

Encyclopedia of Seas

Igor S. Zonn  
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Aleksandr V. Semenov

# The Eastern Arctic Seas Encyclopedia



Springer Reference

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# Encyclopedia of Seas

This *Encyclopedia of Seas* series is designed to accumulate and systematize our knowledge about the unique natural water areas – the Aral, Caspian, Black, Arctic, Far-Eastern, and Baltic seas – their wealth, the events that took place on its waters and shores, and the remarkable people whose lives were and are closely intertwined with the seas. The Encyclopedia series contains thousands of terms and concepts related to the seas. It describes geographical features: rivers, lakes, straits, and bays; provides information about towns, seaports, transport communications, basic aquatic biological species, nature reserves, national and international programs for the study of the sea, research institutes, historical monuments, activities of prominent explorers and travelers, researchers, and scientists. Each Encyclopedia includes a chronology of major historical events connected with these seas for several centuries.

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# The Eastern Arctic Seas Encyclopedia

With 200 Figures





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ISBN 978-3-319-24236-1      ISBN 978-3-319-24237-8 (eBook)  
ISBN 978-3-319-24238-5 (print and electronic bundle)  
DOI 10.1007/978-3-319-24237-8

Library of Congress Control Number: 2016953630

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Printed on acid-free paper

This Springer imprint is published by Springer Nature  
The registered company is Springer International Publishing AG  
The registered company address is : Gewerbestrasse 11, 6330 Cham, Switzerland

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## Acknowledgment

We would like to thank the editors at Springer-Verlag for their timely interest in the Arctic seas and their support of the present publication. We would like to thank Springer-Verlag for the steady interest toward the Arctic Ocean, which resulted in a significant list of book publications (in chronological order since 2010 only):

- Ferguson SH, Loseto LL, Mallory ML, editors. A little less Arctic. Top predators in the world's largest Northern Inland Sea, Hudson Bay. 2010.
- Johannessen OM, Volkov VA, Pettersson LH, Drange H, Gao Y, Maderich VS, Neelov IA, Nielsen SP, Bobylev LP, Stepanov AV, Zheleznyak MJ, Tishkov V. Radioactivity and pollution in the Nordic seas and Arctic. Obs. Model. Simul. 2010.
- Hovelsrud GK, Smit B, editors. Community adaptation and vulnerability in Arctic regions. 2010.
- Barr S, Lüdecke C, editors. The history of the International Polar Years (IPYs). 2010.
- Gutman G, Reissell A, editors. Eurasian Arctic land cover and land use in a changing climate. 2011.
- Wasum-Rainer S, Winkelmann I, Tiroch K, editors. Arctic science, international law and climate change. Legal aspects of marine science in the Arctic Ocean. 2012.
- Marchenko N. Russian Arctic seas. Navigational conditions and accidents. 2012.
- Lemke P, Jacobi H-W, editors. Arctic climate change. The ACSYS decade and beyond. 2012.
- Østreng W, Eger KM, Fløistad B, Jørgensen-Dahl A, Lothe L, Mejlaender-Larsen M, Wergeland T. Shipping in Arctic waters. A comparison of the northeast, northwest and trans polar passages. 2013.
- Berkman PA, Vylegzhanin AN, editors. Environmental security in the Arctic Ocean. 2013.
- Max MD, Johnson AH, Dillon WP. Natural gas hydrate – Arctic Ocean deepwater resource potential. 2013.
- Rösel A. Detection of melt ponds on Arctic sea ice with optical satellite data. 2013.

- Weiss J. Drift, deformation, and fracture of sea ice. A perspective across scales. 2013.
- Müller DK, Lundmark L, Lemelin RH, editors. New issues in polar tourism. Commun. Environ. Polit. 2013.
- Tedsen E, Cavalieri S, Kraemer RA, editors. Arctic marine governance. Opportunities for transatlantic cooperation. 2014.
- Grebmeier JM, Maslowski W, editors. The Pacific Arctic region. Ecosystem status and trends in a rapidly changing environment. 2014.
- Weidemann L. International governance of the Arctic marine environment. With particular emphasis on high seas fisheries. 2014.
- Evengård B, Nymand Larsen J, Paasche Ø, editors. The new Arctic. 2015.
- Kroner U. The geology of the Arctic. 2015.
- Keupp MM, editor. The northern sea route. A military and business analysis. 2015.
- Kallenborn R, editor. Long-range transport of man-made Contamination into the Arctic and Antarctica. 2016.

We are very grateful to Academician Gennadiy G. Matishov, the Chair of the Southern Scientific Center of the Russian Academy of Sciences, Director of the Murmansk Marine Biological Institute RAS, and to Sergey L. Dzhenyuk, Senior scientist at the Murmansk Marine Biological Institute, for their review of the part of the manuscript related to the East Siberian Sea, valuable comments, and careful editing, which made the text more complete and accurate.

We express special thanks to Elena V. Kostyanaya (Oceanological Scientific-Coordination Centre at P.P. Shirshov Institute of Oceanology RAS) for the time she lavishly spent on the search and selection of materials for various articles of the Encyclopedia, as well as to Dr. Sergey M. Shapovalov, the Head of the Oceanological Center and Vice-President of SCOR, for supporting our efforts to create encyclopedias of the Russian seas.

Invaluable assistance in the preparation of the Encyclopedia was done by Tatyana I. Abakumova, whose endless patience and professionalism allowed to bring this work to completion.

The authors would like to offer a special thanks to the “Integrated Training Centre” for translating the Encyclopedia into the English language and ensuring accuracy and top-notch quality of the offered translation. Specifically, we are grateful to Helen Panovich, the company’s director; to Sergey Chelnokov, Project Manager and Chief Translator and Editor; and to the translators: Irina Champuridze, Dmitry Glushenko, Gennady Golovin, Polina Ivkova, Polina Kiseleva, Yulia Kurganova, Daria Raskova, Ekaterina Tatarenko, and Daria Turkina. Without your contributions and tedious work, the publication of the Encyclopedia would not have been possible.

The authors express their deep gratitude to the leadership of the S.Yu. Witte Moscow University, charitable foundation “CREATION XXI Century” and to Nikolai G. Malyshev, the Chairman of its Board of Trustees, for financial support of translation and preparation of the manuscript.

The work on “The Eastern Arctic Seas Encyclopedia” was supported by the Russian Science Foundation under the project N 14-50-00095.

Moscow, Russia  
9 May 2015

Prof. Igor S. Zonn  
Prof. Andrey G. Kostianoy  
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## Introduction

“The Eastern Arctic Seas Encyclopedia” is the fourth one in the new series of encyclopedias about the seas of the former Soviet Union published by Springer-Verlag. The first volume “The Aral Sea Encyclopedia” was published by Springer in 2009, “The Caspian Sea Encyclopedia” in 2010, and “The Black Sea Encyclopedia” in 2015. We have to note that in 2004–2015, in Russian edition we published 13 volumes of the encyclopedias for every sea of the former Soviet Union. Springer publishes the updated and upgraded versions of these books in English by compiling several seas in one volume for the present “The Eastern Arctic Seas Encyclopedia” for the Laptev Sea, East Siberian Sea, and Chukchi Sea, and for the next volumes to be published in 2015–2016: “The Western Arctic Seas Encyclopedia” for the Barents Sea, White Sea, and Kara Sea; “The Far Eastern Seas Encyclopedia” for the Sea of Japan, Sea of Okhotsk, and Bering Sea. The last book “The Baltic Sea Encyclopedia” will appear as a separate volume in this book series.

The Eastern Arctic seas of the Arctic Ocean include the Laptev, East Siberian, and Chukchi seas. These are transit marginal seas of the Arctic Ocean, located on the Northern Sea Route. In the west, these seas border with the Western seas of the Russian Arctic and, in particular, with the Kara Sea. In the east, where the Chukchi Sea is connected to the Bering Sea through the Bering Strait, there is a state border between Russia and the United States. In the Eastern Arctic seas, there are a number of large islands – New Siberian Islands, Anjou Islands, Lyakhovskiy Islands, Medvezhii Islands, Wrangel Island, Ayon Island, Gerald Island, etc. Several rivers run to the seas, among them one of the largest Siberian rivers – the Lena, as well as Khatanga, Olenyok, Yana, Anabar, Indigirka, Kolyma, and Alazeya rivers.



The Eastern Arctic seas ([http://upload.wikimedia.org/wikipedia/commons/5/58/East\\_Siberian\\_Sea\\_map.png](http://upload.wikimedia.org/wikipedia/commons/5/58/East_Siberian_Sea_map.png))

These seas are one of the most severe and coldest Arctic seas due to their high-latitude location and the presence of polar ice caps, which cover the seas from October to May–June. Shores are strongly indented, and although there are bays they are shallow and there is a lack of sheltered anchorage areas. Their main purpose is transit. The only significant ports are Tiksi, Pevek, and low-density port Ambarchik. Severe nature, sparse population, and remoteness from the central regions of Russia significantly limit the ability of the economic use of these seas.

Exploration of the shores of the Eastern Arctic seas started in the seventeenth century, when the Russian Arctic navigators and explorers went on the koch boats along the coasts between the rivers Lena and Kolyma, in other words, when Russians advanced along the Great Northern Sea Route to Eastern Siberia. In 1633, Tobolsk Cossacks Ivan Rebrov and Ilya Perfiliev discovered the Olenyok River mouth, and in 5 years they also discovered Yana Bay. Ivan Rebrov was the first who passed Dmitry Laptev Strait. In 1642, Cossack Mikhail Stadukhin with a group of servitors and industrial people on koch boats reached the Alazeya River, and in the next year the mouth of the Kolyma River. There is no doubt that Russian Cossacks and explorers first saw the islands lying along the coasts of the East Siberian Sea. In 1646, the pioneer of the East Siberian Sea, Pomor Isay Ignatiev, on his koch boat for the first time in history of Russian navigation moved from the mouth of the Kolyma River to the east and explored about 300 km of the North Asian coast and Ayon Island. In 1648, two Russian sailors Semen Dezhnev and Fedot Popov first rounded the extreme north-eastern point of Asia and proved the existence of the passage from the Chukchi Sea to the Bering Sea, or from the Arctic Ocean to the Pacific Ocean.

In 1712, Cossack Merkuriy Vagin reached by the sea Bolshoy Lyakhovskiy Island, traveled in it, and saw Malyi Lyakhovskiy Island from its northern coast. Among the pioneer explorers of the Laptev Sea were G. Semenov, I.E. Erastov, V.E. Bugor, I. Lyakhov, Ivanov Postnik, E.Yu. Buza, and M.V. Stadukhin. The Fifth Detachment of the Great Northern Expedition (Second Kamchatka Expedition) described the coasts from the Yana River to the east from 1735 to 1742. They were P. Lasinius and then A. Lozhkin, D.Ya. Laptev, and Kh.P. Laptev.

In 1762–1766, N. Shalaurov tried to find the sea passage from the Lena and Kolyma mouths around Chukotka, but died with the crew of his ship near Chaun Bay. In 1787, the North-Eastern astronomical expedition headed by I. Billings and G. Sarychev on two small boats tried to pass the East Siberian Sea from the Kolyma River along the northern coast of Chukotka, but was able to pass only to Cape Bolshoy Baranov.

The outstanding efforts in the investigation of the Eastern Arctic seas and islands belong to Russian sea explorers: V. Bering, O.E. Kotzebue, Ya. Sannikov, M.M. Gedenshtrom, Admiral P.F. Anjou, M.N. Vasiliev, G.S. Shishmarev, A.A. Bunge, E.V. Toll, A.V. Kolchak, F. Wrangel, N.A. Begichev et al., and later to Soviet geographers, oceanographers, and geologists I.P. Tolmachev, B.V. Davydov, G.A. Ushakov, and G.E. Ratmanov. Among foreign explorers and travellers – Englishmen James Cook, C. Clerke, F. Beechey, and H. Kellet; Americans T. Long and G.W. De Long; Canadian V. Stefansson; and many others.

During the First International Polar Year, first meteorological station was operating in 1882–1884 at Sagastyr Island in the Lena River mouth, and only in 1932 a permanent polar meteorological station was opened in Tiksi, which is still active today. The same year another polar meteorological station was organized on Kotelnyi Island.

In 1878, a well-known Swedish polar explorer A.E. Nordenskjöld travelled by sea from the Atlantic to the Pacific Ocean along the northern coasts of Europe and Asia on the “Vega” ship. A part of his travel passed via the Eastern Arctic seas, where he made regular meteorological and oceanographic observations.

In 1893, an outstanding Norwegian polar explorer F. Nansen, in his attempt to reach the North Pole on the “Fram,” entered the Laptev Sea, and northward from Kotelnyi Island started his drift to north-west. In 1918, heavy ice fields in the Laptev Sea stopped the “Maud” ship of another outstanding Norwegian polar explorer R. Amundsen, who traveled by the North-Eastern Passage with the aim to repeat the voyage of F. Nansen.

In the twentieth century, refinement of geographical maps was made on the basis of astronomical works by K. Vollosovich (1909), G. Sedov (1909), and on the basis of the hydrographic expedition to the Arctic Ocean on the ships “Taymyr” and “Vaigach” (1911–1914). The first nonscheduled cargo cruises were launched in 1911, the so-called Kolyma operations from Vladivostok to Kolyma.

During the Soviet period, the systematic exploration and development of the Far North and the Northern Sea Route began. After the passages of icebreakers “A. Sibiryakov” (1932), “Chelyuskin” (1933), and “F. Litke” (1934) through the Northern Sea Route in the East Siberian Sea, there were

conducted voyages of ships and numerous expeditions on the icebreakers “Krasin” (1935), “Sedov” (1937), “Malygin” (1939–1940), and “North Pole”(1946).

During the Great Patriotic War (1941–1945) transportation across the Northern Sea Route as well as passage of warships of the Pacific Fleet in the northern theater of war were carried out. A large amount of military and cargo transportation was done through the Arctic ports Pevek, Ambarchik, and Tiksi.

Each Arctic Sea has its own historical tragedy, including the Eastern Arctic seas. In 1901–1902, in the Laptev Sea dramatic events happened with the expedition of Baron E. Toll who tried to find the legendary Sannikov Land on the schooner “Zarya” and died in the Arctic.

Several ships were lost in the East Siberian Sea: an American schooner “Elizif” in 1929, “Revolutionary” in 1933, “Mossovet” in 1947, and “Vitimes” in 1965. The steamer “A. Sibiryakov” performed a very hard voyage in 1932, the first in the history of navigation passage of the Northern Sea Route in a single navigation. In 1933–1934, the icebreaker “Krasin” helped the passage of the first Lena expedition to deliver goods to the Far East. In 1938, the icebreaker “Ermak” helped the icebreakers “Sadko” and “Malygin” get free from the ice captivity in the Laptev Sea. In the Laptev Sea, a heroic drift of the icebreaker “G. Sedov” lasted 812 days. Ice crushed the timber ship “Rabochiy” in 1938 and the transport ship “Bryanskles” in 1980. One event of the twentieth century of passing the Northern Sea Route is world-known – the icebreaker “Chelyuskin” was lost in 1934 in the Chukchi Sea. The heroic rescue of its crew became an epic story. In the postwar period (after 1945), the progress in the construction of the icebreaker fleet has allowed to solve problems of the northern delivery of goods, transportation of hydrocarbons, and other essential goods. Currently, it has been decided to expand and modernize the port of Tiksi, located in the Laptev Sea near the mouth of the Lena River, which is the main supply base for all maritime cabotage navigation in the eastern part of the Russian Arctic.

It should be noted that for many years the Eastern Arctic seas were completely closed to free economic activity, and even more so for international shipping. This has affected the poor knowledge of the region and its development. In this regard, we should mention the following expeditions aimed to explore the seas on board of the “Sedov” and “Sadko” ships in 1937, which were led by V.Yu. Vize; in 1980 the hydrological expedition of the Arctic and Antarctic Research Institute on board of the “Akademik Shokalskiy” ship under Ya.Ya. Gakkel leadership, and others. Since 1993, the program “Laptev Sea Ecosystem” has been performed by the Russian-German expedition.

In order to improve the management structure and coordination of search and rescue of people in distress in the waters of the Northern Sea Route, the Marine Rescue Sub-Center (Center in Dikson) was established in Tiksi. It operates during the navigation season (July–October) on a rotational basis.

Oil was discovered in 1933 on the shores of the Laptev Sea. Later there were found several oil fields. Integrated geophysical studies in the Khatanga Bay performed by “Yuzhmorgeologiya” were renewed in 2007. They indicate high oil and gas potential of the Eastern Taymyr. “Rosneft” and “Exxon Mobil” signed an agreement for the exploration of the Ust-Olenyok,



Ust-Lenskiy, and Anisinsko-Novosibirsk deposits in the Laptev Sea, considering them as the most promising ones.

This Encyclopedia is designed to accumulate and systematize our knowledge about the unique natural water areas – the Laptev, East Siberian, and Chukchi seas – their wealth, the events that took place on its waters and shores, and the remarkable people whose lives were closely intertwined with the seas.

The Encyclopedia contains about 1,500 terms and concepts related to the seas. It describes geographical features: rivers, lakes, straits, bays; provides information about towns, seaports, transport communications, basic aquatic biological species, nature reserves, national and international programs for the study of the sea, research institutes, historical monuments, activities of prominent explorers and travelers, researchers, and scientists. The Encyclopedia includes a chronology of major historical events connected with the Eastern Arctic seas for more than 400 years.

This Encyclopedia is designed to satisfy the needs of many readers in the knowledge of the history and geography of the Arctic Russia. Anticipating possible comments on the text, we would like to draw the reader's attention to the fact that the present Encyclopedia is the author's approach, especially in the selection of natural and historical facts, which give, in our opinion, the idea of the past and present of the Eastern Arctic seas and their surrounding areas. Thus, we keep the responsibility for possible inaccuracies and alternative interpretation that may arise. Of course, the information given on the pages of the Encyclopedia is not exhaustive.

Many experts have virtually worked on this Encyclopedia; some of them are listed in the bibliography, others – in the online resources listed at the end of the book. The use of these materials unwittingly made them our coauthors.

We acknowledge that the preparation of such an encyclopedia requires gaining information and knowledge from people who live and work on the shores of the Eastern Arctic seas. Unfortunately, this seems to be difficult to achieve. Therefore, we consider this work to be a basis for reflections and preparation of future editions of the Encyclopedia by the interested specialists. We have just tried to piece together multiple, diverse, and often conflicting information about these seas.

# A

## Alaska Blackfish (*Dallia pectoralis*)

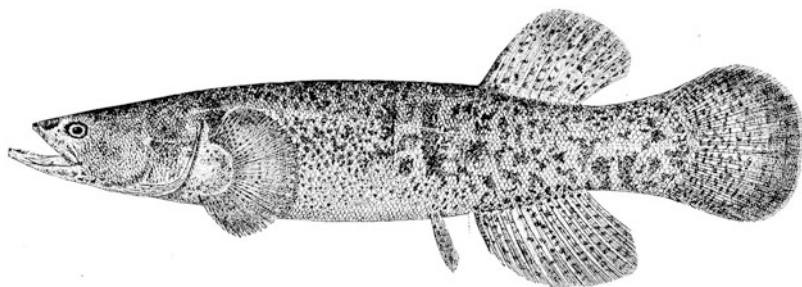
Alaska blackfish (*Dallia pectoralis*) – a fish of the Dallidae family, inhabiting the Chukotka water basin. The body is black and brown. The dorsal and caudal fins are fringed with a thin orange stripe which turns red during the spawning period. The length is 20 cm. The spawning is fractional from May to July. A. B. feeds mostly on wrigglers. In winter it digs into silt and often gets frozen into the ice, staying alive for a long period, but still dying in significant amounts. It is not important for trade and industry.

## Alaska Maritime National Wildlife Refuge (AMNWR)

Alaska Maritime National Wildlife Refuge (AMNWR) – established in 1980 by the decision

of the US Congress to conduct national and international scientific research of marine resources. It was organized to protect marine mammals, marine, and other migratory birds. It is composed of 2,400 islands, headlands, cliffs, islets, rocks, and reefs of Alaska with a total area of 20,000 km<sup>2</sup>, of which 10,700 km<sup>2</sup> are inhabited by wildlife. The refuge extends from Cape Lisburne to the Chukchi Sea, to the end of the Aleutian Islands in the west and from Forrester Island in the southern part of Alaska Peninsula to the east. Here are various forms of landscapes and territories, including tundra, volcanoes, cliffs, beaches, lakes, and rivers. The refuge is well known for the abundance of seabirds. Here are 75 % of Alaskan seabirds – from 15 to 30 million of 55 various species. Forty millions of seabirds accounting for 80 % of all seabirds in North America inhabit this area. Sea lions, seals, walruses, whales, and otters are also present. The administration of the refuge is located in the city of Homer, Alaska.

Alaska blackfish (Source:  
[https://en.wikipedia.org/wiki/Alaska\\_blackfish#/media/File:Dallia\\_pectoralis\\_\(line\\_art\).jpg](https://en.wikipedia.org/wiki/Alaska_blackfish#/media/File:Dallia_pectoralis_(line_art).jpg))





Alaska Maritime National Wildlife Refuge (Source: <http://www.thearmchairexplorer.com/alaska/alaska-maritime-nwr>)

## Alaska Stationary Ice Lead

Alaska stationary ice lead – formed between the drift ice and the shore ice in periods of continuous southeastern winds which keep the drift ice away from the mainland coast of Alaska.

## Alaska, State

Alaska, State – (derived from the Indian word meaning “Great Land,” formerly known as Aleutia, American Siberia, Morzhovia, Polaria, and other names, but eventually the name Alaska was acknowledged). The former Russian America, since 1959 the 49th state of the USA in the northwest extremity of the North American continent, separated from the rest of the USA by the territory of Canada (Yukon and British Columbia territories). It was formed on the territory of the Russian America. From the day of its purchase from the Russian Empire in 1867 to the year of

1959 it had a status of “a territory.” The area is 1.5 million km<sup>2</sup>, the largest state of the USA. It consists of a mainland part and a large number of islands (the Alexander Archipelago, the Aleutian Islands, the Pribilof Islands, Kodiak Island, etc.). Alaska is washed by the Arctic Ocean (the Chukchi Sea, the Beaufort Sea) and the Pacific Ocean (the Bering Sea). The Pacific coast is skirted with high mountain ranges (McKinley peak being the highest – 6,193 m high) and covered with coniferous forests of great value. The inner part presents highlands 1,200 m high in the east and not more than 400 m high in the west. Closer to the west the highlands turn into coastal lowlands and in the north are fringed with the Brooks Range. This is the so-called Alaska North Slope.

Alaska lies within the geologically active Pacific Ring of Fire which accounts for earthquakes and volcanic eruptions (the year 1964 here saw the second most powerful earthquake in the world). Most landscapes are molded by numerous glaciers.

The most important rivers are the Yukon, which is navigable and rich in waterpower, and

Alaska State: climate zones

(Source: [https://en.wikipedia.org/wiki/Alaska#/media/File:Alaska\\_climate\\_regions\\_USGS.gif](https://en.wikipedia.org/wiki/Alaska#/media/File:Alaska_climate_regions_USGS.gif))



A

the Kuskokwim. The rivers are abundant in fish – Chinook salmon, red salmon, Arctic grayling, halibut, rainbow trout, Arctic char, etc. Alaska has more than three million lakes.

Indigenous population is the Indians (the Tsimshian, Athapaskan, Eyak, Tlingit, and Haida tribes) and the Inuits or Eskimos (the Inupiat, Alutiiq, Aleut, and Yupik tribes). Around 16 % of the population consider themselves the descendants of the indigenous peoples. The administrative center is Juneau (since 1990). The population is 650,000 people with the biggest concentration in the southern and southeastern part of Alaska. The main cities are Anchorage (where half of the state's population lives), Fairbanks, Sitka, and Ketchikan.

The climate in the northern and central areas is cold, winter lasts for 6–8 months, and the vegetation presents tundra and woodlands. South, southwestern, and southeastern parts are coastal; there are many islands and convenient non-freezing bays.

The fauna is abundant: elk, jackass deer, caribou, musk ox, tundra wolf, polar fox, polar bear on the Arctic ocean coast, lemmings, blue hare, various birds, American black bear, grizzly bear and Kodiak bear, sable, lynx, mink, marten, hoary marmot, Dall sheep, etc. American eagle, the symbol of the USA, is well appreciated among them. Alaska Bay, the Bering Sea, and the Arctic

Ocean are home to various mammals: sea lions, seals, sea otters, killer whales, humpback whales, sea bears, walruses, etc.

According to many specialists, remote ancestors of the modern natives came to Alaska from North-Eastern Asia between 30,000 and 12,000 years ago crossing the isthmus which lay in place of the Bering Strait. Today around 70 % of the inhabitants are comers from other places who have chosen this state on their own free will. About 16 % of them are representatives of indigenous peoples; the majority of the others are European descendants.

Alaska was discovered in the first half of the eighteenth century by Russian explorers. In 1784 the first permanent Russian settlement was founded on Kodiak Island. Russian colonists who inhabited the settlements mostly along the Pacific coast were involved in fur trapping, ship-building, and various crafts. Global expeditions organized by the Russian-American Company (there were 13 expeditions in the period from 1804 to 1840) ensured regular connection between Alaska and Russia. In 1854 the Russians started coal deposits exploitation here.

During the Crimean War (1853–1856) the Russian Empire did not have the necessary forces in the Pacific to defend and maintain its settlements in North America. For this reason it was decided to sell Alaska under the contract of March

18 (30), 1867 at the price of 7.2 million dollars. The US Senate ratified the contract with the majority of a single voice. At the moment Alaska was called “Uncle Sam’s Attic,” “Walrussia,” and “Seward’s Icebox” (after the name of the US State Secretary who supported the idea of the purchase of Alaska.)

At the end of 1890s the discovery of gold in the neighboring area of Canada (Klondike), the central part of Alaska and the Seward Peninsula caused “the gold rush” which stimulated the growth of settlements in the inner part of Alaska. The period between 1911 and 1938 witnessed the copper deposits development in Alaska in the Copper River basin. In 1915–1923 a new railway connected the coast with the central part of Alaska. By the beginning of the twentieth century, the economic specialization of Alaska had been established: fish and fur as well as precious metals extraction.

Today Alaska is closely associated with oil, fish, and tourism. Most of the hydrocarbon reserves (circa 48 billion barrels of oil) are situated in the Alaska North Slope. A unique oil and gas field Prudhoe Bay which was discovered on the shore of the Beaufort Sea in 1968 with the reserves of 10 billion barrels of oil and 27 trillion cubic feet of gas became a symbol of the state’s prosperity and success. Alaska accounts for a fourth of all the oil production in the USA; 9/10 of the state’s yield comes from the “black gold.” In 1977 within the period of 3 years Alaska acquired a Trans-Alaska Pipeline system about 1,280 km long connecting Prudhoe Bay and the port of Valdez, the Gulf of Alaska. The cost of its construction comprised 7.7 billion dollars, which is 1,000 times as much as the cost of Alaska when it was purchased from Russia.

The traditional enterprises in Alaska, commercial fishing (biggest in the world) and seafood processing, account for about a half of Alaska’s gross output (salmon fishes, herring, codfish, flounder, crabs, etc). Fishing is a favorite sport in Alaska whose inhabitants call fish “their past, their present, and their future.” The main export item is salmon fishes. Alaska possesses one of the last schools of wild salmon in the world, which is

valued more than that artificially bred in Chile, Norway, Scotland, etc.

The mining industry is represented by zinc (in Kotzebue area) and gold (in Fairbanks area) production. Tourism is extremely well developed (Alaska welcomes around one million tourists annually due to its hunting and fishing attractions) giving occupation to a significant part of the population. Another sphere which is developed is reindeer breeding. The climate is quite severe, that is why only potatoes, cabbages, and carrots are grown on the field; all the rest is grown in greenhouses. There is dairy cattle husbandry in Alaska. The widest spread means of transport are hydroplanes, snow scooters, and cross-country vehicles.

Alaska is connected with Seattle and other US Pacific ports by water. Seward used to be the main port, but during the World War II, the port of Whittier was built, and now it guarantees convenient connection with the inner parts of Alaska. Seward and Fairbanks are linked by the State Alaska Railroad. There are a number of convenient highways, the main being called “Alaska.” It is 2,224 km long and connects Fairbanks with the city of Dawson Creek (Canada). It was built within the period of 8 months and 12 days. The Yukon River plays some role in navigation. Important airlines connecting the USA with the Eastern countries intersect Alaska.

Alaska has a large number of the US airfields, air force, and naval bases. In 1997 Gakona saw the launch of an aurora research project HAARP (High Frequency Active Auroral Research Program). Specialists call it a geophysical or climatic weapon of the USA. Another station called HIPAS is situated not far from Fairbanks.

Alaska annually holds sled dog races along a 1,700 km route from Anchorage to Nome, which was approved by the US Senate. Sled dog races are a national sport in the USA.

Alaska is home to 15 natural reserves and parks with the total area of 218,000 km<sup>2</sup>. Alaska itself is called a natural reserve of the USA. The largest conservation area is Denali Park (formerly called McKinley), established in 1917 and lying in the very center of the state. Another national park is Katmai (“The Valley of Ten Thousand Smokes”).



It is a territory of active volcanism. The historic national park in Sitka keeps the biggest collection of the northern totem poles.

The Russian period deeply influenced the culture of Alaska. A significant part of its native population still practices orthodoxy. Sitka (former Novoarkhangelsk) has quite a large population of Russian origin. St Michael's Cathedral is also situated here. To commemorate the times of the Russian America, Alaska annually celebrates Alaska Day in October 18. This state holiday yearly reconstructs the Russian atmosphere in Alaska. Anchorage museum boasts of many artifacts from the Russian everyday life of the nineteenth century.

## Alaska-Siberian Air Road, "ALSIB"

Alaska-Siberian Air Road, "ALSIB" – an abbreviated name of a complicated air road Alaska

(Fairbanks, USA) – Siberia (Chukotka-Yakutia-Krasnoyarsk), built on the resolution of the USSR State Defense Committee in October 1941 which stipulated the lend-lease deliveries of the US aircraft to the Red Army starting from 1942 (after the tragedy with the polar convoy PQ-17). The total length of the route is 14,000 km, from the assembly point in Great Falls, Montana (where the aircraft constructed on various American plants were ferried) through Canada, Alaska, the Bering Strait to Chukotka and then to Krasnoyarsk. The planes were ferried by the pilots of the 7th ferry group of the US Air Force. The USSR received 8,000 planes, including 5,000 fighter planes Bell P-39 "Airacobra" and P-63 "Kingcobra," more than 2,000 bombers A-20 "Boston" and B-25 "Mitchell," and 710 transport airplanes C-47 "Douglas." In Fairbanks the aircraft were checked by the Soviet defense representatives after which the planes were transferred to the contingent of the First Aviation Ferry Division named after the Red Banner. The last US aircraft crossed the



Alaska-Siberian Air Road (Source: [http://bravo369.net/wp-content/uploads/2014/04/Alsib\\_route\\_map.jpg](http://bravo369.net/wp-content/uploads/2014/04/Alsib_route_map.jpg))

Bering Strait in September 1945. During the ferrying process, 115 pilots and technicians from the Soviet side died and almost the same number of people on the Canada-Alaska part of the route died from the American side. On the American and Asian areas of the route, 2 planes out of a 100 got lost. The “A.” story was first fully made public after the release of a Russian feature film “Transit” (2006).

## Alazeya

Alazeya – a river in the northeastern part of the Sakha Republic (Yakutia), Russia. Its two arms flow into the East Siberian Sea creating a bar. The length is 973 km and the basin area is 70,000 km<sup>2</sup>. Its several sources originate in southern Alazeya Plateau. At the mouth the river falls into several arms. Its lower part flows through the tundra. The bed is meandering. The Alazeya is fed by rain and snow. Average water flow rate in the mouth comprises 320 m<sup>3</sup>/s. The river breaks up at the end of May to the beginning of June and freezes at the

end of September to the beginning of October. The biggest tributary is the Rossokha river (left). The drainage area includes more than 24,000 small lakes. The Alazeya was the place where Russian pioneering explorers first met the Chukchi people in 1642.

## Allies of Russia

Allies of Russia – was a medal established under the decree of Alexander I on August 15, 1806. The head side represents the Russian state coat of arms – a double-headed eagle gripping the scepter and the ball. Over the eagle’s head is the crown of the Russian Empire and on its breast is a shield with the monogram of Emperor Alexander I. The tail side bears an inscription “Allies of Russia.” The medal was basically awarded to chiefs of North American Indian tribes, the Aleutians, and the Eskimo as a state sign of allegiance to the Russian Empire. The award ceremony was the responsibility of the Russian-American Company.



Alazeya River (Source: [https://en.wikipedia.org/wiki/Alazeya\\_River#/media/File:Siberia\\_Alaz.png](https://en.wikipedia.org/wiki/Alazeya_River#/media/File:Siberia_Alaz.png))

## ALSIB

ALSIB – See Alaska-Siberian Air Road.

## Ambarchik

- (1) A bay in the eastern Kolyma Gulf in the East Siberian Sea by the mouth of the river Kolyma between Cape Stolbovoy and Cape Medvezhiy (Tonkiy), the Sakha Republic (Yakutia), Russia. The border between Yakutia and Chukotka Autonomous District lies in the vicinity of the bay. Ambarchik Bay is open to the north and goes 3 km deep into the mainland. At the entrance its width is about 7 km and the depth is 4 m. From October to July it is frozen. The Kolyma River flows into it. To the east of the bay, there is Zaliv (Gulf) Medvezhiy and to the west is Bukhta (Bay) Troyana, also known as Chayachya. By Cape Stolbovoy the bay joins the mouth of the Kolyma River (Protoka Kamennaya Kolyma). The shore has tundra vegetation and is predominantly low with steep areas. The bay was described by the participants of the Great Northern Expedition of 1733–1743. In 1740 D. Laptev built a barn for keeping stores here which gave name at first to the bay and then to the port (the Russian word for “a small barn” is “ambarchik”). In the eastern part of the bay there is a settlement named Ambarchik which is home to a polar station.
- (2) A port settlement in the northeastern extremity of Yakutia. It is situated on the shore of Ambarchik Bay on the eastern side of the river Kolyma mouth to the west of Chukotka Autonomous District and to the south of the East Siberian Sea. Not far from it there is a runway for helicopters and transport aircraft. It lies in the Northern Sea Route.

In 1932 “enemies of the people,” mostly former “kulaks” (wealthy peasants), were brought here by means of the Kolyma from Vladivostok. By 1935 the population had grown up to several

thousand people. It was not a settlement, but a “Dalstroy” camp, which was an industrial subdivision of GULAG. The same year saw the establishment of the most important hydro-meteo station to observe this region of the Arctic as well as a transit prison for political prisoners. Some remains of GULAG entangled by the rusty barbed wire can still be found here. Ambarchik settlement is home to a monument to the victims of political repressions and Abramchik Bay, with the memorial sign “Wind Rose” commemorating G. Y. Sedov.

It is a seaport situated close to the mouth of the Kolyma River at the junction of sea and river routes. The location of the port was determined by the presence of Zyryanskoe coal deposit at the upper Kolyma. The construction of the port began in mid 1930s. In late 1930s the port had three piers, five dock tugs, working shops for minor repair of vessels, electricity supply, etc. Thus it became the first port of the East Siberian Sea. However the shallow waters prevented sea vessels from approaching the port at less than 10 km, which hindered the loading processes. As soon as the end of the World War II (year 1953), the port was closed because of sea shallowness.

In 2011 the station was inhabited by six people. The port no longer exists but some vessels cast their anchors in Ambarchik Bay.

## Amguema

- (1) A river flowing into the Chukchi Sea, Chukotka Autonomous District, Russia. The length is about 500 km; the basin area is 28,100 km<sup>2</sup>. Originating in Chukchi Plateau, it flows mostly in a wide waterlogged valley. In the upper areas it is stepped. Average duty of water in lower reaches is 276 m<sup>3</sup>/s, the flow is 9.3 km<sup>3</sup>. Average annual water turbidity is up to 75 g/m<sup>3</sup>. There are many lakes in the Amguema’s basin area. The origin of the river’s name is purely Chukchi. The most precise spelling of the name was presented by N. Daurkin, the participant of I. Billings’ expedition at the end of the eighteenth



Amguema River (Source: [https://en.wikipedia.org/wiki/Amguema\\_River](https://en.wikipedia.org/wiki/Amguema_River))



century. Afterward the cartographers accepted a slightly distorted spelling proposed by I. Billings, that is, “Amguema,” derived from the word “amguyan.” This is the variant that can be seen on modern maps.

- (2) A lagoon to the south-east of Tankargynpilgyn Lagoon that is linked to it by a dry creek. The lagoon is separated from the Chukchi Sea by a mixed sand and shingle spit called “Kosa Dvukh Pilotov.” It still keeps many old barrels and bricks that have remained from the former settlement Takokagyn. The Amguema River flows into the top of the lagoon forming a forked delta. The lagoon is connected to the sea by a passage 3,6 km wide. Most of it presents huge drying sand shoals. At the extremity of the spit the depth is 7–13 m.
- (3) A settlement in Chukotka Autonomous District, Russia, on the right bank of the river of the same name with the population of about 600 people. Reindeer breeding is developed. People observe traditional patterns of life.

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### Amosov, Fedot (?-?)

Amosov, Fedot (?-?) – a pomor. Searching for islands in the East Siberian Sea in 1723, he traveled for more than 200 km along the mainland coast to the east of the Kolyma River mouth. In 1724 he set off on a dog sledge from Nizhnekolymsk northward and reached one of the Medvezhyi Islands, more likely, Krestovsky Island, which he circled and saw two more islands behind it.

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### Amundsen, Roald (Rual) Engelbregt Gravning (Amundsen Rual) (1872–1928)

Amundsen, Roald (Rual) Engelbregt Gravning (Amundsen Rual) (1872–1928) – a Norwegian scientist, polar explorer and traveler, the first polar navigator to circumnavigate the world, the

discoverer of the South Pole, and the first man to reach both Poles and to sail round all the Arctic Ocean shores. In 1890–1892 he studied medicine at the University of Kristiania (now Oslo, Norway). Beginning with 1894 he served as a seaman and a navigation officer on several ships. In 1897–1899, as a navigation officer on board the “Belgica” ship, he participated in the Belgian Antarctic Expedition led by Adrien de Gerlache de Gomery who discovered a strait later named after him (de Gerlache Strait) and the Danco Coast. In 1901 Amundsen became a sea captain. In 1903–1906, accompanied by his fellow travelers on board the sail and motor yacht “Gjøa,” he successfully traversed the Northwest Passage from the east to the west via the straits of the Canadian Arctic Archipelago from Greenland to Alaska. The crew spent three winters in the sea. In 1907 Amundsen visited Russia, where he made a report at the meeting of the Russian Geographical Society commemorating his Northwest Passage expedition. Amundsen explored the shores of several islands of the Canadian Arctic Archipelago. In 1909 he was preparing for a long drift on board Fridtjof Nansen’s ship “Fram” in the Polar Basin but later decided to reach the South Pole of which he informed his crew at sea only in January 1911. Having landed at the Bay of Whales (the Ross Ice Shelf), Amundsen and four of his fellows reached the South Pole in dog sledges and planted a Norwegian flag there 34 days ahead of the Englishman R. Scott and his crew.

On returning from the Antarctic, Amundsen planned to repeat the drift of another Norwegian polar explorer, Fridtjof Nansen, again on board the “Fram.” Nansen’s expedition lay through the Arctic Ocean and the Northern Sea Route along the Eurasian shores. In 1918 Amundsen’s expedition left Norway on a specially built ship named “Maud,” twice (in 1918 and 1919) stayed for winter at Cape Chelyuskin in the Laptev Sea and once (in 1919–1920) at Ayon Island in the East Siberian Sea. In 1920 the expedition reached the Bering Strait, thus having traversed the Northeast Passage in 3 years. This was the third successful passage in history. In course of the expedition in the Arctic Ocean much research was done. Amundsen did not study the collected materials

himself but passed them to F. Nansen and other scientists.

He was one of the first to come up with an idea to use airplanes for the Arctic research and was the first in Norway to obtain a pilot license. In 1921–1924 Amundsen was raising money and preparing for flights to the North Pole. In 1925 he and his fellows set off from the Svalbard Archipelago in two planes. However, one of the planes crashed and the expedition returned. In 1926 Amundsen led the first transatlantic flight across the North Pole in the airship “Norge” heading from Spitsbergen to Alaska. Among the participants were the aeronautical engineer U. Nobile and the American millionaire L. Ellsworth. In 1927 Amundsen traversed Russia by means of the Trans-Siberian railway on his way back to Norway from Japan. In 1928 in an attempt to rescue U. Nobile’s expedition which crashed in the Arctic Ocean on board the airship “Italia,” Amundsen set off on the flying boat “Latham” and was killed in a crash with all his crew presumably in the Barents Sea. In Russia Amundsen



Amundsen Roald Engelbregt Gravning (Source: [http://en.wikipedia.org/wiki/Roald\\_Amundsen](http://en.wikipedia.org/wiki/Roald_Amundsen))

was referred to as “a Viking of the twentieth century” and he called himself “a crusader of Arctic research”.

Vadsø Island, Norway, preserves an exposition “Airships and Vessels” dedicated to the North Pole expeditions on the airships “Norge” and “Italia” (1926–1928). There is a mast for an airship mooring process preserved of the island.

There are monuments to R. Amundsen in Tromsø and in Oslo. Besides Umberto Nobile initiated the erection of a monument commemorating the deceased members of the expedition on board the airship “Italia” in 1928 and those who died rescuing the expedition. Among those killed in the crash on June 18, 1928 are Rual Amundsen, René Guilbaud, Leif Dietrichson, Albert Cavelier de Cuverville, Gilbert Braze and Emile Valette) who lost their lives in the Barents Sea performing a self-sacrificing flight to rescue the survivors of the expedition on board the “Italia.”

In 1974 the garden near the Arctic and Antarctic Research Institute in St. Petersburg, Russia, saw the unveiling of Amundsen’s bust which is a gift of the Norwegian government in the memory of the explorer’s 100th anniversary).

The main books (translated into Russian) are “The First Flight Across the Polar Sea” (1927,

joint authorship), “On board the “Maud,” Expedition along the Northern coast of Asia” (1929), “The South Pole” (1937), etc.

A sea, a bay, a mount, a glacier, and an American research station “Amundsen-Scott” in the Antarctic as well as a basin and a gulf in the Arctic Ocean and an icebreaker in the USA are called after Amundsen.

## Anabar

Anabar – a river in the Sakha Republic (Yakutia), Russia. Its length is 939 km, and the basin area is 100,000 km<sup>2</sup>. Average runoff of water is 610 m<sup>3</sup>/s. The Anabar originates on the Anabar Plateau and flows along a valley with steep shores into the Laptev Sea. In the lower reaches where the Anabar cuts across the North Siberian Lowland, the valley expands. At the mouth in the Laptev Sea the river forms a cone-shaped shallow estuary with numerous shoals (Anabarskaya Guba). The estuary is rich in fish (vendace, Arctic cisco). Russian industrialists and noblemen reached the Anabar in the 1640s. In 1643 the first Russian person to discover the river became a construction

Anabar River (Source:  
[https://de.wikipedia.org/  
wiki/Anabar\\_\(Fluss\)](https://de.wikipedia.org/wiki/Anabar_(Fluss)))



foreman Vasiliy Sychoy, one of the streltsy. His unit was sent to the east of Khatanga by a Mangaseian voivode Ukhtomskiy to consolidate “the new lands” by the Tsar’s authority. The mouth of the Anabar from the sea was discovered in 1648 by a Mangaseian unit under the command of Yakov Semenov who performed his first recorded sea voyage from the mouth of the Kheta River to the river Anabar. The research work at the Anabar was initiated in 1735–1740 by the Lensko-Khatangskiy group of the Great Northern Expedition under the command of lieutenant V. V. Pronchishchev and, after his death, of Kh.P. Laptev. The first instrumental survey was performed in 1898 by a participant of the expedition of the St. Petersburg Academy of Sciences (1893–1894) lieutenant E. I. Shileyko.

## Anabar Bay

Anabar Bay – situated in the western part of the Laptev Sea between the mainland shore and the Nordwick Peninsula. It is 67 km long, 76 km wide, and 3–12 m deep. In the south it merges into Anabarskaya Guba into which the Anabar River flows. On the right shore of Anabar Bay there is Khorgo Mys (Cape Khorgo) adjoined by a sand spit which protrudes into the waters of the

bay for 2 km. On the right shore, there is a low seashore terrace 4–5 m high. Its surface is water-logged. The bay is covered by ice most part of the year. It is called after the river Anabar. The research work at Anabar Bay was initiated in 1735–1740 by the Lensko-Khatangskiy group of the Great Northern Expedition under the command of lieutenant Kh.P. Laptev. A more detailed research was done in 1913–1914 by the participants of the Arctic Ocean Hydrographic Expedition of 1913–1915 on icebreakers “Vaygach” and “Taymyr” under the command of the frigate captain B. A. Vilkitsky.

## Anabarskaya Guba

Anabarskaya Guba – a south part of Anabar Bay. It is called after the river Anabar which flows right into the top of the bay in the Laptev Sea. The length is 24–25 km and the width is 6–7 km. The southern part has many shoals. In the south Anabarskaya Guba merges into Anabar Bay. It was first researched, at least partly, in 1735–1740 by the Lensko-Khatangskiy group of the Great Northern Expedition. Lieutenant E.I. Shileyko, a participant of the 1893–1894 expedition of the Academy of Sciences under the command of E.V. Toll, was the first to describe and map it in 1893.

Anabar Bay (marked in red)

(Source: [https://en.wikipedia.org/wiki/Anabar\\_Bay](https://en.wikipedia.org/wiki/Anabar_Bay))



## "Anadyr"

"Anadyr" – in the early 1950s, such was the cryptonym of I. V. Stalin's operation for accumulating an army of a million people in Chukotka ready to invade Alaska in case of a war conflict with the USA.

## Andreev Land

Andreev Land – a hypothetical island, a phantom island. Was named after the sergeant of geodesy Stepan Andreev who commanded the expeditions of 1793 and 1764 aimed at exploration of the group of the Medvezhiy Islands. It is presumably laid at the distance of 580 km to the northeast of the Medvezhiy Islands. The Medvezhiy Islands (5 islands in total) are situated opposite the Kolyma River mouth. They were first mentioned by Mikhailo Nasedkin. In 1702 he performed a passage from the Kolyma mouth to the Indigirka mouth. He told that he saw some islands on his way. On the map of the northeast of Siberia brought to St. Petersburg in 1726 by the Yakut Cossack Afanasiy Shestakov, there was painted Kopay Island (one of the Medvezhiy Islands) and around 2 days distance from it to the north – a big land. The head of Okhotsk and Kamchatka districts colonel Fedor Plenisner sent two squadrons to explore the islands to the north of the Kolyma mouth. The first was commanded by Cossack Nikolay Daurkin and headed for the Chukchi Peninsula, the second under the command of Sergeant Stepan Andreev – for the Medvezhiy Islands (they were named after the expedition returned). Andreev set off northward on March 4, 1763, from the Nizhnekolymskaya fortress in dog sledges. In April 22, having passed from the Krestovaya River to the Medvezhiy Islands by ice, he visited the five islands of the archipelago and in May 2 returned to the mainland as he had run out of food for dogs. Andreev presented the full report about the circumstances of his travel to Plenisner on May 6, 1763, and attached his diary.

In it Andreev vaguely mentions that he had seen something from the fifth Menvezhiy Island (Chetyrekhtolbovy) "to the south or how they name it here to the midnight." The expedition report was published.

On March 16, 1764, a new expedition under the command of Andreev was launched. The participant set off in dog sledges from Nizhnekolymsk and in April 10 reached the first of the Medvezhiy Islands (Krestovsky) and soon Chetyrekhtolbovy Island. In April 16 Andreev set off to the northeast by sea. In April 22 after about 580 km way away from the fifth Medvezhiy Island, the expedition discovered a large low island (about 100 km) stretching from east to west. Having approached the island but not reached it they saw fresh sledge traces leading to the north. One of the participants fell ill and the expedition turned back. It returned to Nizhnekolymsk on May 8. On 22 September 1794 Andreev presented his report and diary to Plenisner. This expedition report was not published.

All these circumstances caused the appearance of a legend about the AL which had been presumably seen by him to the north of the Medvezhiy Islands. To create detailed description of the AL, I. Leontiev, I. Lysov, and A. Pushkarev organized a special expedition. It started in Tobolsk and headed toward the mouth of the Kolyma and further to the Medvezhiy Islands and the AL. It worked for 3 years, from 1769 to 1771, but never discovered the AL. There is no information on the reasons, as in 1787 most of the archives vanished in a huge fire in Tobolsk.

In May 1810, M. M. Hedenstrom searching for AL moved by ice to the northeast from Bolshoy Baraniy Kamen about 170 km. His further advancement was prevented by a wide ice hole. In 1820 an expedition of lieutenant F. P. Wrangel set off from St. Petersburg "to make a survey of the shores from the Kolyma River mouth eastwards to Cape Shelagskiy and from it northwards to the uninhabited land which, according to the Chukchi people, is not far from there." Having moved 170 km further to the north from the Medvezhiy Islands and 270 km to the northeast



of it, Wrangel did not find any signs of the AL and questioned Andreev's trustworthiness.

The possible reason is that the report and the diary of Andreev's expedition of 1764 had not been published and thus remained unknown to the researchers of the later times who based their conclusions only on the published report of 1763. In his reports and the diary of 1763, Andreev did not mention a land seen by him from the Medvezhyi Islands. He mentioned this only on April 22, 1764, in the journal of his second trip, when he moved at least 570 km from the Medvezhyi Island (and not 270 km).

In Soviet times the scientists made several attempts to find the AL with the help of sea and airships. After some unsuccessful attempts, it was suggested that the AL had existed but had been composed of permafrost soil and fossil ice. So it might have melted just like Vasilyevsky Island and half of Semenovskiy Island (of the New Siberian group of islands) in the Laptev Sea.



Andreev A.I. (Source: [http://qwercus.narod.ru/andreev\\_AI\\_bio.htm](http://qwercus.narod.ru/andreev_AI_bio.htm))

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### **Andreev, Alexander Ignatyevich (1887–1959)**

Andreev, Alexander Ignatyevich (1887–1959) – a Soviet historian, archaeographer, the Arctic Ocean explorer, a specialist in Siberian history, PhD in History (1940), and a professor (1945). He graduated from the History Department of St. Petersburg University in 1916. In the 1920–1930s, he participated in expeditions around Yakutia and the coast of the Kara Sea. In the 1930–1950s, he worked as a researcher in the Institute of History, and the History and Archive Institute. He is the author of many works dedicated to the history of Siberia and Russian North, the history of geographic discoveries in the Arctic and Pacific Oceans, and the history of Russian science, among which are “The Expedition of V. Bering,” “The Role of the Russian Navy in the Geographic Discoveries of the eighteenth and nineteenth to twentieth centuries,” “Letters and Papers of Peter the Great,” and works about

G. I. Nevelskoy, the Laptev brothers, S. P. Krashenninnikov, and many others.

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### **Andreev, Stepan (?-?)**

Andreev, Stepan (?-?) – a sergeant and geodetic surveyor and a researcher of the Medvezhyi Islands. In 1763–1764 he went on two expeditions from the mouth of the Kolyma to the Medvezhyi Islands, mapped them, and made the first topographic sketch. No astronomical position finding was performed. He was the first to find a way to the north of the Medvezhyi Islands to the black space on the map of the East Siberian Sea, where he saw land with the traces of “unknown people” with sledges and reindeer teams. Later this land, named “Andreev's land,” has been searched for by many researchers of the Arctic, but has not been found.

In 1912 the participants of the Arctic Ocean Hydrographic Expedition named one of the

Medvezhyi Islands in the East Siberian Sea after Andreev.

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## Andreeva Island

Andreeva Island – an island from the group of Medvezhyi Islands, the East Siberian Sea, the Sakha Republic (Yakutia), Russia. It is situated in the central part of the Medvezhyi Islands 2 km to the west of Pushkarev Island. This island presents a granite cliff oval in the shape. It is about 40 m long and about 300 m wide. Maximum height is 8 m. The island got its name in 1912 from the participants of the Arctic Ocean Hydrographic Expedition on the icebreakers “Taymyr” and “Vaygach.” It is named after the first explorer of the islands, sergeant and geodetic surveyor Stepan Andreev, who explored and made a topographical sketch of the island in April 1764.

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## Anian, the Strait of Anian

Anian, the Strait of Anian – a semi-mythical strait separating America and Asia and situated in place of the Bering Strait. It was first mentioned by an Italian cartographer Gastaldi in 1562. It first appeared on the maps at around the same time (see “Bering Strait”). The most ancient map showing the Strait of Anian is a map of North America by an Italian cartographer Zalterno (1566). According to the academician L. S. Berg, this strait is “a cartographical fantasy.”

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## Anjou Islands

Anjou Islands (Yakut name “Anjou aryylara”) – central and largest islands in the New Siberian Archipelago. They are situated on the border of the Laptev and the East Siberian Seas, Russia. The archipelago consists of the islands Kotelny, New Siberia, Belkovskiy, Faddeyevsky, and Bunge Land. Total area is around 29,000 km<sup>2</sup>. The

landscape is predominantly plain and 60–80 m high. From September to June, the islands are surrounded by massive ice cap. The southern shores and Sannikov Strait are traversed by a line of the eastern part of the Northern Sea Route. The islands are included into the Lena Delta Wildlife Reserve. They were discovered by industrialists I. Lyakhov in 1772–1773 (Kotelny Island) and Y. Sannikov in 1805 (Faddeyevsky and Stolbovoy islands). The archipelago is named after the Russian Arctic explorer admiral P. F. Anjou who was studying the islands in 1821–1823. Sometimes they are called the New Siberian Islands proper. Earlier they included Faddeyevsky Island and Bunge Land, but they cannot be found as separate islands on modern maps.

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## Anjou, Petr Fedorovich (1796–1869)

Anjou, Petr Fedorovich (1796–1869) – an admiral and explorer of the Arctic, the Caspian, and the Aral seas. In 1814 he graduated from Marine Cadet Corps. He served in the Baltic Fleet. In 1815 he was promoted and became midshipman. In 1817 Petr Anjou traveled to Spain (Cadiz) from Kronstadt. In the period from 1820 to 1823 in command of Ust-Yanskaya Expedition, he described the northern coast of East Siberia between the rivers Olenyok and Indigirka. He also was the first to map the New Siberian Islands. Petr Anjou traveled 10,000 km in dog sledges in winter and about 4,000 km riding a horse or in a boat in summer thus proving that the coast can be described from the sea and from the frozen sea surface in winter. He was the first to study drift and pack ice in the Laptev Sea, the dominating currents and winds, day and seasonal fluctuation of air and water temperature, and soil character and made measurements of the depths and determined the magnetic declination and magnetic dip and their yearly changes, the flood and ebb sea level variations, etc. He discovered the northern shore of Kotelny Island and Figurina Island. In 1825–1826 as captain-lieutenant (1824) took part in a geodesic description of the northeastern



Anjou Islands (Source: [http://commons.wikimedia.org/wiki/File:New\\_Siberian\\_Islands\\_map.png](http://commons.wikimedia.org/wiki/File:New_Siberian_Islands_map.png))

shores of the Caspian and the western shores of the Aral Sea. In command of a battery on the battleship “Gangut” he distinguished himself in the battle of Navarino (1827) in which he was badly wounded. In 1828–1844 Petr Anjou served in the Baltic Fleet again and was promoted to the rank of rear admiral (1844). Beginning from 1849 he was a member of the Marine Academic Committee and from 1855 director of mast timber department. In 1860 he became a member of the council of the Ministry of State Property. In 1866 he was promoted to the rank of admiral.

A northern group of the New Siberian Islands, a cape on Kotelny Island, and a spit on Faddeyevsky Island (both the islands are part of the New Siberian Islands) in the Laptev Sea were named after Petr Anjou.

## Arctic

Arctic (derived from a Greek word “arktikas” meaning “northern” and “arktos” meaning “bear”) – a northern Polar Region of the Earth lying within the Arctic circle  $66^{\circ}33'$ . It is situated in the region around the North Pole. The Arctic region derives its name from the name of the Ursa Major constellation. It includes seawater areas that are covered with drift ice in the summer, making it unfavorable for navigation as well as land territories where there is ice cap and treeless tundra on the permafrost. Within the Arctic lies the Arctic Ocean and its marginal seas with the islands of the Canadian Arctic Archipelago, Greenland Island, the Svalbard Archipelago,





Anjou P.F. (Source: <http://moremhod.info/index.php/library-menu/16-morskaya-tematika/230-tverskaya-slava-rossijskogo-flota?showall=&start=16>)

Franz Josef Land Archipelago, Novaya Zemlya, Severnaya Zemlya, the New Siberian Islands, Wrangel Island, and others and part of the European northern coast, the northern coast of Asia and America, and a significant part of mainland on the Taymyr Peninsula. The border of the Arctic is also drawn along the isotherme with the temperature  $+10^{\circ}\text{C}$  of the warmest month (July or August) which almost coincides with the northern border of woody vegetation. Within these borders the Arctic occupies the area of about 25 million  $\text{km}^2$  of which 10 million  $\text{km}^2$  is land and about 15 million  $\text{km}^2$  is water surface.

### **Arctic and Antarctic Research Institute, Federal State Budgetary Institution ("AARI")**

Arctic and Antarctic Research Institute, Federal State Budgetary Institution ("AARI") – belongs to

the Federal Service for Hydrometeorology and Environmental Monitoring (Roshydromet) in St. Petersburg and presents the only research institution in Russia which conducts comprehensive research of the polar regions of the Earth. It dates back to the Northern Research and Trade Expedition of the Technical Society at the Supreme Council of National Economy (1920); since 1925, it was called the Northern Studies Institute, since 1930 the All-Union Arctic Institute, and in 1936 the institute got the name of the Arctic Research Institute (ARI). In 1958 the institute got its current name. In 1932 the institute came under control of the Northern Sea Route Authority at the USSR Council of People's Commissars (Glavsevmorput) and became its main scientific institution. This institute is a leader in polar science. Its main task has been comprehensive studies of the Arctic seas in order to maintain the Northern Sea Route.

Since 1994 the Institute has had a status of the State Research Center of the Russian Federation. AARI is a research and coordination center for hydrometeorological, aerological, ice, ionospheric, and magnetic observations as well as for control over the hydrometeorological and geophysical network in the Arctic and Antarctic; hydrometeorological support to the economic sector and defensive activities in the Arctic; for keeping a state water cadastre in the Arctic; for the sea ice of the World Ocean and the freezing seas of Russia; for keeping the state database of polar regions environmental states in several disciplines and divisions.

The Institute has arranged more than 1,000 research expeditions. It controls the work of drifting ice stations "North Pole" and the Arctic polar stations. AARI is responsible for the organization of the comprehensive scientific Russian Antarctic Expedition (RAE). In 1969 the AARI scientists completed the first two-volume Atlas of the Antarctic in the world. Its authors were awarded the USSR State Prize (1972).

AARI includes 21 research subdivisions, the Murmansk Branch (1972), the Arctic high-latitude expedition, the Russian Antarctic expedition (1955), the Centre for Ice and Hydrometeorological Information, the Centre for Polar Medicine, the Engineer and Ecological Centre,

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Arctic (Source: [https://en.wikipedia.org/wiki/Arctic\\_Ocean#/media/File:Arctic.svg](https://en.wikipedia.org/wiki/Arctic_Ocean#/media/File:Arctic.svg))



Arctic and Antarctic Research Institute (Source: [http://www.aari.nw.ru/info/pics/zdanie\\_01.jpg](http://www.aari.nw.ru/info/pics/zdanie_01.jpg))

research and expedition fleet of six research vessels (among which is the research ship “Akademik Fedorov” equipped with top notch research tools), the motor boat “Professor Multanovskiy,” a unique specialized ice tank, research and experimental facilities – “Ladozhskaya,” and “Gorkovskaya” stations (in Leningrad Region), the World Ocean and Ice Data Center.

At the premises of AARI, the specialists opened the Russian-German Laboratory for Sea and Polar Research named after O. Y. Schmidt and the Russian-Norwegian Laboratory for Arctic Climate Research named after Fram.

Many Soviet researchers and polar explorers have worked in the Institute: O. Y. Schmidt, P. L. Samoylovich, Y. M. Shokalskiy, V. Y. Vize, M. M. Somov, A. F. Treshnikov, and others. There is the Arctic and Antarctic Museum, which is a

unique museum in Russia and the biggest in the world.

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## Arctic and Southern Oceans

Arctic and Southern Oceans – the fourth of the regional volumes of the “Geography of the World Ocean,” comprising seven volumes. This is a fundamental work summarizing general scientific data on physical, economic, and political geography of the oceans, as well as characteristics of each particular region. The volume has two parts – “The Arctic Ocean” and “The Southern Ocean,” with similar structure. Published by the USSR Academy of Science and the USSR Civil Defence in 1985.



## Arctic Cape (Formerly Known as Cape Molotov)

Arctic Cape (formerly known as Cape Molotov) – situated in the north of the Komsomolets Island (the Severnaya Zemlya Archipelago) and washed by the Kara Sea and the Laptev Sea. This is the northernmost point and the western point of the Laptev Sea border and the northeastern point of the Kara Sea border. This is a starting point for many Arctic expeditions as the distance from the Cape to the North Pole is only about a 1,000 km. It was discovered during the expedition under the command of Vilkitsky in 1913 and was named Zhokhov Cape after an officer of the watch. In 1931 it was mapped by the participants of the Northland expedition under the command of G. A. Ushakov and renamed in honor of a Soviet statesman V. M. Molotov. In 1959 it was once again renamed to commemorate Soviet Arctic explorers.

## Arctic Char, Bull Trout (lat. *Salvelinus alpinus*)

Arctic Char, Bull Trout (lat. *Salvelinus alpinus*) – a migratory fish of the *Salmonidae* family. It has intraspecific forms which are different in external appearance, coloring, and way of life. The

migratory AC has a tapering head of a conic form, the upper jaw is narrow and quite long with adult species, and the tail-stem is not high. The fish in the sea has a dark-green back with small spots, silvery sides, a white belly, and gray fins. The sides of the body sometimes have white or pink spots. In the river the coloring sometimes changes: the back gets olive-brown, the sides dark brown with silvery hue and numerous red spots, the belly gray and red, and the fins rose-red. In spawning period the fishes acquire special coloring: the body gets darker, the spots brighter, the male's jaws become longer, and the lower jaw obtains an outgrowth while the upper obtains an indentation fit for the outgrowth. In this period the jaw edges, the belly, and pectoral, abdominal, and proctal fins are red or orange, and their external rays are milk-white. The maximum body length is up to 88 cm, usually 35–45 cm, and the weight sometimes reaches 15 kg. The fish is widespread in the North Atlantic, the Arctic, and North Pacific Ocean. The fish becomes mature at the age of 5–7 years old. It flows to the river in August of September. The spawning happens in autumn and winter in rivers and lakes. The fish lays eggs into nests on the rocky ground at the depth of 13–46 cm. The fertility is usually 3.5 thousand eggs. Precocious males take part in the process of spawning with migratory AC. Annually only a part of mature fishes lay eggs. The eggs are large (5 mm), light-yellow, or orange. Young fish leave their nests in spring and live in the river for

Arctic Char, Bull-Trout

(Source: <https://de.wikipedia.org/wiki/Seesaibling>)



2–4 years. In the sea they fatten for several months close to the shore, feeding on fish. In rivers they fed on fish, shellfish, maggots of water, and flying insects. The AC is an important fish for industry and trade.

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### Arctic Cod (Polar Cod) (*Boreogadus saida*)

Arctic Cod (Polar Cod) (*Boreogadus saida*)—cold-water, schooling, pelagic fish of the Cod family (*Gadidae*). It inhabits all the Arctic seas circumpolarly. In the Russian part of the Arctic Region, it can be met from Spitsbergen in the west to the Bering Sea in the east. Its length is up to 35 cm, usually 12–16 cm. It stays close to the ice edge and in the coastal zone. It survives in desalinated and even in fresh water, goes quite far up the rivers. For the most part of the year it can be met in the water of 0 °C to –1.8 °C, in autumn it prefers water temperature 0.6 °C...2.2 °C. In autumn and winter it gathers in the coastal zone in great numbers. It matures at 3–4 years, growing to 19–20 cm. The spawning period is from October to March. The spawn is pelagic. The fertility is 9,000–21,000 eggs. It plays an important role in feeding of some sea animals and fish-eating birds. It can be eaten by terrestrial animals (polar foxes and bears) as well, when it is cast to the shore by storms during autumn schooling. Lifetime is 6–7 years. Economic significance is not high.

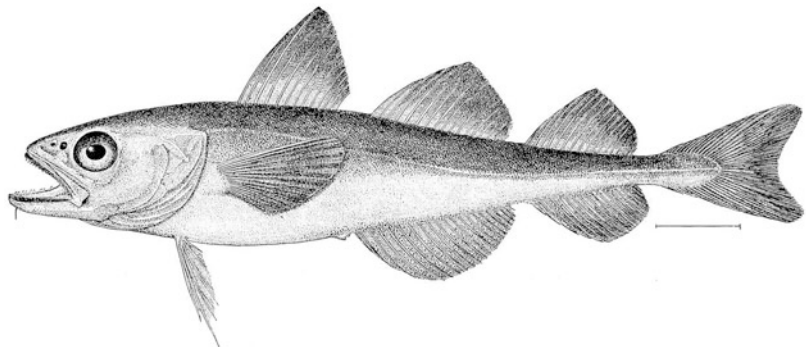
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### Arctic Council (AC)

Arctic Council (AC) – an international intergovernmental regional structure aimed at promoting cooperation in the sphere of environmental protection and sustainable development support in the circumpolar regions. It was established on September 19, 1996, in Ottawa (Canada) where the representatives of eight Arctic states (Denmark, Iceland, Canada, Norway, Russia, the USA, Finland, and Sweden) signed the Declaration of the Establishment of the Arctic Council as an intergovernmental forum for promoting cooperation, coordination, and interaction among the Arctic states. It convenes once in 2 years on a ministerial level. Along with the abovementioned Arctic states, the permanent panelists of the forum are the Inuit Circumpolar Conference, the Aleut International Association, Saami Council, the Russian Association of Indigenous Peoples of the North and the Far East, Arctic Athapaskan Council, and Gwich'in Council International.

In compliance with the Constituent Declaration, the Arctic Council also provides an observer status. It can belong to non-Arctic states, intergovernmental and interparliamentary organizations, and universal and regional organizations including nongovernmental ones. They may only provide scientific, financial, or conceptual assistance to the working groups of the Council. The Declaration on the Establishment of the Arctic Council reads that its main aims are promoting cooperation and coordination of interaction

Arctic Cod (Source: [https://en.wikipedia.org/wiki/Boreogadus\\_saida](https://en.wikipedia.org/wiki/Boreogadus_saida))



between the Arctic states regarding the Arctic problems (excluding the military security matters), mostly within the realm of environmental protection and sustainable development, the monitoring and coordination of the programs of the Arctic environment protection. The programs of Arctic Environment Prevention Strategies (AEPS) are now under the authority of the Arctic Council. These programs are: Arctic Monitoring and Assessment Programme (AMAP), the Conservation of Arctic flora and fauna (CAFF), the Protection of the Arctic Marine Environment (PAME), Emergency Prevention, Preparedness and Response (EPPR), and Sustainable Development and Utilization (SDU). The eight Arctic states have an exclusive prerogative of deciding over the Council work. The first ministerial session of the Arctic Council took place in 1998 in Iqaluit (Canada), the second in 2000 in Barrow (Alaska, USA), the third in 2002 in Inari (Finland), the fourth in 2002 in Reykjavik (Iceland), the fifth in 2007 in Salekhard (Russia), the sixth in 2009 in Tromsø (Norway), the seventh in 2011 in Nuuk (Greenland, Denmark), the eighth in 2013 in Kiruna (Sweden), the ninth in 2015 in Iqaluit (Canada).

Among the observers are Great Britain, the Netherlands, Poland, Germany, France, United Nations Environment Program (UNEP), United Nations Environment Commission for Europe (UNECE), the Nordic Council of Ministers, the Standing Committee of Parliamentarians of the Arctic Region, the Northern Forum, the World Wildlife Fund, the International Arctic Science Committee (IASC), North Atlantic Marine Mammal Commission, Advisory Committee on Protection of the Sea (ACOPS), Association of World Reindeer Herders, Circumpolar Conservation Union, International Arctic Social Sciences Association, International Federation of Red Cross and Red Crescent Societies, International Union for Circumpolar Health, and International Union for Conservation of Nature.

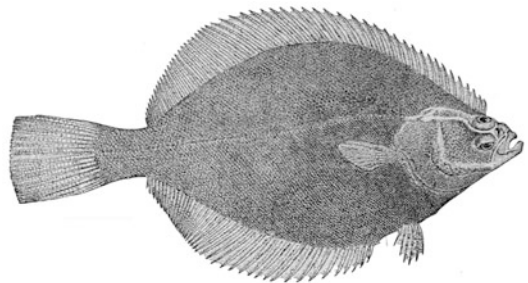
Current issues of the Council and pre-session preparations are tackled by the working body, the Senior Arctic Officials (SAO), which holds panel sessions three or four times a year according to the statutory regulations.

## Arctic Environment Protection Strategy (AEPS)

Arctic Environment Protection Strategy (AEPS) – a strategy adopted in 1991 by governments of eight countries, which have territories adjacent to the Pole (Finland, Canada, Denmark/Greenland, Iceland, Norway, Russia, Sweden, the United States) in Rovaniemi, Finland. Its purposes, as stated in the Rovaniemi Declaration, are as follows: protection of Arctic ecosystems, including people; protection, improvement, and rehabilitation of the environment and sustainable exploitation of nature reserves, including by local people and indigenous peoples of the Arctic Region; acceptance of traditional and cultural needs, values, and way of life of indigenous peoples, as they see it, trying, to the extent possible, to reconcile them with the necessity to protect the Arctic nature; regular review of the state of the Arctic environment; and finding, decreasing, and eventually elimination of pollution. In 1996 the Arctic states established the Arctic Council basing on this strategy.

## Arctic Flounder (*Liopsetta glacialis*)

Arctic Flounder (*Liopsetta glacialis*) – a marine fish of the *Pleuronectidae* family. It lives at shallow depths and on a soft coastal bed and can range far inland up the river. The body length is up to 30–35 cm, with the average of 25 cm. It matures at the age of 4–5 years. In January-February, but



Arctic Flounder (Source: [https://en.wikipedia.org/wiki/Arctic\\_flounder](https://en.wikipedia.org/wiki/Arctic_flounder))

not every year, it spawns under ice and produces as many as 200,000 eggs. A.F. feeds on mollusks, crustaceans, worms, and small fish. Its lifespan is 12 years. It is of a low commercial significance.

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## Arctic Herald

Arctic Herald – a research and information journal of the Russian Geographic Society and the Association of the Arctic Business Collaboration. It has been published in Moscow since March 2012 four times a year in the Russian and English languages.

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## Arctic Human Development Report

Arctic Human Development Report – the first comprehensive scientific review of the Circumpolar North as a specific region of the world published in 2004 by the Arctic Council. Its Russian translation was published in 2007. The preparation of the report was initiated at the meeting of the ministers for foreign affairs in Inari, Finland, in the autumn of 2002 within the framework of the Programme of Iceland Presidency in the Arctic Council. The report contains a comprehensive assessment of the social-economic, cultural, and political potential of the Arctic. It is a component of the program for regional cooperation development in the Arctic. The report consists of 11 chapters, a brief summary of the main conclusions, an introduction, and a conclusion. It is drawn up as a treaty document and the content is coordinated by all the parties. Part I: Orientations ((1) Introduction and (2) Demography); Part II: Main Systems ((3) Society and Cultures: Changes and Stability, (4) Economic Systems, (5) Political Systems, and (6) Legal Systems); Part III: General Topics ((7) Resources Management, (8) Survivability of the Communities, (9) Health and Welfare, (10) Education, (11) Gender Relations, and (12) Circumpolar International Relations and Geopolitics); and Part IV: Conclusion ((13) Arctic

Human Development Perspective: Main Conclusions and New Issues).

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## “Arctic Is My Home”

“Arctic Is My Home” – was the first polar encyclopedia for schoolchildren combined and edited by a famous Russian geographer and historian V. I. Magidovich and the first of the three volumes of the edition “History of the North Exploration through the Biographies of Famous People” (the second volume has a name “Nature of the Earth’s North,” the third “The People of the Earth’s North”). The first volume (280 pages) includes the following sections: “A Name on the Map,” “Evidence and Legends,” “The Great Northern Expedition,” “Arctic Floating Facilities,” “Missioners,” “The Northern Sea Route,” “Papanin Expedition,” “Polar Stations,” and “Polar Aviation.”

The book is illustrated by photos and pictures from the books of famous researchers, writers, painters as well as the works by the participants of the First international contest “The Arctic and Its Discoverers Through Children’s Eyes.” In his foreword the President of the Russian Federation V.V. Putin says: “While reading this book you will learn about the brave and courageous people who explored the severe and magnificent North. We are proud that it was the Russian people who first discovered these areas.”

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## “Arctic Ocean”

“Arctic Ocean” – one of six volumes of the “Atlas of the Oceans” and a fundamental scientific and cartographic work published in 1980. The volume containing maps and brief explanatory texts is divided into following chapters: history of the ocean exploration, its floor and shores, climate, hydrology (hydrophysics), hydrochemistry, biogeography, reference materials, and navigation-geographic materials. The





The Arctic Herald Journal (Source: [http://image.isu.pub/140802154710-99b9ee2ddb07977f1b7a765886ccde7/jpg/page\\_1\\_thumb\\_large.jpg](http://image.isu.pub/140802154710-99b9ee2ddb07977f1b7a765886ccde7/jpg/page_1_thumb_large.jpg))





“Arctic Ocean” (Source: [https://i.livelib.ru/bookcover/1000182595/o/bdccc/\\_Atlas\\_oceanov.\\_Severnij\\_Ledovityj\\_ocean.jpeg](https://i.livelib.ru/bookcover/1000182595/o/bdccc/_Atlas_oceanov._Severnij_Ledovityj_ocean.jpeg))

chapters contain maps of the most important navigations and expeditions, ocean floor geography, morphometric data, data on earthquakes and volcanoes, geomorphology, bottom sediments, heat balance of waters, air temperature, atmospheric circulation, visibility, atmospheric fronts and climatic zones, temperature, salinity, water density, sound velocity, surface and deep water currents, fluctuations of surface, waves, tides, chemical elements, distribution of life forms, etc. In total, 184 maps are available.

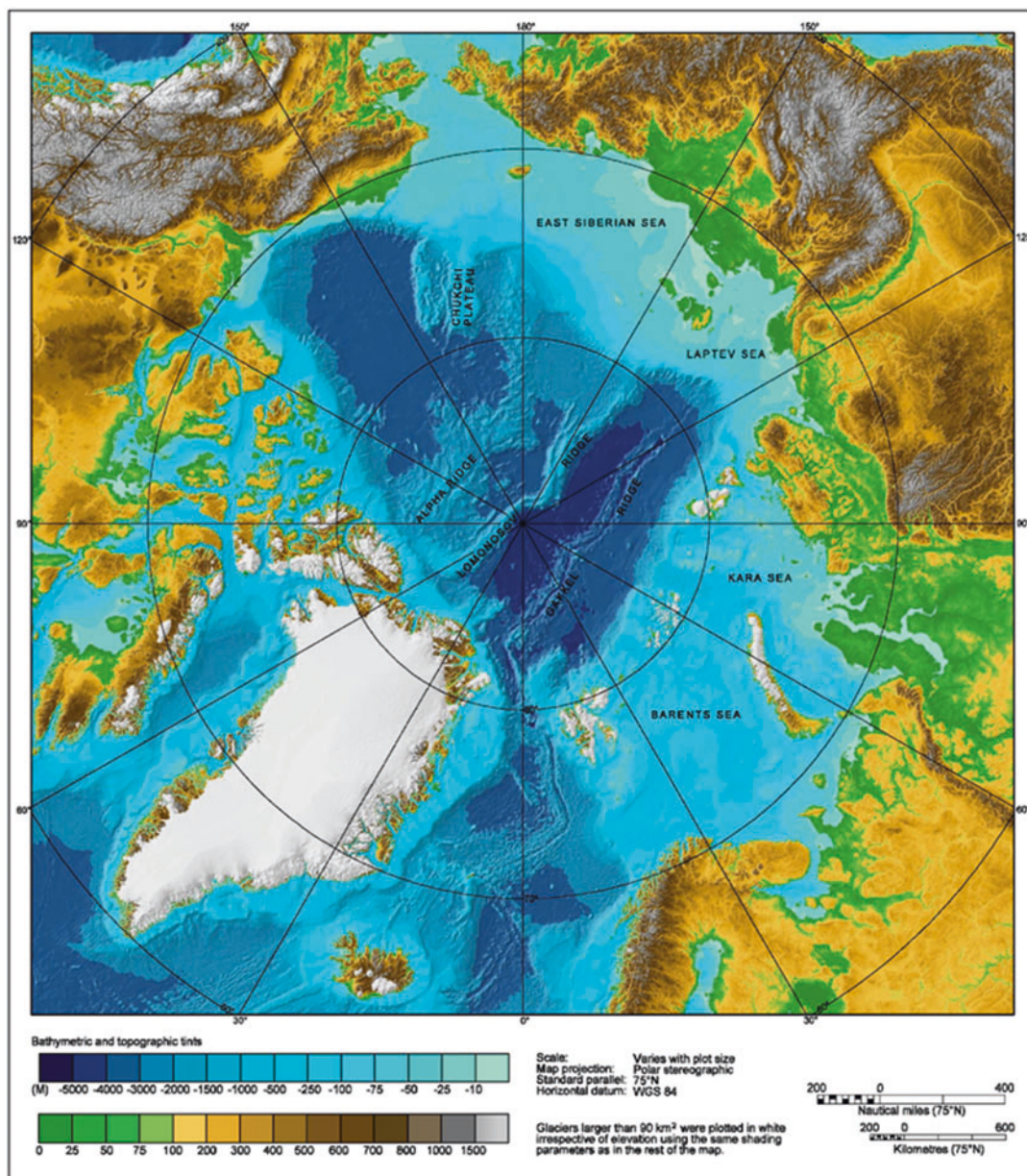
## Arctic Ocean (AO)

Arctic Ocean (in the USSR, by the ruling of the USSR Central Executive Committee dated June 27, 1935, it was replaced by the name “Severnij Ledovityi Okean” or the “Northern Ice Ocean”) – the smallest ocean on the planet. Its area is 14.75 million km<sup>2</sup> (around 2.8 % of the World Ocean area); the volume is around 18 million km<sup>3</sup>. The

average depth is 1,225 m and the maximum depth is 5,527 m. It washes northern coasts of Eurasia and North America. By physiogeographic features, AO is divided into three large parts: the Arctic Basin, central deepwater part of the ocean, limited by the edge of the continental shelf; the North European Basin – the Greenland Sea, the Norwegian Sea, the Barents Sea, and the White Sea; and marginal Arctic seas – all the other seas, straits, and the Hudson Bay. The Arctic Basin is subdivided into two subbasins: Eurasian and Amerasian, with the borderline along the submerged Lomonosov Ridge. The Kara Sea, the Laptev Sea, the East Siberian Sea, and the Chukchi Sea are often called the Siberian shelf seas in the Russian science. In other countries the ocean is called the Arctic Ocean. The AO is rich in islands: Greenland (the largest island of the World Ocean), the Canada Arctic Archipelago, Shpitsbergen, Franz Josef Land, Novaya Zemlya, Severnaya Zemlya, the New Siberian Islands, the Wrangel Island, etc.; the total area is around 4 million km<sup>2</sup>.

Large rivers that flow into AO are: the Northern Dvina, the Pechora, the Ob, the Taz, the Yenisei, the Khatanga, the Olenyok, the Lena, the Yana, the Indigirka, the Kolyma, the Mackenzie, etc. The coastline of AO is quite complicated; it forms a number of seas and bays. Shoreline features are diverse. The shores of Greenland, Iceland, the Scandinavian Peninsula are mostly rocky and high, with fjords; the shores of the Canada Arctic Archipelago are rocky but not high. The northern shore of Asia is mostly abrasive and high, though sometimes it can be low and smooth, including delta coasts and lagoon coasts, etc.

AO bottom relief is characterized by well-developed shelf area, steep continental slope, and huge submerged ridges in the Arctic Basin. The width of the shelf zone can reach 1,200–1,300 km (near the New Siberian Islands, the Canada Arctic Archipelago). All the seas of AO are within the shelf zone (except of the Greenland Sea and the Norwegian Sea, straits, and the Hudson Bay). More than a half of AO area, namely, 8.11 million km<sup>2</sup>, is less than 500 m in depth, while the depths over 4,000 m are only 0.32 million km<sup>2</sup> (2.2 % of the area). There are trans-oceanic submerged



Arctic Ocean (Source: [https://en.wikipedia.org/wiki/Arctic\\_Ocean#/media/File:IBCAO\\_betamap.jpg](https://en.wikipedia.org/wiki/Arctic_Ocean#/media/File:IBCAO_betamap.jpg))

ridges such as the Lomonosov Ridge, the Mendeleev-Alfa Ridge, the Gakkel Ridge, and other elevations that are part the Arctic Basin into deep basins including the Nansen Basin, the Amundsen Basin, the Makarov Basin, the Podvodnikov Basin, the Canada Basin, etc. Relatively high Lomonosov Ridge over the

basins' bottom can reach 3,300–3,700 m. Minimal depth over the Lomonosov Ridge is 954 m. Floor sediments in AO (in the shelf zone) are terrigenous – sand, sandy silt, and organic and nonorganic silt in the deep water.

Climate, hydrological, and ice conditions of AO are determined specifically by its high-

latitude location, atmospheric circulation, water, and heat exchange with the Atlantic and Pacific Oceans, and large continental water supply. The high-latitude location of AO – almost all of it is within the Polar Circle – determines the existence of polar day and polar night. Little sun in the winter period in combination with the strong reflecting capacity of snow and ice cover (5–10 times higher than the reflecting capacity of water) leads to year-round ice, harsh climate, and considerable interseasonal (from winter to summer and from summer to winter) changes in hydrometeorological conditions. Atmospheric circulation has a most significant effect over natural processes in AO. It is in the atmosphere where principal advection (inflow) of heat to the Arctic happens, and surface winds largely determine the circulation of water and ice in the ocean.

During water exchange a great amount of warm and salty Atlantic and Pacific waters flow into AO. Water from the Atlantic is brought mainly by North Atlantic Current through Faroe-Shetland Channel – on average  $126 \times 10^{12} \text{ m}^3$  a year, bringing  $41 \times 10^2 \text{ J}$  of warmth and  $44.3 \times 10^{14} \text{ kg}$  of salt. To the north from Spitsbergen, the Atlantic waters arriving there with West Spitsbergen Current submerge under the less dense Arctic waters and turn into warm deep-water current (with the temperature above  $0^\circ \text{C}$ ) in the Arctic Basin. Due to the Atlantic waters, air temperature in this polar region is  $8\text{--}10^\circ \text{C}$  higher than on the New Siberian Islands located 200 km to the North. Waters from the Pacific Ocean come to AO through the Bering Strait in the amount of  $30 \times 10^{12} \text{ m}^3$  a year on average. Around  $5.14 \times 10^{12} \text{ m}^3$  of fresh water from the mainland flows into AO a year. These waters accelerate the process of ice formation and, creating discharge currents, facilitate ice removal from the ocean.

Characteristic features of AO's climate are mostly harsh continental conditions, cloudy weather, and fogs in summer, low air temperatures, strong winds, and snowstorms in winter. The average monthly air temperature is from  $-2^\circ \text{C}$  in the southern part of the Norwegian Sea to  $-36^\circ \text{C}$  in the region of the Canada Arctic Archipelago, around  $-30^\circ \text{C}$  in the seas of the Siberian Shelf; in summer it is up to  $10\text{--}12^\circ \text{C}$  in

the Norwegian Sea and  $4\text{--}6^\circ \text{C}$  in the seas of the Siberian Shelf. In winter the minimum surface temperature of the air over the Arctic Basin, the Canada Arctic Archipelago, and the Kara and the Laptev Seas can reach  $-53^\circ \text{C}$ . In summer maximum air temperature in the coastal areas of the Siberian Shelf seas is up to  $28^\circ \text{C}$ , with up to  $15^\circ \text{C}$  in the north.

Average speed of wind: in winter over the North European Basin, the average speed of wind is  $9\text{--}10 \text{ m/s}$ ; in the seas of the Siberian Shelf, it is  $5\text{--}10 \text{ m/s}$ ; in the Arctic Basin, it is up to  $5 \text{ m/s}$ ; and in the summer, it does not exceed  $5 \text{ m/s}$ . Storms (wind speed over  $15 \text{ m/s}$ ) happen mostly in summer. For the Siberian Shelf seas, monsoon changeability of winds is characteristic: in winter prevailing are the winds of south direction, blowing from land to water; in summer, winds of north direction, blowing from sea to land.

The ice of AO is its major physiographical feature. It has a huge impact over environment and human activity not only in the high, but also in the middle latitudes of the Northern hemisphere. The main currents of AO are as follows: Eastern Anticyclonic Circulation (velocity  $2\text{--}5 \text{ cm/s}$ ), Trans-Arctic Current ( $2\text{--}10 \text{ cm/s}$ ), East Greenland Current (around  $20 \text{ cm/s}$  in Fram Strait, around  $40 \text{ cm/s}$  southward of Iceland), Norwegian ( $30\text{--}40 \text{ cm/s}$ ), West Spitsbergen ( $20\text{--}30 \text{ cm/s}$ ), Nordcape ( $10\text{--}30 \text{ cm/s}$ ), and Pacific (speed around  $40 \text{ cm/s}$ , in summer). Trans-Arctic and East Greenland Currents drive ice and cold Arctic waters of AO. Warm and salty waters from the Atlantic brought by Norwegian and West Spitsbergen currents in the area northward off Spitsbergen go to the depth and form in the Arctic Basin a very weak deep current in the layer around  $200\text{--}1,000 \text{ m}$  deep. AO water masses are formed basically by Arctic and Atlantic waters, and, in a lesser extent, by Pacific waters and fresh waters from the mainland.

One of the conspicuous features of the North European Basin of the Arctic Ocean is sharp contrasts of temperature and salinity of waters in the upper layers where warm and more salty Atlantic waters brought northward by the Norwegian Current meet cold and less salty Arctic waters driven



southward by the East Greenland Current. In the contact area hydrologic fronts are formed, the most lengthy, intense, and sustainable in the World Ocean. The fronts cause drastic weather changes, frequent fogs, large accumulations of nutritional substances, and, consequently, of plankton and fish.

Weather conditions in Siberian Shelf marginal seas are harsh. The seas are covered with ice for the most part of the year. At this time the water in them is almost homogenous from surface to bottom, with the water temperature close to the freezing temperature. In summer the water gets warm only in a relatively narrow coastal stripe, free from ice during 1–3 months a year (in some areas of seas this happens not every year). Water temperature in summer in the shorefront, heavily influenced by river discharge, can reach 8–10 °C; to the north it gets colder to make 0 °C near the ice edge. Water salinity in summer in the shoreline area is not higher than 10‰, to the north it rises up to 30–32‰ near the ice edge.

Anthropogenic pollution AO water and ice is not significant at large, in spite of the presence of seaports and limited regions of ocean mining (oil and chemical pollution, suspended matter, etc.). Relative ecological cleanliness of the ocean is the result of the effective mechanism of natural self-purification. The Arctic Basin in general is one of the most environmentally pristine areas of the World Ocean and the planet in general. The Russian Centre for the Arctic Ocean Physiographic Conditions Complex Research (as well as the Arctic Region in whole) is the Arctic Research Institute (AARI) in St. Petersburg.

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### **Arctic Ocean Scientific Council (AOSC)**

Arctic Ocean Scientific Council (AOSC) – a regional nongovernmental organization. It was founded in 1984. It includes scientific institutions from 17 countries. Together with two research councils, it coordinates programs of oceanographic and coastal research in the Arctic Region.

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### **“Arctic Pollution: A State of the Arctic Environment Report”**

“Arctic Pollution: A State of the Arctic Environment Report” – the first report prepared by the Arctic Monitoring and Assessment Programme (AMAP) in 1997. It was published in Russian in 1998. It is a result of joint efforts of more than 400 scientists and administrators. The report is based on the results of national and international monitoring programs coordinated by AMAP in eight states of the Arctic Region, Russia, Sweden, Canada, Finland, Norway, USA, Iceland, and Denmark (Greenland) as well as on the data collected from a number of research programs of the countries outside this region and international organizations.

The report includes Introduction and the following chapters: The Arctic; Physical Means of Pollution Spread; Polar Ecology; Northern Peoples; Stable Organics; Heavy Metals; Radioactivity; Acidification and Arctic Haze; Oil Hydrocarbons; Climate Changes, Ozone Layer Destruction, and Ultraviolet Radiation; and Pollution and Human Health.

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### **Arctic Shipping Company**

Arctic Shipping Company – in 1967 the Port of Tiksi became home to an independent shipping company named the North-East Department of the Fleet reporting directly to the Ministry of Navy of the USSR. By mid-1980s the fleet possessed 20 motorships and 4 cargo tanks. The total cargo carrying capacity was 79,000 t. In 1987 the enterprise was renamed into the Yakutsk sea transport manufacturing group. Apart from the cargo fleet and ship repairing yards it included the port of Tiksi and Khatanga. Since 1991 the enterprise existed in the form of a shipping company, ports, and most of the shore units having been withdrawn from it. The company got the name of “The Arctic Shipping Company.” Since 1993 it has been a state enterprise.

## Arctic Staghorn Sculpin (*Gymnacanthus tricuspis*)

Arctic Staghorn Sculpin (*Gymnacanthus tricuspis*) – a sea fish of Cottidae family. The body is naked; its length reaches 15–20 cm. The head is wide, covered in the upper part by rugged bony plates which form an original helmet. The back is dark; there are sometimes dark spots on the sides. Dorsal fins are striped. The fish usually inhabits shallow waters of the coastal zone at the depth from 0 to 45 m. It tolerates temperature fluctuations and often can be found in the areas with 0 °C temperatures. It usually digs itself into the sand and sand and silt ground but can be found on the gravel. It becomes sexually mature at the age of 3. The fertility is 2,000–3,500 eggs about 2 mm in diameter. It feeds on little bottom shell-fish worms. It inhabits all the seas of the Arctic Ocean. It is not important from the trading point of view.

## Arctic Zone of the Russian Federation

Arctic Zone of the Russian Federation – defined by the decision of the State Committee of the USSR Council of Ministers for the Arctic. This zone includes fully or partially the territories of Murmansk and Arkhangelsk Regions; Taymyr District of Krasnoyarsk Krai, Nenets, Yamalo-Nenets, and Chukotka Autonomous Areas; the Sakha Republic (Yakutia); and lands and islands listed in the Central Executive Committee and the

Council of People's Commissars of the Soviet Union resolution on April 15, 1926, "On declaring lands and islands situated in the Arctic Ocean the territory of the USSR," domestic waters, and the closed sea that are adjacent to the northern coast of the Russian Federation.

## "Arctic. Ecology and Economy"

"Arctic. Ecology and Economy" – a scientific journal. It has been published in Moscow by the Nuclear Safety Institute of the Russian Academy of Sciences since 2011. It sheds light upon different problems of the Arctic associated with the national environmental safety, the economy of oil and gas production, and business.

## Arctida

Arctida – a hypothetical northern polar continent which is supposed to have existed in the geological past. The term was suggested in the nineteenth century by a German zoogeographer I. Eger who used this word to refer to "the northern polar land" that presumably connected the New World with Eurasia via circumpolar regions. Later the existence of Arctida was claimed by a Soviet Arctic oceanographer Y. Y. Gakkel, who thought it to be an ensemble of archipelagoes, though. According to him both the New Siberian Islands and Wrangel Island are remnants of the prehistoric land. This land may have surrounded the Svalbard

Arctic Staghorn Sculpin  
(Source: <http://en.wikipedia.org/wiki/Gymnacanthus>)





"Arctic. Ecology and Economy" Journal (Source: <http://www.ibrae.ac.ru/pubtext/99/>)

Archipelago, Franz Josef Land Archipelago, Severnaya Zemlya Archipelago, Canadian Arctic Archipelago, and the modern mid-oceanic ridges: the Gakkel, Lomonosov, and Mendeleev ridges dominated these territories as mighty mountain ranges connecting America and Eurasia.

## "Arktika"

"Arktika" (in 1982–1986 was renamed into "Leonid Brezhnev") – the second heaviest nuclear-powered icebreaker in the world, the main Arctic icebreaker of Arctic class leading icebreakers of the USSR (among the "Sibir," the "Rossiya," and others) designed to escort cargos in the Arctic seas. It was constructed in the Baltic Shipyard in Leningrad in 1974. In 1975 it had test operations in the Kara Sea and long-term pack ice in Shokalsky Strait (Severnaya Zemlya). It is

179 m long and 30 m wide, water draft is 11 m, and displacement is 23,460 t. Capacity of atomic energy propulsion is 75,000 hp, maximum speed in open water is 21 knots. The crew comprises 150 people. The hull lines made it possible to break the ice 5 m thick. The ship and its mechanisms are fully automatic. On the stern there is a landing pad and a shed for a helicopter. In August 1977 the "Arktika," under the command of Captain Y. S. Kuchiev, reached the North Pole. The expedition lasted for 29 days and the icebreaker covered 3,850 miles of which 1,300 miles it went through heavy long-term ice. The course of the "Arktika" was laid off from Murmansk to Cape Zhelaniya, then through the Vilkitsky Strait to the point latitude 80° N and longitude 130° E, and then to the Pole. To commemorate this historic event a metal board with the national state emblem of the USSR was put on the ground of the North Pole. The board contained the name of the ship, location, and the date of the icebreaker's reaching the Pole. The icebreaker was awarded the Order of the October Revolution. In July 1998 the "Arktika" escorted the German research icebreaker "Polarstern" whose aim was to study the Alpha Ridge included into the area of Central Arctic Highlands in the Arctic Ocean to the east of the Lomonosov Ridge. In 2004 the "Arktika" escorted the research vessel "Akademik Fedorov" which launched a drifting station "SP-33." In 2012 the icebreaker was excluded from the Naval Vessel Register.

## "Arktika 2007"

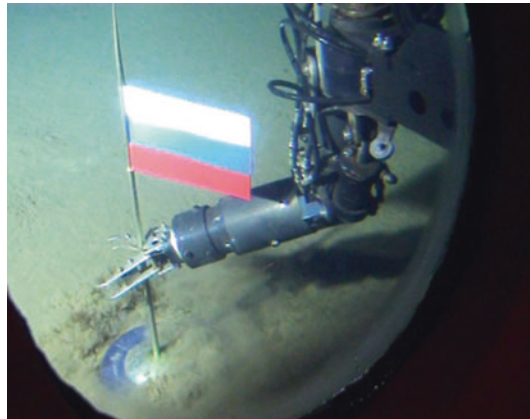
"Arktika 2007" – a research and geopolitical expedition conducted by Russian and foreign explorers in the Arctic zone of the Russian Federation. There were two stages in this expedition. The first was performed in the period from May to June 2007 on a nuclear icebreaker "Rossiya" and aimed at geological and geophysical studies in the zone where the Lomonosov mid-ocean ridge joins the Laptev Sea and the East Siberian Sea shelves. The expedition was meant to justify the external border of the Russian Federation continental

"Arktika" icebreaker  
 (Source: [https://ru.wikipedia.org/wiki/Арктика\\_\(атомный\\_ледокол\)](https://ru.wikipedia.org/wiki/Арктика_(атомный_ледокол)))



shelf. In concordance with the UN Convention on the Law of the Sea of 1982 ratified by Russia in 1997 its participants may claim an expansion of 200 miles of exclusive water area economic zone and a spread of its sovereign rights for the continental shelf within 10 years after its ratification. This stands if it is proven that the subaqueous shelf part is the continuation of the mainland, the continental massif of the littoral state.

The second stage of "Arktika 2007" took place in the period from July to August 2007. It was conducted on board the research ship "Akademik Fedorov" that left St. Petersburg and was led to the North Pole by the nuclear icebreaker "Rossiya" belonging to Murmansk Shipping Company. On August 2, 2007, after the participants reached the Pole, they performed a descent to the bottom in two manned submersibles "Mir 1" and "Mir 2," on board the first there being three Russian citizens (A. Sagalevich, A. Chilingarov, and V. Gruzdev) and the second being manned by an international



"Arktika 2007" Expedition. Flag of the Russian Federation on the bottom of the Pole. (Source: <http://sever.sokolniki.com/EditorFiles/image/Material/e0ac093ab34033bda546f41733058383.jpg>)

team of three people as well (a Russian citizen E. Chernyaev, a citizen of Sweden F. Paulsen, and an Australian citizen M. McDowell). "Mir 1"



descended to the depth of 4,261 m and “Mir 2” to the depth of 4,302 m. They took samples of the bottom soil and planted a flag of the Russian Federation made of a titanium alloy.

### “Atlas of the Oceans”

“Atlas of the Oceans” – a fundamental scientific and cartographical work summarizing modern knowledge of natural processes and phenomena taking place in the World Ocean. More than 30 research and industrial institutions of the Ministry of Defense, the Academy of Sciences, Hydrometeorological Service, and Scientific-Research Institutes of the Russian Federation (up to 1992 – the USSR) took part in its preparation. There were published eight volumes: “The Pacific Ocean” (1974), “The Atlantic and Indian Oceans” (1977), “The Arctic Ocean” (1980), “Terms, concepts, reference tables” (1980), “Bottom relief of the World Ocean” (1980), “The Straits of the World Ocean” (1993), “The Man and the Ocean” (1996) and “The Antarctic” (2005).

### Avinov, Alexander Pavlovich (1786–1854)

Avinov, Alexander Pavlovich (1786–1854) – a Russian seafarer and admiral. In 1804–1807 he served as a midshipman on English naval ships, in 1805 participated in the Battle of Trafalgar. In 1819–1822 on board a sloop “Otkrytiye” (Discovery) he took part in the circumnavigation under the direction of M.N. Vasilyev who was trying to find a passage between the Pacific and the Atlantic oceans. In 1820 Avinov entered the Chukchi Sea through the Bering Strait and described a large stretch of the coast. He explored and described a segment of the northwestern coast of Bristol Bay in the Bering Sea. He served on the Baltic Sea and commanded the battleship “Gangut” on which in 1827 took part in the battle of Navarino against the Turco-Egyptian Navy. In 1834 Avinov was appointed Chief of Staff of the



Avinov A.P. (Source: <http://www.rzn-patriot.ru/name/avinov.html>)

Black Sea Fleet and the ports of the Black Sea, from 1837 to 1848 served as a Commander of the Port of Sevastopol.

### Ayon

Ayon – (former Sabadey, derived from the Chukchi word “ayo” meaning “human brain”) (1) one of the biggest islands in the East Siberian Sea situated at the entrance to Chaunskaya Bay, Chukotka Autonomous District, Russia. In the west it is separated from the Kyttyk Peninsula by the Maly Chaunsky Strait, in the east – by the Sredniy Proliv (Sredniy Strait). The area is circa 2,000 km<sup>2</sup>; the altitude up to 65 m. The surface is slightly hilly, formed by loose stratum including minerals and ice. The island is dominated by Arctic tundra. The shores are not high, occasionally steep, and largely surrounded by foreshore. Consolidated pack ice can be observed throughout the year. A homonymous settlement and a polar station are situated on the island. Since 1983 the northwestern part of Ayon has been home to a natural landmark “Ayonskiy” (13 ha) established to





Ayon Island (Source: [https://ru.wikipedia.org/wiki/%D0%90%D0%B9%D0%BE%D0%BD\\_\(%D0%BE%D1%81%D1%82%D1%80%D0%BE%D0%B2\)#/media/File:Ayon\\_Island\\_-\\_Landsat\\_TM\\_102.jpg](https://ru.wikipedia.org/wiki/%D0%90%D0%B9%D0%BE%D0%BD_(%D0%BE%D1%81%D1%82%D1%80%D0%BE%D0%B2)#/media/File:Ayon_Island_-_Landsat_TM_102.jpg))



Ayon Village (Source: [https://en.wikipedia.org/wiki/Ayon,\\_Russia#/media/File:Ayon.jpg](https://en.wikipedia.org/wiki/Ayon,_Russia#/media/File:Ayon.jpg))

protect the areas of relict tundra and steppe vegetation and endemic flora species. A Norwegian Arctic explorer H. Sverdrup found here the traces of the dwellings of the Onkilon, a mysterious tribe that used to inhabit the Chukchi Peninsula. In September 1919 the members of R. Amundsen's expedition on the ship "Maud" had their winter quarters close to the island, at the entrance to Chaunskaya Bay.

The island is believed to have been discovered in 1646 by a manufacturer from Mezen named Isay Ignatyev.

(2) a settlement at the entrance to Chaunskaya Bay, Chukotka Autonomous District, Russia, with the population of 450 people, 70 % of whom are the Chukchi. A polar station.

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## **Ayonskiy Ocean Ice Massif**

Ayonskiy ocean ice massif – a sustainable accumulation of heavy consolidated pack ice in the

East Siberian Sea not far from Wrangel Island which is well-known among polar explorers. It occupies a big part of the East Siberian Sea. Its southern periphery almost borders upon the mainland coast throughout the year. The massif is an offspur of an ocean massif which supplies it with heavy paleocrystic ice. These clusters are called ice massifs. They present a significant marker of ice conditions in Arctic seas being the main serious obstacle for any professional activities on the Arctic seas shelf, including that of navigation along the Northern Sea Route.

The ice of ice massifs can be described as thicker and more rigid. In the Arctic seas of the Siberian Shelf, specialists single out nine ice massifs named according to their geographical location. The position, size, and form of the ice massif depend mostly on the total impact of wind and undercurrents on the drift ice, which accounts for their significant fluctuation from year to year.

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# B

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## **Badigin, Konstantin Sergeevich (1910–1984)**

Badigin, Konstantin Sergeevich (1910–1984) – an Arctic explorer, sea captain, Candidate of Geographic Sciences, writer, and Hero of the Soviet Union (awarded in 1940). In 1929 began his naval career as a sailor on merchant ships in the Far East. In 1932, he graduated from the Marine Technical School in Vladivostok. As a navigation officer, he served on the icebreaker “Krasin” in 1935–1936 and afterward on the icebreaker “Sadko” which in October 1937 got trapped in fast ice in the Laptev Sea together with the icebreakers “Malygin” and “G. Sedov.” In March 1938, he was appointed captain of “G. Sedov” and continued drifting with a crew of 14 members up to January 1940. The drift lasted for 812 days. All the crew were bestowed the title of the Hero of the Soviet Union. At the beginning of the World War II, B. was the chief of the Soviet icebreaker fleet in the White Sea. In 1942, he was transferred to the Northern Sea Route Authority and appointed chief of the staff of the Arctic Sea operations. B. initiated winter escorts of the Soviet transport to Arkhangelsk by the White Sea. Together with M.P. Belousov was in charge of the White Sea Ice Operation Authority. At the end of 1943, he became captain on the ships of the Northern Sea Route Authority and the Ministry of Navy. In 1954–1955, he was the head of the Sea Navigation Department of

the Central Research Institute for Water Transport Operations.

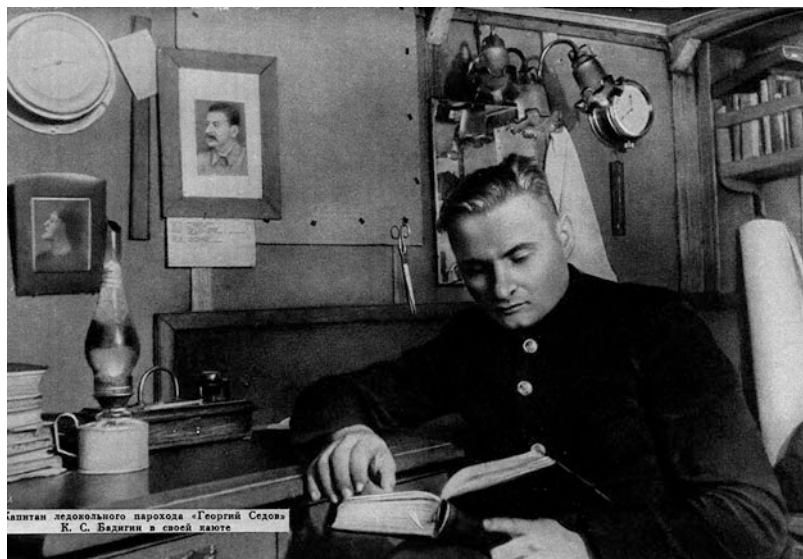
B. is well known for his works in history of polar navigation. Among his books are *On Board the Icebreaker “Georgy Sedov” Across the Arctic Ocean. Captain’s Notes* (1941), *The Mystery of Andreev’s Land Resolved* (1953, in co-authorship with N.N. Zubov), *Across the Cold Seas* (1956), *On the Sea Roads. Captain’s Notes* (1958), and *Three Winters in the Arctic Ice* (1960). He created several works about the history of the Russian Fleet: “The Way to Grumant. Foreign Sails” (1960), “Corsairs of Ivan the Terrible. A Chronicle from the sixteenth-century” (1977), “Conquerors of the Cold Seas,” “Keys to the Haunted Castle,” and “Shipwreck at the Cape of Good Hope.” All the abovementioned works were published in Moscow in 4-volumed collected works in 1988–1990.

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## **Baidzharakhi**

Baidzharakhi – (derived from a Yakut word) a hammock rising over the ground due to the process of fossil ice melting out in the regions of permafrost prevalence. Usually can be found in groups and are arranged in rows. B’s diameter is 3–10 m; its height ranges from 0.5 to 5 m. They are separated from each other by ravines. On the smooth slopes of rivers and brook valleys, there

Badigin K.S. (Source:  
[http://www.polarpost.ru/  
 forum/viewtopic.php?f=8&t=2554](http://www.polarpost.ru/forum/viewtopic.php?f=8&t=2554))



can be seen some outlines of hillocks no higher than 0.5 m. On the steep slopes B. are of a conical shape and rise up to 1.5–3 m high. On the slopes of hollows and in the upper reaches of brooks, Bs form the so-called baidzharakhi circuses which sometimes occupy a large territory. On the New Siberian Islands, they cover vast areas. Bs are characteristic of Northeastern Asia and Alaska.

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## Balakhna

Balakhna – a river in the southeast of the Taymyr Peninsula. It originates in Balakhninskoe Lake (Ai-Turku). The length is 200 km. It flows across the northern part of the lower tundra and into the Khatanga Bay in the Laptev Sea.

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## Baldwin

Baldwin – a peninsula in the eastern part of the Kotzebue Sound, Chukchi Sea, Alaska, USA. It is washed in the west by the waters of the gulf, in the east by Hotham Inlet which connects the Kotzebue Sound with Selawik Lake. The peninsula presents a wide sandspit. In its southwestern

part, there is Eschscholtz Bay. In the northern extremity of the peninsula, there is the city of Kotzebue.

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## “BARKALAV 2007–2009”

“BARKALAV 2007–2009” – a complex expedition in the Barents, Kara, Laptev, and East Siberian Seas. The research was done within a framework of the national purpose-oriented research subprogram “Sea research in the Arctic, in the Russian seas, continental shelf and the World Ocean. Models and technologies of marine forecasts and calculations” as well as the scientific program of Russia’s participation in the “International Polar Year 2007–2008” program realization. The expedition was conducted at the expense of the federal budget. The research was aimed at obtaining new complex data on the contemporary state of the seawaters, studying seasonal cyclic characteristics of the environment in order to gain a better understanding of the climatic changes in ice, hydrological and hydrochemical regimes of the Arctic seas, as well as biological conditions and processes of sediment accumulation on the sea bed. The work within the program “BARKALAV-2008” in the

White Sea, southeastern part of the Barents, Kara, East Siberian, and Laptev Seas, was conducted by the expedition of the Arctic and Antarctic Research Institute in the period of 3 months. The expedition in the Laptev Sea attracted scientists from Germany (GEOMAR Institute), who used their program of bottom station installation.

## Barrow

1. A promontory, a deserted northernmost point of the US territory, Alaska. It separates the Chukchi Sea in the west from the Beaufort Sea in the east. Near B. the shelf is cut into three deep-sea trenches, the biggest of which is called Alaska trench and is 45 km wide. The promontory is thermo-abrasive. Icy aleurites, sands, and gritstone underlying the littoral tundra plain are subject to abrasion. The thermo-abrasive projection, accompanied by soliflual shelf along the foot, is 4–6 m high. The shore retreat velocity ranges from 1.7 to 3.3 m and even up to 10 m a year.

In winter and spring, B. is home to polar bears. On the way to the promontory, there is College Ilisagvik conducting natural research together with the Arctic scientific consortium of Barrow. The history of the promontory is closely connected to numerous Arctic expeditions. In 1926, R. Amundsen's expedition on the airship "Norge" reached Point B. having flown over the North Pole.

The promontory was discovered by the senior navigation officer T. Elson from the sloop "Blossom" under the command of an English mariner F. Beechey and was called after the secretary of the English Admiralty John Barrow.

2. A small town (Inupiat name for it is "Utkiagvik" meaning "a place of white owls hunting"), the northernmost in the USA, the capital of the Northern Eskimo in Alaska, the center of a vast district called the Alaska North Slope. Is situated in tundra on the shore of Kotzebue Sound in the Chukchi Sea. The population is about 4.2 thousand people (as of 2010). To the north of the town, there is Point Barrow. The town lies about 2,100 km from the North Pole in permafrost district with the depth of soil freezing amounting to 400 m. There is ice at the shore almost all year round stepping back only for several weeks in July and August. The midnight sun in the summer lasts for 84 days. Due to B's location 515 km to the north of the Polar Circle, the climate in the town is cold and dry and is classified as polar. Winters in B. can be very dangerous because of the combination of severe frosts dropping to  $-52^{\circ}\text{C}$  and heavy winds. Even in the summer, the weather here is very chilly. B. sees one of the most severe natural conditions among the towns in the world, temperature never rising above  $0^{\circ}\text{C}$  from the beginning of October to the end of May, and day temperature is above  $0^{\circ}\text{C}$  only 109 days a year. On the average, the temperature in B. goes below  $0^{\circ}\text{C}$  324 days a year, and it may freeze or snow in any month. B. is the biggest settlement of Eskimo and Inupiat in Alaska. In the center of B., there are two lagoons – Tasigaruk and Isatkoak.

Among the sights of the town are the Ukkuksi excavations in its western part; a monument to the famous pilot Wiley Post, who wanted to find a route from California to the USSR, and to his friend Will Rogers who died in a crash in 1935; the Inupiat Heritage Center, established to commemorate their contribution to whaling trade; an arch made of



Point Barrow (Source: [https://en.wikipedia.org/wiki/Point\\_Barrow#/media/File:Barrow\\_point\\_panorama.jpg](https://en.wikipedia.org/wiki/Point_Barrow#/media/File:Barrow_point_panorama.jpg))





Barrow town (Source: [https://en.wikipedia.org/wiki/Barrow,\\_Alaska#/media/File:Barrow\\_Alaska.jpg](https://en.wikipedia.org/wiki/Barrow,_Alaska#/media/File:Barrow_Alaska.jpg))

whale bones on the shore of the Chukchi Sea; and Brower's café (Charles Dewitt Brower) situated in the former fort of the first European colonist who arrived here in 1884. Close to the town, there is a weather station and an oil extraction spot. The population is occupied with fishing and sea hunting. From time to time, cargoes from the Pacific ports of the USA are brought here. B. has an on-season pier operating and other types of port equipment and an airport. In 1947 an Arctic research laboratory started to operate not far from B. Up to 1981, it conducted complex research, creating special facilities for experiments in the interests of the Air Force and the Navy working in the Arctic. At present the laboratory conducts research for the US Navy.

3. A submarine canyon (trough valley) cutting across the Chukchi Sea shelf and stretches along the coast of Alaska. It is up to 160 m deep.

### **Batakov, Anton Maksimovich (1752 to Before 1807)**

Batakov, Anton Maksimovich (1752 to before 1807) – a navigation officer, participant of the expedition of J. Billings and G.A. Sarychev, and an explorer of the Aleutian Islands and the Chukchi Peninsula. In 1771, he became a navigation officer apprentice and was transferred from Arkhangelsk to Kronstadt. A year later in the squadron of N.I. Senyavin, he moved over to Revel (old name of Tallinn). In the period from 1773 to 1775 on board the ship “Mironosets,” he cruised in the Mediterranean Sea and the archipelago and was promoted to assistant navigator. In 1776–1783 he navigated the Baltic, Northern, and Barents Seas on different ships. In the period from 1784 to 1785, he was describing the Dnieper, in 1785–1794 participated in the expedition under the command of J. Billings and G.A. Sarychev, in

1786 arrived in Okhotsk and further to Verkhnekolymsk, and in 1787 on board the “Palas” under Billing’s command went down the Kolyma and via the East Siberian Sea reached Cape Bolshoy Baranov, but the ice forced the expedition to return after which it set out to Okhotsk. In 1789 on his way to Petropavlovsk on board, the ship “Slava Rossii” participated in discovering Jony Island. In 1790, he navigated from Kamchatka to Kayak Island and took part in discoveries and description of separate Aleutian Islands and studies of the northern coast of the Gulf of Alaska. In 1791 while doing a marine survey, he navigated from Petropavlovsk to Unalaska Island and further to St. Mathew Island and St. Lawrence Island after which entered the Bering Strait. In the autumn of the same year together with Billings, he left the ship in the Gulf of St. Lawrence and in winter 1791–1792 researched the Chukchi Peninsula up to Chaun Bay on reindeers. In 1794 he returned to St. Petersburg. From 1795 to 1797, he served at the Draft Admiralty Board and then navigated the Baltic and Northern Seas on various ships.

## Bay of Nolde, Nolde Bay

Bay of Nolde, Nolde Bay – a relatively large bay in the East Siberian Sea limited in the north and northeast by Aachim Peninsula; the depth is 1.5–2.5 m, extended to 15 km from the southeast to the northwest; the width of the bay is 7 km in the transverse section. The total area is 1,000 km<sup>2</sup>. The ridges approaching the bay in the west and southeast are composed of Triassic sandstones and shales. The highest point is Perkayon (302.8 m). In the vicinity of B.N., ancient rocks overlap younger ones due to tectonic movements. The delta of the small river of Keveem, composed of river alluvium, is located in the southern part of the bay. Aachim Peninsula, located at the north and northwest, is a plain area of approx. 150 km<sup>2</sup>, elevated by 15–35 m. The plain is composed of predominantly sandy and sandy loam soils. From

the east, the Peninsula borders with the delta of the river Pegtymel (the area is approx. 250 km<sup>2</sup>); the length of this river is more than 300 km. In its younger part, the delta forms an alluvial terrace composed of sands at the level of 0.5–0.8 m. The older parts of the delta are elevated by 2–2.5 m and broken by the network of thermokarst lakes and canals.

The climate of the area is harsh, arctic. The average monthly air temperature, according to the weather stations at Cape Shelagsky and Cape Valkarkay, is –24.9 to –28.2 °C in December–March, the absolute minimum –45 °C. In winter there are constantly blowing strong winds and frequent blizzards (on average – 69 days). There are no frost-free periods in the area of B.N. In summer fogs are frequent; the average number of foggy days per year is 78. Strong winds blow continuously. Calm sunny weather rarely lasts for more than 1 day. The mean monthly air temperature is +1.7 °C in June, +3.2 °C in July, and +2.7 °C in August. Snow cover usually becomes steady at the end of September, but in some years, it may happen a month earlier.

A coastal polynya is formed in mid-June. For the period from July to September, the sea is ice-free, but drifting ice floes near the coast may appear at any time of the year. Often, the edge of the pack ice is located at a distance of 40–60 km from the coast.

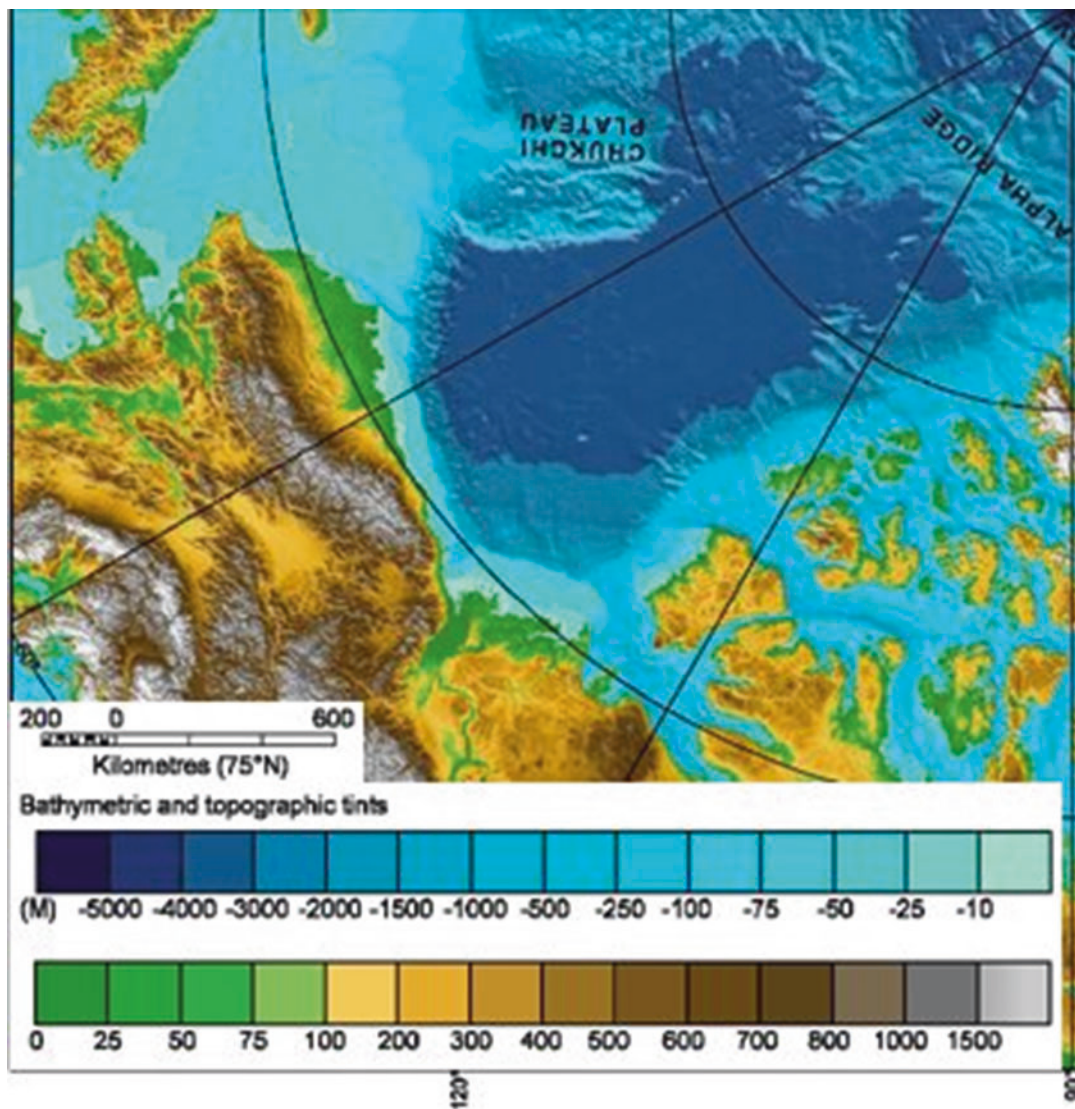
The water area of B.N. is separated from the coastal edge by a narrow pebble beach and coastal lowland areas. Halophytic meadows are well developed here on muddy bottoms of sand-muddy shoals, above which there are sandy beach ridges with sparse grassland vegetation and driftwood rubbles.

It is named in honor of B.A. Nolde, a baron, captain of the 2nd rank.

## Beaufort Sea

Beaufort Sea – a sea in the Arctic Ocean by the north shores of North America at the coast of Alaska and Canada between Banks Island





The Beaufort Sea: bottom topography (Source: [https://en.wikipedia.org/wiki/Beaufort\\_Sea#/media/File:BeaufortSeaBathymetry.jpg](https://en.wikipedia.org/wiki/Beaufort_Sea#/media/File:BeaufortSeaBathymetry.jpg))

(Canadian Arctic Archipelago) in the east and Cape Barrow, the Chukchi Sea, in the west.

The area comprises 481 thousand km<sup>2</sup>. Average depth is 1,004 m, and the deepest point is 3,749 m. Large rivers flowing into it are Colville, Anderson, and Mackenzie. Most of the B.S. is covered with drifting ice, but every summer the coast of Alaska and Canada is free from ice and open for navigation. The sea was named in honor of the English admiral F. Beaufort.

### Beechey, Frederick William (1796–1856)

Beechey, Frederick William (1796–1856) – an English naval officer, rear-admiral (1854), hydrographer, artist, member of the Royal Geographical Society and its chairman (1855), and researcher of North America, North Africa, and the Pacific Ocean. At the age of 10, he started to serve in the

Royal Navy and a year later became a midshipman. In 1818, he participated in the Arctic expedition of B. Buchan, in 1821 made a survey of the Mediterranean coast of North Africa, in 1825 B. was appointed to command HMS “Blossom” and to research the Bering Strait, and in the summer of 1826, he passed through the strait and reached latitude  $71^{\circ}23'31''$  N and longitude  $150^{\circ}21'30''$  W. He described Kotzebue Sound in the Chukchi Sea and was the first to map about a thousand km of Alaska coast – from Kotzebue Sound to Cape Franklin. He also discovered Wainwright Bay. In July of the same year, B. named three islands in the Bering Strait, two of which were named the Diomed Islands (big and little), and the third uninhabited island got the name Fairway Rock which has been preserved till modern times. Then in the same year in the southern part of the Pacific Ocean, B. discovered several atolls from the Tuamotu Archipelago. In autumn 1827, B. researched the coast of the Seward Peninsula. He put together a dictionary of the Eskimos in Alaska. In 1831 he published the results of his expedition to the Pacific Ocean and the Bering Strait together with the polar expeditions of 1825–1828 in a 2-volume book.



Beechey F.W. (Source: [http://en.wikipedia.org/wiki/Frederick\\_William\\_Beechey](http://en.wikipedia.org/wiki/Frederick_William_Beechey))

## Begichev (Bigichev), Nikifor Alekseevich (1874–1927)

Begichev (Bigichev), Nikifor Alekseevich (1874–1927) – a navy sailor, an Arctic explorer, and twice honored with Lomonosov Gold Medal. In 1895, he was recruited to the Navy and in 1897–1900 navigated on a training steam-sailing ship as a seaman and boatswain’s mate in the Atlantic Ocean, twice from Kronstadt to the Antilles.

As part of the crew of E.V. Toll’s expedition (1900–1902) being a boatswain, he participated in a high-latitude expedition in the Arctic Ocean aimed at studying the New Siberian Islands; on the steam-sailing schooner, “Zarya” reached Bennett Island (the De Long group of islands, the East Siberian Sea). During the expedition, Baron E. Toll and three of his companions from sledge and paddling group vanished forever, but B. and most of the crew returned to the mainland. In spring 1903, he was searching for E.V. Toll dog-sledged from the mouth of the Yana River to Kotelny Island and in August reached Bennett Island on a whale boat and found the winter quarters of the deceased members of the expedition. In this campaign, B. rescued the head of the searching party A.V. Kolchak, who fell through the ice.

In 1904, he participated in the defense of Port Arthur on the torpedo boat “Besshumny” and was interned to Qingdao Port with all the crew.

Starting with summer 1906, B. hunted for fur-bearing animals in Taymyr. At the entrance to the Khatanga Bay, where the maps showed a peninsula, he discovered an island (Bolshoy Begichev) in 1908 having circled it. To the west of it, he discovered another island (Maly Begichev) for the second time after Kh.P. Laptev. In 1915, he navigated from Lake Pyasino to the north, topped the western part of the Byrranga Mountains (the Begichev Ridge), and discovered three small rivers while in charge of a brigade for rescuing the crew parts that had stayed for winter in the ice on board the steam vessels “Taymyr” and “Vaygach.” Near the shores of the Kara Sea, he found a group of 52 seamen from the “Taymyr” and “Vaygach” that had covered almost 320 km and escorted them out to the Yenisei mouth. In the summer of 1921 near

the Taymyr Peninsula, he found three fire pits and different objects of expedition outfits and clothing on the southern coast of the Mikhailov Peninsula (130 km to the north of the Pyasina mouth) in course of a search operation for two lost Norwegians from the ship “Maud” whom R. Amundsen had ordered to send some letters. (Half a century later, that was established to be a stop of the crashed expedition of V.A. Rusanov).

In 1922 as a member of a geological team of N.N. Urvantsev, B. studied the Pyasina River, covering 850 km in a boat along the river and about 500 km on foot along the shore of the Kara Sea. To the west of its mouth on the shore of the Pyasina Bay, he found two big packages with documents of R. Amundsen’s expedition, miscellaneous papers, and petty objects including a watch and a wedding ring. Still further to the west, close to Dikson settlement, he found a human skeleton. These were the remains of one of the two deceased messengers of R. Amundsen (later B. was awarded a gold watch by the Kingdom of Norway). In the summer of 1926, B. navigated down the Pyasina to its mouth with a cooperative craft society, where he died.

In 1964, Dikson settlement saw the unveiling of a monument to N.A. Begichev under which his remains were reinterred.

B. gave his name to two islands (Bolshoy and Maliy Begichev) in the southwestern part of the Laptev Sea, a ridge stretching from the mouth of the Pyasina to the northeast up to the upper Tarea River.



Begichev N.A. (Source: <http://doskado.ucoz.ru/blog/2014-05-30-13635>)

Island was discovered in 1739 by Kh. Laptev and named St. Nicolas. For a long time, the islands were considered to be a peninsula until N.A. Begichev proved their island status in 1908–1913. He named the smaller one Nikolay Island and the bigger one Sizoy Island. In 1933 the islands got the name of Begichev. They are part of the Sakha Republic (Yakutia).

## Begichev Islands

Begichev Islands – two islands situated in the southwestern part of the Laptev Sea at the entrance to the Khatanga Bay in the southern part of the Laptev Sea. These are Bolshoy Begichev and Maliy Begichev lying 7 km away from it. In winter they are surrounded by thick pack ice and in the summer by separate drift ice. The surface presents a steeply sloping plain covered by tundra vegetation. Local people hunt for arctic foxes and reindeer. There is a resting place for walrus here. Maliy Begichev

## Belkov, Nikolai Semenovich (?–?)

Belkov, Nikolai Semenovich (?–?) – A Russian sailor, Arctic explorer, and Yakut manufacturer. In 1804 discovered salt and oil deposits close to the Khatanga Bay and in 1808 an island in the Laptev Sea (the New Siberian Islands) and named it St. John the Savior Island. Later the participants of the expedition renamed it in honor of the discoverer into Belkovskiy Island. In 1808–1811, he took part in an expedition under the command of M.M. Hedenstrom who was studying the New Siberian Islands. In 1814 he discovered Semenovskiy Island and in 1822 Vasilyevskiy Island



(a different version says that both the islands were discovered in 1815 by a Yakut M. Lyakhov). In 1936 Vasilyevsky Island was not found any more and by 1948 Semenovskiy Island also disappeared. They consisted mostly of frozen soil and were destroyed by water.

## Belkovsky

Belkovsky – the westernmost island in the New Siberian Archipelago in the Laptev Sea. It is the territory of the Sakha Republic (Yakutia) and is situated 24 km to the west of Kotelniy Island, from which B. is separated by Zarya Strait. The length is 25 km, the widest part in the south reaches 15 km. The area is about 500 km<sup>2</sup>. The island is formed by dark massive carbonate rock with occasional delves of pure calc spar of various intensity which in the southern and eastern parts of the island give way to unconsolidated rock. The surface is plain, not more than 120 m high. The shores are low, occasionally rocky. On the cliffs, there are huge colonies of birds, and on one of the spits at the Cape Severnyi, there is a resting place of walrus. The island was discovered by a manufacturer N.S. Bel'kov in 1808. The island was visited by P.F. Anjou, A.V. Kolchak, and F.A. Matisen, who made their astronomic observations there.

## Belousov, Mikhail Prokofyevich (1904–1946)

Belousov, Mikhail Prokofyevich (1904–1946) – a polar sea captain and the hero of the Soviet Union. He graduated from the marine department of the polytechnic in Rostov-on-Don. In 1924, he began his career as a seaman and then as a navigation officer on various ships in the Far East seas. In 1935, he became captain of the icebreaker “Krasin” and escorted several cargo boats from the west to the east along a big part of the Northern Sea Route. In 1937–1938, he escorted ships through the ice in the eastern sector of the Northern Sea Route. In 1939 as a captain of the



Belousov M.P. (Source: <http://www.polarpost.ru/forum/viewtopic.php?f=8&t=2018>)

icebreaker “Josef Stalin,” he was the first to perform a return thorough passage within one navigation along the Northern Sea Route from Murmansk to Port Provideniya (Chukotka) and back. In 1940 rescued a drifting icebreaker “G. Sedov” from the ice and reached latitude 87° 17'N, the northernmost point of free flotation through the ice in winter period. During the Great Patriotic War, (1941–1945) he was in charge of deepwater transportation in the Arctic.

His name was given to Cape Belousov on Ziegler Island in Franz Josef Land, a mount on Wrangel Island in the Chukchi Sea, and to the diesel and electric-powered icebreaker “Captain Belousov”.

## Beluga Whale or White Whale (*Delphinapterus leucas*)

Beluga whale or White Whale (*Delphinapterus leucas*) – a big mammal of the cetacean family

Beluga whale at the Atlanta aquarium. Photo by Greg Hume (Source: [https://en.wikipedia.org/wiki/Beluga\\_whale#/media/File:Beluga03.jpg](https://en.wikipedia.org/wiki/Beluga_whale#/media/File:Beluga03.jpg))



Delphinidae, suborder Odontoceti (toothed whale), which is sometimes called “a polar dolphin.” Its body length reaches 6 m and weighs 1.5 tons. The color of an adult B. is white which explains the name. It is spread in the circumpolar regions inhabiting the Arctic and adjacent seas. Within the Arctic sea region, there are two subspecies: the Kara B. and the Pacific Ocean B. It is well adapted to life among the ice. Its skin is completely devoid of hair but is protected by a thick (up to 2 cm) layer of epidermis. On the head, there is a thick fatty “pad” which allows the animal to wedge away or break the light ice. B. eats fish (capelin, polar cod, salmon fishes, herrings, etc.), shellfishes, and mussels. Hunting for fish it enters big rivers (the Ob, Yenisei, Lena, Amur, etc.), sometimes going 1,000 km and more up the stream, with lives in stocks having the population ranging from several dozens to a thousand. In winter, B. does not stay in the Laptev Sea, is prone to seasonal migrations, and reaches maturity when it is 2–3 years old. The female gives birth to one, rarely two, calf. It has great importance in trading and is valued for its fat (gives 250–400 kg), meat, and skin (up to 9 m<sup>2</sup>). Moreover, it has costly bone fat, which is used for lubrication. Year 2008 saw the launch of the program of studying, distribution, and population of B. in the Russian Arctic by means of aviation and

vessel observation. The scientists trace their migrations with the help of a radio beacon of the system ARGOS, study the population structure of B. with the help of molecular and genetic diagnostics, and evaluate the state of the animal health and the impact of different anthropogenic factors on them.

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## Belyaka

1. It is a spit, presenting a natural limit to the entrance of Kolyuchinskaya Guba, the Chukchi Sea, from the east. It stretches from the east to the west for 20 km and separates Belyaka Lagoon from the sea. The eastern part of the spit is no wider than 300 m and is formed by sand and pebbles. When heavy northern winds blow, the waves roll across it. To the west, the spit gets gradually higher; here the area presents waterlogged tundra with a lot of fresh lakes. The northwestern and eastern shores of the spit are fringed with a hilly sand beach 40–200 m wide. In the middle of the northern shore, the beach is followed by a cliff, which gets eroded and goes deep into the land. On the northern shore of the spit, small driftwood can be found. The shore off the sea is bold;

autoboats may come right up to them. Its western shore is even bolder.

2. It is a lagoon in the northeast of Kolyuchinskaya Guba, the Chukchi Sea. It was named in 1913 by the participants of the Hydrographical expedition in the Arctic Ocean after the name of a coal passer of the icebreaker “Taymyr” V.S. Belyak, who died in an accident on September 25, 1913. The lagoon got the name of the spit in later times.

## Bennett Island

Bennett Island – a part of the De Long Archipelago in the northeastern part of the New Siberian Islands, East Siberian Sea, the Sakha Republic (Yakutia), Russia. The area is about 150 km<sup>2</sup>, and the height is up to 426 m. The island has a prolate form stretching from southwest to northeast. The distance from the southwestern Cape Emma (named after the wife and widow of the American polar explorer D. De Long) to the northeastern Cape Emmelina (named after the wife and widow of a Russian polar explorer E. Toll) comprises 28 km and from the northwestern Cape Nadezhda to the southeastern Cape Sophia 14.5 km. There is Cape Sophia on the island which was named by A.V. Kolchak after his fiancée (wife and widow) Sophia Fedorovna Omirova and still bears this name. He married her in Irkutsk after returning from the last expedition of E.V. Toll. In the southwestern part of the island not far from Cape Emma, there is Mount De Long (426 m high), the highest point not only on the island but in the whole New Siberian Archipelago. The cliffs along the shores reach the height of 200–220 m. Virtually all the territory of the island excluding the coastal cliffs is covered with glaciers. On the territories where the glaciers go down to the sea, the shores consist of glacier ice. Here there are three isolated glacier domes. The biggest lies in the central part of the island and is named the Toll Dome with the area of 55.5 km<sup>2</sup> and 400 m high; the ice is 150–160 m thick. The water around the island is also frozen. The vegetation is extremely rare (tracheophytes and mosses), mostly in the flat coastal areas with

high bedding of long-term frozen soils and polygonal deposits on the surface.

The island was discovered in 1881 by the participants of the polar expedition on the yacht “Jeannette” under the command of lieutenant D. De Long and named after the publisher of the American newspaper “New York Herald” James Gordon Bennett who subsidized the expedition. De Long spent 10 days on the island. After its discovery, the island was identified by many scientists with the hypothetical Sannikov Land.

It was first described and mapped by the Russian Arctic explorer E.V. Toll in 1902. In January 1903 the Academy of Sciences organized an expedition aimed at rescuing E.V. Toll’s group. The expedition took place in the period from May 5 to December 7, 1903. The initial plan was to send the icebreaker “Ermak” in search of the expedition, but eventually it was decided to send 17 people in 12 dog sledges yoked by 160 dogs. The head of the expedition was A.V. Kolchak. It took the participants 3 months to reach B.I. and the travel was very hard. On August 4, 1903, on reaching B.I., the expedition discovered the traces of E.V. Toll and his companions: documents of the expedition, collections, geodesic instruments, and a diary. It was found out that Toll arrived at the island in the summer of 1902 and headed for the south having the food in stock only for 2–3 weeks. It became clear that the expedition had perished. The way back lasted for about 4 months. On December 7, 1903, Kolchak’s expedition returned to the mainland. The materials of the expedition served as a base for A.V. Kolchak’s monograph “Ice of the Kara and the Siberian Sea” published in 1909.

In 2003 to commemorate the 100th anniversary of E.V. Toll’s expedition rescue by the expedition of A.V. Kolchak, the island saw the erection of a 5-m high cross and a memory plate.

## Berezhnykh, Ilya Avtonomovich (1799–1839)

Berezhnykh, Ilya Avtonomovich (1799–1839) – a staff captain of the Corps of Fleet Navigators. B. graduated from the Baltic Navigator School.

Until 1819 he navigated on the ships of the Baltic Fleet. In 1820–1824, he was an assistant navigator who participated in reconnaissance marine surveying of the northern shores of Siberia and New Siberian Islands under the command of P.F. Anjou. He was the first to survey the southern and the eastern shores of Kotelný Island – the biggest among the New Siberian Islands. In 1825–1827, he was the assistant navigator in command of a detachment, conducted a reconnaissance marine survey of the coast between the Pechora River and Cape Kanin Nos, and circled Kolguyev Island on a kurbass. In 1827 he was accepted to the Corps of Fleet Navigators which led to his promotion to second lieutenant. In 1828–1835, he navigated the Mediterranean and the Baltic seas. In 1831 he was promoted to lieutenant and in 1835 to staff captain and moved to a shore unit.

He gave his name to Cape Faddeyevsky (New Siberian Islands), East Siberian Sea.

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## Bering Land Bridge National Preserve

Bering Land Bridge National Preserve – in 1978 acquired the status of a national monument and in 1980 of a national preserve in line with the adopted Alaska National Land Conservation Act, ANILCA. It lies in the north of the Seward Peninsula and serves as a reminder of Beringia land bridge which was 88 km long and 1,000 km wide. It is believed that during the Ice Age, this land bridge was used by first people and animals to move from Asia to North America. Around 15 thousand years ago as a result of massive ice melting and rise of the World Ocean level, the land bridge disappeared under the waters of the Bering Strait. The preserve includes wide expanses of tundra and Granite Mountains of volcanic origin.

Bering Land Bridge  
National Preserve: The  
Serpentine Tors (Source:  
[https://en.wikipedia.org/  
wiki/Bering\\_Land\\_Bridge\\_  
National\\_Preserve#/media/  
File:Serpentine\\_Tors\\_  
2007-013\\_NPS1.jpg](https://en.wikipedia.org/wiki/Bering_Land_Bridge_National_Preserve#/media/File:Serpentine_Tors_2007-013_NPS1.jpg))





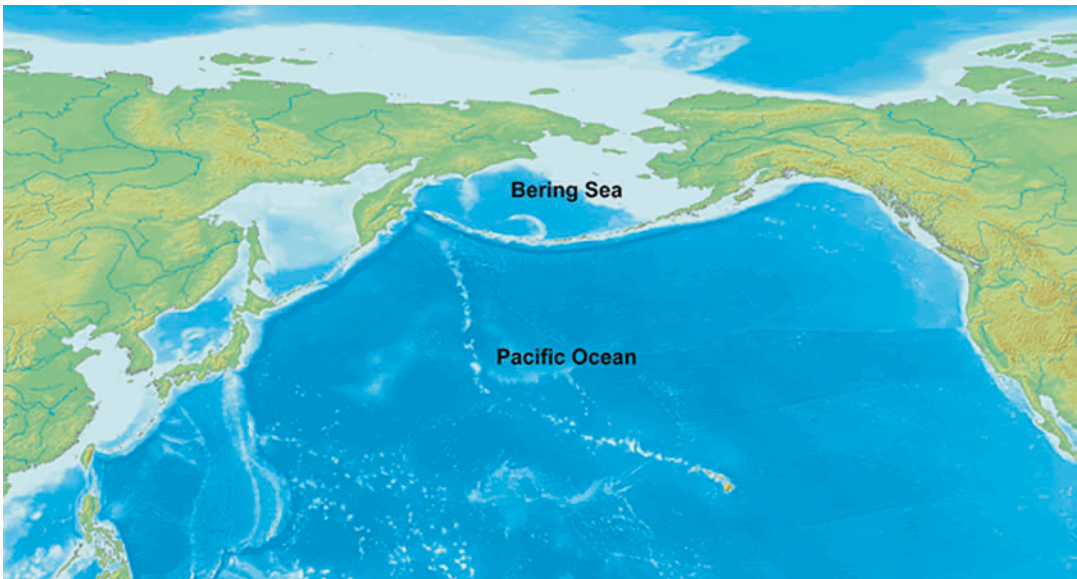
## Bering Sea

Bering Sea – a marginal sea of the Pacific Ocean situated between Asia, North America, the Aleutian, and the Commander Islands in its north. It was named after a Russian navigator V. Bering and stretches from the north to the south for more than 1,600 km and from the west to the east for 2,400 km. The area including the islands is 2,315 thousand km<sup>2</sup>. The deepest point is 4,773 m; in the north, the sea is less than 200 m deep. The shelf plate of the B.-S. presents 46 % of its total area, while the continental margin and the deep-sea bottom account for 17 % and 37 % respectively. The shores are low and cliffy. The shoreline has a complex outline. The biggest bays are Anadyr Bay and Olyutor Bay (close to Russian coast), and Norton Bay and Bristol Bay (Alaska, USA). The biggest islands are St. Lawrence Island, Nunivak Island, and Karaginskiy Island. In the northeastern part, the shelf is 20–140 m deep, while in the southwestern part, there are two deep-sea basins separated underwater by the Olyutor Ridge. Bottom sediments are multicolored sands and silt.

The climate is subarctic, moderate: average temperature in February ranges from  $-4^{\circ}\text{C}$  to  $-23^{\circ}\text{C}$ , while in August from  $+5^{\circ}\text{C}$  to  $+10^{\circ}\text{C}$ . Atmospheric precipitations reach 200–1,500 mm. The water temperature on the surface in February ranges from  $+2^{\circ}\text{C}$  to  $-1^{\circ}\text{C}$ , while in August from  $+5^{\circ}\text{C}$  to  $+10^{\circ}\text{C}$ . Salinity is 30–33 ‰. Most of the B.S. is covered with floating ice. The land ice starts to form in the bay in November. The currents form cyclonic gyres. The Anadyr and the Yukon rivers flow into it. Fishing trade is developed. More than 240 fishes are hunted here (salmon fishes, flatfishes, herring, saury, bastard halibut, codfish, crabs), as well as sea calves and whales. Fur seals and sea calves are well traded here. On the shores and the islands, there are colonies of birds. The sea is very important for the transportation. The main ports are Provideniya (Russia) and Nome (USA). The B.S. borders on the Chukchi Sea through the Bering Strait.

## Bering Strait

Bering Strait – a strait between Asia and North America, connecting the Arctic Ocean (the



The Bering Sea (Source: [https://de.wikipedia.org/wiki/Beringmeer#/media/File:Bering\\_Sea\\_Location.png](https://de.wikipedia.org/wiki/Beringmeer#/media/File:Bering_Sea_Location.png))



Bering Strait (Source: [https://en.wikipedia.org/wiki/Bering\\_Strait#/media/File:Bering\\_Strait.jpeg](https://en.wikipedia.org/wiki/Bering_Strait#/media/File:Bering_Strait.jpeg))

Chukchi Sea) and the Pacific Ocean (the Bering Sea). It is 96 km long, 35–86 km wide, and up to 60 m deep. The Diomed Islands (the Gvozdev Islands) divide it into three water ways. The strait brings warmer surface water of the Bering Sea to the north and cold waters of the Arctic Ocean to the south, to the western coastal zone. B.S. is covered with drift ice in the period from October to August. 65 km away from the coast of Alaska, there is King Island, also known as Ugiuvak. The coast of the B.S. is home to one of the extreme points of Russia, Cape Dezhnev (66° 05' N and 169° 40' W).

In the middle of the strait, between Big Diomed Island and Little Diomed Island, there lies the state border of the Russian Federation and the USA, set in 1867, as well as the date line. The Northern Sea Route runs through the B.S.

The B.S. was first passed by a Cossack S.I. Dezhnev and F.A. Alekseev (Popov) during the trade expedition on 1648 and later in 1728 by

the Russian expedition of V. Bering, after which the strait was named, and A. Chirikov. The American shore of the strait was discovered in 1732 by the expedition of Russian geodesists I. Fedorov and M. Gvozdev.

Further surveys of the strait belong to the English navigators J. Cook in 1778, C. Clerke in 1779, the Russian navigators and researches G.A. Sarychev in 1791, O. Kotzebue in 1816, M.N. Vasilyev in 1820 and 1821, and others. Many Russian men of war made a survey of a number of geographical points of the western shore.

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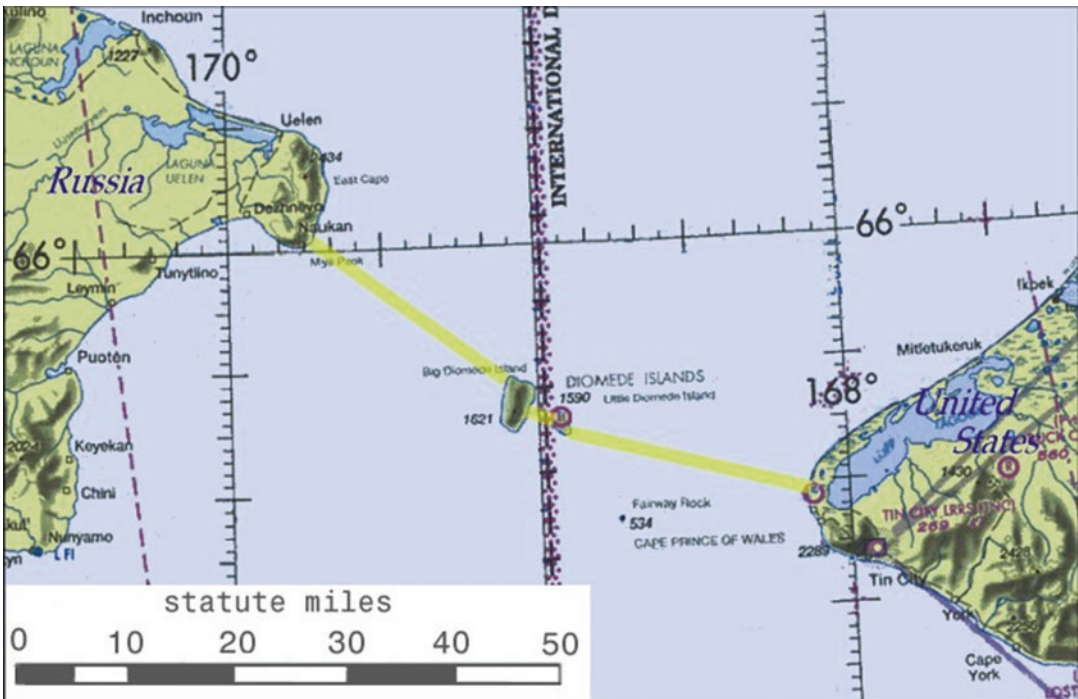
## **Bering Strait, Eurasia-America Transport Link**

Bering Strait, Eurasia-America Transport Link – a project aimed at connecting Eurasia and North

America (Chukotka and Alaska) with a tunnel, American Peace Tunnel, or a bridge, International Peace Bridge, across the Bering Strait. In 1890 the governor of Colorado State, USA, William Gilpin, was the first to come up with an idea to connect North America and Eurasia with the help of railway ferry line. The USA and Russia started to discuss the projects for construction of a railway line across the Bering Strait. An eminent researcher of Alaska Loïcq de Lobel addressed the Imperial Russian Technical Association with an idea of a project and a proposal to reconnoiter the route from Yakutsk to the Bering Strait and further to Alaska. Later, from the middle of the twentieth century, there appeared projects for construction of a railway transportation corridor between Chukotka and Alaska in a form of a tunnel or a bridge. The discussions resumed in the 1990s.

The project was discussed at big international conferences in Washington, Moscow, Anchorage, Novosibirsk, Fairbanks, and at the UN conferences for global projects in Barcelona, for marine

tunnels in Norway, for the Arctic problems in Finland, for the Arctic coast problems in Magadan, for large projects management in Norway, as well as at the meeting of the executive and engineering staff of North American Free Trade Agreement (NAFTA) railways in Montreal. In 1991 Washington, USA, saw the registration of an international nonprofit corporation “Interhemispheric Bering Strait Tunnel and Railroad Group” (IBSTRG), the Russian name of it being “Transcontinental.” In 1996 Anchorage, Alaska, USA, hosted a summit of a working group for cooperation “Russian Far East – Western Coast of the USA” within the framework of Gore-Chernomyrdin Intergovernmental American-Russian Commission. The work of the group resulted in a recommendation to Russia and the USA to support the project research as “having a big potential. . .” The project was listed as a priority program of the cooperation committee of APAC countries. In April 2007 Moscow hosted an international conference



Bering Strait, Eurasia-America Transport Link: Possible route of the bridge across the Bering Strait (Source: [https://en.wikipedia.org/wiki/Bering\\_Strait\\_crossing#/media/File:BeringBridge.jpg](https://en.wikipedia.org/wiki/Bering_Strait_crossing#/media/File:BeringBridge.jpg))



“Transcontinental main road Eurasia – America through the Bering Strait.” In the same year, the President of the Russian Federation V.V. Putin considered and approved of “The Strategy of Railway Transport Development in Russia up to 2030,” which stipulates the construction of a transcontinental railway line Pravaya Lena – Zyryanka – Uelen more than 3,500 km long with an entrance to the Bering Strait. Year 2011 saw an international conference “Transcontinental main road Eurasia-America” at which the Russian representative pointed out that the current variant of the project provides a multi-line connection: a high-speed electrified railway, a motor road, an electricity transmission line, and a communication line in a single transportation corridor. The cost of the project is estimated at 30–35 billion dollars which would be offset in 13–15 years time. This project has attracted the attention of both critics and adherents who suggest considering other projects partaking to the connection of the two continents.

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### **Bering, Vitus Ionassen (Bering, Ivan Ivanovich – After Christening) (1681–1741)**

Bering, Vitus Ionassen (Bering, Ivan Ivanovich – after christening) (1681–1741) – a prominent Russian sailor, officer in the Russian Navy, captain commander, in charge of the First and the Second Kamchatka expeditions, which laid the foundation to systematic research of polar seas, northeastern coast of Asia, Kamchatka, the Commander Islands and the Aleutian Islands, as well as northwestern America. He devoted all his life to the search of an answer to the question “whether or not Asia joins America” and was born in Horsens (Denmark). In 1703, he graduated from Sea Cadet Corps in Amsterdam and navigated twice to the East Indies on a Dutch ship. In 1704, as an experienced sailor, he was invited by K.I. Cruys, Peter the Great’s associate in Russian Navy creation, to serve as a second lieutenant in Russia. In 1705, he took part in the defense of the river Neva mouth from the Swedish Army in

command of the schuyt #1. In 1706, he was promoted to lieutenant and in 1710 to captain-lieutenant; he navigated the Gulf of Finland on a guard ship and was moved to the Azov Fleet. A year later, in command of the snow “Templar” with 12 cannons on board participated in the Pruth River Campaign of Peter the Great. After returning to the Baltic Fleet, he commanded various ships, executing the Tsar’s special orders. In 1714–1715, he ferried the warships “Pearl” and “Selafail” from Hamburg and Archangelsk to Riga and Kronstadt. In the period from 1716 to 1719, he commanded these two ships. In 1720, he was promoted to frigate captain. In 1721, he commanded the “Marleburg” with 60 cannons on board and in 1723 the largest in the Russian Navy battleship “Lesnoe” with 90 cannons on board. In 1724, he resigned but later was restored at the order of Peter the First at the rank of captain.



Bering V.I. (Source: [http://www.sormlib.nnov.ru/kraevedenie/sor\\_ist/sor\\_ist5/sor\\_ul\\_persona/bering\\_vi](http://www.sormlib.nnov.ru/kraevedenie/sor_ist/sor_ist5/sor_ul_persona/bering_vi))

In 1724 Peter the Great orders to get ready for the Kamchatka Expedition. In 1725 B. was appointed the head of the First Kamchatka Expedition (1725–1730), the official aim of which was to learn for sure if there is a land bridge or a strait between Asia and America. An important role in the organization and implementation of the expedition was played by B.'s assistant, A.I. Chirikov. The participants of the expedition researched and mapped the Pacific coast of Kamchatka and Northeast Asia, discovered the Kamchatka and the Ozerny Peninsulas, Kamchatskiy Zaliv (Bay), Karaginskiy Zaliv (Bay), Kresta Bay, Providence Bay, and the Diomed Islands and St. Lawrence Island. The expedition floated along the eastern shore of Kamchatka, the southern and eastern shores of Chukotka, passed the strait (subsequently called after Bering), without realizing it, up to 67°18'N where it lost the land out of sight, and returned not having found the answer to the question about the strait (62°24'N) but having made the following conclusion: "it is impossible that Asia should connect to America." Bering managed to survey some parts of the Kamchatka coast and discovered the Avachinsky Zaliv (Bay). He was the first to describe and make pictures of more than 3,500 km of the western coastal line of the sea, which was later called the Bering Sea.

On returning to Saint Petersburg in 1730, B. suggested a plan of exploration of the mainland northern coast and reaching the mouth of the Amur, the Japanese Archipelago and America by means of sea. In 1733 he was appointed the head of the Second Kamchatka (Great Northern) expedition, A. Chirikov becoming his deputy. On June 4, 1741, B. and Chirikov set off from the Kamchatka Coast to the southeast, commanding two packet boats. Having searched in vain for the land in the northern part of the Pacific Ocean, the ships headed northeastward, but on June 20 they separated forever because of thick fog. On the ship "St. Peter," B. reached the coast of North America on July 21, 1741. B. was the first to cross the waters of the Gulf of Alaska; noticed a mountain range (St. Elias Mountains); discovered Tumannyi Island (now called Chirikov Island), five islands (Evdokeevskie), snow mountains (Aleutian Range) on a "hardened shore" (the Alaska

Peninsula), and the Shumagin Islands at the southwestern edge; and was first to meet the Aleutians. On his way back from America to Kamchatka, he discovered parts of the Aleutian Islands and the islands subsequently called the Commander Islands. On November 4, 1741, the waves drove the ship to an uninhabited island. The ship was damaged and the crew was suffering from sea scurvy; that is why Captain Commander B. decided to stay there for winter where he died after a serious disease and 14 members of his crew died of scurvy. Later the island was named after Bering. He was buried on the shore of a bay named Commander Bay.

As a result of the 10-year work of the northern teams during the Second Kamchatka Expedition, the northern and the eastern coasts of Russia and inner territories on East Siberia appeared on the maps; the ways to America and Japan were found; North and West coasts of America were discovered as well as the Kuril and the Aleutian Islands, the outlines of two big peninsulas (Gydan and Taymyr), and dozens of new islands; numerous bays became known to the specialists, and the navigable depths were defined. Scientists acquired the information about the climate, tides, ice regime of the Arctic, and other particularities. The base for further exploration of the Arctic was laid.

B. gave his name to the sea in the northern part of the Pacific Ocean, the strait, separating Asia from America, a cape, a mount and a settlement in the Gulf of Anadyr, an island in the Commander Archipelago, a bay on Spafaryev Island (the Okhotsk Sea), and a glacier in Alaska. In the honor of B., the Commander Islands, Commander Bay, and the sunken land (Beringia) that used to join Asia and America were named.

The USSR initiated the construction of a multipurpose icebreaker and transport supply ship "Vitus Bering" to work in the Arctic.

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## Beringia

Beringia – a region including marine and land territories, bordered in the west by the Lena river (Russia), in the east by the Mackenzie River

(Canadian Province British Columbia), in the north by the 78 parallel of the northern latitude in the Chukchi Sea, and in the south by the tip of the Kamchatka Peninsula.

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## Beringia

Beringia – the name of the Russian National Natural and Ethnic Park on the territory of the Chukchi Peninsula, Russia, including land and marine parts of the Chukchi and Bering Seas. It was opened in 1993.

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## Beringia, Bering Land Bridge

Beringia, Bering Land Bridge – in archeology and paleogeography, the name of a land bridge which used to connect the territories of the Eurasian (Chukotka) and American (Alaska) continents. It was 2,000 km wide from north to south. During the previous three million years, the territory of B. rose and sank as a result of general rise in the World Ocean level at least six times. The last time the continents separated was about 10–11 thousand years ago, but the land bridge had existed for 15–18 thousand years before this. Scientists believe that B. used to serve a natural bridge which facilitated the colonization of the American continent. The concept of B. was more fully defined by an American scientist D.M. Hopkins. B. is a part of Beringida.

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## Beringida

Beringida – a paleobiogeographical land covering the continental shelf of the Laptev Sea; East Siberian, Chukchi, and Bering seas; the adjacent marginal lowlands of northeastern Asia and Alaska; and low-hill terrains with vast depressions, fringing them. The term was suggested by A. Sher.

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## Bidarrah

Bidarrah – an Eskimo open fishing transport and race boat. It is the oldest boat type that the Chukchi Sea peoples have. It is light, has a timber frame, and is tightly covered with seal or walrus skin. Large Bs were 10 m long and had a square sail made of ringed seal skin of about 10 m<sup>2</sup>. To hunt whales and other sea animals outside the shore, the navigability of Bs could be improved by fastening inflated seal skins to the broadsides. The racing B. usually has six rowers and a helmsman.

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## Billings (Billinks), Joseph (1761–1806)

Billings (Billinks), Joseph (1761–1806) – captain commander of the Russian Navy. He was born in England, starting from 1766 was listed in the Royal Navy, participated in the third (and last) circumnavigation of J. Cook (1776–1780), and took part in the navigation of expedition ships in the Bering and the Chukchi seas. In 1783, he was accepted to the Russian Navy as a midshipman. As a lieutenant commander, he was appointed head of the “secret” North-Eastern Geographical and Astronomical Naval Expedition (1785–1793) aimed at research and survey of the shores of northeastern Siberia and the Aleutian Islands. His assistants were R. Gall, G.A. Sarychev, and K.T. Bering, V. Bering’s grandson. In 1786, B. arrived in Okhotsk and moved to Verkhnekolymsk where he started the construction of two ships, “Pallas” and “Yasashna,” on the bank of the Yasashna River. Three attempts (1787) to reach the East Siberian Sea from the mouth of the Kolyma and to round the Chukchi Peninsula were not successful because of severe ice conditions. However, the members of the expedition made the first, relatively precise, survey of the coast between the Kolyma River and Ayon Island (300 km). The expedition returned to Okhotsk. In 1789 B. discovered Saint Jonas’ Island in the Okhotsk Sea while moving from Okhotsk to Petropavlovsk



Beringia, Bering Land  
 Bridge (Source: [https://en.wikipedia.org/wiki/Beringia#/media/File:Beringia\\_-\\_late\\_wisconsin\\_glaciation.png](https://en.wikipedia.org/wiki/Beringia#/media/File:Beringia_-_late_wisconsin_glaciation.png))



B

on the ship “Slava Rossii” built in Okhotsk. In 1790 on the same ship, he navigated from Kamchatka to Kodiak Island (the northern shore of the Gulf of Alaska) and participated in discovery and survey of separate Aleutian Islands and in the research of the Gulf of Alaska coast. In 1791 he moved from Petropavlovsk to Unalaska Island and from there to St. Matthew Island and St. Lawrence Island and entered the Bering Strait. B. landed on the American coast close to Cape Rodney. Further the expedition moved to the Gvozdev Islands (the Diomede

Islands) and Saint Lawrence Bay. In the same year, he passed the command over the ship to G.A. Sarychev and in winter 1791–1792 made a research trip around the Chukchi Peninsula as far as Chaunskaya Guba (Bay) together with a small company on reindeers. B. kept a register of all his expeditions and made 20 maps and plans all by himself. These became a base for inner Chukotka region maps created before 1931.

In 1793 after the end of the work, B. went to St. Petersburg together with G.A. Sarychev where

they for 2 years were preparing a detailed report of the expedition. The report consisted of three books (each is about 2,000 pages), written in English and translated into Russian subsequently.

In 1795 he was moved to the Black Sea Fleet and appointed commander of the battleship “Apostle Andrey” with 50 cannons on board. In 1797–1798, he commanded the “Apostle Andrey,” and then on the transport ship “Rozhdestvo Bogoroditsy,” he participated in surveys of the northern shores of the Black Sea from the Kerch Strait to the Dniester mouth. B. compiled and published “The Atlas of the Black Sea” (1799). In 1799, he was appointed captain commander and retired.

He gave his name to a cape, a settlement, and a lagoon in the De Long Strait, the East Siberian Sea, a glacier in Chugach Bay, the Gulf of Alaska, the Pacific Ocean, and a cape in the Aleutian Islands, the Bering Sea, USA.

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## Billings Cape

Billings Cape – a cape on the coast of the De Long Strait, Russia. It is a geographical reference point, separating the coast of the East Siberian Sea from the coast of the Chukchi Sea. The cape is a complex of a huge accumulative form similar to a barrier spit separating from the sea the water areas of several oval-shaped lagoons. The highest index of a storm roller comprises 5.2–5.4 m, and together with a dune on top of the storm roller crest, it amounts to 6.8 m. Here there is a polar hydrometeorostation “Cape Billings.” It was named after the captain commander and hydrographer of the Russian Navy Joseph Billings. To the south of the cape, there is rather a large lagoon named Valkakynmangkak.

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## Blue Whale (*Balaenoptera musculus*)

Blue Whale (*Balaenoptera musculus*) – a marine mammal and a rorqual of Balaenopteridae family. It is the largest existing animal and the heaviest

that ever existed. It inhabits the area from the Chukchi Sea, Greenland, Spitsbergen, and Novaya Zemlya to the Antarctic. It is very rarely seen in the tropical belt. Today its population is small. Its back and sides are dark gray, with bluish shades. The body is dotted with light-gray spots and marble pattern. In the tail part, the spots are more concentrated, and tail stem is marble-like due to a great number of parasites injuring the skin. A dorsal fin is very small and located close to the tail, and its height is around 1 % from the body length. The upper jaw has 750–800 pitch-black plates up to 1 m high. The spout in the form of prolonged inverted cone is 6–9 m high. B.W. is a typical plankton eater: it feeds on small crustaceans in the upper sea layer. B.W. does not eat fish, and its stomach capacity is 1.5–2 tons crustaceans, average length is around 24 m, and average size of male and female in the Northern Hemisphere is 22.8 and 23.5 m, respectively. The maximum length of a female whale caught in the Barents Sea is 30 m weighing 135 tons. In 1909 a B.W. 33.58 m long and weighting 200 tons was measured. The tongue of the B.W. weights 4 tons. When feeding, B.W. swims 11–15 km/h, while a frightened animal can develop a speed of 33–40 km/h. However, B.W. is able to maintain such speed for only several minutes. Whales have no olfaction, their eyesight is relatively weak, but the hearing is perfect. These animals signal one another to find way and get food with the help of ultrasound. They mature at 2 years old. Female whales give birth to one calf once in 2.5 years (doubles and triples are very rare). A newborn 7-m-long calf weighs 2 tons. With the help of contraction of special muscles, a female whale injects in the calf’s mouth a very nutritious milk – it contains only 50 % of water. Whale calves are fed on the milk during 7–8 months. One B.W. is the source of 16–20 tons of grease and 35–40 tons of eatable meat on average. In 1966 the International Whaling Commission prohibited whale catching for 5 years, later on the prohibition was prolonged for indefinite term. In the nineteenth century, B.W. was usual in waters near the Kola Peninsula and Novaya Zemlya, and today they are never seen there. B.W. live alone or in small groups. At present it



Blue whale (Source: [https://en.wikipedia.org/wiki/Blue\\_whale#/media/File:Anim1754\\_-\\_Flickr\\_-\\_NOAA\\_Photo\\_Library.jpg](https://en.wikipedia.org/wiki/Blue_whale#/media/File:Anim1754_-_Flickr_-_NOAA_Photo_Library.jpg))

inhabits the following regions: the northern part of the Bering Sea, the waters of the coasts of Peru and Chile, and the Grand Banks. B.W. is listed in the Red Book.

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### **Bochek, Aleksandr Pavlovich (1892–1980)**

Bochek, Aleksandr Pavlovich (1892–1980) – sea captain. He served in the Russian Navy since he was 16 and graduated from Aleksandrovskoe Maritime Academy in Vladivostok. In 1921 he participated in the campaign aimed at rescuing of a steamer “Kishinev” (later “Pamyat Lenina”) from White Guardsmen’s hijack. In 1922, he became its captain. In 1925–1928, he served as a marine pilot in Vladivostok Port, in 1931 commanded the ferrying process of the river steamer “Lenin” from Yakutsk to the Kolyma River, and in 1932–1933

was a deputy and later head of the Special North-Eastern Expedition aimed at the delivery of cargoes from Vladivostok to the Kolyma River and became head of the Lena-Kolyma Expedition aimed at ferrying of river craft. He participated in escorts of the group of fleet destroyers along the Northern Sea Route to the Far East. In 1936, he became the captain of the steamer “Anadyr” and in 1937–1938 of the steamer “Mossovet” during the first double thorough passage of the Northern Sea Route. In times of the Great Patriotic War (1941–1945), he was the deputy commissioner of the USSR buying committee in the USA for marine transport. After the war, he worked in the People’s Commissariat for External Trade and chief directorate of the Northern Sea Route, Interregional Storage, and the Ministry of Marine.

He is the author of a number of manuals: “Maneuvering a ship with a mechanic engine” (1953), “Marine Practice” (part 2, 1959), and memoirs of his travels “All my life in the sea” (1969).



Капитан А. П. Бочек.

Bochek A.P. (Source: <http://www.polarpost.ru/forum/viewtopic.php?f=8&t=5736>)

A motorship of Murmansk Steamship Line is named after him.

## Bolshaya Balakhnya

Bolshaya Balakhnya – a river in Krasnoyarsk Krai, Russia. Its length is 532 km, and the basin area is 12.6 thousand km<sup>2</sup>. It originates from lakes in the central part of the North Siberian Lowland, flows eastward through the waterlogged tundra and to a small bay on the western coast of the Khatanga Bay in the Laptev Sea, nourishes from rainfall and snow, freezes at the end of September, and breaks up at the beginning of June. It is rich in fish (muksun, Siberian white salmon, Arctic salmon).

## Bolshaya Chukochya (Chukochya, Revum-Revu)

Bolshaya Chukochya (Chukochya, Revum-Revu) – a river in the Sakha Republic (Yakutia), Russia. It flows through the Kolyma Lowland and into the East Siberian Sea. Its length is 758 km, and the basin area is 19.8 thousand km<sup>2</sup>. The bed is meandering. It nourishes from snow and rainfall, and the seasonal flood comes in June. It freezes in October; in winter is frozen down to the bottom and flow resumes in May. Large tributaries are Savva-Yuryakh, Oler, and Semen-Yuryakh.

## Bolshaya Kuropatochya

Bolshaya Kuropatochya – a river in the Sakha Republic (Yakutia), Russia. It originates within the Kolyma Lowland and flows northward through tundra among numerous lakes and into the East Siberian Sea, creating an estuary. Its length is 391 km. The basin area is 6,240 km<sup>2</sup>, nourishes from rainfall and snow, freezes in October, and remains under the ice till the beginning of June.

## Bolshevik

Bolshevik – the southernmost and second largest island in the Severnaya Zemlya Archipelago. It is washed by the waters of the Kara Sea and the Laptev Sea, part of the Krasnoyarsk Krai, Russia, and is separated from the mainland (Cape Chelyuskin) by Vilkitsky Strait, from other islands of the archipelago – by Shokalskiy Strait. The area is about 11.5 thousand km<sup>2</sup>. In the middle of the island, the relief is flattened and dome shaped, reaching the height of 600 m; about 30 % of the land is covered with glaciers and presents an arctic wilderness. Close to the eastern shore of the island there lie several small islands. B. was discovered in 1913 and thoroughly studied by the



Soviet Polar Expedition of G.A. Ushakov and N.N. Urvantsev in 1931–1932.

## Bolshoy

Bolshoy – an island in the Severnaya Zemlya Archipelago, Taymyr Dolgano-Nenets Autonomous District, Russia. It is situated in the central part of the archipelago close to the coast of Bolshhevik Island, to the northwest of the Faddey Bay, and to the east of the Komsomolskaya Pravda Islands and part of the Beregovye Islands. Another island of the group, named Maly, lies to the northwest of it and has an oval shape stretching from the southwest to the northeast. The shores are low-sloped and flat.

## Bolshoy Baranov

Bolshoy Baranov – a cape on the mainland coast of the East Siberian Sea between the mouths of the rivers Kolyma and Rauchua, Chukotka Autonomous District, Russia. It was opened in the middle of the eighteenth century. F.P. Wrangel believed that it took its name “from a large numbers of wild sheep” (“baran” is a Russian word for “a sheep”).

## Bolshoy Begichev

Bolshoy Begichev – an island among the Begichev Islands situated in the entrance to the Khatanga Gulf in the southwestern part of the Laptev Sea. It is part of the Sakha Republic (Yakutia). The area of the island is about 1,800 km<sup>2</sup> with the total length of the shoreline amounting to 180 km. The length is 61 km and the width 57 km.

To the west there lies Maly Begichev Island (7 km wide) separated from B.B. by Pioneer Strait. 14 km to the north, there is Preobrazheniya

Island. The distance from the southernmost point of B.B. Island to the mainland (the Nordvik Peninsula) is 9 km. The central part of the island belongs to a vast upland named Kiryaka with the highest point of 198 m. Almost radially from it, there lie several rivers, cutting through the Krutaya Gryada Range in the north (120 m high) and the short Meridiannaya Gryada Range (80 m high) in the east. The shores of the island are formed by loose marine and delluvial and soliflual depositions and are subject to abrasion, and on the eastern coast, there is a group of accumulative islands creating an island barrier. Long abrasive areas alternate with small accumulative forms. The northern shore is straightened and abrasive. Off the western shore of the island, there stretches westward the low Oleniy Peninsula 15 km long. The lowlands with many small lakes are abundant in the northwest, northeast, and southwest of the island, as well as in the Oleniy Peninsula.

The longest river is the Ilistaya (34 km). There are five rivers here with total length of more than 20 km. The island is marked by cryogenic processes and forms of relief caused by them: polygonal tundra, boolgunyakhs, and thermokarst. Significant areas of the coast are occupied by sandspits, and the northeastern end of the island is covered by friable sands (Keter-Kumak stow). The surface is covered with tundra vegetation. Polar foxes and reindeer live on the island and walruses in the coastal waters.

Until 1908, it was considered a peninsula after having been taken for it by mistake in 1736 by the head of Lena-Khatanga group of the Great Northern Expedition (1733–1743) V.V. Pronchishchev. Till the beginning of the twentieth century, cartographers repeated this mistake, though local traders at the time were aware of the existence of an island in this area. They called it Sizoy. B.B. was officially proven to be an island in 1908 by N.A. Begichev. He mapped its approximate position and named it Sizoy Island. It was more thoroughly studied by N.A. Begichev in 1910–1911. In 1912 the Russian Geographic Society gave it an official name in honor of its first researcher N.A. Begichev. Consequently



after he discovered another small island in the Khatanga Bay, the former was named Bolshoy Begichev Island and the latter Maly Begichev Island.

### Bolshoy Lyakhovsky (Blizhniy)

Bolshoy Lyakhovsky (Blizhniy) – an island from the group of the Lyakhovsky Islands in the New Siberian Archipelago, the Sakha Republic (Yakutia). It is separated from the mainland by Dmitry Laptev Strait and from Maly Lyakhovsky Island by Proliv Eterikan (Eterikan Strait). The length is about 116 km, the width is about 65 km, the height is 270 m. The area is 5,200 km<sup>2</sup>. The relief is marked by two parallel ranges with a fault trough in the middle which is filled with quaternary depositions and fossil ice. The rock ledge is presented in form of separate massifs. There are many fossil remains of quaternary period animals (like mammoths) and forest cover. The surface of the island is covered with tundra vegetation. The island is inhabited and was visited as early as in the seventeenth century, but was first mentioned in the notes of Yakov Permyakov in the beginning of the eighteenth century. In 1712 B.L. Island was visited by a Cossack Merkuriy Vagin and in 1770–1773 an industrialist Ivan Lyakhov whose name was later given to the island. In 1928 the Academy of Sciences of the USSR built the first weather station on its southeastern shore. The locals often called the island “Kovrizhka.” In the western part of the island there lies the Kigilyakh Peninsula, presenting a massif connected with the island itself by a low land bridge. The peninsula is of an irregular quadrangle. There is a lighthouse in this part of the island.

### Bora

Bora – a heavy katabatic cold wind blowing from the mountains to the coast and spreading over the water surface at the distance of 40–50 km. It

usually blows during the frontogenesis. The wind velocity may reach 60 m/s and the gusts 100 m/s.

### Bowhead Whale (*Balaena mysticetus*)

Bowhead whale (*Balaena mysticetus*) – a large mammal in the suborder Mysticoceti. The size of adult B.W. usually reaches 15–16 m, sometimes 20 m. The head accounts for about a quarter of the whole body length. There is no dorsal fin. The throat and abdomen are smooth. The head, back, and sides are dark gray or black, and the lower parts of the body are whitish or white. In the mouth, there are 300–400 whalebones (up to 4.5 m long). It was earlier very widely spread in the Arctic Ocean as well as in the Chukchi, the Bering, and the Okhotsk seas. By now it has only survived in the waters washing the Chukchi Peninsula and the Alaska North Slope. The coast of the latter is the place of migration for about 10 thousand whales. B.W. is a typically Arctic animal, lives by the ice edge and among the open drift ice, feeds on small invertebrates from the surface sea layers (shellfish, sea butterflies, and others), and mates at the end of summer. In February or March, the females give birth to one whale calf 3–5 m long. Bowhead whale hunting is prohibited everywhere, but the aboriginal population of Chukotka and Alaska is officially allowed to hunt several dozens of B.W. for their own purposes.

### Boyle, Roman Platonovich (1794–1854)

Boyle, Roman Platonovich (1794–1854) – a vice admiral, Russian circumnavigator, researcher of the eastern coast of the Bering and Chukchi Seas. He was born to a family of an English marine officer who started to serve in Russia in times of Ekaterina II's reign. In 1811, he graduated from the sea Cadet Corps in the rank of a midshipman and till 1817 navigated in the Baltic and North seas. In 1819–1822, he circumnavigated the

Bowhead whale (Source: [https://en.wikipedia.org/wiki/Bowhead\\_whale#/media/File:Bowheads42.jpg](https://en.wikipedia.org/wiki/Bowhead_whale#/media/File:Bowheads42.jpg))



world on a sloop “Otkrytie” (Discovery) visiting Kamchatka and the Russian America and participated in surveys of the eastern coasts of the Bering and Chukchi seas up to parallel 71°06′ northern latitude, St. Lawrence Island, in the discovery of Nunivak Island and the research of the Pribilof Islands and the San Francisco Bay. In 1828–1829, he took part in the Dardanelles blockade. In the period from 1830 to 1849, he served in the Baltic Fleet, in 1850 was appointed commander of Arkhangelsk Port in a rank of a Rear Admiral (1842), and in 1851 was promoted to vice admiral.

He gave his name to a cape on Otkrytie Island in the Bering Sea.

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### **Broad Whitefish (Chir, Shokur) (*Coregonus nasus*)**

Broad whitefish (Chir, Shokur) (*Coregonus nasus*) – a large freshwater fish of the salmon family (Salmonidae), whitefish genus (*Coregonus*). It has a small head, a bent snout, and small eyes, and the color is dark. The fish has silvery-yellow stripes on the scales on each side of the body. The weight is up to 16 kg, typically 2–4 kg. Body length is 80 cm. The fish feeds in the lakes and reaches sexual maturity at its 7th year of life. It spawns in rivers, less often in lakes. From October to November, it spawns under the

ice. The fish produces up to 135 thousand large eggs, 4 mm in diameter. It feeds on small molluscs and crustaceans. The life span is 15 years. The species is a valuable commercial fish.

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### **Brooks Range**

Brooks Range – a mountain range in the north of Alaska, USA. It stretches from the west to the east from the coast of the Chukchi Sea to the borders of Alaska. The height is 3,048 m and is formed by limestone and crystalline schists. The peaks have a form of a kettle black, and the slopes are cliffy. The highest peaks are covered with permanent snow. There is mountain moss and lichen tundra here. In the lower area of the southern slope, there are light coniferous forests.

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### **Bugor, Vasilii Yermolayevich (?-?)**

Bugor, Vasilii Yermolayevich (?-?) – a pathfinder and an Arctic Russian mariner, one of the discoverers of East Siberia. In 1628, he followed the southernmost way from the Yenisei to the Lena: along the rivers Angara, Ilima, Igirma, Kuta, and Lena and continued the discovery of the Angara Range. In the summer of 1647, he went in a Koch



Brooks Range (Source: [http://en.wikipedia.org/wiki/Brooks\\_Range](http://en.wikipedia.org/wiki/Brooks_Range))

boat down the Lena and reached the Indigirka via the sea, later reaching the Kolyma River. Together with M. Stadukhin, he reached the Anadyr through the Anloy Range and the Anadyr Highland and returned to the Kolyma. In 1656 and 1657, he navigated twice the East Siberian and the Laptev seas hunting for walrus.

them in the ice, B. and his companions skid as far as the Indigirka mouth and went up the river to Uyandinskoe Winter Quarters. In early 1651, he traversed the Alazeya Upland in sledges and reached the Srednekolymsky settlement (ostrog) where he became a garrison commander. B. left a detailed description of his travel.

### **Buldakov, Timofey Mikhailovich (?–?)**

Buldakov, Timofey Mikhailovich (?–?) – a cosack from Yakutia, pathfinder and Arctic mariner, and one of the Russian discoverers of East Siberia, whose travels around the Arctic Ocean marked the beginning of the Northern Sea Route exploration. In 1649, he was sent as a commissioner to the Kolyma. Accompanied by Cossacks on Koch boats, he left Yakutsk and went down the Lena as far as Zhigansk Region. In 1650 B. reached the Laptev Sea, but strong winds kept him in the Lena mouth for a month. Then he reached Buor-Khaya Bay where the Koches got trapped in ice. Leaving

### **Bunge, Aleksandr Aleksandrovich (1851–1930)**

Bunge, Aleksandr Aleksandrovich (1851–1930) – a medical professional, a zoologist, an East Arctic explorer, and a doctor of medicine (1880). After graduating from Derpt (Tartu) University, he participated as a doctor in an expedition of the Russian Geographic Society to the Lena mouth in 1881. For 2 years, he worked as head of a weather station in Sagastyr Island (the Lena mouth, Yakutia). The station was carrying out the program of the First International Polar Year. In 1885–1886, he was commander of an



Bunge A.A. (Source: <http://commons.wikimedia.org/wiki/>)

expedition of St. Petersburg Academy of Sciences to the northern Yakutia and the New Siberian Islands (his assistant being E.V. Toll), personally explored the Yana and Bolshoy Lyakhovsky Island where he studied fossil ice, collected bones of ancient mammals, and observed modern animals. In 1890, he navigated the Yenisei and in 1899–1900 stayed for winter in the Hornsund Fjord on a Russian station Spitsbergen which made measurements of the geographical meridian. As a ship's medical officer, he navigated the Arctic Seas, picking zoological collections. In 1903, he became a flagship doctor of the Pacific Ocean squadron and participant of Port Arthur defense. Starting from 1908 is a flagship doctor of the Baltic Fleet. As an experienced polar explorer, he was a member of a committee for the Arctic expeditions organization at the Main Hydrographical Board.

B. gave his name to a river, a lake, a mountain, a plateau and a glacier in the Svalbard Archipelago, a glacier in the Novaya Zemlya Archipelago, the central part of Kotelný Island, and the northernmost species of a groundhog.

## Bunge Land (Zemlya Bunge)

Bunge Land (Zemlya Bunge) – an island and a sandbank, connecting the western part of Kotelný Island and Faddeyevskiy Island in the central part of the New Siberian Archipelago lying between the Laptev Sea and the East Siberian Sea, Yakutia, Russia. The area is 6,200 km<sup>2</sup>. It is an arctic desert, a tundra, and a polar station “Zemlya Bunge.” The island was discovered in 1811 by a tradesman Y. Sannikov. It was explored in 1886 by the participants of the Arctic Expedition of the Academy of Sciences under the command of the Russian zoologist and polar explorer A.A. Bunge and named after him by E.V. Toll. It is included into the protected zone of the State Natural Reserve “Ust-Lensky.”

## Buorkhaya, Buor-Khaya, Borkhaya

1. A vast bay in the southeastern part of the Laptev Sea to the southeast of the Lena mouth, the Sakha Republic (Yakutia), Russia. The length is 120 km, width at the entrance is 110 km, and depth reached is 18 m. The shoreline has the shape of a funnel with a mouth pointing to the north. The western coast of the bay is home of the Tiksi Port. At the east, it is limited by Cape Buor-Khaya. On the western coast, there is Tiksi Bay and Bykovsky Peninsula. The western shore is upland with quite a meandering shoreline. The Kharaulakhskiy Range approaches this shore. The eastern shore is lower than the western one. In its middle part, the Omoloy River flows into it – the mouth of the river is in the eastern coast. The bay has only two small islands: in the middle there is Mostakh Island and close to the southern shore of Bykovsky Peninsula there lies Brusneva Island. The sea in the bay is frozen about 9 months a year. In the bay, there is an abandoned polar station.



2. A cape that serves a natural northeastern border of Buor-Khaya Bay, to the east of it there lies Yana Bay.

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### **Buza, Yelisei Yuryevich (?–?)**

Buza, Yelisei Yuryevich (?–?) – a pathfinder and Arctic mariner, Cossack foreman, one of the discoverers of East Siberia. In 1631–1633 he took part in the construction of Yakutsk settlement (Ostrog). The information about his independent travels is quite contradictory. One version is that in the summer of 1637 he set off by sea from the mouth of the Lena westward to the Olenyok River, traveled up the river in a Koch boat for 500 km, and stayed there for the winter. In the spring of 1638, he went along the Molodo River (the Lena Water Basin) on reindeers, discovered the Lena-Olenyok Ridge, and in the summer of 1638 reached the sea via the Lena and then the Yana mouth, up which he went repeating the route of I. Perfilyev. In 1639 in a Koch boat, he went down the Yana to the sea and traveling eastward as far as longitude 138°E discovered Chaun Bay and the rivers Yarok and Chondon, lying nearby. For 2 years (1640–1641), he collected the tribute in furs from the Yukagir in the basins of the Chondon and Khroma and continued the Yana-Indigirka Lowland discovery, started by I. Perfilyev, and in 1642 went back to Yakutsk.

Another version says that in the summer of 1637 he set off from the Lena mouth eastward and reached the mouth of the Omoloy River, discovered by him. Here because of the cold, he left his Koch boat, went up the river in a sledge, traversed the Kular Range, discovered by him, and in the autumn reached the Upper Yana where he stayed for the winter. In the summer of 1638, he discovered Chondon Bay, Yarok Island, and the Chondon River, where he lived till the summer of 1642. In 1644 he brought the tribute collected by him to Moscow. His further fate is unknown. For some time,

Buzin Island (now Yarok) and Buzina Bay (now Chondon) were named after him. The right tributary of the Lower Lena is still named in his honor.

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### **Byalynitskiy-Birulya, Aleksander Andreevich (1864–1937)**

Byalynitskiy-Birulya, Aleksander Andreevich (1864–1937) – a prominent Soviet zoologist. In 1891, he graduated from St. Petersburg University, in 1893 worked in the Zoological Museum of the Russian Academy of Sciences in St. Petersburg, and in 1899 participated in an expedition to Spitsbergen. He worked at Hornsund Fjord, Is-Fjord, on Barents Island, participated in a polar expedition of 1900–1903 on the yacht “Zarya” under the command of E.V. Toll, and during the winter stay of the “Zarya,” he worked in Nerpichiy Zaliv (Bay) of Koteln Island (the New Siberian Islands). In 1902, he worked on the western shore of Novaya Sibir Island. In 1917, he became the deputy director of the Zoological Museum and in 1927 its director. In 1930, he was arrested, but in 1931 set free. After that, he worked in Arkhangelsk and studied the Arctic chironomids, crustaceans, fishes’ nourishment, etc.

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### **Bykovskaya Protoka (Arm)**

Bykovskaya Protoka (arm) – one of the big western arms (protokas) on the mouth part of the Lena. The length is 96 km and flows eastward and past the Neelova Bay, after which flows into the Laptev Sea close to Cape Bykov. The arm appeared as a result of a naturally determined redistribution of the flowoff and the migration of the main binnacle to the east and southeast. B.P. seems to be the youngest arm and occupies the most extreme of the possible positions as its southern shore is already a valley wall. It is



formed by Paleozoic rocks, is high (50–100 m), and steep. The arm flows into the bay, the middle part of which forms a stream-mouth bar with large midstream sandbanks. The length of the stream-mouth bar is about 20 km, and the depth on the ridge is 2,2 m. To the left of the B.P., there is Kyuryulekh-Yuese arm (28 km from the river source), Taras-Yuese (49 km), and Saaynalaakh (72 km). Sinitsina Protoka (arm) flows into the Neelova Bay, and Ispolatova Protoka serves the main continuation of the B.P. lower than Dashka bendway. It was through the B.P. that the first steamer “Lena” reached Yakutsk. This steamer escorted the expedition of A.E. Nordenskiöld (1878–1879) on the “Vega.”

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## Bykovskiy Peninsula

Bykovskiy Peninsula – protrudes into the Laptev Sea from the mainland shore to the southeast of the Lena mouth. Its form is an acute triangle. The main massif of the peninsula lies in parallel to the shore and joins with it in its southwestern part with the help of a narrow Kolychev land bridge. The peninsula is about 41 km long and in some places 35 m high. It is formed by frozen marine depositions and is actively eroded from the eastern side. It presents a hilly tundra. To the south of the peninsula there lies Tiksi Bay and to the west Neelova Bay.

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# C

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## Cairn

Cairn – a man-made pile of stones collected on the shore as a trail marker. Cairns are widely used in the Arctic seas as markings, especially in case of hydrographical works.

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## Canoe

Canoe (Carib. *kenu* “dugout boat”) – a boat of North American Indians covered by birch or elm bark on the frame of up to 15 stringers and approximately 50 ribs made from small slats as thick as 10 mm. Pieces of stem and covering were sewn on to the gunwale with spruce roots, boat seams being caulked. Men propel canoe with single-ended paddles either sitting on the thwart or standing on one knee with their faces front, in the direction of the travel. Being the only means of transport for two centuries, the C. was of a great importance for colonization of the North American continent. At present, canoeing, i.e., traveling C. over lakes and rivers, is a widespread sport in Alaska.

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## Cape Chelyuskin

Cape Chelyuskin – the northernmost cape in Russia and Eurasia, the northern end of the Taymyr Peninsula. It is situated in Taymyr Autonomous District (Dolgan-Nenets Autonomous Okrug), Russia. The cape is washed by the Vilkitsky Strait. C. is the boundary point between the Kara Sea and the Laptev Sea. The depth of the waters off the cape is up to 10 m. The coast is steep, with the height less than 10 m. Since 1932 there exists a polar hydrometeorological station “Chelyuskin,” which currently operates as a radio-meteorological center. The northernmost airport is located here, but only a helipad remains functional. The cape was discovered and was first described in 1724 by navigator Semyon Chelyuskin, a participant of the Great Northern Expedition of 1733–1743, during the mapping of the coast of the Taymyr Peninsula and named Cape Northeast. In 1878, the cape was visited by the Swedish polar explorer Adolf Erik Nordenskiöld, and in 1893, it was for the first time circumnavigated by the Norwegian polar explorer Fridtjof Nansen.

In 1842, at the suggestion of the academician A.F. Middendorf, the cape was named after its

Canoe (Source: <http://commons.wikimedia.org/wiki/>)



discoverer, Semyon Chelyuskin. In 1919, by an expedition to the cape led by R. Amundsen, a copper sphere was installed, with the words in Norwegian: “To the conquerors of the NO pass – Adolf Erik Nordenskiöld and his companions. The “Maud” Expedition of 1918–1919.”

with F.A. Alekseev (Popov) in 1648. This proposal was accepted in 1898. In his petitions, Dezhnev stated that he sailed around the Big Stone Nose. The authors of the late seventeenth to early eighteenth centuries, this cape is mentioned under the name of Chukotka Nose, or Non-passable Nose. In 1778, the English navigator James Cook charted the cape on the map as East Cape.

## Cape Dezhnev

Cape Dezhnev (former East Cape, Cape Bolshoy Kamennyi Nos (Big Stone Nose)) – located on the Chukotka Peninsula in the Bering Strait, north-easternmost point of Asia and the easternmost point of mainland Russia. It is an isolated flat-topped mountain range (up to 741 m high); composed of granite, quartz, and nepheline syenites; and steeply breaking into the sea. The cape is one of the most majestic natural formations of the Chukchi Sea. The town of Uelen is located on the Cape.

In 1879, Nils Nordenskiöld, the first explorer sailing via the Northeast Passage from the Atlantic to the Pacific Ocean and doubling this cape, suggested naming it after the Russian explorer S.I. Dezhnev, who first sailed around the cape

## Cape Krusenstern National Monument (Cape Krusenstern)

Cape Krusenstern National Monument (Cape Krusenstern) – a US National Monument, located 80 km northwest of the town of Kotzebue on the shores of Chukchi Sea, Alaska, USA. The area is 262.7 ha. It was unveiled in 1978. A wide coastal strip is composed of 114 parallel limestone slopes and ridges, which form the coastline of the Chukchi Sea. In autumn, this variable landscape of alternating lagoons and coasts attracts many birds. The only inhabited point here is a hunting base in Anigaaq near coastal ridges.

Cape Krusenstern National Monument (Source: [https://en.wikipedia.org/wiki/Cape\\_Krusenstern\\_National\\_Monument](https://en.wikipedia.org/wiki/Cape_Krusenstern_National_Monument))



C

## Cape Onman

Cape Onman – the easternmost end of the rocky peninsula formed by the gentle slope of a coastal mountain located westward of Kolyuchinskaya Guba (Bay), 30 km from Vankarem Village, Chukotka Autonomous Okrug, Russia. The peninsula juts out to the Chukchi Sea by two projections separated by an embayment with steep, but not abrupt slopes. The northern projection of the peninsula is called in local language Engotky and the southern – Vuarat.

Cape is Nykhta. Vitus Bering, in 1728, called the Cape – Cape Gvozdeva. Near Cape Prince of Wales, there is a small village.

## Cape Schmidt

1. A cape (formerly Severnyi), located in the north-east of Asia, which juts out into the Chukchi Sea, Russia. It is the northernmost point of the peninsula about 2 km in width, located between the Zapadnaya (Western) and Vostochnaya (Eastern) bays and projected to the north of the general direction of the coast for about 3 km. It was first mentioned and mapped in 1871 by I.I. Billings during his overland passage from Mechigmen Bay to Chaun Bay and the river of Big Anyuy. A polar station was opened in 1936. In 1929, the Soviet ship “Stavropol” and the American fishing schooner “Nanook” wintered at this Cape. Two US aircraft took furs from “Nanook” by permission of the Soviet government, and, during the second flight, one of the planes crashed in the area of the river of Amguema.

## Cape Prince of Wales

Cape Prince of Wales – the westernmost mainland point of North America, located in the Bering Strait on the Seward Peninsula (Alaska, USA), where the Chukchi and the Bering Seas separate. From Cape Prince of Wales to Cape Dezhnev, the easternmost point of mainland Eurasia, the distance is 86 km. The cape was named in 1778 by the English navigator James Cook in honor of the heir to the British throne, the future King George IV (1762–1830). The former Eskimo name of the

The Cape was named in 1935 in honor of the great Russian explorer of the Arctic, prominent public figure, and scientist Otto Schmidt.

2. A village in the Chukotka Autonomous Okrug, Russia. Until 2008, it was the administrative center of Shmidtovsky District of Chukotka. Since 2009 it is part of Iultinsky District of the Chukotka Autonomous Okrug, Russia. The village is located on the coast of the Chukchi Sea 650 km north of Anadyr and associated with air traffic. It was named for the eponymous Cape Schmidt, with a population of 166 (2015). It was founded in 1931 as a base of Arctic exploration, and in 1936 – as a polar station. Later, in the vicinity of the village, tin and gold mining began. The status of an urban-type settlement was received in 1962. Due to the termination of mining activities, the population of the town reduced for the past 25 years by 30 times. There were industrial enterprises of local importance, including the ionospheric station, the floating power station “Northern Light,” and the airport. The village is linked by a motor road with the village of Ryrkaypy, located on the western shore of the bay. The village has regular aircraft communication with other Russian airports.
3. A seaport located in the Vostochnaya (Eastern) Bay near the village of Cape Schmidt. The port station of Ryveem is also part of the port.

is Erri. The name Cape Shelagsky is derived from the ethnonym of Shelagi people (extruded by the Chukchi of the Yukagir ethnos group), the Chuvantsi tribe who used to live in this area. The member of Wrangel’s expedition Doctor Kiber claims that the Shelagi went to the east from Cape Shelagsky. The interpretation of the Shelagi as a separate ethnos is considered erroneous as well as the fact that the Shelagi are the Chukchi, inhabiting the banks of the Chaun River. Cape Shelagsky is rocky and protrudes 9 km to the sea.

The cape was discovered by Semen Dezhnev in 1648 when one of the Kochi boats crushed at its shores. Dezhnev called the cape “Pervyy Svyatoy Nos.” The Cossack foreman Mikhail Stadukhin obviously reached Cape Shelagsky in 1649 and his namesake Taras Stadukhin in 1660. In the 1760s the merchant Nikita Shalaurof died at Cape Shelagsky.

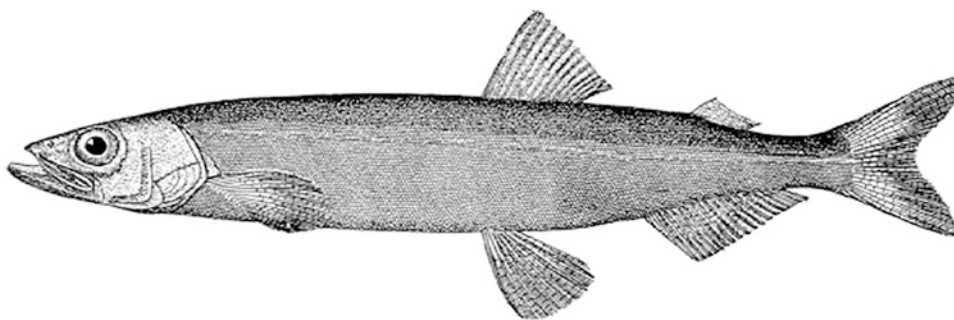
Alexander I ordered to supply two detachments to survey the Siberian coasts beyond Cape Shelagsky; one of the detachments was under command of F.P. Wrangel. Wrangel’s expedition (1820–1824) gave the cape’s description, according to which it consists of tall rocks, the rocks “those consist of fine-grained granite, mixed with greenish spar, dark-green corneous bloedite and mica.”

## Cape Shelagsky

Cape Shelagsky – is the northernmost cape at the exit to the Chaun Bay of the continental Chukotka on the East Siberian Sea coast. The Chukchi name

## Capelin (*Mallotus villosus*)

Capelin (*Mallotus villosus*) – a small forage fish of the smelt family. The body length is 22 cm and the fishing weight is 12–17 g. Capelin is a schooling



Capelin (Source: [https://upload.wikimedia.org/wikipedia/commons/c/cb/Mallotus\\_villosus.gif](https://upload.wikimedia.org/wikipedia/commons/c/cb/Mallotus_villosus.gif))



pelagic fish and it feeds on planktonic crustaceans. *C.* spawns on the second or third year of life. Spawning occurs in spring and summer in the coastal zone at a depth of 50–100 m, at temperature +2–4 °C. It lays eggs in shallow water; eggs are small, are benthic, and are attached to the substrate. The incubation period is 2–3 weeks. *C.* is a rapidly growing fish. In summers, *C.* fattens away from the coast in the bottom layers of water. It feeds on crustaceans. *C.* is the food for many commercial fish, especially during its mass spawning runs to the coast. *C.* is a commercial fish.

## Chamisso Island

Chamisso Island – a small island in the Kotzebue Bay, Alaska, USA. It is situated in the Spafariev Bay at the mouth of Eschscholtz Bay, to the south of Choris Peninsula. The island is triangular in shape. It is 2.3 km long and 0.2 km wide. The highest point of the island is 69 m above sea level. In 1912 Chamisso became a national reserve. The reserve territory the wild area of Chamisso includes the island itself, the neighboring island of Puffin, and, also, some rocks. They constitute a part of the Alaska Maritime National Wildlife Refuge. The island was named after Adelbert

von Chamisso, a French-German writer, poet, and naturalist, who visited the island in 1816 as a member of the Russian expedition on the brig “Rurik” under the command of Captain O.E. Kotzebue (Russian).

## Chaun River

Chaun River – a river in the Chukotka Autonomous Okrug, Russia. The river runs for 205 km. It arises from the ridges of the Chukchi Plateau to the northwest of Lake Elgygytyn. It runs through the Elgygytyn Plain and then flows into the southern part of the Chaun Bay, near the East Siberian Sea, about 100 km from the town of Pevek. The delta is comprised of several branches up to 2 km in width and approx. 0.7 m in depth. After the flood, the riverbed migrates. In the high water, the river rises up to 3 m. Approximately 15 rivers and streams flow into the river.

## Chaunskaya Bay or Chaun Bay

1. A bay in Chukotka that belongs to the eastern part of the East Siberian Sea Basin and

Chamisso Island (Source: [https://en.wikipedia.org/wiki/Chamisso\\_Island#/media/File:Chamisso\\_Wilderness.jpg](https://en.wikipedia.org/wiki/Chamisso_Island#/media/File:Chamisso_Wilderness.jpg))



connects to it through three straits: the Lesser Chaun Strait (on the western side of Ayon Island), the Middle Chaun Strait (between Bolshoy Routan Island and Ayon Island), and Pevek (on the eastern side of Bolshoy Routan). The depth of the bay does not exceed 20 m, with the exception of the Pevek Strait, where it reaches more than 30 m. The basin of the bay contains a large number of small rivers. The Palyavaam River flows into the bay. At the cape of Valkumey in Chaunskaya Bay, rich deposits of tin were discovered, which lead to the establishing in the Arctic regions of Chukotka of the first mining enterprises for the extraction of tin, as well as boosted the construction of the port in Pevek. A winter road passes through the bay, from Pevek to Baranikha. An airport is located on the eastern coast.

2. A nature reserve with an area of 210,500 ha.

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### **Chekin, Nikifor (?-?)**

Chekin, Nikifor (?-?) – a land surveyor, participant of the Great Northern Expedition, and explorer of the Taymyr Peninsula. In 1736, as part of the group led by V. Pronchishchev, he explored the lower reaches of the Anabar River in a small yalbote. Since 1739, he worked under the command of Kh.P. Laptev. On board the double boat “Yakutsk,” he participated in the discovery and mapping of the bay of Noordwijk and the Preobrazheniya Island at the exit of the Khatanga Bay. In winter 1739–1740, together with Kh.P. Laptev and S.I. Chelyuskin, he created a brief “description of the sea shores, of rivers, and bays of the North Sea, beginning from the Lena River,” which contains valuable information on the Taymyr Peninsula.

In spring of 1740, he traveled from the lower reaches of the Khatanga River to Lake Taymyr by two dog sleds and then went along the Taymyr River toward its mouth, finally proving that the river flows into the Kara Sea. He also mapped

about 100 km of the sea coast west of the mouth of the Taymyr River. In 1741, he mapped the eastern coast of the Taymyr Peninsula from the mouth of the Khatanga River to the latitude of the Saint Peter Islands, then, together with a team of explorers, he traveled to Turukhansk. During the years 1754–1757, he worked in the Nerchinsk expedition led by F.I. Soymonov.

A bay and a cape in Novaya Zemlya are named after him, as well as a cape in the Vilkitsky Strait of the Kara Sea.

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### **“Chelyuskin”**

“Chelyuskin” – a steam vessel constructed in 1933 in Denmark by the “Burmeister og Wain” Company, by the order of the USSR under the name “Lena.” Subsequently, it received the name of the Russian polar explorer of the eighteenth century, captain Semyon Chelyuskin. The vessel is 100 m in length, 16.6 m in width, and has a displacement of 3,600 tons, with the engine capacity of 2,450 hp. It had minor ice protection in the bow, but the vessel was not classified an icebreaker. In July 1933, the vessel arrived in Leningrad. The first head of the Chief Directorate of the Northern Sea Route (Glavsevmorput or GUSMP), O.Y. Schmidt, decided to replicate the voyage of the icebreaker “A. Sibiryakov” in one navigation along the Northern Sea Route from east to west toward Vladivostok, unaccompanied by an icebreaker, thus proving that it was possible to navigate this route on a conventional transport ship.

He also became the leader of the expedition; V.I. Voronin was appointed captain of “Chelyuskin” (in 1932, Voronin first navigated this route on board the “A. Sibiryakov”). The decision to have it through the voyage was made at the government level. “Ch.” set out from Leningrad on July 16, 1933, went to Copenhagen for minor repairs, and then voyaged to Murmansk. On August 10, 1933, “Ch.” left Murmansk and in storm conditions navigated through the Laptev



“Chelyuskin” (Source: [https://en.wikipedia.org/wiki/SS\\_Chelyuskin](https://en.wikipedia.org/wiki/SS_Chelyuskin))

Sea, East Siberian Sea, and in the Chukchi Sea where it was clobbered by ice and began drifting. In November 1933 it was in the Bering Strait, 500 m from clean water, but a typhoon drove the ship, already frozen into the ice, in the opposite direction. On February 13, 1934, in the Chukchi Sea, on the 212th day of the voyage and on 120th day of drifting, the vessel was crushed by ice and sank.

One person died (supply manager B.G. Mogilevich), and 104 members of the crew of “Chelyuskin” (including ten women and two young children) landed on an ice floe and were later rescued by the Soviet polar aviation pilots. All members of the expedition who were on the ice (except children) were awarded the Order of the Red Star, and seven pilots – M. Vodopyanov, I. Doronin, N. Kamanin, A. Lyapidevsky, S. Levanovsky, V. Molokov, and M. Slepnev – were the first to be awarded the title “Hero of the Soviet Union.” Subsequently, some of the ship’s crewmembers were persecuted and perished in the camps of the Gulag.

### **Chelyuskin, Semyon Ivanovich (1707–1764)**

Chelyuskin, Semyon Ivanovich (1707–1764) – captain of the 3rd rank, a participant of the Great Northern Expedition, and an explorer of the Taymyr Peninsula. In 1714, he entered the Naval School, a year later he was transferred to the Naval Academy, but in 1716 he returned to Moscow as “malodvorny.” In 1728 he was promoted to junior navigator (podshurman) and served in the Baltic Fleet. In 1733 he was promoted to navigator and enlisted in the Great Northern Expedition (Second Kamchatka Expedition) as part of the group led by V.V. Pronchishchev. In the summer of 1735, traveling on board the double boat “Yakutsk,” he went downstream the Lena River from Yakutsk. Then, going by sea, he traveled to the mouth of the Olenyok River where he passed the winter. As a product of his expedition to the west of the mouth of the Lena, he charted the river’s length from Yakutsk to the sea, under the title “The map

drawn in 1735 and contained in the log-book of the double boat Yakutsk, charting the territory from the town of Yakutsk to the Arctic Ocean, the map drawn by the navigator Semyon Chelyuskin.”

It was the first known map of the Lena River, made with the use of special tools. In 1736, on board the “Yakutsk,” he navigated along the coast to the west, toward the mouth of the Anabar River, then turned north and went beyond the  $77^{\circ}28'$  of the northern latitude, discovering uncharted islands (The Komsomolskaya Pravda Islands). Because of the “great ice” on August 20, the vessel turned back and was wintering in the mouth of the Olenyok River, where V.V. Pronchishchev died. In the winter, having prepared the account for 1736, Ch. went to Yakutsk, where in the summer of 1737 the double boat was brought to by boatswain V. Medvedev. In the summer of 1739, on board the “Yakutsk” (with the team led by Kh.P. Laptev), navigating from the mouth of the Lena River to the west, he participated in the opening of the Bay of Noordwijk and the Preobrazheniya Island at the entrance of the Khatanga Bay. At Cape Thaddeus, he turned back and returned to winter in the Khatanga River.

In the winter of 1739–1740, together with Kh.-P. Laptev and N. Chekin, he wrote an account and brief “Description of the sea shores, of rivers and bays of the North Sea, beginning from the Lena River.” All these materials contained valuable information on the Taymyr Peninsula. In the summer of 1740 on board the vessel “Yakutsk,” he navigated north to latitude  $72^{\circ}26'$ , where the ship was damaged by the ice to a hopeless condition and abandoned by the crew, which then returned to Khatanga. In the spring of 1741, Ch. drove three sled dog teams overland to the mouth of the Pyasina River and started his mapping of the coast of Taymyr. At Mys Lemana (Cape Leman), he met with Kh.P. Laptev, who was coming in the opposite direction from the Lower Taymyra River. In late summer, he arrived in Turukhansk.

In December 1741, he traveled by dog sleds to the mouth of the Khatanga, from where he went north to Cape Thaddeus and mapped the coast to the northernmost point of the continent (Cape Chelyuskin). Then he turned southwest, and,



Chelyuskin S.I. (Source: <http://www.polarpost.ru/articles/Peples/Russia/Cheluskin/SiCheliskin.html>)

continuing the mapping of the territories, in 1741 he joined the same route as Laptev. In the autumn of 1742, he arrived in Yeniseysk, where the full team led by Kh.P. Laptev reunited, and, with a report of the Admiralty Board on the successful exploration, he set out on the first sleigh road to St. Petersburg.

In 1742, he was promoted to the rank of midshipman. From 1745 to 1756, he served in the Baltic Fleet and was in command of a number of yachts. In 1756, he was awarded the rank of lieutenant commander. In August 1760, he was promoted to Captain of the 3rd rank and dismissed from service.

He gave his name to a cape in Vilkitsky Strait, to a number of islands in the Taymyr Bay of the Kara Sea and in the mouth of the Pyasina River, as well as a peninsula in the Taymyr, and to a famous steamboat, destroyed (crushed by ice) in 1934 in the Chukchi Sea.



## Chetyrehstolbovoy Island

Chetyrehstolbovoy Island – an island in the Medvezhyi Islands (Bear Islands) in the East Siberian Sea, the Republic of Sakha (Yakutia), Russia. It is the easternmost island of the group. The Leontiev Island, which is the closest to Ch., is about 21 km to the northwest. Ch. is the third island of the group in terms of size, after the Krestovsky and Leontiev islands. It has an oblong shape and extends from west to east. The island is 9.5 km in length and up to 2.5 km in width. The island rises from the sea as a single mountain, reaching the height of 94 m. The northern coast is steep, while the southern is mildly sloping. The coastline is indented, steep cliffs alternating with slopes, on which there are beach ridges that isolate fresh water lagoons from the sea. An upland area with steep sides, reaching the height of approx. 40 m above sea level, is located at the westernmost of the island. In the northeastern part of the island, there is an upland with the highest point of approx. 100 m above sea level. The middle part of the island is heavily fissured by a net of ravines, which in summer accommodate water flows. A small bay is located at the southern tip of the island. Most of the island's surface is covered with weathering products that form stone deposits. The fauna is represented by deer, bears, wolves, foxes, and small rodents who arrive here from the mainland. Short, stiff grass and moss grow on the low banks and on the gentle slopes. In 1924, the Norwegian expedition ship “Maud” stayed in the proximity of the island. A polar station, opened in 1933, is located in the eastern part of the island.

The island was discovered in 1710 by a Cos-sack named Jacob Permiakov and mapped in 1769 by land-surveying ensigns Ivan Leontiev, Ivan Lysov, and Alexey Pushkarev, who traveled there by dog sleds from Nizhnekolymsk. The island received its name placed after the kigilyakha pillars – the remains of the ancient land surface of the island – that reach more than 15 m in height. The pillars were formed due to the influence of extreme temperatures that create cracks in the rock and because of subsequent

weathering. As a result of this, by the mid-1990s only one pillar remained on the island.

## Chirikov, Aleksey Ilyich (1703–1748)

Chirikov, Aleksey Ilyich (1703–1748) – a Russian explorer and captain-commodore. During the First and Second Kamchatka Expeditions, together with V. Bering he discovered the northwestern coast of North America and a number of islands of the Aleutian Chain. In 1715, he entered the Naval School, and a year later, he was transferred to the Naval Academy, which he graduated at the top of his class. At the orders of Peter the Great, for his achievement in the sciences, Ch. was promoted to unterlieutenant and appointed to serve on the ship “Peter” of the Baltic Fleet. A year later, at the orders of the Admiralty College, he was assigned to the Naval Academy as a teacher of seamanship and navigation. In 1724, he was appointed second deputy of V. Bering in the First Kamchatka Expedition (1725–1730) and promoted to lieutenant. Since then, his efforts have been devoted to solving the state task of exploring and developing of maritime routes in the Far East.

In 1728, on the boat “Saint Gabriel,” he navigated from Nizhnekamchatsk, across the Bering Strait, into the Arctic Ocean to the latitude 67°19'N. He participated in the mapping of the Chukchi Peninsula and in the discovery of Kresta Bay, of St. Lawrence Island, one of the Diomed Islands, and Preobrazheniya Bay. In late 1728–early 1729, under the direction of Ch. Chaplin, the final map of the First Kamchatka Expedition was drafted and in 1730 presented to the Senate. In 1732, he was promoted to Captain of 2nd rank.

In 1733–1741, during the Second Kamchatka Expedition, Ch. served as deputy to V. Bering and since 1741 as chief of the expedition. In 1733 he was promoted to Captain. In 1741, commanding the packet boat “St. Paul,” he became the first European to reach the northwestern coast of North America at Cape Bartolome, near Baker Island. He discovered the Alexander Archipelago.





Chirikov, A.I. (Source: <http://tulagid71.ru/objects/chirikov-a-i/>)

Navigating to the northwest along the American continent for about 450 km, he examined and mapped its coast. On the way back, he discovered and mapped a number of islands of the Aleutian Chain (Adak, Agattu, Attu, et al.). In 1741, he sent a report on the results of the voyage to the Admiralty Board, enclosing a map and the history's first description of the northwestern coast of North America. In 1742, after wintering in Petropavlovsk harbor, Ch. repeated his voyage to the east toward the shores of America, but only reached Attu Island, became the second (after V. Bering) to discover the Commander Islands, and returned to Petropavlovsk in July. Two weeks later, he went to Okhotsk and, in 1742, he arrived in Yakutsk.

In 1743, he received the order of the Senate to "discontinue his sea voyages," and, together with his crew, he moved to Yeniseysk. In 1746, after spending 18 years of his life studying Siberia and the Far East, he returned to St. Petersburg. Soon he was appointed director of the Naval Academy.

Under his guidance, a group of naval officers prepared a number of completed maps based on the information from the expedition. At the end of 1746, he was transferred to Moscow as head of the Admiralty office due to health-related reasons. In 1747, he was promoted to captain-commodore.

A number of objects are named after Ch.: several capes on Kyushu Island, Japan, in the Gulf of Anadyr of Bering Sea, at Tauiskaya Guba in the Sea of Okhotsk, on Attu, the Aleutian Islands in the Bering Sea, as well as a seamount in the Pacific Ocean, and an island in the Gulf of Alaska.

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## Chondon River

Chondon River – a river in the northern part of the Republic of Sakha (Yakutia), Russia. The river originates in the ridges of the Olekmo-Charskoe Highlands and then flows through the Yana-Indigirka Lowlands. The river is 606 km in length; the basin area is 18,900 km<sup>2</sup>. The river flows into the Yana Bay of the Laptev Sea.

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## Christmas Flounder (*Liopsetta glacialis*)

Christmas Flounder (*Liopsetta glacialis*) – a sea fish, the family of flatfish (Pleuronectidae). It is common in the East Siberian, the White, the Barents, the Bering, and the Okhotsk seas. C.F. inhabits shallow depths and soft soils of coastal waters. It can migrate upriver far. The body length is 30–35 cm, usually 25 cm. Jaw teeth are shaped as incisors forming a cutting edge. The mouth is small and asymmetrical. The body of the male is covered with ctenoid scales, females with cycloid scales. The lateral line is almost straight. Behind the eye there is a grungy crest. The ocular part of the body is brown or dark olive with dark spots. On the dorsal, anal, and caudal fins, there are small and large spots. C.F. matures at the age of 4–5 years. Spawning occurs in January and February under the ice, not annually. Productivity is up to 200,000 eggs. It

feeds on mollusks, crustaceans, worms, and small fish. The life span is 12 years. The fish is of minor economic value.

## Chukchi

Chukchi – a shallow lake in the delta of the Kolyma River in the Republic of Sakha (Yakutia), Russia. The area is 120 km<sup>2</sup>. It is connected with Lake Maloye Chukchi and – through a series of canals and lakes – with Lake Nerpichye and the left sleeve of the Kolyma River.

## Chukchi

Chukchi – people in the Russian Federation (15,900 in 2010), the indigenous population of the Chukotka Autonomous Okrug (12,800). They also live in the north of the Koryak Autonomous Okrug (1,500) and in the Lower Kolyma Region of Yakutia (1,300). They speak the Chukchi of the Chukchi-Kamchatka family. They also speak Russian.

The Chukchi were divided into the deer Chukchi, tundra reindeer-herding Chukchi, and seaside (coastal) Chukchi, sedentary hunters who hunted sea animals living near the Eskimos. The ancestors of the Chukchi and their relative Koryak people lived in the interior of Chukotka. They were engaged in hunting reindeer and were relatively sedentary. The first mention in the Chukchi Russian documents dates from the 1640s of the seventeenth century. In 1897, the number of Chukchi was approx. 12,000. In 1930, the Chukotka National District was formed and since 1980 – the Chukotka Autonomous Okrug.

The main occupation of tundra Chukchi is nomadic herding. They use reindeer as sled animals.

The basis of employment and food for coastal Chukchi is aboriginal whaling and hunting other marine mammals: in winter and spring, it is the seal; in summer and autumn, it is the walrus and the whale.

Traditional crafts include fur tanning, weaving bags of fireweed and wild rye in women, treatment of bone in men, advanced carving and bone and walrus tusks engraving, and, application of fur and sealskin, deer hair embroidery. The art center for bone carving was the village Uelen (established in 1931). Most modern Chukchi preserve traditional occupations like the reindeer herding and fishing farms. Some are engaged in cattle breeding and greenhouse vegetable production, the service sector, education, and health. Family of reindeer herders live in settled villages; there are aggregated settlements of coastal Chukchi.

Traditional clothing is made from the skins of deer and seals.

The main food of deer Chukchi is venison and of the coastal Chukchi – the meat of sea animals (walrus).

Chukchi preserved pre-Christian beliefs (worship of animals, polar bears, whales, walrus, etc.; sacred objects, amulets, tambourines, a device for making fire; shamanism).



Chukchi (Source: [https://en.wikipedia.org/wiki/Chukchi\\_people](https://en.wikipedia.org/wiki/Chukchi_people))

Writing was developed in 1931 on the basis of Latin and since 1936 – on the basis of the Russian alphabet. Since 1990s the Association of the Chukchi peoples of Chukotka is reviving the traditional culture of the Chukchi.

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## **Chukchi Department of TINRO Center**

Chukchi Department of TINRO Center – organized in 1994. It is located in Anadyr. It consists of three laboratories: a lab studying anadromous and freshwater fish, a lab for Fishing hydrobiology, and a lab for fisheries ichthyology. The main focus of the Center is the study of aquatic animals in the field adjacent to the waters of the Chukotka Autonomous Okrug and inland waters. About ten cruises of scientific and fishing vessels are held annually. Sea expeditions study pollock, cod, halibut, flounder, grenadiers, saffron cod, gobies, shrimps, and crabs. Research covers the main salmon-spawning waters of Chukotka Autonomous Okrug. The Department monitors walrus rookeries and provides scientific support for whaling. A long-term program of development of sea mammal hunting operates.

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## **Chukchi Highlands**

Chukchi Highlands – located between the Chaunskaya Guba and the Bering Strait. They occupy the northern part of the Chukchi Peninsula, Chukotka Autonomous Okrug, Russia. They are 450 km in length and up to 1,843 m in height. They include ridges of different spatial orientation: Shelagsky, Ekvvyatansky, Iskatel, Pegtymelsky, Chentalsky, etc.; their height reach 500–1200 m with the maximum rising up to 1,600 m. The relief is characterized by flat tops. They are a system of heavily dissected lowlands and middle ranges and arrays. The northern ridges are composed mainly of sandstones and shales and cut granites; the south is dominated by volcanic deposits. There are deposits of tin, mercury, and coal. The climate is

harsh. The Ch.H. is a watershed drainage basin of the Arctic and Pacific Oceans. In the lower slopes, there is mountain tundra; the upper slopes are an Arctic mountain desert.

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## **Chukchi Rise**

Chukchi Rise – a ledge, extending into the Arctic Ocean from the Chukchi Sea shelf (width varies from 500 to 1,700 km), which forms a rise 200 km wide. It rises steeply from the deep ocean floor and has a truncated and dismembered top, which apparently had been under the influence of the wash or ice.

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## **Chukchi Sea**

Chukchi Sea – an adjacent sea of the Arctic Ocean, the easternmost of its Arctic seas. It bathes the northern coast of the Chukchi Peninsula (Russia) and the northwestern coast of Alaska (USA). Its western boundary extends from the intersection of the meridian 180 ° with the edge of the continental shelf (76 °N, 180 °E) along the 180° meridian to Wrangel Island, Cape Zapadnyy, and then through the De Long Strait and Cape Yakan, along the eastern border of the East Siberian Sea. The northern boundary extends from a point at 72 °N, 156 °W to Cape Barrow in Alaska, where it connects to the Beaufort Sea, then along the mainland coast from the southern entrance of the bay of Cape Shishmareva (Seward Peninsula, USA). The southern border of Ch.S. goes along the northern border of the Bering Strait from the southern entrance of the bay of Cape Shishmareva to Cape Unikyn (Chukchi Peninsula) and further along the continental coast to Cape Yakan. The Bering Strait connects the Ch.S. with the Bering Sea of the Pacific Ocean. The Long Strait is part of the Ch.S., and its western border runs from Cape Blossom to Cape Yakan. The eastern boundary of the strait extends from cape Pillar (Wrangel Island) to Cape Schmidt.



The Chukchi Sea (Source: [https://en.wikipedia.org/wiki/Chukchi\\_Sea](https://en.wikipedia.org/wiki/Chukchi_Sea))

The Ch.S. is one of the continental-adjacent seas. Its area is 595 (589) thousand km<sup>2</sup>, its volume is 42 (45) thousand km<sup>3</sup>, and the average depth is 71 m, with 1,256 m at the deepest. The Ch.S. has only three islands – Wrangel Island (7,300 km<sup>2</sup>), Herald Island, and Kolyuchin Island; along the American coast, in the Gulf of Kotzebue, there are also Chamisso Island and Puffin Island.

From the spurs of the mountain ranges that stretch inside the Chukchi Peninsula and Alaska, numerous small rivers and streams flow into the many coastal lagoons. The largest of them are the Anguema River, the Vankarem River on the Chukchi Peninsula, as well as Kobuk, Noatak, and Utukok and others in Alaska. The total flow of all rivers flowing into the Ch.S. (including Alaska) is 82.6 km<sup>3</sup>. The estimated sediment run-off from the side of Chukotka is 1 million tons per year and from Alaska – 2.7 million tons per year. The muddiness of the rivers of Chukchi Peninsula ranges from 25 to 100 g/m<sup>3</sup>, with an average of 50 g/m<sup>3</sup>.

The coastline of the Ch.S. (including islands) is approx. 1,600 km. The coastline is slightly indented. The bays include Kolyuchinskaya Bay, Kotzebue Bay, and Shishmareva Bay. The coast is mountainous almost throughout its length. On the eastern coast of Wrangel Island, there are low hills that drop off sharply into the sea. Low mountains stretch along the northern coast of Alaska and Chukotka, but they are usually far from the water's edge. The coastline is formed by low gravel and sand bars, separating the lagoons from the sea. Such a landscape is typical of the coast of the Ch.S.

Along the coasts of the Ch.S., there are capes such as Cape Yakan, Cape Schmidt, Cape Vankarem, Cape Serdtse-Kamen, Cape Krusenstern, Cape Hope, Icy Cape, Cape Lisburne, Cape Barrow, etc.

The Ch.S. is mostly located on the continental shelf with the depths of 40–60 m. The shelf is comprised of abrasion-accumulative plains of varying age. A characteristic feature of the continental margin within the sea is the existence of a

special intermediate zone between the continental shelf and the slope, the so-called avanshelf – an inclined plane, at times stepped, lowered to the depth of several hundred meters. The amount of sediments in the sea today varies widely, from 0 to 10 m. The relief of the seafloor is rather flat. The depth of water is generally less than 50 m (56 %), while the maximum depth (in the north) does not exceed 1,300 m. Isobaths of 10 and 25 m are located close to the coast. There are shallows with depth of water up to 13 m. The bottom is split by two canyons: the Herald Canyon with a depth of 90 m and the Barrow Canyon with the maximum depth of 160 m. The seafloor is covered with silt with sand and gravel. Numerous lagoons are located on the mainland coast of the Russian part of the sea. The largest of them are Kanygtokynmanky, Neskynpilgyn, Tenkergykynmangky, and Nutauge.

The climate of the sea is that of the polar zone. Its characteristics include little solar heat and small annual fluctuations of the air temperature. In autumn and winter, the sea is influenced by several large-scale pressure systems. At the start of the season, it is subject to the spurs of the Siberian and Arctic Anticyclones and the Aleutian Low. Because of this distribution of pressure systems, the direction of the wind over the sea is very changeable. Wind speeds average 6–8 m/s. The air temperature in autumn falls quickly, and in October on Cape Schmidt and Wrangel Island, it reaches  $-8^{\circ}\text{C}$ . In November, northwesterly winds begin to dominate, and in February the low pressure trough disappears. Siberian and North American wind spurs come close above the sea, at times merging and forming a “bridge” of high pressure between the continents. Because of this, the north part of the sea is dominated by northerly and northeasterly winds, while the south is subject to northerly and northwesterly winds. In the second half of winter, southerly bearings generally blow over the sea. The wind speed is usually about from 5 to 6 m/s. The air temperature in the coldest month (February) averages  $-28^{\circ}\text{C}$  in Uelen and about  $-25^{\circ}\text{C}$  on Wrangel Island and  $-28^{\circ}\text{C}$  on Schmidt Island. This temperature distribution is due to the warming effect of the Pacific Ocean and cooling effect of the Asian continent.

Winter is characterized by dull, cold weather with gusty winds, which is sometimes changed by flows of warm air from the Bering Sea.

In the warm time of the year, the North American and the Siberian Anticyclone are not present in the region, and the North Polar Maximum becomes weakened and moves to the north. In spring, a field of low pressure exists to the south of the sea, extending from the Icelandic Low to the east and connecting to the trough of mild Aleutian Low. Toward the end of the season, unstable winds acquire a predominantly southern direction. Their speed typically does not exceed 3–4 m/s. In spring, as a rule, the weather is cloudy, quiet, dry, and cold. The temperature in April averages  $-12^{\circ}\text{C}$  on Uelen and  $-17^{\circ}\text{C}$  on Wrangel.

In summer, a spur of the Pacific Maximum comes closer to Alaska, and over the ice-free spaces, water pressure is slightly elevated. In the southern part of the sea, the winds of the southerly and southeasterly direction are predominant, and in the northern regions, there are northerly and northwesterly winds. Their speed usually reaches 4–5 m/s. The temperature of the warmest month (July) is on average  $6^{\circ}\text{C}$  in Uelen, about  $2.5^{\circ}\text{C}$  on Wrangel, and  $3.5^{\circ}\text{C}$  on Schmidt. In areas along the coast, sheltered from the winds, it can reach  $10^{\circ}\text{C}$  and higher. Summer weather is cloudy, with rain and snow. The summer is very short, and the transition to the next season begins already in August.

The continental runoff in the Ch.S. is rather insignificant. Only  $72\text{ km}^3$  of river water per year flows here, which is about 5 % of the total coastal runoff in all Arctic seas and just a fraction of a percentage point of the volume of its waters. Of this amount,  $54\text{ km}^3/\text{year}$  flows from the rivers of Alaska, and  $18\text{ km}^3/\text{year}$  comes from Chukotka River. This modest coastal runoff does not change the hydrological conditions of the sea significantly, but it affects the temperature and the salinity characteristics of coastal waters.

In a much greater extent, the nature of the Ch.S. is affected by the water exchange with the Central Arctic Basin and the Pacific Ocean through the Bering Strait. A slight increase in water temperature at the bottom layers in the



north of the Sea is connected to the transformed warm Atlantic waters flowing here.

The hydrological structure of the sea is generally similar to the water composition in other Siberian Arctic seas, but it has its own characteristics. In western and central areas of the sea, surface Arctic waters are typical. In the narrow coastal zone, especially where the rivers flow into the sea, one can find warm desalinated water, formed by the mixing of seawater with river flows. At the northern edge of the sea, the continental slope is cut deep by the Chukotka Trough, along which Atlantic waters spread at the depth of 400–450 m, with a maximum temperature of 0,7–0,8 °C. These waters come into the sea 5 years after they enter into the Arctic Basin in the Svalbard area. A middle layer lies between the surface and the Atlantic waters.

The eastern part of the sea has relatively warm and salty waters coming from the Bering Sea. They arrive here in the volume of 30,000 km<sup>3</sup>/year. They usually move to the north and the east, but in some years the De Long branch is significantly more developed. This branch has warm currents that get to the East Siberian Sea through the De Long Strait. Moving toward the Ch.S., Pacific waters mix with the local waters, cool down, and sink into the subsurface layers. In the eastern part of the sea with depths of 40–50 m, they extend from the surface to the bottom. In the northern parts of the sea, where it is deeper, the waters form a layer with its center located at the depth of 40–100 m, under which there is deep water. In the surface Arctic and Pacific waters, seasonal layers form and are destroyed, which is linked to the intra-annual variability of oceanographic characteristics. Temperature in winter and early spring in the under-ice layer is distributed fairly evenly over the space of the sea and is –1,6 °C... –1,8 °C. In late spring on the surface of pure water, it rises up to –0,5 °C... –0,7 °C near the ice edge and up to 2–3 °C in the Bering Strait. Due to the influx of summer warmth and the waters from the Pacific with an average temperature of 0,2–4 °C, the temperature of the water surface rises. The temperature in the marginal ice zone in August is –0,1 °C... –0,3 °C; in the western part of the coast, it is approximately 4 °C; to the

east of the meridian of 168 °W, where it lies the axis of the flow of the Pacific, it rises up to 7–8 °C; while in the eastern Bering Strait, it can even reach 14 °C. In general, the western part of the sea is cooler than the eastern.

The vertical distribution of water temperature in winter and early spring is homogeneous almost throughout the sea. From the surface to the bottom, it is –1,7 °C... –1,8 °C, and only in the Bering Strait on the level of 30 m, it rises to –1,5 °C. In spring, the temperature of the water surface rises, but at levels of 5–10 m, it lowers toward the bottom, at first rather sharply, but then more smoothly. In summer, in the south and east of the sea, the radiation heating goes fairly deep, and in some shallow areas, it goes down to the bottom.

The surface temperature of 6–7 °C is observed at the levels of 10–12 m, where it decreases with depth, and even at the bottom, it is 2–2,5 °C. In the central part of the sea, the influence from the Bering Sea waters appears smaller. The surface temperature (about 5 °C) covers a layer with a thickness of 5–7 m, and then it decreases fairly rapidly to the bottom. In the northern part of the sea in the Chukchi troughs in the upper layer at about 20 m, the temperature is 2–3 °C, then it falls to 1,6 °C on the level of 100 m, then it rises again, and at the bottom layer, it is close to zero. This is caused by the influence of warm Atlantic waters coming from the Central Arctic Basin. In autumn, the cooling of the surface spreads from the inside, which leads to equalization of temperature along the vertical direction. Winter vertical circulation reaches the bottom, and in winter the temperature of all the water in the sea is about 0 °C.

The levels and the distribution of salinity on the surface of the sea are influenced by different seasonal influx of the Pacific and – in the coastal zone – of river waters. Winter and early spring are characterized by increased salinity of the ice layer. In the west it is about 31 ‰; in the central and northeastern parts, it is close to 32 ‰; but it is highest in the Bering Strait with 33–33,5 ‰. From the end of spring and during the summer, when the inflow of waters through the Bering Strait is enhanced and there is an increased continental runoff, the salinity distribution pattern on the surface of the sea becomes quite varied. In

general, the salinity increases from west to east from about 28 ‰ to 30–32 ‰. At the edges of the ice, it decreases and is 24 ‰, while near the mouths of the rivers, it drops to 3–5 ‰. In the Bering Strait, the salinity remains the largest – 32.5 ‰. In autumn, with the start of the ice formation, there is a general increase in salinity, and then it becomes equal throughout the surface of the sea. In winter and early spring, the salinity typically changes very little, almost throughout the whole sea. To the northwest of the Bering Strait, where the influence of the Pacific waters is strong, the salinity is quite significantly higher and varies from 31.5 ‰ to 32.5 ‰ between the levels of 20 and 30 m. Moving away from this zone, the increase in water salinity with depth is not as great and happens more smoothly. As a result of the spring thaw, it rises sharply in the layer of 5–10 m from 30 ‰ to 31–32 ‰. Below it grows very slowly, and at the bottom it is close to 33 ‰. Such a vertical change of salinity can be observed in the coastal strip, but the surface layer is much stronger, and desalinated water is underlain with waters of lower salinity – 30–31 ‰. In summer, the freshened surface layers of the sea decrease as a result of the inflow of the Pacific waters, and in autumn they disappear completely. In the central part of the sea, with the influence of the Bering Sea waters, the salinity steeply increases from 32 ‰ to 33 ‰ from the surface to the bottom. In the area of drifting ice and along the coast of the Chukchi Sea coastline, the salinity in the surface layer with a thickness of 5–10 m is lower, then there is its sharp increase (up to 31–31.5 ‰) in the layer of 10–20 m, and then it gradually increases to the bottom, where it reaches 33–33.5 ‰. In autumn and especially in winter, the salinity increases due to salinization during the ice formation. In some areas, the salinity levels become equal everywhere in the autumn, while in others it does so only at the end of winter.

In accordance with the distribution and seasonal changes in salinity and temperature changes, the density of water also changes. In autumn and winter, when the salinity is increased and the water is extremely low, its density is quite high. Similar to the distribution of salinity, the high density on the surface is found in the

southern and eastern parts of the sea, and to the northwest, the density decreases slightly. In the warmer half of the year, the surface water gets desalinated, gets warmer, and their density decreases. Due to the relatively intensive introduction of salt water from the Bering Sea at this time of the year, more dense waters are located in the southern and eastern parts of the sea. In the north and west, the density on the surface is reduced, because the top layer of the sea gets fresh water due to ice melting and due to an inflow of the low salinity waters of the East Siberian Sea. In winter, the density increases from the bottom surface rather evenly throughout the water column. In spring and summer, near the ice edge and in the coastal strip, the top layer of water with a thickness of 10–20 m is very different in density from the underlying layer below, under which the density increases uniformly to the bottom. In the central part of the sea, the density varies vertically more smoothly. In autumn, due to the cooling of the sea surface, the density begins to increase. The changeable winds and a varying vertical dispersion of density largely determine the conditions and opportunities for water mixing in the sea.

In spring and summer, the water spaces free from sea ice differ in density, and relatively weak winds mix only the uppermost layers. The same depth of wind mixing is in the estuarine areas. In autumn, the vertical stratification of water is reduced, and the winds are intensified, so wind mixing penetrates to the horizons of 10–15 m. Deeper it is prevented in its spread by significant vertical density gradients. This picture is especially characteristic of the western part of the sea. Stable structure of water is beginning to be destroyed by the autumn convective mixing, which penetrates only 3–5 m below the wind mixing. Relatively small (up to 5 m) increases are seen in the thickness of the upper homogeneous layer due to thermal convection in autumn. Only at the end of winter, at depths of 40–50 m (which occupy about 90 % of the sea), winter vertical circulation extends to the bottom. At greater depths, the ventilation occurs when lower layers backslide into the water down the slopes, toward the bottom.

The total water circulation in the sea, besides the basic factors that influence the flow of the Arctic seas, is largely determined by flows coming through the Bering Strait and the De Long Strait. Surface currents of the sea as a whole form a weakly pronounced cyclonic gyre. Coming out of the Bering Strait, Pacific waters spread like waves. Their main flow is directed almost to the north. At the latitudes of Kotzebue Bay, they are joined by the freshened continental runoff waters from this bay. Moving further to the north, the Bering Sea water flow near Cape Hope is divided into three streams. One of them, Alaska, continues to move to the north, and Cape Lisburne turns northeast to mount Barrow. The second one goes from Cape Hope and deviates to the northwest. Meeting on the way to the Herald Canyon, this stream is divided into two branches. One of them – Longovskaya Branch – is to the west, while the southern shores of Wrangel Island, where it merges with the current, envelops the island on the east side. The other one – the Geraldovskaya Branch – continues to spread in the northwest direction through the Herald Canyon which goes up to 73–74 °N. Here it meets with local cold water and turns east, forming an ever-present cold Chukchi flow. The flow of water is introduced into the Ch.S. across the De Long Strait, flowing along the coast toward the southeast. With sufficiently strong development, in winter it brings out surface water and ice from the Ch.S. to the Bering Sea, forming the so-called polar flow.

Tidal range is insignificant along the coast of Chukotka. At some points it is only 10–15 cm. At Wrangel Island tides are higher. In Rogers Bay level rises above the high water level at low tide 150 cm, because here comes the wave formed by the addition of waves coming from the north and west. The same value of the tide is observed at the top of Kotzebue Sound, but there are large tides which are caused by the configuration of the coasts and topography of the bay.

Almost the whole year, the sea is covered with ice. In winter, from November–December to May–June, the sea is completely covered with ice. Fast ice is slightly developed. Its width varies in different places, but not more than 10–20 km.

Drifting ice is located beyond the fast ice. Most of these are 1- and 2-year ice formations, with the thickness of 150–180 cm. In the north of the sea, there are many years of heavy ice.

In summer the ice edge retreats northward. In the Chukchi Sea, the Chukchi and Wrangel ice massifs are formed. The first of these consists of heavy ice. The minimum amount of ice in the sea is usually in the second half of August until the first half of October. In some years, the ice accumulates in the Long Strait and stretches along the coast of Chukotka. In such years, navigation is extremely difficult. In other years, the ice, on the other hand, departs far from the coast of the Chukchi Peninsula, which is very favorable for navigation. In late September, new ice begins to form, which over time continues to increase and covers all the winter sea.

According to estimates, the shelf of the Ch.S. contains up to 30 billion barrels of oil. In February 2008, the US government announced the successful bidding for the production (the total price of \$2.6 billion). The decision has been criticized by environmentalists.

The population of the coast is not numerous – the Chukchi, Eskimos, and Russians. Small settlements mainly consist of one-story wooden houses. The largest settlements are Cape Schmidt village and the village of Uelen.

Major ports include Uelen (Russia) and Barrow (USA).

The Ch.S. is not rich in fish. It has 37 species of fish. Of local commercial importance are char (polar cod), smelt, polar flounder, polar cod, and a few other species. Hunting sea mammals (seals) is developed. There are polar bears in the Ch.S.

Through the Chukchi Sea passes the Northern Sea Route. It is the easternmost link between the ports of the Far East, the mouths of Siberian rivers, and the European part of Russia. The eastern part of the sea connects foreign Pacific ports in Canada and the USA and the mouth of the Mackenzie River. The navigation in the sea is quite complicated, which is due to a lack of coastal landmarks and ice conditions. In the period of 1914–1983, six ships perished in the sea. During a voyage in 1983, as a result of compression of ice, 57 vessels got captured by the ice; 30 of them

were damaged to varying degrees, including five icebreakers.

The name of the sea comes from the Chukchi Peninsula and its peoples – the Chukchi.

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## **Chukchi Sea Encyclopedia**

*Chukchi Sea Encyclopedia* – one of the books in the series *Encyclopedia of Russian Seas*, published by “International Relations” a publishing house in Moscow in 2013. Its authors are Prof. I.S. Zonn, Prof. A.G. Kostyanoy, and Dr. M.I. Kumantsov. The publication is dedicated to one of Russia’s northern seas – the Chukchi Sea – a part of the Arctic Ocean. The Encyclopedia contains about 250 articles on the hydrographic, geographic, and hydrological characteristics of the sea. The most significant natural features are presented: the islands, peninsulas, bays, rivers, their geographical features, economy, culture, and history, as well as cities, ports, water and biological resources, international agreements, research institutions, the activities of prominent scientists, researchers, and travelers. The Encyclopedia provides a chronology of major events that have become momentous milestones in the history of the discovery and development of the Chukchi Sea from the seventeenth century to the present day. Second edition of this book was published in 2015.

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## **Chukchi Sea, History of Exploration**

Chukchi Sea, History of Exploration – in the seventeenth century, Russian merchants, industrialists, and service class people came to some stretches of the eastern seas of the Arctic Ocean and began exploring its coastline. Polar seamen traveled most of all to develop trade, hunting, and fishing. Sea exploration was out of question then. In the summer of 1648, Semyon Dezhnev steered all along the northern shores of the Chukchi Peninsula and was the first to double the easternmost cape of Asia. In 1728, the ship “St. Gavriil” (under

the command of A. Chirikov and V. Bering) entered the strait (later named the Bering Strait) coming as high as 67°18'N. The expedition made first hydrological observations. An enterprise, most known for its scientific results, among many other expeditions hereafter was the one under J. Billings and G. Sarychev that conducted extensive research (1791) in the Chukchi Sea. As the result of this endeavor, the first accurate map of the Chukchi land in Northeast Asia and Alaska was drawn.

In 1816, the brig “Rurik” in command of Lieutenant O.E. Kotzebue entered the Bering Strait coasting the northwest shores, and he discovered a bay named after him. In 1820, expeditions of M.N. Vasilyev and G.S. Shishmarev on the vessels “Otkrytiye” and “Blagonamerennyi” operated in the Chukchi Sea and executed a survey of the northern coast of Alaska. In 1821, M. Vasilyev retried to find the Northwest Passage, but he sailed as far along the Alaska coast as 70°13'N. In 1821, the Admiralty Department organized an expedition led by Lieutenant P.F. Anjou (the Yana team) and Lieutenant F.P. Wrangel (the Kolyma team) that were active up to 1824. The Kolyma team had to “identify the position of Cape Shelagsky, run a survey of the coast to the east of it, and by that, make final of the connection between Asia and America.”

In 1821–1823, F. Wrangel led a dog sled expedition that watched magnetic declination and made meteorological and ice observations. Writing about his voyage, F. Wrangel depicted once and again ice conditions at different seasons and gave their first scientific description. Also, it was he who put forward a valid assumption that there was a large island (named after him later, in 1867) in the north of the sea and marked its approximate location on the map to the north of Cape Shelagsky.

In 1826, the British Admiralty sent an expedition under F. Beechey that surveyed the northern coast of Alaska, sailing along the southern coast of the Chukchi Sea up to Point Barrow. He was the first to draw Diomed Islands in the Bering Strait correctly on the map. In 1838, exploring the Chukchi Sea, A.F. Kashevarov traveled in skin boats (bidarrahs) along the coast and surveyed it



И.С. Зонн, А.Г. Костяной, М.И. Куманцов

# ЧУКОТСКОЕ МОРЕ ЭНЦИКЛОПЕДИЯ



«МЕЖДУНАРОДНЫЕ ОТНОШЕНИЯ»



30 miles farther than Point Barrow, the extreme point attained by Captain F. Beechey.

In 1849, British captains H. Keller and T. Moore took their voyage on HMS “Herald” and HMS “Plover” to discover Herald Island and make the first deep water hydrological station in the Chukchi Sea for water temperature measurements at various depths.

Managers of the governing board of the Russian-American Company composed largely of naval officers that paid great attention to geographic research with the intention to facilitate seafaring and, therefore, enhance knowledge about geography of that part of the world. In 1851, the Company created “Mercator’s Chart of the Bering Strait and the Adjacent Part of the Arctic Sea.” The map was generated in the wake of voyages of the British vessels that went on a mission to find Sir John Franklin.

In 1855, Americans John Rogers and Thomas W. Long on the whaler “Nile” undertook expeditions and confirmed *ad oculos* assumptions of F. Wrangel about the island named after him (1867). The voyage of George W. De Long, a US Navy officer, on the ship USS “Jeannette” (1879–1881) ended tragically. In 1878–1879, Adolf Erik Nordenskiöld crossed the Chukchi Sea on the ship “Vega” passing the winter by Kolyuchin Island.

In 1880, US Captain Calvin L. Hooper on the USRC “Thomas Corwin” carried out a number of surveys and observations on currents and water temperature in the Ch.S. Next year, an expedition on the same ship was the first to land on Wrangel Island (US explorers named it “New Columbia” and collected botanic samples and other pieces of natural history).

In 1910–1915, the Russian Admiralty organized a hydrographic expedition on the icebreaking steamers “Taymyr” and “Vaygach” to traverse the Northern Sea Route from the east of the Arctic to the west. On its voyage the enterprise performed the first oceanographic transect in the Ch.S. to the north of Cape Shelagsky and surveyed the northern coast of Chukotka known only from sketches by Billings, Wrangel, and Nordenskiöld. In 1913–1914, the Canadian Arctic

Expedition under the command of the American Captain Robert Bartlett on the “Karluk” obtained abundant data on ice drift in the north of the Ch.S. The ship and almost half of its crew tragically died to the north of Wrangel Island. In 1920–1921, navigating through the Northern Sea Route, the Norwegian Expedition led by Roald Amundsen and H. Sverdrup on the ship “Maud” overwintered near Cape Serdtse-Kamen in the Ch.S.

In 1922–1924, an expedition under B.V. Davydov on the vessel “Krasny Oktyabr” was active in the Ch.S. Captain P.G. Milovzorov led a series of freight voyages over the Ch.S. into the mouth of the Kolyma, to the shores of Chukotka, and Wrangel Island (1911–1928).

However, the period of extensive and regular Ch.S. exploration started in 1931–1932, after the icebreaker “A. Sibiryakov” had crossed the Northern Sea Route in a single navigation. Back then, at the outset of developing and building up infrastructure of the Northern Sea Route, Soviet polar explorers established a network of polar stations in the Ch.S. and performed consistent oceanographic research missions and observations on ice mode of the sea by means of coastal stations and ice reconnaissance.

In 1932, the State Hydrology Institute arranged an expedition on the ship “Dalnevostochnik” that studied hydrological regime of the Southern Ch.S. In 1933, the same voyage was made on the trawler “Krasnoarmeets.” G.E. Ratmanov led both expeditions.

Scientific and research missions were carried out on the icebreaker “F. Litke” (1929–1934) and the steamship “Chelyuskin” (1933–1934). After the wreck of the “Chelyuskin,” participants of the enterprise, the so-called Schmidt Camp, landed on ice and made hydrological and oceanographic observations summed up in “The Regime of the Chukchi Sea” (1938) by Yakov Gakkel and Pavel Khmyznikov. Meteorological stations significantly increased in number in the northern coast of the Chukchi Peninsula after the crash of the “Chelyuskin.”

In 1934, the icebreaker “Krasin” (scientific operations headed by N.I. Evgenov) was engaged

in extensive hydrological work in the part of the Ch.S. to the south of the Cape Schmidt – Wrangel Island – Herald Island – Icy Cape (Alaska) line. The expedition made a course survey and geological research. This mission made valuable contribution to the knowledge of the Ch.S. The following year, the “Krasin” was also a platform for important scientific research in the Ch.S. under G.E. Ratmanov and went as far to the north of Wrangel Island as  $73^{\circ}30'N$ . Here, waters containing elements from the Atlantic Ocean were found at a depth of 100–120 m.

In 1938, hydrological exploration was carried out by the survey ship “Okhotsk” and in 1939 – the icebreaking steamer “Malygin.” In 1943–1944, a voyage under the command of Y.A. Borindo made comprehensive marine survey down the coast of the Bering Strait to Kolyuchinskaya Bay.

In the postwar period (after 1945), icebreakers took part in the exploration of the Arctic as before. The East Oceanographic Expedition on the icebreaker “Serny Polyus” set out from Vladivostok in July, 1946 was the first major sea mission. In August, the icebreaker reached  $73^{\circ}44'N$ , the record latitude for free floating vessels in the Ch.S. Through comprehensive studies the expedition improved bathymetric maps of the Chukchi and East Siberian seas, determined circulatory water motion in the east of the East Siberian Sea that affects the movement of the Ayon Ice Massif, and proved Atlantic water intrusion into the East Siberian and Chukchi Seas. An aerostat was employed for meteorological observations in the Arctic environment for the first time.

After the Great Patriotic War (1941–1945), Hydrographic Enterprise of the USSR Ministry of Marine was in charge of hydrographic operations performed in the littoral sea for many years. In 1964–1965, ships of the Soviet Pacific Fleet made detailed survey of the bottom shape and seabed as well as hydrological observations in the Bering Strait and to the north of it.

In 1969, the expeditionary unit of the First Pacific Oceanographic Expedition together with the Polar Expedition organized by Scientific-Research Institute of Geology of the Arctic

resumed integrated geophysical research on the ice. In 1978–1981, polar northeast missions under P.P. Shirshov Institute of Oceanology of the USSR Academy of Sciences went on to the northeast Ch.S. and studied deposition of sediments in the northeastern part of Beringia. It was confirmed that terrigenous discharge comes from Alaska via the Bering Strait of the Ch.S. Besides, a full range of geological and geomorphological investigations was conducted in the Bering Sea and adjacent regions. In 1984, the NOAA ship “Surveyor” carried out geological study in the Ch.S. In 1985–1986, the oceanographic research vehicle “Aleksey Chirikov” executed an integrated oceanographic (hydrographic, geophysical, hydrological, meteorological) survey in the south Ch.S.

In the end of the 1980s – beginning of the 1990s, comprehensive studies of ecosystems in the Bering and Chukchi seas were conducted under Yuri Izrael, a Soviet and Russian scientist and member of the Academy of Sciences, and summed up in the book *Study of Ecosystems of the Bering and Chukchi Seas* edited by Y.A. Izrael and A.V. Tsyban and published in 1992.

In 2007, USCGC “Healy” embarked on a large-scale scientific research mission – an acoustic survey and seafloor mapping of the US northern portion of the Ch.S. – “to better understand its morphology and the potential for including this area within the USA extended continental shelf under the UN Convention on Law of the Sea.” This mission was part of the work done by closed Interagency Task Force headed by Larry Mayer that had been performing charting and seismic survey of the seabed in the Arctic since 2004 in preparation of the US claim to UN for jurisdiction of the additional area of the Arctic shelf.

In 2008, Canada and the USA made a joint cruise to map the sea area 400–600 miles north of the Alaska coast in the Ch.S. The expedition collected data on large reserves of oil and gas deep in the Arctic Ocean and obtained information required for future delimitation of the continental shelf to the north of Alaska. This entails mostly 3D mapping of the seabed in the vicinity of the Ch.S.

## Chukchi Sea, Names

Chukchi Sea, Names – until 1933–1935 the Chukchi Sea included the East Siberian Sea, which has been separated from it and gained its own status as a sea after the works of G.E. Ratmanov (1932–1933) and the research on the icebreaker “Krasin” (1935). In 1928, the Norwegian scientist Prof. H. Sverdrup, analyzing the observations made by the Norwegian expedition on the ship “Maud,” came to the conclusion that the sea that lies between the New Siberian Islands and Wrangel Island in its physical and geographical conditions differs greatly from the sea between the Wrangel Island and Alaska. Therefore, the uniting of the Chukchi Sea and the East Siberian Sea under a single name of the East Siberian Sea, as it was named by the Imperial Russian Geographical Society at the beginning of the twentieth century at the suggestion of Prof. Yu.M. Shokalskiy, seemed wrong to him. Sverdrup shared his thoughts with Soviet scientists V.Yu. Vize and suggested naming the sea from Wrangel Island to Alaska “the Dezhnev Sea.” However, according to Vize, it was correct to call it “the Chukchi Sea” after the people inhabiting the Chukchi Peninsula. The official name was confirmed on June 27, 1935, by the Decree of the USSR Central Executive Committee.

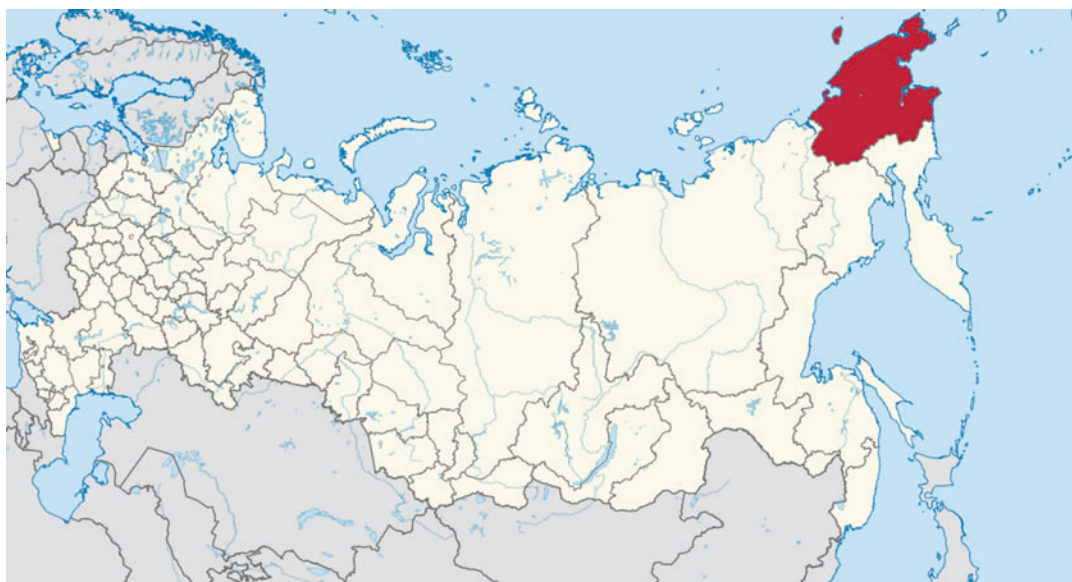
## Chukotka Autonomous Okrug

Chukotka Autonomous Okrug – a federal subject of the Russian Federation. It was formed on December 10, 1930 as Chukotka National District. Since 1953, it had been a part of the Magadan Region, RSFSR. In 1980 it became autonomous, and since July 1992, it has been part of the Russian Federation. Ch. is located in the far northeast of Russia. It occupies a part of the continent, the Chukchi Peninsula, and a number of islands (Wrangel, Ayon, Diomedea (Ratmanova), etc.). It is washed by the East Siberian Sea, the Chukchi Sea, and the Bering Sea. A significant portion of the Okrug is located above the Arctic Circle. Ch. is part of the Far

East Region of Russia. It covers an area of 737.7 thousand km<sup>2</sup>. The population is 50.5 thousand (2015). The administrative center of Ch. is Anadyr. Other cities include Bilibino and Pevek. The population is comprised of Russians, Chukchi, Evens, Eskimos, Chuvans, Yukagirs, and others. There are 8 administrative districts, 3 cities, and 15 villages. The average population density is 0.07 people per 1 km<sup>2</sup>. The shores are heavily indented. To the northeast is the Chukchi Plateau (its height reaches up to 1843 m), in the central part is the Anadyr Plateau, and in the southeast – the Anadyr Lowland. There are deposits of tin and mercury ores, coal and lignite, natural gas, and others.

The climate is harsh; marine climate on the coast; in the inner parts, the climate is continental. Winter lasts up to 10 months. The average January temperature ranges from –15° to –39 °C; in July it's up to 5–10 °C. Precipitation totals 200–500 mm a year. The vegetation period in the southern part of the Okrug is 80–100 days. Perennial high cold-resistance vegetation is widespread.

Large rivers include the Anadyr River (with its tributaries the Mayn, the Belaya River, the Tanyurer River), the Velikaya River, the Anguema River, the Omolon River, and the Bolshoi and the Maly Anyuy rivers. There are numerous lakes; the largest include Lake Krasnoye and Lake Elgygytgyn. The Okrug is located in the forest-tundra zone, the tundra zone, and the polar desert zone. The soils are mainly mountain tundra and peaty gley, sometimes peat podzolic and alluvial. Tundra vegetation is predominant (dry mountain tundra with bushes and shrubs, tussock, and cotton-grass tundra). On the upper slopes of the mountains and on Wrangel Island, there are polar desert areas. Characteristic trees are larch, poplar, willow, birch, and alder. The fauna of the Okrug includes wild foxes, polar foxes, wolves, wolverines, chipmunks, squirrels, lemmings, hares, brown and polar bears, etc. There is a large variety of birds: white and tundra partridges, ducks, geese, swans, etc.; in the coastal areas, there are guillemots, eider ducks, and gulls that form “rookeries.” The seas are rich in fish (chum, pink salmon, trout) and marine mammals (walruses, seals, etc.); whitefish,



Chukotka Autonomous Okrug (Source: [https://en.wikipedia.org/wiki/Chukotka\\_Autonomous\\_Okrug#/media/File:Chukotka\\_in\\_Russia.svg](https://en.wikipedia.org/wiki/Chukotka_Autonomous_Okrug#/media/File:Chukotka_in_Russia.svg))

white salmon, and graylings live in rivers and lakes. There is a nature reserve “Wrangel Island” on the territory of Ch.

The main industry is mining (gold, tin, tungsten, mercury ore, coal, and lignite). Facilities operate for the production of building materials. Energy is provided by the Bilibino nuclear heat and power plant, the Chaun and the Anadyr thermal power stations, the Bering and the Egvekinotskaya hydroelectric power stations, and the floating power station “Severnoe Siyanie” (“Polar Lights”) at Cape Schmidt. Reindeer breeding, fishery, and hunting for fur and sea animals are widespread. Dairy farming, poultry farming, pig farming, fur farming, and hothouse economy are being developed. The ports are Pavel, Anadyr, Egvekinot, and Beringovsky. Navigation is on the Anadyr River, the Velikaya River, the Bolshoi, and the Maly Anyuy.

## Chukotka Flaw Polynya

Chukotka Flaw Polynya – forms in some years with easterly and southeasterly winds along the coast of the Chukchi Sea. It is 10–15 miles in

width, but it extends for a long distance and is filled with intermittent ice patches and arches of ice concentration of various widths. With northwesterly and northerly onsetting winds, the polynya closes rapidly. It is used for the passage of vessels.

## Chukotka Nose

Chukotka Nose – the archaic name of the northeastern tip of the Chukchi Peninsula and the entire Asian continent. In 1898 it was renamed Cape Dezhnev.

## Chukotka Peninsula

Chukotka Peninsula – located in the northeastern part of Asia, Russia. The area covered is 49,000 km<sup>2</sup>. It is separated from America (Alaska) by the Bering Strait. Ch.P. is washed by the Chukchi Sea and the Bering Sea. The coast is slightly indented. The only large bay is Chaunskaya Bay. The Bering Sea has a number

of convenient bays – Provideniya Bay, Glubokaya Bay, etc. – as well as some large bays, Lavrentiya Bay, Mechigmen Bay, Anadyr Bay, and Kresta Bay. The terrain is predominantly mountainous.

### Chum Salmon (*Oncorhynchus keta*)

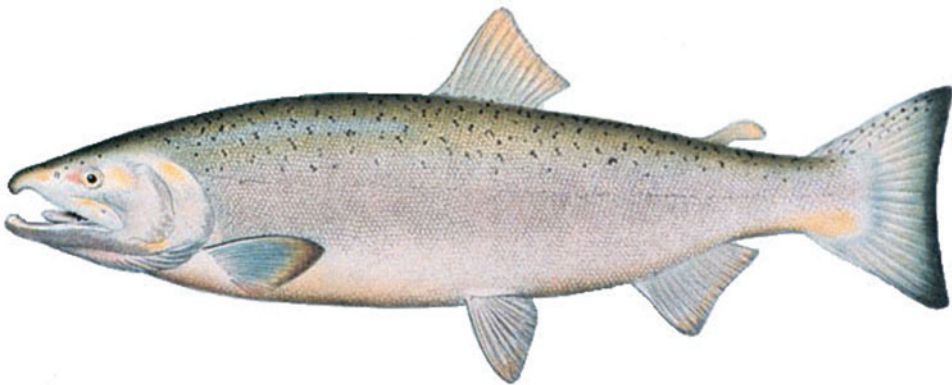
Chum Salmon (*Oncorhynchus keta*) – a commercial anadromous fish, the second most populous of the *Oncorhynchus* genus, the Salmonidae family. It occurs widely all over the northern Pacific Ocean, along the American coast – from San Francisco to the north as far as the Mackenzie River Basin (the Arctic Ocean). Along the Asian coast, the C.S. is found from the Korean Peninsula to the north as high as Providence Bay. Single species can go up the Lena, Yana, Indigirka, and Kolyma rivers. C.S. is first mentioned in the work “Kamchatka” by the explorer S.P. Krasheninnikov (1756).

The chum can grow to 1 m in length and to 10 kg in weight. Males are larger than females. C.S. enters the rivers for spawning, traveling up sometimes as far as 1,000 km. Chum comes for spawning mostly within the age of 4–6 years. By and large, the species of 3–10 years old participate

in reproduction. Two types represent C.S. almost in all areas of its habitat: summer (average body length is up to 60 cm) and autumn (body length is up to 75 cm). The autumn C.S. is bigger in size and weight, more fertile, and has a higher growth rate.

The summer chum prevails in the northern regions and the autumn one – in the southern. Both types occur in the Amur River and the rivers of Sakhalin and Ayan-Okhotsk District. The summer C.S. matures at the age of 3–5 years. It migrates to rivers from the beginning of July to the end of August and, in mid-August, spawns in the mountain affluents of the large rivers, at the orifice of the ground waters, and in the gravel and fast water. The female can lay up to 3,000 eggs. Eggs are orange, as large as 7 mm in diameter. The egg stage is 103–120 days. Chum fry run to sea when they are 4–5 cm long. The autumn C.S. matures at the age of 4 years and enters the rivers end August–early September, advancing much farther than the summer chum. It spawns later, often under ice. It can lay eggs at the outlet of ground waters, producing about 4,000 eggs on the average. The autumn chum grows faster than the summer one.

At sea the chum eats mainly fish (sand lance, herring, and others). It is very important for commercial fishery.



Chum salmon (Source: [https://ru.wikipedia.org/wiki/%D0%9A%D0%B5%D1%82%D0%B0#/media/File:Oncorhynchus\\_keta.jpeg](https://ru.wikipedia.org/wiki/%D0%9A%D0%B5%D1%82%D0%B0#/media/File:Oncorhynchus_keta.jpeg))



## Clerke, Charles (1741–1779)

Clerke, Charles (1741–1779) – captain and an explorer of the Bering Sea, who sailed four voyages around the world. He was born in Essex, England. C.C. entered the Royal Navy at the age of 14 as a midshipman. In 1764–1766, he participated in the cruise of Captain John Byron sailing aboard HMS “Dolphin” around the world in search of the Solomon Islands and new lands in the Pacific Ocean. In 1768–1771, 1772–1775, and 1776–1779, C.C. circumnavigated the earth three more times under Captain James Cook as commander of the “Discovery,” the second ship of the expedition. From September through October, 1778, they visited Unalaska Island where J. Cook and C.C. met G.G. Izmaylov, a Russian navigator, and exchanged charts of the Bering Sea. After the death of J. Cook in the Hawaiian Islands in 1779, C.C. took command of the expedition, moved to the sloop “Resolution,” and led his vessels to the north, to the Chukchi Sea. From April to June, the ships called at Petropavlovsk where Major Magnus Carl von Behm, the chief commander of Kamchatka, supplied the expedition with water, provision, and ship equipment. In his turn, C.C. gave Behm a compiled map of discoveries made by the enterprise and a collection of ocean “curiosities” as well as some Cook’s diaries and other documents to pass on to the Ambassador of the UK to Russia.

However, he failed to reach Icy Cape along the coastline of Alaska and never traveled farther than Cape Schmidt due to heavy ice. Unpassable ice doomed the attempt of the expedition in July to penetrate to the Chukchi Sea to the north of 70 °N. In August, 1779, C.C. died of tuberculosis off the coast of Kamchatka en route to the port of Petropavlovsk. He was buried with military honors in Petropavlovsk. The seafarer’s grave was set in order by: the expedition by J.F. Lapérouse (1787); the crew of the sloop “Nadezhda” under the command of I.F. Krusenstern (1805); P.I. Rikord, a commander of Kamchatka (1818); and the British



Clerke C. ([https://en.wikipedia.org/wiki/Charles\\_Clerke](https://en.wikipedia.org/wiki/Charles_Clerke))

parliamentary delegation that erected an extant obelisk in 1913. A monument to C.C. was set up in Petropavlovsk-Kamchatsky.

His name is given to an island and reef near Vancouver Island, the rocks he discovered in the South Atlantic Ocean, in the vicinity of South Georgia Island.

## Collins Russian-American Telegraph Line (Collins Overland Line)

Collins Russian-American Telegraph Line (Collins Overland Line) – the project of laying a telegraph link between the eastern and western hemispheres across the Bering Strait. The project was the development of the telegraph proposals put forward by an American businessman and politician L.M. Collins and provided for enhancing the trade links between the American states of California, Oregon and Washington, and Russian Siberia. Collins offers were supported by US President Franklin Pierce and Secretary of State

William Marcy. The Russian government supported the proposal for the construction of Collins Russian-American telegraph line that would link the telegraph systems of both hemispheres across the Bering Strait. The idea by Collins found support not only in Russia and the USA but also in Europe, which faced with serious difficulties in trying to pave the intercontinental telegraph cable across the bottom of the Atlantic Ocean. In Russia, the project and the future estimated cost for laying a telegraph line across the Bering Strait were prepared, and in the autumn of 1861, the construction of the line from Nikolaevsk-on-Amur began with the expectation that in 1864 it would reach Khabarovsk and in 1865 it had to be completed in one of the southern ports on the Sea of Japan.

The construction of the telegraph line was also started in the USA from a starting point in San

Francisco. In the autumn of 1864, negotiations on the construction of the telegraph across the Bering Strait continued in St. Petersburg with the participation of L. Collins and President of the American Telegraph Company "Western Union" (Western Union Telegraph Company) H. Sibley, where the question of a possible sale of Russian America to the USA was raised. The telegraph construction was considered both in the USA and in Russia as a "great enterprise." However, in February 1867 in St. Petersburg, it was reported on the termination of work by Americans due to the successful resolution of technical difficulties related to the transatlantic cable laying from Europe to America across the bottom of the Atlantic Ocean. Despite numerous Russia's protests, the project participants from the USA were firm: a telegraph line across the Atlantic was much cheaper than communications over the Bering Strait.

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## Dam in the Bering Strait

Dam in the Bering Strait – a project of the dam was first proposed in the late nineteenth century in order to improve the climate of the Far East and surrounding areas. The original purpose was to stop the flow of cold water and ice from the Arctic Basin to the Bering Sea, because it was thought that the cold currents most of all cooled the Far Eastern Maritime Region, Japanese islands, and others. It was later disclosed that the effect of the Arctic water runoff on the climate is very insignificant and that the relatively warm waters come from the Pacific Ocean to the Arctic Basin. After that, the dam project was revised: it had to stop the flow of warm Pacific waters to the Chukchi Sea and thus to improve the heat supply of the Bering Sea and the surrounding areas.

Eventually, there were several studies on the use of the Bering Strait. D. White, professor of the University of California (USA), offered to warm Pacific waters entering the Bering Strait, in nuclear power plants. Soviet engineer A.I. Shumilin proposed integrated utilization of the Bering Strait, primarily, by mechanical pumping to increase the natural flow of Pacific waters through the Bering Strait, thereby mitigating climate in the Bering Sea, and at the same time to build a railway linking Chukotka and Alaska. In 1956, the Soviet engineer and geographer P.M. Borisov proposed the project “co-current regeneration of warm Atlantic waters through the Arctic Basin to the Pacific Ocean, as a basis

for gradual improvement of the climate.” The idea of this project was the construction of a dam over the Bering Strait, which would provide ice melting in the Arctic Ocean due to the direct flow of the Atlantic waters, which would eventually lead to a shift of all natural areas to the north and thus “improve the climate across northern Eurasia and North America.”

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## Daurkin (Tangitan), Nikolay Ivanovich (About 1734–After 1795)

Daurkin (Tangitan), Nikolay Ivanovich (about 1734 – after 1795) – a Chukchi traveler, Arctic mariner, cartographer, and Chukchi Peninsula and Alaska explorer. He was of the Chukchi origin and was brought up by the Cossack squadron commander D.I. Pavlutskiy. In 1760, he left for Tobolsk where he was accepted into the Cossack squadron due to his knowledge of the Russian and the Yakut languages. In 1761, he was appointed as an interpreter to the Anadyr Ostrog (settlement). In 1763, he participated in the bidarra trip along the Anadyr but later left his service and went to live with the Chukchi. Daurkin roamed with them around Chukotka and visited St. Lawrence Island. Upon returning to Ostrog in 1764, he was arrested for self-willed actions. In confinement he wrote a report on his trip around the Chukotka Peninsula and drew a first relatively correct map which was used up to 1811. In 1765, he was declared not

guilty and transferred to Irkutsk where he studied cartography. He served in Gizhiginsk Fortress; in 1767–1771, he worked as an interpreter in an expedition to the Medvezhyi Islands and drew a detailed map of Chukotka and Kolyma district and a part of Alaska coast. In 1791, as a member of the expedition of I.I. Billings, G.A. Sarychev visited the Diomed Islands; he was one of the first Russians who landed at the coast of Alaska; together with a Cossack captain I. Kobelev, they discovered Port Clarence Bay. He accompanied I.I. Billings in his expedition around Chukotka. Till 1795, he worked as an interpreter in Okhotsk.

Daurkin gave his name to a peninsula in north-east of Chukotka between Kolyuchinskaya and Mechigmentskaya Bay.

### Daurkin Peninsula (Chukotka)

Daurkin Peninsula (Chukotka) – occupies the northeastern part of the Chukchi Peninsula between Kolyuchinskaya Bay and Ieniveemkueym Bay of the Chukchi Sea in the west and Mechigmentskaya Bay and the bay with the same name in the southeast of the Bering Sea, Chukotka Autonomous District, Russia. Most of it is occupied by Genkanyi Ridge more than 900 m high. The shores are low and not rugged. There are two capes: Serdtse-Kamen and Dezhnev. In the east, Saint Lawrence Bay cuts into the peninsula. Among the large rivers are the Igelveem and the Chegitpun. The peninsula was named in honor of the Russian mariner, a Chukchi explorer, N. Daurkin.

### Davydov, Boris Vladimirovich (1884–1925)

Davydov, Boris Vladimirovich (1884–1925) – a Russian count, sea officer, hydrographer, and geodesist. Upon graduation from the Sea Cadet Corps, he participated in the Russo-Japanese War. In 1919, he was appointed a commander of the icebreaker “Taymyr” on which he identified the



Davydov B.V. (Source: <http://dic.academic.ru/dic.nsf/rwiki/632906>)

position of several points from Cape Dezhnev to the Kolyma River. In 1913, he led the hydrographical expedition in the Pacific Ocean. He created the “Sailing Directions of the RSFSR coasts, the Okhotsk Sea and the East shore of the Kamchatka Peninsula including Karaginsky Island” (1923), for which the Russian Geographical Society awarded him the F. Litke Gold Medal. After the establishment of the Soviet government in Vladivostok (1922), D. became the head of the Ship Navigation Security Protection Authority in the Far East. In 1924, he commanded the navigation of the gunboat “Krasny Oktyabr” in Wrangel Island, the Chukchi Sea. The expedition removed the American colonists from the island and restored the rights of the USSR for it installing the state flag on the island.

In the grip of ice. The navigation of the Gunship “Krasny Oktyabr” in Wrangel Island,” Leningrad, 1925.

Davydov gave his name to bays in Wrangel Island, the Chukchi Sea, and Dobrynya Nikitich

Island in the Kara Sea and to capes in Bolshevik Island in the Laptev Sea and in the Chikhachev Bay in the Sea of Japan. The gunship “Krasny Oktyabr” was renamed into “Davydov.” Now an oceanographic ship and a fishing refrigerator in the Pacific Ocean bear the name of Davydov.

## De Long Islands

De Long Islands – northeastern group of islands in the East Siberian Sea, which is included into the New Siberian Archipelago (Jeannette, Henrietta, Bennett, Vilkitsky, Zhokhov Islands), the Sakha Republic (Yakutia), Russia. De long islands lie to the northeast of Novaya Zemlya Island. The total area comprises of 217–228 km<sup>2</sup>. The height is up to 426 m (Bennett Island). Jeannette, Henrietta, and Bennett Islands were discovered in 1879–1881 during the expedition of the American polar explorer lieutenant G. De Long on the USS “Jeannette.” Two other islands were discovered by the hydrographical expedition of Vilkitsky on the ships “Vaygach” and “Taymyr” in 1914.

## De Long Strait

De Long Strait – separates the south coast of Wrangel Island and the coast of the Asian continent. The strait links the East Siberian Sea and the Chukchi Sea. The length is 125 km, the width is 100–146 km, and the depth is 36–50 m. There is a stream in the strait of which the velocity is approximately 30 cm/s. The strait was named after the American explorer, captain of the whaling ship “Nile,” who discovered the southern shore of Wrangel Island in 1867. In 1947, the Soviet ship “Mossovet” was crushed by ice in the strait. Most of the year, it is covered with ice.

## De Long, George Washington (1844–1881)

De Long, George Washington (1844–1881) – an American polar explorer. He graduated from the United States Naval Academy (1865) and served in the US Naval Forces with the rank of lieutenant and later lieutenant commander. He conducted his

De Long Islands (Source: [https://en.wikipedia.org/wiki/Bennett\\_Island#/media/File:Delong1.PNG](https://en.wikipedia.org/wiki/Bennett_Island#/media/File:Delong1.PNG))







De Long G.W. (Source: [http://etc.usf.edu/clipart/29200/29210/delong\\_29210.htm](http://etc.usf.edu/clipart/29200/29210/delong_29210.htm))

first navigation on the ship “Jeannette” and studied the western shore of Alaska and the hydrological regime of Baffin Bay (1873). In 1879, he commanded the expedition on the yacht “Jeannette,” which was supported by the editor of the “New York Herald” editor James Gordon Bennett. The expedition aimed at reaching the North Pole and finding the lost expedition of N.A.E. Nordenskiöld. To the northeast of Herald Island, the ship was trapped in ice and set drifting till June 1881. During this drift, Jeannette and Henrietta Islands were discovered. After the yacht’s wreck in June 1881, its crew had to drift on a block of ice and discovered Bennett Island. On three sloops, De Long set off southward; the sloop with De Long and part of his companions on board reached the mouth of the Lena where all the crew died of starvation. The remains of De Long’s camp and his diary were discovered in 1882 by G. Melville, the commander of another sloop saved by the Yakuts. Only 13 people from the “Jeannette’s” crew survived the expedition. De Long’s diary was published in 1883 under the name “The Voyage of Jeannette.” In 1884 an Eskimo discovered fragments of the uniform of

two sailors from the “Jeannette” crew on a huge block of ice close to the settlement of Krederikshaab in the southwestern coast of Greenland. The block of ice with the clothes covered the distance of 4000 miles in 3 years, moving with the streams of the Eastern Hemisphere to the eastern coast of Greenland. This proved to F. Nansen and later to J. Cook that it is possible to reach the Central Arctic by means of currents and ice drift in the North Pole region. On top the mountain America-Khaya in the Lena mouth, there is a cross commemorating the memory of the participants of De Long’s American expedition.

He gave his name to a group of islands in the East Siberian Sea (the New Siberian Islands Archipelago).

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## Development and Use of Arctic, Sub-Program

Development and Use of Arctic, Sub-Program – one of the 10 subprograms of the Federal Target Program (FTP) “World Ocean,” approved by the Government of the Russian Federation in 1998. The sub-program was intended till 2012. It includes activities in the following areas: improving the mechanism of state management in the Arctic; increasing energy independence of Arctic regions; increasing the reliability and efficiency of Arctic transport system; creating conditions for sustainable development in the Arctic; improving the management of social development; and international cooperation and operations on Spitzbergen. The implementation of the sub-program began in 1999.

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## Dezhnev, Semen Ivanovich (About 1605–Beginning of 1673)

Dezhnev, Semen Ivanovich (about 1605–beginning of 1673) – a Cossack Hetman, pathfinder, and Arctic mariner and one of the discoverers of a strait between Asia and North America, the

Chukchi Sea, northern part of the Pacific Ocean, and the Chukchi Peninsula. He started his service in Siberia as a common Cossack soldier in Tobolsk at the end of 1630; then, he was moved to Yeniseysk and in 1638 to Yakutskiy Ostrog (settlement). In 1639 and in the summer of 1640, he was collecting the tribute in furs in the Sredniy Vilyuy, along the Tatta and the Amga, the left tributary of the Aldan. In the winter of 1640/1641, he served in the Verkhnyaya Yana Basin in the squadron of D.M. Zyryan (Erila). In the summer of 1641, he was appointed to serve in the squadron of M.V. Stadukhin and reached the small settlement in the Oymyakon (the left tributary of the Indigirka). In the spring of 1642, it was attacked by the Evens. The garrison got the help from the Cossacks, the Tunguses, and the Yakuts, and the attack was defeated. At the beginning of the summer 1643, the squadron of M.V. Stadukhin, including Dezhnev, went down to the mouth of the Indigirka in a koch, navigated by sea as far as the Alazeya River and in its lower parts encountered the koch of D.M. Zyryan. The united group of travelers under the command of M.V. Stadukhin on two vessels set off eastward. The Cossacks reached the Kolyma mouth, where they were attacked by the Yukagirs, but managed to escape up the river and in its middle reaches founded a settlement (now called Nizhnekolymsk).

In the Kolyma, Dezhnev served up to 1647. In the spring of this year, he and his three companions delivered a cargo of furs to Yakutsk. Then Dezhnev asked to be accepted as a member of a trade expedition of F.A. Popov as a tribute collector. Because of heavy ice conditions, the expedition on seven koches set off eastward only next summer. It is generally thought that only three vessels reached the Bering Strait (two crashed in a storm and two more went missing); in the strait, one more vessel sank. In the Bering Sea, another autumn storm separated the two koches left in the expedition. Dezhnev and his 25 companions were thrown off to the Olyutor Peninsula, and only after 10 weeks, the mariners managed to reach the lower reaches of the Anadyr.

This version contradicts the testimonials of Dezhnev himself, which he wrote down in 1662:



Dezhnev S.I. (Source: [https://en.wikipedia.org/wiki/Semyon\\_Dezhnev](https://en.wikipedia.org/wiki/Semyon_Dezhnev))

he stated that six ships out of seven reached the Bering Strait, and during a storm in the Bering Sea or in the Anadyr Gulf, five koches sank, including that of F.A. Popov. After the Koryak Mountains were crossed, Dezhnev and his companions reached the Anadyr. Out of 12 people who went in search of a camping ground, only three came back; 17 Cossacks survived after a winter stay in 1648/1649 and built river ships before the ice broke. In the summer, they went 600 km up the stream and in the upper reaches of the Anadyr in 1650 founded a winter settlement for fur tributary collectors. At the beginning of April, the squadrons of S.I. Motora and M.V. Stadukhin reached this settlement. Dezhnev made an agreement with S.I. Motora to join their efforts and in the autumn attempted to reach the Penzhina without success and roamed the mountains for 3 weeks having no guide. In late autumn, Dezhnev sent part of his company to the lower reaches of the Anadyr to buy some food from the locals. In January 1651, M.V. Stadukhin robbed this food group and in the middle of February went southward to the Penzhina. The members of Dezhnev's group survived through the spring and in summer and autumn tried

to solve the food problem and to find the breeding places of sables, though, with no result. As a result, they surveyed the Anadyr and most of its tributaries; Dezhnev made a drawing of the basin (was not found). In the spring of 1652 on the sandbank in the south of the Anadyr Liman, they discovered the richest breeding ground of walrus with a huge amount of the dead animals' tusks.

In 1660, Dezhnev was changed after his request and went by land to the Kolyma with the load of treasure bones and from there moved to the lower reaches of the Lena. He stayed for winter in Zhigansk through Yakutsk and reached Moscow in September 1664. He was appointed a title of a Cossack Hetman. On returning to Siberia, he was collecting the tribute on the rivers of the Olenyok, the Yana, and the Vilyuy. In 2002 archeologists excavated Dezhnev's house in the settlement of Ust-Olenyok. Here he lived with his second wife, a Yakut woman, for 4 years. From here in 1671, he brought his sable treasure to Moscow.

In the period of 40 years in Siberia, Dezhnev participated in many battles and was wounded 13 times including 3 serious wounds. Judging by his written testimonials, he was a very reliable, honest man struggling to execute all the orders.

Dezhnev gave his name to a cape in the Bering Sea, an island in the Laptev Sea, a bay in the Bering Sea, islands in the Kara Sea, a bay close to Zemlya Alexandra Land Island, and the Barents Sea. In 1972 Veliky Ustyug saw the unveiling of a monument in his honor.

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## Dipper

Dipper – an inner bay formed by flat sand spits either above or under water that dries only when water is low. Typical dipper is Vaskina Bay in the Laptev Sea.

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## Dmitry Laptev Strait

Dmitry Laptev Strait – is situated in the Arctic Ocean, separates Bolshoy Lyakhovsky Island

(the New Siberian Islands group) from the northern shore of an Asian continent, the Sakha Republic (Yakutia), Russia. It connects the Laptev Sea with the East Siberian Sea. Its length is 115 km, width is 50–63 km, and depth is 10–14 m. The shores of the strait are almost parallel and cliffy. Most of the year, the strait is covered with ice. Fluctuation of up- and downsurges amounts to 2.5 m. It was named after D.Y. Laptev, who discovered the strait in 1740. It is often considered a part of the Laptev Sea. Up to the beginning of the nineteenth century, there was an island in the strait, Diomed Island, which was formed from soil and ice, after the melt-out of which the island turned into a shoal.

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## Dranitsyn, German Vasilyevich (1912–1976)

Dranitsyn, German Vasilyevich (1912–1976) – a Soviet Arctic captain and an honorary polar explorer (1938). After the graduation from Arkhangelsk Sea Technical School in 1933, he navigated as a second mate and the executive officer in seal hunting ships, polar supply ships, and icebreakers “Malygin,” “G. Sedov,” “Leningradsovet,” “Joseph Stalin,” etc. He was a participant of hunting trade development in the remote regions of the Arctic. In 1948–1976, he commanded the icebreakers “Ermak,” “Molotov,” “Joseph Stalin,” and “Kapitan Voronin” on the Northern Sea Route. In 1961, he served as a captain-instructor and was the first to conduct a passage of icebreakers and transport ships across the difficult Krasnoy Armii Strait in the Severnaya Zemlya Archipelago; he participated in the arrangement of the North Pole 10 expedition landing from the nuclear icebreaker “Lenin” on the drifting ice in the East Siberian Sea. He took part in the improvement of the ice navigation tactics in the Arctic and was awarded state prizes.

D. gave his name to the Arctic icebreaker “Kapitan Dranitsyn” (1980).



Dmitry Laptev Strait (Source: [http://en.wikipedia.org/wiki/Dmitry\\_Laptev\\_Strait](http://en.wikipedia.org/wiki/Dmitry_Laptev_Strait))

## Dunay Islands

Dunay Islands – a group of islands (archipelago) in the Laptev Sea which lie in the northern part of the Lena mouth and belong to Yakutia. Dunay Islands include Egorsha, Lepeyoshkabalyt-Belkee, and Dunay-Aryta. The biggest of them, Dunay-Aryta Island, and all other groups are named after the Yenisei Cossack Konstantin Stepanovich Dunay. In Soviet times, there was a polar station in Dunay-Aryta Island.

## Dunay-Belkoy

Dunay-Belkoy – together with Egorsha Belkoy Island, it is a small northernmost island in the Lena mouth, the Laptev Sea, Yakutia, Russia.

## Dvukh Pilotov Spit (Two Pilots Spit)

Dvukh Pilotov Spit (Two Pilots Spit) – located to the southeast of Cape Shmidt in the mouth of the Amguema River, Chukotka Autonomous District, Russia. The spit is 2–9 m high, which separated the Tenkergynpilgyn Lagoon from the sea, and is formed from sand and shingle and is covered by tundra vegetation in some places. Sometimes it is possible to see flotsam here. The outshore of the spit is low and shallow. It was named in honor of the two American pilots who died here in 1929. Famous polar pilot C. Eielson and attendant F. Borland set off to rescue the owner of the schooner “Nanuk” Olaf Swenson that was staying in the East Siberian Sea for winter. They commanded the plane “Hamilton” and set off in the autumn of 1929. The place of the plane crash

was discovered by a famous polar pilot M.T. Slepnev. The dead bodies of the pilots were found only in 1930 by the sailors of the motorship “Stavropol.” C. Eielson participated in Wilkins’ flight over the polar basin and was the head of the aviation society “Alaska Airways.” In 1983 the Soviet motorship “Nina Sagaidak” sank opposite the spit.

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## **Dzhangylakh**

Dzhangylakh – an island in the central part of the Olenyok Bay opposite the Olenyok River mouth, the Laptev Sea, Yakutia, Russia. It has an oval form. It has a height of 30–37 m. The southeast shore is cliffy. There are many bogs and small lakes in the island.



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## East Arctic Headquarters, East Headquarters

East Arctic Headquarters, East Headquarters – exercises direction over the sea operations in the East Siberian Sea. All the ships come under its operative command. The head of the headquarters chooses the route and its variants, defines the possibility of independent navigation, and arranges the ice escort and aeronautical ice reconnaissance. Among the headquarters' functions is also the control over the necessary ice, hydrometeorological, and navigational information provided to the ships. The headquarters is based in the town of Pevek, Russia.

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## East Arctic Seas

East Arctic Seas – the eastern seas of the Arctic Ocean, including the Laptev Sea, the East Siberian Sea, and the Chukchi Sea.

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## East Cape

East Cape – a former name of Cape Dezhnev used before 1898.

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## East Siberia

East Siberia – a part of the Asian territory of Russia lying to the east of the Yenisei River as far as the ranges of the Pacific Ocean Drainage Divide and from the marginal seas of the Arctic Ocean to the state borders of Russia with Mongolia and partially China. The area is 7.2 million km<sup>2</sup>. Most of it is occupied by the Central Siberian Plateau; in the north there is a lowland zone (North Siberian Lowland, Central Yakutsk Lowland, Yana-Indigirka Lowland), in the south the mountains of South Siberia, and in the east the Yana-Kolyma Plain. In the north E.S. is washed by the Kara Sea, the Laptev Sea, and the East Siberian Sea. The vast territory of E.S. possesses great natural resources.

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## East Siberian Cod (*Arctogadus borisovi*)

East Siberian Cod (*Arctogadus borisovi*) – a fish of the Gadidae family. Its length is up to 56 cm and maximum weight is up to 1.5 kg. The back is dark olive, the sides are gray, and the belly is with numerous dark spots. E.S.C. prefers cold water more than any other species from the family; lives in schools close to the coast; enters freshwater in river estuaries; matures at 4–5 years; spawns in summer, in the coastal area; feeds on invertebrates and fish; and lives in the Arctic Ocean seas east from the Yenisei Bay.

## East Siberian Sea

East Siberian Sea – situated between the New Siberian Islands and Wrangel Island and washes the eastern part of the Russian Arctic coast. Its western border is the eastern border of the Laptev Sea, with which it joins by means of Dmitry Laptev Strait, Eterikan Strait, and Sannikov Strait. The border stretches from the crossing point of Kotelny Island northern end with the end of a continental shelf (latitude 79° N, longitude 139°E) as far as the northern end of this island (Cape Anisiy). Further it stretches along the eastern shores of the New Siberian Islands to Cape Svyatoy Nos (Dmitry Laptev Strait). The northern border lies along the edge of a continental shelf from the point latitude 79° N and longitude 139°E to the point latitude 76° N and longitude 180°E. The eastern border with the Chukchi Sea starts from the edge of shelf longitude 180° E as far as Wrangel Island, further along its northwestern shore up to Cape Blossom and still further across the De Long Strait to Cape Yakan on the mainland. The southern border lies across the

mainland shore from Cape Yakan to Cape Svyatoy Nos.

The E.S.S. is one of the mainland marginal seas of the Arctic Ocean. Its area is 913 thousand km<sup>2</sup>, shelf area 889.1 thousand km<sup>2</sup>, volume 49 thousand km<sup>3</sup>, average depth 54 to 58 m, and maximum depth 915 m. The sea is shallow because it lies fully on a continental shelf, 72 % are less than 50 m deep.

Relatively large bays are the Chaun Bay, the Kolyma Bay, and the Omulyakh and Khromskaya Bays. There are not many large islands: Medvezhyi, Ayon, and Shalaurov Island. In the coastal area of the E.S.S., small islands are mostly clustered. There are such groups of islands close to the Kolyma mouth from the north side, at the entrance to the Chaun Bay and the Aachim Bay.

The shoreline presents quite large curves, sometimes continuing into the land, sometimes protruding into the sea, but there are areas with a straight shoreline. All the shores lie within the territory of the Russian Federation. Small curves usually associate with the mouths of small rivers. The landscapes of the western coast of the E.S.S. differ drastically from those of the eastern



East Siberian Sea (Source: [http://upload.wikimedia.org/wikipedia/commons/5/58/East\\_Siberian\\_Sea\\_map.png](http://upload.wikimedia.org/wikipedia/commons/5/58/East_Siberian_Sea_map.png))

coast. In the area from the New Siberian Islands up to the mouth of the Kolyma River, the shores are very low and drab. Here waterlogged tundra comes close to the sea. Further to the east from the shores of the Kolyma, after Cape Bolshoy Baranov, the coast gets hilly. Hills come close to the water from the Kolyma mouth to Ayon Island and sometimes cliff sharply. The Chaun Bay is fringed with low but steep straightened shores. The coast that is different in relief and formation belongs to different morphological types of shores.

The submerged relief of the shelf, forming the sea bottom, is generally speaking a plain, which is slightly sloping from the southwest to the northeast. The sea bottom does not have any significant depressions or uplands. Predominant depth is 20–25 m. To the northeast of the Indigirka mouth and the Kolyma mouth, there are shallow trenches on the sea bottom. They are believed to be the remnants of ancient river valleys which were flooded by the sea. The area of small depths in the western part of the sea presents the so-called Novosibirskaya Shoal. The deepest parts of the sea are in its northeastern part. It gets noticeably deeper within the depths from 100 to 200 m.

The E.S.S. situated in the high altitudes lies in the zone of the Atlantic and the Pacific Oceans' influence. Rare as they are, the western part of the sea sees cyclones of the Atlantic origin, the eastern part – those of the Pacific origin. The climate of the E.S.S. is polar marine but with continental characteristics.

In winter the most influence on the sea comes from the spur of the Siberian High which approaches the coast, but the ridge of the Polar High is not very influential here. This accounts for cold southwestern and south winds with the speed of 6–7 m/s blowing over the sea. They bring cold air from the continent, which is why the average temperature in January is only about  $-28 \dots -30$  °C. In winter the weather is quiet and cloudless spoilt only by cyclone intrusions in some days. The Atlantic cyclones in the western part of the sea cause strong winds and some warming, and the Pacific cyclones with cold continental air only increase the speed of wind and cloud cover and lead to snowstorms in the southeastern part of the sea. In the hilly areas of the coast, the Pacific

cyclones cause local foehn with storms which accounts for a slight rise in temperature and a drop in air humidity.

In the summer the pressure over the Asian continent is low, and over the sea it is high, which is why northern winds are predominant. At the beginning of the season, they are very weak, but during the summer their speed gradually grows reaching 6–7 m/s. By the end of the summer, the western part of the E.S.S. becomes one of the stormiest parts of the Northern Sea Route. There is often wind blowing at the speed of 10–15 m/s. The strengthening of the wind here is due to foehns. The southeastern part of the sea is much calmer. Stable northern and northeastern winds determine the low air temperature. The average temperature in July in the north of the sea is 0–1 °C and 2–3 °C in the coastal areas. In summer time the E.S.S. mostly sees cloudy weather with drizzling rain and sometimes a mix of snow and rain.

In autumn the weather very rarely gets warm which is explained by the fact that the sea is remote from the ocean atmospheric centers and their influence on atmospheric processes is too weak. Typical climatic characteristics of the sea are a relatively cold summer in all the sea region, rough weather at the end of summer and especially in autumn in marginal regions of the sea, and still weather in its central part.

Continental runoff in the E.S.S. is relatively small, only 230–250 km<sup>3</sup>/year, which presents 10 % of the total river runoff into all the Arctic Seas. The rivers flowing into the sea are the Indigirka, Alazeya, and Kolyma. The biggest of the flowing rivers, the Kolyma, brings to the sea about 120–130 km<sup>3</sup> of water annually, the second biggest river, the Indigirka, –60 km<sup>3</sup> a year, and the Alazeya only 10 km<sup>3</sup> a year. All the other rivers in the same period of time bring to the sea around 35 km<sup>3</sup> a year. The river water flows to the southern part of the sea, 90 % of the stream flow coming in summer months, like in other Arctic Seas. The water gets strongly desalinated on the area of 50,000 km<sup>2</sup> which accounts for about 6 % of its total area.

Though the sea is quite large, the coastal stream flow does not influence its hydrological

regime to a large extent, rather explaining some water peculiarities of the coastal areas in summer time. The main characteristic features of the hydrological regime of the E.S.S. are caused by high latitudes, free communication with the Central Arctic Basin, big ice coverage, and small river runoff.

As the sea is shallow and lacks deep trenches spreading outside the northern limits, most of its volume from the surface to the bottom is occupied by the surface Arctic waters. Only a limited number of areas close to the river mouths can boast of specific water originating as a result of a mix of river and seawater. It is marked by higher temperatures and low salinity. The surface water temperature in all seasons generally drops in the direction from the south to the north. In winter it approaches the freezing point and amounts to  $-0.2 \dots -0.6^{\circ}\text{C}$  near the river mouths and closer to the sea borders reaches  $-1.7 \dots -1.8^{\circ}\text{C}$ . In summer the range of surface temperature is determined by the ice conditions. Water temperature in bays reaches  $7-8^{\circ}\text{C}$ , in open ice-free areas it reaches  $2-3^{\circ}\text{C}$ , and at the ice edge, it is close to  $0^{\circ}\text{C}$ .

Changes in water temperature depending on its depth in winter and spring are difficult to notice. Only close to the mouths of large rivers, it drops to  $-0.5^{\circ}\text{C}$  in subglacial areas and to  $-1.5^{\circ}\text{C}$  at the bottom. In the summer the ice-free districts show a slight drop in water temperatures from the surface to the bottom in the coastal area in the west of the sea. In its eastern part, the surface temperature can be found in the layer of 3–5 m deep, and then it drops abruptly at the depth of 5–7 m and then decreases smoothly closer to the bottom. In the zones of coastal runoff influence the area 7–10 m deep can boast of homogeneous temperature, between 10 and 20 m deep it drops, at first abruptly and then smoothly decreases to the bottom. Shallow, scarcely heated E.S.S. is one of the coldest Arctic Seas.

Water salinity on the surface generally grows from southwest to northeast. In winter and spring, it comprises 4–5 ‰ close to the mouth of the Kolyma and the Indigirka, reaches the point of 24–26 ‰ by the Medvezhyi Islands and the point of 28–30 ‰ in the central areas of the sea, and grows up to 31–32 ‰ in its remote northern parts.

In summer due to the flow of river water and the ice melting, these figures drop to 18–22 ‰ in the coastal areas, 20–22 ‰ in the Medvezhyi Islands, and 24–26 ‰ in the north, at the melting ice edge.

In winter most of the sea gets slightly saltier from the surface to the bottom. Only in the north-western district where the ocean waters come from the north, the salinity grows up to 23 ‰ in the upper layer 10–15 m deep and 30 ‰ at the bottom. Close to the river mouths, the upper desalted layer 10–15 m deep from the surface is underlain by water with more salinity. Starting from the end of spring and all through the summer, there is desalted layer 20–25 m thick forming in the ice-free areas. Under this layer the salinity grows with the depth of the sea. As a result in the shallow areas (up to the depth of 10–20 or even 25 m), all the water column gets desalted. In deeper areas in the north and east of the sea, in the areas 5–10 m and at times 10–15 m deep, the salinity surges and then grows smoothly up to the very bottom.

In autumn and winter, the water mass density is higher than in spring and summer. It is higher in the north and the east than in the west where desalted waters from the Laptev Sea permeate. But this difference is not really big. Usually the water mass density grows with the depth. Its vertical distribution is similar to the salinity scheme.

The waters have different layer patterns, which create different conditions for water circulation in different areas of the E.S.S. In relatively badly stratified and ice-free areas, heavy winds stir the water up to the level of 20–25 m in the summer. So in the areas where the water depth is not bigger than 25 m, the wind-driven circulation reaches the bottom.

In the areas of abrupt water stratification in terms of density, the wind-driven circulation reaches the level of only 10–15 m, where its significant vertical density gradients lie.

Autumn and winter water convection in the E.S.S. at the depth of 40–50 m (more than 70 % of its total area) reaches the bottom. By the end of the cold season, the winter vertical circulation spreads to the depth of 70–80 m, where it is limited by strong vertical water stability.

Constant currents on the surface of the E.S.S. create weak cyclonic circulation. Along the mainland coast, there is a regular water transfer from the west to the east. Close to Cape Billings, part of the water flows to the north and northwest and into the north marginal seas where it is mixed with the water flowing to the west. Water movement scheme changes according to different meteorological situations. Part of the water from the E.S.S. flows through the De Long Strait into the Chukchi Sea. Constant currents are often interfered by wind-driven ones, which are sometimes even stronger than the former. Flood tide streams are not very influential here.

The E.S.S. boasts of regular lunisolar semidiurnal tides. They are caused by a tidal surge which enters the sea from the north and moves toward the mainland coast. Its front is stretching from the north-northwest to the east-southeast, from the New Siberian Islands to Wrangel Island. The tides are more expressed in the north and northwest. Closer to the south, they get weaker as the ocean tidal surge slackens on the vast shallow area. So, in the part of the sea from the Indigirka to Cape Shelagskiy, the tides are almost unobservable. To the west and east of this district, the size of the tide is also very small comprising only 5–6 cm. In the mouth of the Indigirka, the shore configuration and the relief cause the growth of tides up to 20–25 cm. On the mainland coast, the water level changes are mostly caused by meteorological reasons.

The annual level variations are characterized by the highest position in June and July when the river flow is plentiful. A drop in coastal runoff in August leads to a 50–70 cm drop in the sea level. As a result of heavy winds in autumn (in October), the sea level rises. In winter the level decreases and in March or April it reaches its minimum.

Surges that violate the sea level up to 60–70 cm are very well expressed in summer season. In the mouth of the Kolyma and Dmitry Laptev Strait, they reach their maximum – 2.5 m. Fast and abrupt sea level variations are one of the typical features of the sea coastal areas.

Ice-free areas of the sea develop significant wave disturbance. It gets especially rough in times of stormy northwest and southeast winds

which speed up over the surface of ice-free water. The waves reach the height of maximum 5 m, their normal height being 3–4 m. Strong wave disturbance is mostly typical at the end of summer and the beginning of autumn (September) when the ice edge retreats to the north. The western part of the sea is rougher than the eastern one. Its central areas are relatively quiet.

The E.S.S. is the most ice-infested sea in the Russian Arctic. It is fully covered with ice in the period from October–November to June–July. At this time the inwash of ice from the Arctic Basin to the sea is predominant unlike in other Arctic Seas where the outwash ice drift is more common. A characteristic feature of the E.S.S. ice is formation of strong land ice in winter. It is important to mention that it is mostly spread in the western shallow part of the sea and occupies a narrow coastal area in the east of the sea. In the west the width of the land ice reaches 400–500 km. Here it joins the Laptev Sea land ice. In the central areas its width comprises 250–300 km and closer to the east of Cape Shelagskiy 30–40 km. The ice margin approximately coincides with the isobath curve 25 m which lies 50 km northward from the New Siberian Islands and then turns to the southeast approaching the mainland coast near Cape Shelagskiy. By the end of the winter, the land ice thickness reaches 2 m. It reduces from the west to the east. Outside the border of the land ice, there lies the drift ice. Usually it is first-year or second-year ice 2–3 m thick. In the extreme north of the sea, it is possible to encounter multiyear pack ice. South winds prevailing in winter often drive the drift ice away from the northern ice edge. As a result there appear quite large areas of ice-free water and young ice that form Novosibirskaya (in the west) and Zavranglevskaya (in the east) stationary ice polynyas.

In the beginning of the summer after the land ice breaks and gets eroded, the position of the ice edge is determined by wind and current action. However ice is permanent to the north of the line between Wrangel Island and the New Siberian Islands. In the western part of the sea in place of a vast area of land ice, there forms the New Siberian Ice Massif. It consists of predominantly first-year ice and by the end of the summer gets eroded.



Most of the eastern area of the sea is occupied by a branch of Ayon Oceanic Ice Massif, which to a great extent forms heavy old ice. Its southern periphery during the year almost joins the mainland coast determining the ice situation in the sea.

The ESS is the most difficult sea among other seas in the Northern Sea Route, through which the transit traffic goes. The transportation of food and consumer products to the northern parts of East Siberia goes through Pevek Port.

The fauna in the coastal zone and the mouths of large rivers is relatively abundant. This is the place for those animals that are adjusted to the life in low-salinated water. In the central areas, it is possible to see cold water and brackish water animals. Among the fishes the most important are brook trout, Siberian white salmon, Arctic cisco, cisco, navaga, and flounder. Fish hunting is important on a local scale.

The main ports of the E.S.S. are Ambarchik in the mouth of the Kolyma and Pevek in the Chaun Bay. On the coast there have appeared new settlements and industrial enterprises. In the Soviet times the native population, the Yakuts (to the west of the Kolyma) and the Chukchi (to the east of the Kolyma), obtained a writing system. The region saw the opening of schools, medical institutions, as well as reindeer and hunting farms. On Wrangel Island there is a natural preserve – the main breeding ground of polar bears.

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## East Siberian Sea Encyclopedia

“East Siberian Sea Encyclopedia” – one of the books in the series “Encyclopedia of Russian Seas”, published by “International Relations” publishing house in Moscow in 2014. Its authors are Prof. I.S. Zonn, Prof. A.G. Kostianoy, and Prof. A.V. Semenov. The publication is dedicated to one of Russia’s northern seas – the East Siberian Sea, a part of the Arctic Ocean. The Encyclopedia contains about 250 articles on the hydrographic, geographic and hydrological characteristics of the sea. The most significant natural features are presented: the islands, peninsulas, bays, rivers, their geographical features, economy,

culture and history, as well as cities, ports; water and biological resources, international agreements, research institutions, the activities of prominent scientists, researchers, and travelers. The Encyclopedia provides a chronology of major events that have become momentous milestones in the history of the discovery and development of the East Siberian Sea from the seventeenth century to the present day. Second edition of this book was published in 2015.

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## East Siberian Sea, History of Exploration

East Siberian Sea, History of Exploration – the East Arctic Shelf of E.S.S. was discovered in the seventeenth century by I. Rebrov and E. Buze, Russian sailors, who sailed their koches through the Dmitry Laptev Strait in 1638. In 1648, Semyon Dezhnev, Fedot Popov, and others navigated from the mouth of the Kolyma eastward to the Bering Strait and farther along the Anadyr River. In the eighteenth century, the first works describing coastlines and islands were done, and maps were drawn. A very substantial investigation was carried out by the participants of the Great Northern Expedition; D. Laptev and his fellows (1735–1742); then N. Shalaurov (1761–1764); the geodesist S. Andreev (1763–1764); I. Leontyev, I. Lysov, and A. Pushkarev (1769–1771); and J. Billings and G. Sarychev (1786–1792). Other expeditions, by P.F. Anjou (1822) and F.P. Wrangel (1820–1824), made more accurate descriptions of the coasts.

By the beginning of the nineteenth century, Russian seamen and hydrographers had not yet surveyed the Siberian coast from the embouchure of the Kolyma River to Kolyuchinskaya Bay. In 1800, the merchant Yakov Sannikov discovered Stolbovoy Island and in 1806 Faddeevsky Island. In 1806, New Siberia Island was discovered, in 1809 – Belkovsky Island. Due to active reclamation of the northern shores of Siberia, their precise description was vital. In 1808–1811, an expedition led by M.M. Gedenschtrom together with Yakov Sannikov was the first to chart the New



The East Siberian Sea Encyclopedia (2014) (Source: Image courtesy by Andrey Kostianoy)

Siberian Islands and the Lyakhovsky Islands and the Siberian coast from the Lena River to Chaunskaya Bay and determine the winter fast ice boundary in the E.S.S. In 1821–1824, an expedition composed of two teams – the Ust-Yanskiy (Ust-Yana) team under Lieutenant P.F. Anjou with navigators I.A. Berezhnykh and P.I. Ilyin and the Kolymskiy (Kolyma) team under Lieutenant F.P. Wrangel with the warrant officer F.F. Matyushkin and the navigator P.T. Kozmin – surveyed the coastline from the Olenyok River to Kolyuchinskaya Bay including the New Siberian Islands and the Medvezhi Islands. The expedition was traveling by dog sleds in winter and by boats and horses in summer. The Ust-Yanskiy team operated from 1821 till 1823. The team described the coast of Siberia from the Olenyok River to the Indigirka River and all islands of the New Siberian Archipelago, determined about 100 astronomical positions

lying to the north of 70° N, took 40 measurements of magnetic declination and inclination, and made regular meteorological observations.

In 1821–1824, the Kolymsky team described the coastline from the Indigirka River to Kolyuchinskaya Bay, the Medvezhi Islands, Ayon Island, and the Lena River over 320 km from its mouth. F.P. Wrangel paid thorough attention to search for islands that, as G.A. Sarychev told, hypothetically existed. To prove this thesis, they undertook four journeys covering 270 km over the ice to the north and northeast of the Medvezhi Islands. During these expeditions Wrangel watched ice and made its first scientific description.

In the twentieth century, maps were further refined using astronomical data in the works by K. Vollosovich (1909) and G. Sedov (1909) during the Arctic Ocean Hydrographic Expedition on the ships “Taymyr” and “Vaygach” (1911–1914).

1911 saw the first occasional voyages of steam boats from Vladivostok to Kolyma.

The E.S.S. belongs to the least explored seas of the Russian Arctic Region with its environmental conditions extremely hard for navigation and hydrographic operations, mostly due to harsh climatic and ice conditions. Except for Chaunskaya Bay that is jugged far into the continent, all open sea areas were blank for a long time. The expedition led by A. Nordenskiöld on the "Vega" in 1878 took the first zoological samples. After that, in 1901 and 1902, the Russian Polar Expedition under E. Toll made their studies at sea on the schooner "Zarya." In 1908, G.Y. Sedov led an expedition and conducted a sketch survey of the Kolyma River. The first nonscheduled steamship journeys from Vladivostok to Kolyma started in 1911. The Hydrographic Expedition of the Arctic Ocean on the ships "Taymyr" and "Vaygach" took place in 1911–1914 and a Norwegian voyage on the ship "Maud" in 1924–1925. During the latter one, H. Sverdrup obtained valuable data researching the dynamics of the E.S.S., its meteorological and aerometeorological modes, and Earth's magnetism. F. Malmgren's observations of the polar ice aligned his name with those of outstanding glaciologists.

In 1921, N.I. Evgenov accomplished a 2-year hydrographic reconnaissance of the Lena River Delta and proposed a project for coastal traffic management between the Lena and Kolyma Rivers and Yakutia resupply from Vladivostok by sea.

To develop navigation in the E.S.S., it was necessary to set up weather stations on its coasts that had never been there prior to the Soviet times. The first weather station of the E.S.S. was constructed on the southeastern coast of Bolshoy Lyakhovsky Island by the Academy of Sciences of the USSR in 1928. In the Soviet period, systematic expansion into the regions of the Extreme North and the Northern Sea Route included the East Siberian Sea and rivers running into it. In 1931, an Aeroflot expedition explored the stretch of the coastline from Cape Dezhnev to the mouth of the Kolyma River, and the next year an expedition aboard the motor boat "Pioner" surveyed the embouchure of the rivers Chukochya,

Alazeya, and Indigirka and bays Khromskaya and Omulyakhskaya. The expedition organized by the Chief Directorate of the Northern Sea Route on the icebreaker "Krasin" set several stations in the De Long Strait and north of Wrangel Island. The Yakut expedition on the ship "Polyarnaya Zvezda" took some samples in the Dmitry Laptev Strait in 1927. After the icebreakers "Sibiryakov" (1932) and "Chelyuskin" (1933) had passed through the Northern Sea Route, steam vessels plied the East Siberian Sea on a yearly schedule, and a number of voyages were taken: on the icebreakers "Krasin" (1935), "G. Sedov" (1937), "Malygin" (1939–1940), and "Severny Polyus" (1946). In 1937, expeditions on steam icebreakers "G. Sedov" and "Malygin" conducted research in the Laptev Sea and in the area of the New Siberian Shoal of the E.S.S. and on the continental slope of the polar basin north of New Siberian Islands picked around 40 stations in the west of the E.S.S. In 1937–1938, a third high-latitude expedition on the icebreaker "Sadko" was undertaken. The voyage by the Chief Directorate of the Northern Sea Route on the icebreaker "Severny Polyus" took 23 samples, 5 of them were the first quantitative samples grabbed from the bed.

In postwar years (after 1945), icebreakers bore their share in the Arctic research like before. The East Oceanographic Expedition on the icebreaker "Severny Polyus" that set out from Vladivostok in July 1946 was the first major sea mission. In August the icebreaker reached 73°44'N, the record latitude for free-floating vessels in the Chukchi Sea. Through comprehensive studies, the expedition improved bathymetric maps of the Chukchi and East Siberian Seas, determined circulatory water motion in the east of the E.S.S. that affects the movement of the Ayon Ice Massif, and proved Atlantic water intrusion into the East Siberian and Chukchi Seas. An aerostat was employed for meteorological observations in the Arctic environment for the first time.

In 1973, a diving expedition by the Zoological Institute of the USSR Academy of Sciences explored the eastern part of the Laptev Sea as well as the western part of the E.S.S. near the

New Siberian Islands with eight diving sections in the shallow water. In 1977 and 1980, a team of specialists from the P.P. Shirshov Institute of Oceanology, Academy of Sciences of the USSR, on drifting stations North Pole-23 and North Pole-22, took around 30 trawling samples in the north-east of the sea, by the New Siberian Shoal. The next expedition under the Zoological Institute of the USSR Academy of Sciences, in 1980, conducted a detailed exploration of Chaunskaya Bay projected deep into the continent using 12 sections. In 1989, a Zoological Institute expedition on the ship “Dmitry Laptev” grabbed 12 quantitative samples from the bed in the section area from Cape Billings, in the east of the E.S.S. The entire history of research numbers a little more than 200 samplings in the open part of the E.S.S., the overwhelming majority of which were trawled. New qualitative and especially quantitative samplings over the vast area from the west to the east of the sea collected by the Marine Research Laboratory of Zoological Institute, Russian Academy of Sciences, in 2004, onboard the “Ivan Kireev” during the high-latitude expedition of Pacific Oceanographic Institute, allowed to get an insight into the distribution of benthos communities in the regions explored.

### East Siberian Sea, Names

East Siberian Sea, Names – up to the beginning of the twentieth century, the sea had several names: the Ledovitoe (the Ice) Sea, the Ledyanoe (the Ice) Sea, the Indigirka Sea, the Northern Sea, and the Siberian Sea. It was renamed into the East Siberian Sea at the beginning of the twentieth century by the Imperial Russian Geographic Society after the suggestion of Prof. Y.M. Shokalskiy. The name was approved by the decree of the Central Executive Commission of the USSR of June 27, 1935. Till 1933–1935 the Chukchi Sea was considered a part of the East Siberian Sea. It became independent after G.E. Ratmanov’s explorations (1932–1933) on the icebreaker “Krasin” (1935).

### Eastern Strait

Eastern Strait – situated to the east of the Khantanga Bay, the Laptev Sea. Separated Bolshoy Begichev Island from the mainland bay Nordwick. The width is about 9 km and the depth 14 to 22 m.

### Ebelyakh Bay

Ebelyakh Bay – is a bay at the southeastern coast of the Laptev Sea. It is located between Cape Svyatoy Nos and the Shirokostan Peninsula. Cape Svyatoy Nos is the northeast border of the bay and the cape also serves as the southern exit to the Dmitry Laptev Strait. Cape Churkin is the southwest border of the bay. It opens toward the northwest and intrudes 26 km into the continent. The entrance width is 37 km. The depth reaches 11 m. The banks of the bay are covered by tundra. The southern bank is low and uliginous. It is steep in the north with the maximum height of 387 m (Cape Svyatoy Nos). The rivers of Suruktakh, Yuryunkhastakh, Adargaydakh, and Ekekey fall into the bay. It received its name after Ebelyakh River, a branch of the Suruktakh River. The Cape Svyatoy Nos Arctic station and the Serkin Hole are situated on its banks. The swampy area of the bay is covered with lakes. The largest of them is Bvstakh Lake, at the distance of 37 km from the shore. The bay is an administrative unit of the Sakha Republic, Yakutia, Russia.

### Enurmino

Enurmino – is a small Chukchi settlement on the shore of the Chukchi Sea in the area of the Northern Pole Circle, located near Cape Serdtse-Kamen’, Chukchi Autonomous Okrug, Russia. The population is 315 people, exclusively Chukchi. The main occupation is hunting. The settlement was formed in the 1950s as the result of resettling of the Chukchi families from the



neighboring nomad camps. There are about 50 one-story houses. The Arctic station Cape Netten is 3 km to the northwest, on the shore, and 60 km further there is another settlement, Neshkan. A tremendous walrus breeding ground is located near Enurmino, on narrow pebble beaches, hidden between rocky cliffs. The shallow coastal waters deny the sea vessels the opportunity to approach the shore. All the provisions are delivered by helicopters or, less often, on small barges.

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### **Environmental Protection Cooperation Agreement Between the USSR and the USA**

Environmental Protection Cooperation Agreement Between the USSR and the USA – was signed on March 23, 1972. The Agreement outlined areas of cooperation on environmental protection for both countries. Among such areas were Arctic and Subarctic ecosystems. It became void on June 23, 1994 after signing the Environmental Protection and Natural Reserves Cooperation Agreement Between the Government of the Russian Federation and the Government of the United States of America.

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### **Eskimo**

Eskimo – is the ethnos, populating the northeast of Russia, the Chukchi Peninsula, as well as St. Lawrence Island and Alaska in the USA (approx. 40,000) and Canada (approx. 25,000). The descent of the Eskimos is questionable. Evidently, their ancestral home was Northeast Asia, from where they migrated to America through the Bering Strait. The Eskimos are direct descendants of an ancient culture, which was spread on the White Sea coast since the late first century BC.

Since the seventh until the thirteenth to fifteenth centuries, whale hunting was developing there, and the regions of Alaska and Chukotka, closer to the north, saw the development of small pinniped hunting. The main type of economic activity was sea animal hunting. They shot whales from several canoes by harpoons and later harpoon cannons were employed. The walrus was hunted on drifting ice, the seal was shot from kayaks, and bottom gill nets were installed under ice to hunt for the ringed seal (at the beginning of winter). For water transportation, canoes and kayaks were used, “racket skis” helped to travel on snow, and special boots with spikes (made of bone) attached to them secured walking on ice. The oldest type of the housing was a stone construction with the floor

Eskimo (Source: <https://ru.wikipedia.org/wiki/%D0%AD%D1%81%D0%BA%D0%B8%D0%BC%D0%BE%D1%81%D1%8B>)





submerged into the ground and paved with the bones of the whale's skull and shoulders. They wore blind clothes made from seal and deer skin. The traditional food is seal, walrus, and whale fat and meat. The Eskimos never practically Christianized and every settlement had a shaman. The early stages of the Eskimo Arctic culture development include bone carving. Traditional occupations, such as fishing, sea animal hunting, and fur mosaics, continue developing. Traditional beliefs, shamanism, songs, and dances are preserved. The national language is taught at schools.

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### **Eterikan (?–?)**

Eterikan (?–?) – an Ustyansk Yakut from the lowers of the Lena, a manufacturer, and seaman (there were allegedly two brothers with the same surname). In 1759 or 1760 he discovered the richest locations of mammoth's remains on Blizhniy Island (the New Siberian Islands). Then, having crossed the channel, he was the

first to visit the neighboring Malyi Island. In 1860 Blizhniy Island was called Eterikan. In 1770 both islands were renamed into Bolshoy and Malyi Lyakhovskiy (after I. Lyakhov) under the order of Catherine II. The channel between them is called Eterikan. Moreover, the name Eterikan remained in the names of two rivers on Bolshoy Lyakhovskiy Island.

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### **Eterikan, Channel**

Eterikan, Channel – separates Maly Lyakhovskiy Island (the former Malyi) from Bolshoy Lyakhovsky Island (the former Blizhniy). It is 14 km wide and 5–9 m deep. It is supposed that the channel was discovered in 1759–1760 by the manufacturer and seaman and the Yakut from the lowers of the Lena, Eterikan, who discovered the richest locations of mammoth's remains on Bolshoy Lyakhovsky Island. It was called so in the 1760s by local manufacturers. The channel is often considered to be a part of the East Siberian Sea.

# F

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## Faddey

- (1) A cape that was named by K.P. Laptev (1739) in honor of St. Faddey, because it was his fete on the day the cape was discovered (21 August Old Style). Later both the bay and the islands were named after the cape (1913).
- (2) A group of islands in the Laptev Sea, by the east coast of the Taymyr Peninsula in the area of the Faddey Bay. The FIs consists of three small islands: Faddeyya-Yuzhnyy Island, Faddeyya-Vostochnyy Island, and Faddeyya-Severnnyy Island, which were named by the Soviet hydrographers according to their position in the group of islands and in honor of F.G. Bellingshausen. The islands are low, with rocky cliffs on the northeast coast and the opposite side sloping down to the sea. The largest island – the Faddeyya-Severnnyy Island (4 km in length) – is famous for being the place (along with the Simsa Bay, lying west), where the northernmost ( $77^{\circ}\text{N}$ ) encampments of Russian pathbreakers on the entire continent of Eurasia were found in 1940–1941 together with a wrecked koch.
- (3) A bay of rectangular shape, located on the northeast coast of the Laptev Sea, by the Taymyr Peninsula. It is limited by the Pronchishchev Coast in the west. The bay is more than 35 km long and 20–25 km wide and

has the maximum depth of 23 m. The Faddey Islands are located at the entrance to the bay. The Faddey River flows into the bay. The FB is covered by ice for most of the year. The western shore of the bay is included into the “Chelyuskin Peninsula” section of the Great Arctic Reserve. The bay was explored and mapped in 1913 by the Hydrographic Expedition of the Arctic Ocean on the icebreaking steamers “Vaygach” and “Taymyr” under the command of Captain 2nd Rank B.A. Vilkitsky and named after the Faddey Cape.

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## Faddeyevskiy

Faddeyevskiy – one of the Islands of Anjou – subgroup of the New Siberian Island Archipelago, Sakha (Yakutia) Republic, Russia. It covers the land area of 5,300 km<sup>2</sup> with altitudes of up to 65 m. It is connected with the Kotelny and the Bunge Land Islands, forming a solid land-mass. The soil is accumulated by sands and clays, penetrated with underground ice cores. The lake district of the island occupies a small part of the Valleys of the Ulakhan-Yura and Khastyr Rivers. Here approximately 60 cryogenic lakes are located, each of them occupying at least 1–1.5 km<sup>2</sup>. The surface area of the largest lake is 4.3 km<sup>2</sup>. There are several small rivers on

the island. The prevailing vegetation of the area is mossy and lichenous. Arctic fox cropping is common on the island. It was discovered in 1805 by Yakov Sannikov – the “foreman” of the Syrovatskiy guild of merchant; the island was named after the Russian industrialist Faddeev, who constructed the first winter quarters there.

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## Fairway Rock

Fairway Rock – is located 16 km to the south-southeast of the Little Diomed Island, USA. It occupies the area of 0.3 km<sup>2</sup> and is 163 m high. The slopes of the cliff are steep, while the top is flat. An oceanographic station with radioisotope thermoelectric power plant was set up on the FR in 1960. The rock is visible from afar and serves as a natural mark for those passing into the Chukchi Sea. It was discovered in 1648 by Russian explorers under the command of S.I. Dezhnev. The island was named by the captain of the Royal Navy of England F. Beechey in 1826.

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## Far East

Far East – in a broad sense, the region of the Earth including a number of states and territories on Northeast Asia and extreme eastern areas of Russia, among them are Primorskiy and Khabarovskiy Krai; Amur, Magadan, and Sakhalin Oblast; Chukotka Autonomous Okrug and Jewish Autonomous Okrug; partly the territories of Yakutia and Chita Oblast; eastern part of China; North and South Korea; Japan; and sometimes the Philippines. Thus, it is divided into the Russian and foreign Far East.

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## Far Eastern Federal Okrug (District) of the Russian Federation

Far Eastern Federal District of the Russian Federation – one of the seven federal districts formed in concordance with the decree of the President of the Russian Federation N°849 of May 13, 2000, on the territory of the Russian Federation. It is the largest district in the Russian

Fairway Rock (Source: [https://en.wikipedia.org/wiki/Fairway\\_Rock](https://en.wikipedia.org/wiki/Fairway_Rock))



Federation, including the Sakha Republic (Yakutia), Primorskiy Krai, Amur Oblast, Kamchatskiy Krai, Magadan Oblast, Sakhalin Oblast, Jewish Autonomous Okrug, and Chukotka Autonomous Okrug. The central city is Khabarovsk.

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### Far Eastern Navaga, or Pacific Navaga, Saffron Cod (*Eleginus gracilis*)

Far Eastern Navaga, or Pacific Navaga, Saffron Cod (*Eleginus gracilis*) – cold-loving benthic fish of the cod family (Gadidae). Common in the coastal waters of the Chukchi and Bering Seas, the Sea of Okhotsk, and the Sea of Japan. N migrates in the mouths of the rivers and lakes. The body length ranges from 15 to 50 cm; the usual length is 25–35 cm; the average age is 3–4.5 years. Its weight is 1.1 kg. It always keeps in the coastal zone, moving to the coast in winter for spawning and leaving the coastal zone in

summer for fattening when the water is warmed up off the coast to a depth of 30–60 m. It spawns from December to February near the coast in the area of influence of tidal currents at a low, near-bottom temperature. Females lay 25,000–210,000 eggs. The period of egg development lasts from 80 to 90 days at temperatures up to  $-1.8^{\circ}\text{C}$  and salinity of 23–32 ‰. N feeds on crustaceans and fish fry. N becomes sexually mature at the age of 2–3 years. The greatest concentrations of N are recorded in the Anadyr-Navarin area and Bays of Olyutorsky, Korfa, and Karaginsky. N is a delicious important food fish, proteic, and low fat. Its ice fishing is widely used.

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### Far Eastern Region of the Russian Federation

Far Eastern Region of the Russian Federation – situated in the eastern part of the Russian Federation, the area is 6.2 million km<sup>2</sup>

Far Eastern Navaga  
(Source: [https://en.wikipedia.org/wiki/Saffron\\_cod](https://en.wikipedia.org/wiki/Saffron_cod))





Far Eastern Region of the Russian Federation (Source: [https://en.wikipedia.org/wiki/Russian\\_Far\\_East](https://en.wikipedia.org/wiki/Russian_Far_East))

(36.4 % of Russia's territory, the largest region). The population is 8.1 million people. The region includes nine subjects of the Russian Federation: the Sakha Republic (Yakutia); Primorskiy, Khabarovskiy, and Kamchatskiy Krai; Amur, Magadan, and Sakhalin Oblast; and Jewish Autonomous Okrug and Chukotka Autonomous Okrug. It has a very favorable geographic location, being washed by the Arctic and Pacific Oceans and by the Laptev, East Siberian, and Chukchi Seas in the north and the Bering and Okhotsk Seas and the Sea of Japan in the east. Has land borders with China and North Korea in the south and sea borders with Japan across the La Perouse Strait in the east and with the USA across the Bering Strait in the northeast.

More than three fourths of the territory is covered with young mountains. Heavy earthquakes, active volcanism (active volcanoes and geysers in the Kamchatka and the Kuril Islands), and tsunamis are not rare here. The Chersky Range (four to five times bigger in its area than the Caucasus) contains mountain ranges (Sikhote-Alin, Verkhoyansk, Stanovoy, Sredinnyi, Vostochny), uplands (Central Siberian Plateau, Yana Upland, Oymyakon Plateau, Kolyma

Upland, Central Yakut Plain), and lowlands (Yana-Indigirka and Kolyma).

Water resources of the region include the main rivers: the Amur (the longest river in the Russian Federation, 4,440 km) and the Lena (the third longest river) with the tributaries the Vilyuy, the Aldan, the Kolyma, the Yana, the Indigirka, the Anadyr, the Kamchatka, the Ussuri, and the Poronay (Sakhalin Island). There is also the large Lake Khanka. The highest waterfall in the Russian Federation is Ilya Muromets (Iturup Island).

The climate is arctic in the north (Wrangel Island is an arctic desert), typical inland in the northern and central parts (the influence of arctic air mass manifests itself), and marine monsoon climate in the southeast (maximum rainfall in July and August). The average temperature in January around the Arctic Coast is  $-28^{\circ}\text{C}$  up to  $-40^{\circ}\text{C}$ , in the central part reaching  $-50^{\circ}\text{C}$  ( $-70^{\circ}\text{C}$ , "cold pole" in the area of Verkhoyansk and Oymyakon, Yakutia), in the south along the Amur ranging from  $-2^{\circ}\text{C}$  to  $-30^{\circ}\text{C}$ , at the coast of the Sea of Japan and the Chukchi and the Okhotsk Seas from  $-12^{\circ}\text{C}$  (Primorskiy Krai) to  $-19^{\circ}\text{C}$  (Magadan Oblast), in Kamchatka from



–11 °C to –24 °C, and in Sakhalin from –8 °C to –24 °C. The average July temperature in the abovementioned areas is, respectively, ranging from +2 °C to +8 °C, from +14 °C to +20 °C, from +17 °C to +21 °C, from +20 °C to +8 °C, from +10 °C to +16 °C, and from +10 °C to +19 °C. Rainfall amounts to 200 mm a year in the Arctic Coast, 300–700 mm in the central part of the region, 800–900 mm along the Amur and in Primorskiy Krai, in Sikhote-Alin up to 1,200 mm, in Kamchatka 600–1,100 mm, in Sakhalin 400–850 mm, and in the islands up to 1,000–1,200 mm a year.

Interaction of continental and marine air masses and a complicated relief result in great variation of vegetation. Zonal variability is very obvious as well as vertical zonality in the mountains. The main peculiarity of the nature is the presence of typically southern and northern representatives in the species composition of the flora and the fauna. There are tundra in the Arctic Ocean Coast and the Bering Sea; forest-tundra as far as Okhotsk (Magadan Oblast); taiga (Ussuri) in the south, in Primorye, Amur River region; light forests with stone birch and larch and along the slopes the tangle of cedar elfin wood with alder tree and lichen in Sakhalin Island, the Kamchatka Peninsula, and the coast of the Okhotsk Sea; and broad-leaved forests (a combination of flora and fauna of taiga and the zone of monsoon mingled forests) in the south of Primorskiy Krai.

Of the total area of the region, forest occupies 280.6 million ha or 45 % (predominantly coniferous forests). The stand of timber comprises 21,260 million m<sup>3</sup>, or 26.6 % of Russia's stand of timber. Forest resources do not limit forest harvesting volume to a significant extent, but their development leads to serious expenses.

The soil covering is represented in the north by mountain and tundra and mountain and taiga soils and in the south by brown, gray forest, sod and podzolic, and mountain and forest soils. The northern part is covered by permafrost.

In terms of mineral deposit variety, the Far Eastern Region excels in the whole country, but many depositions are badly studied and need much geological work.

Biological resources in the 200-mile long sea zone are evaluated at 25.8 million tons, including 23 million tons of fish resources. The region is rich in hunting animals, especially furbearers, as well as in berries, mushrooms, and medical plants.

Free-trade zones are “Bolshoy Vladivostok,” “Nakhodka” and “Tumangan” (Primorskiy Krai), “Eva” (Jewish Autonomous Okrug), “Magadan,” and “Sakhalin.”

Coal mining: Lena coal-mining field (Yakutia) – Kangalassy (brown coal) and Sangar and Dzhebariki-Khaya (mineral coal); South Yakutian Coal Basin (crotzling coal, mostly exported to Japan), Neryungri; Nizhnezeyskiy Lignite Basin-Raychikhinsk (Amur Oblast); Bureinskiy Coal Basin-Urgalsk deposition (Sredniy Urgal, Khabarovskiy Krai); Primorskiy Krai-Partizansk (mineral coal), Artem and Bikinsk Basin (brown coal); Magadan Oblast-Arkagala, Galimy (mineral coal); Chukotka Autonomous Okrug-Beringovskiy Basin (mineral coal), Ugolnye Kopi (close to Anadyr, brown coal); Sakhalin-Mgachi, Boshnyakovo, Lopatino (mineral coal), Gornozavodsk, Vakhrushev (brown coal). Ziryanskiy Coal Basin (Yakutia) and a brown coal field in Kamchatka (Korf) are not under development.

Oil and gas production: Okha and Nogliki, the Sea of Okhotsk shelf (Sakhalin oil and gas development district). Gas production: Sredne-Vilyuysk and Talon-Maskachka Basins (Yakutia). Oil refinery plants: Komsomolsk-on-Amur, Khabarovsk, a mini-refinery in Sakhalin

Ironstone deposits: Yakutia, Amur Oblast, Jewish Autonomous Okrug (not under development). Steelworks in Komsomolsk-on-Amur (Khabarovskiy Krai)

Deposits and development of polymetallic ore (Dalnegorsk (Primorskiy Krai)), of tungsten ore (Vostok (Primorskiy Krai)), of tin ore (Ese-Khaya, Deputatskiy (Yakutia), Pevek (Chukotka Autonomous Okrug), Omsukchan (Magadan Oblast), Solnechnoe (Khabarovskiy Krai), and Perevalnoe and Kavalerovo (Primorskiy Krai)), and of gold (Nezhdaninskoe, Allakh-Yun, and Ust-Nera (Yakutia), Zolotaya Gora (Amur Oblast), and Dukat (Magadan Oblast)). Mercury

deposits – Chukotka Autonomous Okrug, Yakutia, Khabarovskiy Krai. Lead production – Dalnegorsk (Primorskiy Krai).

Diamond mining – Mirny (Yakutia).

Huge supplies of waterpower: Zeya Dam, Vilyuysk, and Kolyma Hydroelectric Power Stations. Bilibino Nuclear Power Plant (Chukotka Autonomous Okrug). Supplies of geothermal energy are significant – Pauzhet Geothermal Power Station, the only of its kind in Russia (Kamchatskiy Krai).

The population is 8.1 million people (5 % of the whole population of the Russian Federation). The ethnic composition is very diverse, but the Russians prevail everywhere. Their proportion reaches 88 %, about 7 % are the Ukrainians and 4.5 % are the Yakuts and the Nivkhs (Sakhalin Island), Belorussians, and Tatars – 1 % each. In recent years there has been a huge influx of the Chinese. Indigenous peoples are presented by the Yakuts (380,000 people); the Dolgans, the Evenkis, and the Evens live in the north; the Chukchi and the Eskimos occupy northeastern parts; the Aleutians live in the islands; the Koryaks and the Itelmens in Kamchatka; the Nanais, the Ulchis, the Orochis, the Udegeis, and the Nivkhs in the Amur Basin and to the east of it. Each people's population does not exceed 10,000 people (except for the Evenkis, 24,000 people). Severe living conditions have stipulated the prevalence of town population over one village; the average rate in the region is 76 %. The average density of population is 1.3 people for 1 km<sup>2</sup> (the lowest rate in the Russian Federation), ranging from 13.5 people for a km<sup>2</sup> in Primorskiy Krai to 0.6 and 0.5 people for a km<sup>2</sup> in Magadan Oblast and Yakutia, respectively.

In economy there prevail extractive industries. In the Soviet time, the South Yakutian Territorial Production Complex was founded.

The region contains about three tenths of the Russia's timber supplies. Timber processing complex (Komsomolsk-on-Amur (Khabarovskiy Krai)). Woodworking industry (Lesozavodsk (Primorskiy Krai), Blagoveshchensk, Khabarovsk, Amursk, and Bikin (Khabarovskiy Krai)). Plywood industry (Vladivostok, Birobidzhan). Furniture production (Blagoveshchensk,

Khabarovsk, Vladivostok). Match production (Blagoveshchensk). Pulp and paper production (Poronaysk, Ulegorsk, Kholmsk, Makarov, Tomari, Dolinsk (Sakhalin Oblast), Amursk (Khabarovskiy Krai)). Concrete production (Spassk-Dalний (Primorskiy Krai), Teplozersk (Jewish Autonomous Okrug)). Heavy mechanical engineering (ore mining, lift handling, and foundry equipment) (Komsomolsk-on-Amur (Khabarovskiy Krai)). Power engineering (Khabarovsk). Aircraft engineering, war, and passenger plane production ("Su") (Komsomolsk-on-Amur). Helicopter production (Arsenyev (Primorskiy Krai) and Ussuriysk (Primorskiy Krai)). Shipbuilding and ship repairing (Vladivostok, Nakhodka (Primorskiy Krai), Khabarovsk, Komsomolsk-on-Amur, Sovetskaya Gavan, Nikolaevsk-on-Amur (Khabarovskiy Krai), Blagoveshchensk (Amur Oblast), Petropavlovsk-Kamchatskiy (Kamchatskiy Krai), Kholmsk, Nevelsk (Sakhalin Oblast)). Utility supply production (Birobidzhan, Belogorsk, and Svobodnyi (Amur Oblast)). Diesel engine and metal-cutting equipment production (Khabarovsk).

The largest in the Russian Federation fish processing industry, providing more than 40 % of fish crop in the country. Salmon fishes, crabs, squid, shellfishes (scallops), sea cucumbers, and seaweed are harvested here.

Light and food manufacturing industries are not very well developed (except fish industry).

Agriculture is not developed as well, except for Amur Oblast, Jewish Autonomous Okrug, and Primorskiy Krai. Polar agriculture type is prevailing here. Favorable agroclimatic resources provide stable agronomy in the extreme south. Here the grain crops are spring wheat, winter rye, barley, oats, and corn in the south of Primorskiy Krai. Soya planting is important on a national level (Amur Oblast). There are plantations of beets (Primorskiy Krai) and sunflowers (Primorskiy and Khabarovskiy Krai, Amur Oblast). Horticulture is also developed.

Reindeer (Yakutia, Magadan Oblast, the Chukotka Autonomous Okrug, and Kamchatskaya Oblast) and velvet antler breeding, cattle breeding, pig farming and beekeeping (in the south), animal breeding, and fur trade

Transport network is underdeveloped. Main railway lines are the Trans-Siberian Railway (Chelyabinsk-Vladivostok through Amur Oblast, Jewish Autonomous Okrug, and Khabarovskiy Krai) with branches stretching up to Komsomolsk-on-Amur and Vanino (Sovetskaya Gavan, Khabarovskiy Krai); Baikal-Amur Mainline (BAM, Ust-Kut, Irkutsk Oblast-Komsomolsk-on-Amur, Khabarovskiy Krai); and Malyi BAM-Berkakit (Yakutia)-Tynda (on BAM)-NAM (Trans-Siberian Railway). Sakhalin Railway (the longest narrow-gauge railway in the Russian Federation). Combined train-car ferry Vanino-Kholmsk (Sakhalin). There are construction projects for a railway tunnel from mainland to Sakhalin Island and for a railway through the Bering Strait. Automobile highways of federal significance “Amur” (Chita-Verkh-Svobodny-Aldan-Birobidzhan-Khabarovsk), “Kolyma” (Yakutsk-Magadan), “Ussuri” (Khabarovsk-Vladivostok), and “Lena” (Verkh-Tynda-Yakutsk) connect Yakutia to the Trans-Siberian Railway.

River navigation along the Lena lasts 120–180 days and along the Amur up to 9 months. Big river ports are Khabarovsk, Komsomolsk-on-Amur, Blagoveshchensk, and Yakutsk. Rather an isolated location away from the European part of Russia and access to the seas of the Pacific and the Arctic Oceans determine the status of the region as an outpost of Russia in the eastern borders. Foreign economic relations with many countries of the Pacific area are conducted through the Far Eastern ports. The largest seaports are Nakhodka (close to Vladivostok), Vladivostok, and Petropavlovsk-Kamchatskiy. The ports of the Northern Sea Route are Tiksi (Yakutia), Pevek, and Provideniya (both are in the Chukotka Autonomous Okrug). Air transportation. Gas pipeline Vilyuysk-Yakutsk. Petrol pipeline Okha (Sakhalin)-Komsomolsk-on-Amur.

Space launch complex close to Svobodnyi (Amur Oblast).

The region has a significant tourism potential – unique (and rich in fish) rivers and lakes and volcanic regions – the Kamchatka Peninsula, the Kuril Islands.

Art handicrafts: bone carving – Uelen (Chukotka Autonomous District).

## **Fedorov, Yevgeny Konstantinovich (1910–1981)**

Fedorov, Yevgeny Konstantinovich (1910–1981) – Soviet geophysicist, Academician of the USSR Academy of Sciences (1960), statesman, and Hero of the Soviet Union (1938). In 1932 he graduated from the Physics Department of the Leningrad State University. In 1933 together with a dog driver, Fedorov made a long voyage through the iced straits of the Franz Josef Land from the Tikhaya Bay to the Prince Rudolf Island. In 1934, he was invited to the Taymyr Peninsula to work on a polar station on the Cape Chelyuskin. Here he made several on-foot journeys across Taymyr from Starokadomskiy Island in the Vilkitskiy Strait by the Laptev Sea to the northeast and to the Taymyr River in the southwest and carried out magnetic and hydrological observations, topographical survey, and the setting of coordinates in the “blank” areas of Taymyr.

In 1937–1938 Fedorov participated in the expedition to the North Pole as a researcher. For his hardwork during the 274-day drift, he was awarded the title of the Hero of the Soviet Union. In 1939 F. was appointed Director of the Arctic and Antarctic Research Institute, but in the same year, he was transferred to Moscow and appointed Chief of the Hydrometeorological Service of the Council of People’s Commissars of the USSR (1932–1947). During the Great Patriotic War (1941–1945), Fedorov contributed a lot to organizing the hydrometeorological support of military operations. He was promoted to Lieutenant General. In 1947 F. was fired on a false denunciation and reduced to the ranks.

Fedorov engaged in restoration of the Elbrus complex alpine expedition. In 1952 he was appointed head of the complex geophysical expedition, which included the Elbrus Expedition. In 1956 he was appointed Deputy Director of the Institute of Applied Geophysics and in 1959 was promoted to its director. In 1969 he was awarded the second State Prize for the development of the method of the influence on hail processes by rocket application of special chemicals inside the hail clouds (he received the first State Prize in 1946). In 1958–1959 a group of experts led by Fedorov

contributed to the signing of the 1963 Treaty banning nuclear tests in the atmosphere, outer space, and underwater. In 1960 he became an Academician of the USSR Academy of Sciences, and in 1962 he was appointed Chief of the Main Directorate of the Hydrometeorological Service of the Council of Ministers of the USSR (MDHCM).

Fedorov was fully engaged in the creation of the World Weather Watch; he was also the initiator of the expansion of sea and ocean research of the MDHCM. In 1974 he resigned from his post in MDHCM and devoted himself to studies in the field of human interaction with nature and the environment. In 1979 Fedorov led the Soviet delegation at the First World Climate Conference. Upon his initiative the "Appeal to the Nations" was adopted, which was the document warning the peoples of the world of the possible catastrophic consequences of the Earth climate changing due to the military and industrial activities.

A group of islands in the Nordenskiöld Archipelago was named after Fedorov, as well as the research vessel "Akademik Fedorov".



Fedorov Ye. K. (Source: <http://bendery-ga.org/atljhjd.html>)

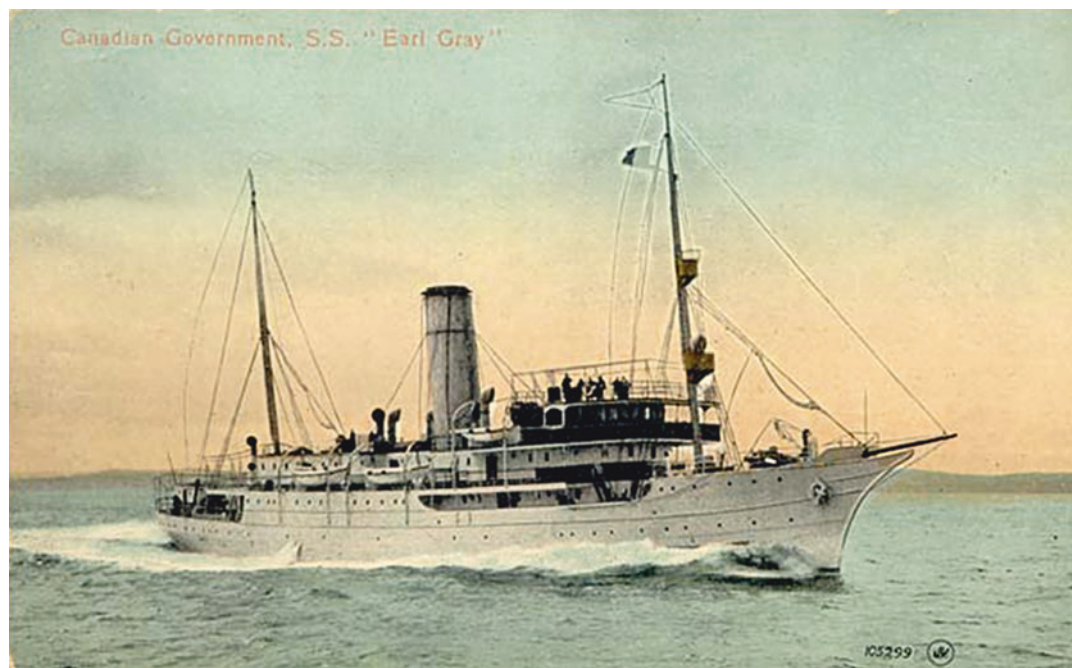
## "Fedor Litke"

"Fedor Litke" – (former "Earl Grey") an ice-breaker of the Russian Arctic Fleet (ice cutter), built in 1909 in the UK on the factory of "Vickers & Co" on commission from the Canadian government. It was 83 m long and 14.5 m wide with the molded depth of 8.45 m, the displacement of 4,200 tons, and the speed of 18.5 knots. It differed from the icebreakers by its pointed forebody, for which it was named "Ice cutter." In 1914 it was bought by Russia and renamed "Canada." V.Y. Vize called it the "White Swan." In 1917 it sank at the Jokangsky roads of the Barents Sea. In the same year, it was raised and after a reconstruction was included into the Arctic Ocean Fleet. In 1920 it was renamed "The Third International." In 1921 it was named after the Russian Arctic explorer Admiral F.P. Litke. In 1934 the steamer made the first through voyage on the Northern Sea Route from east to west in one navigation (with N.M. Nikolaev as captain and V.Y. Vize as supervisor). Moreover, by the Komsomolsk Islands, the steamer rescued from ice three ships of the First Lena Expedition. It was excluded from the list of the merchant fleet in 1958.

## First Kamchatka Expedition (1725–1730)

First Kamchatka Expedition (1725–1730) – In January 1725, Peter I prepared a special instruction for Vitus Bering before sending him to the expedition to study the northeast passage and, above all, to prove the existence of a strait between Asia and America. In addition to the chief of the expedition Vitus Bering, the crew included officers A.I. Chirikov, M.P. Shpanberg, and P.A. Chaplin and two surveyors – in all, approx. 70 people. After the construction of the ship "St. Gabriel" in Nizhnekamchatsk, in July 1728, the expedition sailed to Chukotka. Having passed the strait (Bering), they turned back, without seeing American shores. At the beginning of 1730, Vitus Bering handed the ship over to the





“Fedor Litke” – (former “Earl Grey”) (Source: [www.wikipedia.org/wiki/Fyodor\\_Litke\\_\(1909\\_icebreaker\)](http://www.wikipedia.org/wiki/Fyodor_Litke_(1909_icebreaker)))

military expedition used against the rebellious Chukchi. The conquest of the Chukchi failed, and the head of the expedition D.I. Pavlutski sent in 1732 sub-navigator I. Fedorov and surveyor M.S. Gvozdev onboard of “St. Gabriel” to examine the both shores of the strait and put it on the map, which was successfully done.

The first expedition conducted an instrumental survey of the coast from Cape Karaginskiy at the Kamchatka Peninsula to Cape Dezhnev, gave a description of currents and winds and the nature of the population, and discovered several islands. The expedition was a prelude to the Great Northern (Second Kamchatka) Expedition).

## First Lena Expedition

First Lena Expedition – organized in 1933 by the USSR Northern Sea Route Authority (NSRA) for delivery of goods to the mouth of the Lena River with their following transportation to the inner regions of Yakutia. The expedition under the

command of B.V. Lavrov included a caravan of three cargo ships “Pravda,” “Volodarsky,” and “Comrade Stalin.” The ships “Volodarsky” and “Stalin” came to Tiksi where they were unloaded, and the ship “Pravda” delivered to Nordvik Bay an oil-prospecting expedition. The existing ice conditions forced the ships to spend the winter near Samuila Islands, a group of Komsomolskaya Pravda Islands. During the winter, the vessels were used as bases for field surveys of the Taymyr Peninsula, organized by the geologist N.N. Urvantsev. In August 1934, the icebreaker “Fyodor Litke” was sent on rescue and freed the ships from the ice captivity. This expedition was the next step after the Kara Expeditions to the east for the development of the Northern Sea Route.

## Fish and Invertebrates of the Chukchi Sea

Fish and Invertebrates of the Chukchi Sea – in the sea there are approx. 70 species of fish and



approx. 30 species of invertebrates. See the list below:

Fish: Asian arrow-toothed flounder (*Atheresthes evermanni*), American arrow-toothed flounder (*Atheresthes stomias*), Arctic sculpin (*Myoxocephalus scorpioides*), Arctic staghorn sculpin (*Gymnocanthus tricuspis*), white-bellied lord (*Hemilepidotus jordani*), warty sculpin (*Myoxocephalus verrucosus*), brown mackerel (*Hexagrammos octogrammus*), goby butterfly (*Melletes papilio*), raven sculpin (*Hemitripterus villosus*), two-horned east itself (*Icelus spatula*), Taranets stone loach (*Salvelipus taranetzi*), humpback Liparis (*Liparis gibbus*), salmon (*Oncorhynchus gorbuscha*), antler goby (*Enophrys diceraus*), spearnose (*Leptagonus decagonus*), yellow-bellied flounder (*Pleuronectes quadrituberculatus*), yellowfin sole (*Limanda aspera*), starry flounder (*Platichthys stellatus*), mud snakefish (*Anisarchus medius*), keta (*Oncorhynchus keta*), coho (*Oncorhynchus kisutch*), short-spined sailor fish (*Nautichthys pribilovius*), Andriyashev lumpfish (*Eumicrotremus andriashevi*), Fabricius snakefish (*Lumpenus fabricii*), scaleless small fox (*Podothecus veternus*), multi-mud sculpin (*Myoxocephalus polyacanthocephalus*), bearded small fox (*Podothecus accipenserinus*), soft tadpole sculpins (*Psychrolutes paradoxus*), sockeye salmon (*Oncorhynchus nerka*), grey mullet *Triglops* (*Triglops pingelii*), Okhotsk Liparis (*Liparis ochotepsis*), spotted lord (*Hemilepidotus gilberti*), flathead sculpin (*Megalocottus platycephalus*), polar flounder (*Pleuronectes glacialis*), polar lycode (*Lycodes polaris*), arctic shanny (*Stichaeus pupctatus*), scanty-toothed lycode (*Lycodes rarideps*), frogfish (*Aptocycus vepricosus*), polar cod (*Boreogadus saida*), rock sole (*Lepidopsetta poxystra*), Alaska western char (*Salvelinus malma*), polar flat-headed flounder (*Hippoglossoides robustus*), polar four-horned poacher (*Hypsagonus quadricornis*), Siberian

whitefish (*Coregonus sardinella*), arrow-shaped snakefish (*Lumpenus sagitta*), Pacific delta smelt (*Osmerus mordax dentex*), Pacific capelin (*Mallotus villosus catervarius*), Pacific navaga (*Eleginus gracilis*), Pacific sand lance (*Ammodytes hexapterus*), Pacific sleeper shark (*Somniosus pacificus*), Pacific herring (*Spiraea pallasii*), Pacific cod (*Gadus macrocephalus*), Pacific halibut (*Hippoglossus stenolepis*), Pacific pollock (*Theragra chalcogramma*), Pacific halibut, black (*Reinhardtius hippoglossoides matsuurae*), small staghorn sculpin (*Gymnocanthus galeatus*), big-mouthed sculpin (*Ulca bolini*), arctic alligator fish (*Ulcina olrikii*), proboscidea flounder (*Myzopsetta proboscidea*), chinook salmon (*Oncorhynchus tshawytscha*), spiny lumpfish (*Eumicrotremus orbis*), rough hamecon (*Artediellus scaber*), broad-headed staghorn sculpin (*Gymnocanthus detrisus*), spinyhead sculpin (*Dasycottus setiger*), armored skate (*Bathyraja parmifera*), and Japanese dog poacher (*Percis japonica*)

Invertebrates: snow crab *Opilio* (*Chionoecetes opilio*), pentagonal hairy crab (*Telmessus cheiragonus*), spider crab (*Hya coarctatus alutaceus*), kuro shrimp (*Argis lar*), humpy shrimp (*Pandalus goniurus*), uneven sculptured shrimp (*Sclerocrangon boreas*), sand shrimp (*Crangon septemspinosa*), hermit crab (*Pagurus sp.*), sea urchin (*Strongylocentrotus droebachiensis*), common sand dollar (*Echinarachnius parma*), gastropod mollusk (*Neptunia sp.*), gastropod mollusk (*Buccinum sp.*), scallops (bivalve) (*Chlamys sp.*), black *Musculus* (bivalve) (*Musculus niger*), lamellibranch (*Macoma calcarea*), bivalve (cockle) (*Serripes sp.*), octopus (*Octopus sp.*), starfish (*Ctenodiscus crispatus*, *Pteraster tessellatus*, *Leptasterias arctica*, *Leptasterias polaris*), sea cucumber (echinoderm) (*Cucumaria sp.*, *Psolus sp.*), ascidian (*Halocynthia purpurea*, *Halocynthia aurantium*), sea squirts (*Boltenia ovifera*), brittle stars (*Ophiura sarsi*), and gorgonias (horn corals) (*Gorgonia*)

## Fish of the East Siberian Sea

Fish of the East Siberian Sea – the ESS, located inside the Arctic Circle; it is one of the most inhospitable Arctic Seas, as it is almost not influenced by warm ocean waters. The fauna is not rich and consists of the arctic forms, among which a large portion of highly arctic species. Marine life forms are of euryhaline character, i.e., can withstand wide variations in the degree of salinity of the seawater, and are concentrated mainly in the northern and northeastern regions. Closer to the mainland, the life forms become more brackish and near the mouths of rivers – freshwater. Phytoplankton of the sea is dominated by blue-green algae and diatoms. In zooplankton there are mostly ciliates, rotifers, copepods, and chaetognaths – “sea arrows.” In some periods tunicates and pteropods can appear. The bottom fauna is characterized by an abundance of shell-bearing rhizopods – foraminifers. In the soil there are also many polychaetes, crustacean amphipods, and isopods. Among them the most numerous are Portland Arctic mollusks; echinoderms are widely represented by highly arctic species of brittle stars and sea stars. The sea is inhabited by marine, migratory, and semi-migratory fish. The most common are Siberian whitefish (caught on the Islands of Kotelný, Bolshoy, and Maly Lyakhovskiy); char, trout, cisco, muksun, white salmon, and rainbow smelt (migrates near the New Siberian Islands every 5 years); whitefish (near the Islands of Kotelný and Bolshoy Lyakhovskiy); capelin; cod; herrings; and some bottom fish. In the coastal zone at the mouths of rivers flowing into the sea, there are valuable fish of the salmon, whitefish (on the New Siberian Islands only occasional, sporadic migrations of this fish are observed) and sturgeon families, which come here from rivers and do not migrate far to the north.

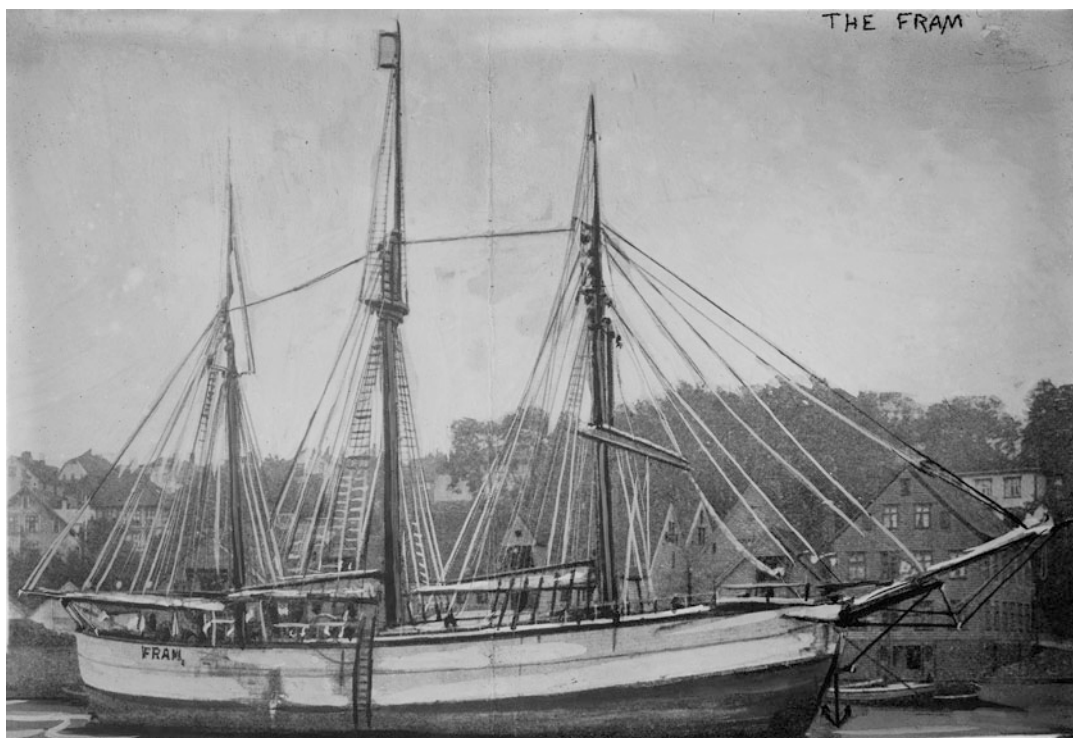
There is no information about sharks inhabiting these waters. It is quite possible to assume that here, there is a frequenter of the Arctic waters – sleeper shark (*Somniosus*). This

fish reaches a length of 6 m and almost never appears on the surface of the sea, preferring to stay in the middle layers of the water. By their diet sleeper sharks are versatile. It can eat micro-organisms, tiddlers, and animal remains. It never attacks an active prey as it is an extremely slow predator, as, indeed, most of the Arctic sea giants.

## "Fram"

"Fram" – (Norwegian for "Forward") a polar schooner of the Norwegian expedition of F. Nansen and R. Amundsen. The schooner was built in 1892 in Larvik by one of the best Norwegian shipbuilders C. Archer on commission from F. Nansen and with his participation. The three-masted ship was designed specifically for scientific research and navigation in difficult ice conditions. It had a rounded shape, 70-cm-thick strong hull consisting of three skins. The schooner had the length of 39 m, the width of 11 m, the displacement of 402 tons, the power of the steam engine 220 horsepower, and the draft of 3.75 m; the speed in calm waters was up to seven knots and there were eight boats, including two emergency ones. A small windmill was additionally installed on the schooner to generate electricity. The crew of the vessel was 13 people. In 1893 Nansen attempted to reach the North Pole drifting on ice. In September of the same year, "Fram" got frozen in the ice near the New Siberian Islands and drifted under the leadership of Nansen (until 1895) and then for the first time in history reached 83°24'N under the leadership of O. Sverdrup. In 1896, having drifted for 1,055 days, the ship was freed from the ice near Svalbard and got back to Vardø, Norway.

In 1898–1902 O. Sverdrup made a journey to the northern part of the Canadian Arctic Archipelago on board this ship. In 1910–1912 R. Amundsen reached Antarctica on the "Fram" and having landed in the Bay of Whales at the



“Fram” (Source: [http://commons.wikimedia.org/wiki/File:Fram\\_-\\_Amundsens\\_ship\\_1910-1911.jpg](http://commons.wikimedia.org/wiki/File:Fram_-_Amundsens_ship_1910-1911.jpg))

Ross Ice Shelf became the first man to explore the South geographic pole (4 weeks ahead of the Englishman R.F. Scott). The schooner covered the distance of 84,000 nautical miles, sailing both northward and southward. In 1914–1935, when “Fram” returned to Oslo and was permanently anchored, the funds were being raised for the restoration and preservation of the vessel, as well as its repair. In 1936 the King of Norway put forward the initiative to preserve the “Fram” as the pride of the nation. The schooner was exhibited as a monument in a special pavilion of the Norwegian Maritime Museum in Oslo. At the stempost of the vessel, there is a monument to its constructor Colin Archer. The name of this vessel was given to an island, a trench in the Arctic Ocean, and several straits of the Arctic Ocean between Greenland and Svalbard and of the Kara Sea between the Taymyr Peninsula and the Nansen

Island of the Nordenskiöld Archipelago, a city in Paraguay.

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## Fram, Island

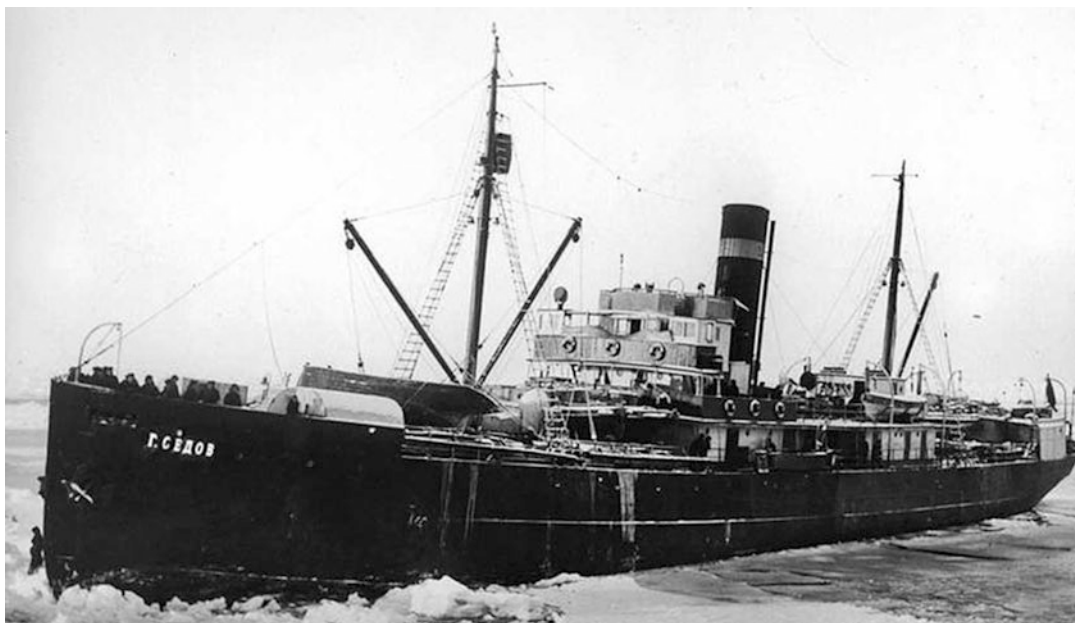
Fram, Island – is located to the north of the Pronchishchev Cape, adjacent to the ridge of the Komsomolskaya Pravda Islands in the Laptev Sea, Taymyr (Dolgano-Nenets) Autonomous Okrug, Russia. It was named in 1919 after the ship “Fram” by the members of the Norwegian polar expedition on board the ship “Maud” under the command of R. Amundsen. On board the “Fram,” the expedition to the central regions of the Arctic Ocean was carried out in 1893–1896 under the leadership of the Norwegian scientist and Arctic explorer F. Nansen.

# G

## **“G. Sedov”**

“G. Sedov” – a Soviet icebreaker that conducted an unprecedented drift from the Arctic to the Atlantic Ocean in 1937–1940. Was built at the shipyard “Henderson and Co” in Glasgow, England, in 1909 and was initially named “Beothic.” Later was purchased by the Russian government in 1915 from “Hudson’s Bay Company” and renamed after the Arctic explorer G.Y. Sedov. In 1916–1919 was used for cargo transportation during winter navigation in the White Sea, and as an icebreaker as well. In 1920 the “G. S.” participated in the First Soviet Arctic Expedition in the Kara Sea to the mouths of the Ob and the Yenisei (the so called Siberian Bread Expeditions). In 1928 took part in the search of the members of U. Nobiles’ expedition on the airship “Norge,” which wrecked to the north of the Svalbard Archipelago. In 1929 the “G.S.” was used for the expedition of the Institute for Northern Studies in course of which Franz Josef Land was explored and a first geophysical observatory was founded in the Tikhaya Bay. In 1930 an expedition on the “G.S.” was the first to explore the northern part of the Kara Sea (commander of the expedition Prof. O.Y. Schmidt, scientific supervisor Prof. V.Y. Vize, captain B.I. Voronin), discovered Vize Island, Isachenko Island, Voronin Island, Schmidt Island, the Sedov Archipelago to which the Northland Expedition of G.A. Ushakov was landed.

In October 1937 in course of a hydrographical expedition in the Laptev Sea “G.S.” together with the icebreakers “Sadko” and “Malygin” got trapped in ice to the north of the New Siberian Islands. All the three icebreakers started their drift northwards. In the summer of 1938 the icebreaker “Ermak” reached the drifting ships and escorted the “Sadko” and “Malygin” out of the ice. Because of the damage of the steering wheel the “G.S.” was turned into a drifting polar station. Fifteen volunteer under the command of captain K.S. Badigin stayed on board the icebreaker. The drift lasted for 2.5 years. Severe conditions, 153 ice nips and motions did not prevent the crew of the “G.S.” from conducting valuable oceanographic, meteorological, geophysical and biological observations. In course of the drift the “G.S.” was the first icebreaker in history to reach latitude 86°39’N. The crew fixed the steering wheel. In the Arctic winter conditions, the icebreaker “Joseph Stalin” reached the “G.S.” which rested in the Greenland Sea after the drift through the strait between Spitzbergen and Greenland. On the 13th of January, 1940 the “G.S.” was escorted out of the ice. All the crew of the “G.S.” were bestowed a title of the Hero of the Soviet Union for heroism and courage, and the icebreaker was awarded the Order of Lenin. During the Great Patriotic War (1941–1945) the “G.S.” was a part of the White Sea War Fleet as an icebreaker under the name “LD-3.”



“G. Sedov” icebreaker (Source: <http://wwportal.com/e-tot-den-v-istorii-232/>)

“G.S.” served in the fleet till the year 1967. Then it was sold to Germany where it has been used as a museum of the Arctic exploration up to the present moment. The water displacement is 3,056 t, length – 73.3 m, width – 10.9 m, the steam engines capacity – 2,360 kWt, speed in ice-free water – 13 knots. In 1967 a new icebreaker with the same name “G.S.” joined the USSR fleet.

G. Sedov gave its name to a group of islands in the Severnaya Zemlya Archipelago in the Kara Sea, and the roads of the Nordenskiöld Archipelago in the Kara Sea.

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## Gabyshevskiy (Stolbik), Island

Gabyshevskiy (Stolbik), Island – situated in the area close to the Kolyma River mouth, the East Siberian Sea. One of the largest islands in the mouth. Separates the Pokhodskaya and the Chukochya Protoka (Arm). Was named with respect to a wide hill in the north-western part of

the island, which looks like a high stand-alone building; the latest local name is “stolbik” (from the Russian word meaning “a column”).

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## Gakkel, Yakov Yakovlevich (1901–1965)

Gakkel, Yakov Yakovlevich (1901–1965) – an oceanologist, East Arctic explorer, Doctor of geographical sciences. After graduation from St.-Petersburg University worked in the Arctic Institute. Took part in 21 geographical expeditions, including 16 to the Arctic and the ones on the icebreaker “A. Sibiryakov” (1932) and the steamer-ship “Chelyuskin” (1933–1934). Together with the hydrographer P. Khmyznikov made a number of measurements along the routing line of the “Chelyuskin,” obtained new data on the depth of two water areas. In the Laptev Sea the explorers singled out the south part with a smooth bottom relief and the northern part with





Gakkel Ya. Ya. (Source: [https://ru.wikipedia.org/wiki/%D0%93%D0%B0%D0%BA%D0%BA%D0%B5%D0%BB%D1%8C\\_%D0%AF%D0%BA%D0%BE%D0%B2\\_%D0%AF%D0%BA%D0%BE%D0%B2%D0%BB%D0%B5%D0%B2%D0%B8%D1%87](https://ru.wikipedia.org/wiki/%D0%93%D0%B0%D0%BA%D0%BA%D0%B5%D0%BB%D1%8C_%D0%AF%D0%BA%D0%BE%D0%B2_%D0%AF%D0%BA%D0%BE%D0%B2%D0%BB%D0%B5%D0%B2%D0%B8%D1%87)))

deep “furrows”; proved the data of their predecessors on the shallowness of the East Siberian Sea and notices the “meridionally elongated trenches” (the submerged river valleys). In the high-latitude expeditions of 1948–1955 G. controlled the compilation of the first map of the Arctic Basin bottom, on which he showed three submerged mountain ridges (Mendelev and Gakkel) besides the Lomonosov Ridge. Came up with the hypothesis of former existence of land in place of the Arctic Ocean, which he called Arctida, proved the fact that there are natural zones in the ocean, explored the Chukchi Sea currents, discovered a natural process of ice-field rotation.

## Gavrilov (Vtorko) (? – ?)

Gavrilov (Vtorko) (? – ?) – a Yenisei Cossack, pathfinder, Arctic sailor, one of the discoverers of East Siberia. In 1640 set off from Eniseysk to Yakutsk with a brigade of D. Kopylov to start the new service. In the autumn of 1641 started his trip to Oymyakon as a member of M.V. Stadukhin’s group, gave the first characteristic of the upper reaches of the Indigirka and the Oymyakon Upland. In the spring of 1642 he went down the Indigirka, entered the East Siberian Sea and reached the mouth of the Alazeya. After a winter stay, he went to the Kolyma, participated in the construction of Nizhnekolymskiy Ostrog (settlement) and served in it from 1644 to 1650. After he was appointed the Ostrog keeper, G. contributed to the navigations of I. Ignatyev on a koch from the Kolyma across the east as far as the Chaun Bay (1646) as well as to the expedition of S.I. Dezhnev and F.A. Popov from the Kolyma around the Chukotka Peninsula into the Bering Sea (1648).

## Gedenshtrom Bay

Gedenshtrom Bay – (the Yakit name is Gedenshtrom Khomoto) a bay in the East Siberian Sea on the southern shore of Kotelnii Island (the New Siberian Islands). The entrance to it is situated between Zemlya Bunge and the Faddeevskiy Peninsula. The bay is open to the south and penetrates the island for 110 km. The width at the entrance is about 12 km. The depth is 14 m. The rivers Peschanaya, Buor-Yuryakh, Kozhevennaya, Tumara-Yuryakh, Tumus-Yuryakh, Uesya-Yuryakh, Alyn-Yuryakh, Erge-Yuryakh, Omuk-Munna, Yuzhnaya and others flow into the bay. Kotordyr and Tas-Ary Islands are situated in the bay. At the exit there are Neizvestnye Islands. The coast of the bay as well as the whole of Kotelnii Island is uninhabited.

It was named after the explorer of North Siberia M.M. Gedenshtrom, who arrived at Faddeevskiy Island in 1809 together with a surveyor Kozhin

and a town citizen Sannikov and ordered the later to explore the strait between Faddeevskiy Island and Kotelnui Island. Sannikov crossed the strait in several places and decided that its width was ranging from 7 to 30 km. In 1811 Sannikov travelled around Faddeevskiy once more and explored the rivers flowing into the sea. The area between Kotelnui Island and Faddeevskiy Island, which had been considered a strait, turned out to be a bay. In 1822 captain P.F. Anjou studied this area. The western shores of the bay are determined by the formation of Zemlya Bunge – they are built mainly from sandy soil. A small northwestern coast lies by the Strelka Anjou Peninsula; the shores there are low and waterlogged; there are many lakes and rivers. The eastern coast, on the contrary, is higher: the relief is hilly and reaching the point of 34 m.

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### **Gedenshtrom, Matvei Matveevich (Mathias von Hedenström) (about 1780–1845)**

Gedenshtrom, Matvei Matveevich (Mathias von Hedenström) (about 1780–1845) – a Russian Arctic explorer, the first to study the New Siberian Islands. Not having finished its studies in the University of Derpt (Tartu), started serving at the customs in Riga, but was arrested and exiled to Siberia because of service delinquencies. In 1808 organized an expedition to the New Siberian Islands helped by the industrialists Y. Sannikov at the expense of the State chancellor and count N. P. Rumyantsev. In 1809 reached the island, which he named Novaya Sibir, in dog-sledges from Ust-Yansk through the Laptev Strait, Bolshoy Lyakovskiy and Faddeevskiy Islands. Described about 200 km of the island's south shore. In the summer of the same year surveyed almost 1,000 km of the coast between the Yana and the Indigirka, correcting significant mistakes of the map in one of the most rugged parts, from the Yana to Cape Svyatoy Nos (about 500 km). After the winter of 1809/1810, which he spent on the Merkushina Strelka Peninsula (the mouth of the

Khroma River) reached the mouth of the Indigirka from which he returned to Novaya Sibir Island, named by him. In search of a land to the east of the island he decided to travel along the land-ice for almost 100 km and discovered the Siberian Polynya, the area of open water at the border of drift ice and continental land-ice. Returned to the mouth of the Kolyma and then advanced northwards for 150 km, but was repeatedly stopped by the Siberian Polynya. In the autumn he set off from the Kolyma mouth westwards and described 500 km more of the coast. In 1812 was transferred to civil service in Irkutsk. In 1819 moved to St.-Petersburg. Several years later returned to Siberia and served as a governor postmaster in Tomsk.

The author of the works “Gedenshtrom's Journey Across the Arctic Ocean” (1822), “Description of the Arctic Ocean coastline from the Yana mouth to Cape Baranov” (1823), “Notes on Siberia” (1830) containing invaluable data on the nature of the New Siberian Islands and the history of their exploration by the pathfinders.

G. gave his name to a bay (and an island in it) by Faddeevskiy Island and mountains in the south-western coast of New Sibir Island.

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### **“Geolog”**

“Geolog” – a low tonnage technical research ship of the Institute of Oceanology of the USSR Academy of Sciences. Was built in 1950 in the USA. Water displacement is 168 t, length – 27.5 m, width – 6.4 m, draft – 2.6 m, speed – 10.3 knots. In 1951–54 the ship performed some navigations to the Bering and Chukchi seas in order to make a cadastral survey of the coast of the Chukchi Sea, the Gulf of Anadyr and the east coast of Kamchatka. In 1955 was used for an expedition to the Sea of Okhotsk and Sea of Japan, the Tatar Strait in course of which some biological research was conducted (predominantly around Sakhalin Island). In 1956 the ship participated in an expedition dedicated to “Dynamics and Morphology of the Far East Seas” with the West-Sakhalin group.

## Gilev, Alexey (? – ?)

Gilev, Alexey (? – ?) – a geodetic surveyor, a participant of Billings-Sarychev's expedition, an explorer of Northeastern Asia and the Kuril Islands. Executing an order of J. Billings in May-September 1790 on a bidarra and in the company of the geodetic surveyor O. Khudyakov G. made a survey of the southeastern shore of Kamchatka between Cape Shipunskiy and Lopatka (about 500 km) and mapped seven northern islands of the Kuril Ridge having circled them, starting from Paramushir Island. The explorer penetrated into the profound regions of the islands, gave characteristics of their relief, defined convenient bays and carried out a census. In the summer of 1791 J. Billings sent G. "to observe" the shores of Chukotka. Having navigated around the eastern shore of the Peninsula on a bidarra from the Mechigmenskaya Guba to Cape Dezhnev, G. at first walked across the cape on foot and then navigated along its coast on a bidarra and then on foot again. He described the Chukotka coastland as far as the Kolyuchinskaya Bay, repeated and spec-

ified the survey of T. Perevalov (1746). In late autumn he surveyed the coast line up to the Chaun Bay and mapped about 1,700 km of the shore of the Chukchi Peninsula.

G. gave his name to the cape on Paramushir Island.

## "Gjøa"

"Gjøa" – the schooner sailed by R. Amundsen, a Norwegian polar explorer, in 1903–1906 through the Northwest Passage from Oslo, Norway, to San-Fransisco, USA. It was built in Hardanger, Norway, in 1899 as a fishing boat. R. Amundsen described it in his "My Life. . .": "Gjøa was shallow-draft, 72 ft long (1 ft = 30.4 cm – Edit.) and 11 ft wide. It is clear. She was only a single master equipped with a mainsail and several jibs. She had an auxiliary motor." Gross register tonnage is 47 register tons. R. Amundsen purchased the "G." in 1901. In 1972, the "G." was given to the Norwegian Maritime Museum.

G

"Gjøa" (Source: [http://www.sail-worldcruising.com/photo/photos\\_2012\\_2/Med\\_Gjoa%20sailing1.jpg](http://www.sail-worldcruising.com/photo/photos_2012_2/Med_Gjoa%20sailing1.jpg))



## “Graf Zeppelin” (IZ-127)

“Graf Zeppelin” (IZ-127) – an exemplary rigid airship of its time. Was built in Germany. Its length was 236.6 m, the width – 30.5 m, height – 35.5. m. The volume is 105,000 m<sup>3</sup>, of which 75,000 m<sup>3</sup> belongs to the buoyant gas and the rest was meant for storage of the combustion gas (hydrogen) necessary for the work of its engines. The airship had 5 Maybach engines 530 hp each, which made it possible to carry 40 t (or 20 passengers and 15 t of mail or other cargoes) to the distance of 14,000 km with the cruiser speed of more than 100 km. Three German radio-officers at a time could accept meteorological information from all major radio stations of the world twenty-four-seven. The German crew of the “G.Z.” consisted of 26 people. The airship was used for a travel around the world and several transatlantic travels (including the one to Brazil).

In 1931 the Politburo of the All-Union Communist Party passed a resolution “On the expedition of H. Eckener (the head of the ship-designing

company) to the Arctic” and in the July of the same year the “G.Z.” performed the flight. The most up-to-date motion-picture and photo equipment was installed on the airship. 46 aeronauts were on board the “G.Z.” The Soviet Union was represented by the research advisor of the expedition R.L. Samoylovich, an aerologist and Professor P.A. Molchanov, an engineer and airship constructor F. Assberg, a radio officer E.G. Krenkel. The “G.Z.” set out in Berlin, made the only short halt in Leningrad to restock the hydrogen and drinking water, after which it flew over Karelia, Arkhangelsk, Franz Josef Land where it quickly docked in Tikhaya Bay to meet the ice-breaker “Malygin” and receive the post for G.A. Ushakov’s group. After this the route was as follows: Severnaya Zemlya – Bardroper Island – Dikson Island – northern edge of Novaya Zemlya – Kolguev Island – Arkhangelsk – Berlin. The flight lasted for 134 h, of which 116 over the Soviet Arctic. The members of the expedition were almost continuously making an air photographic survey of the coasts, the measurements of the geomagnetic anomalies, studied the patterns of the drift ice movements. As a result of this flight



“Graf Zeppelin” (Source: [https://ru.wikipedia.org/wiki/%D0%93%D1%80%D0%B0%D1%84\\_%D0%A6%D0%B5%D0%BF%D0%BF%D0%B5%D0%BB%D0%B8%D0%BD\\_\(%D0%B4%D0%B8%D1%80%D0%B8%D0%B6%D0%B0%D0%B1%D0%BB%D1%8C\)\)](https://ru.wikipedia.org/wiki/%D0%93%D1%80%D0%B0%D1%84_%D0%A6%D0%B5%D0%BF%D0%BF%D0%B5%D0%BB%D0%B8%D0%BD_(%D0%B4%D0%B8%D1%80%D0%B8%D0%B6%D0%B0%D0%B1%D0%BB%D1%8C))))

the scientists obtained giant scientific material and valuable photo and video materials which were transferred to Germany (where they allegedly were “lost”). These very materials of reconnaissance character played their role in the course of the WW II during the military operations of the German submarines in the Northern Sea Route in the Soviet Arctic.

## Great Northern (Second Kamchatka) Expedition (1733–1743)

Great Northern (Second Kamchatka) Expedition (1733–1743) – the First Kamchatka Expedition on Vitus Bering (1725–1730) did not result in any new geographic discoveries, as the question if Northern Asia is connected to America was not answered in a definite way. In St.-Petersburg the results of Bering’s expedition brought much disappointment. On returning Bering started to make arrangements for a new expedition to find an answer to the question. As Bering already knew the region, he was given an order to draw a project of a new expedition. The project, presented to the Admiralty Board with N.F. Golovin in charge and ober-secretary of the Senate I.K. Kirilov, Captain Commander F.I. Soimonov and A.I. Chirikov, was cardinally rewritten and expanded.

In 1733 the Senate enacted the plan of the new expedition. Bering was appointed its commander once again and A.I. Chirikov and M.P. Shpanberg became his assistants.

The new expedition had a task of describing all the northern shores of Siberia in order to learn for sure if there is a Northern Passage; finding a way to Japan and to the shores of North-Western America and studying Siberia (its geography, natural history, ethnography, Siberian peoples’ languages and their history; researching the shores of the Okhotsk Sea and the islands lying close to it as well as mouths of the rivers flowing into it.

It was the first expedition with such important and numerous tasks set before the crew in the world. It was a great state undertaking, geographical in the broadest sense of this word, and it was

to be conducted under quite severe conditions. To carry out all the tasks the members were divided into several groups, both marine and land, which acted almost independently after the departure from the base.

The first group was describing the shores of the Arctic Ocean from the Pechora to the Ob rivers, at first under the command of lieutenant Muravyov and Pavlov, and later under the command of S.G. Malygin. Years of operation: 1734 through 1739.

The second group was describing the shores from the Ob to the Yenisei rivers under the command of D.L. Ovtsyn. Years of operation: 1734 through 1738.

The third group was describing the shores from the Yenisei eastwards under the command of F.I. Minin. Years of operation: 1738 through 1741.

The fourth group was describing the shores from the Lena River westwards, at first under the command of V. Pronchishchev, later – of Kh.P. Laptev. Years of operation: 1735 through 1741.

The fifth group was describing the shores from the Lena eastwards under the command of P. Lasinius, later – of D.Y. Laptev. Years of operation: 1735 through 1742.

The first group reported directly to the Admiralty; all the rest formally reported to V. Bering, but got instruction from the President of the Admiralty Board Admiral N.F. Golovin.

The sixth group, aimed at surveying the Kuril Islands and the shores of the Sea of Okhotsk as well as describing the way to Japan, was led by M. P. Shpanberg. Years of operation: 1738 to 1742.

The seventh group was to find islands in the northern part of the Pacific Ocean and the ways to North America. It is now called Bering-Chirikov Expedition, which was in operation in 1740, 1741 and 1742.

The eighth group got the task of describing the inner districts of East Siberia, Kamchatka in particular. This group is called the First academic expedition as such professors and members of the Russian Academy as G.F. Miller, I.G. Gmelin, L. Delil de la Kreuer, G.V. Steller, I. Fisher and adjuncts of the Academy S.P. Krasheninnikov, A.D. Krasilnikov and others took part in its work.

The tenth group under the command of geodesists P.N. Skobeltsyn and Vasily Shatilov was to



search for a convenient river route from Verkhne-udinsk to Okhotsk which was very important for the development of sea navigation in the Pacific Ocean.

This colossal undertaking, both in terms of the idea and the results, is referred to by the scientists quite differently: the Northern Expedition, the Second Kamchatka Expedition,



Great Northern Expedition: Map of Siberia compiled from the results of the First (1725–1730) and Second (1733–1743) Kamchatka Expeditions (Source: [https://en.wikipedia.org/wiki/First\\_Kamchatka\\_Expedition](https://en.wikipedia.org/wiki/First_Kamchatka_Expedition))

the Second Bering Kamchatka expedition, the First Academic Siberia-Pacific Ocean Expedition.

The participants of the Second Kamchatka Expedition carried out all the tasks set before them in a brilliant way. The materials collected by them contributed much to the process of studies of the vast part of Siberia, the adjacent countries and the oceans and seas surrounding it as well as Alaska and the Aleutian Islands.

### **Grey Whale, Californian Whale (*Eschrichtius robustus* or *Eschrichtius gibbosus*)**

Grey Whale, Californian Whale (*Eschrichtius robustus* or *Eschrichtius gibbosus*) – a marine mammal of a baleen whale suborder. The sole species in the genus of grey whales (*Eschrichtiidae*). G.W. is considered one of the most ancient mammals – the age of the species is around 30 million years. The length of the body of adult G.W.: 12–15 m for females, 11–14.6 m for males. The weight is 15–35 t. The back is more convex than the belly. The head is short, around 20 % of the body length, flattened from the sides. Mouth divides the head of G.W. in two equal parts, the upper and the lower. The body is grey-brown in colour, less often – black-brown; it is covered with numerous light spots up to 10 cm in diameter. G.W. inhabits the northern part of the Pacific Ocean, with regular seasonal migrations. Two populations of G.W. are known: West-Pacific (Okhotsk and Korean) and Chukchi-California. The first one winters and breeds close to Korea and South Japan. The latter one winters and breeds in the Gulf of California, and gains weight in the Chukchi Sea, the Bering Sea and the Beaufort Sea in summer, occasionally entering the East Siberian Sea. In Russian waters whales of both populations can be seen.

G.W. is believed to have the longest seasonal migration of any mammal. It covers 12,000–19,000 km per year; so, in 40 years G.

W. covers the distance equal to the distance from Earth to moon and back. G.W. are typical off the shore dwellers and can often be seen in shallow waters. They can get themselves dry during low tide, swimming away with the flow. This is the only whale species that scoops up sediments from the sea floor. G.W. usually feeds at the depth 15–60 m, scooping benthos from the floor together with water, silt and pebbles (which get to the stomach that way) and filtering them through baleen.

G.W.'s diet comprises up to 70 invertebrate species, small crustaceans, and small fish. In the Bering Sea it feeds mainly with sea floor crustaceans. A young mammal 6 m long eats up to 115 kg in 12 h, an adult whale (12 m long) – 550 kg. During migration and wintering whales depend on their fat reserves, feeding opportunistically. During migration whales lose up to 1/3 of their weight.

G.W. migrates alone, in pairs or in groups of up to 10–18 mammals. In nursery grounds up to 150 whales can sometimes gather. G.W. swims slowly – its usual speed is 7–10 km/h. When feeding, G.W. remains underwater 3–7 min, maximum 20 min. It can create V-shaped blow 1.5–3 m high with the intervals from 3 to 20 s between them. Escaping orcas and sharks, G.W. can near the shore, reaching shallow waters.

Pregnancy of G.W. lasts about a year. Newborn whales are 3.6–5.5 m long and their weight is 650 – 800 kg. They mature at 8–9 years. The parental instinct is strong: protecting a young whale, female whale can attack a boat. The mortality rate of young whales is rather high.

In the past G.W. was one of the main commercial species of whales due to the easiness of hunting it. In 1853–1856 its numbers in the waters of California amounted to 30,000 mammals. However, heavy hunting resulted in almost full extinction of the species. By 1930 only several hundred of G.W. were left. In 1938 the limitations for hunting were introduced, and in 1947 it was totally prohibited. After that the population of Californian whales grew to 25,000. At present only the native people of the Chukchi Peninsula are allowed G.W. hunting for their needs.





Grey Whale (Source: [https://en.wikipedia.org/wiki/Gray\\_whale](https://en.wikipedia.org/wiki/Gray_whale))

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## Guba

Guba – a Russian Pomor word for sea gulfs with a river mouth penetrating deep into the land. Is widely spread in the north of the European part of Russia in Siberia and the Far East. Gs. are usually named after a river flowing into them, for instance, Kolymskaya Guba and Khromskaya Guba in the East Siberian Sea. In such gulfs the influence of rivers is very big: the bed has the traces of river depositions, the water is desalted to a great extent and is very different from the sea water in color.

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## Gulf of Olenyok, or Olenyok Bay

Gulf of Olenyok, or Olenyok Bay – a gulf in the Laptev Sea between Terpyay-Tumus Peninsula in the west and the Lena delta in the east, and the mainland in the south and west. It juts out into the

inland for 65 km. The width is approx. 130 km, the depth of 15 m. It has a number of islands – the largest are Dzhanghylakh, Salkay Islands and others. Most of the year it is covered with ice. In August and September is completely cleared of ice. The waters of the bay are light salted, which allows freshwater fish, such as Arctic char, to live in the bay.

The eponymous river flows into the Gulf of Olenyok forming a delta of over 470 km<sup>2</sup>. The eastern shore of the gulf is an edge of the Lena delta, in particular one of the three main Lena arms – Olenyokskaya – runs into the gulf.

The gulf was discovered in 1633–1634 by the detachment of the Yenisei Cossacks led by Ivan Rebrov. It was first described and mapped by the expedition of Pronchishchev in 1735–1736. The expedition spent the winter on the shores of the gulf; on the way back in September 1736 the expedition leader Vasily Pronchishchev and his wife died and were buried on the coasts of the gulf near the mouth of the Olenyok River.

In 2002, French explorer and writer Gilles Elkaim travelled for almost 60 km around the bay in a seagoing kayak.

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## GUSMP

GUSMP – a small island at the mouth of the Kolyma River, the East Siberian Sea. Was discovered in the mid-seventeenth century by Russian Polar explorers and named by Soviet Arctic explorers in the honor of the Northern Sea Route Authority (GUSMP is the acronym of this organization name in Russian).

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## Gvozdev, Mikhail Spiridonovich (about 1704–1759)

Gvozdev, Mikhail Spiridonovich (about 1704–1759) – a second lieutenant of geodesy, a participant of the First and the Second Kamchatka Expeditions. Northwest Alaska explorer. From 1716 to 1718 studied in Moscow Mathematics and Navigation School. In 1721 graduated from St.-Petersburg Maritime Academy. From 1727 to 1732 participated in expeditions of A.F. Shestakov and D.I. Pavlutskiy aimed at exploration and annexation of new lands in Chukotka and Kamchatka regions to Russia. Navigated on the boat

“Svyatoy Gavriil” and other ships in the Okhotsk and the Bering Seas. In the summer of 1732 on the boat “Svyatoy Gavriil” (commanded by I. Fedorov) navigated from the Nizhnekamchatskiy Ostrog (settlement) into the Bering Strait to the shores of northwest America and back. The sailors were the first Europeans to reach the coast of North America in the area of Cape Prince of Wales. G. described the shores of the strait and the islands lying in it. In 1733–1735 controlled the construction of settlements in Kamchatka. From 1735 to 1738 was held in custody on a false denunciation.

In 1738–1741 served as a geodesist in Okhotsk Port, led the cartographic process of the coast from Okhotsk towards the Udskeya Guba. In 1741–1743 was appointed a geodesist for the Great Northern (Second Kamchatka) Expedition with the group of M.P. Shpanberg on the double-sloop “Nadezda,” explored the Udskeya Guba, the Shantar Islands and the Kuril Islands, the eastern coast of Japan. In 1743 on M.P. Shpanberg’s suggestion started compilation the map of the boat “Svyatoy Gavriil’s” navigation and presented a detailed report of the expedition of 1732. After the end of the Second Kamchatka Expedition continued his service in Siberia.

His name was given to islands in the Bering Strait (now named the Diomed Islands) and a cape on the Sakhalin by the Gulf of Patience in the Okhotsk Sea.

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## Henrietta Island

Henrietta Island – an island within the De Long Archipelago, in the northeastern part of the New Siberian Islands, the East Siberian Sea, the Sakha Republic (Yakutia), Russia. The northernmost island in the East Siberian Islands. The area is 12 km<sup>2</sup> and the height 315 m. The island, just like all the De Long group of islands, belongs to the Verkhoyansk-Chukotka fold zone. The Paleozoic and Mesozoic sandstone standing on end is covered by flood basalt. The island is covered by glaciers; the ice cap with an area of about 6 km<sup>2</sup> occupies the highest southeastern part of the island. Southern and eastern edges of the cap are limited by cliffs of the underlying basalt plateau, over which the falls of ice dominate for 40–50 m. On the other hand, on the eastern shore, there is only one glacier tongue protruding to the sea in the clough. Vegetation is scarce; besides crustaceous and foliose lichen, it is possible to find rare flowering plants: Arctic poppy, saxifraga, chickweed, artemisia. In the summer period, the island, lying at the very edge of sea ice, attracts many birds, flying here for the nesting period. Up to 1940 the island was home to a polar station. In 1979 it was the starting point of the Soviet Ski Scientific and Sport Expedition of the newspaper “Komsomolskaya Pravda” toward the North Pole. It was led by D.I. Shparo. After 75 days of skiing through 1,450 km, the expedition reached the Pole.

The island was discovered by the American Polar explorer G.W. De Long in 1881 when his ship, trapped in ice, was drifting past H. Island and its neighbor Jeannette Island. In 1937 the expedition on the “Sadko” under the command of R.L. Samoylovich built a polar station on the H.I. It existed until 1963. Now the island is uninhabited.

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## Herald

1. An island situated in the Chukchi Sea, 70 km to the east of Wrangel Island, Chukotka Autonomous District, Russia. The area is about 10 km<sup>2</sup>. The height reaches 364 m. In the northwest the islands end with a narrow (up to 70 m) sand and shingle spit. It is covered with tundra vegetation. It was discovered and named in 1849 by the participants of an English expedition on the ship “Herald” under the command of Captain Sir Henry Kellett aimed at rescuing of the lost expedition of the English Arctic explorer and traveler D. Franklin. It was then named after the ship. Hundred miles eastward from the island, there lies the Herald Bar 13.8 m deep, which is a dangerous area for navigation. The island is uninhabited. Since 1976 it has been a part of the natural preserve on Wrangel Island. In 2004 the island was included into the list of UNESCO World Heritage Sites.



Photo # NH 92128 "Henrietta Island", discovered by USS Jeannette north of Siberia, May 1881



Henrietta Island: Sketch by Lt. Cmdr. George DeLong on 25 May 1881, depicting "Henrietta Island", north of Siberia ([https://en.wikipedia.org/wiki/Henrietta\\_Island](https://en.wikipedia.org/wiki/Henrietta_Island))

2. A submarine valley (trough) traversing the shelf of the Chukchi Sea. It lies along the meridian  $175^{\circ}$  W. The depth is up to 90 m.

## Hotham, Inlet

Hotham, Inlet – an effluent (waterway) of the Kotzebue Sound at the northwestern coast of the Chukchi Sea, Alaska, USA. The inlet is 80 km long and 8–32 km wide. The rivers Kobuk and Selawik fall into the inlet. The inlet connects the Selawik Lake and the Kotzebue Sound. In the southwest the inlet is limited by the Baldwin Peninsula. The inlet was discovered and named in 1926 by Captain of the Royal Navy of England F.W. Beechey after Sir Henry Hotham, one of the Lords of the British Admiralty.

## Hydrocarbon Resources of the Chukchi Sea Coastal Shelf Zone

Hydrocarbon Resources of the Chukchi Sea Coastal Shelf Zone – the Chukchi Sea includes two petroleum basins: the North Chukotka Petroleum Basin and the South Chukotka Petroleum Basin located to the northeast and southeast of the Wrangel Island in hard-to-access areas with

extreme ice conditions. The South Chukotka Petroleum Basin is composed of volcanic-alluvial Cretaceous-Paleogene rock formations up to 4–5 km thick. The oil and gas potential of the South Chukotka Petroleum Basin is due to a high possibility of oil and gas generation and accumulation in its deeply submerged central part. The North Chukotka Petroleum Basin is formed in the extensive sublatitudinal downwarping of the southern slope of the hyperborean platform. The North Chukotka Petroleum Basin contains carbonate-terrigenous Paleozoic, Mesozoic, and Cenozoic deposits 4–12 km thick. The eastern part of the North Chukotka Petroleum Basin adjoins the Alaska North Slope Basin with its proven oil and gas reserves, which increases the possibility of discovering oil and gas deposits in the North Chukotka Petroleum Basin.

The report made by the US Secretary of Energy in 2008 offers the assumption that the outer part of the Chukchi Sea coastal shelf zone contains 10 billion barrels of oil and 1.4 trillion cubic meters of natural gas. In 2008 – for the first time in 17 years – the first licenses to develop the Outer Continental Chukchi Sea Shelf were sold to oil and gas companies. Royal Dutch Shell has bought 275 license blocks. Statoil ASA (Norway) and Eni S.p.A. (Italy) joined in as well. As a result, seven companies bought 5,354 license blocks. In the eastern coastal area of the Chukotka Autonomous Okrug outside the Khatyrka Rural Settlement, three marginal fields have been discovered:

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## Ice Blocks

Ice Blocks – heaps of ice in the riverbed during the ice drift. Due to them the water-level rocket, sometimes up to several meters, causes floods. I. B. may cause destruction of hydraulic engineering equipment and of the shores. The biggest I. B. forms in the rivers Severnaya Dvina and Lena. For their destruction the specialists use explosives and other methods.

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## Ice Drift

Ice Drift – movement of ice generated by wind and water streams. I. D. of the Arctic Ocean is caused mainly by wind, but in long periods of time (months) due to great violation of wind speed and directions, I. D. is determined by permanent currents. The main elements of the large-scale I. D. (as well as surface water circulation) are trans-Arctic I. D. in the eastern part of the hemisphere and the anticyclonic in the western part. The trans-Arctic I. D. originates in the north of the Chukchi Sea, then following to the area of the geographical pole and further to the strait between Greenland and Spitsbergen. In half a year, a block of ice within a drift passes about 400–450 km in the general direction. In the anticyclonic circular

drift, the ice makes a full clockwise rotation in 5–10 years.

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## Idlidlya

Idlidlya – a small rocky island in the Chukchi Sea, Chukotka Autonomous Okrug, Russia. It is located 3–4 km from the Chukchi Peninsula against Maaminilgyn Lagoon. It is composed of massive gray granites. The northern part of the island lies higher and a sheer abrasive cliff breaks it by the sea. The island is 1 km long. On its shore there is Neshkan, a tiny Chukchi village. This island is of a particular importance for local ecological observations, especially on species composition.

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## Ignatyev, Isay (?–1657)

Ignatyev, Isay (?–1657) – a Pomor, a pathfinder, and the pioneer of the East Siberian Sea. Leading a group of entrepreneurs in 1646 that was looking for new fur-trapping grounds, he was the first in the history of Russian navigation to steer his koch from the mouth of the Kolyma eastward. He discovered around 300 km of north Asian coast and

Ayon Island protecting passage into Chaunskaya Bay and voyaged toward Ayon Island several times. As the legend goes, he was killed in a skirmish with natives.

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### **Ilyin, Petr Ivanovich (1796–1842)**

Ilyin, Petr Ivanovich (1796–1842) – lieutenant colonel of Russian Fleet Navigator Corps (FNC) and explorer of northeastern Siberian shores and Pacific coast of the Kamchatka Peninsula. At the age of 13, he entered the Okhotsk crew as a shipboy and has been studying in the Okhotsk Navigation School from 1809 till 1811. In 1811–1813, he sailed the sloop “Diana” from Okhotsk to the shores of Japan and back. In 1814, being promoted to apprentice navigator, Class 1, he went to St. Petersburg via Siberia. In 1815, he continued his studies in the Kronstadt Navigation School; then, he sailed the frigate “Merkuriy” in the North Sea and the English Channel for 2 years. In 1817–1819, he circumnavigated the world as a noncommissioned assistant navigator of the sloop “Kamchatka” and had his part in positioning the islands of Aleutian Ridge and the survey of Chignik Bay (Kodiak Bay). From 1820 to 1824, he was out on the Ustyansk Expedition. He surveyed the shores of the Arctic Ocean from the mouth of the Yana River to the embouchure of the Olenyok River, found wintering vestiges of V. V. Pronchishchev and N. P. Shalaurov, and plotted the first precise map of the explored coast. He was awarded the rank of navigator, Class 12. From 1825 through 1826, he was employed by the Drawing Office in Admiralty Department. In 1827, he was raised to navigator, Class 9, and sent to Kamchatka and then reclassified to FNC staff captain. In 1830–1831, traveling in Baidara, he surveyed Avacha Bay and the eastern coast of the peninsula from Avacha Bay to Cape Shipunskiy and determined the latitude of Cape Lopatka. From 1831 – private inspector of the Okhotsk Fleet Navigators – he was the head of the Okhotsk Navigation School. In 1836, he was advanced to FNC lieutenant colonel.

A bay in Alexander Archipelago (coast of Northwest America) was named after I.’s first name.

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### **Inchoun**

Inchoun – a settlement situated to the north of Cape Dezhnev on the shores of the Chukchi Sea, Chukotka Autonomous Okrug, Russia. It is located at the foot of the sandbar that separates a lagoon of the same name from the sea on the east. The coast is shingly by the settlement and changes to sandy at the bar ridge. Fresh breeze plunges such a swash that some waves roll over the sandbar into the lagoon. Population is around 400 inhabitants, mostly natives. From the east skirt of the modern locality toward the Inchoun cliff, there is an ancient village and burial ground of Eskimo antecedents partially examined by archeologists. Inchoun is a typical national settlement with single-story buildings where mostly sea hunters that cherish traditions and habits of their forefathers reside. Off the settlement, on Uten Cape (*utak* is an Eskimo word meaning “wait”), the largest walrus rookery in Chukotka is placed. It is not surprising that the Eskimos settled down here as long as 3,000 years ago, the ancient village on the western head of the Cape being witness to that.

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### **Indigirka**

Indigirka – a river in Yakutia, which flows into the East Siberian Sea. It is 1,726 km long. The area of its basin is 360,000 km<sup>2</sup>. The area of its delta covers about 5,500 km<sup>2</sup>. It is formed by confluence of the Tuora-Yuryakh and the Taryn-Yuryakh rivers that flow down from the northern slopes of the Khalkan Range. Its basin lies in-between permafrost, northward of 70° N in tundra zone; hence, immense icing is characteristic for its rivers (in the basin of the Moma, a tributary of the Indigirka, Ulakhan-Taryn is placed – the largest icing in Russia with the area



Indigirka River at Ust-Nera (Source: [https://en.wikipedia.org/wiki/Indigirka\\_River](https://en.wikipedia.org/wiki/Indigirka_River))

of 80–90 km<sup>2</sup> and maximum ice thickness of 5–6 m). In relation to the structure of the valley, bed, and flow rate, the Indigirka can be broken into two reaches: upper mountain (640 km) and lower plain (1,086 km). In its headwater the Indigirka flows along Yana-Oymyakon Highland and then in crevasse cuts a number of mountain ridges of the Chersky Range system leaving riffles behind, lower reach – at Yana-Indigirka Lowland. The mouth of the river is deltaic and composed of estuarine stretch, about 200 km in length, and open estuarine flat coastline. The top of the estuarine area lies 200 km away from the sea – higher than Chokurdakh settlement where large surges can come. The head of the delta is located 130 km from the sea. Its width along the seaside is about 150 km. There are three main arms (Protoka) in the delta, Russko-Ustinskaya, Srednyaya – the greatest one – and Kolymskaya, as well as many minor branches building up around hundreds of islands. The Srednyaya Protoka is the natural riverbed extension that gets more than 50 % of liquid runoff and, correspondingly, the bulk of

suspended load with the total amount of 19 million tons. The surface of the delta is low and muskeg with many lakes of both residual (Ilmen type) and thermokarst origin. Substantial part of deltaic surface is submerged at the time of surges. Waves advance 60 km upstream the Srednyaya Arm with surge as high as 1 m. Deposits of longshore bars make up the most deltaic area between arms, alluvial deposits being distributed in narrow stripes along the arms.

Down the source Bosyakov, Kolyma, and Maydan branches go off that arm and leftward – Kitinskiy and Malenkiy branches. Through low islands (Nemkov, Smerti, Derevyanniy, and others), the Srednyaya Arm in a number of branches meets the estuarine coastline; the leftmost one (Nemkov) forms an extensive bar 20 km long. Water is 1.5–2 m deep at the bar crest. In 1974, a short navigation passage was cut through this bar – 7 km long, 40 m wide, and 2.1–2.7 m deep. In subsequent years the passage was drifted, especially during seasonal floods. The surface of the delta is low and swamped;

multitude of lakes is present, thermokarst origin predominately. Deltaic islands are composed of sand-shale sediments with ice lens.

The Indigirka is nourished by rain and melt (snow, ice, and aufeis) waters. Main tributaries of the low reach are Selennyakh, Uyandina, Allaikha, and Byoryolyokh (on the left) and Nera, Moma, and Badyarikha (on the right). Annual runoff into the mouth is 54.2 km<sup>3</sup>/year. The runoff in spring is 32 %, in summer 52 % (seasonal flood in June–early July), and in autumn 16 %. The average water discharge downstream is 1,750 m<sup>3</sup>/s and maximum 11,500 m<sup>3</sup>/s. The flow of solid matter equals to 13.7 million tons per annum. River breathing is up to 11 m. Ice covers the Indigirka from October to early May–early June. In winter it freezes through in some stretches. It is navigable from the embouchure of the Moma (1,154 km). Main harbors are Khonuu, Druzhina, Chokurdakh, and Tabor. The Indigirka is abounding in fish, in the mouth – fishery of vendace, broad whitefish, muksun, nelma, omul, and cisco.

The Indigirka basin has gold mines.

Human settlements situated on the Indigirka River are Oymyakon, Ust-Nera, Khonuu, Belaya Gora, and Chokurdakh. Along the Indigirka River, the Oymyakon rural locality, the North Pole of Cold, is located as well as Zashiversk, a historical site – a town depopulated by small pox in the nineteenth century.

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## Inner Shelf Transfer and Recycling (ISHTAR)

Inner Shelf Transfer and Recycling, ISHTAR – an international project that was implemented in 1985–1988; it was aimed at studying the summer hydrological conditions in the northern part of the Bering Sea and Bering Strait and in the southern part of the Chukchi Sea, with a special emphasis on ecohydrodynamic studies. The program of the project, in addition to the extensive marine research, included a numerical simulation of the ecohydrodynamic condition of the northern part

of the Bering Sea on the basis of three-dimensional GHER model of the University of Liège (Belgium) elaborated by Prof. Jacques Nihoul.

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## Institute of the Biological Problems of the North, Far East Branch of the Russian Academy of Sciences (IBPN FEB RAS)

Institute of the Biological Problems of the North, Far East Branch of the Russian Academy of Sciences (IBPN FEB RAS) – was formed in Magadan in January 1972, on the basis of the Department of Biological Problems under the Northeast Comprehensive Research Institute, established in 1968. IBPN scientific research envelope explores functioning and organization principles of northern populations, communities, and ecosystems; studies adaptive strategies of biosystems at different levels in the North; develops scientific basis for conservation, renewal, and management of biological resources of the North; investigates the set of problems in biogeography and ecology of the Beringia sector of the Arctic and Subarctic regions. The institute has as many as 20 divisions: laboratories of mammal ecology, helminth ecology, ornithology, biocenology, ichthyology, hydrobiology, seashore ecology and resources, vegetation structure, soil science, human genetics, population genetics, herbarium team, demographic studies, and electron microscopy. The institute coordinates the research of the North's biological resources. It held and participated in many all-union and all-Russian symposiums and conferences. IBPN maintains constructive contacts with research institutions and higher education establishments in Russia, as well as academic institutions and scholars abroad: Canada, Finland, Bulgaria, Poland, Japan, and the USA. Most of the institute's laboratories are involved in Beringia Heritage project with Beringia International Park being organized as a part of it. The institute was given the lead part to execute the "Impact of Human Activity on



Tundra Ecosystems” project of the UNESCO “Man and the Biosphere Programme.” IBPN is engaged in the implementation of convention between the USA, Japan, and Russia for observation and protection of migratory birds and their habitat. Mammal ecology lab carries out cooperative project “Taxonomy and Zoogeography of Mammals in Beringia” with scientists from the museum of the University of Alaska.

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## Instruction of Peter I to Vitus Bering

Instruction of Peter I to Vitus Bering – well-known directions of Peter the Great, written himself in January 1725 a few weeks before his death, to Vitus Bering prior to the First Kamchatka Expedition. It says:

1. “At Kamchatka or somewhere else one or two decked boats are to be built.
2. With these you are to sail northward along the coast, and (as the end of the coast is not known) this land is expected to be part of America.
3. For this reason you are to inquire where this land meets America, and go to some city of European dominium; and when European ships are seen you are to ask what the coast is called, note it down, make a landing, obtain reliable information, and then, after having charted the coast, return.”

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## International Arctic Science Committee (IASC)

International Arctic Science Committee (IASC) – a nongovernmental international organization founded in 1990 by representatives of eight Arctic countries – Denmark (Greenland), Iceland, Canada, Norway, Russia, the USA, Finland, and Sweden – for cooperation on various aspects of research in the Arctic. Currently, scientific organizations and groups from 19 to 23

countries – England, Germany, Denmark (Greenland), Finland, France, Italy, Canada, China, Republic of Korea, the Netherlands, Norway, Poland, Russia, the USA, Finland, Sweden, Switzerland, Japan, Austria, Czech Republic, Spain, Iceland and India – are involved in the IASC activities studying the Arctic regions and their role in the development of the Earth. Geographically, the area of interest of the IASC is the Arctic Ocean and adjacent parts of the land. Research projects of the Committee include, among other problems, issues of biological diversity in the Arctic ecosystems, Arctic hydrology, glaciology and ecology of the Arctic sea transport routes, and the life of the indigenous people of the Arctic (Inuit, Chukchi, Sami, Aleuts, and others). The decision-making body of the IASC is the Council, composed of representatives of all the Committee members (Russia is represented by the Academy of Sciences), which elects the president of the organization who heads its activities between the annual sessions of the Council. The IASC Secretariat is located in Potsdam, Germany.

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## International Northern Sea Route Programme, INSROP

International Northern Sea Route Programme, INSROP – an international research program aimed at developing a comprehensive knowledge base on the ice sea routes along the Russian Arctic coast from Novaya Zemlya in the west to the Bering Sea in the east. This route, formerly known as the Northeast Passage, is now better known as the Northern Sea Route (NSR). The program was carried out in 1993–1999 within the framework of the Fridtjof Nansen Institute. The interdisciplinary program was developed to study all aspects of the increase of the potential and the international use of the NSR. The program primarily provided for the creation of a joint Norwegian-Japanese-Russian venture involving more than 450 scientists from 14 countries. In all, during this period 167 technical reports on a wide range of issues were published, including the

publication of several books and other end products, including the INSROP GIS database.

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## "International Polar Year"

"International Polar Year" – a series of books, published in Russian by the publishing house "Paulsen." It includes, on the one hand, the basic works and, on the other hand, diaries and regional works, which became classics during the life of the authors, but not published for a long time. All these works are related to the same "lodestar" – the Arctic. Among the published books, there are the *Encyclopedia of North* (2005); *To the South, to Franz Josef Land* by V. Albanov (2007); *Zavolochye* by B. Pilnyak (2007); *The Papanin Foursome: Ups and Downs* by Yu. Burlakov (2007); *The Depth of 4261 Meters* by F. Paulsen, A. Chilingarov, and M. MacDowel (2007); *The Russian Arctic Sea* by V. Vize (2008); *The Icebreaking Fleet of Russia in 1860–1918* by V. G. Andrienko (2010); *The Icebreaker Lenin, The First Nuclear One* by V. Blinov (2010); *People's Enemies Behind the Arctic Circle* by S. A. Larkov and F. A. Romanenko (2010); *Polar Diaries of a Member of Secret Arctic Expeditions of 1949–1955* by V. Volovich (2011); *Polar Aviation of Russia in 1914–1945* by A. Pochtarev and L. Gorbunova, Book 1 (2011); and *Winter Soldiers* by I. A. Zotikov (2011).

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## International Polar Year (IPY)

International Polar Year (IPY) – a period of concurrent geophysical observations in the Arctic by efforts of a number of countries under a common plan and method. The first IPY was conducted from August 1882 to August 1883. The IPY initiative belonged to the Austrian Arctic explorer K. Weyprecht. After his death (1881), the leading

role in the organization of the first IPY went to the director of the Main Physical (later Geophysical) Observatory in Russia H. Wild. Russia, Sweden, Norway, Finland, Holland, Denmark, England, Canada, Germany, Austria-Hungary, France, and the USA took part in conducting the first IPY. Observations were made on 13 polar stations in the northern polar region and at two stations in the Southern Hemisphere. In the Russian sector of the Arctic, there were two polar stations – in Malye Karmakuly (the New Earth since 1882) and on the island of Sagastyr (at the mouth of the Lena). Since 1883, observations yielded valuable results, but to address the issue of atmospheric circulation in the polar region, they were not enough.

Fifty years after the first IPY, the second IPY was held (from August 1932 to August 1933). Of 17 stations, organized within the framework of the second IPY, ten were opened in the USSR, including the northernmost one in the world on Rudolph Island (Franz Josef Land). Extensive meteorological and glaciological observations were conducted in the Arctic. The second IPY confirmed the importance of international scientific cooperation of various countries.

In 2007–2008, the new IPY was held at the initiative of Russia. Its conduct was caused by the need for a comprehensive assessment of natural and man-made processes now occurring in the polar regions and their impact on the Earth's climate system.

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## Inupiat

Inupiat – Alaska's native people. They related to the Inuits or Eskimos. They primarily live on shore of the Arctic Ocean and North Slope of Alaska. In ancient times separate groups of Inupiat occupied the territory between Norton Sound near the Bering Strait and the Canadian border. Some of them were settled, and some went long way to hunt collectively for whales, caribou, and other animals. Nowadays

Inupiat (Source: <http://en.wikipedia.org/wiki/Inupiat>)



subsistence of many Inupiat is hunting, fishing, and gathering. The Inupiat have several large spots in Alaska that are expected to be rich in hydrocarbons.

## Ioniveem

Ioniveem – a creek in the east of the Chukotka Peninsula, Russia. It runs about 150 km. The river gets its waters mainly from the melting of snow. To a less degree, rainwater and groundwater take their part in water balance. Ioniveem flows into the Ioniveemkuyim Inlet of Kolyuchinskaya Bay, the Chukchi Sea.

## Ioniveemkuyim

Ioniveemkuyim – an inlet in the southeast section of Kolyuchinskaya Bay, to the east of Kuetskuyim Inlet, Chukotka Autonomous Okrug, Russia. The Ioniveem and Ulveem rivers flow into

it. Ioniveemkuyim is one of the inlets that form the bay. Inlet coast is prevalently flat, sandy, or loamy and here and there steep. Coasts are swamped in many places and enclosed by foreshores in the south of the inlet. Two rivers flow into the head of the inlet. The Ioniveemkuyim River is the eastern one. Depth at inlet debouchure is 7–8 m. A trench 5–7 m deep stretches 25 km into the inlet.

## "Iosif Stalin" ("Sibir")

"Iosif Stalin" ("Sibir") – the first Soviet icebreaker named after I. V. Stalin, the Soviet statesman. It was built in 1937 at Baltic Shipyard in Leningrad. The icebreaker could carry three seaplanes for ice reconnaissance and was fitted out with weather-proof quarters, repair shop, and refrigerators designed to store year's food supply. The vessel set out on its first voyage in August 1938. At the same time, the icebreaker under the command of M. P. Belousov was engaged in operation to free the "G. Sedov," an icebreaker with steam engine, trapped in ice on the Greenland Sea. Here, the

“Iosif Stalin” icebreaker  
(postage stamp, 1940)  
(Source: [https://ru.wikipedia.org/wiki/%D0%A1%D0%B8%D0%B1%D0%B8%D1%80%D1%8C\\_\(%D0%BB%D0%B5%D0%B4%D0%BE%D0%BA%D0%BE%D0%BB,\\_1938\)\)](https://ru.wikipedia.org/wiki/%D0%A1%D0%B8%D0%B1%D0%B8%D1%80%D1%8C_(%D0%BB%D0%B5%D0%B4%D0%BE%D0%BA%D0%BE%D0%BB,_1938))))



“Iosif Stalin” reached 80° 42’N that was the record for free floating during polar night. In 1939–1940, it passed through the Northern Sea Route twice in one shipping season. In 1940, it was awarded the Order of Lenin. During the Great Patriotic War (1941–1945), the icebreaker was armed, in 1942, and reassigned to the chief directorate of the Northern Sea Route from White Sea Flotilla. After the navigation in the eastern sector of the Arctic in 1942, it went to Seattle, Alaska, and the USA, for repairs. In 1956, it was renamed “Sibir,” overhauled, and improved with boilers being switched to oil fuel. In 1958, the icebreaker was converted in Vladivostok. It was in operation in the Arctic region until 1972 and was consigned for breakup in 1973.

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### **Ivanov (Gubar), Postnik (?-?)**

Ivanov (Gubar), Postnik (?-?) – a Yenisey Cossack and pathfinder and one of the people to discover Verkhoyansk and Chersky Range. In 1632–1633, he visited a tributary of the Nizhniy Vilyuy River and the lower reach of the Lena River. Leading a team in 1637–1638, he was the first Russian to transverse the central part of the

Verkhoyansk Range, the Yana Plateau, and the chain of the Chersky Mountains to the Indigirka cutting main overland route from the Lena River to the middle Indigirka. He brought the first records about the Eveny and the upper Indigirka. In 1639–1640, I. P. managed the Indigirka land and undertook two more expeditions there.

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### **Ivanov, Kurbat Afanasyevich (?–After 1667)**

Ivanov, Kurbat Afanasyevich (?–After 1667) – a pathfinder and explorer of East Siberia and North-east Asia. He served in Cossack troops since 1638. In 1640–1659, he led a number of expeditions along the Lena River, was the first to come to Baikal over the Primorskiy Range, and discovered Olkhon Island. He conducted expeditions for hunting and fishing in the Lena Basin area. He was the chief of Anadyr ostrog in 1659–1664. He worked in Anadyr area. He walked about 1,500 km along the coast of Gulf of Anadyr and northeastern shores of the Bering Sea and discovered Bay of Krest, Providence Bay, the Govena Peninsula, and Korfa Bay. In 1665, he made a drawing of the explored area.

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### **“Jeannette” (USS “Jeannette”)**

“Jeannette” (USS “Jeannette”) – (former “Pandora”) – is a three-master sail and motor schooner. It was specially equipped for the crew of De Long in the docks of San Francisco. It was ironed from the outside and supplied by extra steam engines. In 1879 it set out in search of the expedition of N. A. E. Nordenskiöld (on the “Vega”), which started its journey in 1878 through the Northeast Passage. Water displacement is 420 t and the power of steam engine 147 kWt. The crew comprised 33 people. “J.” got trapped in ice to the northeast of Herald Island after which its 22-month-long ice drift started. On June 12, 1881, “J.” was crushed by ice masses and disappeared forever. Three years after its loss, the Eskimos found 50 small objects on a small block of ice by the shores of South Greenland. Among them was a description of food supplies and a list of

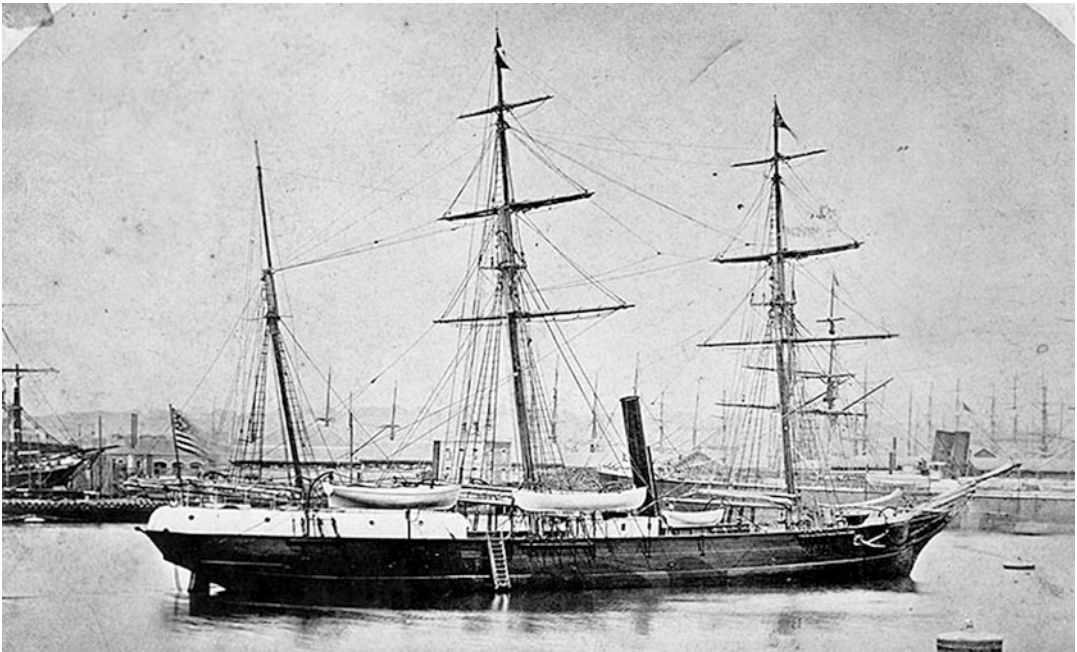
ship’s boats signed by De Long himself as well as waterproof trousers with a marking of one of the ship’s sailors.

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### **Jeannette Island**

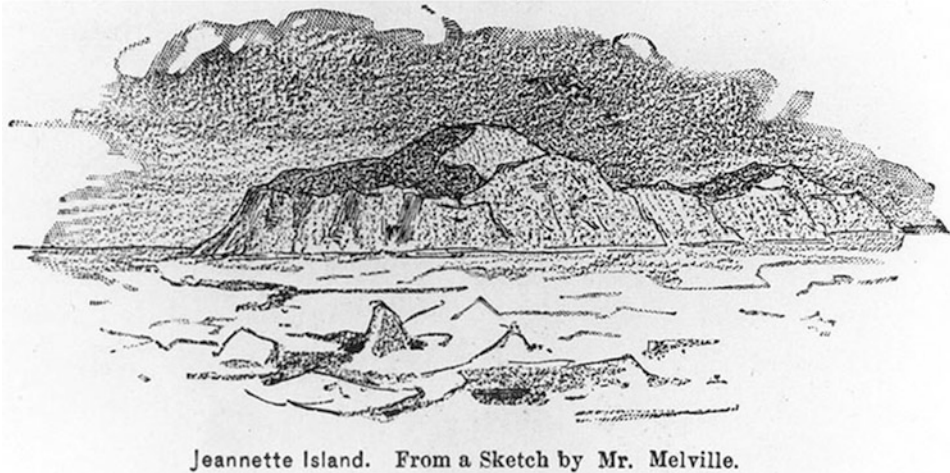
Jeannette Island – a part of the De Long Archipelago in the northeast of the New Siberian Islands, the East Siberian Islands, and the Sakha Republic (Yakutia), Russia. The area is 3.3 km<sup>2</sup>. The height is up to 350 m. It consists mostly of sandstone. It is covered with glaciers and firn fields. The climate is arctic and very severe. Average January temperature drops down to –31 °C and in July 1–3 °C. It was discovered in the expedition of 1879–1881 by the American polar explorer G. De Long and named after the expedition ship “Jeannette”.





USS "Jeannette" (Source: [http://en.wikipedia.org/wiki/USS\\_Jeannette\\_\(1878\)](http://en.wikipedia.org/wiki/USS_Jeannette_(1878)))

Photo # NH 92127 "Jeannette Island", discovered by USS Jeannette north of Siberia, May 1881



Jeannette Island. From a Sketch by Mr. Melville.

Jeannette Island: sketch by George Melville of Jeannette Island, north of Siberia in May 1881 (Source: [https://en.wikipedia.org/wiki/Jeannette\\_Island](https://en.wikipedia.org/wiki/Jeannette_Island))

upper Echinsk, Uglovoye, and upper Telekajsk. The ultimately recoverable oil resources for the three fields total 2.5 million tons. Following a reassessment, the said oil reserves have been written off as noncommercial. So far, no hydrocarbon resources have been discovered in the Russian part of the Chukchi Sea coastal shelf zone.

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## Hydrocarbon Resources of the East Siberian Sea Coastal Shelf Zone

Hydrocarbon Resources of the East Siberian Sea Coastal Shelf Zone – belong to the Novosibirsk Petroleum Basin formed in the extensive sublatitudinal downwarping of the southern slope of the hyperborean platform. The East Siberian Sea Coastal Shelf Zone is the least explored one of the Eurasian Arctic shelf zones. The shelf zone contains carbonate-terrigenous Paleozoic, Mesozoic, and Cenozoic deposits 4–12 km thick and may prove to be rich in hydrocarbon resources.

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## Hydrographical Expedition of the Arctic Ocean (1898–1915)

Hydrographical Expedition of the Arctic Ocean (1898–1915) – the purpose of the expedition was to secure the future of the Arctic navigation. In 1898 it was formed on the basis of a special hydrographical expedition under the command of Russian lieutenant colonel of the Corps of Fleet Navigators A.I. Vilkitsky. The expedition

conducted research in the Barents, Kara, and White seas under the control of A.I. Vilkitsky (1898–1901), A.I. Varnek (1902), and F.K. Drizhenko (1903–1904). In the period from 1898 to 1910, the expedition had a lot of things done: surveys of the Gulf of Ob and the Yenisei Gulf based on the astronomical positions; studies of the fairway in the Pecherskaya Guba and surveys of its southeastern shore; measurements in the Kara Strait and the Yugorsky Strait and surveys of the Yugorsky Strait shores; marine survey of the western and the eastern shores of Vaygach Island and its northern shore as well as the measurements and the marine surveys of the northern part of the Baydaratskaya Guba; marine surveys of the western and the northern coast of the Yamal Peninsula and the northern shore of Bely Island; etc.

Among the members of the expedition starting from 1910 were the commander I.S. Sergeev (starting from 1913 – B.A. Vilkitsky); assistant commanders G.L. Brusilov, K.K. Neupokoev, and N.V. Sakharov; the commanders of the icebreaker “Taymyr” B.V. Davydov and B.A. Vilkitsky (from 1913); the commanders of the icebreaker “Vaygach” A.V. Kolchak (1910), K.V. Loman (1911–1912), and P.A. Novopashennyi; and hydrographers N.I. Evgenov, A.M. Lavrov, and others. Moving across the northern water areas, the expedition described the northern coast of East Asia and a number of islands and collected much information about the currents, ice, atmospheric, and magnetic phenomena. The expedition members discovered Severnaya Zemlya (1913), the last significant geographic discovery of the twentieth century in the world.

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**Joint Statement of Presidents of the USSR and the USA on the Establishment of the Soviet-American Park in the Bering Strait Region**

Joint Statement of Presidents of the USSR and the USA on the Establishment of the Soviet-American

Park in the Bering Strait Region – was signed on June 1, 1990. It recorded the willingness of the parties “to create a Soviet-American international park representing complex of special protection land and water areas in the Bering Strait region in the territory of Chukotka and Alaska.” In 1993 Russian natural and ethnical park “Beringia” was established. The creation of single Russian-American preserve area is in the near future.

## Kamchatka Expeditions

Kamchatka Expeditions – Russian expeditions in the eighteenth century placed a cornerstone for consistent exploration of Siberia, the Far East, the Northern Sea coast and islands of the North Pacific Ocean. The First Kamchatka Expedition of 1725–1730 was set up to research North-East Russia and seek the land connection between Asia and America. It was commissioned by Peter the Great. General-Admiral F.M. Apraksin, President of the Russian Admiralty, exercised overall leadership; captain-commander V.J. Bering was its direct leader whereas lieutenants A.I. Chirikov and M.P. Shpangberg were his assistants. In January, 1725, the expedition left Saint-Petersburg, and in April, 1727, arrived in Okhotsk. On August 21 (September 1), the Expedition on the shitik “Fortuna” (under command of V. Bering) and the boat under command of A. Chirikov entered the Penzhina Sea (the Sea of Okhotsk), and on September 4 (15), landed the Kamchatka Peninsula in the vicinity of Bolsheretsky Island. In winter, they travelled dog sleds to Nizhny Kamchatsky ostrog. On July 13 (24), 1728, the mission on the ship “Sv. Gavriil” built there launched a voyage northwards searching for a strait that separated Asia and America. It sailed along the eastern coast of Kamchatka, southern and eastern shores of Chukotka, and discovered Sv. Kresta Bay and St. Lawrence Island. On August 15 (26), the expedition came as

high as 67°18'N and turned back. It discovered St. Diomedes Island on its way back (as a matter of fact, there were two islands – nowadays called Ratmanov and Kruzenshtern islands). On September 1(12), the expedition returned to Nizhny Kamchatskiy ostrog. Thus, they crossed the Strait that divides the two continents. But due to heavy fogs the American coast escaped their observancy. In 1729, V. Bering on his boat “Sv. Gavriil” traversed 300 km south-eastward, but found no land and turned back, rounded Kamchatka, and on July 23 (August 3) reached Okhotsk. The expedition came back to Saint-Petersburg.

The Second Kamchatka Expedition, 1733–43 («The Great Northern Expedition») intended to explore the Northern Sea Route, shores of the Arctic Ocean, Siberia and the Far East. Nine sea and ground teams, more than a thousand people in total took part in the mission. They acted on their own but followed a single plan. The 1st team (S.V. Muravyov and S.G. Malygin) researched coasts from the Pechora to the mouth of the Ob in 1734–1739. The 2nd team (D.L. Ovtsyn) charted the coastline from the Ob to the Yenisei in 1734–1738. The 3rd team plied shores from the Yenisei eastwards till it joined the group moving from the Lena River westwards. In 1738–1741, the voyages under command of F.A. Minin were taken by the following groups. The 4th team (V.V. Pronchishchev, Khariton Laptev and S.I. Chelyuskin) described shorelines from the Lena to the west in 1735–1741. The 5th team (P.

Lasinius, V. Rtishchev and Dmitry Laptev) studied the coast from the Lena eastwards to Kamchatka in 1735–1742. The 6th team (M.P. Shpanberg and V. Valton) surveyed the Kuril Islands, coast of the Sea of Okhotsk, and established a route to Japan within 1738–1742. The 7th team searched for new islands in the northern portion of the Pacific Ocean as well as paths to North America in 1740–1742. V. Bering and A. Chirikov on two sailing vessels set out from the Petropavlovsk harbor and, in July 1741, reached the northwestern coast of North America and plotted it on the map. Also, they discovered and charted some of the Aleutian Islands, the Bering Island (of the Commander Islands) and a chain of islands near the northwestern coast of North America. The 8th team, composed of members of the Russian Academy of Sciences in Saint-Petersburg (G.F. Miller, J.G. Gmelin, G.W. Shteller), the geodesist A.D. Krasilnikov, S.P. Krashennnikov and others, conducted a survey of the internal areas of East Siberia. The 9th team (P. Skobeltsyn and V. Shetilov) set a convenient river route from Verkhneudinsk to Okhotsk. Obtained materials made a valuable contribution to the knowledge of Siberia, the Far East, the Arctic and Pacific oceans, and the northwestern coast of North America, the Aleutian and the Kuril Islands. The published compilation of maps was the first accurate outline of the North Asia shores, part of the coasts of the north-western America, the Kuril and other islands.

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## Karkarpko

Karkarpko – a small island of blocks and pebbles in the Chukchi Sea, Chukotka Autonomous Okrug, Russia. It lies at the entrance to Vankarem Lagoon, 3 km to the east of Cape Vankarem (in the Chukotka Peninsula), a piece of continent closest to the island with a namesake settlement. The island is 0.6 km in length. K. is the large rookery of walruses. The island has a stationary site for environmental observations.

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## “Karluk”

“Karluk” – brigantine, the flagship of the Canadian Arctic Expedition of 1913–1916, organized by known anthropologist Vilhjalmur Stefansson. The vessel, when it was bought V.Stefanssonom, was 29 years old. It was built for the Aleutian fishing industry (salmon) in 1884, then it was converted into a whaler. Displacement 247 t, length 37 m, width 6.9 m, draft 4.9 m, board thickness 51 mm of Australian ironwood. The ship’s captain Robert Bartlett. The crew of 25 people. On July 13, 1913 “K” went to explore Herschel Island in the Beaufort Sea. On August 13, 1913, 300 km from their destination, “K” was trapped by ice and started a slow drift to the west. After a long drift through the Beaufort Sea and the Chukchi Sea on January 10, 1914 brigantine was crushed by ice and sank. For several months the crew and expedition members were fighting for survival on the ice first, and then on the shores of Wrangel Island, which got 17 people. The rest died or were missing. Surviving 12 people earn their living by hunting and were saved only in September 1914 by a Canadian schooner “King and Wing.” In 2013 the Canadian Mint released a 100 dollar coin commemorating the 100th anniversary of the Canadian Arctic Expedition of 1913. In 2014, on the east coast of Wrangel Island on the site of the “Karluk” crew wintering a memorial sign was installed with an inscription in Russian and English: “At this point, in March 1914 there was organized the main camp of the crew of ‘Karluk’ that crushed by ice near Herald Island”.

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## Kasegaluk Lagoon

Kasegaluk Lagoon – a coastal lagoon, 200 km in length, located in the western part of the North Slope of Alaska, USA. It is separated from the Chukchi Sea by a chain of long thin barrier islands that stretch southwards and north-eastwards from the town of Point Lay and westwards down to Icy Cape (Ledyanoy). There are seven passes via



“Karluk” (Source: [https://fr.wikipedia.org/wiki/Dernier\\_voyage\\_du\\_Karluk](https://fr.wikipedia.org/wiki/Dernier_voyage_du_Karluk))



these islands. The lagoon is nourished by waters from the Kukpowruk, the Kokolik, and the Utukok Rivers. Originally, the lagoon had Inupiat name “Kasegarlik,” but they changed it to its present spelling in 1929. In 1965, at Wainwright, the lagoon’s name was recorded as “Kasegelik” that means “spotted seal place.”

### **Kashevarov (Koshevarov), Aleksandr Filippovich (1809–1866)**

Kashevarov (Koshevarov), Aleksandr Filippovich (1809–1866) – Russian Major General, a hydrographer, that travelled twice around the Earth and explored the north-western coast of America, Alaska and the Aleutian Islands. He was born on Kodiak Island and fostered by A. A. Baranov, a Governor-in-Chief of settlements in Russian America. K. was sent to Saint-Petersburg, first to private boarding school, then – to the Baltic Navigation School in Kronstadt which he graduated in 1828 with the rank of warrant officer of Fleet Navigator School. In 1828–1830, he sailed around the world on the R.A.C. ship “Elena” with cargo for Novoarkhangelsk (Alaska). During his voyage from Sydney, Australia, to Russian

America as a navigator, he described a series of atolls of the Marshall Islands and established the fix for Gran Cocal Shoal. In 1831, he was assigned to the R.A.C. The same year he set out on his second world cruise on the naval transport “America” with freight for Petropavlovsk and Novoarkhangelsk where he went to disposal of F.P. Wrangel, a Governor-in-Chief of the colonies. *En route* he determined position of Peyster, Genderville Islands, Gilbert chain of islands and some of the Marshall Islands. Since 1833, he plied off the coast of Alaska and the Aleutian Islands commanding the boat “Bober,” first, and the schooner “Kvikhpak,” later. In 1838, he was in charge of a hydrographic mission to research the north-western shores of America. From 1839 till 1844, he navigated different ships again (the brig “Chichagov,” the steamer “Nikolay” and others) on the Sea of Okhotsk, near the coasts of Kamchatka, the Kuril and the Aleutian Islands and Alaska. In 1844, he came back to Saint-Petersburg and was attached to Hydrographic Department (H.D.). He compiled “Atlas of Waters of East Ocean with the Okhotsk and Bering Seas.” In 1850, he was reclassified to the rank of Lieutenant with promotion to Lieutenant Commander and appointed as superintendent of Ayan Port. From 1851 to 1854, he was providing provision support

to an expedition under G.I. Nevelskiy. In 1856, K. was transferred to Saint-Petersburg as captain of the 2nd rank, and 2 years later was made Head of H.D. drawing office. In 1865, he was raised to Major General and discharged.

An island and a pass in the Alexander Archipelago by the coast of North-West America as well as a mountain in a Gulf of Alaska were named after him.

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## Kayak

Kayak – an Eskimo hunting, completely covered, rowing boat. A skirt connected with an opening for a rower and fastened on his breast makes it fully water-proof. The hull is constructed of wood and bone, single parts being lashed together. The cover is sewn from skin of seal, sea lion or caribou, and soaked with fat. K. can be designed for one (up to 8.5 m in length), two and three paddlers. Nowadays, sea kayaking is widespread in Alaska. K. can be used to reach remote areas and coasts difficult to access.

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## Kekur (Stack or Seastack)

Kekur (Stack or Seastack) – a pillared or conical cliff of natural origin, found usually in the rivers, seas or on their coasts. The name K. is popular in Siberian regions and the Far East, specifically, to designate rocks at water-partings of the Lena, the Indigirka and the Yana River basins. K. is also commonly used to denominate cliffs on the sea shores in the Arctic Ocean.

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## Khara-Tumus, Peninsula

Khara-Tumus, Peninsula – (Yakut for “Black Cape”) is located in the Khatanga Gulf of the Laptev Sea, in the Republic of Sakha (Yakutia), Russia. The Uryung-Tumus and Hara-Tumus peninsulas are connected to the Siberian coast by one common isthmus, which is broad but callow. The peninsula is 48 km long and approximately 34 km wide. The shores of

Kayak: Two people in kayak, Nunivak, Alaska, photographed by Edward S. Curtis, 1930 (Source: [https://en.wikipedia.org/wiki/Kayak#/media/File:Edward\\_S.\\_Curtis\\_Collection\\_People\\_035.jpg](https://en.wikipedia.org/wiki/Kayak#/media/File:Edward_S._Curtis_Collection_People_035.jpg))





K

Kekur: Big Flowerpot, Flowerpot Island, Ontario, Canada (Source: [https://es.wikipedia.org/wiki/Stack\\_\(geomorfolog%C3%ADa\)#/media/File:Flowerpot\\_Island\\_Big\\_Flowerpot.JPG](https://es.wikipedia.org/wiki/Stack_(geomorfolog%C3%ADa)#/media/File:Flowerpot_Island_Big_Flowerpot.JPG))

the peninsula abound with rivers and brooks. The north-eastern coast bends archwise to the north-east and in its eastern part it becomes the low coast of the Otmelaya Bay. It was described and mapped with the local toponym in 1905 by the participants of the Khatanga expedition of the Imperial Russian Geographic Society under the command of geologist I.P. Tolmachev.

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## Khariton Laptev Cape

Khariton Laptev Cape – located on the northeastern shore of the Taymyr Peninsula (south-east of Cape Chelyuskin). Named in honor of the participants of the Great Northern Expedition of the eighteenth century Khariton P. Laptev.

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## Khariton Laptev Coast

Khariton Laptev Coast – a narrow strip along the northwest coast of the Taymyr Peninsula between the rivers of Pyasina and Taymyr, Krasnoyarsk Krai, Russia. In the central part there is the Sterligov Polar Station. From 1993, much of the coast became part of the Great Arctic Reserve, named in honor of the participants of the Great

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## Khardargastah (Kasarachiy)

Khardargastah (Kasarachiy) – an island located in the delta of the Lena River, near the Sagastyr Island, in the Republic of Sakha (Yakutia), Russia. There is a large rookery of a rare black brant on this island.

Northern Expedition of the eighteenth century Khariton P. Laptev, who described this coast in 1741.

## Khatanga

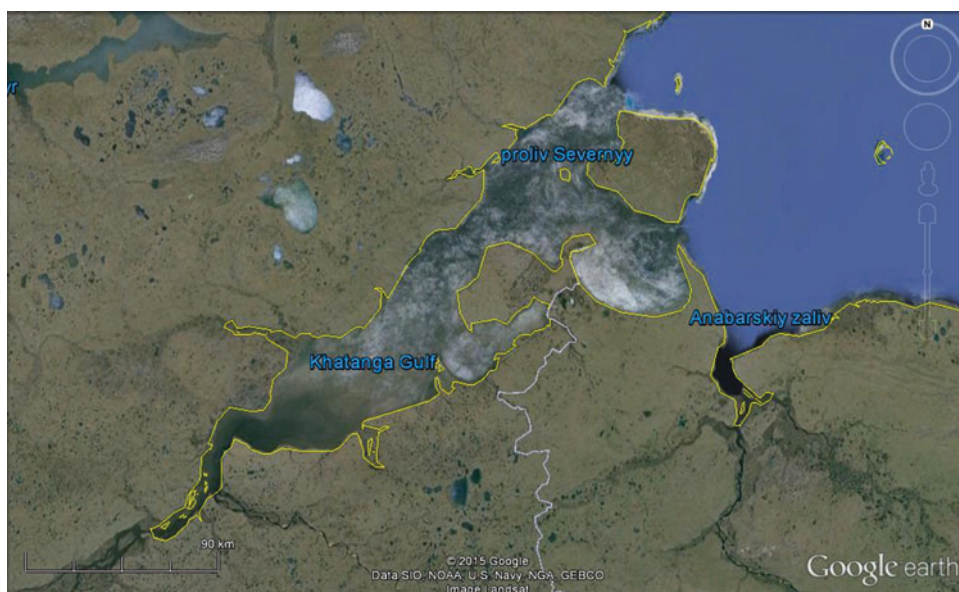
1. a river in the northwest of Eastern Siberia, in the Taymyr (Dolgano-Nenets) Autonomous Okrug, Russia. It is formed by the confluence of the Kotuy and the Kheta Rivers. It falls into the Khatanga Bay of the Laptev Sea. Its length is 227 km (from the rise of the Kotuy River it is 1,636 km); its total river basin makes 364,000 km<sup>2</sup>. The river has no delta, and falls into the gulf in one channel. There is a number of low-lying islands at the debouchment of the river, which are covered with marshy tundra. The regime of this river is that of the East Siberian type. The high-water usually is in late May – early June, with the peak falling on mid-June. The principal source of nourishment is the snow; however during warmer seasons, the rains can also contribute to it, even causing summer and autumn floods. During the high-water seasons the water discharge can reach about 24,750 m<sup>3</sup>/s. The mean turbidity is approximately 50 g/m<sup>3</sup>; the river flow estimates 105 km<sup>3</sup>/year and the mean water discharge is 3,320 m<sup>3</sup>/s. The river is navigable. The Khatanga hithe is built on the river. Fishery is developed, with such species as whitefish, cisco, whitefish, white salmon, trout, char, etc. being quite common.
2. village, the centre of the Khatangskiy District, Taymyr (Dolgan-Nenets) Autonomous Okrug, situated 833 km to the north-east of Dudinka. It is located on the Khatanga River. There are an airport and a seaport in this village. A fish farm, construction companies, a geological expedition and Taymyr Natural Reserve are situated here. The population of the village is 2,600 people (2010). It was founded in 1626 and considered a “gate” to the North Pole. The tourists travelling to the

North Pole are brought from this village by plane to the ice airfield, called “Barneo” by the aviators, and then to the pole by helicopters. If the weather is favourable it can take them around 2–3 days to go there and get back.

## Khatanga Bay

Khatanga Bay – a bay in the south-western part of the Laptev Sea, formed by the confluence of the river Khatanga, which washes the Taymyr Peninsula from the south-east. It is 220 km long with the maximum width of up to 54 km and the depth in the mouth of up to 28 m. From the northwest it is limited by a part of the south-eastern coast of the Taymyr Peninsula, on the south-east – by Siberian coast with the peninsulas: Khara-Tumus, Uryung-Tumus and Nordvik. The Kozhevnikov Bay is located in the western part of the Bay. Most of the bay belongs to the Krasnoyarsk Krai, with a small territory in the Sakha (Yakutia) Republic. The coast of the bay is rather elevated, reaching 30–40 m height in many places, and even 60–80 m in some areas. The coastline is heavily indented, especially in the eastern part, and forms several bays and lagoons. There are surface fields of low-quality coal in many places along the coast. At the entrance to the bay there are three islands: the Preobrazheniya Island (Vstrechniy), the Bolshoy Begichev Island and the Malyi Begichev Island. The Bolshoy Begichev Island divides the entrance to the bay into two straits: the Northern Strait (13 km wide) and the Eastern Strait (8 km wide). In some areas a casting wave from the river meets the new tidal wave from the sea, causing a rapid increase in the level and distribution of the backwater upriver. The tides are semi-diurnal (up to 1.5 m). The bay is covered with ice most of the year.





Khatanga Bay (Google Earth, 2016)

K

### Khmyznikov, Pavel Konstantinovich (1896–1943)

Khmyznikov, Pavel Konstantinovich (1896–1943) – one of the founders of the polar hydrography, Doctor of Geographical Sciences. He graduated from the Sea Corps in 1915, served as the chief of the watch on the cruiser “Rossia,” mine officer on the submarine “Volk.” During the Ice Cruise of 1918 he commanded a boat, after which he retired from service due to a disease. In 1919 he worked in Omsk at the Special Committee of the Northern Sea Route (Komseverput), established by Kolchak, and then sided with the Soviets. In 1920 he was discharged, and began to study the Arctic Region. At that time he graduated from the Leningrad Institute of Geography. In 1935 for his long study of the hydrology of the Yana River Basin he was granted the degree of Doctor of Geographical Sciences. He participated

in the cruise of the “Chelyuskin” as member of the scientific staff. In 1938 he was arrested “on the hydrographers’ case,” sentenced to 5 years of imprisonment and died in the detention camp.

### Khroma River

Khroma River – a river in the northeast of the Sakha Republic (Yakutia), Russia. It is 275 km long with the river basin of 19,700 km<sup>2</sup>. It falls into the Khromskaya Bay of the East Siberian Sea. The Kh.R. is formed by the confluence of the rivers Temteken and Nemalak-Arangas, which flow down from the Polousniy Ridge. The river flows through the Yana-Indigirka Lowland. It has a snow- and rain-fed stream. The river freezes in late September and breaks up in late May. It usually freezes through. The main left tributary is the Uryung-Ulah River.



## **Khromchenko, Vasilii Stepanovich (1792–1849)**

Khromchenko, Vasilii Stepanovich (1792–1849) – Captain 2nd rank, Russian circumnavigator, explorer of Alaska. In 1815 he graduated from the Kronstadt Navigational School. In 1815–1818 on the brig “Rurik” K. made a voyage around the world via Petropavlovsk and the Island Unalaska. He participated in the discovery and survey of the Kotzebue Sound, the Shishmarev Bay, the Sarychev Island, the Gulf Esholtsa, the Chamisso Island in the Chukchi Sea, and in the hydrographic work in the Gulf of Lawrence, on the St. Lawrence Island and the Aleutian Islands. Sailing through the tropical areas of the Pacific Ocean, he examined individual islands of the Tuamotu Archipelago, the Caroline and Marshall Islands, and discovered the atolls of Rumyantsev, Spiridov, Suvorov, Kutuzov, the Rurik Island chain, etc. From 1820 to 1825 he served in the Russian-American Company, mainly studying and conducting surveys of the areas located north of the Gulf of Alaska and the Aleutian Islands. He discovered the Hagemeister Strait and the Hagemeister Island, the Golovnin Bay and the Nushagak (Khromtchenko) Bay, described the Kusokwim Bay and Norton, debouchments of the rivers Nushagak and Kuskokwim, a significant part the Otkrytiye (Nunivak) Island and the Bay of Dobrykh Vestey. In 1823 he was promoted to the rank of lieutenant. In July 1826 he returned to Kronstadt. In 1828–1830 K. made a second voyage around the world to the shores of Russian America commanding the ship “Elena.” During this trip he explored the Marshall Islands. In 1831–1833 commanding the craft “America” K. travelled around the globe for the third time. In the Pacific Ocean he determined the coordinates of the Peyster Island, the Gendervil Island, as well as some islands of the Gilbert and Marshall Islands. In 1835–1842 he sailed on different ships, cruised in the Baltic Sea. In the beginning of 1843 K. was promoted to captain 2nd rank and dismissed from the service.

There is a bay in the Bristol Channel named after him, as well as an island in the Saint Lawrence Bay (now the Bennett Island), a bay and a cape in the New Earth (the Kara Sea).

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## **Khromskaya Guba (Bay)**

Khromskaya Guba (Bay) – a shallow bay in the south-western part of the East Siberian Sea, the Sakha Republic (Yakutia), Russia. It is located between the Khromskaya Strelka Peninsula and the mainland; is open to the north. The bay is 100 km long, 5 km wide at the entrance (with maximum width of 20 km) and less than 1 m deep. It is covered by ice most of the year. There is some tundra vegetation on the coast of the bay. The coast is low and in some places is not higher than 15 m. The rivers Khroma, Lapcha, etc. flow into the bay. The Khromskaya Creek connects the K.G. with the Vostochnyi Bay. The island Uzenkiy is situated in the eastern part of the bay. Near the bay there is a lake-marsh area, with the largest lakes being the Uzornoye Lake and the Tustakh-Kuel Lake, located on the northern shore of the K.G.

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## **Khudobin, Andrey Vikulovich (? – around 1829)**

Khudobin, Andrey Vikulovich (? – around 1829) – assistant navigator, Russian circumnavigator, researcher of the Bering Sea and the Chukchi Sea. He graduated from the Kronstadt Navigational School in 1819. In 1819–1822 on the sloop “Otkrytiye” he made a journey around the world with anchorage in Kamchatka and Russian America. K. participated in the survey of the eastern coasts of the Bering Sea and the Chukchi Sea to the 71°06’N, as well as the exploration of the St. Lawrence Island and a part of the coast of the Oahu Islands (Hawaii). He also took part in the discovery of the Nunivak Island, examination of the Pribilof Islands and the San Francisco Bay. In 1826, on the sloop “Moller” K. went on his

second journey around the world. In the winter of 1827–1828 K. explored the area to the east and northwest of the Hawaiian Islands. In 1828 he took part in mapping the northern shore of the Alaska Peninsula. He also examined a group of islands to the west of Port Moller, which were later named after him by F.P. Litke.

eastern group of the Fox Islands (Akutan, Akun, Avatanak, Tigalda, Unimak, etc.) and the southwestern tip of the Alaska Peninsula. He discovered a group of small islands in the Bristol Bay of the Bering Sea, which were named after him by G. Sarychev.

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### Khudyakov, Osip (? – ?)

Khudyakov, Osip (? – ?) – a non-commissioned officer of geodesy, member of the Billings-Sarychev expedition, researcher of the Bering Sea, Alaska and the Aleutian Islands. He was trained in Marine Geodesy by G.A. Sarychev and sailed with him in the 1787–1792 on the ships “Yasashna” and “Slava Rossii.” In 1787 on the ship “Yasashna” K. examined part of the coast of the East Siberian Sea from the mouth of the Kolyma River to the Cape Bolshoy Baranov, conducted survey of the Kolyma River. The book of the voyage was preserved and came down to us. In 1789–1790 he participated in the study of the Uliya River, described the coast of Kamchatka between the Petropavlovskaya Harbor and the Cape Shipunskiy, as well as the first five north most Kuril Islands. In 1791–1792 in the Aleutian canoes on behalf of G.A. Sarychev K. explored the

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### Kivalina

Kivalina – a small settlement on the northwestern coast of the Chukchi Sea, Alaska, USA. The population was 374 as of the 2010 census. K. is on the tip of a 12-barrier island located between the Chukchi Sea and a lagoon at the embouchure of the Kivalina River, 130 km northwest of Kotzebue. In 1900, reindeer were brought here and some people were trained as reindeer herders. People of K. are engaged in catching whales. The original village was situated at the north end of the namesake lagoon, but was relocated later. In 1960, an airplane runway was built. Due to sea wave erosion caused by severe storms, the city is planned to relocate again to a new site 12 km away from the present site. K. was first reported by Lavrentiy Zagoskin, a Russian explorer, in 1847 as the Inupiat community “Kivualinagmut”.

K

Kivalina (Source: [https://en.wikipedia.org/wiki/Kivalina,\\_Alaska](https://en.wikipedia.org/wiki/Kivalina,_Alaska))



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## Kobelev, Ivan (? – ?)

Kobelev, Ivan (? – ?) – a Russian Cossack sotnik (commander of 100 men), pathfinder, and explorer of the north-west coast of America. In 1779, he passed from Gizhiga to the Chukotka Peninsula, steered his baidara from there to Ratmanov Island, and then, apparently, to Krusenstern Island. He collected information about Russian people living on the Khever River (probably, the Yukon). Journal and map of the tour were published in “Mesyatseslov” (“A calendar of the months”), 1784. In summer 1780, he along with a company of the Chukchi traversed the Bering Strait on baidaras and landed on the coast of America. In 1787, he participated in the expedition of I.I. Billings and G.A. Sarychev, sailed on the ship “Pallas” in the East Siberian Sea. Afterwards he travelled by reindeer from Nizhnekolymsk to Gizhiga and came across the Chukotka Peninsula to Saint Lawrence Bay. Thence, in summer 1791, accompanied by the Chukchi he undertook a trip on baidaras to Kolyuchin Island (the Chukchi Sea), conducting

a survey as he proceeded. In 1793, he was advanced to lieutenant.

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## Kobuk River

Kobuk River – (Inuit name, means «big river») is the largest river in the north-west Arctic Region of Alaska, USA. Its length is 451 km. Drainage basin area is 32,000 km<sup>2</sup>. Width is 460 m. Flow speed is 5–8 km per hour in its middle and lower reaches. With headwater in the Endicott Mountains, the river crosses a mountain chain and forms two canyons – Upper and Lower Kobuk Canyon. Entering the Hotham Inlet of the Kotzebue Sound, it makes broad delta. It is fed by rain and snowmelt. Average annual flow for the K.R. ranges from 165 m<sup>3</sup>/s to 422 m<sup>3</sup>/s, with lower reach discharge varying from 850 m<sup>3</sup>/s to 2,799 m<sup>3</sup>/s. The river is covered with ice 6 months of the year. Annually, there are two flood peaks reflected: the first (end of May-June) is associated with melting snow and the second (July through September) with late summer precipitation. The

Kobuk River (Source:  
[https://en.wikipedia.org/  
wiki/Kobuk\\_River](https://en.wikipedia.org/wiki/Kobuk_River))



river is abundant in fish, especially *Stenodus leucichthys* and salmon.

### Koch (Kocha, Kochmora)

Koch (Kocha, Kochmora) – an ancient Pomor sailing and rowing boat of eleventh to nineteenth centuries. It took its name from the additional anti-icing planking made of solid wood – oak or larch, called *kotsan* in the Arkhangelsk dialect. The boat had an egg-shaped hull to protect it from jamming by ice, so that the boat could be “squeezed out” by the lateral ice pressure. K. had the specific outlines for ice navigation and was equipped with a mast, hanged rudder and oars. Its length was 10–15 m, width of 3–4 m, draft of 1 to 1.5 m. With a slant of wind sail K. could develop a speeds of 6–7 knots. K. could drift until it reaches open waters. In addition, K. could be dragged over the ice by reeling the rope on a shaft (special windlass) attached to the solid ice ledge or secured by anchor to a hole in ice. In the seventeenth century, the state-run Lena-based shipyards produced up to 10 K. per year, how many K. were built by private shipbuilders is unknown.

### Kolchak, Alexander Vasilyevich (1874–1920)

Kolchak, Alexander Vasilyevich (1874–1920) – Russian Navy officer, Arctic explorer, statesman and military leader, Admiral (1918). He graduated from the Naval College with honors (1894), served on warships in the Pacific. By the recommendation of S.O. Makarov, K. was seconded to the Academy of Sciences. He was a member of major marine expeditions. From July 1900, K. served as a hydrologist and magnetologist on the ship “Zarya” during the Russian Polar Expedition of 1900–1903 (led by E.V. Toll). K. conducted route survey, determined the astronomical points on the Taymyr Peninsula and the New Siberian

Islands, collected geological and biological samples, materials on the structure of sea and land ice. He organized a rescue expedition for E.V. Toll and his team. In early 1903, R. together with N.A. Begichev and 5 companions took an unprecedented over 10,000-km railway-sledge-foot trip from St.-Petersburg to Yakutsk for 20 days, then to Verkhoyansk, and from there to the mouth of the Lena on dog-sleds. Having removed from “Zarya” a whaleboat weighing 1,200 kg, they put on the sled and with the help of 160 dogs and 8 people, bearing the burden, portaged the boat to the island of Kotelny first by land from Tiksi to the mouth of the Yana, and then over sea ice. From there they moved under oars through open waters and sometimes portaged the boat again. On the Bennett Island, Kolchak’s team found an abandoned camp of E.V. Toll, documents and some items. After confirming the death of E.V. Toll and his companions, the expedition returned to Yakutsk. In 1906, for this campaign, K. was awarded a military order and the Great Gold (Constantine) Medal – the highest award of the Russian Geographical Society.

During the Russian-Japanese war K. was sent to Port Arthur. He laid naval mines around Port Arthur, which succeeded in sinking a Japanese cruiser, commanded a battery of naval guns. He was wounded, and after the surrender of Port Arthur K. was in captivity. Upon his return to St.-Petersburg was awarded a military order and the golden arms. The key life principle for K. was the desire to serve his Motherland.

In 1906–1907, K. was one of the organizers of Russia’s Naval General Staff. He developed the naval program of Russia defending the interests of the fleet in the State Duma, made reports and read lectures at the Naval Academy. In 1908, K. began to organize the Hydrographic Expedition of the Arctic Ocean, he personally supervised the construction of icebreakers, one of which, “Vaygach,” K. took under his command and sailed on it from St.-Petersburg to the Far East. K. started a survey of the Chukchi Sea and the Bering Strait profile, but was recalled to St.-Petersburg, to the Naval General Staff. Then K. was involved into practical

works in the mine fleet. K. met the World War I at the headquarters of the Baltic Fleet (in Helsingfors). To protect St.-Petersburg and naval bases he carried out an emergency mine laying in the Gulf of Finland. The polar experience proved useful for K. in early 1915. Despite the heavy ice conditions, under the command of Kolchak, minefields were laid twice around the German coast, which undermined several German ships. In September–November 1915, K. commanded a mine division in Riga. In June 1916, with the rank of Vice Admiral K. was appointed commander of the Black Sea Fleet.

During the February Revolution in Russia, K. managed to keep the Black Sea Fleet in submission. He recognized the Provisional Government. K. deemed “the republican form of government” to meet the demands of the country. But in June, seeing the impossibility of fighting the general collapse, K. refused to command the fleet. The Provisional Government was sent on a mission to the United States for the “exchange of experience” in mining. At the time of the October Revolution in 1917 K. was in Japan. He joined the British armed forces and was sent to Manchuria. In October 1918, together with the British military mission, K. arrived in Omsk, where he took the post of Minister of War and Navy, of the “All-Russian” (Ural-Siberian) government. In November, after a government coup, the Admiral and the “Supreme Ruler,” to whom all the territory east of the river of Kama, North and Northeast regions were formally subordinated, lived the life of his own. Primorye was controlled by the Japanese, and the Urals, the southern and eastern border regions of Russia were mainly ruled by local commanders. Heads of other White Armies recognized the power of K., but there was almost no coordination between them, which led to the failure of the Moscow campaign of the Whites. In early 1919, the Army of K., which rear was supported by the allies, was executing a successful offensive and really threatened the Bolsheviks. In April 1919, the North Sea Route committee was established (chaired by S.V. Vostrotin), and in September a convoy from Arkhangelsk delivered military cargoes to the Ob and took Siberian bread.

Some of Northern Expeditions (N.N. Urvantsev near the Norilsk ore mines) continued their activities. However, K. had neither governmental program nor supporters in the government and actually restored the bureaucracy similar to the Tsarist regime. In summer, due to the collapse of the logistic supplies and the lack of military aid, the White Army began to retreat, followed by peasant uprisings caused not so much by the land policies of K. (it was not pursued at all, in fact), but by despotism and arbitrariness of Cossack military commanders and atamans. K. tried to manage atamans, giving them general ranks, but in fact K. controlled only A.I. Dutov (Orenburg Cossack Army) and a number of minor Cossack leaders. The autocracy of Cossack atamans led to horrific atrocities against civilians and imprisoned rebels, for what K. personally was guilty only indirectly. (In the Soviet historiography the military power system of K. was named Kolchakovshchina.)

Under attacks of Red Army, K. retreated to Irkutsk with the rests of the troops and a train with the gold reserves of Russia, which he seized from the Bolsheviks in Kazan. On December 27, 1919 at the station of Zima of the Irkutsk Guberniya (Province) K. was taken under the protection of the White Czechs. On January 4, 1920, at the station of Verkhneudinsk, K. resigned by formally handing power to A.I. Denikin, but actually to G.M. Semenov, Transbaikalian Ataman, and moved to an Allies' train, who guaranteed him safe passage to the east. On January 15, the White Czechs, striving to ensure the advancing of their units to Vladivostok, handed K. (by agreement with the Allies) and the train with gold to the Irkutsk SR-Menshevik Political Center, which soon gave up the power to the Bolsheviks. Despite the scheduled trial, the Bolsheviks (by a secret order of Lenin) executed K. with his last Prime Minister V.N. Pepelyayev on February 7, 1920. The body of K., by the officer's version, was dropped into an ice-hole in the Angara.

Works: “The ice of the Kara and Siberian Seas” (1906), “What Fleet Does Russia need?” (1908); “Autobiography” (1992).

In 1901, his name was given to an island in the Kara Sea (in 1939 the island was renamed after





Kolchak A.V. (Source: <http://vmireinteresnogo.com/unikalnye-lyudi/belaya-gvardiya-aleksandr-vasilevich-kolchak-16-11-1874-07-2-1920-gg.html>)

Rastorguev, but in 2005, by the RF Government Resolution the Kolchak's name was returned to it). In 1999, a cross was mounted on the scene of K. death. In 2002, in one of the halls of the Museum of the Marine Corps (the former Frunze Naval Academy) in St. Petersburg a memorial plate was installed. In 2004, a monument to Kolchak was erected in the Znamenskiy Monastery of Irkutsk. In 2009, a honorary monument with a bas-relief of Kolchak was installed on the island which bears his name.

## Kolesovskaya Otmel

Kolesovskaya Otmel – an island in the East Siberian Sea, situated at a distance of 3 km from the continent at the entrance to the Kolyma Bay. The territory belongs to the Sakha (Yakutia) Republic,

Russia. The coastline is not permanent due to ebbs and floods. It was named after Mikhail Kolesov, a Kolyma estate manager.

## Kolyma

Kolyma (Yakut: Halyma) – the largest river of the Arctic Ocean basin (after Lena) in the north-east of Russia, in the Sakha Republic (Yakutia). The river meets the East Siberian Sea. The basin area is 643,000 km<sup>2</sup>, with a length of 2,200–2,600 km. The average runoff is 3,900 m<sup>3</sup>/s, the maximum – 25,100 m<sup>3</sup>/s (in June), the minimum – 23.5 m<sup>3</sup>/s (in April). The run-off in the delta is 122 km<sup>3</sup>/year. The level fluctuations are up to 14 m. It is formed by the confluence of the rivers of Kulu and Ayan-Yuryakh. At the river head it is a mountain river flowing through a narrow and deep valley. The stream is fast with a lot of cripples. In the Kolyma Lowland the river bed is circuitous (approx. 1,150 km) divided into arms and the stream is sluggish. On the right of the river there is the Yukagir Plateau, which cuts the Cherskii mountain ranges. The delta covers an area of 3,000 km<sup>2</sup>. At the mouth of the river the downward current waves can reach 2.5 m. The nourishment is by snow (47 %), rain (42 %) and underground water (11 %). The high water is from mid-May (even if frozen up) till September. The freeze-up period lasts from the end of September – mid October to May – early June. The ice drift lasts from 2 to 18 days, accompanied by ice jams. The value of sediment run-offs at the river mouth is approx. 8.2 mln tons/year. After commissioning of the Kolyma HPP (1983) the sediment run-off decreased slightly. At the mouth of K. there is the bay of Ambarchik. Kolyma was discovered in 1643 by the first Kolyma expedition of M. Stadukhin. The river is accessible for ships at the port of Zelyonyi Mys (Green Cape). The largest confluents are Taskan, Seimchan, Popovka, Yasachnaya, Zyrianka, Otoghina, Sedema – on the left side, Bakhapcha, Buyunda. Balygychan, Sugoy, Korkodon, Kamenka, Beryozovka, Omolon, Anuy – on the right side.

## Kolyma Bay

Kolyma Bay – a shallow bay at the south-western shore of the East Siberian Sea, the Republic of Sakha (Yakutia), Russia. K.B. is located east of the mouth of the Indigirka. It is opened to the east, juts into the mainland for 21 km. The width at the entrance is 9 km. The shore is low, swampy. The shore of Bay is covered with tundra vegetation. The Kolyma arm of the river of Indigirka runs into the Bay which it is named after. The islands of Teryuttyakh and Emkaryndinskiy are located in the Bay. At the exit of the Bay there are the islands of Kolesovskiy and Kolesovskaya Otmel. Around the Bay there is lake-marsh areas. The largest of the lakes are the Loginskies and Kargovato lakes on the south shore of K.B. The Bay is covered with ice for most of the year. The Bay should not be confused with the Kolyma Gulf, which is larger and located 330 km to the southeast.

The Gulf is covered with ice most of the year. Tides are up to 0.2 m, semidiurnal. The Gulf is not to be confused with the Kolyma Bay, which is smaller and located 330 km to the northwest.

## Kolyma Lowland

Kolyma Lowland – a low-lying plain, situated in the north-east Siberia, downstream the river of Kolyma and in the basin of the river of Alazeya, Republic of Sakha (Yakutia), Russia. It stretches for 750 km between the Alazeya and Yukaghir plateaus. The total area is approx. 170,000 km<sup>2</sup>. The lowland is formed by fluvio-lacustrine loam soil. Permafrost and permafrost-thermokarst landforms are widely spread. The height is up to 100 m (rare hills of up to 300 m). A lot of lakes and swamps. Swampy deciduous open woodlands are replaced in the north by shrub-grass, and then by arctic tundra. The area of reindeer pastures.

## Kolyma Gulf

Kolyma Gulf – a gulf near the southeastern coast of the East Siberian Sea, the Republic of Sakha (Yakutia), Russia. The gulf is situated between the Cape of Krestovskiy and the delta of the Kolyma River, after which it is named. It is open to the north, juts into the mainland for 45 km. The width at the entrance is 106 km. The depth is 4–9 m. On the shore there is tundra vegetation. The Kolyma River runs into the gulf in the southern part forming a vast delta with many islands, the largest of which are Kamenka, GUSMP, Sukharnyi, Stolbik, Tabyshevskiy, Shtormovoy. The river Big Chukonya flows into the Gulf in the west forming a wide estuary. On the coast there are capes of Big Chukochiy, Small Chukochiy, Kekury, Tolsty, Dyrovaty, Laptev, Obryvistiy. The coastline is predominantly lowlands. To the east of the Gulf there are the bays of Troyan (Chayachya) and Ambarchik.

## Kolyma River Estuary

Kolyma River Estuary – situated in a zone of permafrost formations, an estuary of infilling (fills a former gulf). This is proven by the following signs: large residual lakes, the mouths of Projhodskaya and Kolymskaya Protoka (Arm) expanding northwards in a shape of cone, which is a hereditary feature of the former gulf; wedge-shaped estuary and the main feature is that the sea edge of the estuary does not only protrude outside the general contour of the shore, but even coincides with some of its concavities. The estuary is formed by several residual blocks – Tabyshevskiy Island reaching the height of 60 m, built from ancient alluvial forms (upper-Quaternary), Kamen Dyrovaty Island formed by bedrock.

The estuary includes an estuarial stretch 282 km long and an estuarial seabeach. The top of the estuarial area coincides with the mouth of the large right tributary, the Omolon River, which

attracts significant water upsurges. The area of the estuary is 3,250 km<sup>2</sup>, its top lying 120 km away from the East Siberian Sea. The estuary is formed in a place of the Kolyma splitting in two and then in three big arms: Kolymskiy (Kamennyi), Pokhodskiy and Chukochiy with many shallow branches. Pokhodskiy and Chukochiy arms are separated by Gabyshevskiy Island (Stolbik), the largest in the estuary. In the mouths of Kamennyi and Pokhodskiy arms there are huge bars. The right shore of the navigable Kamennyi arm is high (up to 30–40 m), with cliffy capes, the left shore estuaries are low and waterlogged. The estuary lies in the zone of permafrost rock, the active layer is about 50–60 cm. It is possible to see fossil ice, the exits of which accelerate the speed of abrasion processes on the shores.

Although the flow of solid water of the Kolyma is not big, judging by fixed surveillance (5.5 million tons), the actual income of the sedimentary material on the stream-mouth bar and the seashore is not limited to this source. Permafrost melting and fall of rock masses, forming the arms' shores, increase the muddiness of the river waters quite drastically. To a large extent this material forms the sandy islands in the outer edge of the estuary and the stream-mouth bars. The formation of the stream-flow bar and the front edge of the estuary as well as the shallowing of the seashore is largely due to shore-marine alluviation.

## Kolyma Trips

Kolyma Trips – the first trip on the route Vladivostok-Kolyma was made by the steamer “Kolyma” of the company “Dobroflot” in 1911 (sailed on this route for more than 20 years). This trip delivered food to the residents of the Kolyma Region. Later the trips became an annual event and were performed by the steamer “Kotik” of the same company. During the Civil War in Russia, the trips were interrupted and resumed in 1923 under the Soviet flag. The first trip from Vladivostok to Kolyma was carried out by the steamer “Stavropol.” In 1932, the North-East expedition

was organized to deliver goods from Vladivostok to Kolyma, and in 1935, the first voyage was plied from Murmansk to Kolyma, which launched the Western Kolyma operations. Trips to Kolyma were complicated by unfavorable ice conditions.

## Kolyma-Indigirka Inland Navigation Company (KIINC)

Kolyma-Indigirka Inland Navigation Company (KIINC) – established in 1939 on the basis of the Kolyma River Administration of GUSMP DalStroy (1932) and the Indigirka Operational Section of the Yakutsk Territorial Administration of the company GlavSevMorPut with the purpose of transportation support of mining enterprises of the Magadan Oblast of the Kolyma-Indigirka industrial district of the YASSR. The company carried out transportation of passengers and cargoes by the rivers of Kolyma and Indigirka and their confluents. The headquarters is located in the village of Zyrianka. KIINC was subordinated to GlavSevMorPut, since 1941 to DalStroy. In 1957 it was transferred under the management of the Ministry of the River Fleet of the RSFSR. In 1972, KIINC was affiliated with the United Lena River Shipping Company.

## Kolyuchin

Kolyuchin – a small island located at the entry to the Kolyuchinskaya Bay in the Chukchi Sea, Chukotka, Russia. The shortest distance to the mainland is across the Strait of Sergievskiy – 11.3 km. This is a residual island a maximum height of 188 m, which is composed of light-gray granite, granodiorite and granosyenites. In the western part of the island there is the polar station “Island of Kolyuchin.” The island is visited by polar bears, there are bird colonies and in some years walrus rookeries. Near the island there are migration routes of bowhead whales.

## Kolyuchinskaya Bay

Kolyuchinskaya Bay – the only large and deep-water bay of the Asian coast of the Chukchi Sea at the northern coast of the Chukchi Peninsula, the largest bay in the Russian Arctic, Chukotka Autonomous Okrug, Russia. Genetically, it is a large estuary, formed as a result of the ingress of the sea into the valley of the Ioniveyem River. The length is 100 km, the width at the entry is 2.8 km, in the inner part is approx. 37 km. The depth does not exceed 15–16 m at the entry and on the average is 3–4 m off the east coast. Most of the year the bay is covered with ice.

From the sea, the bay is limited by a chain of the Gray Geese Islands (Serykh Gusey Islands) and the spit of Belyaka, with the width of the deep-water passage between them of 2.2 km. The northwestern part of the bay between the mainland and the Gray Geese Islands is called the Kunergvin Lagoon. There are small lagoons of Belyaka and Chapatchen and the bays of Chapatchen and Tasytkyn in the north-eastern part of the K.B. The small bay of Kamak plunged into the western shore of the K.B., and the bays of Kuetyuyym and Ioniveemkuyym – into the south shore. Shores of the K.B. are predominantly high, with stretching clay cliffs, landslides, and gravel and sand bars near the shore.

There are several rivers running into the Bay, among which the largest are the rivers of Ioniveem, Etureroem and Ulyuveem. The catchment basin of the rivers of the K.B. area is 13.8 km<sup>2</sup>, the water yield is 2.4 million tons/year.

In 1793, I. Billings named it the Count Bezborodko Bay in honor of the Russian statesman A.A. Bezborodko (1747–1799). However, the name did not come into use, giving up to the local name of the island.

In the area of the K.B. the aircraft “Sovetskiy Sever” crashed in 1928. In autumn of 1932 the icebreaker “G. Sibiryakov” lost its water propeller, and the ice steamer “Chelyuskin” was beset here as well. The Soviet pilot A. Lyapidevskiy, on the plane ANT-4, and S. Levanevskiy met with an

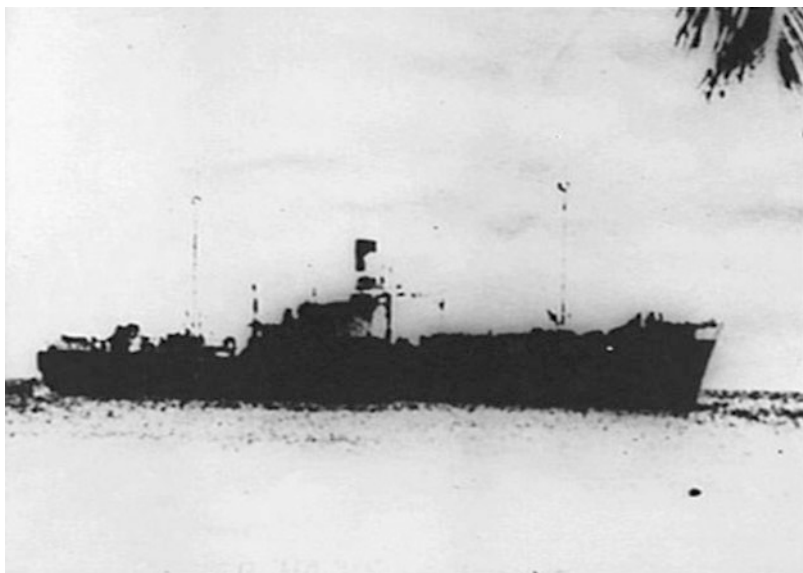
accident. Levanevsky crashed the US aircraft “Flister” in this area.

## “Komet”

“Komet” – a German auxiliary cruiser-raider, scout ship of the German Navy. The ship was involved into the Operation “Fall Grün” – an intelligence campaign of the summer of 1940 to the Pacific Ocean along the Northern Sea Route. The former merchant ship “Ems,” belonged to the company “Norddeutscher Lloyd.” In 1939 she was converted and armed at the shipyard of the company “Howaldtswerke” in Hamburg. The ship was equipped with six 150-mm cannons, 10 torpedo tubes, 9 anti-aircraft installations, 400 anchor mines, a high-speed torpedo boat, specially equipped for hidden laying of the mines and an “Ardo-196” seaplane. Radio communication was provided by operators with knowledge of Russian and English languages. The leader of this reconnaissance mission was Kapitän zur See (Captain 1st Rank) Robert von Eyssen, an experienced hydrographer. Captain of the ship was Fregatten-Kapitän (Captain 2nd Rank) Keptel. The passage of “Komet” was agreed with the Soviet government for 950,000 Reichsmarks. On July 3, 1940 “K.” left Gotenhafen (Gdynia).

A reliable legend was invented to disguise the passage of “K.” In some areas of the route “K.” was disguised using special adaptations as the Soviet icebreaker “Dezhnev,” Soviet supply vessel “Dunai” (Donau). The escort of “K.” in the Kara Sea was provided by the Soviet polar navigators. For this, “K.” was repainted and did not look like a foreign battle ship, for which it was prohibited to enter the Kara and the Laptev seas. Soviet navigators had to prevent Germans from studying the Arctic seas and coasts. In the Laptev Sea, “K.” was escorted by the Soviet icebreaker “Joseph Stalin,” and in the East Siberian Sea by “L. Kaganovich.” In early September, “K.” under the fake name of “Semyon Dezhnev” passed the Bering Strait and entered the Gulf of Anadyr, where she was examined by the German divers, and then went into the Pacific Ocean. “K.” took

“Komet” (Source: [https://en.wikipedia.org/wiki/German\\_auxiliary\\_cruiser\\_Komet](https://en.wikipedia.org/wiki/German_auxiliary_cruiser_Komet))



passage on the Northern Sea Route in recordingly short time – 23 days, of which only 15 were sea days. From 1940, “K.” started active “hunting” for the UK naval communications in the Pacific Ocean.

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## Komsomolets Island

Komsomolets Island – one of the four major islands in the Severnaya Zemlya Archipelago, located in the northern part of the Kara Sea between and the Laptev Sea, Krasnoyarsk Krai, Russia. The island is separated from the island of October Revolution by the Strait of the Red Army, and from the island of Pioneer by the Strait of Yunyi. The northernmost point of the island is the Arctic Cape, where many Arctic expedition start from. The eastern coast of the island is washed by the Laptev Sea. The total area is 9,000 km<sup>2</sup>, the maximum height is 780 m. About 65 % of the island is covered by glaciers with inclusions of siltstone, sand and loam. Most of the island is occupied by the largest ice cap in the archipelago – the Glacier of Academy of Sciences, which area is 5,900 km<sup>2</sup>, the thickness of

the ice is up to 500 m, and the height above sea level – 750 m.

The island was first explored and mapped in 1931 by the Severnaya (North) expedition of G.A. Ushakov and N. Urvantsev in 1930–1932, and named after the Lenin Komsomol, which members were actively involved in research and development of the Arctic. A large bay in the Laptev Sea near the south-east coast of the island was named the bay of Krenkel in 1973 in honor of a polar radio operator, who wintered in the Severnaya Zemlya Archipelago in 1935–1936 at the polar stations “Tin (Olovyannyi) Cape” (southeast of the island of October Revolution) and “Home (Domashniy) Island” (in the Sedov Archipelago).

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## Komsomolskaya Pravda Islands

Komsomolskaya Pravda Islands – a group of nine islands off the Taymyr Peninsula, as part of the Krasnoyarsk Krai in the Taymyr (Dolgan-Nenets) Autonomous District, Russia (the largest are Bolshoi and Samuila) in the western part of the Laptev Sea, stretching out for about 40 km along



Komsomolets Island  
(Source: [http://commons.wikimedia.org/wiki/File:Komsomolets\\_Island-de.svg](http://commons.wikimedia.org/wiki/File:Komsomolets_Island-de.svg))



the northeast coast of Taymyr. They are separated from the mainland by the Strait of Free Cuba, which is 5.6 km wide in the narrowest point. The Bolshoy Island (20 by 11 km) and Samuila Island (14 by 5.6 km) are the largest of them. The height is up to 68 m (the mountain of Yellow Gorbushka in the center of the Bolshoy). The islands are primarily composed of the frozen loose deposits and underground ice. In the western part there are rocky coastal cliffs formed by sedimentary and igneous rocks. The relief is hilly; the soil mainly consists of gravel and sandy loam. It is medallion-gravelly, structural arctic tundra, solifluction terraces are developed on the slopes of the Samuila Island. The surface is covered with tundra vegetation. There are several intermittent streams up to 4 km in length. The islands are located north-east of the mouths of the bays of Teresa Klavenes and Sims. East of the Samuila Island, on the shore of the Hydrographer Dikson Strait, there are remnants of a polar station.

The islands were discovered by Russian explorers V.V. Pronchishev (the Bolshoy Island in 1736) and S.V. Chelyuskin (the Samuila Island in 1742). In 1913, the GESLO expedition on

boards of the ships “Taymyr” and “Vaigach” under the command of Captain 2nd Rank B.A. Vilkitskiy mistakenly referred these islands to the Samuila Island. In 1935, by a decree of the USSR Central Executive Commission the Samuila Islands were renamed into Komsomolskaya Pravda Islands – in the honor of the newspaper which played a major role in the study and development of the Arctic.

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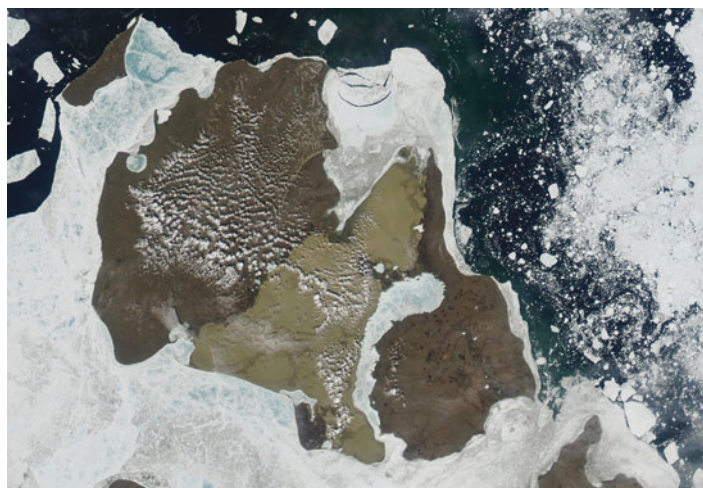
## Kotelny Island

Kotelny Island – the largest island in the archipelago of the New Siberian Islands, in the group of Islands of Anjou, in the Laptev Sea, Russia. The area of 23,200 km<sup>2</sup>, the height is up to 374 m. The shores of the island are strongly rugged. The central part of the island occupies a plateau dissected by valleys of large rivers into a series of separate uplands. The island is composed of limestones and shales. The terrain is hilly. There are more than 20 lakes, many swamps, tundra type vegetation. K.I. is linked

Komsomolskaya Pravda Islands (Source: [https://en.wikipedia.org/wiki/Komsomolskaya\\_Pravda\\_Islands](https://en.wikipedia.org/wiki/Komsomolskaya_Pravda_Islands))



Kotelny Island: a satellite view (Source: <https://ru.wikipedia.org/wiki/%D0%9A%D0%BE%D1%82%D0%B5%D0%BB%D1%8C%D0%BD%D1%8B%D0%B9>)



K

to the Bunge Land and the island of Faddeevskiy forming a single landmass. On the island, after the World War II (1941–1945) a support base was founded with the village of (avantport) Temp – an undeclared capital town of the archipelago for the storage of fuel, spare parts, equipment, food supplies for military transport aircraft for conducting landing operations in the triangle bounded by the New Siberian Islands and the North Pole, as well as for the high arctic air expeditions. In the extreme western point of the island at the cape of Walter there is the tomb

(with a Lutheran cross on it) of H.E. Walter, doctor of the yacht “Zarya.” The island was discovered in 1773 by Yakutsk merchant I. Lyakhov and named so because one of the Lyahov’s companions left a copper pot in there. A polar station was opened in 1933. In the polar station of the island there is a plaque with the inscription: “Eduard Vasilyevich Toll. Set foot on the New Siberian Islands on May 2, 1886 for the first time, perished during the Russian polar expedition in 1902 along with his valiant companions F.G. Seeberg, N. Dyakonov and V. Gorokhov.

The Academy of Sciences of the USSR, the Yakut ASSR, the summer of 1928.”.

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## Kotzebue

Kotzebue (*Qikiqtaġruk* in Inupiat – “almost an island, half-island”) – The city lies on the five-kilometer sandy spit at the end of the Baldwin Peninsula in the Gulf of Kotzebue of the Chukchi Sea on the west coast of Alaska, 43 km north of the Arctic Circle, USA. The population is approx. 3,200 people (2010). The indigenous people are the Inupiat. K. is a commercial, economic and administrative center. The lead-zinc mine Red Dog located 160 km north of the city plays an important role in K. economics. K. is the only city

in Alaska which is fully powered by wind power. On the shore south of the city there are fishing camps where fish, meat of seals and walruses is smoked and jerked. The city is characterized by two places of interest: the National Park Visitors Center with many exhibits dedicated to national parks of northwest Alaska; the local museum Ootukakutvik (Inupiat: “a place with old things”) – a collection of artifacts and exhibits on the history of the city. K. is the gateway to the National Park “Kobuk Valley” and other attractive natural places in North Alaska. It has an airport.

A small seaport has seasonal docking and other facilities. Shipping operations do not exceed 300,000 t during navigation. Cargoes are transferred to riverboats, which sail up the river Kobuk. Archaeological findings suggest that Inupiat



Kotzebue (Source: [https://en.wikipedia.org/wiki/Kotzebue,\\_Alaska](https://en.wikipedia.org/wiki/Kotzebue,_Alaska))



Eskimos lived here at least in the fifteenth century. Rivers of Noutak, Selawik and Kobuk flowing into the Kotzebue Sound near the city of Kotzebue formed a center for transportation to the inland settlements. In addition, people from inland settlements and residents of the Russian Far East came here to trade. Subsequently, the arrival of hunters, gold miners and missionaries to this region contributed to the development of the settlement. Though Alaska has its own caribou (wild reindeer species), Russian reindeers were imported here in 1897, which stroke roots here very well. The city is named after the Kotzebue Sound in 1816, i.e., after the Russian explorer Otto von Kotzebue.

## Kotzebue Sound

Kotzebue Sound – a sound in the Chukchi Sea at the western coast of Alaska, USA. The length is 330 km, the width varies from 54 to 130 km, the depth is 13–25 m. Most of the year it is covered with ice. Named after the Russian explorer Otto von Kotzebue. In the southern part of the sound there are several small bays of Eschscholz,

Spafarev, Good Hope. More than 10 rivers flow into the sound, of which the largest are Kugruk and Kauk. In the eastern part of the bay there is the eponymous city.

## Kotzebue, Otto Evstafievich (Otto von Kotzebue) (1788–1846)

Kotzebue, Otto Evstafievich (Otto von Kotzebue) (1788–1846) – a Russian circumnavigator, Captain 1st Rank (1829), sailed around the globe three times. In 1797 he was designated to the 1st Petersburg Cadet Corps, which trained the ground officers. Having interrupted his training, O.K., in 1803, volunteered to the sloop “Nadezhda,” leaving for the first circumnavigation in the history of the Russian Fleet under the command of I.F. Krusenstern. K. received good naval training, gained an experience in marine surveying, practical astronomy and mapping. In 1806, after returning from the voyage, he was promoted to sub-officers. He participated in the War of 1808–1809 with Sweden, took part in cruising between Helsingfors and the Ålands. In 1811–1814, he was a captain the yacht in the

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Kotzebue Sound (Source: [https://en.wikipedia.org/wiki/Kotzebue\\_Sound](https://en.wikipedia.org/wiki/Kotzebue_Sound))



White Sea. In 1815–1818, in the rank of lieutenant, K. was placed in command of a research expedition, sponsored by Count N.P. Rumyantsev, in the brig “Rurik” and circumnavigated for the second time with the purpose of conducting geographical research in the Pacific Ocean and to explore ways from the Pacific to the Atlantic. The expedition discovered a number of Islands in the Tuamotu Archipelago, in the ridge of the Marshall Islands, surveyed a previously unknown 600 km coastline in the Chukchi Sea, where a vast sound was discovered in western Alaska, later named after Kotzebue, with bays of Good Hope (Dobroy Nadezhdy), Spafaryev and Eschscholz with the peninsula and Horsch and the island of Chamissot, and conducted major oceanographic research. For the first time in oceanographic practice K. measured the relative transparency of sea water. He also gathered valuable ethnographic materials. For the successful execution of the scientific program K. was prematurely promoted to lieutenant commander. From 1819 to 1822, he was an officer for special assignments at the chief commander of the port of Revel. In 1823–1826, as a commander the sloop “Enterprise,” K. undertook his third circumnavigation in order to deliver cargoes to Kamchatka and cruise for the protection of Russian settlements in the Aleutian Islands.

During this voyage the expedition discovered new islands in the Tuamotu Archipelago, Samoa, in the ridge of Ratak of the Marshall Islands, conducted major oceanographic surveys, the main part of which was done by Russian physicist E.H. Lenz. Research by K. and Lentz laid foundation for accurate observations in oceanography. In 1826, K. was promoted to Captain 2nd Rank and appointed an officer for special assignments to the commander of the Revel Port. Then he was commander of a naval crew and the new 110-gun warship “Emperor Peter I” which was under construction in St.-Petersburg. In November 1828, K. was enlisted in the Marine Guard crew. The results of his two circumnavigations K. summarized in scientific papers. In 1830, due to illness, he resigned.

The works by K. include narratives: “A Journey to the Southern Ocean and the Bering Strait for Finding a Northeastern Sea Passage, undertaken in



Kotzebue O.E. (Otto von Kotzebue) (Source: [https://en.wikipedia.org/wiki/Otto\\_von\\_Kotzebue](https://en.wikipedia.org/wiki/Otto_von_Kotzebue))

1815–1818, at Expense of His Excellency, Mr. State Chancellor Count N.P. Rumyantsev on the ship ‘Rurik’ under the command of Captain-Lieutenant Kotzebue” (vol. 1–3, St.-Petersburg, 1821–1823); “A Journey Around the World Performed at the Behest of Emperor Alexander I on the warship ‘Enterprise’ in 1823–1826 under the command of Lieutenant-Commander Kotzebue” (St.-Petersburg, 1828) and others.

An atoll in the Pacific Ocean, a mountain, a city and a creek and a bay in Alaska on the coast of the Chukchi Sea are named after K.

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### **Kozhevnikov, Mikhail Yakovlevich (1870–1942)**

Kozhevnikov, Mikhail Yakovlevich (1870–1942) – a military topographer, geodesist, and explorer. He graduated from Moscow non-classical secondary school. In 1890–1892, he studied in the



Military Topography School; then in 1892–1893, he was attached to the 145th Novocherkassk Infantry Regiment. In 1893–1906, he took part in a mission to survey North-West border area, whence, in 1897–1898, he was assigned to the 115th Vyazemsk Infantry Regiment. In 1904–1909, K. was transferred to an expedition under the geologist I.P. Tolmachev researching North Siberia, the Yenisei Governorate and the Yakutsk District: Members of Khatanga expedition were the first to map the huge area (greater than 1,000,000 km<sup>2</sup>) bounded by the Yenisei on the west, the Nizhnyaya Tunguska in the south, the Olenyok in the east, specify the hydrographic network of the region, trace down all the flow of the Khatanga, the Kotuy, the Moyero and the Anabara Rivers, and significantly updated the chart of Khatanga Gulf. This name was finally established after the Tolmachev mission. The biggest gain though should be considered the discovery, contouring and the first survey of the Anabar Plateau which is a part of the Central Siberian Plateau. In 1906–1909, he made observation of Saint-Petersburg Governorate and Finland; thence, in 1906–1908, K. was attached to Main Hydrographic Directorate for surveying the Murmansk coastline. In 1909–1917, he acted as a cartographer to the Military Topography Office in the Main Directorate of the General Staff. In 1909–1910, K. joined the geologist K.A. Volossovich's team to explore Siberia between the Lena River and the Bering Strait that was arranged by the Ministry of Trade and Industry. In 1911, he was transferred to the Kostroma Governorate and other places (due to 300th anniversary of the Romanov dynasty that was coming up in 1913) to identify in situ boundaries of the old Romanov demesne by the time Mikhail Fyodorovich Romanov was crowned. The same year, K. carried out a survey of the Borodino Field (to prepare for celebration of the 100th anniversary of the Patriotic War of 1812). In 1912, he was honored a small gold medal of the Imperial Russian Geographical Society (RGO) for literary work. From September 1914 to October 1915, K. took a war-time position of the company officer, Corps of Military Topographers under Governor-General of Galicia. In 1922, he was listed in

the 1st Detachment of Military Topographers. In 1922–1924, K. compiled maps for the Northern Military Topography Division.

The following geographic locations are named after K.: a bay in Khatanga Gulf, the Laptev Sea; a cliff, near Cape Schmidt, the Chukchi Sea, surveyed in 1909; a settlement, Krasnoyarsk Kray, Taymyr National District (the 1920s).

## Kozhevnikov Bay

Kozhevnikov Bay – located in Khatanga Gulf near the south-west coast of the Laptev Sea. It juts into the continent north-eastwards. Its length exceeds 50 km and width varies from 22 km in its outer portion to 7 km in the inner. The bay belongs to the Krasnoyarsk Kray of Russia, the smaller stretch of the east shore lies in the Republic of Sakha-Yakutia. In the north K.B. is bounded by the Khara-Tumus Peninsula; an isthmus connecting the mainland with the Khara-Tumus and Yuryung-Tumus Peninsulas – in the east; and the continental coastline – in the south. Crenelated bay shoreline forms a series of shelfy lagoons. The bay is 5–16 m deep. The settlement of Nordvikstroy is situated on the southern shore of the bay, in its inner part. There is tundra vegetation ashore. Due to severe climate, K. B. is covered with ice most of the year. The Ilya, the Propuon, the Dzharagalakh, the Semieriskayay, the Takyan Yuryakh Rivers flow into the bay. Cape Ilya projects in the center of the south shore. Coastline is chiefly low.

In 1930s, the area was teeming owing to the icebreakers plying the Northern Sea Route. Localities Kozhevnikovovo and Kosistyi were founded; narrow-gauge railroad was laid. There are disused steam locomotives in the bay up to the present day. The Dnepr troposcatter communication system is stationed on the eastern coast.

In 1905, M.Y. Kozhevnikov, Captain of the Corps of Military Topographers and a member of the Khatanga expedition organized by the Russian Geographic Society and led by the geologist I.P. Tolmachev, surveyed the bay and mapped the Khatanga and the Anabar rivers, and the seashore between their

embouchures. In 1924, the bay was named after Mikhail Kozhevnikov.

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### **Kozmin, Prokopiyy Tarasovich (1795–1851)**

Kozmin, Prokopiyy Tarasovich (1795–1851) – Lieutenant Colonel of Fleet Navigator Corps (FNC), circumnavigator, and explorer of the Arctic and the Sea of Okhotsk. In 1816, he graduated from the School of Navigation. In 1816–1817, he sailed the frigate “Merkuriy” in the Baltic and the North Seas. In 1817–1819, he went on a voyage around the world aboard the sloop “Kamchatka” via Petropavlovsk and Russian America. He took part in the mission to set coordinates for different islands of the Aleutian Range and survey Chiniak Bay. From 1820 to 1824, K. conducted hydrographic research of the northern coast of East Siberia between the Kolyma and the Indigirka Rivers, and the Medvezhiy Islands during the expedition under F.P. Wrangel. In 1825–1827, he made his second circumnavigation of the globe on the sloop “Krotkiy.” In 1829–1831, K., employed by the Russian American Company that assigned him to examine and describe the road from Yakutsk to the mouth of the Uda River, the Shantar Islands, discovered two unknown islands to the east of Bolshoy Shantar Island. He determined 17 astronomical positions and plotted a map of the Shantar Islands. In 1833, K. was appointed an assistant director of the 2nd division in the Hydrographic Department (H.D.). Since 1837, he was in charge of the H.D. Tool Office.

A bay and a cape in Peter the Great Gulf as well as a promontory in the East Siberian Sea were named after him.

in 1959 of the nuclear-powered icebreaker “Lenin.” Built in England in 1917. The length is 98.5 m, width is 21.6 m, draft is 7.9 m and displacement is 10.8 t, the capacity is 10,000 hp, speed is to 15 knots in clean water. In 1917, during the World War I, “Svyatogor” participated in the escort of convoys of the Allies in the White Sea; during the Civil War, in 1918, the ship was used in fighting against the British invaders. In 1919, it was taken back to England, but later returned to Russia. In 1920, “Svyatogor” conducted a rescue operation to release the icebreaking steamer “Solovey Budimirovich” (“Malygin”) stuck in the ice. The icebreaker was actively involved in the development of the Northern Sea Route. In 1928, “K.” accomplished a feat – saved the Arctic expedition of U. Nobile on the airship “Italy,” and then took part in the search for the aircraft of R. Amudsen, who flew out in search of “Italy.” In the same year, “K.” crew raised the flag of the USSR on the Franz Josef Land. In 1933, “K.” made winter voyage to the Novaya Zemlya reaching for the first time in the history its inaccessible northern shore. In 1934, “K.” was mobilized to rescue members of the Chelyuskin Expedition. In 1935, “K.” took part in hydrological studies in the East Siberian and Chukchi seas. In 1938, “K.” rescued icebreaker “Lenin” trapped in ice during the Great Patriotic War of 1941–1945, “K.” maintained navigation along the Northern Sea Route to Vladivostok. In 1949–1960, the icebreaker was overhauled and upgraded first in Riga, then in Germany. In 1971, “K.” was converted into a power base for geologists. At the end of 1980s, “K.” was handed over to the International Fund for History and Science for use as a museum in Leningrad. In 2004, the icebreaker was given to the Museum of the World Ocean in Kaliningrad as a museum branch (in St. Petersburg) and joined the fleet of historic ships.

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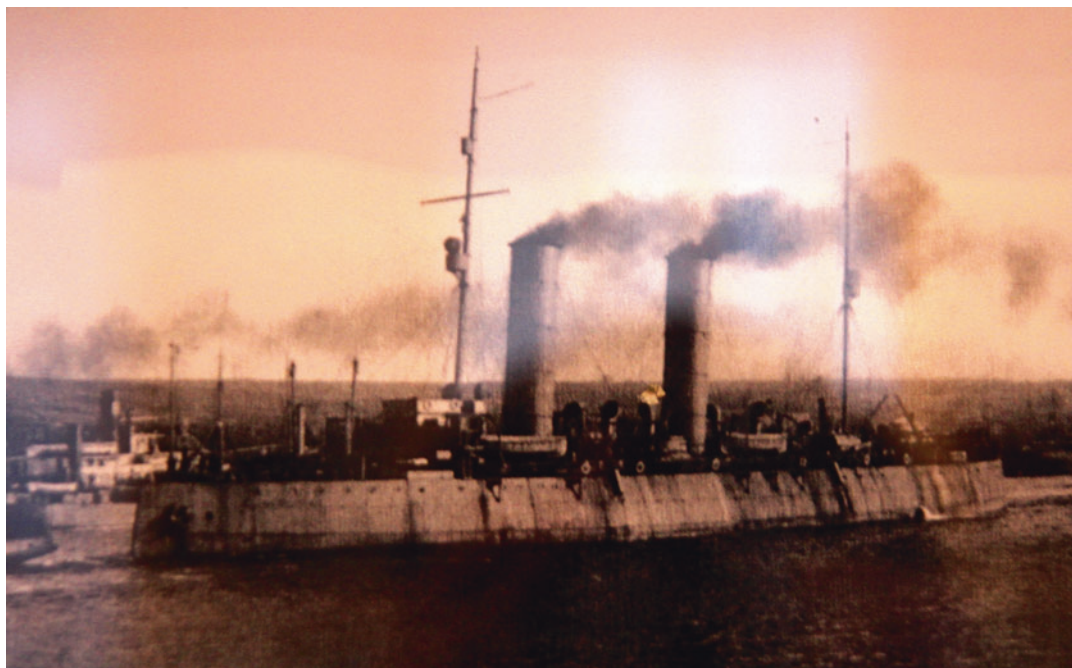
### **“Krasin” (“Leonid Krasin”)**

“Krasin” (“Leonid Krasin”) (before 1927 as “Svyatogor”) – a capital icebreaker, improved copy of the icebreaker “Ernak.” The most powerful icebreaker in the North until the construction

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### **Krasnoy Armii Strait (Red Army Strait)**

Krasnoy Armii Strait (Red Army Strait) – a strait in the Arctic Ocean, which separates the islands of



K

"Krasin" ("Svyatogor" in 1917) (Source: [https://en.wikipedia.org/wiki/Krassin\\_\(1917\\_icebreaker\)](https://en.wikipedia.org/wiki/Krassin_(1917_icebreaker)))

Oktyabrskoy Revolutsii (October Revolution) from the islands of Komsomolets and Pioneer (Northern Land), connects the Kara and Laptev seas. It is often considered part of the Kara Sea. Its length is about 110 km. The width varies from 10 to 18 km. The depth is up to 460 m. The shore is steep, mountainous, covered with glaciers (the glaciers of the Academy of Sciences, Otdelnyi, Kusanov, Pioneer, Albanov). The strait is covered with ice all year round, rarely gets free of ice. In the strait, there is a lot of small islands. It was discovered and mapped in 1931 by the Northern Expedition of 1930–1932 under the leadership of G.A. Ushakov and named in honor of the Red Army.

### **"Krasnyi Oktyabr" (Red October)**

"Krasnyi Oktyabr" (Red October) – (formerly "Verhoven") a gunboat. The ship was built at the machine building shipyard in Copenhagen in

1897 as a port icebreaker. Its length was 58.5 m, width – 12.95 m, displacement – 1,525 t, hull height – 7.75 m. The engine power – 2,500 hp, speed – 13 knots. The crew was 80 people. In 1921–1922, the two-masted monotube "Nadyozhnyi" was a part of the Siberian Flotilla and served Vladivostok Port. After the Civil War in Russia, in 1924, the vessel was enrolled in the Naval Forces of the Far East, was armed and turned into a gunboat and named K.O. The ship was armed with 4 Japanese 120 mm guns. In the period from July to October 1924, the gunboat under the command of hydrographer B.V. Davydov sailed to the island of Wrangel to counteract the attempts of Great Britain and the United States to seize the islands of Wrangel and Herald and prevent the accession of the island to the RSFSR. The K.O. team erected on the island a mast with the Soviet flag, thereby conferring the right to the island to the Soviet Union.

A group of poacher, including one American, was found on the island and taken on board. Then the ship moved to the Cape Blossom to carry out a

“Krasnyi Oktyabr”: On the way to Wrangel Island on 16 August 1924 (Source: [https://ru.wikipedia.org/wiki/%D0%9E%D1%81%D1%82%D1%80%D0%BE%D0%B2\\_%D0%92%D1%80%D0%B0%D0%BD%D0%B3%D0%B5%D0%BB%D1%8F](https://ru.wikipedia.org/wiki/%D0%9E%D1%81%D1%82%D1%80%D0%BE%D0%B2_%D0%92%D1%80%D0%B0%D0%BD%D0%B3%D0%B5%D0%BB%D1%8F)))



series of hydrographic surveys and refine the map of the island. For this campaign, in 1925, the ship was awarded the revolutionary banner of the Central Executive Committee; the expedition leader B. V. Davydov and others, as well as the vessel itself, were awarded the Order of the Red Banner. After Davydov's death in 1926, K.O. was renamed into “Captain Davydov,” but later became known as “Davidov” and was returned to the commercial port. In 1943, the vessel was overhauled in Vancouver, Canada. In 1956 the vessel was decommissioned and in 1957 deleted from the list of the USSR Marine Fleet Ministry.

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## Krestovskiy Island

Krestovskiy Island – an island within the Medvezhyi (Bear) Islands in the East Siberian Sea, the Republic of Sakha (Yakutia), Russia. The island is located 30 km north-east of the continent, separated by the Strait of Kolyma. The westernmost and largest island of the group has an elongated shape with a thickening in the southern part, approx. 16 km in length, 1.5 km in width in the north up to 9 km in the south. The bend of the island to the north forms the bay of Pioneer. Northern and eastern shores are steep and

rocky, the west coast is lowlands covered with boulders and gravel, the southern shore is sloping. In the northern part of the island there are two elevations, the largest of them is the Shapka Mountain (273 m). Several small, partially marshy creeks run from the mountains and hills towards the coast. On the northern hill 63 m in height there is the Krestovskiy Fire (Ogon' Krestovskiy) lighthouse. In the north-west coast the vegetation is represented by larch, fir and poplar. The whole territory is covered by moss and short grass. The wildlife is represented by deers, bears, wolves, foxes and small rodents. Dmitry Laptev was the first who reached this island in 1740 while sailing from the river of Indigirka to Kolyma. Laptev gave it the name, which was not eventually taken on, the island of St. Anthony. The accurate map of the island was drawn up by geodesist-ensigns Ivan Leontiev, Ivan Lysov and Alexey Pushkarev who visited the island in 1769. In 1763, Sergeant Andreev found traces of human habitation on the island.

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## Krusenstern, Cape

Krusenstern, Cape – a headland on the northwest coast of Alaska, USA. K.C. is located near the

settlement of Kivalina and outlines the Kotzebue Sound in the south and the Chukchi Sea from the west. It consists of a series of coastal ridges and swampy lowlands with numerous ponds and lakes. The coastline of the Cape consists of bars, lagoons and beaches. In 1978, the Cape was declared a national monument. It is named in honor of the foremost Russian navigator and explorer I.F. Krusenstern.

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### **Krusenstern Lagoon**

Krusenstern Lagoon – located on the northwest coast of the Chukchi Sea, Alaska, United States, north of the eponymous cape, and is part of the recreational monument Cape Krusenstern.

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### **Kungasalakh**

Kungasalakh – a lake in the east of the Taymyr Peninsula. The area is 270 km<sup>2</sup>. The lake is linked with the lake of Arylakh via a bayou. The flow is to the Khatanga Bay of the Laptev Sea.

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### **Kyanygtokynmankyn**

Kyanygtokynmankyn – a lagoon, located on the stretch of coastline of the Chukchi Sea between

the Cape of Yakan and the Schmidt Island, Chukotka Autonomous Okrug, Russia. The entry to the lagoon is opposite the mouth of the river of Kuvekvyn (69°13'N, 179°23'E). The entry width is about 400 m. It is divided into several parts by the spits of Ylvakytryn and Notakytryn. In the south it rests on the mountain range of Khrankakenyggon. In the east it merges with the Chukchi Sea and the lagoon of Eryokynmankyn. From the south-eastern part of the lagoon a narrow channel leads to the shallow lagoon of Erykynmangky. The depth of the lagoon is mostly 3–4 m. The Leningradskiy village is 12 km to the north, and the village Polarnyi is 10 km southward. The flowing rivers are the Vyeikuul, a creek from the lake of Primorskoye, the Usatyi, the Pilgynkuul, the Kyvekvin.

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### **Kyttyk**

Kyttyk – a peninsula of the Asian continent, which separates the East Siberian Sea from the Chaun Bay; it is separated from the islands of Ayon by the Small Chaun Strait. The peninsula is a lake-alluvial plain. The peninsula plain is built of sea sands outcropping in the northern part of the island of Ayon. The base of the peninsula is oriented in the sublatitudinal direction and extends for 70 km from the mouth of the river of Emykkyvyan in the east to the mouth of the river of Erygyveem flowing into the River of Rauchua 15 km above its mouth.



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**Lappo, Sergey Dmitrievich  
(1896–1972)**

Lappo, Sergey Dmitrievich (1896–1972) – a Soviet polar hydrographer. In 1916 he graduated from the Russian Imperial Naval College (the last graduates), receiving the rank of warrant officer. L. was assigned to the battleship “Tsesarevich,” which was part of the maneuver brigade in Kassari (now Estonia). In 1916, he participated in the Moonsund and Ösel operations. Later L. met with the famous polar explorer B. V. Vilkitsky, and this acquaintance was decisive for his future work in the Russian North. In 1920, he took part in his first expedition to the western shore of the Gulf of Ob on the survey motor boat “Orlik.” Here the expedition found a large and deep water area for the reception of ships of the so-called Grain Expeditions – a cargo port called the New Port. Within 3 years, L. together with other members of the hydrographic team carried out depth measurements in support of construction works. In the mid-1920s, L. became an assistant chief of the Kara Expeditions for navigation. He participated in the preparations for the construction of ports of Igarka and Tiksi; on the motor vessel “Pioneer,” he studied waters of the Noordwijk Bay in the Laptev Sea. In 1936, on board of the motor-sailing boat “Politotdelets,” L. conducted surveys of the coastal topography and studied the bottom

topography on the New Earth and the island of Pakhtusov in the Kara Sea. In 1938, he headed the “ice and weather service” of the Arctic Institute. He developed a new method of the prediction of ice coverage based on the autumn weather observations.

During the Great Patriotic War (1941–1945), L. became a Candidate of Science and organized the navigation of naval transportation vessels, paving safe routes on the Northern Sea Route for warships. In 1946 he participated in a strategic aerial navigation in the Laptev Sea. In 1950, he became a professor, lecturer at the Moscow State University, and chairman of the USSR Civil Defense Hydrological Commission. He was editor of scientific journals “Oceans and Seas” and “World Ocean.”

L. published the “Oceanographic Handbook on the Arctic Seas of the USSR” (1940) and the “Polar Explorer Reference Book. Overview of Oceanography, Climate, Wildlife and People of the Arctic” (1945).

Both sons of L. chose the profession of oceanographers. Sergey S. Lappo was a corresponding member of the RAS and headed the P.P. Shirshov Institute of Oceanology of the RAS in Moscow (1995–2006).

A peninsula in the north of the Krasnoyarsk Territory and a cape in Laptev Sea are named after S. Lappo.

## Laptev Oil- and Gas-Bearing Basin (OGB)

Laptev Oil- and Gas-Bearing Basin (OGB) – occupies almost the entire shelf of the Laptev Sea. Geophysical studies confirm the existence of sedimentary deposits, defined as OGB. It was formed on the large Laptev Plate, built by rocks of the Mesozoic–Cenozoic age. Signs of oil and gas in them were identified in the wells drilled on the coast of the bays of Khatanga and Olenyok. In the rock outcrops on the coast, there are numerous oil shows, including the largest deposit of asphalts (the Olenyok River). The highly promising target for the search of oil and gas in the Laptev OGB is the extensive Trofimovskiy uplift, located on the northern coast of the Lena River delta and occupying part of the delta and the seawaters. Probably, it is complicated by a number of individual oil traps, forming a large tectonic structure of the type of a tectonic rampart or a structural high in which oil and gas deposits may merge into one giant field. The possibility of drilling deep wells on the banks of river branches of the Lena's delta creates favorable conditions for rapid search and exploration in the southern part of the uplift.

## Laptev Sea

Laptev Sea – a marginal, predominantly continental sea of the Arctic Ocean in Russia, located between the Severnaya Zemlya Archipelago and Taymyr Peninsula in the west and the New Siberian Islands to the east. It bears the name of Russian sea explorers – the Laptev brothers. Its western boundary runs along the eastern shore of the Severnaya Zemlya from the Arctic Cape (the Komsomolets Island), through the Strait of the Red Army along the eastern coast of the October Revolution Island to Anuchin Cape, across the Strait of Shokalskiy to Cape Peschanyi on Bolshevik Island and along its eastern coast to Cape Vaygach, then along the eastern border of the Vilkitsky Strait, and further along the mainland

shore to the top of the Khatanga Bay. The northern boundary of the sea runs from the Arctic Cape to the point of intersection of the meridian of the northernmost point of Kotelnii Island (Cape Anissiy) with the edge of the continental shelf (79°N, 139°E); the eastern border extends from this point by the meridian 139°E to the Kotelnii Island, further along its western shore, through the Sannikov Strait, along the western shores of the Big and Small Lyakhovskiy Islands and the western boundary of the Dmitry Laptev Strait to Cape Svyatoy Nos (St. Nose).

The southern boundary runs along the mainland coast from this Cape to the top Khatanga Bay. With the East Siberian Sea, the L.S. is linked by the straits of Sannikov, Eterikan, and Dmitry Laptev, with the Kara Sea by Vilkitsky, Shokalskiy, and the Red Army straits.

The L.S. belongs to continental marginal seas. Its area is 662,000 km<sup>2</sup>, the volume is 353,000 km<sup>3</sup>, the average depth is 533 m, and the maximum depth is 3,385 m.

Near the L.S. coasts, there are several groups of islands, as well as dozens of islands, most of which are located in the western part of the sea. Their area is 3,784 km<sup>2</sup>. Komsomolskaya Pravda, Faddey, and Peter islands are near the Taymyr coast. Among individual islands the largest are Starokadomskiy, Malyi Taymyr islands near the eastern coast of Severnaya Zemlya, Begichev Island at the entry to the Gulf of Khatanga, and Yarok Island in the Yana Bay. Of the New Siberian Islands, only Stolbovoy and Belkovskiy islands are fully located in the L.S. Many small islands are located in the river deltas.

Seashores are severely rugged and form bays, gulfs, embayments, peninsulas, and headlands of multiple shapes and sizes. Eastern coasts of Severnaya Zemlya and the Taymyr Peninsula are significantly embayed. To the east of the peninsula, the shoreline forms several gulfs and bays (Khatanga, Anabar, Olenyok, Yana, Kozhevnikov, Noordwijk, Tiksi, Buor-Khaya, Vankin) and peninsulas (Hara-Tumus, Noordwijk). The west coast of the New Siberian Islands is less rugged.

By its nature, the coast is quite varied. There are abrasion and accumulative and icy shores. Sometimes, low mountains reach the sea; most



The Laptev Sea (Source: [https://upload.wikimedia.org/wikipedia/commons/f/f0/Laptev\\_Sea\\_map.png](https://upload.wikimedia.org/wikipedia/commons/f/f0/Laptev_Sea_map.png))

of the coasts are lowlands. The L.S. is characterized by the predominance of terrigenous sediments. On the coast there are widely spread Quaternary sediments, shackled by permafrost.

The bottom of the L.S. is an almost non-segmented plain gently descending to the north. Here one can separate some troughs, small uplands, and benchlands. A wide but short trough is located against the Lena Delta, a funnel-shaped trough is at Olenyok Bay, and a long and narrow trough goes from Stolbovoy Island to the north. In the eastern part of the sea, there are Semyonovskiy and Vasilyevskiy benchlands. Half of the total area is occupied by the sea depths up to 50 m, and south from  $76^{\circ}\text{N}$ , they do not exceed 25 m. The northern part of the sea is much deeper. At a depth of 100 m, the bottom drops sharply. The sea is mostly shaped by waters of the southern part with the depths of 25–100 m.

The L.S. is one of the most severe arctic seas. It generally has a polar marine, sometimes continental, climate that is most evident in the relatively large annual fluctuations of air temperature.

In the cold season, the sea is primarily in the area of high atmospheric pressure – the Siberian Anticyclone. In the autumn, unstable winds

gradually take the southern direction increasing to stormy ones. Less common are cyclones, with less cloudiness. In winter, the L.S. is under impact of three major pressure systems. In the southeastern part, there is the Siberian Anticyclone wedge line, which center is located near the Yana Bay. From the north there is an extending polar maximum wedge. In the western part of the sea, sometimes there are effects of the Icelandic minimum wedge. In accordance with such baric conditions, southern and southwesterly winds with an average speed of about 8 m/s dominate in this season. By the end of winter, their speed decreases; calm sea is frequently observed. The air is strongly cooled. The air temperature over the sea, in general, decreases from the northwest to the southeast in January, and near the Bay of Tiksi it is equal to  $-26 \dots -29^{\circ}\text{C}$ . Calm and mainly clear winter weather is sometimes interrupted by cyclones passing rather south of the sea. They cause severe cold northerly winds and blizzards, which last only a few days. At the beginning of the warm season, the destruction of atmospheric pressure begins. The baric situation is generally similar to the winter, but a little more blurred, so the spring winds are very unstable in direction.

In addition to the southern winds, northerly winds also blow sometimes. Usually, the winds are gusty, but not strong. The air temperature steadily rises. Cloudy and relatively cold weather prevails.

In summer, the Siberian maximum is absent, and the polar maximum is quite weak. South from the sea, the pressure is slightly reduced; over the sea itself, it is slightly higher. Consequently, northerly winds blowing at a rate of 3–4 m/s are the most frequent. Strong winds (with speeds greater than 20 m/s) in summers are not observed. The average monthly temperature in August is the annual maximum; in the central part of the sea, the temperature is equal to 1–5 °C. On the coast, in enclosed bays, the air sometimes (though rarely) warms up very significantly (up to 32.7 °C in Tiksi). Summers are characterized by increased cyclonic activity. At this time, cyclones move over the southern part of the sea, where they also fill up with air. This results in a cloudy weather over the sea with a continuous drizzle. In late August, the Siberian maximum pressure begins to form that signifies the transition to autumn. Thus, most of the year, the L.S. is under the influence of the Siberian Anticyclone. This leads to a relatively weak cyclonic activity and mostly weak winds of monsoonal character.

Long and strong cooling under calm wind winter conditions is an important climatic feature of the sea. Another very important factor of the formation of natural image of the L.S. is the continental runoff, which is contributed by many small and few large rivers. Most of them are the Lena, which annually brings an average of approx. 530 km<sup>3</sup> of water; the Khatanga, over 105 km<sup>3</sup>; the Yana – 32 km<sup>3</sup>; the Olenyok – 40 km<sup>3</sup>; and the Anabar – approx. 25 km<sup>3</sup>. All other rivers deliver about 20 km<sup>3</sup> of water per year. The total volume of annual runoff into the sea is about 720–767 km<sup>3</sup>, accounting for 30 % of the total flow to all the Arctic Sea. Due to precipitation, the sea receives 164 km<sup>3</sup>, with the evaporating capacity from its area of 63 km<sup>3</sup>. In summer, desalinated water masses in the surface layer are transferred through the straits of the New Siberian Islands to the East Siberian Sea, while more salty ocean masses come from the west.

However, the runoff distribution is very uneven in time and space. About 90 % of the annual runoffs fall on the summer months (June–September), of which on August fall about 35–40 % of annual runoffs, whereas in January, this value barely reaches 5 %. Such a distribution of runoffs during the year is due to the fact that the rivers, which flow into the L.S., are snow fed, and the vast majority of their water flows to the southeastern part of the sea (the Lena only gives 70 % of the continental runoff). Depending on the amount of water brought by the rivers and hydrometeorological conditions, river waters are distributed either to the northeast, reaching the northernmost point of Kotelnnyi Island, or far to the east, flowing through the straits in the East Siberian Sea. A large continental runoff leads to the desalination of water in the vast expanses of the sea, especially in the southern and eastern parts. In general, the L.S. area, subjected to the influence of desalinated rivers, totals approx. 145,000 km<sup>2</sup>. The overall solid runoff volume is more than 20 million tons/year, sometimes reaching up to 30 million tons/year, although other data are available as well.

Surface Arctic waters prevail in the L.S. In the areas of strong influence of the continental runoff, the mixing of river and Arctic surface waters leads to the formation of the water of a relatively high temperature and low salinity. At their interface (subsurface horizon of 5–7 m), there are large gradients of salinity and density. In the north, warm Atlantic waters flows in a deep trench over the Arctic surface water, but their temperature is somewhat lower than in trenches of the Kara Sea. These steams penetrate here 2.5–3 years after starting they flow at Spitsbergen. The bulk of the deep Atlantic water penetrates to the L.S. via the Sadko Trench up to 77°N. In the L.S., which is deeper (as compared to the Kara Sea), the horizons from 800–1,000 m to the bottom are filled with Arctic cold bottom water with a temperature –0.4...–0.9 °C and almost homogeneous salinity (34.90–34.95 ‰).

For most of the year, the water temperature is close to freezing temperature and decreases rapidly after the summer maximum. In winter, the surface water temperature varies from –0.8 °C

(near Mostakh Island) to  $-1.7^{\circ}\text{C}$  (near Cape Chelyuskin) due to differences in salinity in these areas. In the early spring months, ice is melting, so the water temperature is almost the same as in winter. Only in coastal areas (especially in estuarine areas) which get cleared of ice before the others, the water temperature is slightly higher than in the central regions. It generally decreases from south to north and from east to west. Over the summer, the sea surface warms significantly. In August, the south (Buor-Khaya Bay) surface water temperature can reach  $10^{\circ}\text{C}$  or even  $14^{\circ}\text{C}$ , in the central regions, it is  $3\text{--}5^{\circ}\text{C}$ ; at the northernmost point of Kotelnii Island, it is  $0.8^{\circ}\text{C}$ ; and at Cape Chelyuskin, it is  $1^{\circ}\text{C}$ . In general, the western part of the sea, where cold waters of the Arctic Basin come, is characterized by low ( $2\text{--}3^{\circ}\text{C}$ ) water temperatures than in the eastern part, where the main mass of warm river waters is concentrated, and the surface temperature can reach  $6\text{--}8^{\circ}\text{C}$  here.

The water temperature decreases rapidly with depth. In winter, in the areas with depths up to  $50\text{--}60\text{ m}$ , the water temperature is the same as from the surface to the bottom. In the coastal zone, it is  $-1.1\text{--}1.2^{\circ}\text{C}$ , and in the open sea, it is around  $1.6^{\circ}\text{C}$ . In the northern areas at depths of  $50\text{--}60\text{ m}$ , the water temperature rises by  $0.1\text{--}0.2^{\circ}\text{C}$  due to the inflow of other waters.

In the north, in the area of the deep trench, a negative temperature is observed from the surface to  $100\text{ m}$  deep. Here it begins to rise (to  $0.6\text{--}0.8^{\circ}\text{C}$ ) to a depth of about  $300\text{ m}$  and then slowly lowers till the bottom. High temperature values (above zero) in the layer of  $100\text{--}300\text{ m}$  are associated with the penetration to the L.S. of warm Atlantic waters from the Central Arctic Basin.

In summer, the  $10\text{--}15\text{ m}$  thick upper layer is well warmed to a temperature of  $8\text{--}10^{\circ}\text{C}$  in the southeastern part and to  $3\text{--}4^{\circ}\text{C}$  in the central regions. Below these horizons the temperature decreases sharply and reaches  $-1.4\text{--}1.5^{\circ}\text{C}$  in the horizon of  $25\text{ m}$ . These values or those close to them are preserved till the bottom. In the western part of the sea, where the warming is less, no such sharp differences in temperature are observed.

Salinity in the L.S. is very inhomogeneous: in summer it varies from 1 to almost  $31\text{‰}$ , but in the

surface layer desalinated water with a salinity of  $20\text{--}30\text{‰}$  is predominant, and its distribution is very complicated. In general, it increases from the southeast to northwest and north. In winter, with the minimum river runoff and intensive ice formation, the salinity increases. At that (as in summer) it is higher in the west (near Cape Chelyuskin –  $34\text{‰}$ ) than in the east (at Kotelnii Island –  $25\text{‰}$ ). This salinity remains high for a long time; only in June the ice begins to melt and salinity decreases. In summer, the southeastern part of the sea is the most desalinated. In the Buor-Khaya Bay, the salinity drops to below  $5\text{‰}$ , and to the west of Lyakhovskii Island, it increases ( $10\text{--}15\text{‰}$ ). In the western part of the sea, there are more salted waters ( $30\text{--}32\text{‰}$ ). They are slightly north of the line from Peter Island to Cape Anissii. Thus, desalinated waters go north in the eastern part of the sea, and salt waters go down to the south in the western part of the sea.

With the depth the salinity increases, but there are seasonal differences in its distribution. In winter, in shallow water, it increases from the surface to the horizons of  $10\text{--}15\text{ m}$ , and below it and till the bottom, salinity remains almost unchanged. At greater depths, salinity increases markedly not from the surface itself but from the underlying horizons. The spring-time vertical distribution of salinity starts from the moment of intensive melting of snow and ice. At this time, salinity decreases rapidly in the surface layer and preserves its winter values on lower horizons.

In summer, in the zone of distribution of river waters, the upper layer ( $5\text{--}10\text{ m}$ ) is very much desalinated; below there is a very sharp increase in salinity. In the layer of  $10\text{--}25\text{ m}$ , the salinity gradient sometimes reaches  $20\text{‰}$  per  $1\text{ m}$ . In northern part of the sea, salinities increase relatively rapidly from the surface to  $50\text{ m}$ ; from here to  $300\text{ m}$ , salinity slowly increases (ranging from  $29\text{‰}$  to  $33\text{--}34\text{‰}$ ); deeper it is almost unchanged.

In autumn, in southern area, the summer salinity jump is gradually diffused.

In the L.S., the density distribution rather relates to salinity than the temperature. This is due to a large range of salinity and a weak influence of the water low temperature on the density.



The density increases from the southeast to the northwest. In winter and autumn, the water is denser than in summer and spring. In winter and early spring, it has almost the same density from surface to bottom. In summer, large gradients of salinity and temperatures at depths of 10–15 m determine a sharp decrease of their density. In autumn, due to cooling and salinization of surface waters, their density increases. Density stratification of the waters can clearly be seen from late spring to early autumn. It is very distinctive in the southeastern and central parts of the sea and near the ice edge.

Wind mixing in the ice-free sea spaces is weak due to the relatively weak winds during warm seasons and a large sea ice cover. During spring and summer, the wind stirs only the uppermost layers up to 5–7 m thick in the east and up to 10 m in the western part of the sea.

Strong autumn and winter cooling and intensive ice formation cause the active development of convective mixing. Due to the relatively high degree of uniformity of waters and early ice formation, the density mixing penetrates most deeply (to the horizons of 90–100 m) to the north of the sea. In the central part, the convection reaches the bottom (40–50 m) by the beginning of winter, and in the southern part because of the large vertical gradients of salinity, it extends to the bottom even at low depths only by the end of winter.

Surface currents form a cyclonic gyre. The coastal flow moving along the mainland coast from west to east deviates off the eastern shores to the north and northwest and, in the form of Novosibirsk Stream, goes beyond the sea, connecting with the Transarctic Stream of the Central Arctic Basin. Away from it, near the northernmost point of Severnaya Zemlya, the East Taymyr Stream branches off it to the south and moves to the south along the eastern coast of Severnaya Zemlya and Taymyr Peninsula and closes the cyclonic ring. A small amount of the coastal waters flows out through Dmitry Laptev and Sannikov straits to the East Siberian Sea. The flow velocity in this gyre is low (2 cm/s). Depending on a large-scale baric situation, the center of cyclonic circulation can shift from the

middle of the northern part of the sea toward Severnaya Zemlya. Accordingly, this creates branches from the mainstream. The permanent streams are overlapped with tidal currents.

In the L.S., tides are very distinctive everywhere with their anomalous semidiurnal character. The tidal waves enter from the north, from the Central Arctic Basin, fading and deforming along its way to the south. The tidal range is usually small, preferably about 0.5 m. Only in Khatanga Bay, the range of oscillations of the tidal level exceeds 2 m in spring tides. This is due to the well-known “funnel” effect observed, for example, in the Bay of Fundy. The tidal wave that came to Khatanga Bay (“funnel”) grows in size and extends to almost 500 km up the river of Khatanga. This is one of the examples of deep upriver penetrations of tidal waves. However, the effects of boron in Khatanga are not observed. To other rivers, which flow into the L.S., tides hardly penetrate. They fade away very close to the mouths, as tidal waves are damped in deltas of these rivers.

In addition to the tidal level fluctuations, seasonal and storm surges are observed in the L.S. Seasonal level changes are insignificant, in general. Most of all, they are distinctive in the southeastern part of the sea, in the areas close to the mouths of rivers, where the fluctuations reaches 40 cm. The minimum level is observed in winter, the maximum – in summer.

Storm surges are observed everywhere and in any season, but they are the most significant in the southeastern part. Positive and negative surges cause the greatest decreases and increases in the L.S. levels. The range of fluctuations of surge levels is 1–2 m and sometimes reaches up to 2.5 m (Tiksi Bay). Most often, positive and negative surges are observed in autumn with strong and steady winds. In general, northern winds cause positive surges and southern winds negative surges, but depending on the configuration of the coast, fluctuations of positive–negative surge levels are caused in each particular area by winds of certain directions. So, in the southeastern part of the sea, the most effective are westerly and northwesterly surge winds.

On average, surges of force 2–4 with wave heights of about 1 m prevail in the L.S. In summer (July–August) in the western and central parts of the sea, storms occasionally reach the force of 5, when the wave height reaches 4–5 m. Autumn is the most stormy season of the year when the maximum high waves (up to 6 m) can be observed. However, in this season, waves about 4 m high prevail, which is predetermined by the acceleration distance and depths. Wave processes are the main factors affecting the coasts. They lead to coastal destruction and the subsequent transformation of the sedimentary material to its abrasion, turning it into a subtle and migratory slurry carried for significant distances from the source areas.

Most of the year (October to May), the L.S. is covered with ice. Ice formation begins in late September and lasts simultaneously over the whole of the sea. In winter, extensive fast ice develops in its shallow eastern part with a thickness up to 2 m. The boundary of the propagation of fast ice is the depth of about 25 m, which in this area of the sea is remote for several hundred kilometers from the coast. The fast ice area is about 30 % of its sea. In the western and north-western parts of the sea, the shore ice is small, and during some winters, it is entirely absent. North of the landfast ice zone is the drifting ice area.

With almost continuous carryover of ice from the sea to the north in winter, behind the landfast ice, significant spaces of polynyas and young ice are preserved almost through the whole winter. The width of the zone varies from dozens to several hundred kilometers. Its separate parts are called the Vostochno-Severozemelskaya, Taymyrskaya, Lenskaya, and Novosibirskaya polynyas. The latter two at the beginning of the warm season become enormously huge (thousands of km<sup>2</sup>) in size. Ice melting begins in June and July, and by August large areas of the sea are free of ice. In summer, ice edges frequently change their position under the influence of winds and currents. The western part of the sea is more arctic in general than its east. The oceanic Taymyr ice massif comes down to the sea along the eastern coast of Taymyr, which bears frequent heavy

multiyear ice. It is well preserved until the new ice formation, depending on the prevailing winds, moving either to the north or to then south. The local Yana ice massif formed by landfast ice, by the second half of August, usually melts “on the scene” or is partially carried away to the north beyond the sea limits.

Flora and Fauna are of the Arctic origin. Phytoplankton is represented mainly by diatom algae both marine and brackish freshwater. In zooplankton the most common are ciliates, rotifers, copepods, and among the benthic fauna (bents), foraminifera, polychaetes, isopods crustaceans, mollusks, and bryozoans prevail.

Due to harsh environmental conditions, the biological productivity of the L.S. is low, and life in its waters is generally poor both quantitatively and qualitatively. 37 species of fish live here. Ichthyofauna is represented by marine anadromous and semi-anadromous fish species. The most common are Siberian whitefish, trout, cisco, whitefish, white salmon, and sturgeon. Of marine mammals, there are walruses, bearded seals, eared seals, and toothed whales – belukha.

The deltas of rivers are nesting areas for many birds in summer, including geese, gulls, and others. The permanent residents of the coastal tundra are snowy owl and ptarmigan. In some places on the rocky cliffs, there are multiple rookeries (diving pigeons, guillemots, gulls, etc.). Along the banks are deer, lemming, and gopher and predators such as foxes and wolves; on the ice and on the islands, polar bears.

Estuaries and deltas of the local are fishery areas. Whitefish, cisco, and sometimes muksun are caught in small quantities. Of great commercial importance is walrus. In the tundra the industries include hunting for fur (mainly polar fox), animals, and reindeer.

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## Laptev Sea Encyclopedia

“Laptev Sea Encyclopedia” – one of the books in the series “Encyclopedia of Russian Seas”, published by “International Relations” publishing



The Laptev Sea Encyclopedia (2014) (Source: Courtesy by Andrey Kostianoy)

house in Moscow in 2014. Its authors are Prof. I.S. Zonn and Prof. A.G. Kostianoy. The publication is dedicated to one of Russia's northern seas – the Laptev Sea, a part of the Arctic Ocean. The Encyclopedia contains about 300 articles on the hydrographic, geographic and hydrological characteristics of the sea. The most significant natural features are presented: the islands, peninsulas, bays, rivers, their geographical features, economy, culture and history, as well as cities, ports; water and biological resources, international agreements, research institutions, the activities of prominent scientists, researchers, and travelers. The Encyclopedia provides a chronology of major events that have become momentous milestones in the history of the discovery and development of the Laptev Sea from the 17th century to the present day. Second edition of this book was published in 2015.

## Laptev Sea Oil- and Gas-Bearing Basin

Laptev Sea Oil- and Gas-Bearing Basin – one of the four OGB of the Eastern Arctic. It occupies almost the entire shelf of the Laptev Sea. According to geophysical research, the OGB is formed on the large Laptev platform, composed of rocks of the Mesozoic–Cenozoic age. The maximum bent part of the platform (9–8 km) is linked with the South Laptev Depression filled with Proterozoic, Paleozoic, and Mesozoic–Cenozoic rocks. Shows of oil and gas in these rocks were found in wells drilled on the coast and Khatanga and Olenyok bays. Numerous oil shows were identified there in outcrops on the coast, including the largest deposit of asphalts (the Olenyok River). The extensive Trofimovskiy uplift, located

on the northern coast of the delta of the Lena River and occupying part of the delta and sea areas, is considered highly promising and priority target for the search for oil and gas in this OGB.

## Laptev Sea Pollution

Laptev Sea Pollution – traditionally the sources of pollution are oil carbohydrates, wastewater, water transport, etc. In Bulunkan Gulf, lying in the middle part of the western shore of Tiksi Bay, the oil carbohydrates reach the threshold allowable concentration of 20 and it is considered catastrophic; in Buor-Khaya Gulf they amount to the concentration of 12. High content of oil products is typical for the sea navigation route. Spues of uncleansed flows of the settlement of Tiksi add to the pollution of coastal waters. They are polluted by carbohic acid to a great extent. Its high concentration may be explained by a huge amount of sunken timber. Carbohic acid content in the offshore of the Yana and the Lena reaches the concentration of 5, in the Yana Gulf of 60, in Buor-Khaya Bay of 45, and in Bulunkan of 22. The water in the Neelov Gulf is marked by dirtiness and in the Tiksi and Buor-Khaya bays by pollution.

## Laptev Sea Shelf

Laptev Sea Shelf – the area of the shelf is assessed ambiguously – from 504 to 530 (72 % total area) to 650,000 km<sup>2</sup>. The differences of the assessments are determined by the location of the outer borderline of the shelf, either on its edge, i.e., on the isobath of approx. 200 m, or on the registered border of the continental shelf which is located at the depth of 800 m, on the isobath of 200 m. The shelf is approx. 400 km wide on average; the minimum is approx. 150 km; the maximum is approx. 810 km.

The shelf is characterized by shallow depths and flat relief. Geomorphology transformation processes continue in the shallow water part of

the Laptev Sea shelf at present. The destruction of the islands, which are mainly formed by frozen subsoil, results from thermoabrasion. The same processes caused the disappearance of the Vasilyevskiy, Mercurius, and St. Diomedé islands and turned Semyonovskiy Island into a sand drift.

## Laptev Sea: History of Exploration

Laptev Sea: History of Exploration – in the early seventeenth century, unknown Russian seamen sailed from the west, rounded Cape Chelyuskin, and arrived at the eastern shores of the Taymyr Peninsula. I. Rebrov was one of the pioneers in the history of exploration of the Laptev Sea. In 1633, he went down the Lena River and sailed by sea to the embouchure of the Yana River. Within the ensuing several years, Cossacks surveyed all the coastline of the Laptev Sea east of Khatanga. Participants of the Great Northern Expedition (V.V. Pronchishchev, Khariton and Dmitry Laptev, S.I. Chelyuskin) drew first maps of the Laptev Sea coasts. In 1760–1761, merchants I. Bakhov and N. Shalaurov researched the shores of the Laptev Sea east of the mouth of the Lena River. In 1808–1811, an expedition led by M. M. Gedenschtrom together with Yakov Sannikov was the first to chart the New Siberian Islands and the Lyakhovskiy Islands and the Siberian coast from the Lena River to Chaunskaya Bay. In 1820–1824, an expedition under P. F. Anjou compiled a detailed chart of the New Siberian Islands and the mainland shore between the Olenyok and the Indigirka rivers. In 1878, an expedition by A. Nordenskiöld on vessels “Vega” and “Lena” passed to the Laptev Sea. In 1900–1902, a Russian expedition under E. V. Toll conducted its studies in the Laptev Sea. The Russian hydrographic expedition on ships “Taymyr” and “Vaygach” in 1912–1914 made the first marine chart and sailing directions for the Laptev Sea, discovered the Emperor Nicholas II Land (Russian: Zemlya Imperatora Nikolaya II), later called Severnaya Zemlya. A precise coast survey, soundings, and hydrologic exploration of the Laptev Sea were made in Soviet



times though. It is remarkable that the Laptev Sea was being researched and developed at the same time. Alongside with regular sailing routing, there were extensive observations at hydrometeorological stations as well as an integrated study of the Laptev Sea and adjoining areas.

In 1921, N. I. Evgenov accomplished his two-year hydrographic reconnaissance of the Lena River Delta and proposed a project for coastal traffic management between the rivers Lena and Kolyma and Yakutia resupply from Vladivostok by sea.

The Laptev Sea saw expeditions on the schooner "Polyarnaya Zvezda" (in 1927), "A. Sibiryakov" (1932), "Chelyuskin" (1933), and on the icebreaker "Fyodor Litke" (1934). A lot of missions were undertaken later by the Hydrographic Service of the Arctic Institute. Regular freight voyages started in 1933 when the steamers "Tovarishch Stalin" and "Volodarskiy" set from the west arrived in Tiksi Bay and the steamer "Pravda" in Nordvik. In 1937–1938, a third high-latitude expedition on the "Sadko" took place and carried out investigations mainly in the Laptev Sea, in the East Siberian Sea, at the New Siberian Shoal, and on the continental slope of the Polar Basin north of the New Siberian Islands.

The Laptev Sea is a part of the Northern Sea Route that determines its economic value.

After the Great Patriotic War (1941–1945), research covered the system of ice openings and front boundaries in the Laptev Sea as indicators of the state and climatic environmental variability of the Siberian Shelf seas. In the research area, it was discovered that the waters of the Atlantic Ocean coming from the northern regions of the Laptev Sea make the bottom layer heavier.

In 1948, the icebreaker "Fyodor Litke" mission performed a hydrological section in the Laptev Sea and studied the formation of the Taymyr ice Massif. Materials obtained by this expedition are still employed in ice and meteorological forecasts.

In 1960–1980, due to the transition of the fieldwork to drifting ice stations, the activity of research vessels in the Arctic region stopped.

At the end of the 1980s, the situation changed after a new generation of research ships of the icebreaking and reinforced class was introduced.

Comprehensive exploration of the Laptev Sea started in mid-1990s within the scope of cooperation between Russia and Germany. In 1993, the joint Russian–German expedition "Arctic-93" was launched. As its part, the expedition "Transdrift 1" carried out investigations in the ice packs of the northern area of the Laptev Sea and in the east of Nansen Basin. In 1994, the seminar "Russia–Germany Cooperation in the Laptev Sea and Around it" in Saint Petersburg drew the conclusions of that enterprise. The following projects were accomplished: "Laptev Sea System" (1994–1997), "Taymyr" (1994–1997), "The Laptev Sea-2000" (1998–2001), and "Lena-2002" (2002). The activities were done by the Arctic and Antarctic Research Institute (Saint Petersburg), Institute for Permafrost Studies (Yakutsk), Murmansk Marine Biological Institute, Alfred Wegener Institute for Polar and Marine Research (Bremerhaven, Germany), and Institute for Polar Ecology (University of Kiel, Germany).

The German icebreaker "Polarstern" and the Russian expedition vessels "Ivan Kireev," "Professor Multanovskiy," "Kapitan Dranitsyn," and "Boris Petrov" were the platforms for joint studies.

Over the period of 1993–1998, ten expeditions were held primarily in the Laptev Sea with approximately 150 stations being set up. The main goal of the expeditions was to examine the marine fauna diversity. It was established that the composition of species and distributive features of macrobenthos on the Laptev Sea shelf are determined mainly by the summer river water discharge and associated with salinity change that is typical of this aquatic area.

A biogeographic analysis of the Laptev Sea fauna showed that Boreal-Arctic species dominate the whole sea area, with North Atlantic species substantially prevailing.

Three missions on the "Polarstern" in 1993, 1995, and 1998 to the north of the Laptev Sea were of prime importance because hydrobiological stations were settled in these regions almost



half century after the “Sadko” expedition (1937–1938) in the area of perennial ice cover. Sea fauna distribution in upper bathyal was proved to be zonal that can be ascribed to rich sedimentary organic matter and warm waters of the Atlantic Ocean.

In August–September, 2002, the Russian–American expedition “AVLAP-2002” onboard the icebreaker “Kapitan Dranitsyn” took place. The mission aimed to investigate the Laptev Seabed shelf and natural sea system condition, interaction of its major constituents, and its impact on the climatic change formation in the northern polar regions. For that purpose, submerged buoy station was set for 1 year to measure temperature, conductivity, pressure, and three components of current velocity near the bottom layer, about 60 m thick. For the sake of scientific integrity of investigations, standard oceanographic observations were made using temperature and conductivity gauges to probe the water, as well as extensive meteorological observations and visual monitoring of the ice cover state. Survey area encompassed the continental slope of the northern part of the Laptev Sea. US counterparts were represented by the University of Alaska staff (IARC).

In 2007–2009, the comprehensive expedition “BARKALAV-2007–2009” operated in the Barents, Kara, Laptev, and East Siberian seas as part of national science and technology dedicated subprogram “Marine Research in the Arctic, the Seas of Russia, Continental Shelf, and in the World Ocean. Models and Technologies for Sea Forecasts and Calculations” and the science program for Russia’s participation in the International Polar Year 2007–2008. Expedition studies intended to obtain new integrated data about the current state of sea areas, seasonal cycles of environmental attributes in order to understand climatic variability of ice, hydrological and hydrochemical regimes of the Arctic seas, and biological conditions and deposition of sediments on the seabed. New complex data were acquired about the existing areas of seas. AARI and scientists from Germany (GEOMAR Institute) took part in the mission.

In 2010, the expedition “LapEx-2010” went on the survey vessel “Nikolay Evgenov” and carried out 45 stations, picked up two submerged buoy stations (SBS), and set five buoy SBSs.

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## Laptev Sea, the Names of

Laptev Sea, the Names of – before the beginning of the twentieth century, the sea had several names. On the maps of the seventeenth century, it was called Tatar and Lena seas; on the maps of the eighteenth century and, in part, nineteenth centuries, Siberian and Arctic Seas (in association with other seas of the Arctic Ocean); on the maps of the late nineteenth century – the beginning of the twentieth century – the Nordenskiöld Sea. In the early twentieth century, on Russian maps, it had no name. In 1913, the Russian Geographic Society by the initiative of the well-known geographer and oceanographer Prof. Yu. M. Shokalskiy was named the Laptev Sea in memory of the two cousins, members of the Great Northern Expedition, lieutenants Dmitry Yakovlevich Laptev and Khariton Prokofievich Laptev. Finally, the name was approved by the resolution of the Central Executive Committee of the USSR in 1935.

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## Laptev Walrus (*Odobenus rosmarus laptevi*)

Laptev Walrus (*Odobenus rosmarus laptevi*) – one of the three independent subspecies of walruses of the pinnipeds genus (*Pinnipedia*). The area of habitation is the Laptev and East Siberian Seas. Coastal pastures are located on the islands of Peschanyi, East Taymyr, in the Lena Delta, and on the New Siberian Islands. The population of L.W. in the Laptev Sea is approx. 2,300 animals. This subspecies is listed in the *Red Data Book of the Russian Federation*. Its independence as a subspecies is questioned by many researchers.

Laptev Walrus (Source:  
<https://en.wikipedia.org/wiki/Walrus>)



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### Laptev, Dmitry Yakovlevich (1701–1771)

Laptev, Dmitry Yakovlevich (1701–1771) – a Russian Arctic explorer, vice admiral, and member of the Great Northern Expedition. In 1715 he entered the Naval Academy, graduating in 1721 with the rank of subofficer, and began his service in the Baltic Fleet. In 1726 with the rank of noncommissioned lieutenant, L. commanded the snow “Favorite” and in 1727 the frigate “St. Jacob.” In 1733 in the rank of lieutenant, L. was enlisted in the Second Kamchatka (Great Northern) Expedition, and in October 1734, he arrived in Yakutsk. He was engaged into the cargo delivery on ships in the Lena River Basin to the Yudomski Krest tract. In 1736, after the death of P. Lassenius, he was appointed a chief of the squad operating from the east of the river of Lena to Kamchatka. In November 1739, L. was promoted to the captain colonel rank. In 1739–1741 (with two winterings), he described the ocean shore from the mouth of the Lena River to the Cape Bolshoy Baranov. The coastal parties surveyed basins of the rivers of Indigirka, Yana, Khroma, Alazeya, and Kolyma. In 1741–1742, he went on a journey from the Nizhnekolymsk fortress to the Anadyr fortress and surveyed and described the basin of the Anadyr River. In the winter of 1741/1742, he also described the way from the Anadyr fortress to the river of Penzhina

and further to its mouth. L. drafted the first map of Chukotka based on the materials of the instrumental survey, which linked the Arctic and Pacific oceans. Upon returning to St. Petersburg in December 1743, he continued to serve in the Baltic Fleet. He was an advisor at shipyards and then commanded the ships “St. John Chrysostom” and “St. Nicholas.” In 1757 he was promoted to rear admiral rank, and in the beginning of the summer campaign, he commanded the squadron of Kronstadt. In 1762 he retired with the rank of vice admiral.

L. mapped all his sea voyages from the mouth of rivers of Lena and Kolyma in the “Map of the Northern Coast of Siberia from the mouth of the Lena River to the mouth of the Indigirka in 1736” and the “Accurate Map” described in 1739–1740 by his boat team (from the mouth of the Indigirka to the mouth of the Kolyma). The members of the expedition conducted the first survey of the Arctic coast from Taymyr to Chukotka. For the first time, the bays of Khatanga and Olenyok, Buor-Khaya Bay, and estuaries of the major rivers of Anadyr, Olenyok, Lena, Yana, Indigirka, and Kolyma were mapped reasonably well, and multiple geographic objects were discovered.

A cape in the estuary of the Kolyma, the Laptev Sea (named after D. Ya. Laptev and Kh. P. Laptev), and a strait between the Big Lyakhovskiy Island and Svyatoy Nos (Saint Nose) Cape are named after D. Laptev.

### Laptev, Khariton Prokofievich (1700–1763)

Laptev, Khariton Prokofievich (1700–1763) – a Russian Arctic explorer, captain, and participant of the Great Northern Expedition. He was a cousin of D. Ya. Laptev. In 1715, he entered the Naval Academy and after 3 years became a midshipman; in 1726, L. was promoted to the rank of subofficer. Until 1737 he sailed on ships of the Baltic Fleet. In December 1737, L. was promoted to the rank of lieutenant and appointed commander of the dubel boat “Yakutsk” during the Great Northern Expedition to survey the coast of the Arctic Ocean from the river of Lena to the river of Yenisei. In May 1739 he arrived in Yakutsk. He sailed down the Lena on the dubel boat and, following westward along the coast, discovered and described the bay and island of Preobrazheniya (Transfiguration). Then he reached the Cape Faddey but because of the ice turned back and spent the winter in the lower reaches of the river of Khatanga. In the summer of 1740, he sailed to 75°26'N but was trapped by ice. Having left the ship and unloaded all stocks on ice, he went ashore with the team and returned to their previous wintering camp. In November, the detachment was divided into three parties and began surveying Taymyr on land, crossed the peninsula on dogs to the point of the inflow of the Lower Taymyr to the Taymyr Bay, and after turning reached the Cape Sterlegov.

On June 1, 1741, L. met with the party of Semyon Chelyuskin near the Cape Lehmann. In the late August, he arrived on boats in Turukhansk. On the way he made a route survey of the bank of the Yenisei. On December 5, he sent Semyon Chelyuskin to finish surveys of the north-eastern coastal area of Taymyr between Cape Faddey and the mouth of the Lower Taymyr River. On July 20, 1742, all works were completed. Laptev's team performed the first cartographic survey of the coast between the rivers of Lena and Yenisei in the history. During the winter of 1742–1743, the researcher prepared two maps and a detailed description of the work and left for St. Petersburg. In October 1743, the Admiralty Board heard his report “Description made by

Navy Lieutenant Khariton Laptev during the Kamchatka Expedition between the Lena and Yenisei Rivers of the Condition of the Rivers as well as of all the Entrepreneurs living there.” In 1746–1758, when commanding various ships, he sailed the Baltic, North, Barents, and White seas. In 1746, he participated in the drafting of the “General Map of the Russian Empire.”

In 1752, he was assistant director of the Naval Gentry Cadet Corps. During the Seven Years' War, Captain 2nd Rank Laptev led the warship “Uriel” and participated in the naval blockade of the Prussian coast. In 1758 he was made captain 1st rank. From 1762 he served as Oberster Kriegskommissar (head of supplies) of the fleet.

His name was given to a cape in the Gulf of Taymyr and the Laptev Sea (named after D.Ya. Laptev and Kh. P. Laptev), a coast between the rivers of Pyasina and Taymyr. On August 15, 1980, a monument to Kh. P. Laptev, S. I. Chelyuskin, and their comrades was erected on the bank of the Khatanga River, near the place of the winter camp of the dubel boat “Yakutsk.”

Laptev's major work is the “Description made by Navy Lieutenant Khariton Laptev during the Kamchatka Expedition between the Lena and Yenisei Rivers of the Condition of the Rivers as well as of all the Entrepreneurs living there” (1851, 1982).

### Largha Seal or Spotted Seal (*Phoca largha*)

Largha Seal or Spotted Seal (*Phoca largha*) – a marine mammal of the family of seals (Phocidae); a species closely related to the common seal having a similar appearance. It lives in the North Pacific from Alaska to Japan and the Far East coast of Russia. Its coloring is bright gray studded with brown spots that gave it its name. Males reach a length of 1.7 m and females 1.6 m. The weight is 60–150 kg. The seal reaches sexual maturity at the age of 3–4 years. It stays in coastal areas stay in coastal areas, willingly going ashore. During mating they crawl out of water on the ice, where from February to March they deliver

Largha Seal (Source:  
[https://en.wikipedia.org/wiki/Spotted\\_seal](https://en.wikipedia.org/wiki/Spotted_seal))



calves. The female usually delivers one calf (length of 75–80 cm, weight up to 7 kg). It feeds on fish and small crabs and octopuses. Outside the mating season, they travel for long distances and reach latitudes located far to the south. The population of spotted seals is estimated to be more than 200,000. L.S. is a commercial stock for the local population. Some individuals can reach the eastern part of the Laptev Sea.

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### **Lassinius (Lassenius) Petr (Peter) (About 1700–1735)**

Lassinius (Lassenius) Petr (Peter) (about 1700–1735) – a Navy officer, lieutenant, researcher of the Eastern Arctic, member of the Great Northern Expedition, and explorer of the delta of the Lena and Laptev Seas. He was born in Sweden. In 1725, L. was hired for the Russian military service with the rank of lieutenant. L. was a member of the First Kamchatka Expedition of Vitus Bering. In 1733, L. was promoted to lieutenant of the major rank and appointed as head of the Lena–Kamchatka (East Siberian and east Lena) detachment of the Great Northern (Second Kamchatka) Expedition and commander of the boat “Irkutsk” and sent to study the Arctic Ocean east of the Lena. In July 1735, on the boat “Irkutsk” with a team of 52 people, L. went from Yakutsk down the river. In August, through the

eastern arm of its delta, he reached the sea with the task to move along the coast to the east and pass through the strait into the Pacific Ocean. He was soon stopped by heavy ice and went into the bay of Buor-Khaya, where in the estuary of the Kharaulakh River, he stayed for wintering during which L. and 35 sailors died from scurvy (its first victim was the commander of the detachment). The surviving members of the team in the summer of 1736 were rescued and taken to Yakutsk.

A cape and a peninsula on the Taymyr Peninsula in the Laptev Sea were named after him.

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### **Lavrov, Aleksey Modestovich (1887–1942)**

Lavrov, Aleksey Modestovich (1887–1942) – Russian hydrographer, cartographer, explorer of the Eastern Arctic, and engineer rear admiral. Upon graduating the Marine Corps, L. served in the Baltic. Since 1911 he was on the Siberian flotilla, sailing on the transport ship “Taymyr.” L. was an auditor, a watch officer, and an assistant chief of the Arctic Ocean Hydrographic Expedition, during which Severnaya Zemlya (Northern Land) was discovered. In 1914–1915, during the passage from Vladivostok to Arkhangelsk on the Northern Sea Route, L. wintered in the Taymyr Peninsula.

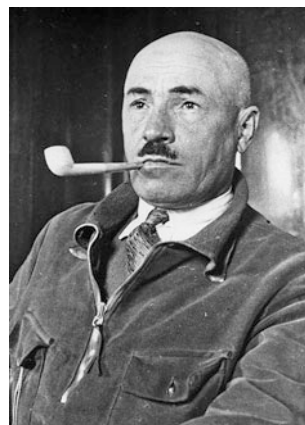


Lavrov A.M. (Source: <http://lexicon.dobrohot.org/images/0/0b/00007221.jpg>)

L. was a participant of the World War I (1916) and Civil War in Russia (1918–1920). Later, he was a member of two expeditions – the Kara Trading Expedition on “G. Sedov” (1926) and the Rescue Expedition on “Malygin” (1928) in the search for U. Nobile. In 1930, L. was one of the organizers of the All-Union Arctic Institute; then he became the secretary of the Polar Commission of the Academy of Sciences and the chairman of the Commission for the Study of the Arctic Ocean. In 1932, L. led the Taymyr scientific expedition on board of “Taymyr.” In 1937, he headed the navigation of two hydrographic ships from Leningrad to Vladivostok on the Northern Sea Route. In the beginning of the Great Patriotic War (1941–1942), L. worked as chief editor of the special Navy department, which issued maps for the Red Army. His name is given to a bay (the coast of the Wilkes Land, Antarctica), a cape, and an island in the Laptev Sea (Severnaya Zemlya); a cape in the Kara Sea; and a strait in the Barents Sea.

### Lavrov, Boris Vasilyevich (1886–1941)

Lavrov, Boris Vasilyevich (1886–1941) – a Soviet economist, one of the builders of the Igarka Port. In 1933–1934, L. headed the First Lena



Lavrov B.V. (Source: [https://ru.wikipedia.org/wiki/%D0%9B%D0%B0%D0%B2%D1%80%D0%BE%D0%B2\\_%D0%91%D0%BE%D1%80%D0%B8%D1%81\\_%D0%92%D0%B0%D1%81%D0%B8%D0%BB%D1%8C%D0%B5%D0%B2%D0%B8%D1%87](https://ru.wikipedia.org/wiki/%D0%9B%D0%B0%D0%B2%D1%80%D0%BE%D0%B2_%D0%91%D0%BE%D1%80%D0%B8%D1%81_%D0%92%D0%B0%D1%81%D0%B8%D0%BB%D1%8C%D0%B5%D0%B2%D0%B8%D1%87))

expedition on three ships, “Pravda,” “Volodarskiy,” and “Stalin” and reached Tiksi Bay from the west. When returning during wintering at Ostrova Samuila, the northeast coast of Taymyr, after the plane crash, together with pilot M. Y. Lindel, he walked up to the polar station on the island of Domashniy, Severnaya Zemlya. Later, L. headed the GUSMP (Northern Sea Route chief directorate) Department for economic and cultural development of the peoples of the North. In 1936 he headed the company Nordvikstroy at Spitzbergen. In 1937, L. made a number of statements, which were inconsistent with the official policy of the GUSMP management, for which he was arrested by the NKVD.

### “Lena”

“Lena” – a support vessel of the Norwegian expedition on “Vega” by A. E. Nordenskiöld and Captain G. Johansen. In 1878, at the mouth of the Lena River, “Lena” broke up with “Vega” and went up the Lena River to Yakutsk. “Lena” was the first steamer reaching Yakutsk from the sea. She was in service at Lena River until the 1930s.



## Lena

Lena (Evenki, *Ölüöne*; Yakut, Ulakhan-Yuryakh – big river) – a river in eastern Siberia, one of the great rivers of Russia and the globe. By water content it is the sixth largest in the world. The length is 4,400 km; the basin area is 2,490,000 km<sup>2</sup>. It flows through the Irkutsk region and the Republic of Sakha (Yakutia). The L. originates from a small lake on the western slope of the Baikal Mountains and runs into the Laptev Sea at 73°N. The L. basin is located in taiga and tundra and a small portion north of 71°N in forest tundra. Permafrost soils are widely spread.

According to the nature of the valley and the riverbed, the Lena is divided into three major areas: the upper, from the source to the inflow to the Vitim; the middle, between the mouths of the Vitim and the Aldan; and the lower, from the inflow to the Aldan to the mouth of the Lena. The upper Lena is rapid mountain river flowing through a deeply incised narrow valley with rocky shores and rock cliffs closing to the water, the so-called cheeks (“Drunken Bull” and others, 237 km below Kirensk). The large right tributary is the Kirenga. On the Shishkin rocks (near the village of Shishkino), there are well-preserved paintings of people and animals, hunting scenes, etc. made by the ancient inhabitants of the basin.

In its middle reaches, the Lena is a deep river, especially after the influx into the Olyokma, with the width of the channel up to 2 km; the valley is up to 30 km. At this section the Lena takes major tributaries: on the right, the Vitim, the Big Patom, the Olyokma, and the Chara, and on the left, the Nyuya. Below the city of Uritsk, almost a 200 km section of the Lena Pillars begins – a wonderful creation of nature. The river here constantly undermines the limestone plateau; the shore breaks steeply, forming a chaotic pile of rocks resembling ruins of castles, minarets, columns, etc.

The lower Lena flows within the Central Yakutia lowland. Its valley extends to 20–25 km with numerous lakes and swamps. Here the Lena meets with its major tributaries – the Aldan (right) and the Viluy (left). Then the valley narrows. On the right bank of the Lena, there are spurs of the

Verkhoyansky Ridge. From the village of Bulun, the river flows between the Kharaulakh Mountains and the Czekanowski Ridge in a narrow valley (up to 2 km). The mouth area of the Lena belongs to the delta type. It includes the largest river delta in Russia and a vast sea coast. 130 km from the mouth, the Lena is divided into numerous arms forming a vast delta of approx. 30,000 km<sup>2</sup> (the second place after the delta of the Mississippi). The largest arms of the delta are the Trofimovskaya arm (delivers to the sea up to 70 % of river water), the Olenyokskaya arm, and, the most important for shipping, the Bykovskaya arm with a length of 106 km (links the L. with the Bay of Tiksi).

By the water content, the Lena takes second place after the Yenisei among Russian rivers. The average annual water flow is 17,000 m<sup>3</sup>/s, the maximum is 200,000 m<sup>3</sup>/s, and the minimum is 366 m<sup>3</sup>/s. The average annual runoff to the Laptev Sea is approx. 540 km<sup>3</sup>. The solid runoff is approx. 12 million tons.

By the nature of the water regime, the Lena refers to the rivers of the East Siberian type and has a stretched snow flood and rain floods. The ice formation in the upper reaches occurs from late October to mid-May and in the lower reaches from late September to early June. The ice cover of the Lena and its tributaries is used as winter roads for motor transport. There is a regular ice crossing near Yakutsk extending the period of land communication between the right and left banks of the river for 1.5–2 months. Spring floods and summer–autumn rain floods (80–90 % of the annual flow fall on a warm part of the year) are very indicative. Ice opening leads to frequent powerful ice blocks with a water level increase of 10–15 m. Ice buildups are very distinctive for the Lena Basin.

Navigation on the Lena existed since 1855. The first steamship, which came from the sea to the mouth of the Lena, was the steamer “Lena,” accompanied by “Vega” of the expedition of N. A. E. Nordenskiöld while sailing through the Northern Sea Route along the coast of Siberia in the 1878–1879. Currently, the Lena remains the main transportation artery of Sakha–Yakutia. In floods, the Lena is navigable from Kachug; regular navigation is from Ust-Kut (Osetrovo). The

major ports and berthing areas are Kachug, Zhigalovo, Ust-Kut, Kirensk, Lensk, Olyokma, Pokrovskiy, Yakutsk, Sangar, Zhigansk, and Bulun. The Kirenga, the Viluy, the Vitim, the Olyokma, and the Aldan are navigable tributaries. Exit from the Lena to the sea is through the port of Tiksi, built in 1934 on the Northern Sea Route.

Rivers of the Lena Basin have large reserves of hydropower (Viluiskaya and Mamakanskaya HPP) and minerals. There are mines of gold (in the Aldan), diamonds (Vilyui Basin), coal, natural gas, iron ore, mica, rock salt, and woods. In the lower reaches of the Lena, there are commercial fishing areas, whitefish, Siberian whitefish, white salmon, perch, trout, and burbot; in the upper reaches, there is a less valuable fish of the commercial importance – grayling, dace, pike, and perch.

The first information about the Lena was obtained by the Russians in the early seventeenth century. In 1623, Mangazeya trafficker P. D. Pyanda going on sled from the Lower Tunguska to the Viluy reached the banks of the Lena. In 1630, Ataman I. A. Galkin founded at the Lena

the Ust-Kut fortress. In 1632, Cossack Captain P. I. Beketov built the Yakutsk fortress. In 1633 (or 1634), Russian explorer and polar navigator I. I. Rebrov went down the Lena to its mouth and from there reached the mouth of the Olenyok by sea. In the first half of the eighteenth century, members of the Great North (Second Kamchatka) Expedition began research of the Lena. In 1735, V. V. Pronchishchev, head of one of the detachments of the expedition, performed the first instrumental survey of the Lena from Yakutsk to the mouth of the Lena. The first scientific description of the geographical Lena Basin was done by naturalist I. G. Gmelin. In the second half of nineteenth century, geological studies of the Lena Basin were carried out by L. Middendorf, P. A. Kropotkin, and V. A. Obruchev. Of great importance in the study in the Lena basins, opportunities of their economic development were the research works of the scientific station on the island of Sagastyr (the northern part of the L. Delta) during the first International Polar Year (1882–1884), when the map of the Lena Delta was



Lena River (Source: <https://ru.wikipedia.org/wiki/%D0%9B%D0%B5%D0%BD%D0%B0>)

drawn up. In 1920–1921, the first hydrographic expedition of F. A. Matisen worked in the delta and lower reaches of the Lena and prepared the atlas of the delta of the Lena with the bay of Tiksi and the atlas of the Lena below the city of Yakutsk. In the 1924–1933, the Yakutsk Expedition of the USSR Academy of Science conducted comprehensive studies of the nature in the Lena Basin.

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### **Lena Delta Wildlife Reserve (or Lena Delta State Nature Reserve)**

Lena Delta Wildlife Reserve (or Lena Delta State Nature Reserve) – wildlife reserve set up in 1985 and located in the delta of the Lena River in the Republic of Sakha-Yakutia, Russia. It has a total land area of 61,000 km<sup>2</sup>, making it the largest protected area in Russia. The wildlife reserve includes the Lena Delta itself, some islands in the Laptev Sea, and lowland areas between the branches of the Lena River as well as some dry tundra areas of the Chekanovskiy Ridge spur. L. is dominated by wetlands and Arctic tundra lands. 40 % of the L. area is taken up by lakes, rivers, and river anabranches. L. is mainly aimed at conserving aquatic and a semiaquatic bird species. The fauna and flora of this natural reserve include 32 species of mammals, 88 species of birds, and 633 species of plants. The ichthyofauna of L. is represented by: Siberian white salmon, muksun, broad whitefish, vendace, sturgeon, peled, and other rare and endangered species of fish.

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### **Lena River Delta**

Lena River Delta – is rather a rare case of a huge alluvial deltaic cone formation (the area is up to 28,500 km<sup>2</sup>). The top of the estuary is a head of the forest left arm – Burluyskaya Protoka. 70 km down the river close to the cliffy cape Krest-Tumsa and Stolb Island, there is a main point of the Lena's division into large arms

(protokas) – Olenyokskaya, Tumatskaya, Trofimovskaya, and Bykovskaya. L.R.D. presents a product of sea gulfs filling up with river drift and a result of advancement estuaries formation by separate river arms. In a current day there are remains of the bedrock relief left (Stolb Island, America-Khaya Mountain), as well as the areas of older seashore lowland. The hydrographic network of the delta includes 6,089 stream flows of the total length of 14,626 km and 58,728 lakes with the total area of 3,196 km<sup>2</sup>; in the delta there are 1,600 islands.

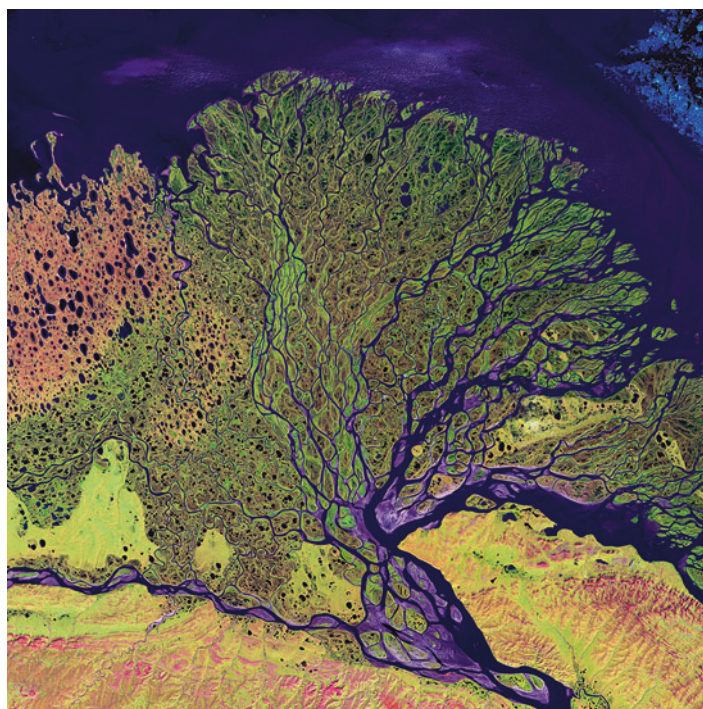
Olenyokskaya Protoka forms a vast stream-flow bar 28 m long in the place of flowing into the Olenyok Gulf. Tumatskaya Protoka flows to the northwest, and a large Arynskaya Protoka extends outward from it. Trofimovskaya Protoka (with a system of arms of itself) is the only natural continuation of the Lena bed. It flows northward. Here there is a resource reserve “Lena Delta.” The territory of the Lena Delta is a part of the State Natural Reserve “Ust-Lenskiy.” In the delta, there are two polar stations: “Khabarovo” close to Stolb Island and “Dunai” on the archipelago of the same name. The water area of the Lena River is a place of spawning and feeding of Siberian white salmon, Arctic cisco, muksun, sterlet sturgeon, and other valuable fish species. Here there are also wintering holes of the sturgeons. In times of the Great Patriotic War (1941–1945), the German soldiers built a secret stronghold with fuel supplies for their submarines in the Lena Delta. In the spring of 1945, a Nazi submarine U-534 reached this place. The documents, found inside the submarine, prove the existence of the stronghold. The Lena Delta is a claimer for entry into the list of UNESCO World Heritage Sites.

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### **“Lena-2002”**

“Lena-2002” – a joint Russian–German scientific expedition to the delta of the Lena and the surrounding bay of Tiksi and the New Siberia Archipelago in 2002. The expedition included 27 scientists. The scientific program was aimed

Lena River Delta: a satellite view (Source: [https://en.wikipedia.org/wiki/Lena\\_River](https://en.wikipedia.org/wiki/Lena_River))



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at studying terrestrial and coastal areas, including permafrost soils and ecosystems, modern periglacial environment, and quaternary environmental changes based on the study of permafrost dynamics of the Arctic coast.

150,000 ha), Tuor-Sis area (the ridge of Tuor-Sis to the river of Ukta in the south, 217,000 ha), and the New Siberian Islands area (3,500,000 ha).

## "Lena Delta"

"Lena Delta" – a resource reserve, created by decree of the government of the Republic of Sakha-Yakutia in 1996 to reduce the anthropogenic pressure on the Ust-Lenskiy Natural Reserve. The area is 5,932 ha. It is a subdivision of the state Ust-Lenskiy Nature Reserve. It consists of two zones – a zone of licensed withdrawal of biological resources (a protected buffer zone) 1,050,000 ha in area and a zone of traditional use of natural resources 4,882,000 ha in area, which includes the Vostochnyi (east) area (the eastern part of the delta of the Lena,

## "Lena-Nordenskiöld"

"Lena-Nordenskiöld" – the International Biological Station, founded in 1995 in the delta of the Lena on the money of the World Wildlife Fund (WWF) for carrying out international scientific research in the public Ust-Lenskiy Nature Reserve. The station is located on the right bank of the Bykovskaya arm of the Lena Delta 70 km from Tiksi. The station building is built of Daurskaya larch in the traditional Siberian style. It has all necessary conditions for life and scientific work. In the vicinity of the station, there are many bird nests; not far from it, there is a migration way of musk oxen herds.



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## Lend-Lease

Lend-Lease – a form of international economic relations, which took place from 1941. It meant the system of renting or leasing military equipment, weapons, ammunition, strategic raw materials, food, and various goods and services from one country to other allied countries. In March 1941, the US Congress passed the Lend-Lease law (Lend-Lease Act), which gave the president the right to assist any country whose defense is recognized vital for the USA. During World War II, the USA, Canada, and the UK were given leases to their allies in the anti-Hitler coalition. For these purposes, the US Congress allocated US\$ 7 billion. The route of vessels carrying lend-lease cargoes ran along the ridge of the Aleutian Islands through the Bering Sea to Petropavlovsk-Kamchatskiy. The vessels entered the Sea of Okhotsk from the ocean through the First Kuril Strait. The main points of acceptance and storage of cargoes from the USA were Vladivostok, Petropavlovsk-Kamchatskiy, Magadan (Nagaev Bay), Nikolayevsk-on-Amur, and others. The average ship journey time was 18–20 days. The US-owned vessels were not involved in carrying lend-lease cargoes across the Pacific. The first voyage across the Pacific with the American cargo for the USSR was made in June 1941. Approaches to Vladivostok and Petropavlovsk-Kamchatskiy during the war were mined, so arriving ships had to go into the military port pilot service points for navigation plans. These points were located in the bays of Akomten (40 km from Petropavlovsk) and Valentina (200 km from Vladivostok).

At the beginning of the operation of the Pacific route, lend-lease goods were transported only by surviving Soviet transport ships, as well as ships transferred to the USSR under the L.L. agreement, which were not new US vessels. In 1942, for the carriage of L.L. goods from the USA, the USSR Navy Commissariat provided 40 vessels. In 1943, the FESCO fleet was replenished under the L.L. agreement by fifty new US Liberty-type bulkers and tankers. Totally, up to 150 vessels were received. The maximum number of vessels

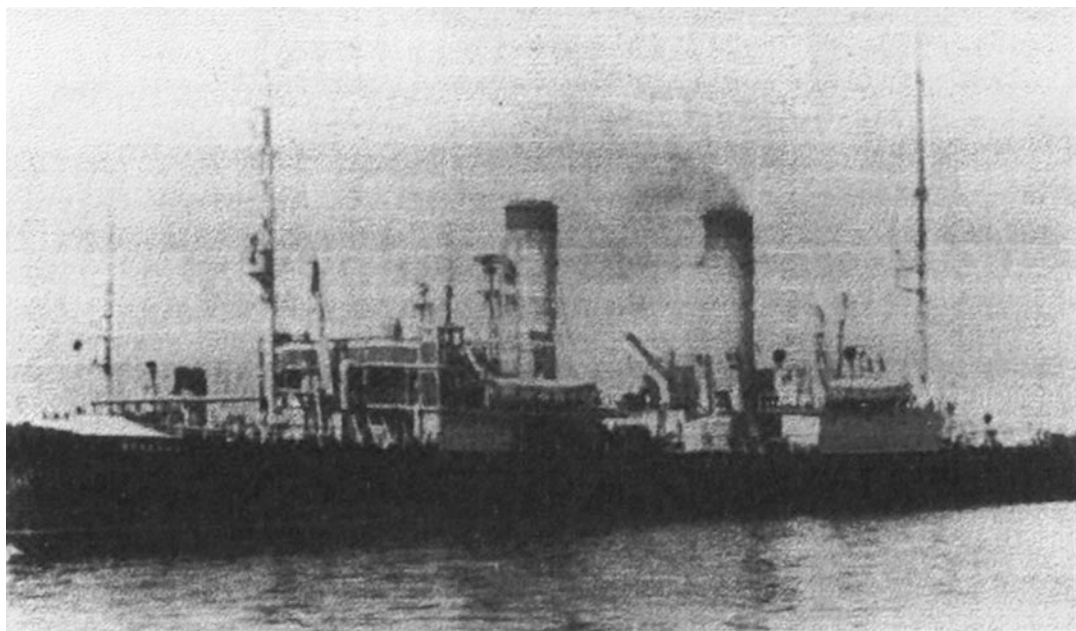
participating in the Pacific L.L. traffic was about 300. There were no convoys. Vessels with L.L. cargoes mainly sailed from ports on the west coast of the USA. In all, 8,244,000 t of L.L. cargoes was transported across the Pacific Ocean from the USA to the Far East ports of the USSR. The Pacific Fleet due to receipt of ships from the Allies for the period of the Great Patriotic War formed two divisions and a separate detachment of patrol boats (26 of the MO-1 type) and five units of torpedo boats (32 boats of the A-1 type).

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## “Lenin”

“Lenin” – icebreaker, ordered by the Russian Empire, was laid down in June 1916 by Armstrong Whitworth at Newcastle upon Tyne (UK) as the “St. Alexander Nevsky”. The ship was launched on 23 December 1916, and completed in June 1917. Following the February Revolution in Russia, the Russian Empire had ceased to exist, and the ship was requisitioned by the Royal Navy and commissioned as HMS “Alexander” in September 1917. She served in the North Russia campaign during the Allied intervention in Civil War in Russia, and was handed over to White Russian Forces when the British withdrew in October 1919. The ship have been taken by the Soviet Power in 1921 and named “Lenin”. In 1937 “Lenin” was trapped in ice of the Laptev Sea with a convoy of five ships and spent an enforced winter. They were rescued by the icebreaker “Krasin” in August 1938. During World War II “Lenin” took part in Russian convoys in the Arctic. In 1942 she was part of a convoy spotted at the Mona Islands in the Kara Sea by a Kriegsmarine “Arado Ar 196” during Operation “Wunderland”. German heavy cruiser “Admiral Scheer” tried to find it, but bad weather, fog, and ice saved “Lenin” from destruction. Icebreaker continued its service till 1957, when the nuclear-powered icebreaker “Lenin” was launched, then it was renamed “Vladimir Ilich Lenin”. The ship was hulked in 1968, and finally scrapped in 1977.





“Lenin” icebreaker (Source: [https://en.wikipedia.org/wiki/Lenin\\_\(nuclear\\_icebreaker\)](https://en.wikipedia.org/wiki/Lenin_(nuclear_icebreaker)))

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## “Lenin”

“Lenin” – a nuclear icebreaker, built in 1957 in Leningrad at the shipyard named after A. Marti to operate on the Northern Sea Route. It was commissioned for fleet operations in 1959. Its length is 134 m, width is 27.6 m, draft is 9.2 m, displacement is 16,000 t, speed is 18 knots, and the crew is 151 people. The nuclear power plant included three nuclear reactors of thermal power of 90 MW each. The thickness of the ice belt in the middle part of the icebreaker was 36 mm, the forebody is 52 mm, and the stern is 44 mm. The sea endurance of the ship was 12 months. The icebreaker was built with the participation of 30 research institutes, 60 design bureaus, and over 250 industrial enterprises. After the completion of sea trials in 1960, the ship came to Murmansk and escorted vessels on the Northern Sea Route. In 1961, the icebreaker delivered a polar explorers and SP-10 equipment to the ice floe at 75°27'N and 177°10'E in the East Siberian Sea. After that, the icebreaker delivered DARMS (automatic weather station) to the northern part of the Laptev Sea. The icebreaker was used for

testing new types of nuclear steam generators. In 1970, at the Zvyozdochka shipyard in Severodvinsk, “Lenin” was repaired and modernized with the replacement of three reactors for two reactors. In 1971, “Lenin” was the first of surface vessels to sail north of Severnaya Zemlya. During its operation the ship covered more than 654,000 miles, of which in the ice more than 550,000 miles. She was decommissioned in 1989 and laid up at Murmansk, where she was converted into a museum. The ship was awarded the Order of Lenin.

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## Leontyeva Island

Leontyeva Island – an island within the Bear Islands, the East Siberian Sea, the Republic of Sakha (Yakutia), Russia, located in the central part of the Medvezhii Islands, 7 km south of Pushkarev Island. It is the second largest after Krestovskiy Island. It has an elongated shape expanding to the north with a length of 13 km and a width of 1 km in the south up to 7 km in the

“Lenin” nuclear icebreaker  
 (Source: [https://en.wikipedia.org/wiki/Lenin\\_\(nuclear\\_icebreaker\)](https://en.wikipedia.org/wiki/Lenin_(nuclear_icebreaker)))



northern part. It consists of two parallel mountain ranges up to 80 m high. Small, sometimes swampy, streams flow from the central highland to the northwest and east coasts. The shores are mostly steep and inaccessible, up to 22 m high. There are a lot of driftwoods on the island; mammoth bones were also frequently found. Flora and fauna include a rare short grass, moss, and lichen, and deers, bears, wolves, foxes, and small rodents coming from the mainland.

The island together with the other islands of the group was discovered in 1710 by Cossack Yakov Permiakov; however, it was mapped only in 1769 by geodesist-ensigns Ivan Leontyev, Ivan Lisov, and Aleksey Pushkarev. In honor of ensign I. Leontyev, the island was named in 1912 by members of the Hydrographic Expedition of the Arctic Ocean on the icebreakers “Taymyr” and “Vaygach.”

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## Lockwood Islands

Lockwood Islands – located on the north coast of Taymyr west of Cape Pronchishchev in the Bay of Maud, Laptev Sea, Taymyr A.O., Russia. They were first discovered in 1742 by S. Chelyuskin named in 1893 by the chief of the Norwegian Polar

Expedition of 1893–1896 on the ship “Fram” F. Nansen in memory of one of the members of the American Polar Expedition of 1881–1884 (headed by A. Grili) Lieutenant James Lockwood (1852–1884), who reached then a record-breaking 83°24'N during his sled rides to the North Pole in April 1884. On modern maps they are shown as East Lockwood and West Lockwood islands by their position in the group of islands.

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## Loman, Konstantin Vladimirovich (1880–1917)

Loman, Konstantin Vladimirovich (1880–1917) – a Russian colonel and explorer of the Arctic Ocean and the Finnish archipelago. He graduated from the First Cadet of Corps in St. Petersburg and in 1898 was enrolled as a cadet in the Naval Cadet Corps. After 3 years, he was promoted to the rank of subofficer and appointed to the cruiser second rank “Dzigit” and sailed on it to the Pacific Ocean. As a crew member of this ship and of the battleship “Poltava,” L. participated in the naval and land battles for the defense of Port Arthur. He was three times wounded and shell shocked. He was in captivity in Japan. L. returned to Russia, and from 1906 to 1908, he sailed on the destroyer

“Tsesarevich.” In 1909 he received the mine officer training and was enrolled as mine officer second class. In 1910, with the rank of lieutenant (1905), L. was transferred to the Siberian flotilla and appointed commander of the icebreaker “Taymyr.” In three months he was transferred to the icebreaker “Vaygach” and simultaneously appointed assistant chief of the Arctic Ocean Hydrographic Expedition. In 1911, L. was promoted to lieutenant and participated in the survey and measurements of the Chukchi and East Siberian Seas from Cape Dezhnev to the mouth of the Kolyma, a hydrological section from Cape Billings to Wrangel Island, and survey of the coast south of Cape Dezhnev to Cape Litke. In 1912, he participated in the survey of the sea coast from the Kolyma to the Lena, the Medvezhii and Lyakhovskiy islands, a hydrological section of the coast of Kamchatka to Bering Island, and other surveys. Upon returning to Vladivostok, L. was sent to the hydrologic department. In May 1913, he was enlisted in the Kronstadt garrison with the title of hydrographer, recertified as captain of the Kronstadt garrison, and appointed a member of the commission on the study of the Finnish archipelago. Simultaneously, he was acting chief of a hydrographic party of the Finnish archipelago. In 1915, L. was promoted to lieutenant colonel and then to colonel. In 1917 he was appointed commander of a battalion of artillery in the Primorskiy Front near the Moonsund fortified position (Cape Sorve). L. was killed in the explosion of powder magazines.

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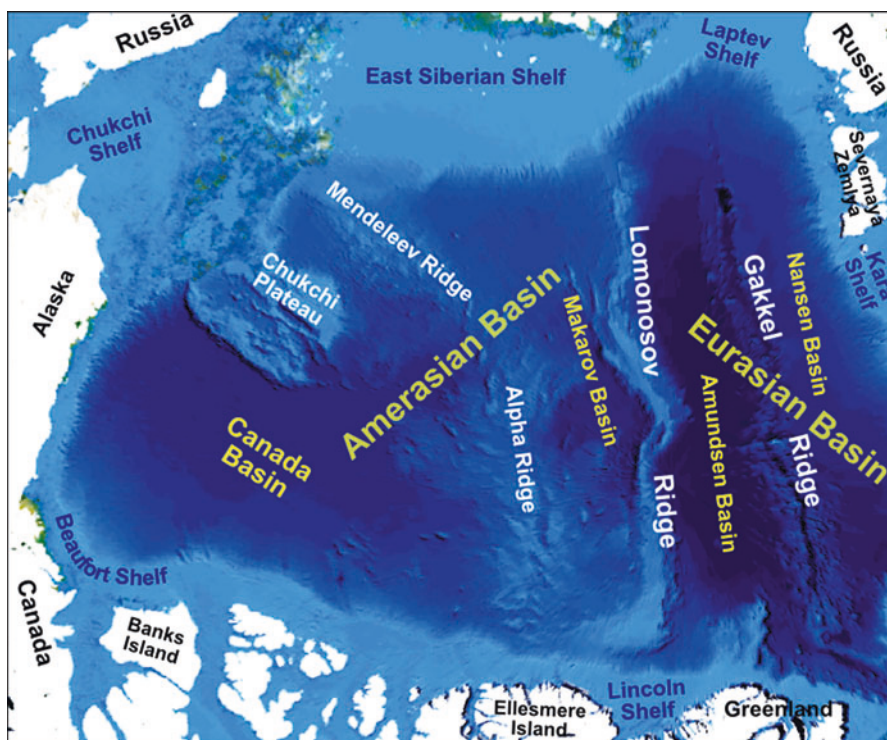
## Lomonosov Ridge

Lomonosov Ridge – an underwater ridge in the Arctic Ocean. It separates the bottom into two parts, distinct from one another: Atlantic in the west (Eurasian subbasin) and Pacific in the east (Amerasian subbasin). This ridge is a large underwater blocky and block-folded structure rising from the ocean floor for more than 2,000 m. It stretches for approximately 1,800 km from the New Siberian Islands through the central part of the ocean to the Ellesmere Island in the Canadian

Arctic Archipelago. The ridge is 950–1,650 m deep, is 60–200 km wide, and has a rounded crest; it rises above the surrounding areas of the ocean floor for around 3,000–3,700 m. The minimum depth over the individual peaks is above 900 m. The crest of the ridge is 26 km wide; it is mainly flat, indicating that it was truncated to a depth of 1,400 m below sea level. The slopes are relatively steep, dissected with canyons, and covered with deposits of silt and sandy silt.

The ridge was discovered in 1948 by Soviet high-latitude expeditions, which became one of the largest geographical discoveries of the twentieth century. It was named after M.V. Lomonosov.

In the 2000s, the geological structure of the ridge attracted the international attention due to a claim submitted by Russia to the UN Commission on the Limits of the Continental Shelf. In this document the Russian side argued a proposal to establish new outer limits for the Russian continental shelf, beyond the previous 200-nautical-mile zone (but within the Russian Arctic sector). One of the arguments was the statement that the underwater Lomonosov Ridge and Mendeleyev Ridge are extensions of the Eurasian continent. In 2002 the UN Commission neither rejected nor accepted the Russian proposal, recommending additional research. In 2007 the Russian expedition worked in the aquatorium of the ridge to specify the limits of the continental shelf. A set of studies was conducted that year, including deep seismic studies, above-ice gravity measurements, airborne geophysical survey, acoustic measurements, telephotometry shooting, and bottom sampling. The preliminary results of an analysis of the earth crust model examined by “The Arctic-2007” Expedition gave the Ministry of Natural Resources of Russian Federation reasons to believe that the structure of this ridge corresponds to the world analogs of the continental crust, and it is therefore part of the Russian Federation’s adjacent continental shelf. Since 2004 Denmark also intensified its research of the bottom of the Arctic Ocean and the northern part of the Atlantic Ocean. One of the goals is to prove that the L.R. is an extension of Greenland. In December 2013 Canada also submitted a claim to the UN Commission to extend the continental shelf.



Lomonosov Ridge (Source: [https://en.wikipedia.org/wiki/Lomonosov\\_Ridge](https://en.wikipedia.org/wiki/Lomonosov_Ridge))

## Lyakhov, Ivan (?–About 1800)

Lyakhov, Ivan (?–about 1800) – a Russian merchant and hunter and researcher of the New Siberian Islands. L. explored the fishing and hunting areas of the Laptev Sea coast from the mouth the Lena to the mouth of the Indigirka. In the spring of 1770, L. with a group of hunters traveled on sled across the frozen Laptev Sea to the north of Cape St. Nose, visiting the island of Blizhniy (Eterikan), discovered by M. Vagin and Ya. Permyakov, and discovered a new island. Both islands were subsequently named after L. – Lyakhovskiy Islands by a decree of Catherine II. In the summer of 1733, L. explored the islands and discovered an island off the Anjou group of islands, named Kotelnyi (the largest of the New Siberian Islands). L. drew the plan of the coastline, made the first description of the Lyakhovskiy Islands, and organized a hunting enterprise there. L. described

the results of his travels in supplements mailed to the St. Petersburg Admiralty.

## Lyakhovskiy Islands

Lyakhovskiy Islands – a southern group in the archipelago of the New Siberian Islands dividing the Laptev and East Siberian seas. They consist of the Great Lyakhovskiy (area of approx. 4,600 km<sup>2</sup>), Small Lyakhovskiy (area of 1,325 km<sup>2</sup>), and Stolbovoy (area of approx. 170 km<sup>2</sup>) islands. The total area is 6,600 km<sup>2</sup>. From the Asian continent, the islands are separated by the Dmitriy Laptev Strait. Most of the islands are composed of surface sand and clay deposits covering fossil ice. The islands are covered with tundra vegetation. Polar foxes are commercially exploited species. The islands were discovered in 1712 by Cossack Mercuriy Vagin. L.I. were named

by the decree of Catherine II in honor of the Yakut merchant and industrialist I. Lyakhov, who had visited the islands for the first time for fishing and hunting purposes in 1770.

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## Lysova Island

Lysova Island – an island within the Medvezhii Islands in the East Siberian Sea, the Republic of Sakha (Yakutia), Russia. The island is located in

the central part of the group 3.3 km south of Leontyeva Island. It is elongated from north to south with a length 2.8 km and a width of 1.2 km. It is quite high, up to 17 m steep shores. The maximum height of the island is 35 m. In the northern part, there are two small marshy lakes.

The island is named in 1912 by the participants of the Arctic Ocean Hydrographic Expedition on the icebreakers “Taymyr” and “Vaygach” in honor of Ivan Lysov, one of the three geodesist-ensigns who drew up the first map of the Medvezhii Islands in 1769.



## Makar

Makar – an island in the Laptev Sea in the delta of the Yana. It is located 30 km from the mainland coast and 21 km from the nearest of Shelonsky Islands. Administratively, it belongs to Yakutia. The island is approximately 3.5 km in diameter. The north coast consists of argillaceous steep rocks. The height of the island above sea level is approximately 12 m. The island is a good reference point when approaching the bays of Shelyakhskaya and Vankina.

## Malmgren, Finn (1895–1928)

Malmgren, Finn (1895–1928) – a Swedish geophysicist and Arctic explorer. He graduated from the University of Uppsala in 1917 and began working at a meteorological observatory. In 1920, he joined the Hydrographic Institute in Bourne. In the 1922–1925, he participated in the Arctic expedition of R. Amundsen on the ship “Maud,” which drifted in 1923–1924 in the East Siberian Sea. In 1926, he was a member of the trans-Arctic flight of the airship “Norge.” In 1928, he took part in the Arctic expedition of U. Nobile on board of the airship “Italia.” Malmgren was tragically killed in the crash of the airship. Malmgren initiated research of physical and chemical properties of sea ice and set their dependence on the salinity of the ice itself and on its

temperature. As noted by V.Yu. Vize, “observations of the behavior of the polar ice, conducted and processed by Malmgren himself, put the young scientist in the row with the most prominent glaciologists.”

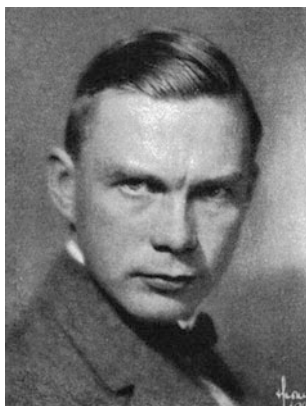
Malmgren is the author of *On the Properties of Sea Ice*, Leningrad, 1930.

## Malyi Chaunskiy Strait

Malyi Chaunskiy Strait (former Sabadeisky) – located on the west side of Ayon Island, separating it from the Asian continent in the east of the East Siberian Sea, Chukotka, Russia. This is a shallow water area with extensive silty tidal coastlines and sandspits. In the northern part of the strait, marine brown algae (*Laminaria* sp.) are met in storm drains. A part of the peninsula adjacent to the strait is covered with a patterned lace of thermokarst lakes and brackish marshes in halophytic interlacustrine areas.

## Malyi (Small) Lyakhovskiy

Malyi (Small) Lyakhovskiy – the island is part of the Lyakhovskiy Islands of the southern group of islands in the archipelago of New Siberian Islands, located to the north of Bolshoy (big) Lyakhovskiy Island. They are separated by



Malmgren Finn (Source: [https://en.wikipedia.org/wiki/Finn\\_Malmgren](https://en.wikipedia.org/wiki/Finn_Malmgren))

Eterikan Strait about 14 km wide. The length of the island is about 42 km, the width is 28 km, and the total area is 1,325 km<sup>2</sup>. To the north of it, there is Kotelny Island, separated from Malyi Lyakhovskiy by Sannikov Strait 55 km wide. To the west, at 118 km, there is Stolbovoy Island. The surface of the island is flat; there are Tinkir-Kyuel lakes on it and about ten rivers. The island is formed by a volcanic eruption. In 2012, a mammoth with unfrozen blood was found there. The island was first observed in 1712 by Cossack M. Vagin. It was named after the Russian explorer, merchant, and industrialist from Yakutsk, Ivan Lyakhov, who discovered the islands in 1770, and for its small size named Malyi (small). At the end of the eighteenth century, by decree of Catherine II, the island on which I. Lyakhov hunted foxes and searched for mammoth ivory was given the name of Lyakhovskiy.

## Malyi Taymyr

Malyi Taymyr – an island in the southeastern part of the Severnaya Zemlya archipelago, the Laptev Sea, in the Taymyr (Dolgan-Nenets) Autonomous District. It is located to the northeast of Cape Chelyuskin, Russia. Its length is 30 km and width is 10 km. The total area is approximately 100 km<sup>2</sup>. The height is up to 31 m. It is built of

fluvioglacial and marine sediments (sand, loam). The vegetation is Arctic moss-lichen tundra. Polar station operated from 1943 to 1994. It was discovered in 1913 by the hydrographic expedition of the Arctic Ocean under the command of Captain 2nd rank B.A. Vilkitsky. In 1914, by decree of Emperor Nicholas II, the island was named the Island of Tsarevich Alexei. In 1926, the island was renamed as Malyi Taymyr by a decree of the USSR.

## “Malygin”

“Malygin” – an icebreaking steamer, former Canadian icebreaker “Bruce,” purchased by Russia in 1915 on Newfoundland from the Hudson Bay Company and then renamed as “Solovey Budimirovich” in honor of the epic hero. The steamer was built in England in 1912. The length is 79.8 m, the width is 14.2 m, and the displacement is 3,200 tons. The mechanism power is 3,000 hp; the speed is 12 knots. In 1917, it was part of the fleet of the Arctic Ocean. It worked in the north. In 1920, the ship was included in the White Sea Flotilla. In January 1920, it came out with passengers from Arkhangelsk to Indiga along the Pechora Sea coast and was trapped by ice, carried out to the Kara Sea, and drifted northward. On June 19, 1920, at latitude 72°36'N, it was met by the icebreakers “Svyatogor” and “Canada” (later “Fyodor Litke”). One hundred fifty people of the crew and passengers were rescued on the steamer. In 1921, the icebreaker was renamed as “Malygin” in honor of the Russian polar explorer Captain-Commander S.G. Malygin.

In 1921, “Malygin” participated in the Plavmornin expedition, in 1928 took part in the rescue of the expedition of U. Nobile, and in 1931 participated in a scientific expedition to Franz Josef Land, finding out that the archipelago of Alfred Garisworth shown on maps did not really exist. On Hooker Island, “Malygin” met with the airship “Graf Zeppelin.” “Malygin” twice sailed to the Franz Josef Land and reached 82°28'N (north of Rudolph Island), setting a world record of free navigation in ice. In 1932, the expedition



“Malygin” (1912) (Source: [https://ru.wikipedia.org/wiki/%D0%9C%D0%B0%D0%BB%D1%8B%D0%B3%D0%B8%D0%BD\\_\(%D0%BB%D0%B5%D0%B4%D0%BE%D0%BA%D0%BE%D0%BB\)](https://ru.wikipedia.org/wiki/%D0%9C%D0%B0%D0%BB%D1%8B%D0%B3%D0%B8%D0%BD_(%D0%BB%D0%B5%D0%B4%D0%BE%D0%BA%D0%BE%D0%BB)))

of “Malygin” founded the world’s northernmost polar station of Rudolph Island within the Second International Polar Year activities. At the end of 1932, “Malygin” took the ground near Spitsbergen and was rescued by the crews of the icebreaker “Lenin” and a rescue tugboat “Ruslan.” In October 1937, it was trapped by a drifting ice in the Laptev Sea, from which it got free in late August 1938 with the help of the icebreaker “Ermak.” In 1940, during a hurricane off the coast of Kamchatka, “Malygin” went missing with all the crew and members of the hydrographic expedition, 98 people in all. “Malygin” made a significant contribution to the development of the Arctic and the Northern Sea Route. It was one of the first ships which opened the era of Arctic tourism in 1931.

### “Malygin the Icebreaker”

“Malygin the Icebreaker” – a nickname given by wisecrackers to a postage stamp used to pay the letters carried by the airship “Graf Zeppelin” on the icebreaker “Malygin” during their polar voyage in late July 1931. This playful nickname was due to the fact that the stamp depicts “Malygin,” “Zeppelin,” and a polar bear.

### Malyi Begichev

Malyi Begichev – the island is part of the Begichev Islands 9 km from the western end of the Oleniy Peninsula, Bolshoy Begichev Island, and the Republic of Sakha-Yakutia. It is located in the Khatanga Gulf, west of Bolshoy Begichev Island. They are separated by the Pioneer Strait about 9 km wide. The island is 5.2 km long and 4 km wide; the total area is 15 km<sup>2</sup>. Northeast of the island is the Northern Strait, which separates the island from the Laptev Sea. The distance from the southernmost point of Malyi Begichev to the mainland (Uryung-Tumus Peninsula) is 25 km. In the eastern part, there is a spit. The surface is covered with a number of small lakes. The island is round in shape with a coastline of approximately 17 km. Its southeastern part is lowland, and the rest is a steep coast 10–15 m high. The island, apparently, was discovered in 1739 by the head of the Lena-Khatanga detachment of the Great Northern Expedition of 1733–1743, Lieutenant K.P. Laptev, and named as St. Nicholas Island. Then it was repeatedly “discovered” and first described in May 1908 by the Russian sailor and Yeniseisk industrialist N.A. Begichev and named Nikolay Island in honor of his companion, industrialist N. Semenov. In 1933, an expedition by Glavsevmorput on the schooner “Pioneer”

under the leadership of S.D. Lappo renamed the island in honor of its discoverer N.A. Begichev.

### **Mammoth (*Mammuthus primigenius*)**

Mammoth (*Mammuthus primigenius*) – an extinct species of elephants. The mammoth was covered with dense long reddish-brown hair. It was up to 3.5 m in height. The body weight is up to 6 t. The average weight of a pair of tusks is 120 kg. It has been known since the second half of the Pleistocene. It was found in Europe, Siberia, and north-western North America. The species was especially widely spread in the warm postglacial period (40,000–45,000 years ago). It was extinct from the late Pleistocene to early Holocene (9,000–13,000 years ago) due to changes in climate and landscape conditions, especially due to the increase of the thickness of the snow cover, which hampered foraging in winter. In Europe, the disappearance of the mammoth was significantly contributed by its extermination by humans. The mammoth was a hunting object for prehistoric people, as evidenced by rock paintings. The humans used the meat, skins, and parts of the skeleton. People fabricated different tools and art products from its tusks. The mammoth reached sexual maturity at the age of 10–15; the life

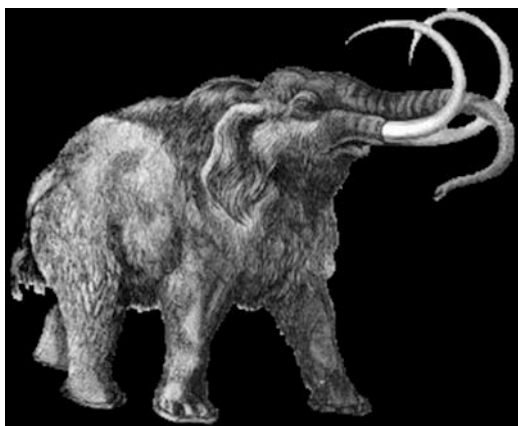
expectancy was 60–70. Skeletal remains of the mammoth, particularly tusks, are often found in the north of Siberia and Alaska. In the eighteenth century, in northern Yakutia, mainly on the New Siberian Islands, a whole industry was originated to collect mammoth tusks from a melted soil (up to 25 t in some years). Stuffed mammoth is exhibited in the Zoological Museum in St. Petersburg and in Moscow Darwin Museum.

### **Mammoth Shore**

Mammoth shore – the name of the western shore of the East Siberian Sea named so due to an abundance of tusks, skeletons, and sometimes mammoth carcasses found there.

### **Maria Pronchishcheva Bay**

Maria Pronchishcheva Bay – a bay in the Laptev Sea, located on the east coast of Taymyr about 75 km north of the entry to the Gulf of Khatanga. The bay length is more than 60 km and width varies from 3 to 10 km. The maximum depth is 22 m. To the west of the bay lies Byrranga Mountains from which several rivers run down into the bay. The shores are low. Most of the year, the bay is covered with ice. Arctic tundra is located around the bay. The water area of the bay and its shores are included in a special section of the Arctic Taymyr Reserve. Administratively, it is part of Krasnoyarsk Krai, Russia. It was discovered in 1736 by Vasily Pronchishchev. For a long time, it was unnamed. In 1913, the cape at the entry to the bay was named by the expedition of Vilkitsky after the wife of Pronchishchev – Tatiana Pronchishcheva – and mapped as Pronchishcheva Cape. In the 1920s, cartographers deciphered the inscription as “Maria Pronchishcheva Bay,” and only in 1983, V. Bogdanov, a student of the Faculty of Journalism of the Moscow University, established the authenticity of the name (Tatiana) and biography of Pronchishcheva. On the shore of the bay, there is a polar meteorological station.



Mammoth (Source: <https://de.wikipedia.org/wiki/Mammute>)

The bay is visited by tourists from Khatanga. In 1988, the icebreaker-class vessel “Vasily Pronchishchev” delivered to the bay a 500-kg cast-iron cross in Arkhangelsk. On the cross, there is the epigraph in the Slavic script: “To Lieutenant Vasily Pronchishchev and his wife Mary. Perished in 1736.”

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### **Marine Arctic Complex Expedition (MACE)**

Marine Arctic Complex Expedition (MACE) – established in 1984 on the basis of the concept of “memory capsules” (containers) – comprehensive studying and preservation of cultural and natural heritage. Over the period of its existence, the MACE has collected and recorded “memory capsules,” storing a great variety of historical, technological, ecological and social, spiritual, and cultural information. At that, various historical and geographical experiments were conducted. Many places in the Arctic, associated with known and outstanding expeditions, were visited; rich data on the real “pathway memory” were collected, which enabled the identification and reconstruction of often tragic events of the past. The work is underway to establish the national park “Russian Arctic.”

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### **Marine Doctrine of the Russian Federation for the Period Until 2020 (Arctic Regional Direction)**

Marine Doctrine of the Russian Federation for the period until 2020 (Arctic Regional Direction) – approved by the President of the Russian Federation on July 27, 2001; it is a founding document that defines the state policy of the Russian Federation in the field of maritime activities – national marine policy of the Russian Federation. The Arctic region direction is defined as one of the major regional priorities of the national marine policy of the Russian Federation. The national marine policy in the Arctic regional direction is

determined by the particular importance of ensuring the free exit of the Russian fleet in the Atlantic, the riches of the exclusive economic zone and continental shelf of the Russian Federation, the decisive role of the Northern Fleet for the defense of the state from seas and oceans, as well as the growing importance of the Northern Sea Route for sustainable development of the Russian Federation.

The basis of the national marine policy in this direction is the creation of conditions for the activities of the Russian fleet in the Arctic seas, on the Northern Sea Route, as well as in the northern part of the Atlantic. At the same time, the following long-term objectives will be achieved: research and development of the Arctic with a focus on the development of import industries and priority solution of social problems; protection of the interests of the Russian Federation in the Arctic; the creation of ice-class vessels for maritime transport, specialized vessels for fishing, and scientific and other specialized fleets; taking into account the defense interests of the state in the exploration and development of biological resources and mineral resources in the exclusive economic zone and continental shelf of the Russian Federation; creation of conditions, including the involvement of the capabilities of the region; for developing bases and using the marine potential, ensuring the protection of sovereignty, sovereign and international rights of the Russian Federation in the Arctic region; restriction of foreign naval activities in agreed areas and zones on the basis of bilateral and multilateral relations with the leading naval powers; defending the national interests of the Russian Federation in respect of the Northern Sea Route, ensuring centralized state management of the transport system, icebreaker servicing, and providing equal access to interested transport service providers, including foreign ones; upgrade and safe operation of nuclear icebreaker fleet; safeguarding the interests of the Russian Federation during the delimitation of maritime areas and the seabed of the Arctic Ocean with the Arctic states; and consolidation of efforts and resources of the federal center and the constituent entities of the Russian Federation for the development of Arctic shipping and sea



and river estuary ports and implementation of the Northern deliveries of goods and cargoes, as well as developing information systems ensuring the specified activity.

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### **Matisen, Fyodor Andreyevich (1872–1921)**

Matisen, Fyodor Andreyevich (1872–1921) – Russian Captain 1st rank Arctic explorer. In 1892, he graduated from the Naval Cadet Corps with the rank of subofficer. He served in the Baltic Fleet. In 1895, he graduated from the navigational officer class and was assigned as a junior navigation officer to the cruiser “Rurik,” on which he made a voyage to the Far East. In 1899, on board of the transport vehicle “Bakan,” Matisen participated in the expedition of the Academy of Sciences to Spitsbergen (Svalbard) to measure the length of a meridian degree (“grade measurements”). From 1900 to 1903, he was first a senior officer (since 1901, the commander) of the yacht “Zarya” and carried out hydrographic surveys as part of Russian polar expedition of the Academy of Sciences under the leadership of E.V. Toll. In 1901 (during the first wintering), he carried out a route survey of the Nordenskiöld Archipelago along the meridian of the Laptev Sea to 77° N and mapped a number of islands and straits of this archipelago. During the second wintering, during sled rides Matisen examined Siberian Islands. After the death of E.V. Toll in 1902, Matisen became head of the expedition. In 1903, he first explored Tiksi Bay, confirming its suitability for the construction of a seaport. In 1904, he was seconded to the Academy of Sciences. Matisen processed materials and collections and compiled the first large-scale map of the Nordenskiöld Archipelago.

In 1906, he was transferred to the Baltic Fleet, commanded the destroyer “Prozorlivyi,” and promoted to captain-lieutenant. In 1907, he was enlisted in navigation officers of Class I and promoted to captain 2nd rank. He was seconded to the Hydrological Directorate and appointed to



Matisen F.A. (Source: [https://en.wikipedia.org/wiki/Fyodor\\_Matisen](https://en.wikipedia.org/wiki/Fyodor_Matisen))

supervise the construction of two icebreakers for the Arctic Ocean Hydrographic Expedition. In 1915, he was promoted to captain I rank. Since April 1917, Matisen was in the naval ministry reserve and then appointed a party head of the hydrographic expedition of the East Siberian region of the Arctic Sea. In the summer of 1919, he organized hydrographic surveys in the Lena Delta and in Tiksi Bay (Ust-Lena hydrographic expedition). In 1920, he surveyed and measured the fairway for vessel exit by the river to Tiksi Bay.

His name is given to a strait in the Nordenskiöld Archipelago, a cape on Podkova Island (Kara Sea, Minin Skerries) and a nunatak on Spitsbergen.

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### **Matusevich Fjord**

Matusevich Fjord – a large fjord, which (37 km) juts deeply into the eastern shore of the island of

Oktyabrskoy Revolyutsii, Severnaya Zemlya, and the Laptev Sea. Its width at the entry is 11 km. It is the most active area of iceberg formation. It was discovered in 1913 by the Arctic Ocean Hydrographic Expedition on icebreakers “Taymyr” and “Vaygach” under the command of Captain 2nd rank B.A. Vilkitsky and named after hydrographer, surveyor Lieutenant Colonel of the corps of hydrographers N.N. Matusevich. Later, in 1931, the fjord was examined and more accurately mapped by the Severozemelskaya (Northern Land) expedition led by G.A. Ushakov.

### **Matyushkin, Fyodor Fyodorovich (1799–1872)**

Matyushkin, Fyodor Fyodorovich (1799–1872) – Russian navigator, explorer of eastern Arctic, and admiral (1867). He graduated in 1817 from the Tsarskoye Selo Lyceum. In 1817–1819, on the sloop “Kamchatka,” Matyushkin participated in the world expedition of V.M. Golovnin sailing to Kamchatka and Alaska. He participated in the survey of the remote Aleutian Islands, Chinok Gulf (Kodiak Island), and Sitka. In 1820–1825, during the land Kolyma expedition of F. Wrangel, he traveled on ice to Medvezhiy Islands, described the Chetyrekhshtolbovyi Island, and explored the basins of the Bolshaya and Malaya Anna rivers. In 1825–1827, he took part in the second world expedition on the sloop “Korotkiy” of Lieutenant-Commander F.P. von Wrangel with stops at Kamchatka and Russian America. He was the first in the Russian Navy who began daily measurements of seawater temperatures and their registration. In 1830–1852, he commanded warship in the Mediterranean and Black and Baltic Seas and served in the Navy Department. In 1852, Matyushkin was the vice-director of the inspectorate and member of the Committee on Drafting New Navy Regulations. In 1858, Matyushkin became chairman of the Scientific Committee of the Sea.

A mountain on Wrangel Island and cape in Chaun Bay (Chukotka) are named after Matyushkin.

### **“Maud”**

“Maud” – a wooden motor sailing three-masted schooner. It was built in 1917 at the shipyard of Malden, Norway. It was built specifically for the expedition of R. Amundsen and designed as Pomoranian ships with rounded boards. The length is 29.8 m. The width is 15.5 m. The draft is approximately 5 m. The displacement is 800 tons. The engine power is 240 hp. The speed is over 8 knots. “Maud” had a supply of food for 5 years. In 1918–1920, R. Amundsen and H.W. Sverdrup (“Maud” captain) sailed on “Maud” through the Northern Sea Route with two wintering (the first was at Cape Chelyuskin, Kara Sea; the second was on Ayon Island) in the East Siberian Sea. The expedition then made a short stop in Nome, Alaska, came to the Chukchi Sea, where the ship lost the propeller, and camped for the winter. In 1921, “Maud” arrived in Seattle, Alaska, for repair. In 1922, “Maud” for the second time sailed north in an attempt to reach the North Pole. It has entered into the ice of the Kara Sea, first under the command of R. Amundsen, and then, after he left the ship and returned to Alaska, under the command of O. Visting. Being frozen in ice, the ship began to drift along the northern edge of the East Siberian Sea, and in 1924, she turned to the north of the New Siberian Islands. In 1925, the “Maud” came back to Nome. Soon, the ship was sold and an inexperienced captain put her stranded near the Baffin Island, and the ship was dismantled.

### **Medvedev, Vasily (? – ?)**

Medvedev, Vasily (? – ?) – a member of the Great Northern Expedition. In 1735–1737, he participated in hydrographic surveys as a boatswain on the dubel boat “Yakutsk” with the detachment of V. Pronchishev and S. Chelyuskin. In December 1736, after the death of Pronchishchev and Chelyuskin’s departure to Yakutsk, Medvedev remained a commander of the dubel boat wintering in the delta of the Olenyok. In the summer of



“Maud” (Source: [https://en.wikipedia.org/wiki/Maud\\_\(ship\)](https://en.wikipedia.org/wiki/Maud_(ship)))

1737, he brought the ship to Yakutsk. In 1730–1742, Medvedev served in the detachment of Kh. P. Laptev. In the winter of 1739–1740, he traveled on dog sleds from the Lower Khatanga to the mouth of the Dudypa (the Pyasina arm) and then down the river of Pyasina to its mouth. Medvedev examined the banks of rivers and the eastern coast of the Pyasino Gulf.

## Medvezhiy Islands or Bear Islands

Medvezhiy Islands or Bear Islands – a group of islands in the East Siberian Sea, to the north of the estuary of the Kolyma, the Republic of Sakha (Yakutia), Russia. The area is approximately 60 km<sup>2</sup>; the height is to 273 m (on Krestovskiy Island). They consist of six islands: Krestovskiy, Leontyeva, Chetyrehstolbovoy, Pushkareva, Lisova, and Andreyeva. All the islands are composed of granites. This is a rocky Arctic tundra. Vegetation of the islands includes mosses

(reindeer moss) and rigid short grass. In the northwest, one can see driftwoods, consisting of larch, fir, and poplar. The wildlife includes wild deer, a great variety of mice, bears, wolves, and foxes coming from the mainland. Medvezhiy Islands were discovered in the second half of the seventeenth to the first half of the eighteenth century by Russian industrialists and sailors. Cossack Yakov Permyakov was the first who visited the islands in 1710, sailing the Arctic Sea from the Lena to the Kolyma. In 1720, Russian industrialist Ivan Vilegin first visited one of the islands, where he came across the ice from the mouth of the Kolyma. In 1740, Dmitry Laptev reached Krestovskiy Island, sailing out of the Indigirka to the Kolyma. He called it the island of St. Anthony. In 1756, Cossack F. Tatarinov and Yukagir E. Konovalov visited the island for commercial purposes. In 1761, the expedition of Shelaurov, while sailing to the Kolyma, sheltered from the ice between islands. In 1763, Colonel F. Plenisher, “the chief of Okhotsk and Kamchatka Krai,” sent there a detachment of Sergeant

Medvezhii Islands (Source: <https://it.wikipedia.org/wiki/Andreeva#/media/File:Medvezhy.PNG>)



Geodesy Stepan Andreev for the examination of the islands, who drove around the islands on dogsleds and made their summary description.

In the 1769–1771, ensigns of Geodesy Ivan Leontyev, Ivan Lysov, and Aleksey Pushkarev on three dogsleds went over ice from Nizhnekolymsk to the Medvezhyi Islands and drew up their fairly accurate map. In 1821, the islands were visited by Lieutenant F. Wrangel. In April 1870, the islands were visited by the expedition of Neumann. In the 1980s, an aviation expedition of the Wrangel Island Natural Reserve worked on the islands in search of polar bear dens.

The name was given in 1864 by Colonel Plenisher because of the presence on the islands of a large number of traces of bears, found by the first explorers.

### **Medvezhyi Patrul (Bear Patrol, also Umky Patrol)**

Medvezhyi Patrul (Bear Patrol, also Umky Patrol) – in 2006, with the support of the World Wildlife Fund (WWF) of Russia, a team of volunteers who received informal name of Bear Patrol was formed in one of the coastal Chukchi

villages. The team warned the villagers of approaching polar bears and takes measures for the expulsion of bears wandered into the village. Initially, the volunteers patrolled the neighborhood in October–December. During this period, polar bears that landed from the ice floes coming from the northeastern part of the East Siberian Sea walk along the coast from northwest to southeast. Attracted by remains of walruses on rookeries near the villages, polar bears inevitably used to visit the residential localities. Seeing the potential of the project, experts from WWF Russia and the Council for Marine Mammals offered Bear Patrol also to collect simple information: the place and time of meeting polar bears and their number, sex, and age. This information was reported by the observers to the experts in Moscow by phone. In subsequent years, WWF Russia began developing a network of similar coastal observation stations in the Russian Arctic. Currently, the network includes 15 settlements, 6 weather stations, and 7 natural protected areas (natural and resource reserves) from Kolguyev Island in the west of the Russian Arctic to the Bering Strait in the east. Currently, Bear Patrol activities include a coastal monitoring, involvement of the residents of the Arctic coastal settlements of Russia and personnel of coastal weather stations and protected natural territories; anti-poaching

activities; and environmental education of the local population.

### **Middendorf, Alexander Fyodorovich (1815–1894)**

Middendorf, Alexander Fyodorovich (1815–1894) – a Russian scientist, naturalist, and explorer and academician (1860), one of the greatest explorers of the Arctic Siberia and the Far East. In 1832, Middendorf graduated from high school. In 1837, he graduated from the Medical Faculty of the University of Dorpat, (today, University of Tartu, Estonia) where he became interested in zoology and other natural sciences, with the degree of Doctor of Medicine. To improve his knowledge, he worked for 2 years at the universities of Berlin, Breslau, Vienna, and Heidelberg under the direction of the greatest experts in the field of zoology, botany, geology, and ethnography. On his return from abroad in 1839, Middendorf was appointed assistant professor at Kiev University, Department of Zoology, where he lectured on zoology and ethnography. In 1840, during the summer holidays, he took part in the expedition to Novaya Zemlya. In 1842–1845, Middendorf headed the Siberian expedition of the Russian Academy of Sciences, which first examined the Taymyr Peninsula, and then passed through Yeniseisk to Krasnoyarsk and Irkutsk to Yakutsk. During the expedition, the first information of the coastal biota of the high Arctic were received. In 1843, Middendorf began to research Taymyr. From the Dudinka (the lower reaches of the Yenisei River) across the Lake Pyasino and along the northern outskirts of the Putoran, he went to the river of Boganida to the lower reaches of the Khatanga to the Lake Taymyr and went down the eponymous river to the Gulf of Taymyr, whereby he again crossed the Taymyr Peninsula after K.P. Laptev, covering 1,500 km. In 1844, on the basis of observations of permafrost in a pit dug by merchant F. Shergin to the depth of 116 m, Middendorf laid the foundations of modern conceptions about the permafrost.

In April 1844, Middendorf left Yakutsk. In early June, the expedition reached the Udskiy fortress, built a canoe, and went down on it to the Sea of Okhotsk. They collected a rich zoological collection on the coast and in the coastal mountains and then went on a canoe along the coast. Upon reaching the Island of Big Shantar, they examined it and returned to the mainland. Having sent the collection to Yakutsk, Middendorf continued to survey the southern coast of the Sea of Okhotsk. Its results were so significant that it led to the creation of the Russian Geographic Society, which follow-up activity Middendorf was actively and directly involved in, strongly contributing to the organization of a number of scientific expeditions, including the expedition of Dietmar to Kamchatka and the Amur Region. In 1870, Middendorf accompanied the Grand Duke Alexei in the voyage in the North Atlantic, as well as in the Barents Sea near Novaya Zemlya on the corvette “Varyag,” where he conducted hydrological and meteorological observations. Regular hydrothermal measurements performed under the direction of Middendorf made it possible for the first time to identify the distribution of the northern branch of the warm North Atlantic Current to the east in the direction of Novaya Zemlya. This branch of the Current, named by Middendorf as the Nordkapp Warm Current, encountering an obstacle in the east (Novaya Zemlya), is divided into two branches, one of which through the Strait of Yugorskiy penetrates into the Kara Sea, and the other flows to the north along the western coast of Novaya Zemlya, without approaching them closer than 60 miles.

In 1878, Middendorf visited the Fergana Valley, having amassed a very large collection of actual materials about its nature. In 1883–1885, Middendorf led several expeditions to the northern half of the European part of Russia and Finland. Since 1845, Middendorf was a full member of the Russian Geographical Society and in 1861 was awarded the Konstantinovskaya Gold Medal of the Society; in 1865 he was elected an Honorary member of the St. Petersburg Academy of Sciences; in 1846, he was awarded the Gold Medal of the Royal London Geographical Society



and was elected an Honorary member of the Society for Geosciences in Berlin; and in 1862, Middendorf was elected an Honorary member of the Dorpat Society of Naturalists and in 1883, an Honorary member of the Russian Geographical Society. In 1885, Middendorf received a knighthood. In 1888, he was awarded the Gold Medal of Karl Ernst von Baer.

The first volume of the major summarizing work of Middendorf titled *Journey to the North and East of Siberia* was released in German in 1848. The Russian version was published only in 1860–1878. In 1852, Middendorf was elected an academician of the St. Petersburg Academy of Sciences and undertook a series of scientific expeditions.

A bay in the Kara Sea, the coast of Khariton Laptev, a glacier on Rudolph Island, the Franz Josef Land in the Barents Sea, capes on Novaya Zemlya, and Taymyr Island in the Kara Sea are named after Middendorf.



Middendorf A.F. (Source: [https://en.wikipedia.org/wiki/Alexander\\_von\\_Middendorff](https://en.wikipedia.org/wiki/Alexander_von_Middendorff))

## Milovzorov, Pavel Georgievich (1876–1940)

Milovzorov, Pavel Georgievich (1876–1940) – a Soviet Arctic captain, veteran of the Arctic navigation, and one of the pioneers of the Northern Sea Route. He graduated from the nautical school. He participated in the Russian-Japanese War, then served in the Far East, and sailed on private vessels in Japan, China, Australia, and Europe. In 1914, he made his first voyage on the steamer “Kolyma” from Vladivostok to the mouth of the Kolyma River. In the 1920s, he marked the beginning of a regular communication between these points. In 1924–1925, the Soviet ship “Stavropol” under the command of Milovzorov was frozen in ice of about 400 km from Chetyrehstolbovoy Island, where at that time was the expedition of R. Amundsen on board of “Maud.” At the request of Amundsen, Milovzorov left for his expedition a few barrels of lubricating oil which they needed, and later, when Amundsen was passing by the “Stavropol” wintering camp, these barrels were found by Amundsen’s expedition. In 1926, the same ship delivered to Wrangel Island the expedition led by G.A. Ushakov to build the first Soviet polar station. On the way back, the sailors raised the Soviet flag on Herald Island. In 1935, for the first time in one navigation on the regular cargo ship “Anadyr,” Milovzorov sailed the Northern Sea Route from Vladivostok to Antwerp, Belgium. In the following years, he worked at the Arctic Institute.

Reefs near the archipelago of Franz Josef Land and a bay in the Mawson Sea (Antarctica) were named after Milovzorov.

## Mogotoyevo

Mogotoyevo – the largest salt lake in the north of the Yana-Indigirka lowland, Republic of Sakha (Yakutia), Russia. It freezes in the second half of September and thaws in June. There is an anabranch from the lake to the East Siberian Sea – the Melkaya River (Mogotoevskaya).

The lake is linked via an anabranch with the salt lake of Bolshoye. The lake is mouthed by the river of Vorontsov, the creek of Yuzhnyi Mogotoevskiy, the river of Melkaya, and multiple creeks. The coast is low lying. There are few capes in the lake: Klyk, Klychok, Tupoy, and Ostryi. On the north shore, there are several hunting huts. The lake has fish like cisco, white salmon, and whitefish in large quantities.

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## Monitoring of the Arctic, the Regional Center

Monitoring of the Arctic, the Regional Center – located in St. Petersburg. The main purposes are to organize, execute, and coordinate works in the network of the state system of observations of the environment in the Russian Arctic and the northwest of Russia; rapid surveying the area of emergency situations related to environmental pollution; collect, process, and analyze information related to environmental pollution in areas of the Arctic shelf and estuarine areas of the rivers of the Arctic zone; develop projects of systems of integrated monitoring of environmental parameters with various levels of spatial localization, including systems of local environmental monitoring of the areas of location of large industrial facilities; develop technologies and technical means for the implementation of monitoring systems; execute serial chemical-analytical works and specialized analytical analyses; and create specialized data banks of hydrometeorological and environmental information.

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## Muksun (*Coregonus muksun*)

Muksun (*Coregonus muksun*) – large semi-anadromous fish of the whitefish family (*Coregonus*), with a length of 75–90 cm and 10.8 kg in weight. The mouth is inferior with an elongated snout. Behind the head, there is a hump. Muksun migrates to rivers in the second half of the summer and does not rise high. It reaches

sexual maturity at an age of 6–12. Muksun spawns in northern rivers from the Kara to the Kolyma not annually, in October and November, in cripples at a depth of 1.5–2 m. The fecundity is 40,000–160,000 eggs. Young species in the first year runs into the lower reaches of rivers, where it fattens before puberty. It feeds on crustaceans and benthic invertebrates, mollusks, and fish. The life expectancy is 20 years. It is valuable commercial fish, but its stocks are undermined. It is the target for breeding.

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## Muostakh

Muostakh – an island, located 26 km east of Cape Kosistyi. It is made of fossil ice and loose rocks. Its length is 9.3 km; the width is not more than 0.5 km. Its height is 10–15 m and it has steep shores, especially on the east side. In the northern part, the island is destroyed by warm waters of the Bykovskaya gully.

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## Murmansk Initiative

Murmansk Initiative – a speech by the Soviet President Mikhail Gorbachev in Murmansk in 1987 at the ceremony of awarding the Order of Lenin and the Gold Star of the Hero to the city of Murmansk is now considered as the first step to a modern cooperation in the Arctic, leading to the so-called Rovaniemi Process and to the creation in 1991 of the Environmental Protection Strategy of the Arctic. The six proposals made by the President included a call for the establishment of a nuclear-free zone in Northern Europe, the reduction of military activity, taking confidence-building measures in the northern seas, civilian cooperation for the development of natural resources, coordination of scientific research, cooperation in the field of environmental protection, and the opening of the Northern Sea Route for foreign vessels. It was the first sign of change in the closed position of the Soviet North, which

thus laid the foundation for real transformations in the Arctic.

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### **Muromets, Akakiy (? – ?)**

Muromets, Akakiy (? – ?) – Russian Arctic navigator, industrialist, and discoverer of the western part of the Laptev Sea and a part of the coast of Taymyr Peninsula. He was engaged in the fur trade in the basin of the Lena. In the 1640s, with

a cargo of furs, he went on two koch boats from the Lena Delta to the west, completed studying Olenyok Bay, started by I.I. Rebrov, observed the coast section of the Laptev Sea, and found the Bay of Anabar. The voyage was ended on Faddey Islands, where both boats wrecked in Bay of Sims (77°N). Most of the sailors, including Muromets, died during wintering. Muromets discovered Big Begichev Island, part of the eastern and northern coast of the Taymyr Peninsula (Pronchishchev Coast) and a part of the east coast of Chelyuskin Peninsula.

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**Nansen, Fridtjof Wedel-Jarlsberg  
(1861–1930)**

Nansen, Fridtjof Wedel-Jarlsberg (1861–1930) – an outstanding Norwegian explorer, founder of physical oceanography, explorer of polar countries, diplomat, social and political activist, and honorary member of the St. Petersburg Academy of Sciences (1898). He graduated from the University of Christiania (now Oslo) in 1882 and specialized in zoology (a Professor since 1897). N. became interested in research of the northern polar regions. In 1885, for his published work *Materials on the Anatomy and Histology of Myzostoms*, N. was awarded the Gold Medal of the Royal Academy of Sciences. In 1888 he received his doctorate and was the first to cross on ski the ice dome of Greenland and became a national hero in Norway. In 1890, N. proposed the idea of achieving high latitudes on ships, drifting with the ice. His plan was based on the assumption of the existence of a current flowing from east to west along the coast of Asia through the central part of the Arctic.

In July 1893, on the specially built Norwegian ship “Fram” (forward), led by Captain O. Sverdrup, N. came from Norway (Vardo Port) to the New Siberian Islands, to the north of which he expected, after being trapped by ice, to start his transarctic drift. There were only 13 Norwegians on board. Already in the beginning of August, “Fram” entered the Kara Sea. In mid-August

Sverdrup Island was discovered. In late August, the expedition reached the group of many islands (later named the Minin Skerries). The largest of them N. called Oleniy (deer), probably due to a successful deer hunting. A few days later near Cape Sterligov, N. discovered a group of seven islands named after the members of the expedition, Lieutenant S. Scott-Ganon. At that time “Fram” was to the west of the islands located to the north of Taymyr and named by N. the Nordenskiöld Archipelago in honor of this Swedish polar explorer. “Fram” began to drift to the north of Kotelný Island on September 20, 1893. In 1895, together with F.Y. Johansen, N. on three dog sleds left the ship and went on foot to the North Pole; at latitude 86°14'N, when there were 226 miles to the North Pole, N. was forced to turn to the Franz Josef Land. In spring of 1896, they again went south to the Cape Flora, where they met the English expedition of Jackson and on their ship returned to Norway, where “Fram” soon arrived after being drifted into the Atlantic Ocean.

During “Fram’s” drift, a large number of oceanographic and climatological surveys were conducted that resulted in discovering the existence of large depths in the Arctic Basin, defining the structure and origin of its water masses and other findings. Analyzing “Fram’s” drift, N. discovered the impact of the Earth’s rotation on the ice movement. The 3-year drift of “Fram” made N. famous worldwide. In 1898, N. attended a meeting of the Russian Geographical Society,

where E. Toll reported the plan of the expedition to the Sannikov Land and highly appreciated N., who then was elected an Honorary member of the St. Petersburg Academy of Sciences. In 1899, N. together with other Norwegian government members and scientists visited the world's first specialized research vessel "Andrey Pervozvannyi," which came to the Norwegian capital Christiania. The result of the inspection was the decision by the Norwegian government to build for the country a similar vessel, which later received the name "Michael Sars."

In 1900, N. participated in the expedition aboard "Michael Sars" to explore the Atlantic currents in the Arctic Ocean – it was the first modern oceanographic expeditions. In 1902, N. established the Central Oceanographic Laboratory in Christiania and was one of the organizers and members of the International Council for the Exploration of the Sea. In 1904, N. bought his own research yacht "Veslemø" ("the girl from the mountains"), on which he undertook some minor expeditions in 1904, 1909, 1911, and 1912. N. developed a method for determining the stream velocity from drifting ships, proposed by M. Lomonosov and S. Makarov, and designed a bathometer and an accurate hydrometer.

At the invitation of the Russian government and with the help of the Joint Stock Siberian Society of Steamship Navigation, Industry, and Trade, in 1913 N. on the cargo ship "Korrek" made an expedition along the Northern Sea Route. The expedition on this vessel sailed from the Strait of Yugorsky Shar along the shores of the Arctic Ocean through the Kara Sea to the mouth of the Yenisei and then on the riverboat "Omul" to Yeniseisk, thus proving the possibility of establishing regular maritime communications between Europe and Siberia. Then N. visited Khabarovsk and Vladivostok, where he met with the Amur River basin researcher K. Arsenyev. N. described his voyage and visiting Siberia in the book *Through Siberia* (1914).

In 1905, Russia was the first to recognize the independence of Norway, and the Russian Emperor Nikolay II expressed the hope that the world-famous polar explorer Fridtjof Nansen

would come to Russia as an Ambassador (however, he was sent to London).

N. is known as a public figure. After the First World War (1914–1918), he became the first high commissioner for refugees of the League of Nations and established the Nansen passport office issuing the so-called Nansen passport – an international document that certifies the identity of the owner, as a rule, a refugee without citizenship. N. had a deep sympathy for Russia; he was one of the organizers of the aid for the starving people affected by the Volga famine in 1921 and established the Nansen Aid Committee. In 1922, N. was awarded the Nobel Peace Prize "for long-term efforts to assist the vulnerable." In 1925, N. traveled to Armenia, what was described in his book *Through Armenia* (1927), and in 1929 he published his book *Across the Caucasus to the Volga*.

N. was an initiator of polar aeronautics; in 1924, he established the international research organization "Aeroarktik" and was its chairman for life. In 1902 N. published his book *In the darkness of the Night and in the Ice* and in 1915 *Through Siberia*. In 1937–1940, the collected works of N. were published in Russian in five volumes, and in 1956 he published the book *Fram in the Polar Sea*.

The 10-kroner note portrayed F. Nansen in 1972–1984.

The name of Nansen is given to a ridge (Nansen Threshold) between the northeastern part of Greenland and Spitsbergen, an island and a cape of Franz Josef Land, a mountain on the Taymyr Peninsula, and a strait between the Grant Land and Sverdrup Island in the Canadian Arctic Archipelago.

In 1995, Russia issued a gold coin with the portrait of N. par value of 50 Roubles, and Armenia issued a silver coin with the nominal value of 100 Drams. In the same year, at the initiative of Nikolay Ryzhkov, former Chair of Council of Ministries of the USSR, a Nansen fund was established subsequently registered in Armenia. Many countries issued stamps with the image of Nansen. In 2002, a Nansen monument was erected in Moscow.





Nansen Fridtjof Wedel-Jarlsberg (Source: <http://www.nansenamundsen.no/no/galleries/nansen/fridtjof-nansen/>)

## Narwhal (*Monodon monoceros*)

Narwhal (*Monodon monoceros*) – a *Monodontidae* mammal of the narwhal family, the only species of the narwhal genus. The body length of adult narwhals is 3.8–4.5 m and that of newborns is about 1.5 m. The weight of males is 1.5 t, of which about one-third of the weight is fat; females weigh about 900 kg. The head is round, with overhanging frontal eminence; there is no dorsal fin. The mouth is small, located at the bottom. Adults are different in malculation – grayish-brown spots on a light background, which sometimes merge – and only two upper teeth are present. Of these, the left one develops in males to a tusk up to 2–3 m in length and weighing up to 10 kg, spiral, and curved left, and the right one is not usually toothed. The right tusk in males and both tusks in females are hidden

in the gums and rarely develop, about one of 500 tusks. Broken tusks do not grow, but the root canal of such tusk will be covered by a bone plug. N. tusks are characterized by high strength and flexibility; their ends can bend at least by 31 cm in either direction without breaking.

The purpose of tusks is still not clarified, but, as far as it is known, it does not serve as an instrument of attack and is not used as an attack weapon or to crush the ice crust. It was assumed that it is required for courtship, to attract females. There is also a version that the tusks are necessary for males during courtship tournaments – it was noted that N. sometimes rub tusks. There is speculation that the N. tusk is a sensitive organ. Under the electron microscope, it was found that the canine is penetrated by millions of tiny tubes containing nerve endings. Presumably, the tusk allows N. to feel the change in pressure, temperature, and relative concentration of suspended particles in the water. By crossing tusks, N. apparently clear them from warts.

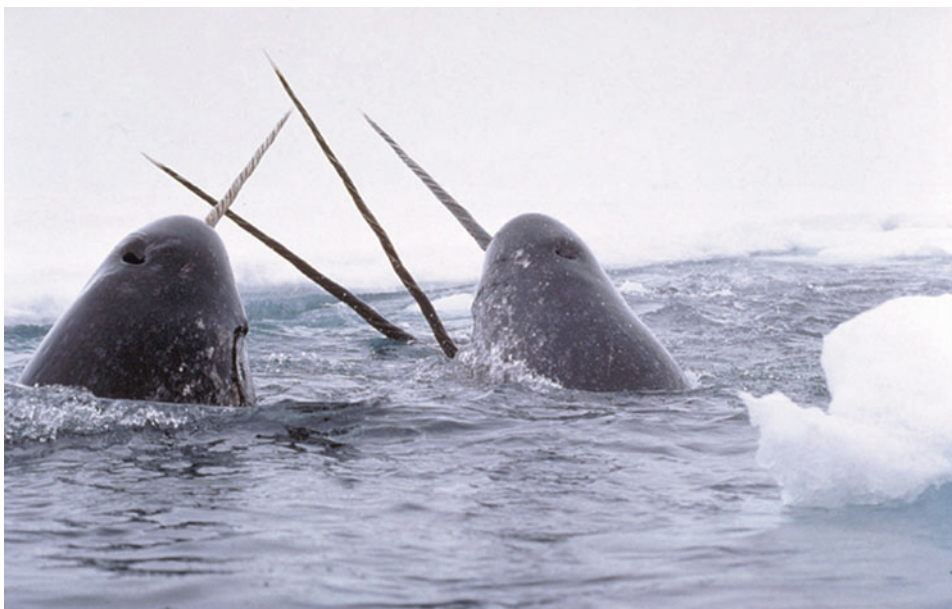
N. inhabit the high latitudes – the Arctic Ocean and the North Atlantic waters. N. live in the cold waters along the edge of the Arctic ice, making seasonal migration, depending on the movement of sea ice – for winter to the south and in summer to the north. N. rarely reaches the polar waters below 70°N and only in winter. In winter N. live in lanes between the ice; if the ice hole freezes, males break the ice from underneath (up to 5 cm thick ice), hitting by their backs and tusks.

N. eats cephalopods, to a lesser extent, crustaceans and fish, eating mostly benthic ichthyofauna (cod, rays, halibut, flounder, gobies). In search of food, narwhals dive to a depth of 1 km and remain underwater for long; it was observed that N. shoo the bottom fish from soil using their tusks.

The natural enemies of N. are polar bears, killer whales, and humans, and cubs are hunted by polar sharks.

N. keep out singly or in small groups, usually of 6–10 heads, which consist of adult males or females with cubs; earlier, they used to form large clusters of several hundreds of thousands of animals.

The peak of mating is spring. Pregnancy lasts 14–15 months, and the full reproduction cycle



Narwhal (Source: <https://en.wikipedia.org/wiki/Narwhal>)

covers 2–3 years. Usually one, rarely two cubs are born. Male puberty comes with a body length of 4 m and females of 3.4 m, which corresponds to 4–7 years old. Life expectancy in nature is up to 55 years and in captivity up to 4 months. Cases of captive breeding are unknown.

N. meat is used as food by northern peoples, particularly the Eskimos; N. fat is used as oil for lamps and bowels for the manufacture of ropes; tusks are of particular value, which are used for carving. N. skin contains a lot of vitamin C.

N. are protected rare species, listed in the Red Book of Russia. The accurate data on the population are missing. According to an approximate calculation, their quantity is estimated at 30,000–40,000 heads.

family (*Coregoninae*). It is abundant in the Arctic Ocean Basin. The length is 150 cm and weight of 50 kg. The mouth and scales are large, silvery flanks. It begins migrating for spawning early, under the ice, and continues to spawn through the summer. N. migrates very high (in the Yenisei River, for up to 1,500–1,900 km, the Ob – 3,500 km from the river mouth). N. reaches sexual maturity late (at 7–18 years). Spawning occurs in late September and October, not annual, at intervals of 3–4 years. It has bottom caviar. Fertility is 125,000–325,000 eggs. It feeds on fish and does not feed only during the spawning season. It is an important and valuable commercial species.

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## Nelma (*Stenodus leucichthys nelma*)

Nelma (*Stenodus leucichthys nelma*) – semi-anadromous and freshwater fish of the whitefish

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## Nerpichiye

Nerpichiye – a lake in the northeast of the Kolyma Lowland on the left bank of the delta of the Kolyma River, Sakha Republic (Yakutia), Russia.

The area is 237 km<sup>2</sup>. Only one river – the Nerpichiya – flows out of the lake and runs into the East Siberian Sea. The lake has a low coast that stretched from the southeast to the northwest. It is linked via channels with a system of lakes, connecting with the river Konkovaya. The lake is fed by snow and rain. It is the place for geese and ducks nesting. The lake is a home to a special form of lake herring. It is also inhabited by salmon, grayling, rainbow smelt.

## Neshkan

Neshkan – (in Eskimo: *seal head*) a Chukchi village on the northeastern coast of Chukotka, Russia. It is located on the spit that separates the Neskynpilgyn Lagoon from the Chukchi Sea. The population is 730 people, and the indigenous population is 94 %. Transport communication is maintained in summer by sea and by air with helicopters. The village is famous for its tradition of breeding sled dogs; its inhabitants became winners of international sled dog races.

## Neskynpilgyn, Neskenpilgyn Lagoon

Neskynpilgyn, Neskenpilgyn Lagoon – the largest lagoon on the southwest coast of the Chukchi Sea near Cape Yakan to the Bering Strait, located east of the Lagoon of Einenekvyn, Chukotka Autonomous Okrug, Russia. The entrance to the lagoon is located 68 km east of the entrance to the Kolyuchinskaya Bay. It is open to the north and juts out into the mainland by 25 km. The entrance width is approx. 800 m. Spits separating the lagoon from the sea are swamped with a lot of lakes; the seaward shores of the spits are bold. With strong northeasterly winds, the spit in low-lying areas are flooded. The shores of the lagoon are heavily rugged and in some areas abrupt. The western and southern shores of the lagoon are mountainous. Between the spits, there is an entry to the lagoon up to 200 m wide, and

depths of 2–4 m prevail in the lagoon. Most of the year, it is covered with ice. On the shore of the bay, there is tundra vegetation. On the spit separating the lagoon from the sea, the Chukchi settlement of Neshkan is located.

## Neupokoyev, Konstantin Konstantinovich (1884–1924)

Neupokoyev, Konstantin Konstantinovich (1884–1924) – a senior lieutenant and researcher of the seas of the Arctic Ocean. In 1905 he was among the first who graduated from the Sea Cadet Corps and received the Admiral Nakhimov award. From 1905 to 1910, he sailed as a chief of the watch and navigator officer on different ships in the Far-Eastern Seas. In 1907, onboard of the transport vessel “Shilka,” he surveyed the eastern coast of Kamchatka. He was promoted to the rank of lieutenant in 1909. In 1910, N. was appointed to the icebreaker “Vaigach.” In February 1911 he was confirmed as the assistant chief of the Arctic Ocean Hydrological Expedition. During his service in the Expedition, he participated in various hydrographic operations and discoveries of the Severnaya Zemlya Archipelago, Vilkitsky Strait, Vilkitsky Island, Small Taymyr, and Starokadomsky and Novopashennyi Islands (from 1926 as Zhokhov Island). In 1914–1915, N. carried out hydrographic works during the first through passage from east to west across the Northern Sea Route (with a wintering near Cape Chelyuskin). Then N. was promoted to senior lieutenant. In 1916–1917, N. commanded the icebreaker “Taymyr.” In February 1918, N. presented the report of the Arctic Ocean Flotilla Command, in which he proposed to examine in more detail the shore of the Arctic Ocean and create buoyage areas in the Lena Delta and other rivers along the Northern Sea Route. A month later, N. spoke at a general meeting of the Arkhangelsk Society for the Study of the Russian North with the message on the further study of ice conditions the Kara Sea and eastern regions of the Arctic Ocean. During the intervention, he served in the Hydrographic

Expedition of the West Siberian region of the Arctic Ocean under the command B.A. Vilkitsky. After the liberation of the North in 1920–1921, he headed the Ob-Yenisei hydrographic detachment and later the Department of Safety Navigation in the Kara Sea and the mouths of Siberian rivers (Ubekosibir) established in 1922. In addition, N. was also engaged into navigation and hydrographic surveys of Kara barter transactions.

His main work is *Materials for Navigational Directions of the Siberian Sea* (1922).

His name is given to a bay, a gulf, an island, a lagoon, a cape, and a bank in the Arctic Ocean and a bay in Antarctica (the Princess Martha Coast).

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## New Russia

New Russia – the name of Alaska proposed by V. Bering's companion Sven Waxell.

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## New Siberia

New Siberia – an island in the archipelago of the New Siberian Islands of the group of Anjou Islands, on the border of the Laptev and East Siberian Seas. The area is approx. 6,200 km<sup>2</sup> and a height of 76 m. In the west, it is separated from the neighboring Fadevsky Island by the Blagoveshchensky Strait (a minimum width is 26 km) and washed from the southwest by the Sannikov Strait. N.S. is composed mainly of anthropogenic deposits, which in many places consist of fossil ice. The island is characterized by flat terrain, complicated by a large number and variety of landforms formed with the participation of exogenous permafrost processes. Flat surfaces are covered by polygonal tundra; on the hillsides there are solifluction processes and thermokarst. Over a large distance, the coast of the island is built of permafrost rocks up to 10–17 m high and on the northern coast up to 25 m. In summer, the soil thaws and the rock edges collapse triggering

landslides. In general, the island is characterized by thermoabrasion. It is contributed by the activities of the sea, shortly breaking away from the ice. A specific feature of the island is a dense river network. Western and central parts of the island are occupied by the largest river basin – the Bolshaya. The island has many lakes. Relatively large lakes are located in the northwestern part. There are more than 20 large lakes, and the area of the largest one, Dyara-Kyuyol, is 5.9 km<sup>2</sup>. The island is covered with tundra vegetation. The island is part of the protection zone of the State Ust-Lenskiy Nature Reserve. It was discovered in 1806 by Russian industrialists Semen and Lev Syrovatskiy. It was explored in 1886 by E. Toll. The name was given by M.M. Hedenström.

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## New Siberian Islands (Novosibirskiye Ostrova)

New Siberian Islands (Novosibirskiye Ostrova) – an archipelago in the eastern part of the Arctic Ocean on the border of the Laptev and East Siberian Seas (frequently called the Archipelago of the two seas), north of the Asian coast between the mouths of the rivers Yana and Kolyma, the Republic of Sakha-Yakutia, Russia. N.S.I. are separated from the coast of East Siberia by Laptev Strait. The Archipelago is located within the continental shelf. Its length from west to east is 700 km, and the total area is approx. 36,000 km<sup>2</sup>. The Archipelago consists of three groups of islands. The southern group consist of Lyakhovsky Blizhniy Islands (Big and Small Lyakhovsky Islands) and Stolbovoy Island. To the north of Lyakhovsky Islands, there is the central group, or the island of Anjou (further), consisting of the islands of Kotelny (linked by a sandy plain to the Bunge Land), Faddeevsky, Belkovsky, New Siberia, and the two small islands of Figurina and Zheleznyakova. Both groups are often combined under the name New Siberian Islands (Novosibirskiye Ostrova). The northern group, or De Long Islands (small), includes the island of Jeannette, Henrietta, Bennett, Vilkitsky, and Zhokhov. In all, there are



New Siberian Islands (Source: [https://en.wikipedia.org/wiki/New\\_Siberian\\_Islands](https://en.wikipedia.org/wiki/New_Siberian_Islands))

13 relatively large islands and approx. 40 smaller ones. Of all the N.S.I., only the westernmost islands of the archipelago – Stolbovoy and Belkovsky – are entirely within the Laptev Sea. The Novosibirsk Archipelago is separated from the Eurasian continent by Dmitry Laptev Strait (50 km). The southern and central groups of islands are separated by the Straits of Sannikov. Big and small Lyakhovsky Islands are separated by Eterikan Strait (15 km), and between Kotelny and Belkovsky Islands, there is Strait Zarya (25 km). The N.S.I. Archipelago is located in the shallowest waters of the North Siberian shelf (a continental platform) and forms an area with shallow depths on the Northern Sea Route. The depths prevailing in this area are 14–22 m, but large areas of the sea are even shallower. All the islands are located within the continental shelf,

mostly low lying, which represent the remains of the plains with some hills and outcrops of igneous rocks (basalts on De Long Islands). The maximum height on Bennett Island is 426 m and on Kotelny Island 374 m. The islands are built of permafrost, mostly loose quaternary deposits, with inclusions of fossil ice; melting of its large masses leads to permanent changes in the shape of the islands.

The climate is Arctic, harsh, and formed mainly under the influence of the Siberian Anticyclone. The average January temperature ranges from  $-28^{\circ}\text{C}$  to  $-31^{\circ}\text{C}$  and in July no more than  $+3^{\circ}\text{C}$ . Snow covers the islands for 9 months. The annual rainfall is 130–145 mm and on the tops of ice domes 300–400 mm. The total area of N.S.I. glaciers is  $77.3\text{ km}^2$ . There is a developed network of rivers, and the largest river is the



Volnaya on the island of Bolshoy Lyakhovsky 150 km in length. N.S.I. have a lot of lakes. On Kotelný Island, there are more than 20 lakes and on Faddeyevsky Island approx. 60 lakes. Swamps are widespread.

The vegetation is of tundra and polar desert type. The islands have many birds, especially waders and gulls nesting. There are bazaars of thick-billed murre, guillemots, and kittiwakes. There are also ptarmigan, snowy owl, Pacific eider, goose, bean goose, duck, and others. The mammal representatives include reindeer, Siberian lemming, and arctic fox (targeted stock). The straits are inhabited by walrus and eared and bearded seals. Fishing has local significance. The waters around the small and big Lyakhovsky Islands are fishing areas (cisco and others). Cisco is also fished near the south coast of the Bunge Land.

The first information about N.S.I. was received from the inhabitants of the coast of Yakutia in the mid-eighteenth century. The first research expedition worked on the islands in 1808–1810 under the leadership of M.M. Hedenström. In 1820–1823, the Expedition of the Russian Navy Lieutenant P.F. Anjou prepared the first accurate map of the Archipelago.

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### **Nikolskiy, Aleksander Grigoriyevich (1892–?)**

Nikolskiy, Aleksander Grigoriyevich (1892–?) – Russian researcher of the Arctic Ocean and lieutenant. In 1912 he graduated from the Sea Cadet Corps with the rank of subofficer. N. was enlisted in the first Baltic naval crew. In May 1913 he was appointed assistant chief of the Hydrographic Expedition of the Arctic Ocean and assigned to the Corps of Hydrographers. Upon arrival in Vladivostok, he took service on the icebreaker “Vaigach.” In 1913, N. was a chief of the watch and participated in the hydrographic expeditions of B.A. Vilkitsky, discovering the Severnaya Zemlya Archipelago, the islands of Small Taymyr, Starokadomsky, and Novopashennyi, and Vilkitsky Strait. At Cape Paks (Laptev Sea) he performed magnetic observations. In 1914–1915,

N. participated in the hydrographic surveys during the first through passage of vessels of the Hydrographic Expedition of the Arctic Ocean from east to west across the Northern Sea Route (with a wintering near Cape Chelyuskin). In September 1915, he was transferred to the Baltic Fleet and promoted to the rank of lieutenant. Prior to the Revolution of 1917, he served in the first Kronstadt naval semi-regiment. N. died in exile.

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### **Nilender, Viktor Vilgelmovich (1885–1968)**

Nilender, Viktor Vilgelmovich (1885–1968) – Russian researcher of the Arctic Ocean and captain 2nd rank. In 1898 he entered at the Sea Cadet Corps, from which he graduated in 1904, and was appointed to the Siberian naval regiment as a chief of the watch on the destroyer № 208. During the Russian-Japanese war, he participated in the bombardment of the port of Wonsan and the destruction of Japanese steamers and schooners. In December 1904, on the ship “Bintan,” N. tried to break through to the besieged Port Arthur, but because of lack of coal, his ship was called at Tsing-Tao (Shandong Peninsula), where it was interned by the German authorities. After returning to Russia in the autumn of 1905, he sailed on the destroyer “Gremyashchiy” and then moved to the supply vessel “Samoyed” as a chief of the watch. He was promoted to the rank of lieutenant. From 1907 to 1909, as a chief of the watch and a senior officer of the transport vessel “Bakan,” N. provided a safeguard to marine fisheries in the Barents Sea. In 1909, he was appointed to the icebreaker “Taymyr,” where under the command of captain 2nd rank F.A. Matisen, he sailed from St. Petersburg to Vladivostok, which became the main base of the Arctic Ocean Hydrographic Expedition. In 1910, he participated in a reconnaissance expedition to the Chukchi Sea and hydrographic surveys near Cape Intsov, located 30 miles north of the village of Uelen. In February 1911, N. was appointed a commander of “Taymyr” and assistant chief of the Arctic Ocean Hydrographic Expedition and

enrolled in the navigation officers 2nd class. In 1911–1913, he continued to navigate “Taymyr” in the seas of the Arctic Ocean and participated in the discovery of the Severnaya Zemlya Archipelago; the islands of Vilkitsky and Small Taymyr; and straits of Starokadomsky and Vilkitsky. In 1914, he was promoted to the rank of lieutenant and appointed an assistant to the naval agent in Japan. A year later, at his own request, he was transferred to the Baltic Fleet and appointed a commander of the destroyer “Krepkiy.” In 1917, he was promoted to captain 2nd rank. N was a member of the Ice Cruise of the Baltic Fleet from Helsingfors to Kronstadt. During the Civil War in Russia, he served in the Baltic Naval regiment until the disbanding of the General Yudenich Army and then emigrated. He lived and worked as a construction engineer in Brazil and Bolivia. N. died in the city of São Paulo (Brazil).

## Nizhneyansk

Nizhneyansk – an urban-type settlement in the Ust-Yansky Ulus (district) of Yakutia, the center of the homonymous village administration, and a major transportation hub and the river port of the Republic of Sakha-Yakutia in the delta of the Yana. The population is 390 people (2010). It is located behind the Arctic Circle in the delta of the Yana River. The settlement was founded during the Great Patriotic War (1941–1945) as a river port. It was transformed into a worker settlement in 1958. It operates as a transport hub. In the town, there is a river port on the Yana River and ship repair workshops. On the right bank of the Yana River is Nizhneyansk Airport, which is part of the structure of the federal enterprise “Airports of the North.” The airport is capable to receive An-24, An-26, L-410, AN-2, and AN-3 airplanes and all types of helicopters. The unpaved runway is 1,700 m long. During spring floods, the airport is flooded by the overflowing river, and at this time only possible landing is for helicopters. Regular flights are made by Yakutia Airlines and Polar Airlines; as of 2012 regular flights were not performed due to unprofitability.

The main cargo traffic goes from the Lena on vessels of mixed navigation. Cargoes are partly transferred from sea to river ships in the port of N. The entry of vessels into the port of N. is limited by shallow depths on the spit of the Yana River.

The population of the village is fast shrinking – 2,500 people in 1989 vs 279 people in 2015.

## Noatak River

Noatak River – a river in the northwest of North America, flowing through Alaska, USA. Its source is located on the slopes of the Brooks Range. The river is approx. 675 km long. The basin area is approx. 26,300 km<sup>2</sup>. It runs into the Chukchi Sea. N. is covered with ice for 6 months.

## Nodvik

1. A peninsula separating the Anabar Bay from the Nordvik Bay. The peninsula is long and narrow and ends in the north with the high promontory – Cape Paksa.
2. A bay at the southwestern coast of the Laptev Sea between the peninsulas of Khara-Tumus in the west and Nordvik in the east. It juts out into the land for 37 km; the width is 39 km and the depth is 6 m. The banks are mainly lowlands. Nordvik Bay, judging by its shape, is clearly of abrasion origin. The northwestern entrance Cape Yuryung-Tumus is composed of cretaceous sandstones. The most of the shore of the bay is an abrasion arc with a fossil cliff, edged from the sea by a wide wind-driven tideland. Most of the year, the bay is covered with ice. Hydrographic studying of the bay began in 1933. Within 2 years, a hydrography team under the leadership of S.P. Lappo on small schooners “Pioneer” and “Khariton Laptev” conducted the study. The bay was discovered in 1739 by the Lena-Khatanga detachment of the Great Northern Expedition



Noatak River (Source: [http://upload.wikimedia.org/wikipedia/commons/e/ea/Noatak\\_River\\_Flats.jpg](http://upload.wikimedia.org/wikipedia/commons/e/ea/Noatak_River_Flats.jpg))

(1733–1743) under command of Lieutenant Kh. P. Laptev on board of the double-boat “Yakutsk.” Kh. P. Laptev gave the bay a Scandinavian name Noordwijk, which means “North Bay.” The bay was first described and approximately mapped by the expedition’s surveyor N. Chekin.

3. A town and port on the northwestern shore of Nordvik Bay. Due to the discovery in the 1930s of shows of oil in the area of Khatanga Bay, it was supposed to be built in the bay of Nordvik a seaport to resolve the problem of provision of the fleet on the Northern Sea Route with liquid fuel. In 1936, excellent Nordvik salt good for fisheries was shipped from here to the Far East. A port station was established in the area. Syndasko Bay was chosen sea vessel moorage. The project of the Nordvik station construction was drafted in 1936. At the end of the 1930s, piers were built. Near Kozhevnikov Bay, coal mining

was started to be used for local needs and for fleet bunkering. The village and the port were gradually equipped with modern conveniences. However, after the Second World War, the oil deposits have been recognized as unpromising, and gradually port began to lose its value. In 1954, the seaport of Khatanga was established on the basis of Nordvik Arctic Sea Port.

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### **Nolde, Boris Aleksandrovich (1885–1936)**

Nolde, Boris Aleksandrovich (1885–1936) – Russian polar explorer, baron, and captain 2nd rank (1917). In 1905 he graduated from the Sea Cadet Corps and promoted to the rank of subofficer.

From 1909 to 1912, N. participated in the Hydrographic Expedition of the Arctic Ocean (in order to study the Northern Sea Route from east to west) as an officer (lieutenant) on the icebreaker “Vaigach.” In 1910, the vessels of the Hydrographic Expedition “Taymyr” and “Vaigach” reached the mouth of the Kolyma River having completed all the surveys of the coast. During this campaign, N. discovered and explored a bay in the East Siberian Sea (into which the rivers of Vyivaam and Keveem flow), which was named after him (Nolde Bay). In 1912–1914, he served on the imperial yacht “Polar Star.”

From 1914 to 1917, he was engaged into the organization of the flotilla on the Neman River and participated in military operations in the Western Front. In 1915, N. was promoted to lieutenant (“for distinguished services”). In 1917 he became captain 2nd rank and, in 1917–1918, the flag captain of the operational headquarters of the Arctic Ocean Fleet. In 1918–1919, N. participated in the Civil War in the north of Russia. In 1919, he was the chief of staff in Arkhangelsk, sailed on an English icebreaker to Murmansk, and was then the commander of the cruiser “Askold,” which was captured by the British. In August 1919, he migrated to Sweden. Later he worked in America, in New York, on the steamer “Orduna.” Since 1923 he lived in Belgium. From 1925 to 1928 he worked in the Belgian Congo in a company engaged in maritime freight and passenger transportations. He returned to Brussels and worked in the newspaper *Russian Weekly in Belgium* (in particular, he wrote articles about the Russian Fleet). In 1936, he died in Brussels. In 2003, the son of N. donated the family archive of documents to the Russian National Library in St. Petersburg (B.A. Nolde Foundation) and to the museum of Arkhangelsk.

### **Nordenskiöld, Adolf Erik (1832–1901)**

Nordenskiöld, Adolf Erik (1832–1901) – a Swedish polar explorer, member of the Stockholm

Academy of Sciences (since 1858), and a corresponding member of the St. Petersburg Academy of Sciences (since 1879). In 1853 he graduated from the University of Helsingfors (now Helsinki). In 1858, he was a Professor of the Stockholm Academy of Sciences and head of the mineralogical collection of the museum. From 1858 to 1863, he took part in the expedition of O. Taurel to Spitsbergen. The expedition gave a relatively accurate survey of large areas of the least known eastern coast of the Earth and the Seven Islands. The expeditions to Spitsbergen in 1864, 1868, and 1872–1873 were headed by N. personally. In 1870 and 1873 he led the Swedish expedition to Greenland that initiated research of its internal areas. With a particular interest in the development of the Northern Sea Route, N. began preparations for the expedition to study the Northeast Passage to the Pacific Ocean. Funds for this expedition were allocated by the Swedish government and philanthropists, including Russian gold mines A.M. Sibiryakov, merchant M.K. Sidorov, and famous Swedish philanthropist O. Dickson. In 1875, on the ship “Preven” and in 1876 on the ship “Imer,” N. made a reconnaissance voyage from Sweden to the mouth of the Yenisei. Here he found a convenient harbor and named it Port Dikson in honor of the man who gave him money for the equipment of the expedition. In 1878–1879, on the sailing steam ship “Vega” (displacement of 357 t, the machine capacity of 60 hp), N. was the first of Western researchers who sailed through the Northeast Passage from the Atlantic to the Pacific with a wintering near Kolyuchinskaya Bay (Chukotka Peninsula). The success of the expedition was contributed by the presence of three support vessels, sent by Sibiryakov, “Lena” with coal to supply “Vega,” “Frazer,” and “Express.” Due to the accumulation of ice, “Vega” was forced to stand up for winter just 300 km away from the Bering Strait. The ice kept “Vega” in captivity for 289 days. After passing through the Bering Strait, and then after calling at Alaska and Yokohama, and further through the Suez Canal, N. returned in 1880 to Sweden, sailing around the whole of Eurasia. The expedition played an important role



Nordenskiöld A.E. (Source: [https://fi.wikipedia.org/wiki/Adolf\\_Erik\\_Nordenski%C3%B6ld](https://fi.wikipedia.org/wiki/Adolf_Erik_Nordenski%C3%B6ld))

in establishing the conditions of navigation on the North Sea Way and studying the nature of the Arctic.

N. was a corresponding member of the St. Petersburg Academy of Sciences (1879), an Honorary member of the Russian Geographical Society (1881), and awarded the Konstantinovskaya Medal of the Russian Geographical Society. N. knew Russian, was kind to Russia, and always objectively assessed the contribution of Russian researchers in the development of the Arctic. Thanks to N., the northeasternmost point of Russia on the Chukchi Peninsula was named Cape Dezhnev.

An archipelago in the Kara Sea, a bay and a cape on Novaya Zemlya, a gulf off the coast of the Northeast Land of Spitsbergen, a cape and a glacier in Greenland, and a river in northwestern Canada were named after N..

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## North America

North America – a continent in the northern part of the Western Hemisphere. In the south it

borders with South America, with the boundary along the Isthmus of Panama. The continent is bounded by the Pacific Ocean and the Bering Sea, the Gulf of Alaska, and the Gulf of California from the west; by the Atlantic Ocean and the Labrador Sea, the Caribbean Sea, the Gulf of Saint Lawrence, and the Gulf of Mexico from the east; and by the Arctic Ocean and the Beaufort Sea, the Baffin Bay, and the Greenland Sea with the Hudson Bay from the north. The following islands belong to N.A.: Greenland, the Canadian Arctic Archipelago, the Aleutian Islands, the Alexander Archipelago, and the Bahamas, the Greater and Lesser Antilles, etc. North America covers an area of about 24,709,000 km<sup>2</sup>. N.A. is the third largest continent by area after Asia and Africa, and the fourth by population after Asia, Africa, and Europe. Its population was estimated at about 565 mln people in 23 independent states (2013). The largest countries are the United States, Canada, and Mexico.

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## North Channel

North Channel – the strait in the Laptev Sea that separates the Bolshoy Begichev Island in the east from the Taymyr Peninsula. The width of N.C. is 13 km, and the average depth is 31–32 m.

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## North Chukchi Oil and Gas Basin (NCOGB)

North Chukchi Oil and Gas Basin (NCOGB) – located to the northwest of the Wrangel Island, Russia, in a water area of the Chukchi Sea which is difficult to access and has a complicated ice situation. NCOGB is formed in a prolonged sublatitudinal trough of the Hyperborean Platform south slope. NCOGB contains carbonate and terrigenous Paleozoic deposits of 4–12 km wide. Its eastern part is immediately





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North America (Source: [https://en.wikipedia.org/wiki/North\\_America](https://en.wikipedia.org/wiki/North_America))

adjacent to the structures of Alaska's northern slope with explored fields of oil and gas, which enhances the likelihood of deposit discovery.

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### **North Yakutia River Steamship Co. (NYRSC)**

North Yakutia River Steamship Co. (NYRSC) – was established in September 1938 on the basis of the water transport office of Yakutia territorial administration of the Northern Sea Route Authority. NYRSC transported passengers and goods in the Lena River low reaches to the Tiksi settlement and along the rivers Yana

(until 1943), Anabar, and Olenyok. The company comprised also Zhataisk Shipyard and Namsk Machine Workshops. NYRSC significantly contributed to the development of river navigation and cabotage trade and to the exploration of small rivers in northern Yakutia. Since 1953 NYRSC belongs within Lena United River Shipping Company.

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### **Northeast Arctic Expedition**

Northeast Arctic Expedition – was a special purpose expedition organized by Dalstroy in 1932 to transfer ships along the route Vladivostok-Kolyma (in the

mouth of the Kolyma River). The expedition consisted of six freight steamers “Anadyr,” “Sever,” “Suchan,” “Mikoyan,” “Krasnyi Partisan,” and “Uritskiy”; icebreaker “Fyodor Litke”; and motor-sailing vessel “Temp.” The expedition was lead by N.I. Yevgenov. Ice forced the vessels to winter near the Rautan Island in Chaunskaya Bay and the East Siberian Sea. “Uritskiy” was stuck in ice on its way to Chaunskaya Bay. “Fyodor Litke” icebreaker could not set it free, so “Uritskiy” was forced to drift in ice for 9.5 months and was set free by “Fyodor Litke” in summer 1933.

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## Northeast Passage

Northeast Passage – a route from the Atlantic Ocean to the Pacific Ocean along the northern coasts of Europe and Asia. More often referred to as the Northern Sea Route.

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## Northern Forum

Northern Forum – an international non-governmental organization of northern regions established on November 8, 1991. The headquarters are located in Anchorage, Alaska. The N.F. participants are the state of Alaska (the USA); the Provinces of Alberta, Yukon, and Northwest Territories (Canada); Regional Government of the Northern Norway (includes the counties Nordland, Finnmark, Troms, and Trondelag); Counties Vasterbotten and Norrbotten (Sweden); Province of Lapland (Finland), the Dornod Province, the Heilongjiang Province (China), Hokkaido Prefecture (Japan), the Komi Republic, the Sakha Republic (Yakutia); St. Petersburg, Khanty-Mansi, Nenets, Yamal-Nenets, and Evenki Autonomous Areas; Magadan and Sakhalin Regions; and Kamchatka Territory (the Russian Federation), with South Korea as an observer.

N.F. has two backup secretariats: one in Bodo (the Northern Norway) working with the

northwestern regions and another one in Yakutsk, focused on the Far East regions and Russia. An executive committee consisting of the chairman and three vice chairmen determines the Northern Forum’s general strategy. Conferences and meetings of regional coordinators are held occasionally, and the session of the N.F. General Assembly is held once in 2 years. In 1992 the N.F. was accredited by the UN as a non-governmental organization and was granted status of an observer in the Arctic Council.

The aim of the N.F. activity is better quality of life in the North through cooperation and sharing of experience, knowledge, and technologies. The N.F. is focused on solving practical economic, social, cultural, ethnical, environmental issues and implementation of priority projects in these areas. At present the N.F. participants are working over the following projects: environmental monitoring (development of specific research methods of environmental protection in the northern regions), wildlife management (study of comparative data on the state of wildlife), conservation of forests (sustainable environmentally friendly forest management), East–west and circumpolar airlines (optimization of the existing air routes and opening of the new ones), light aviation (development of light aviation in the northern regions of Russia basing on the experience of Alaska and Northwest Territories of Canada), the Northern Forum Academy (coordination of effort of scientists and researchers to solve the issues of the North and the Arctic Region), sea resource management (comparative research of the Northern seas’ resources), deer breeding management (exchange of experience and teaching Russian reindeer breeders techniques of their Scandinavian colleagues), establishment of the Bank for Reconstruction and Development of the Arctic Region (assistance to the economic development and cooperation of the N.F. participants), and the Northern Sea Route (development of commercial transport routs in the Arctic Ocean).

Several working groups were formed to work on these issues. The Northern Universities Association is acting under the auspices of the N.F.

## Northern Polar Circle, Arctic Circle

Northern Polar Circle, Arctic Circle – a circle of latitude that runs 66°33'N and marks the border of the cold climatic zone. At the winter solstice (December 22 in the Northern Hemisphere), the sun remains below the horizon, while at the summer solstice (June 22), it remains above the horizon for 24 h at this parallel.

## Northern Practical Dictionary

Northern Practical Dictionary – the first in the history of book publishing fundamental and universal corpus dedicated to the north of Russia and its neighbors in the Arctic Region – the North European Region, Canada, Alaska, and the United States. The Encyclopedia contains over 4,500 articles on northern territories, seas, nature, geographical features, reserves, branches of economy, and population, in particular, small indigenous ethnic groups, century-long history and rich heritage of the region, its outstanding scientists, travelers, and navigators. N.P.D. contains a lot of black-and-white illustrations and sections of colored maps and geographical materials on nature and dress of the indigenous inhabitants of the North. A CD with the audio version of N.P.D. is attached. The encyclopedia was published in Moscow in 2004 by the publishing house “Evropeyskiye Izdania & Severnyye Prostory.”

## Northern Sea Route (NSR)

Northern Sea Route (NSR) (the Northeast Passage up to the beginning of the twentieth century) – a major latitudinal shipping lane of Russia in the Arctic Region and Russian national ice route in waters of the Arctic Ocean that runs along the Barents Sea, the Kara Sea, the Laptev Sea, the East Siberian Sea, and the Chukchi Sea, connecting

the European part of Russia with Siberia and the Far East, European, and Asian ports. The length from Murmansk to Vladivostok is about 5,800 miles. This route is far shorter than the routes through the Suez Canal (12,800 miles) or the Panama Canal (14,900 miles). The length of the main ice-covered part from the Novaya Zemlya Archipelago to the Provideniya Bay at Chukotka is 5,600 km. It is the most challenging shipping lane in the world. The N.S.R. serves the ports of the Arctic Region and large Siberian rivers (import of fuel, equipment, and food and export of wood, including abroad, etc.). The chief ports are Igarka, Dudinka, Tiksi, Pevek, and Provideniya. Navigation continues 2–4 months (in some parts longer, due to icebreakers). Mastering of the ice lane in Russia was not at first systematic. The unified N.S.R. was being laid from west to east gradually, for no less than 500 years in total.

The idea of the N.S.R. from the Atlantic to the Pacific Ocean was suggested by the Russian Ambassador in Rome Dmitry Gerasimov in his talk with the Italian scholar Paolo Giovio. This fact is known due to the *Book of Vasily's Legation to Clement VII* (1525). As far as in 1763, M.V. Lomonosov submitted to the President of the Admiralty “Brief Description of Various Voyages Across Northern Seas and Demonstration of Probable Route through the Siberian Ocean to West India,” in which he substantiated his project – exploration of the N.S.R. In the nineteenth century, M.K. Sidorov and A.M. Sibiryakov decided to bring to life the idea of commercial navigation across the Arctic Ocean, but the authorities did not support them. In 1878–1879 Swedish Arctic expedition of N.A.E. Nordenskiöld, which was in large part financed by A.M. Sibiryakov, on the ship “Vega” (Captain L. Palander), for the first time traveled along the N.S.R. from west to east with one overwintering (in Kolyuchinskaya Bay). Though the expedition was a success, N.A.E. Nordenskiöld made a pessimistic conclusion: “In whole, this route... will hardly be of big use for trade.” That was the age of low-capacity boats, not the icebreakers; there were no planes

and radio, and not a single radiometeorologic station was to be found on the Eurasian northern shore. The development of the Arctic route was destined for staggered progress, with stops lasting many decades. The second through voyage (this time from east to west) was undertaken in 1914–1915 by Hydrographic Expedition of the Arctic Ocean headed by B.A. Vilkitsky on icebreakers “Taymyr” and “Vaygach,” with one wintering over as well on the route Vladivostok–Arkhangelsk. In 1918–1920 Norwegian polar explorer R. Amundsen on the ship “Maud” went along the N.S.R. from Norway to the Pacific Ocean with two winterings. In the beginning of the twentieth century, explorer of the Arctic V.A. Rusanov specified principal components in organization of future polar transport lane: the use of icebreakers, the necessity of scientific data (especially on ice), sustainable connection (including radio), and aerial observation (from aerostats). V.A. Rusanov went missing in 1912 when he was exploring a way to estuaries of Siberian rivers. His ideas started to be brought into life from the arrangement of polar stations (in Yugorski Shar Strait in 1913, on the Vaygach Island and the Yamal Peninsula in 1914, on Dikson in 1915). The duration of Arctic voyages reduced considerably when it became possible to get the required information.

Since 1924 Arctic aviation was being applied for ice reconnaissance. Ideas of V.A. Rusanov got final check when the expedition on the icebreaker “Krasin” was arranged (the head of the expedition R.L. Samoylovich, Captain K.P. Eggi) to save the airship “Italy” in 1928. In the 1920s scheduled sea traffic started in West Arctic (Karsk exchange of commodities). The first thorough voyage along the N.S.R. on the icebreaker “Sibiryakov” (Captain V.I. Voronin) without wintering, in one continuous voyage, was undertaken by Soviet expedition headed by O. Yu. Schmidt in summer 1932. In 66 days the icebreaker went from Arkhangelsk to the Bering Strait, finally stopping in the Japanese port Yokohama. This resulted in organization by Sovnarkom (the Council of People’s Commissars) in December 1932 of the Northern Sea Route Authority with the main

task: “...establish a final sea lane from the White Sea to the Bering Strait, develop it, keep it in the operating condition and ensure safe navigation along this route.” In 1935 four transport vessels covered the route in both directions without winterings and failures.

In 1936, having crossed the ice of the Arctic Ocean, a unit of torpedo-boat destroyers “Voykov” and “Stalin” went through the Bering Strait. This was the first time that military ships sailed along the N.S.R. Overall direction of the expedition was effected by O. Yu. Schmidt. The unit was accompanied by the icebreaker “Fyodor Litke.” Convoying of the ships in the western part of the Arctic Region was done by the icebreaker “Ermak” and in the eastern part by the icebreaker “Krasin.” Torpedo-boat destroyers left Leningrad on June 2, 1936, and arrived in Vladivostok on October 17 of the same year. While in 1876–1919, only 50,000 t of cargo were shipped along the ice lane, and within the period from 1933 to 1938, the figure reached one million tons. The development of the Arctic navigation required further exploration of the Arctic and, particularly, organization of an expedition to explore high latitudes on the icebreaker “Sadko” in 1935–1938, arrangement of the first drifting station “SP-1” (“North Pole – 1”) in 1937, explorations during drift of the icebreaker “Sedov” (1937–1940), etc. The Great Patriotic War (1941–1945) interrupted commercial operation of the N.S.R. Summer navigation, which lasted 3–4 months, was used to deliver military vessels and cargo to the front. The Northern Fleet fought off attacks of the German Navy, especially submarines.

In the postwar years, cargo turnover of the N.S.R. was continuously increasing. This required replacement of old coal-operated vessels with the new ones – diesel and atomic. Icebreakers of “Moskva” type (capacity 26,000 hp) and a new icebreaker “Ermak” (capacity 40,000 hp) were built in Finland and put into operation.

In the end of the 1950s, the first Soviet atomic icebreaker “Lenin” touched the ice, followed by a series of even more powerful (75,000 hp) atomic-powered vessels like “Arktika.” This was when the country’s fleet of atomic-powered icebreakers

was created. In spring 1978 a long-cherished dream of polar seamen – to develop the best high-latitude route through the Central Arctic Region and polar regions – had come true. The test route from Murmansk to Magadan was passed by transport diesel and electric powered vessel “Kapitan Myshevskiy” under the convoy of the atomic icebreaker “Sibir.”

However, the Arctic Region has always been an environment hostile to the man. During the shipping season of 1983, over 30 vessels and icebreakers were captured by ice off Chukotka shores. One of them sank and crashed by ice, and many others were seriously damaged, but there were neither casualties nor was a single vessel forced to stay for winter. In the 1980s annual turnover of commercial shipments along the N.S.R. exceeded seven million tons. In 1991 the “Regulations for the Navigation along the Northern Sea Route Lanes” were approved.

In the beginning of the 1990s, shortage of funds compelled the Arctic fleet to earn currency by offering tourist cruises to high latitudes with indispensable visiting of prestigious place of interest – the North Pole. Such cruises took place in 1990, 1991, and 1992; atomic icebreakers carried foreign tourists to the shores of the Franz Josef Archipelago, Severnaya Zemlya, the Wrangel Island, and the Pole.

However, from 1992 to 2000 the N.S.R. cut the volume of carriage drastically. In 1997–1998 as part of the international project of the European Transport Commission ARCDEV, a test voyage of Russian and Finnish tankers was organized to carry natural gas liquid from the Gulf of Ob and the Yamal Peninsula to the Port of Rotterdam.

In 1999 the N.S.R. was qualified as an independent Eurasian shipping lane. To manage Russian users of the N.S.R. in 2001, the “Non-Profit Partnership for the Coordination of the Use of the Northern Sea Route” was established. In 2003 the State Council of the Russian Federation approved the Transport Strategy of the Russian Federation up to 2020, which particularly defines basic directions of the N.S.R. development, namely, transport support, development of Arctic oilfields, including the offshore ones, and sea export of oil

and gas; development of prospective large-scale regional and transit trips and deliveries of socially important goods to the Northern Territories; and development of the self-sustaining and profitable Arctic maritime transport system. It is estimated that by 2015, the volume of carriage along the N.S.R. can reach four million tons per year. The federal law “on the Northern Sea Route” aimed at specification and confirmation of its status and legal regime is under consideration.

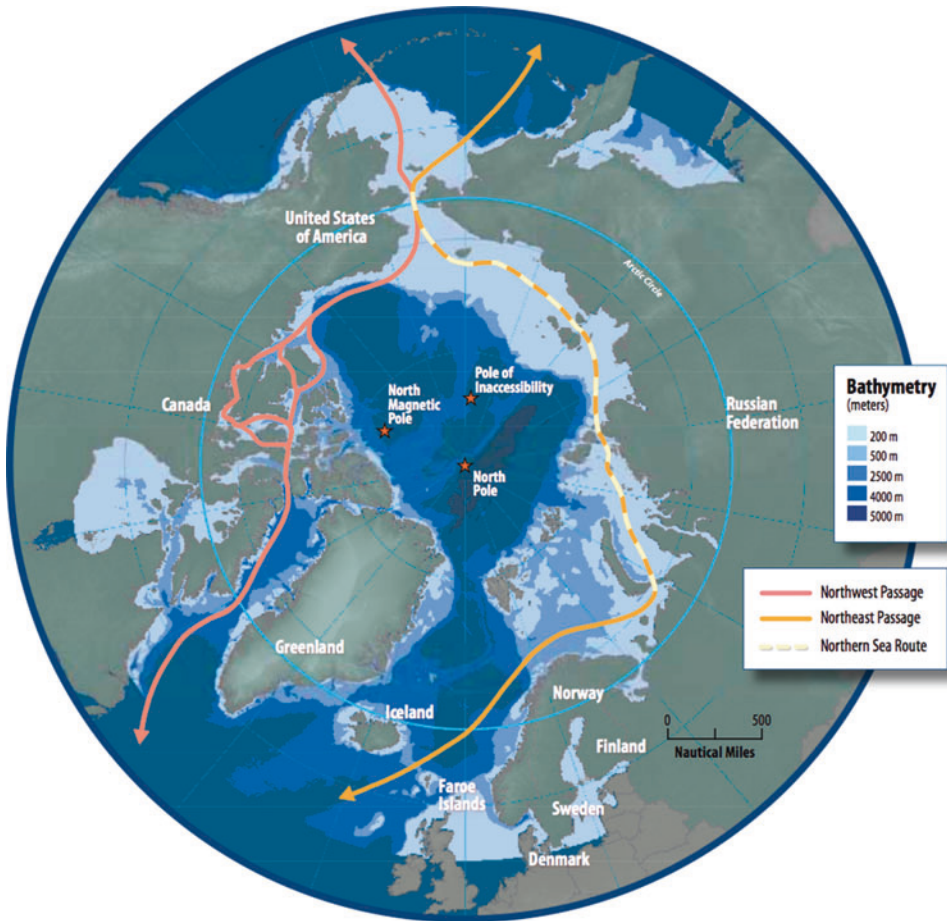
In recent years over 20 icebreaking ships of the Norilsk class are operating on the N.S.R. (each of them transports up to 20,000 t of cargo). They can be used without an icebreaker in meter-wide ice. The tactics of the navigation changed and its timeline extended.

At present the western part of the N.S.R. is navigated throughout the year along the route Murmansk–Dudinka for the purposes of Norilsk Nickel and the Eastern part Vladivostok–Pevek. In 2000 the export of oil from the Gulf of Ob and the islands of Varandey and Kolguev by tanker fleet of Lukoil Oil Company started. Due to the dynamic development of Arctic fields, the construction of the Arctic transport fleet began, namely, icebreaker tankers of 50,000–100,000 t deadweight, which will make it possible to reach the new level of the N.S.R. transportation.

Formerly record-level voyages all the way along the N.S.R. are being resumed. The international commercial interest in the lane Europe–Japan has developed. Vessels with British, German, and Scandinavian goods reach Japanese ports by the shortest way between the two oceans. They are served by Russian northern shipping companies, which get high proceeds due to this, ice air reconnaissance, and radiometeorological and polar stations. The state program of the economic and social development of Russia envisages special measures on the development of the Arctic Region. Prospects of the N.S.R. will largely depend on the scale of investment and production activities in subarctic regions.

Navigation along the N.S.R. (the Kara Sea, the Laptev Sea, the East Siberian Sea, and the Chukchi Sea) is defined as the navigation along the historic national sea route on the nondiscriminatory basis.





Northern Sea Route (Source: [https://en.wikipedia.org/wiki/Northern\\_Sea\\_Route](https://en.wikipedia.org/wiki/Northern_Sea_Route))

The regulation of the Council of Ministers of the USSR dated July 1, 1990, opens the N.S.R. for ships of all flags upon condition of obligatory icebreaking and piloting convoy.

In 2012, the federal law “On Introduction of Amendments to Certain Regulatory Acts of the Russian Federation in the part of state regulation of commercial navigation in the waters of the Northern Sea Route” was passed.

In 2013 Federal State Institution “The Northern Sea Route Administration” was established according to the Order of the Government of Russian Federation № 358-p (March 15, 2013), Federal Law Act № 81 (April 30, 1999) p.3 art. 5.1 “The merchant shipping code of Russian Federation”, to organize navigation in the water area of the Northern Sea Route.

## Northern Sea Route Administration (NSRA)

Northern Sea Route Administration (NSRA) – Federal State Institution “The Northern Sea Route Administration” was established on March 15, 2013 according to the Order of the Government of Russian Federation № 358-p, Federal Law Act № 81 (April 30, 1999) p.3 art. 5.1 “The merchant shipping code of Russian Federation”. Aim – to organize navigation in the water area of the Northern Sea Route. The main functions are: (1) Obtaining and considering the submitted applications and issuing the permissions for navigation through the NSR; (2) Issuing the certificates of the ice conventional pilotage on the

NSR; (3) Researching weather, ice, navigational and other conditions on the NSR; (4) Coordination of installation of navigational aids and harmonization of regions to carry out hydrographic surveys operations on the NSR; (5) Assistance in the organization of search and rescue operations in the water area of the NSR; (6) Assistance in eliminating the consequences of pollution from vessels of harmful substances, sewage or garbage; (7) Rendering the information services in relation to the water area of the NSR, for example, about the organization of navigation, requirements of safe navigation and others; (8) Making recommendations about development of routes of navigation and using icebreaking fleet in the water area of the NSR, ice and navigational conditions there; (9) Timely data retrieval from Russian Hydrometeorological Service about hydrometeorological forecast and ice analysis.

### **Northern Slope of Alaska, Alaska's North Slope**

Northern Slope of Alaska, Alaska's North Slope – the wildest part of the state of Alaska, USA. It spans the Canadian border in the east to the Outer Continental Shelf of the Chukchi Sea in the west. N.S.A. is tundra that runs to the north from the Brooks Range to the coasts of two seas – the Chukchi Sea and the Beaufort Sea. N.S.A. includes outer parts of the Chukchi Sea and the Beaufort Sea continental shelf, the Arctic National Wildlife Refuge, Central Arctic Region (between the Colville River and the Canning River), and the National Petroleum Reserve in Alaska. The slope boasts undisturbed nature and is rich in carbohydrates. It is a unique ecosystem that needs protection and a petroleum (over 36 billion barrels) and gas (3.8 trillion m<sup>3</sup>) reserve. According to the US Department of Energy, the amount of petroleum and gas in the outer parts of the Chukchi Sea and the Beaufort Sea continental shelf is 14 billion barrels and 2 trillion m<sup>3</sup>, respectively. Around 58,000 km<sup>2</sup> in the center of the slope belongs to the state of Alaska, and several large plots are the property of the native

people – the Inupiat – with other lands being the Federal property. The eastern part of the Federal land is the place of location of the picturesque Alaska Maritime National Wildlife Refuge, while the western part is the US largest plot of Federal land (area 93,000 km<sup>2</sup>), known as the National Petroleum Reserve in Alaska (NPR).

### **North Siberian Plain**

North Siberian Plain – located between the low reaches of the Yenisei and the Kolyma rivers. The length is around 3,000 km, and the width is up to 600 km. The western part of the plain is often referred to as the Taymyr Plain, while to the east from the Lena River, in the basin of the Yana, the Indigirka and the Kolyma, respectively, the Yana-Indigirka Plain and the Kolyma Plain. The N.S.P. consists mainly from the Mesozoic sea deposits (sandstones, clay slate, etc.), overlaid by loose sea and ice deposits with multi-year ice inclusions. The surface is gently rugged and wavy. In places it has mountain chains and ranges (up to 635 m). Permafrost is widespread. N.S.P. is strongly waterlogged, with many lakes. Flora is represented by tundra and forest tundra.

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### **Northwest Passage**

Northwest Passage – a route from the Pacific Ocean to the Atlantic Ocean along the northern coast of North America. It goes through the Bering Strait off the shores Alaska and Canada and through the strait of the Canadian Arctic Archipelago. Ice clusters and insufficient depth in some straits impede navigation. In some years multi-year ice up to 3–4 m thick spans the route from Point Barrow (Alaska) on the borderline of the Chukchi Sea and the Beaufort Sea to the mouth of the Mackenzie River. It was first traversed from east to west in 1903–1906 by the expedition from Norway headed by R. Amundsen on the vessel “Gjoa.” In 1944 a Canadian vessel “Saint Roch” crossed the route in single

navigation, and a Canadian icebreaker “Labrador” repeated the venture in 1954. The navigation along the route is mainly for exploration purposes. In the western part of the waterway, they are more regular in summer due to the discovery and development of oil fields in Prudhoe Bay (Alaska). Scientific and operational support of expeditions is affected by the US Naval Oceanographic Office and the Meteorological Service of Canada.

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### **Novopashennyi, Petr Alekseevich (1881–1950)**

Novopashennyi, Petr Alekseevich (1881–1950) – Russian explorer of the Arctic Ocean and captain 1st rank. In 1902, he graduated from the Naval Cadet Corps and was assigned to the Siberian naval regiment. In 1903, he served as a chief of the watch of the security guards of Tyuleniy Island. At the end of the year, he was appointed to the battleship “Sevastopol.” He participated in the defense of Port Arthur and spent a year as a Japanese prisoner of war. He was promoted to the rank of lieutenant (1905). From 1907 to 1908, he was a senior flag officer at the headquarters of the commander of the second detachment of mine ships of the Baltic Fleet. In 1910, he graduated from the Hydrographic Department of the Naval Academy, and then he had his 2-year probation in astronomy and geodesy at the Pulkovo Observatory and received the title of hydrography surveyor. In 1913, he was appointed assistant chief of the Hydrographic Expedition of the Arctic Ocean and commander of the icebreaker “Vaigach.” During his service in the expedition, N. participated in various types of hydrographic operations (determining astronomic points, magnetic observations, marine surveying, and boat sounding) and discoveries of the Severnaya Zemlya Archipelago, Vilkitsky Strait, the Islands of Vilkitsky, small Taymyr, Starokadomsky, and Novopashennyi (Zhokhov Island from 1926). In 1914–1915, while leading “Vaigach,” N. participated in the first in the history through passage from east to west across the Northern Sea Route (with a wintering near Cape Chelyuskin).

He actively cooperated with the Russian Geographic Society. In 1915 he commanded the Baltic Fleet destroyers “Desna” and in 1916 “Konstantin.” In early 1917, he was appointed assistant chief of the communication service of the Baltic Fleet after promotion to captain 1st rank. In April of the same year, N. was elected a member of the Executive Committee of the Naval Officers Union in Revel (Tallinn), and in June he became head of the communication service of the Baltic Fleet. On April 15, 1918, he was approved as a chief of the Hydrographic Expedition of the East Siberian Arctic Ocean region (did not occur due to the capture of Siberia by the Whites) and simultaneously appointed Editor of the Magazine *Sea Digest*. In June 1919, N. served as chief of the Naval Department of the Intelligence Office of the General Yudenich Army and then migrated to the United States, where for several years he led marine research expeditions.

In 1928, he was referred to as the senior officer of the “Union of Mutual Assistance of the Russian Fleet Officers” in Berlin. During the Second World War, he served as a head of the Abwehr cryptographic department “4-0” (German military intelligence and counterintelligence agency). In 1945 he was arrested by agents of the Berlin operative sector of the Soviet Interior Ministry and sent to the Sachsenhausen concentration camp and then to the Soviet Union. He died, apparently in October 1950, in a transit camp at Orsha, Belarus.

His name was given to a bay on the Island of October Revolution (Troynaya) in the Severnaya Zemlya Archipelago, an island in the East Siberian Sea and a glacier on the Novaya Zemlya Island (they were later renamed).

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### **Novosibirskiy (New Siberian) Ice Massif**

Novosibirskiy (New Siberian) Ice Massive – formed in summer in the western part of the East Siberian Sea in the area of extensive land fast ice. It consists of 1-year, and sometimes older, ice. By the second half

of navigation, the whole massif is usually destroyed and then the ice edge retreats far north (north of the New Siberian Islands). But when the massif contains pack ice, it is preserved until the next freeze.

sublatitudinal trough of the southern slope of the Hyperborean Platform near the New Siberian Islands. OGB contains a cross-sectional carbonate and terrigenous sediments of the Paleozoic, partly Mesozoic and Cenozoic, with a total thickness of 4–12 km.

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### **Novosibirskiy (New Siberian) Oil and Gas Basin (NSOGB)**

Novosibirskiy (New Siberian) Oil and Gas Basin (NSOGB) – one of the four OGBs of the Eastern Arctic. It was formed in an extended

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### **Nutaug**

Nutaug – a lagoon in the Chukchi Sea (Chukchi: *Nutevgi* – a name for the Chukchi, who lived in this lagoon).

## October Revolution Island

October Revolution Island – the largest and central in the archipelago of Severnaya Zemlya and Taymyr (Dolgan-Nenets Autonomous District), Russia. Its eastern shores are washed by the Laptev Sea and the northern, western, and southern shores by the Kara Sea. The area is about 14,100 km<sup>2</sup>; the height is up to 965 m. It is separated from the Island of Bolshevik by Shokalsky Strait (the width of 20–38 km) and from the islands of Komsomolets and Pioneer by the Red Army Strait (the width of 3–18 km). The island is slightly elongated from northwest to southeast with a length of 170 km and a width of up to 130 km. There are many large bays, but the biggest is the fjord Matusevich. The largest peninsulas are Gusinyi, Zhyloy, and Parizhskoy Kommunny (Paris Commune).

The relief is classified as plateau – like with a lot of high plains. The coast is uneven, rugged by bays and headlands. The coast of the island is mostly flat; cliffs that are up to 20 m high are found in areas where Rusanov and Universitetsky Glaciers come to the sea and in the Fjords of Matusevich and Marat. In all, there are seven large glaciers on the island, which occupy more than half of the entire area of the island. The largest are Karpinskiy, which is the highest

point of the island, and the Severnaya Zemlya (963 m).

On the island there are many relatively large rivers. The longest of them are the Ozernaya with a length of 64 km (the longest river of the archipelago), the Ushakov 58 km, and the Bolshaya 42 km. There are not many significant lakes on the island; the largest of them is the Fyordovoye Lake that has an area of 57 km<sup>2</sup>. Most of the ponds on the island are covered with ice.

The island has arctic desert and tundra vegetation. The fauna of the island is represented by reindeer, polar bears, arctic foxes, and lemmings. On the north and east coast, there are bird rookeries. In coastal areas, there are walrus rookeries.

O. R. I. is the only Severnaya Zemlya Islands that may be of commercial value due to gold placers found here.

In 1935, the polar station Cape Olovyanniy, whose first head was E. T. Krenkel, was founded in the southeastern part of the island. In 1950, the Arctic Institute researchers conducted weather and snow-glaciological surveys on the island, and in 1974 the same institution built the research station Dome Vavilov at the top of the Vavilov Glacier Dome.

The island was first explored and mapped in 1931 by an expedition of G. A. Ushakov and N. N. Urvantsev of 1930–1932 and named after the October Revolution of 1917.



## Olenyok

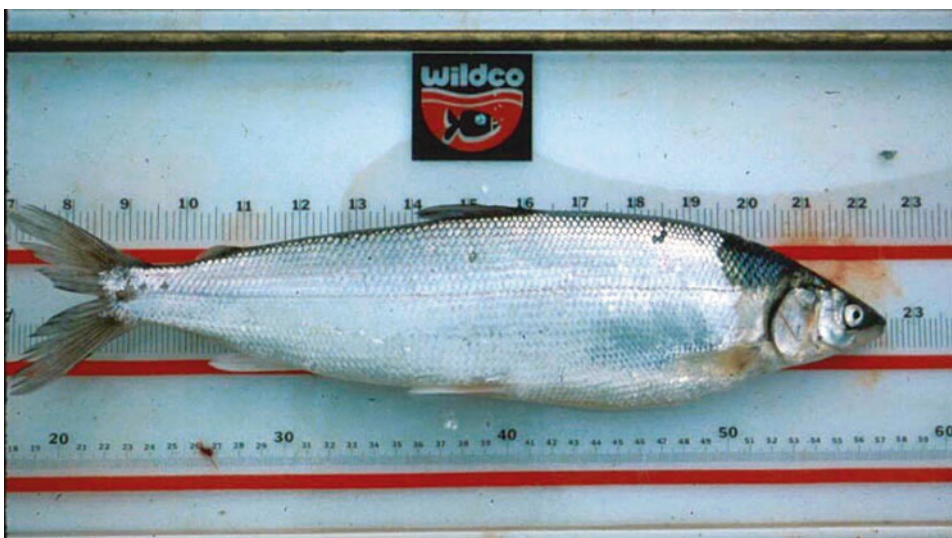
Olenyok – the river flows mainly in the Republic of Sakha (the upper course is in the Krasnoyarsk Region). The length is 2,292 km; the basin area is approx. 220,000 km<sup>2</sup>. It flows into the Gulf of Olenyok of the Laptev Sea, forming a delta (the area of 475 km<sup>2</sup>). It is cataracted. The flow is 40 km<sup>3</sup>/year. The average water runoff is 1,210 m<sup>3</sup>/s. It contains ice formations from the end of September–October to late May–early June. It is navigable in the lower reaches. It is rich in fish (whitefish, cisco, white salmon, etc.).

## Omoloy

Omoloy – a river in the north of the Republic of Sakha (Yakutia). The length is 593 km; the basin area is 38,900 km<sup>2</sup>. Its source is located on the slopes of the Verkhoyansk Range, and it flows north and meets the bay of Buor-Khaya of the Laptev Sea from the east; the width of the river at the mouth is 0.5 to 2.5 km, and the depth is up to 5 m. Fisheries are well developed. Before 1936 there was a radio station of the Glavsevmorput at the mouth of the river.

## Omul or Arctic Cisco (*Coregonus autumnalis*)

Omul or Arctic Cisco (*Coregonus autumnalis*) – a semi-anadromous fish of the salmon family (Salmonidae). Actually omul or Arctic cisco feeds in coastal areas of the Arctic Ocean and makes it way upriver to spawn east of the Pechora (excluding the Ob) and enters rivers of the Arctic Ocean (starting from the Mezen). It is a big fish, approx. 64 cm in length to 3 kg in weight. It begins to migrate to rivers in June and July. It does not feed during migration and gets much thinner. It makes its way upriver for 1,000 km or more. It reaches sexual maturity at the age of 5–10 years. It spawns in October, not annually. Average fertility is 19,000 eggs. After spawning it immediately flows into the estuarine area. Young fish hatch from eggs in the spring and immediately flow into the lower reaches of rivers. In the sea it feeds on benthic crustaceans, fish fry, and small zooplankton. It is a very important commercial species. It is fished in Siberian rivers, as well as in the waters around small and big Lyakhovsky Islands.



Omul (Source: [https://en.wikipedia.org/wiki/Arctic\\_cisco](https://en.wikipedia.org/wiki/Arctic_cisco))

## Omulyakhskaya Bay or Omulyakh Bay

Omulyakhskaya Bay or Omulyakh Bay – a shallow bay with low coasts in the western part of the East Siberian Sea on the coastal area of the Republic of Sakha (Yakutia), Russia. It juts out into the mainland for 75 km in parallel to the coast and continues to the Khromskaya Bay (Khroma Bay).

## Onatsevich, Mikhail Lyutsianovich (1847–1879)

Onatsevich, Mikhail Lyutsianovich (1847–1879) – Russian researcher of the Far Eastern seas and a naval lieutenant. In 1868, he graduated from the Naval Academy, was promoted to midshipmen, and was assigned to the circumnavigation on the clipper “Vsadnik.” Within 3 years, O. actively participated in the hydrographic survey in the Sea of Japan (recordings and measurements of the Hakodate Harbor and Aniwa Bay, chronometric connection of the South Sakhalin and the Japanese islands). From 1872 to 1874, he was a trainee of the hydrographic department of the academic course of Marine Sciences.

He was appointed the head of OSVO. In 1875, he conducted a winter survey in the Gulf of Peter the Great and then on the schooner “Vostok” explored the northwest coast of the Sea of Okhotsk from Ayan to Gizhiginskaya Bay and drew up a map of Tauyskaya Bay. After wintering in Hakodate, Japan, he went into the Bering and Chukchi Seas, where he conducted extensive hydrographic surveys: measurements and preparation of plans and maps of the Bay of Krest and Providence Bay, Saint Lawrence Bay, Bay of Gavriil, and Olyutorsky Bay. At the same time, astronomical, magnetic, and hydrological measurements were carried out under his leadership. In 1878, the Marine Scientists Committee published his report, which was highly appreciated by specialists.

Major works: “*Astronomical Observations in the Sea Made While Sailing on Clipper Vsadnik in 1868–1871*” (1872), “*A Brief Hydrographic Overview of the Voyage of the Schooner Vostok in 1875*” (1876), and “*A Collection of Observations Made During the Hydrographic Trip to the Eastern Ocean in 1874–1877*” (1878).

The name of O. was given to a cape and a peninsula in Tauyskaya Bay in the Sea of Okhotsk. The Maritime Academy put his name on a marble plaque with the names of the most prominent marine researchers.

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### **Pacific Fishery Institute (TIRKH)**

Pacific Fishery Institute (TIRKH) – was established in 1929 through reorganization of the Pacific Scientific and Commercial Station (TONS). The basic task of the Institute is the development of scientific basis for better fishery. Sturgeons and ordinary fish were studied to expand the raw material base in the Amur. In 1930 TIRKH had three fishery plants: Sakhalinskiy on the Tym', Amurskiy (now Teplovskiy) on the Bira, and Kamchatskiy on the Ushki. Apart from works on preserving spawning locations and study of salmon spawning and breeding of juvenile fish in fish refuges, the research on acclimatization of red salmon in the Amur and crucians in Kamchatka was held. In 1932–1933 the “Pacific Complex Expedition” took place, with TIRKH participating in it. The research was held in the Sea of Japan, the Sea of Okhotsk, the Bering Sea, and the Chukchi Sea. In 1932 the Kamchatka and the Sakhalin branches of TIRKH were opened. In 1934 TIRKH was reorganized to the Pacific Research Institute for Fishery and Oceanography (TINRO).

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### **Pacific Herring (*Clupea pallasii*)**

Pacific Herring (*Clupea pallasii*) – sea fish of the Clupeidae family. The distribution is widely in the northern part of the Pacific Ocean; along the Asian coast, its distribution is from the Yellow Sea in the south to the Bering Strait in the north and in America from San Diego in the south to Kotzebue Sound in the Chukchi Sea. Within this huge area, herring is divided into several disjunct populations different in numbers and in distribution.

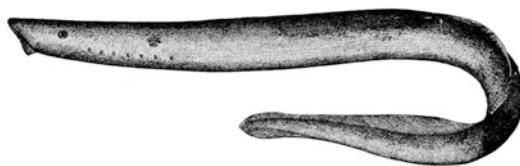
P.H. is a schooling, pelagic fish. It can attain length up to 50 cm, though typical fish size is 40 cm. It can live in freshwater and matures at 2–3 years. The spawning is in spring in the coastal area, in the temperature 2–6 °C at the depth up to 10–15 m; some herring spawns in salty lakes and bays. After spawning, adult herring and tiny fish leave the coastal area, but do not migrate far and gain weight separately. Adult herring feeds on plankton crustacea. Life span is up to 13 years. It is a very important commercial species.



Pacific Herring (Source: [https://en.wikipedia.org/wiki/Pacific\\_herring](https://en.wikipedia.org/wiki/Pacific_herring))

### Pacific Lamprey and Arctic Lamprey (*Lethenteron camtschaticum*)

Pacific Lamprey and Arctic Lamprey (*Lethenteron camtschaticum*) – anadromous fish of the lamprey family (Petromyzontidae). The length is 50–60 cm. The body is long, eel-like, and naked. They are distributed in the basins of the White, Barents, Kara, Chukchi, and Bering Seas, the Sea of Okhotsk, and the Sea of Japan and in the rivers of the Arctic Ocean to the Ob inclusive. The most numerous is in the Onega, the Northern Dvina, and the Mezen. Off the coast of America, L. is found in the Gulf of Alaska. At the end of the summer, L. forms large shoals in pre-estuary spaces of rivers. It enters the river in autumn, in September–October; the migration continues also after ice formation. P.L. moves up the rivers for hundreds of kilometers, mostly at night. Since the beginning of the migration, it stops feeding and winters in freshwater and spawns in late spring to early summer (May–June). Fertility is 80,000–100,000 eggs. After spawning, P.L. dies. Niners live in rivers for few years, transformed into adult lampreys, and run to sea. Adults feed on the blood and muscles of fish (whitefish, herring, salmon, chum salmon, smelt) stuck to their bodies. Lamprey feeds especially actively at the end of summer, when going to swarm. The life span is 7 years, of which 4 years it spends in rivers. It has a high commercial significance.



Pacific lamprey (Source: [https://en.wikipedia.org/wiki/Arctic\\_lamprey](https://en.wikipedia.org/wiki/Arctic_lamprey))

### Pacific Research Institute for Fishery and Oceanography (TINRO)

Pacific Research Institute for Fishery and Oceanography (TINRO) – was established in 1934 as a result of reorganization of the Pacific Fishery Institute (TIRKH). The Institute searched complex solutions for general biological and fishery issues. A lot was done for inventory count of flora and fauna of the Far East seas, many new species were described, and the hydrological regime of seas was studied. Special attention was paid to determine fishery capacities of Russian waters and study their biology, methods of fishing, and treatment of numerous fish species (salmon, herring, cods, sardine, flounder), sea weeds, invertebrates, and sea mammals.

In 1929 TINRO acquired the first research vessel “Rossinante,” which allowed to expand and further develop fishery research activities. In the end of 1940s–1950s, vast complex research in all the Far East seas, waters off Kamchatka and the Kurils, was held. As a result raw basis of the

Soviet fishery in the Far East was considerably expanded. In the end of the 1950s to the beginning of 1960s, TINRO was formed as the country's largest scientific institute. Later on, TINRO enhanced works in the area of commercial fishery. Methods of large-scale trawl fishing were introduced, light fishing and hydroacoustics, the mariculture was further developed, the methodology of raw basis monitoring was implemented, and the ecosystemic approach to study the population of fishery items and prediction of fishery situation using remote sounding methods were developed. In 1994 TINRO was restructured to the Pacific Research Fishery Centre (TINRO-Centre).

### **Palander af Vega, Adolf Arnold Louis (1842–1920)**

Palander af Vega, Adolf Arnold Louis (1842–1920) – a Swedish naval officer and polar researcher. He was born in Karlskrona, Sweden. His father was an admiral of the Royal Swedish Navy and director of the Royal Navy dockyard in Karlskrona. At the age of 14, P. became a naval cadet. In 1864, he graduated from the Naval Academy as a second lieutenant and took part in an expedition to the Mediterranean Sea, Sierra Leone, and Liberia on the corvette “Gefle,” as well as in a voyage to the USA. In 1868, P. participated in the expedition of A. Nordenskiöld to Spitsbergen on the steamer “Sofia.” In 1869–1870, on the ship “Vanadis,” he took part in the expedition in the Mediterranean Sea. Then he became the ship's captain on the postal steamer “Polhem,” first cruising during the winter of 1870–1871 between Gotland and mainland Sweden and then during 1871–1872 to secure the postal route across the Öresund in severe winter conditions. He was also the ship's captain on the steamer “Polhem” during Nordenskiöld's winter expedition to the Spitsbergen islands in 1872–1873, where he displayed exceptional courage and skill and significantly contributed to the scientific work. From the base camp at Mossel Bay, Palander and nine other men accompanied Nordenskiöld on the unsuccessful attempt to reach the North Pole in May–June 1873. Upon



LOUIS PALANDER AF VEGA

Palander af Vega Adolf Arnold Louis (Source: <http://www.revoly.com/main/index.php?s=SBH>)

return to Sweden, Palander's request for an honorable discharge from the navy was granted, and he took employment first as a captain on cargo ships en route to England and later as a captain for a steamer line based in Gothenburg. In 1877 Palander returned to the Royal Navy and became the captain on the successful expedition of A. Nordenskiöld on “Vega” in 1878–1879, which first navigated the Northeast Passage. Upon return to Sweden, he was made a noble by the Swedish King Oscar II under the name of “Palander af Vega.” During 1881–1883, Palander served as an aide-de-camp to the director of the Royal Navy shipyard in Karlskrona. In 1900 he was promoted to full rank of rear admiral, and in 1903 he became a vice admiral. In 1905 he resigned his post as cabinet minister together with the rest of the government and resumed his post in the Swedish Royal Navy.

His name was given to a bay in the northwestern part of the Taymyr Peninsula and a strait in the archipelago of Nordenskiöld southwest of Taymyr, the Kara Sea.



## Pathfinders

Pathfinders – Russian trades or service class men, whose activities lead them to geographic discovery of North and Northeast Asia, of the seas washing it and initiated its reclamation. They were the first to travel through the whole of Siberia from the Urals to the Pacific Ocean in around 60 years, from the end of the sixteenth to the middle of the seventeenth century. The starting point for all the trips to the shores of the Bering Strait and the northern part of the Sea of Okhotsk was the lower reaches of the Kolyma River. They also made use of the sea route from the Lena mouth to the mouths of the Yana, Indigirka, Alazeya, and Kolyma. In order to get access to the Pacific Ocean from the Lena in the seventeenth century, the Ps. also used the rivers Uda, Ulya, and Okhota, flowing into the Sea of Okhotsk. In the second half of the seventeenth century, the Okhota and the Ulya were often reached by means of the rivers Maya (the Aldan tributary) and Yudoma (the Maya tributary).

As a result of steady advance eastward, the Russians reached the coast of the Pacific Ocean as early as the beginning of 1640. In the second quarter of the seventeenth century, they passed all separate parts of the Arctic seas along the Asian coast and the coast of the Sea of Okhotsk. The middle of the seventeenth century was marked by geographic discoveries of great historical importance. Fedot Popov (Alekseev) and Semen Dezhnev navigated around the Chukotka Peninsula through the strait between Asia and America (the Bering Strait); Vassili Poyarkov and Yerofey Khabarov conducted their prominent trips to the Amur. The end of the seventeenth century was marked by the expeditions of Vladimir Atlasov to Kamchatka. By the beginning of the eighteenth century, part of the territory and a huge hydrographical network of Siberia and the Far East were explored, and the navigations of the polar mariners foreshadowed the reclamation of the Northern Sea Route.

## Pavlutsky, Dmitry Ivanovich (?–1747)

Pavlutsky, Dmitry Ivanovich (?–1747) – a Russian explorer of Chukotka and officer of the Tobolsk Dragoon Regiment. In 1727, he was promoted to Captain, since 1730 a Major. Approximately in 1728, he together with A. F. Shestakov led an expedition to the Chukchi Peninsula. Then, he independently went to the Anadyr fortress and fit out M. S. Gvozdev for a marine expedition, which ended by the discovery of Alaska. In 1731, he undertook an expedition to Chukotka and led military campaigns in the Chukotka Peninsula and geographical survey of this area (he headed the military detachment of the expedition of A. I. Shestakov of 1732 and 1744). In 1739–1742 he was the governor of Yakutsk. In 1744, he headed the second Chukchi expedition during which the coast of the Chukchi Peninsula, the coast of the Chukchi, and the East Siberian Seas were surveyed; Mechigmenskiy and Kolyuchinskaya Bays, several small lagoons and Chaunskaya Bay with Ayon Island, as well as many rivers of the Pacific and the Arctic Ocean were mapped for the first time. In 1747, by decree of the senate, he personally left for Chukotka. P. was killed in the battle with the Chukchi in March 1747.

## Peled, Syrok (*Coregonus peled*)

Peled, Syrok (*Coregonus peled*) – predominantly lake fish of the herring family (Clupeidae). The upper jaw is slightly longer than the lower, a lot of gill rakers (49–68). On the head and dorsal fin, there are tiny black specks. It is large, up to 40–55 cm in length and 2.5–3 kg fish, rarely of 4.5 kg. It is common in lakes and rivers (from the Mezen in the west to the Kolyma in the east). Autumn spawning occurs in lakes near spring brooks and in rivers on pebble or sandy bottoms. Fertility is from 5,000 to 85,000 eggs, fine caviar.

P. reaches sexual maturity at the age of 3–5 years. It feeds mainly in lakes on pelagic crustaceans. An important target species in the lower reaches of the Siberian rivers and in the Pechora.

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### **Perfilyev (Perfilyev), Ilya (?–?)**

Perfilyev (Perfilyev), Ilya (?–?) – a Cossack platoon commander, Arctic navigator, and explorer. In the summer of 1633, on two koch ships, he went down the Lena River to its delta. Further, one ship under the command of I. Rebrov moved through the Olenyok anabranch to the west; P. on the second koch via the Bykovskaya anabranch went into the bay of Buor-Khaya and headed east. He sailed around Cape Buor-Khaya, first entered the Yana Bay, and discovered the mouth of the Yana. Going up the river, the Cossacks identified the western part of the Yana-Indigirka Lowland and met Yukagirs (the people which were not known by Russians). In the autumn of 1635, P. reached the headwaters of the Yana (the confluence of its two components) and founded a winter camp (the future city of Verkhoyansk). In 1638, together with I. Rebrov, he moved down to the Laptev Sea and then went to Yakutsk.

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### **Permyakov, Yakov (?–1712)**

Permyakov, Yakov (?–1712) – a Russian explorer and industrialist. In 1710, he sailed from the river Lena to the Kolyma and saw two islands (Big Lyakhovsky and one of the Medvezhiy Islands) in the sea. In 1712, he took part in the expedition led by Cossack M. Vagin, which in the winter reached Big Lyakhovsky Island over the ice from Cape Saint Nose and examined it. P. was killed along with Vagin by rebellious Cossacks from his detachment.

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### **Peschanyi**

Peschanyi – a small circular island north of the Anabar Bay, the Laptev Sea, Republic of Sakha (Yakutia), Russia. It is located 74 km off Big Begichev Island and 62 km north of the coast of the mainland. It is shaped as an atoll and stretched from north to south, the length of approximately 12 km. The sandy strip of land is broken from the east and southeast; in the center, there is a large shallow lagoon. The island is barren and uninhabited. The sea surrounding the island is covered with pack ice in the winter. The climate is characterized by harsh Arctic weather with frequent storms and low temperatures, even in short summer seasons, which last only 2 months. On the island, there is a colony of walruses.

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### **Petra (Peter) Islands**

Petra (Peter) Islands – two low-lying islands in the Laptev Sea, located at the northeastern end of the Taymyr Peninsula (Pronchishchev Coast), at the entrance of Petra (Peter) Bay between Maria Pronchishcheva Bay and the Faddey Bay, Krasnoyarsk Krai, Russia. The islands have an elongated shape with a smoothly curved coastline. The northern Peter Island is an area of approx. 175 km<sup>2</sup>, separated from the east coast of Taymyr by a narrow strait of 1.2–1.6 km, has a length of approx. 20 km and a width of 2–9 km, and is located 9 km to the southeast and a little further from the coast of the mainland, more rounded in shape, the length of approx. 22 km, and 8 km in width on average. The islands are separated by a strait 3–6 km in width. The area is approx. 300 km<sup>2</sup>. Petra Islands also include the islands of Dozhdevoy, Vstrech, Kleshnya, Serpastyi, Volnolomnyi, Mnogomysnyi, Bezymyannyi, Andreyka, and Koshka (Arctic climate). The sea around the islands most of the year is covered with ice, and even in summer near the islands, there is a drifting pack ice that helps the

animals frequently move from the mainland to the islands. The islands are located on the Northern Sea Route. One of the islands was discovered in 1736 by the Lena-Khatanga detachment of the Great Northern Expedition of 1735–1736 under the command of Lieutenant V. V. Pronchishchev. It is called the Island of St. Peter in 1739 by Kh. Laptev, who then applied this name to all three islands discovered by him.

### **Petrov, Vladimir Vasilyevich (1791–?)**

Petrov, Vladimir Vasilyevich (1791–?) – a Russian circumnavigator, captain of the Kronstadt Naval School, and researcher of the Bering and Chukchi Seas. In 1815, he graduated from the Kronstadt navigational school with the rank of assistant navigator. In 1815–1818, on the brig “Rurik,” he made the first circumnavigation around the globe with stops in Petropavlovsk and on Unalaska Island. He participated in the discovery and survey of Kotzebue Sound, Shishmareva Bay, Sarycheva Island, the Gulf of Eschscholz, and Chamisso Island in the Chukchi Sea and in hydrographic surveys in the St. Lawrence Bay and on the Aleutian Islands. In 1819–1822, on the sloop “Blagonamerennyi,” he made his second voyage around the world with stops at Petropavlovsk, Unalaska Island, and Novoarkhangelsk. He participated in surveying the southeast coast of the Chukchi Sea to the parallel of 69°01'N and the St. Lawrence Island, in the drafting of the first map of San Francisco Bay and parts of the coast of Oahu Island. In 1823–1830, he continued to serve in the Baltic Fleet and, in 1824 on the frigate “Provornyi,” sailed to Gibraltar and back to Kronstadt. The following year took part in the survey shooting of Kronstadt harbor. In 1829, Petrov resigned with the rank of captain.

### **Pevek**

1. A strait (from the Chukchi “Peek” – “bloated, fat”), which connects the Chaun Bay and the

East Siberian Sea. It is located between the islands of Big Ayon, Rautan, and the north-western part of Pevek Peninsula. It administratively belongs to the Chukotka Autonomous Okrug, Russia. The strait has an elongated shape of approximately 14 km long and 4 km wide with an average depth of 15–25 m; the maximum is 31 m. The northeastern part of the strait is limited by the spit of Routan (in the north) and Cape Pevek (in the east) and the southwestern part by Cape Peschanyi (in the west) and Cape Matyushkina (in the south). At the eastern shore, the spit of Nablyudeniya separates the eponymous bay from the strait. On the eastern shore of the strait, there are one inhabited locality, the northernmost city of Russia (Pevek), and abandoned villages of Stroitelnyi and Valkumey.

2. A peninsula separating the Chaun Bay from the East Siberian Sea, Chukotka, Russia. On the west coast of the peninsula, 3 km southwest of Pevek, there is the eponymous lagoon. In addition, the northernmost and the highest point of the peninsula is called Pevek.
3. A city in Chukotka, located on the shores of the eponymous strait connecting Chaun Bay and the East Siberian Sea, opposite the Rautan Islands, 640 km from Anadyr. It is the northernmost city in Russia. The polar night lasts from November 27 to January 16 and the polar day from May 18 to July 27. The population is 4,700 people (2015). It is founded in 1933 (the town in 1967) and within a few years became an important regional port, thanks to the natural harbor (Chaunskaya Bay), the opening of the Northern Sea Route and the discovery of tin in the mine Pyrkakaya (which was later renamed as Krasnoarmeiskiy) about 70 km from the city. Then, other tin deposits and later gold fields were discovered. In 1947, there were three uranium enrichment plants (“west,” “east,” and “north”). From 1949 to 1957, there was the Chaunlag and Chaunchukotlag network of Soviet corrective labor camps here. The industries include a

mining and processing plant, gold mines, oxygen and mechanical repair plants, a geological survey company, hydrometeorological and polar stations, and production of building materials. Near P. there is a tin mining (the village of Valkumey), a meat-packing plant, and a dairy. The administration of the reserve “Wrangel Island” is located here as well. The regional airport “Pevek” is 18 km northeast of the city, directly on the East Siberian Sea coast, the second largest in Chukotka. In P. there are also a cultural center, a kindergarten, a secondary school, a leisure/cinema center, a library, an internet club, and a museum. The museum has a stand dedicated to hydrographer and oceanographer N. I. Yevgenov.

In the 1990s, P. was the absolute “champion” among the cities in the relative population decline. If, in 1989, there were 12,900 residents in the city, during the 2002 census, only 5,200 residents were counted. The main reason for such depopulation of the area was job cuts (in the 1990s, tin mines were closed) and the deterioration of infrastructure. Around the city, there are several completely abandoned miners’ settlements.

4. The port of P. is a large sea trading port on the Northern Sea Route, located in the Chaun Bay of the East Siberian Sea. Food and consumer goods supplies to the northern regions of Eastern Siberia go through this port. The port is the eastern base of the Northern Sea Route’s Marine Operations Headquarters, which operatively controls the vessels sailing the Chukchi Sea. It was founded on April 20, 1951, when the directorate of the Arctic Sea Port of P. was organized. The discovery of the richest mineral deposits in the Chaunskiy district of Chukchi Peninsula and their further intensive development significantly contributed to the creation of the port.

The port of P. was built in 1951, and the city was formed around the port. But it has been also affected by economic troubles of the recent 20 years, the number of jobs progressively reduced,

the life got more expensive, and the infrastructure of the city deteriorated. Of course, people began to leave. However, Pevek is still promising. First of all, it works in conjunction with the port of Green Cape in Kolyma, which gives a space for maneuvering, and secondly, it has deep berths, and most importantly, the government adopted the program of industrial development of Chukotka until 2020, and the development of significant gold deposits of Maiskiy and Kupol has already begun.

At the initial stage of the port construction, it was just a mooring line of four pile berths 429.5 m long. At that time, the port had no mechanical equipment, offices, and industrial premises and did not actually meet its purpose. In 1957, with the transfer of the port to the Far Eastern Shipping Company of Ministry of the Sea Fleet, the works began for preparing a master plan for the redevelopment of industrial buildings and construction of houses for the employees. In the 1960s, reconstruction, expansion, and further development of the port continued. For the first time in the Arctic, the construction of tongue-and-groove berths with solid concrete floors began. During this period, much work was done to expand the storage area of the port and improve production and living conditions of port workers. In 1970–1980s, the reconstruction, refurbishment, and upgrade of the port facilities continued. At this time, the port became a base port for handling transshipment cargoes of the Kolyma direction. In 1982, the port was awarded the Order of the “Badge of Honor.” By this time, the seaport, which occupies a strategic position in the eastern Arctic sector behind the polar circle, became a modern highly mechanized largest port on the Northern Sea Route. In the 1990s, as a result of the elimination of the major mining companies of Chaun-Chukotka, there was an obvious sharp decline in the turnover of this commercial seaport. During the difficult years of economic reforms, the port managed to maintain stable operations and retain its highly qualified professional. In 1997, the port was transformed into an open joint-stock company “Sea Commercial Port of Pevek”.



Pevek City (Source: <https://en.wikipedia.org/wiki/Pevek>)

### **Pinegin, Nikolay Vasilyevich (1883–1940)**

Pinegin, Nikolay Vasilyevich (1883–1940) – a Russian polar explorer, artist, and writer, in whose works the nautical theme has an important place. He graduated from the Kazan Art School in 1907 and the Academy of Arts in St. Petersburg in 1916. As an artist, photographer, and cameraman, he participated in the expedition of Georgy Sedov on the schooner “St. Foka” in 1912–1914 and made the first documentary film in the Arctic. In 1916–1918 P. was an artist-historian of the Black Sea Fleet. From 1924, he worked in the Arctic, participated in the first airplane ice reconnaissance in the Novaya Zemlya area, led the construction of a polar station on the New Siberian Islands, and was its first head in 1927–1929. P. presented to the Academy of Sciences a detailed project of studies of Severnaya Zemlya. In 1931–1934, as a member of the Arctic Institute (now the Arctic and Antarctic Research

Institute), he participated in expeditions to the Archipelago of Franz Josef Land and in northern Yakutia. He created a large number of paintings and sketches of the Russian North, on which he captured the coast, islands, ports, and other scenes.

The best “Arctic” works by P. are dedicated to the expedition of Georgy Sedov – “St. Foka in the ice, Harsh shores of the Novaya Zemlya” (1917) and others. A number of P. paintings display the fight of the Russian Navy during the First World War. P. is the author of many books about the North: *In the Land of Polar Foxes* (1931 illustrated by him), *Notes of a Polar Explorer in the Icy Reaches: Georgy Sedov Expedition to the North Pole* (1952), *Georgy Sedov* (1953), and others.

A cape on the islands of Novaya Zemlya in the Barents Sea and an island near them, a lake on the Alexandra Land, a cape on Bruce Island (Franz Josef Land), and a mountain in Antarctica are named after P.





Pinegin, N. V. (Source: [http://qwerqus.narod.ru/pinegin\\_bio.htm](http://qwerqus.narod.ru/pinegin_bio.htm))

## Pioneer Strait

Pioneer Strait – separates Malyi Begichev Island from Bolshoy Begichev Island in the Khatanga Gulf of the Laptev Sea. The greatest depths in the strait are 7–9 m and form a rather narrow and curved groove, surrounded from all sides by shoals. It was described and mapped in 1933 by the Lena-Khatanga expedition on the boat “Pioneer” under the leadership of hydrographer S. D. Lappo and named by members of the expedition in honor of this vessel.

## Plenisner, Fedor (Friedrich) Khristianovich (?–1778)

Plenisner, Fedor (Friedrich) Khristianovich (?–1778) – a Russian traveler, colonel, member of the Second Kamchatka (Great Northern) Expedition, and a researcher of the Northeast Asia. He

was born in Courland. From 1730 to 1735, he served in the Life Guards Cavalry in the rank of corporal. In 1737, he was sent to the port of Okhotsk, where in 1738 he was appointed as a subofficer to the expedition of Vitus Bering (taken as a “painter”). In 1741 at the packet boat “St. Peter,” P. sailed to the northwest coast of America and spent the winter on Bering Island. Then he came to the conclusion that many thousands of years ago, a great isthmus connected the old and new continents. P. assumption was supported by many Russian scientists and travelers. In 1742 he returned to Kamchatka. During the expedition, he made sketches of the coast from Okhotsk to Petropavlovsk and the Gulf of Alaska and portrayed marine animals and fish. In 1742–1753, P. served in St. Petersburg. In 1753, he became a major in the Anadyr fortress. In 1761, at the request of the Siberian Governor F. I. Soymonov, P. was promoted to lieutenant colonel and appointed chief commander of the Anadyr fortress (1761–1763). He organized the collection of information about the “Great Land” to the northwest and east of the Chukotka Peninsula. For this purpose, in 1763–1765, he sent N. I. Daurkin to the Medvezhiy and S. Andreeva Islands in the Bering Strait and arranged the timely formation and dispatch of the expedition of I. B. Sindt for studying and surveying the northeastern coast of Asia and northwest coast of America (1764–1768). He collected information about the islands in the Arctic and Pacific Oceans and together with T. I. Shmalev in 1763 prepared a geographical description of the Anadyr River. In 1764, P. submitted F. I. Soymonov a detailed historical overview of the Anadyr Region. Later, he commanded the Port of Okhotsk (1764–1772). In 1776, he moved to St. Petersburg. In 1777, P. handed over to the St. Petersburg Academy of Sciences the “Map of the Chukchi Nose,” a geographical description of the Anadyr River, and the “Notes to the Map on the Shores Between Asia and America.”

## Point Hope

Point Hope – (Inupiat. *Tiagara*, which means “forefinger”), a town on the northern slope of

Barrow, Alaska, USA. It is located at the northwest end of the Lisburne Peninsula on the coast of the Chukchi Sea. The population is 700 people (2014). It has an airport. In 1861, a hydrographer and historian of Russian America P. A. Tikhmenev called it Tiekagagmiut. The first Europeans who mentioned of it were Russian researchers M. Vasilev and G. Shishmarev, who during their expedition on the sloops "Otkrytie" and "Blagonamerenie" called this place Cape Golovnin in honor of Vice Admiral V. Golovnin. It was renamed in P.H. by British Royal Navy Captain F. W. Beechey. In 1958, P.H. was the base location of members of the operation "Chariot," which was creating a deep artificial harbor (which is used only 3 months a year) 55 km from the town by means of underground thermonuclear explosion.

### **Polar Bear or White Bear (*Ursus maritimus*)**

Polar Bear or White Bear (*Ursus maritimus*) – a mammal of the Ursidae family from Carnivora order. It serves as a symbol of the Arctic. It is the biggest extant terrestrial carnivore. Adult male's body length is 2–2.5 m sometimes amounting to 2.8–3 m. Female's length is usually no more than 2 m. Adult males weigh 400–500 kg (in exceptional cases 800–1,000 kg) and females 200–300 kg (rarely 400 kg). Running speed can reach 60 km/h. The power of a paw blow amounts to 1 t. Apart from marking, it differs from a brown bear in the following aspects: it has a longer and narrower body, a long and mobile neck, and a relatively small head with a more strengthened profile. The ears are small, a little protruding from the hair coat. The feet are massive (especially on forepaws), with densely haired lower surfaces; the nails are slightly crooked, relatively short, and very sharp. The tail is short and hidden in the hair coat. The pelage is very thick in the winter, but it is shorter and less rough than that of a brown bear. In the summer the pelage is shorter than in the winter. The marking is similar for males and females and ranges from purely white (in the autumn and winter) and yellowish to straw colored

(at the end of summer and closer to the end of life which is caused by greasy seafood), gray, and brownish. Long living on land devoid of snow covering accounts for the gray and brownish color of the pelage. P.B. molts almost all round the year. P.B. inhabits all the Arctic, to the south up to the northern mainland coasts, the southern boundary of drifting ice, and the northern boundary of warm sea currents (but not further to the south than latitude 50°N). Separate animals can be found still further to the south up to the Kola Peninsula, Kamchatka, and the Kuril Islands. The area of high density of polar bear population is close to the brim of solid ice, in particular the northern parts of the Barents Sea, the Laptev Sea, and the Chukchi Sea. In the recent century, the area and the boundaries of the P.B. habitat have changed very insignificantly, but the area of their high-density population has shrunk to a great extent. The current livestock population of P.B. in the Arctic is about 40,000 individual animals, of them up to 10,000 in the Russian sector. Usually, P.B. is active throughout the year and constantly roams around the ice, reaching the North Pole Region. They are drawn to waterfronts. While roaming, they often find themselves ashore and can linger there if the ice drifts away from the shores.

The main feed of P.B. is several species of seals, but mostly ringed seal and bearded seal. Depending on ice characteristics and season, P.B. changes the hunting strategy. On land it feeds on lemmings, birds and their eggs, and vegetable food, that is, low shrubs, herbs, and berries. It also eats different waste close to human settlements. It can suffer long-term starvation but, as occasion offers, can eat up to 20 kg and more of meat and fat at a time. On average an adult P.B. eats 5–8 kg of feed a day and hunts about 50 seals a year.

The rut happens in March and April. At this time, the animals go in pairs; sometimes the she-bear is accompanied by several males which often fight with each other. Pregnancy period lasts for 230–260 days. In September and October, pregnant females go ashore, more often finding the places that are not densely populated by people and lying on their nomadic migration ways (in Russia mostly on Franz Josef Land and Wrangel Island), where they go to rest into a bear den.

More rarely, they find a den on mainland coasts or on sea ice. Within the period from December to February, the female gives birth to 1–3 (more often two and as an exception four) blind, deaf, and bare bear cubs weighing only 400–450 g. By the age of 3 months, they are already covered by thick fur and weigh about 10 kg. Now they are able to migrate with their mother. At the age of 8–10 months, the cubs start to procure the food for themselves, though they feed on their mother's milk for more than a year. The family exists for about 2 years (a female usually bears its young once in 3 years). The animals become mature by 4–5 years old. The life span in captivity is 30–40 years. P.B. has virtually no natural enemies or competitors apart from humans. The cubs sometimes become victims of adult animals. P.B. is often contaminated with trichina and *Ascaridae*. Eating meat of P.B. that is infected with trichina may cause disease in a human (often with a fatal outcome). In recent decades, pesticides (including organochlorides) and heavy metals have been found in P.B.'s tissues. The accumulation of these combinations in the P.B. organism may cause less intensive reproduction. P.B. have long been hunted by the native population of the North for valuable skins, meat, and fat (the only inedible organ in a P.B. is its liver because it is too rich in vitamin A).

P.B. and its hunting have played a big role in rituals and beliefs of northern indigenous people. At the beginning of the nineteenth century in the Arctic 600–1,000, individual animals were

annually hunted including about 500 animals in Eurasia. In 1930s, these figures reached 2,000 and 1,000, respectively. Later the hunting decreased. For a human, P.B. is not very dangerous which is due to strict specialization of its feed. But there have been cases of animals' attacks on people, and in recent years, they have become more numerous as hunting for P.B. is now prohibited. It is very dangerous to come close to P.B. and its den, to feed the bears, and to make them accustomed to small handouts. The bears do some harm spoiling the Arctic fox traps, equipment, and stores of polar stations.

Protection measures toward P.B. have started in the Arctic region countries since 1930s when the population of the animals decreased abruptly. Since 1956, hunting P.B. has been prohibited in the Soviet and later in Russian Arctic. In 1973, the USSR, the USA, Canada, Denmark, and Norway signed an international agreement for P.B. preservation. It was prohibited to hunt them in all the Arctic apart from specially discussed cases. As a result of the measures taken, the P.B. population has increased to a significant extent. P.B. live well in captivity and are kept in many zoos of the world. Since 2008 there has been under way a program of research, distribution, and population of P.B. in the Russian Arctic by means of aviation and ship observations, their migrations have been traced with the help of radio beacons of the system ARGOS, the population structure of P.B. has been studied by means of molecular and

Polar Bear (Source: [https://en.wikipedia.org/wiki/Polar\\_bear](https://en.wikipedia.org/wiki/Polar_bear))



genetic diagnostics, and the state of animal health has been assessed as well as the impact of various anthropogenic factors on them.

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## Polar Mediterranean

Polar Mediterranean – a frequent name, meaning “located within the Arctic Circle.” According to the FAO fishing classification, the area is divided into three regions: Eastern and two Atlantic regions, located in the Northwest and Northeast Atlantic. The eastern region (68°30' - 40°W) is located entirely within the Atlantic Region. The poorest in living resources and, therefore, the least developed fishing region.

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## “Polarstern”

“Polarstern” – (German “polar star”) a German research vessel and icebreaker of the Alfred

Wegener Institute for Polar and Marine Research (Potsdam and Bremerhaven, Germany). It was commissioned in 1982 and is mainly used to study the Arctic and Antarctica. It is built and equipped by the shipyards of Howaldtswerke-Deutsche Werft in Kiel and Nobiskrug in Rendsburg. The vessel has a double hull 118 m long, the width of 25.07 m, and the draft of 11.21 m. The vessel is designed to operate at temperatures up to  $-50^{\circ}\text{C}$  and to overcome the ice thickness up to 1.5 m at a speed of 5 knots. Displacement is 17,300 tons, 4 engines with a capacity of 144,000 kW, and the speed is 15.5 knots (28.7 km/h). In 1991, “P.” helped the Swedish icebreaker “Oden” to reach the North Pole. In 1993, “P.” participated in the expedition “TRANSDRIFT-1.” In 2001, the icebreaker again visited the North Pole with the US icebreaker “Healy.” In 2008, “P.” was the first vessel ever covering the Northwest and Northeast Passages during one expedition and thus circumnavigating around the North Pole. The third time, “P.” visited the Pole in August 2011.



“Polarstern” (Source: [https://de.wikipedia.org/wiki/Polarstern\\_\(Schiff\)](https://de.wikipedia.org/wiki/Polarstern_(Schiff)))

## Polyarny

Polyarny – an urban village in the Shmidtovsky District, Chukotka Autonomous Okrug, Russia. It is located on the coast of the Chukchi Sea, 90 km from Cape Schmidt. It has a mining and processing plant (gold).

## Polynya (Shore Clearing)

Polynya (Shore Clearing) – a channel between drift ice and the shore or between drift ice and fast ice. P. is temporarily formed on the rear parts of ice masses. It is of great importance for navigation. Near the northern coast of Chukotka, there is a channel between drift ice and the shore or between drift ice and dead ice. P. is temporarily formed on the rear parts of the ice massifs. They are of great importance for navigation, for example, Chukotka Coastal Polynya near the northern coast of Chukotka.

## Ponomarev, Pavel Akimovich (1896–1970)

Ponomarev, Pavel Akimovich (1896–1970) – a Soviet sea captain, headed the first nuclear-powered icebreaker “Lenin,” and an active participant in the development of the Northern Sea Route. From the age of 16, he served as a sailor on sailing ships in the White Sea. He graduated from the Kemskie nautical classes in 1915 and then was a sailor in the Navy in the Baltic and the North. In 1919, he graduated from the Arkhangelsk Naval College. Since 1922, P. sailed as a navigator on the icebreakers “Lenin” and “Ermak” in the Baltic Sea. In 1928, as a senior assistant captain of the icebreaker “Krasin” he participated in search and rescue in the Arctic Ocean of the crew of the crashed Italian airship “Italy” of U. Nobile. Since 1932, P. was a captain of “Krasin.” In 1934, onboard of “Krasin,” he sailed from Leningrad to the Chukchi Sea through the Panama Canal to assist the expedition of O. Schmidt on the



Ponomarev P.A. (Source: <http://www.myshared.ru/slide/208837/>)

steamship “Chelyuskin.” Since 1935, P. served as a captain of cargo ships on the Northern Sea Route. In 1941, onboard of the icebreakers, “Siberia” and “Admiral Lazarev” supported ice convoys in the White Sea under bombing of Nazi aircraft. In 1956, P. was in charge for the construction of the world’s first nuclear-powered icebreaker “Lenin,” who was then appointed as a captain and held this post until 1961.

His name was given to the supply-icebreaking ship “Pavel Ponomarev” of the Murmansk Shipping Company.

## Popov, Fedot Alekseev (Alekseevich) (?–1648)

Popov, Fedot Alekseev (Alekseevich) (?–1648) – a Russian explorer, navigator, and “Holmogorets” as he was called; together with S. I. Dezhnev, he



discovered a passage between Asia and America in the seventeenth century. In 1642, as part of the trading expedition, he moved from Yakutsk to the Olenyok River. In 1647, in search of new fishing areas, P. organized a sea expedition to the mouth of the Anadyr River with the participation of S. I. Dezhnev. They came out of the mouth of the Kolyma River, but failed to proceed due to heavy ice conditions. In 1648, they made the second attempt by going east on seven koch boats. The expedition passed along the coast from the mouth of the Kolyma River to the Pacific Ocean, rounded the Chukchi Peninsula, and discovered the strait between Asia and America, which 80 years later was again discovered by V. Bering. During the storm, the ships of Popov and Dezhnev were parted, the koch of Dezhnev was thrown to the mouth of the Anadyr River, and the koch of Popov was washed ashore in Kamchatka, where it crashed. This voyage became known only during the Second Kamchatka Expedition of 1733–1743.

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### **Popov, Petr Ilyich (?–?)**

Popov, Petr Ilyich (?–?) – a Russian explorer of the early eighteenth century. In search of new fishing areas, P. in 1711 on a koch sailed down the river of Anadyr and reached the area of Cape Dezhnev, crossed the Bering Strait, and collected information about the life of the Chukchi and Eskimo, the nature of Alaska and Chukotka, fishing areas, as well as on the shortest way to Alaska across the Bering Strait. All information according to him was recorded by a clerk of the Okhotsk fortress and became known after the Second Kamchatka Expedition of 1733–1743.

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### **Preobrazheniya Island**

Preobrazheniya Island – located approx. 27 km east of Cape Sibirskiy. Sometimes it is called Cape Vstrechnyi (Oncoming) since it is oncoming for ships sailing to the Gulf of Khatanga in the Laptev Sea. The island has a horseshoe shape. Its convex

side faces east. The island is 8 km long and no more than 1.8 km wide. The whole eastern and northeastern sides of the island are approx. 90 m high, with quite steep rocky cliffs. To the west, the island lowers gently. Pebble spits run to the west from the north and south ends of the island. On the west side of the island, there is the deep Neupokoeva Bay. In 1913, on the northern end of the island, a cast-iron cross was found and erected. In 1934, he was already standing near the cliff of the island, indicating rapid destruction of the sheer northeastern coast. In the same year, the cross was moved to several tens of meters inland. There are walruses and bird rookeries on the island. There are no rivers on the island. On the south spit, there is a small freshwater lake. It is discovered, apparently, in 1736, by the head of the Lena-Khatanga detachment of the Great Northern Expedition of 1733–1743, Lieutenant V. V. Pronchishchev, and named the Island of Preobrazheniya in 1739 by the head of this detachment, Lieutenant Kh. P. Laptev, after the religious holiday. In 1878, the island was examined by the participants of the Swedish Polar Expedition of 1878–1880 on the schooner “Vega” under the leadership of A. E. Nordenskiöld. For the first time after the expedition, the island was visited with commercial purposes by the famous industrialist N. A. Begichev in 1908, and in his memoirs he called it Bronenosets (the Armorclad) Island. In 1933, the island was visited by the Soviet hydrographic expedition on the schooner “Pioneer” under the leadership of hydrographer S. D. Lappo whose members surveyed the island, mapped the surveyed areas, and gave the island a new name of Vstrechnyi. Since 1940, its original name was restored.

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### **Principles of the State Policy of the Russian Federation in the Arctic Region for the Period Till 2020 and Beyond**

Principles of the State Policy of the Russian Federation in the Arctic Region for the Period Till

2020 and Beyond – approved by the President of the Russian Federation on September 18, 2008. The principles outline the main objectives, main tasks, strategic priorities, and mechanisms for implementation of the policy of the Russian Federation in the Arctic, as well as a system of measures of strategic planning of socioeconomic development of the Arctic zone of the Russian Federation and ensuring the national security of Russia. The document indicates that the national interests of Russia in the Arctic provide for the use of the Arctic zone of the Russian Federation as a strategic resource base of the country; the preservation of the Arctic as a zone of peace and cooperation, saving its unique ecological systems; and the use of the Northern Sea Route as a national unified transport communications of Russia in the Arctic. Among the strategic priorities of the state policy in the Arctic are the strengthening of bilateral and regional organizations within the Arctic Council and the Barents/Euro-Arctic Council, delimitation of the area of the Arctic Ocean, and ensuring mutually beneficial presence of Russia on the Spitsbergen Archipelago. Among the main tasks, which solution will help achieve the main goals of the state policy in the Arctic, there is a development of new types of engineering of equipment and technologies for the development of marine mineral deposits and water resources in the Arctic. In the sphere of military security, defense, and protection of the state border of the Russian Federation, which runs within the Arctic zone of the Russian Federation, the policy provides for increased state control of fishing activities in the Arctic zone of the Russian Federation. The implementation of the goals and objectives is divided into three stages: (1) the first stage (2008–2010), when, in particular, geological, geographical, hydrographic, cartographic, and other works should be carried out for the preparation of materials to substantiate the outer boundary of the Arctic zone of the Russian Federation and increase opportunities for international cooperation, including the effective management of natural resources in the Arctic zone of the Russian Federation; (2) the second stage (2011–2015), when international legal formalization of the external border of the Arctic zone of the Russian

Federation should be provided and on this basis the registration of particular Russia's rights for production and transportation of energy resources, the creation and development of infrastructure, and a management system for the Northern Sea Route communications in order to implement tasks of ensuring the Eurasian transit; and (3) the third stage (2016–2020), when the Arctic zone of the Russian Federation should be transformed into the key strategic resource base of the Russian Federation.

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### **Pronchishchev Beach**

Pronchishchev Beach – a low-lying part of the east coast of the Taymyr Peninsula, restricted on the north of the Faddey Bay, in the south by the beginning of the Khatanga Bay. The area is approx. 380 km. It has a lot of small lakes. It is an Arctic tundra. It was named in 1913 by the expedition of B. A. Vilkitsky in honor of V. Pronchishchev.

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### **Pronchishchev Range**

Pronchishchev Range – an upland in the northwest of the Republic of Sakha (Yakutia). It extends from Anabar Bay of the Laptev Sea in the west to the mouth of the Olenyok River in the east. The height is up to 315 m. It is composed mainly of sandstones and covered with moss and lichen vegetation; sometimes it is a rocky tundra. It was named in 1892–1893 by the expedition of E. V. Toll in honor of V. Pronchishchev.

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### **Pronchishchev, Vasili Vasilyevich (1702–1736)**

Pronchishchev, Vasili Vasilyevich (1702–1736) – a Russian Navy officer, Arctic explorer, lieutenant, member of the Great Northern Expedition, and explorer of the Laptev Sea and the eastern coast of Taymyr. In 1716, he entered the Moscow

School of Mathematical and Navigational Sciences; in 1717, he was transferred to the Naval Academy in St. Petersburg. He served in the Baltic Fleet (1718–1724), participated in the Caspian campaign of Peter I in Persia (1722–1723), and worked as a member of the commission for certification of Navy officers. In 1733, he was appointed head of the 3rd detachment of the Great Northern (Second Kamchatka) Expedition to the shores of the Arctic Ocean with the assignment to describe the mouth of the Lena River to the mouth of the Yenisei. In the summer of 1735, P. went down the Lena on the sloop “Yakutsk” (navigated by S. I. Chelyuskin), entered the sea via the Bykovskaya anabranch, doubled the Lena Delta, and stopped for winter at the mouth of the Olenyok River. In 11 months, the detachment continued their trip. In the mouth of the Anabar River they stopped, and surveyor N. Chekin examined the river upstream within a week. By mid-August, “Yakutsk” entered the bay, which is named in 1913 by the expedition of B. A. Vilkitsky after Maria Pronchishcheva (her right name was Tatiana), and examined it. On August 17, the expedition discovered Peter Islands (the name was given by Kh. P. Laptev). They reached the eastern coast of the Taymyr Peninsula and went north up to  $77^{\circ}29'N$ . From the ship, they noticed few more islands 1.2 miles off the shore (Komsomolskaya Pravda Islands). By noon, August 19, heavy ice blocked the way, and in the middle of Vilkitsky Strait (near the parallel of  $77^{\circ}55'N$  as it was found out lately), the squad turned back. On the way back on board of “Yakutsk,” P. died of scurvy (the true cause of his death – fat embolism syndrome due to open hip fracture – became known recently). Navigator S. I. Chelyuskin, who took command of the detachment, brought the boat to the winter base and buried his commander at the mouth of Olenyok River. P.’s wife Tatiana, accompanying her husband in the expedition, survived him for 13 days and was buried next to him in the mouth of the Olenyok at Cape Tumul. The expedition of P. made the first instrumental survey of the Lena riverbed from the east coast of Taymyr. The Pronchishchev expedition was the first, which prepared an accurate map of the Lena riverbed from Yakutsk to the



Pronchishchev, Vasili Vasilyevich (1702–1736) and his wife Tatiana (1710–1736) (Source: [https://en.wikipedia.org/wiki/Vasili\\_Pronchishchev](https://en.wikipedia.org/wiki/Vasili_Pronchishchev))

mouth and a map of the coast of the Laptev Sea from the Lena Delta to the Faddey Bay. The total length of the coastline described by P. was about 500 km. The Island of Preobrazheniya, three groups of islands of Peter, Faddey, and Samuila (now the Komsomolskaya Pravda Islands), and others were discovered by them.

In 1999, the historical and archaeological expedition “Arctic Search” (headed by S. M. Epishkin) performed the exhumation and reburial of the Pronchishchevs; in the course of this work, their faces were reconstructed, and portraits are painted, and it was found that P. did not died of scurvy as it was believed for a long time, but from an open fracture of the tibia.

The name of P. was given to a cape, a lake, a river, a part of the east coast of the Taymyr Peninsula and a ridge (range of mountains) between the mouths of the Anabar and the Olenyok Rivers in the 1930s, the schooner “V. Pronchishchev,” and the icebreaker-tug “Vasili Pronchishchev” (1961).

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### **Pronchishcheva (nee Kondyreva), Tatiana Fedorovna (About 1710–1736)**

Pronchishcheva (nee Kondyreva), Tatiana Fedorovna (about 1710–1736) – the world’s first Russian polar female traveler, the wife of

V. V. Pronchishchev, and the only female member of the Great Northern Expedition on the dubel-boat “Yakutsk,” commanded by Lieutenant V. V. Pronchishchev. She was educated at home. In 1733, P. moved with her husband to Siberia as part of the Great Northern (Second Kamchatka) Expedition and, in 1735, participated in a voyage from Yakutsk down the Lena to the Arctic Ocean, sharing with the men all the hardships of the campaign and the Arctic polar winter. She died in September 1736 thirteen days after the death of her husband. For two and a half centuries, it was mistakenly believed that P. name was Maria. This name is also written on the cross on her grave. Only in 1983, it became possible to establish her real name. The couple was buried in the estuary of the Olenyok at Cape Tumul. Local residents have still been calling the burial place of T. and V. Pronchishchev as “The Land of Love Probation.” There is a monument to the Pronchishchevs in Yakutsk.

A bay in the Laptev Sea in the northeast coast of the Taymyr Peninsula is named in honor of T. Pronchishcheva.

### **Pronchishcheva Bay**

Pronchishcheva Bay – juts into the eastern shore of the Taymyr Peninsula, the Laptev Sea. The bay has a very twisty shape and protrudes into the shore for approx. 55 km, first branching into three reaches and then into two parts. The width of the entrance is approx. 3 km. The greatest depth is 22 m. The banks are sublime and almost everywhere plunge down to the water. Most of the year, the bay is covered with ice. The height of the tide in the bay is 1.8–2.0 m. A polar station was located here (1934–1990). The bay is discovered by V. V. Pronchishchev and named in 1913 by the expedition of B. A. Vilkitsky after T. F. Pronchishcheva.

### **Puffin Island (Alaska)**

Puffin Island (Alaska) – an island in the Gulf of Kotzebue, Alaska, USA. It is located 3.3 km

northwest of Chamisso Island and 93 km southwest of Selawik on the Kotzebue-Kobuk Lowland. The island is rocky. Many birds nest here, especially horned puffins. It is part of the Alaska Maritime National Wildlife Refuge.

The island is named in 1826 for its birds inhabiting it (sea parrots) by Captain F. W. Beechey.

### **Pushkareva Island**

Pushkareva Island – an island in the East Siberian Sea as part of the Medvezhiy Islands, the Republic of Sakha (Yakutia), Russia. It is located 70 km northeast of the mainland. P.I. is the northernmost island of the group. Twenty seven kilometers to the west of it is Krestovsky Island. It is the fourth largest island of the group, 7.5 km long, and up to 2.7 km wide. Its shape elongated from north to south with a narrow long peninsula in the southeastern part. The shores are steep, up to 17 m in the north, sloping to the embayed coast. On the island, there are three hills. On one of them there is the beacon “Fire Pushkarev.” From the central hills to the east coast runs a small swampy branching creek. Around the island, there are rare stone scatterings. There are no animals other than mice here, though other animals from the mainland come here sometimes through Krestovsky Island.

The island was discovered back in 1710 by Cossack Yakov Permyakov. It was mapped in 1769 by Ensigns of Geodesy Ivan Leontiev, Ivan Lysov, and Alexey Pushkarev. The island is named in honor of the latter in 1912 by members of the Hydrographic Expedition of the Arctic Ocean on the icebreakers “Taymyr” and “Vaigach.”

### **Pyanda (Penda), Panteley Demidovich (The Last Decade of the Sixteenth Century – The First Half of the Seventeenth Century)**

Pyanda (Penda), Panteley Demidovich (the last decade of the sixteenth century – the first half of

the seventeenth century) – a Russian explorer and one of the discoverers of Eastern Siberia. It is a pomor from the Pyanda River. In 1618, on board of a koch boat, he reached the city of Mangazeya by sea. In 1619, he visited the Norilsk mountains, where he mined a certain amount of silver mined and had the opportunity to organize a campaign to “the distant river of Elyuena” (Lena) for the purchase of furs. From Mangazeya with a detachment of 40 “hired guns,” he went to Turukhansk and built several mining plows. In summer of 1620, the expedition began sailing up the Lower Tunguska. In the spring of 1623, they reached the Chechuysky portage, where the Lower Tunguska comes to the Lena by 20 km. Having carried the ships on skids, P., after an ice drift, sailed down the Lena, most likely to the bend where the river changes its direction from east to north. The expedition did not dare to spend the winter among the Yakuts not yet known to Russians and went back. Intending to scout out a new path, P. went up the Lena in light vessels approximately up to 54°-N. Having left the boats, the expedition proceeded westward across the steppes inhabited by Brats (Buryat) herdsmen to the big river (Angara) flowing north. They sailed by the river on karbasses to the mouth of the Angara and arrived in Yeniseysk before the approach of 1624. For 3.5 years, P. covered by unknown river routes

around 8,000 km sailed 2,300 km up and down the Lower Tunguska, observed the stream of the Lena he discovered for 2,400 km, was the first one to drift by the Angara, having examined 1,400 km of its course, and proved that the Lena and the Upper Tunguska are the same river. There is no information about P. in the next years after the expedition. There is only a brief mention of his visit to Yakutsk in 1643.

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## Pyngopilgyn

Pyngopilgyn (Chukchi, *Pynopelgyn* – “suction mouth”; on the north coast of Chukotka, there are no uniform tidal currents, but due to the north wind from the sea, there could be a large surge of water; at this time, seawater rushes through the openings in the lagoon, i.e., as it were “sucked in”) – a lagoon west of Kolyuchinskaya Bay, Chukotka Autonomous Okrug, Russia. The lagoon is located 22 km south-southeast of Cape Onman. The lagoon separated from the sea by two low sand and pebble spits. The width of the entry to the lagoon between the spits is about 200 m. From the sea to the lagoon, there is the navigation path with a depth of 4–5 m. At the entry to the lagoon, the depth is 7–11 m. The soil in the lagoon is silty sand and sand.



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# R

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## **Rasmussen, Knud Johan Victor (1879–1933)**

Rasmussen, Knud Johan Victor (1879–1933) – a Danish polar explorer and ethnographer. He participated in various expeditions to study the Greenland, explored its northern part, almost unexplored before him. In 1910, he organized the research station “Thule” on the northwest coast of Greenland, which became a reference point and the base of the seven subsequent expeditions (Thule Expedition, 1912–1924). The fifth Thule Expedition was particularly important (1921–1924), during which R. and his team traveled by dogsled along the northern coast of America from Hudson Bay to the Chukchi and the Bering Seas (18,000 km). R. described this expedition in his book *The Great Sled Journey* (1932; Russian translation, 1958).

The land in the north of Greenland and the bay southeast of the Island of King William are named after Rasmussen.



Rasmussen K.J.V. (Source: <https://www.pinterest.com/pin/532128512196802840/>)

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## **Ratmanov, Georgy Efimovich (1900–1940)**

Ratmanov, Georgy Yefimovich (1900–1940) – a Soviet oceanographer. He graduated from Leningrad

State University in 1926. In 1932–1933, R. participated in the expedition of the Soviet zoologist and oceanographer K.M. Deryugin to study the seas of the Pacific Ocean; he conducted the first detailed studies of currents of the Bering Strait and water exchange through it. R. studied the hydrological regime of the Bering and the Chukchi Seas.



Ratmanov G.E. (Source: <http://www.polarpost.ru/forum/viewtopic.php?f=8&t=4892>)

## Rauchua (Rauchuvan, Big Baranikha)

Rauchua (Rauchuvan, Big Baranikha) – a river in the Chukotka Autonomous Okrug, Russia. It meets the East Siberian Sea via several channels. R. stems from the northern slopes of the Anyui Ridge, flowing through the lake of Rauchuvagytyn. Its total length is approx. 320 km. In the upper and middle streamways of the river, this is the mid-mountain tundra with pebbled spits, rifts, and willow thickets along creek banks and midstream sandbanks. At its mouth, the river enters the maritime plain covered with a mass of lagoon-cave-in lakes, creeks, and halophytic meadows. The depth in the coastal waters of the East Siberian Sea is 1.5–5 m. Wind-surge sea level fluctuations is 1–1.5 m. The basin area is 15,400 km<sup>2</sup>. The river freezes in October and stays under ice until May. It is nourished due to snow and rains.

The lower reaches of the river are approached by Pacific salmon – pink and chum, as well as by anadromous loaches – malma trout and Tarantsev loach. Deep thermal erosion lakes are inhabited by Arctic char. In the lower reaches of rivers and lakes, there are various whitefish species: Siberian whitefish, broad whitefish, Arctic cisco, humpbacked whitefish, East Siberian grayling, rainbow herring, capelin, and minnow. The fish stocks of the lower reaches of R. are undermined by excessively long-term fishing.

## Rebrov (Robrov), Ivan Ivanovich (?–1666?)

Rebrov (Robrov), Ivan Ivanovich (?–1666?) – a Cossack lieutenant, Arctic explorer, and navigator. As the head of a group of Cossacks, R. was sent in 1631 from Tobolsk to collect tribute in the lower reaches of the Taz River. Together with the detachment of the land explorer S. Korytov, R. reached Yakutsk via the Lower Tunguska, the Chona, and the Vilyui Rivers in 1632. In the summer of 1633, under the command of I. Perfiliev, R. fell down the Lena River on a koch to its delta and then moved west by the Olenyok River. He discovered the Olenyok Bay and found the mouth of the Olenyok River. He founded winter quarters there, and until the summer of 1637, R. collected fur tributes from the Evenki who lived in the valley. In September, he moved to the River of Yana and joined I. Perfiliev's detachment. After spending a winter in Verkhoyansk, the Cossacks returned to Lena and went down the river to the sea. By order of I. R. Perfiliev, R. went east. By the autumn of 1638, he completed the discovery of the Yana Bay and was the first who sailed through the Strait of Dmitry Laptev; then he sailed the East Siberian Sea and discovered the mouth of the Indigirka River. R. observed almost 700 km of the Asian coast between the mouths of the Yana and the Indigirka. He sailed up the Indigirka for 600 km and discovered the eastern end of the Yana–Indigirka Lowland. At the

inflow of the river of Uyandina, he set a winter camp and collected fur tributes from the Evenks and Yakutsk of Abyisky lowlands for more than 2 years. In the summer of 1641, R. returned to Lena by the same route. He was appointed a governor assistant, and in 1642–1647, he served on the River of Olenyok, in 1649–1654 in the Kolyma. He sailed on koch boats the “Cold Sea” (Laptev and East Siberian Seas) and crossed the Kolyma Lowland on sleds with the state treasury. For more than 30 years of service, R. was five times wounded.

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### **Ribbon Seal (*Histiophoca fasciata*)**

Ribbon Seal (*Histiophoca fasciata*) – a representative of the Phocidae family and lives in the northern part of the Arctic Ocean. In Russia, it can be met in the Bering, the Okhotsk, and the Chukchi seas. R.S. is large; the length is

1.5–1.9 m; the weight is 70–90 kg, in some cases up to 150 kg. The body is slender. The head is rounded, with big eyes; the neck is long and flexible. The body is black (males) or gray brown (females), with four wide white stripes along the sides, around the head, and near the tail bone. In winter it lives in the slack ice, sometimes far from the coastline in the depths of ice fields in water leads. R.S. does not form large aggregations. R.S. gives birth in May and April. The length of the newly born is 0.8 m; the weight is 10 kg. Young seals are white, molting in 3–4 weeks to become dark, with dark gray back and light gray belly; stripes on the body appear at 2–4 years. In summer, it lives in the sea; single animals can be met in coast waters only rarely. R.S. does not enter the coast, with the exception for single, mostly young animals. It moves along the ice lizard-like, pushing in turns by one of the front flappers and thrusting the back of the body in the opposite direction. It feeds on fish and cephalopods and is a widespread commercial species.



## Ringed Seal (*Phoca hispida*)

Ringed Seal (*Phoca hispida*) – a pinniped animal of the seal family (Phocidae) and one of the smallest and most common seal. The body length is usually 110–140 cm; the largest animals reach 150 cm in length. They gain the maximum weight in autumn and winter, when most of the animals (adults) reach 40–80 kg. Males of this species are only slightly larger than females. The general coloring is slightly variable individually from light silver to dark gray. The coat is relatively thick and long, and R.S. skin is not only used as raw rawhides, but also for sewing fur products. R.S. is very common in the Arctic Ocean, mainly in its marginal seas and seas of the northern parts of the Atlantic and Pacific Oceans, where ice is available even in winter. Most of the year, R.S. tends to coastal waters, especially to those with embayed coasts and islands. R.S. does not migrate for long distances. In summer, R.S. keeps mainly in coastal waters and sometimes forms small aggregations on the rocks or gravel spits. In autumn, as the sea freezes, most of the animals leave the coastal zone for the depths of the sea and occupy fast and drifting ice. The greatest aggregations of ringed seals are observed in spring on the drifting ice during molting, mating, and giving birth to pups. Most often R.S. is in grouped by 10–20 animals, but there could also be clusters of hundreds or more animals. They remain on the ice until it disappears. Cubs are born on the ice from late February to early May, depending on the area. The length of a newly born cub is about 50 cm and weight about 4.5 kg. A cub, covered with white fur, is born on ice, often in the snow hole. It has thick, long (2–2.5 cm), soft milky white fur or slightly grayish in color, which remain unchanged for about 2–3 weeks (whitecoat). Milk feeding lasts about a month, and this time young seals do not go into the water. Sexual maturity occurs for some females in the fourth year of life, for the majority in the fifth year; the majority of males become sexually mature at the age of 5–7 years. The water depth for R.S. does not matter, because the main food for them is fish.



Ringed Seal (Source: [https://en.wikipedia.org/wiki/Ringed\\_seal](https://en.wikipedia.org/wiki/Ringed_seal))

The composition of the food is very diverse: various crustaceans and common fish – capelin, saffron cod, and smelt. R.S. does not do any significant harm to fisheries. R.S. is of significant commercial value.

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## RosAtomFlot, the Federal State Unitary Enterprise (FGUP RosAtomFlot)

RosAtomFlot, the Federal State Unitary Enterprise (FGUP RosAtomFlot) – became part of the State Atomic Energy Corporation “Rosatom” in 2008. Since that year, all Russian nuclear-powered vessels with nuclear power installations and nuclear service ships were transferred under the supervision of this organization. As a result, the company operates now as the basis for a single icebreaking technological complex of civil nuclear fleet of the Russian Federation. In its

activity, “RosAtomFlot” is guided by the principles of providing reliable and effective icebreaker support of maritime transportation activities in the Russian Arctic, based on the safe operation of ships equipped with nuclear power plants. With this regard, the company performs the following tasks: icebreaking navigation along the Northern Sea Route and to freezing ports of the Russian Federation; transportation of containerized cargo on board of the “Northern Sea Route” nuclear lighter carrier; provision of expedition activities and research studies of the hydrometeorological regimes of the seas and mineral resources of the Arctic shelf adjacent to the northern coast of the Russian Federation; provision of rescue operations in ice in the Northern Sea Route waters and non-Arctic freezing seas; tourist cruises to the North Pole, islands, and archipelagos of the Central Arctic; maintenance and repair works of general stock shipboard and special-purpose nuclear vessels; and safe handling of nuclear materials and radioactive wastes.

Russia has the most powerful icebreaker fleet in the world and the unique experience of design, construction, and operation of such vessels. The Russian nuclear icebreaker fleet consists of six nuclear-powered icebreakers, one container carrier, and four maintenance vessels. Its mission is to ensure the stable operation of the Northern Sea Route, as well as access to the Far North and the Arctic shelf. Today, the company RosAtomFlot based in Murmansk operates four two-reactor icebreakers with a capacity of 75,000 hp (“Rossiya,” “Sovetskiy Soyuz,” “Yamal,” and “50 Let Pobedy”) and two one-reactor icebreakers with a capacity of 50,000 hp (“Taymyr” and “Vaigach”), as well as the lighter container carrier “Sevmorput” with a capacity of 40,000 hp. In addition to this, there are two maintenance vessels that are in operation (“Imandra” and “Lota”), the special tanker for liquid radioactive waste “Serebryanka” and the ship for sanitary treatment of personnel and radiation monitoring “Rosta-1.” Decommissioned vessels include the first Soviet nuclear-powered icebreaker “Lenin,” as well as the icebreakers “Siberia” and “Arktika,” and the maintenance vessels “Lepse” and “Volodarsky.”

It is planned to build three innovative nuclear icebreakers by 2020.

## Routan Islands

Routan Islands – two islands (Bolshoy and Malyi) in the Chaunskaya Bay of the East Siberian Sea, 70°N, 5 km from the Peninsula of Pevek, which are separated by the Straits of Pevek. Geographically, the islands belong to the Chukotka Autonomous Okrug, Russia. The Island of Bolshoy (Great) Routan has an almost triangular shape. It is a sandy area of 33.7 km<sup>2</sup> with a maximum height of 78 m above the sea level. Its dimensions are 9.5 km to 4.5 km. The main part of the island is a plateau-like surface with a slope of 2–4° mainly toward the northwest and southwest. In the eastern and southeastern part of the island, the plateau steeply drops toward the sea, and the edge of the plateau is dissected by large and short ravines. In the southern and southwestern parts, the plateau decreases and gradually turns into vast spits and mud and slightly saline plains. The flat surfaces are occupied by combinations of tundra communities. The 500–600 m wide strait is located southward of the Maly (Small) Routan Island. The Small Routan Island is much less and is located 1 km away from the west of the southernmost point of the Great Routan. Its length is only 1.3 km. There is a small polar station on the Great Routan. There are several lakes; the largest are Krugloye and Vodovoznoye. The Small Routan has one large lake in the southern part – Gusinoe. The islands were discovered in March 1821 by the expedition of the Kolyma team headed by F. Wrangel.

There is the natural sanctuary Routan (19 ha) on the islands.

## Rovaniemi Process

Rovaniemi Process – this process due to concerns over pollution in the Arctic was initiated in 1989, when in the city of Rovaniemi, Finland, hosted



preliminary meetings for the preparation of the Conference on the Protection of the Arctic Environment in the Arctic Region with the participation of Denmark/Greenland, Iceland, Canada, Norway, the Soviet Union, the United States, and Sweden. In 1991, the first ministerial meeting of the Arctic states, which led to the adoption of a strategy of protection of the Arctic environment (AEPS), was a breakthrough in the development of international cooperation for the protection of the Arctic.

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### **Rtishchev, Vasily Alekseevich (1705–After 1776)**

Rtishchev, Vasily Alekseevich (1705–after 1776) – a Russian naval officer, captain of the third rank, and explorer of the Arctic and Pacific Oceans. In 1720, he was apprenticed to the Naval Academy. In 1730, he became a sub-navigator, and 3 years later, he was appointed to the Great Northern Expedition. In 1735 on board of the sea boat “Irkutsk,” he traveled from Yakutsk down the River of Lena to study its eastern coast. While spending the winter in a camp near the mouth of the River Kharaulakh (the bay of Buor Khaya) after the death of P. Lassenius, R. assumed command of the team and reported about the emergency to Vitus Bering. After the arrival of help due to illness, R. left for Yakutsk. In 1736, he was transferred to the detachment of M. P. Shpanberg. R. surveyed the coast near Okhotsk and was engaged in the delivery of supplies for the expedition, and taught soldiers to read. In 1738, he became a navigator, and 3 years later, R. was promoted to the rank of subofficer. In 1741–1742, on board of the double-boat “Nadezhda,” he participated in the survey of the Uda River mouth, Shantar Islands, and the eastern coast of Sakhalin Island, surveying the strait later named (1787) after La Perouse. After the dissolution of the Second Kamchatka Expedition, he stayed in Okhotsk and then served in Irkutsk. In 1751, he was promoted to the rank of lieutenant, 3 years after to lieutenant commander. In 1757, he was appointed head of the Naval

Department of Okhotsk, but came into office only in 1760. In 1758, he was made a commander. Within 5 years, he governed the extensive Okhotsk–Kamchatka Region and organized the expedition of Krenitsyn–Levashov to the Aleutian Islands. In 1764, he handed over his post of the head of the port of Okhotsk, but stayed in the Far East until 1772. In 1776, he arrived in St. Petersburg and handed in his resignation.

A river on the island of Sakhalin (Sea of Okhotsk) bears his name.

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### **Rubets, Ivan Makarevich (?–?)**

Rubets, Ivan Makarevich (?–?) – Russian explorer and navigator and one of the discoverers of the coast of the Bering Strait and the Kamchatka Peninsula, as well as of the Bering Sea strip of Northeast Asia. From 1654 to 1662, he served as a common Cossack. In the summer of 1662, he was promoted to sergeant and sent to the Anadyr fortress to replace K.A. Ivanov. On board of two koch boats, he sailed around the Chukchi Peninsula and came to the Anadyr fortress. This was the second sea voyage after F.A. Popov and S.I. Dezhnev through the Bering Strait, which was mentioned in documents and shown on maps of 1726–1730. In the autumn of 1662, R. sailed along the coast of the Bering Sea and the Bay of Korf and reached the mouth of the Kamchatka River, discovering approx. 600 km of the east coast of the Kamchatka Peninsula. After that, he returned to the Anadyr fortress. Before 1666, he served as an estate manager of Anadyr and then moved to Yakutsk, where he served until 1676. In 1677, R. arrived in Tobolsk and stayed there for residence.

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### **“Russia’s Arctic Seas”**

“Russia’s Arctic Seas” – a fundamental classical work with the subtitle “Essays on the History of Research” by the famous Arctic explorer V. Yu.

Vize. From the date of its only publication in 1948 (when it was titled “Soviet Arctic Seas”) was a reference book, encyclopedia, for all those interested in the history of Arctic exploration. In 2008, the Marine Arctic Complex Expedition (MACE), together with the publishing house “Europa Editions,” rereleased this work in a series of books “The International Polar Year 2007–2008” in two volumes, edited the text of the 1948 edition, added higher-quality illustrations, and changed the original title of the book.

## Russian America

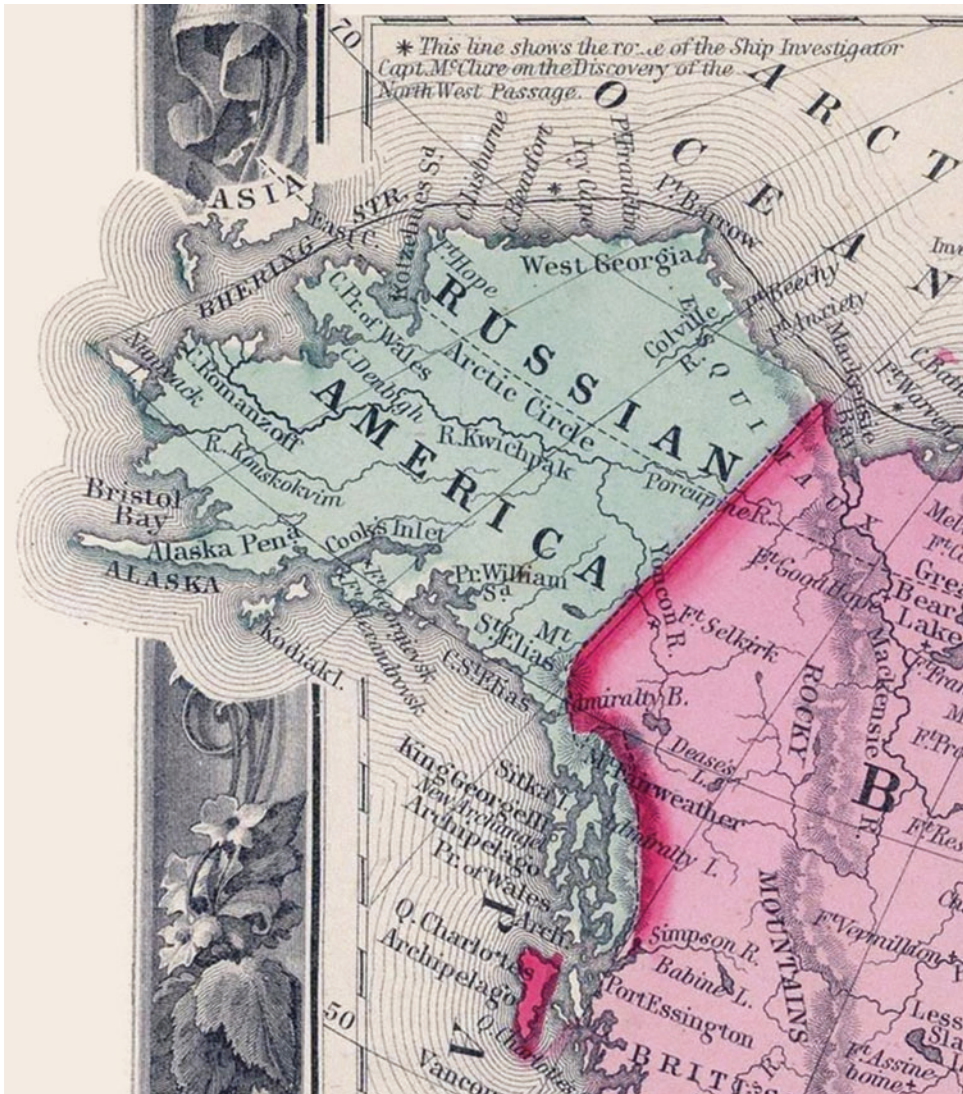
Russian America – the informal name of the territories in Alaska discovered and developed by Russians, the western coast of North America to 55°N – a number of areas in Northern California and the Aleutian Islands in the possession of Russia from the late eighteenth century till 1867, i.e., before signing the agreement for the sale of Russian Alaska to the United States. The administrative center of R.A. was New Archangel (also Novoarkhangelsk, now Sitka). From 1799 until the last days of R.A., the decisive role in the exploration and development of these territories belonged to the Russian-American Company. In all, there were about 15 settlements in Russian America, including a fort in the town of Ross, California. The total area of the Russian colonies was 1,519,000 km<sup>2</sup>. Due to declaring a war on Russia by Britain and France at the end of March 1854, there was a real danger of capture of the Russian possessions in North America by the United Naval Forces of the European states. To avoid this, the Russian vice-consul in San Francisco P.S. Kostromitinov signed on behalf of the Russian-American Company a fictitious agreement on establishing the American-Russian Trading Company there and transferring to this company all of the property, trade, and privileges in the Russian-American Company territory in North America for 3 years.

The transaction was based on mutual trust. However, as a result of complexities of the legal nature which emerged soon after the signing, the

question about the real rather than fictitious sale of R.A. arose. By the time of the sale of Alaska, there were 812 Russians; more than 25,000 Eskimos, Indians, and Aleuts; and about 1,500 Creoles – children born in marriages and nonmarital relationship between Russians and women from the local Aleut and Indian population. By 1877, on the island of Sitka, there were five Russian families; the rest are either returned to Russia or moved to San Francisco. The history of R.A. has remained in the names of many geographic features within this territory, which have names of Russian scientists, sailors, merchants, and other prominent individuals: Island of Chirikof, Strait of Shelikof, Island of Wrangel, Island of Kupriyanov, Mountain and Volcano of Veniaminof, Island of Krenitsyn, Island of Baranov, Island and Strait of Hagemester, City and Bay of Kotzebue, Cape of Kutuzov, Island of Shumagin, Pribilof Islands, Cape and Mountains of Rumyantsev, Chichagof Island, Cape and Strait of Etholén, etc.

## Russian-American Company (RAC)

Russian-American Company (RAC) – the Russian colonial trading joint-stock company was founded by Gregory Shelikhov and Nikolai Rezanov, was approved by the Decree of Emperor Pavel I of July 8 (19), 1799, and existed until the sale of Alaska to the United States in 1867. It was formed by the merger of the Northeastern Company (founded in 1787) and American United Companies (founded in 1797), the owners of which were spouses G.I. Shelikhov and N.A. Shelikhova, as well as I.I. Golikov, M.S. Golikov, and N.P. Mylnikov; with the activities of these companies, the developing of Russian America began. The idea of creating the RAC was supported by the Imperial Court and top Russian government officials – supporters of the expansion of Russian influence in the Pacific Ocean and North America, many of whom later became shareholders of the new company. The RAC replaced many private merchant companies set up in the region after 1741 as a result of



Russian America in 1860 (Source: [https://en.wikipedia.org/wiki/Russian\\_America](https://en.wikipedia.org/wiki/Russian_America))

numerous trade expeditions of first Russian navigators and explorers. The initial capital asset totaled 724,000 rubles (724 shares of US\$ 1,000 each). The board of the company was located in Irkutsk, since 1800 – in St. Petersburg. The company was entitled to exclusively own all businesses and minerals, located in the northwest coast of America from 55°N to the Bering Strait and the Aleutian, Kuril, and other islands. The RAC won the right to organize expeditions, occupy the newly discovered lands, and trade with neighboring countries. In the territory of the

Russian possessions in America, there were several settlements with the center of Novoarkhangelsk (the island of Sitka in the south-east Alaska), shipyards, workshops, and so on. With the support of the Russian government, in 1804–1840, the company organized 25 expeditions, including 15 circumnavigations (by I.F. Kruzenshtern, Y. Lisianskiy, and others). In 1806, by a special decree of Emperor Alexander I, the company was given the right to have its own flag. After the death of Shelikhov, who played a prominent role in preparing the

conditions for the establishment of the RAC, senior positions in the administration were taken by his heirs and relatives. In 1859, under the auspices of the RAC, a school was opened on the island of Unalaska, where the local children of both sexes studied under the direction of Father Innokenty (Veniaminov). The most capable of them were sent to Novoarkhangelsk to learn ship navigation. All male students who were educated at the expense of the RAC were pledged to work for the colonial administration in the next 10–15 years. Those who had a long period of service in the RAC were paid pensions on behalf of the company. The company paid travel expenses to its former employees who wished to move and settle in Russia. By the beginning of 1820s, the interest in the Russian presence in America began to fall, and the contradictions between the Imperial Government and the RAC, including the influence of future Decembrists (some of them served in the St. Petersburg office of the RAC), escalated. In addition, in 1820 the financial position of the company worsened significantly.

For many years, starting from 1821, the company did not pay dividends. The Russian–American Convention on Commerce, Navigation, and Fishing, signed in April 1824, granted the US freedom of trade and fishing in the Russian possessions for 10 years and sparked a protest by the RAC, claiming that the agreement with the United States, concluded in 1824–1825, violates the privileges of the company and jeopardizes its existence. Continued calls by American ships at the possession of the RAC despite the termination of the convention and attempts to trade with the Indians caused serious complications in the US–Russian relations in the 1830s–1840s. The RAC-adopted measures to protect their interests resulted, however, in a significant reduction of the food supply and other supplies to Russian America, which previously were primarily made by US ships (the Boston mariners). Formally, the RAC continued to exist until 1881, and even paid off dividends until 1888, but its power in Russian America ended after raising the flag of the United States in Novoarkhangelsk in October 1867. However, under the treaty, the Orthodox Church, which by

1867 owned nine churches, including 1 cathedral in Novoarkhangelsk and 35 chapels in America, retained the right to pursue activities in Alaska after its acquisition by the United States, as well as the right to own its lands, buildings, and property.

The chief managers of the RAC were A.A. Baranov (from 1799 to January 11, 1818), L.A. Hagemeister (from January 11, 1818 to October 24, 1818), S.I. Yanovsky (October 24, 1818 to September 15, 1820), M.I. Muravyev (September 15, 1820 to October 14, 1825), P.I. Chistyakov (October 14, 1825 to June 1, 1830), Baron F.P. von Wrangel (June 1, 1830 to October 29, 1835), I.A. Kupriyanov (October 29, 1835 to May 25, 1840), A.K. Etholén (May 25, 1840 to July 9, 1845), M.D. Tebenkov (July 9, 1845 to October 14, 1850), N.Y. Rosenberg (October 14, 1850 to March 31, 1853), A.I. Rudakov (March 31, 1853 to April 22, 1854), S.V. Voevodsky (April 22, 1854 to June 22, 1859), I.V. Furugelm (June 22, 1859 to December 2, 1863), and Prince D.P. Maksutov (December 2, 1863 to October 18, 1867).

## "Russian Arctic: On the Verge of Catastrophe"

"Russian Arctic: On the Verge of Catastrophe" – a consolidated analytical overview by the Center for Russian Environmental Policy, with the support of the MacArthur Foundation, USA, published in Moscow in 1996. The team of renowned experts, mainly the Institute of Geography of the Russian Academy of Sciences, under the editorship of corresponding member of the Russian Academy of Sciences A.V. Yablokov, conducted an analysis of the state and trends of the ecological situation in the Russian Arctic. The main conclusion of the review is "The Russian Arctic is on the verge of ecological disaster, and some of its parts have already entered into this disastrous state." The Center for Russian Environmental Policy considered the review as the beginning of the deep analysis of ecological and political problems of the Russian Arctic.



## Russian Discoverers of America of the Eighteenth Century

Russian Discoverers of America of the Eighteenth Century – the discovery of the territories of North American continent by Russian sailors began during the First Kamchatka Expedition of Vitus Bering (1725) undertaken on behalf of Peter I, which resulted in the discovery of a strait separating Asia from America later named after Bering. In 1732, the Siberian explorer Mikhail Gvozdev on board of the ship “St. Gabriel” left to conquer the Chukchi who populated the east coast of Siberia, reached the “Great Land” (Alaska) in the area of the modern Gulf of Norton Sound, and landed with his team in one of the islands of St. Diomede (previously discovered by V. Bering), which were called since then the Gvozdev Islands, but nowadays are known as the Island of Ratmanov and the Island of Krusenstern. As a result of Gvozdev’s research, the coast of the Bering Strait was shown in the map for the first time. In 1733, at the initiative of the Russian government and the St. Petersburg Academy of Sciences, the ambitious second Kamchatka Expedition of V. Bering and A. Chirikov began, which resulted in the discovery of a new fur-rich territory in Alaska. Yemelyan Basov, a fur hunter and sailor from Nizhnekamchatsk, makes sure about the prospects of rich fur trade in the lands discovered by Bering and Chirikov, undertaken in 1743–1747 together with Moscow merchant A. Serebrennikov and Irkutsk merchant N. Trapeznikov on several expeditions on board of the ship “Kapitan,” and later on the ship “St. Peter,” reaching the islands of the Aleutian Chain, where he got a huge amount of fur. His name and the name of his ship were given to two bays on the Island of Mednyi – the Gulf of Basov and the Bay of Peter. Other Russian traders and sailors followed the example of Basov, who had gathered impressive wealth and reached the coast of Alaska and America, namely, Andreyan Tolstykh, who discovered the islands named in his honor Andreyanof (c. 1743); Mikhail Nevodchikov, a Bering Expedition member, who discovered the Near Islands, so named because of their proximity to the coast of Siberia (1745);

Andrei Serebrennikov, who organized the expedition which discovered the group of Rat Islands (1753); and Stepan Glotov, who sailed in 1759 on his ship from Okhotsk to the Island of Kodiak, i.e., approx. 2,500 miles and discovered the Fox Islands, so called because of the abundance of foxes living on the islands; G. Pushkarev soon after S. Glotov landed on the Alaska Peninsula. In 1762, an expedition of several ships under the command of S. Glotov, I. Korovin, A. Druzhinin, and D. Medvedev left for the Fox Islands, but only one of them had a chance to return to Kamchatka. The others were killed in clashes with the Aleuts together with their teams. In 1764, by the orders of Empress Catherine II in order to investigate Alaska, an expedition under the command of Lieutenant I.B. Sindh was undertaken which lasted for 4 years. They landed on the territory of the Seward Peninsula near today’s city of Nome. The same year, according to a secret order by Catherine II, two ships were equipped under the command of P.K. Krenitsyn and M.D. Levashov in order to explore the Islands of the Aleutian Chain. In 1772, by order of the Siberian governor-general, the management of the Aleutian Islands was transferred under the jurisdiction of the commander of the Russian garrison of Bolsheretsk (Kamchatka). In 1781–1783, G.I. Shelikhov “with his fellow companions” made several trips in order to establish the fur trade with the local tribes on the Aleutian Islands and Alaska. As a result of one of these campaigns (1783), the first permanent Russian settlement was founded near the present city of Kodiak with a Russian school opened in 1785.

In the same year, by a secret order of Catherine II, the expedition of I.I. Billings and G.A. Sarychev was organized. Its purpose was to study the northern part of the Arctic Ocean. As a result of studies conducted by expeditions of Krenitsyn–Levashov (1764–1771) and Billings–Sarychev (1785–1795), a professional survey and inventory of all the Aleutian Islands was completed; more than 60 maps and plans of Kamchatka, Aleutian Islands, Chukotka, and North American coast were prepared that fixed Russia’s priority to the discovered islands and lands and guaranteed safe navigation of the Russians to the



Russian Federation  
(Source: <https://en.wikipedia.org/wiki/Russia>)



coast of Russian America. In 1788, G. Pribylov discovered the Islands of St. Paul and St. George named later on after him the Pribilof Islands. In 1794, a mission of the Russian Orthodox Church in the United States was opened on the Island of Kodiak, and Christianity began to actively spread in North America. In 1799, by order of Emperor Pavel I, the Russian–American Company, which received a monopoly on trade in Russian America, was established.

### Russian Federation (RF) or Russia

Russian Federation (RF) or Russia – a state located in the northeast of the world’s largest mainland of Eurasia, which occupies the eastern part of Europe and North Asia. It is washed by 13 seas belonging to the basins of the Atlantic, Arctic, and Pacific Oceans. It shares borders with 18 countries – Norway, Finland, Poland,

Lithuania, Estonia, Latvia, Belarus, Ukraine, Georgia, Abkhazia, Southern Osetiya, Azerbaijan, Kazakhstan, China, Mongolia, North Korea, Japan, and the United States. The eastern border of the Russian Federation passes through the seas of the Pacific Region – with Japan through the Straits of La Perouse, Kunashir, Izmeny, and Sovetsky separating Russian islands of Sakhalin, Kunashir, and Tanfiliev (the Lesser Kuril Ridge) from the Japanese Island of Hokkaido and with the United States – in the Bering Strait, where the Diomed Islands are located and between the Russian Island of Ratmanov (Big Diomed Island) and the US island of Kruzenshtern (Little Diomed Island).

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### Russian North

Russian North – a natural and socioeconomic region of the RF (area 11 million km<sup>2</sup>, or 62 %

of the Russian territory) and a zone of multiyear frozen ground and extreme and harsh climatic conditions. To 11.4 million people living there (1997), or about 7 % of the total population of Russia, social and economic benefits apply. Fifty-five percent of all the Northern territories and 80 % of the world population living in these regions account for Russia. Eleven of 12 northern cities of the world with the population over 200 thousand people are located in Russia. Russia's geopolitical interests lie in the north, with its Northern Sea Route, strategically important airways, and channels of European countries' access to Asia-Pacific Regions. R.N. includes the following territories: Republics (Karelia, Komi, Sakha (Yakutia)); Regions (Murmansk, Arkhangelsk, Magadan, Kamchatka, Sakhalin); Autonomous areas (Nenets, Yamal-Nenets, Khanty-Mansi-Yugra, Taymyr (Dolgano-Nenets), Evenk, Chukotka, Koryak); northern parts of the territories (Krasnoyarsk, Khabarovsk, and Primorsky); and Regions (Tyumen, Sverdlovsk, Tomsk, Irkutsk, Chita, Amur). R.N. has the following economic subzones: European North, West Siberian North, East Siberian North, and Far East North. Now it is common and has a scientifically grounded term "R.N." A vast territory; inhomogeneous environmental and climatic, social, and economic factors; and smooth transition from "northern" conditions to "not northern" ones complicate the determination of the region's southern border. At the same time, it is necessary to determine it to solve scientific, economic, and social tasks, in particular, to define the territories which require state support for their development and are in need of additional expenses connected with the reproduction of labor, social benefits, guarantees, and compensations for those working and living in these territories.

First scientific attempts to define R.N.'s south border go back to 1920. A decree of All-Russian Central Executive Committee and the Council of People's Commissars of the Russian Soviet Federated Socialist Republic dated May 10, 1932, for the first time approved a ruling "On benefits for persons working in the extreme north of the Russian Soviet Federative Socialist Republic," and decrees of the Council of People's Commissars

of the Russian Soviet Federated Socialist Republic dated October 26, 1932, and January 29, 1934, defined the territory to which these benefits applied. In 1945, with the aim of creating a differentiated preponderance in labor compensation, a term "Areas equated with the regions of the extreme north" was introduced. An approved "List of the extreme north regions and areas equated to the extreme north regions" is being elaborated and changed by decision-making authorities on a constant basis.

By now over 20 options of the region's south border have been offered. S.V. Slavin was one of the first researchers to define the south border of the Russian North according to the aggregate physiographic, economic, and social features characteristic to the northern territories. Sometimes the south border of the region is considered as isoline of accumulated temperature over the vegetation period (with average daily temperature over 5 °C) to the north from which sustainable land use is not possible. According to constructional and climatic classification, the border of the Russian North is determined on the basis of climatic aspects crucial for construction and operation of engineering structures. The state standard defines the cold climatic zone by average isoline of absolute minimum air temperature (−45 °C), requiring materials and machines suitable for use under extreme north conditions. Some scientists specializing in the extreme north offer to use the south border of sporadic permafrost as the most common and sustainable from the scientific point of view as a criterion. There exists a Russian North border outlined by transport and geographical features, which lies along the northernmost latitudinal thoroughfare; in the territory to the north of it, no trunk transit system exists (combination of longitudinal and latitudinal roads) and the density of permanent traffic lanes is very low (less than 0.05 km/100 km<sup>2</sup>). Besides, there are various medical, geographic, and bioclimatic borders based on the harshness of environmental conditions for the population, as well as classification by conditions of the equipment operation.

In 1989, for strategic planning and productive power management, the North Commission of the

USSR Academy of Science Research Council on Regional Economics tried to classify the region of the Russian North by the number of factors characterizing the influence of natural conditions over essential components of social and economic systems, namely, man, equipment, and structures. The south border of the region was marked along the south line of the cold climatic zone, to the north from which the climatic effect on man, equipment, and structures, as well as time limitations of various production processes, is at least 1.3–1.5 times higher than in the Moscow Region. Modern scientific offers on delimitation of the Russian North boundaries are made by the Institute of Economic Affairs of the Kola Scientific Center of the Russian Academy of Sciences. The criterion for the region's south boundary determination was the level of the discomfort for the population, considering a number of factors. The final border of the Russian North is specified so as to comply as much as possible with the borders of administrative regions. All the borders mentioned above lie close to each other and sometimes match together, which proves that each option is close enough to real conditions.

The situation with the Arctic border is far less complicated, though there is also no unanimity. The astronomic boundary of the Arctic Region lies along the Arctic Circle ( $66^{\circ}33'N$ ), as well as 65th or 70th parallels, northern latitude. General climatic border of the Arctic Region is isoline of June  $+10^{\circ}C$ . Physiographical border coincides with the tundra's south boundary. The Arctic Region border offered by the North Commission outlines the territory with the highest rise in price of all the types of activity.

## Russian Polar Expedition (1900–1903)

Russian Polar Expedition (1900–1903) – was led by Baron E.V. Toll on the steam barquentine “Zarya.” The expedition was commissioned by the Academy of Sciences; the officers and sailors were detached by the Naval Department. The expedition primarily aimed to find the legendary

Sannikov Land. The crew included Lieutenant N.N. Kolomeitsev (commander of the ship until February 1901), Lieutenant F.A. Matisen (commander since February 1901), and Lieutenant A.V. Kolchak (head of the hydrological team) and zoologist A.A. Byalynitskiy-Birulya, magnetologist F.G. Seeberg, and physician and zoologist H.E. Walter; the supported team of sailors was headed by boatswain N.A. Begichev. Temporary members were geologist K.A. Vollosovich and political exiles V.N. Katin-Yartsev, M.I. Brusnev, and P.V. Olenin. The expedition left St. Petersburg on June 21 (9), 1900; they left Alexandrovsk-on-Murman on July 31, crossed the Yugorsky Strait on August 7, and stopped for wintering near the south coast of Taymyr on October 1.

The crew conducted a comprehensive study of waters, ice, the coast (including mapping), geology, and flora and fauna and carried out magnetic measurements. The crew also undertook long dogsled rides up to the Chelyuskin Peninsula (E.V. Toll and A.V. Kolchak, May 1901). The well-coordinated teamwork was complicated by the conflict between E.V. Toll, pursuing only scientific objectives (frequently going against the interests of the ship navigation in the ice), and N.N. Kolomeitsev, who (according to A.V. Kolchak) “looked at any work not directly related to the ship like on a necessary evil.” As a result, E.V. Toll sent N.N. Kolomeitsev away. The shortage of officers (and coal) weakened the chances of the expedition. The navigation of 1901 was short (August 25–September 24). The ship nevertheless reached a specified location. However, the expedition did not find the Sannikov Land.

E.V. Toll continued to believe in its existence and decided, leaving the “Zarya” (which was wintering off the coast of the Kotelný Island), to move with three companions on the ice to the Bennett Island hoping to see the coveted land from its top. The group reached the island, but because of the ice conditions could not return to the “Zarya.” E.V. Toll and his companions perished. The “Zarya” broken by ice burning the last coal reached the Tiksi Bay on September 12, where it was abandoned by the crew. In August 1903, the rescue team (A.V. Kolchak, N.A. Begichev, and

five more people) found on the Bennett Island a hut clogged with ice and the last letter of E. V. Toll to the President of the Academy of Sciences and 8 lb of geological samples in boxes on the shore. The results of the expedition research were published in 1902–1915 in the *Izvestia* and the “Bulletin of the Academy of Science.”

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## Russian Sector of the Arctic

Russian Sector of the Arctic. The concept of Arctic sectors was introduced in the nineteenth century by signing several international agreements and contracts (the Russian–American Treaty of 1824, the Anglo–Russian Convention of 1825, the Russian–American Treaty of 1867). The sector approach was established by the Central Executive Committee and the Council of People’s Commissars of the Soviet Union Resolution of April 15, 1926, “On declaring lands and islands situated in the Arctic Ocean the territory of the USSR.” This resolution defined the Soviet Arctic sector as the territory lying between longitude  $32^{\circ}04'35''\text{E}$  and longitude  $168^{\circ}49'30''\text{W}$  (excluding the eastern islands of the Svalbard Archipelago). By defining the borders of the sector, the USSR claimed its rights for all islands and lands, be they already discovered or going to be

discovered within the sector in the future. Consequently, the closed sea, the continental shelf, and the exclusive economic zone were defined within the sector based on the general norms of international law and in compliance with the UN Law of the Sea Convention on 1982.

The Russian Arctic Sector covers the area of about 9.46 million  $\text{km}^2$ , of which 6.8 million  $\text{km}^2$  present water areas which is 45 % of the total area of the Arctic Ocean. Within the sector the continental shelf occupies 6.19 million  $\text{km}^2$  or 41 % of all the Arctic water area. It should be noted that under the Arctic ice, there is the area of 5.14 million  $\text{km}^2$  (70 % of the sector) and under the pack ice there are 1.55 million  $\text{km}^2$  of them (23 % of the sector). The length of the Russian Arctic coast is 28,000 km (62,000 km including the islands). Only a small part of the coast is accessible and well explored.

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## Ryyanranot

Ryyanranot – an island located to the north of the island of Ayon in the immediate vicinity of it in the East Siberian Sea, Chukotka, Russia. On the island, one can see relict steppe areas, which are composed of plants of the preglacial era, which do not grow anywhere else.

### **“Sadko” (“Lintrose” Before 1915)**

“Sadko” (“Lintrose” Before 1915) – a Soviet icebreaker. Built in 1913 in Newcastle upon Tyne, the Great Britain, by “Swan Gunter and Wilhelm Richardson” with the name “Lintrose.” Purchased from Canada in 1914 with the name changed to “S.,” after the main hero of an old Novgorod story. The height is 78 m, width 11.4 m, hull height 7.5 m. Deadweight 3,800 t, machine capacity 3,500 hp, and speed 14.5 knots. In 1916 the icebreaker sank as the result of the navigation error in Kandalaksha Gulf of the White Sea. In 1933 lifted by Special Purpose Underwater Work Expedition (EPRON) and repaired in Arkhangelsk in 1934. Used for ice channeling in the White Sea. Participated in expeditions to explore the Arctic seas. In 1935 “Sadko” went for the first high-latitude expedition of the Northern Sea Route authority under the command of G. A. Ushakov, during which depths and currents of the Arctic Basin were explored (a branch of the North Atlantic Current found), set a world record in free floating in the Arctic Circle. “S.” reached 82°41′N in ice and discovered an island named after Ushakov. In 1937–1938, along with icebreakers “Sedov” and “Malygin,” it stayed for winter and drifted in the eastern part of the Laptev Sea. Before 1941 it went for several expeditions along the Northern Sea Route. Perished in 1941 in the Kara Sea, hitting an unknown underwater bank to the far east of the Izvestiy TSIK Islands. The crew was saved by the icebreaker “Lenin.”

An island in the Nordensheld Archipelago was named in the honor of “S.” The icebreaker contributed significantly to the exploration of the Arctic Region and the Northern Sea Route.

### **Sagastyr**

1. An island located in the Lena River Delta, the Sakha Republic (Yakutia), Russia. In the course of the first International Polar Year (1882–1883), a polar station headed by N. Yurgens, a Naval Masters Corps lieutenant, was arranged on the southern bank of the island and was operating from August 31, 1883 to June 19, 1884. Wide-scale observations in meteorology, geophysics, botany, and zoology were made. A thorough topographic survey of the Lena Delta was undertaken. During the second IPY (1932–1933), a polar station was located there as well.
2. (Former Tumat) a settlement located on the northern edge of the Lena Delta, neglected in the former decades. This is a place of history: in 1881, the first Russian meteorological station, where N. D. Yurgens and A. A. Bunge were making observations in 1881–1883, was established there. At present this territory is a protective zone of a nature reserve, which is used for licensed fishing by workers of the Yakutia’s only collective farm “Arktika.”





“Sadko” (Source: [https://ru.wikipedia.org/wiki/%D0%A1%D0%B0%D0%B4%D0%BA%D0%BE\\_\(%D0%BB%D0%B5%D0%B4%D0%BE%D0%BA%D0%BE%D0%BB\)](https://ru.wikipedia.org/wiki/%D0%A1%D0%B0%D0%B4%D0%BA%D0%BE_(%D0%BB%D0%B5%D0%B4%D0%BE%D0%BA%D0%BE%D0%BB)))

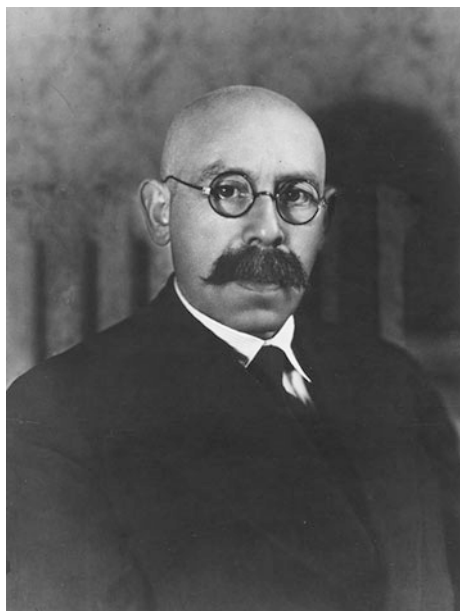
## Salkay

Salkay – is an island located west of Olenyok Bay. Belongs to the group of four islands, with the Daldalakh Island in the north followed by the Orto Ary Island. The length of the island is 7.5 km. It is quite elevated, with even landscape. In the northern part, the height of the island is about 6 m. In the east it is surrounded by large shallows.

## Samoylovich, Rudolf (Reuben) Lazarevich (1881–1939)

Samoylovich, Rudolf (Reuben) Lazarevich (1881–1939) – was a Soviet polar explorer, Dr. Sci. in Geographical Studies, and a Professor. Graduated from Freiburg Mining Academy in 1905. Participated in the revolutionary movement and went through numerous arrests and exiles. During his exile in the Arkhangelsk Government, studied the geology of the Pinezh Region and met V. Rusanov. Worked in Arkhangelsk as a secretary

of the society for the study of the Russian North and from 1912 was a mining engineer of Rusanov’s expedition to Spitsbergen, where coal fields were discovered and secured to Russia. In 1915–1917 in Karelia, S. discovered a large pegmatite vein, which was later named after him. In 1918–1919 S. organized expeditions to Spitsbergen and to Pechorsky District. In 1920 arranged and headed the Northern scientific and commercial expedition, future Arctic Institute. In 1921–1925 explored the shores of Novaya Zemlya and discovered bays, gulfs, and mountains. In 1926 along with D. Shcherbakov determined reserves of Khibiny apatite ore. Took part in 21 Arctic expeditions, including the expedition (1928) of the icebreaker “Krasin” to Umberto Nobile’s airship “Italy” in distress. In 1931 was a scientific supervisor of the international expedition society “Aeroarctic” on the German airship “Graf Zeppelin,” which took a nonstop 106-h flight over the West Arctic. In 1932, on the icebreaker “Vladimir Rusanov,” carried out oceanographic research in the Kara Sea; discovered a group of the Izvestiy TSIK Islands, the Arctic Institute Islands; planted a Soviet flag on the Sverdrup Island (which was



Samoylovich R.L. (Source: [https://en.wikipedia.org/wiki/Rudolf\\_Samoylovich](https://en.wikipedia.org/wiki/Rudolf_Samoylovich))

visited by none at the time), and built a scientific station at Cape Chelyuskin. In 1934 headed a complex expedition on the icebreaker “Sedov” in the Kara Sea; in 1936 and 1937 explored the northwestern part of the Kara Sea, the Laptev Sea, and straits of Franz Josef Land. In 1937–1938 S. led a forced wintering of icebreakers “Sadko,” “Malygin,” and “Sedov,” which were frozen in the drifting ice of the Kara Sea. In spring 1938, most part of polar explorers was taken to the big land by planes. In August 1938 S. was defamed, arrested, and in March 1939 shot dead.

The author of the book *Saving the Nobile Expedition*, Leningrad, 1967.

An island in Severnaya Zemlya, the Kara Sea, a bay in Novaya Zemlya, and the Barents Sea bear the name of S..

## Sannikov Land

Sannikov Land – a phantom island in the Arctic Ocean to the north of the New Siberian Islands that was first seen in 1811 from Kotelný Island by

a Yakut tradesman and a hunter Y. Sannikov. According to him there were “high stone mountains” rising in the north over the sea. In 1822 the Russian Navy lieutenant P. F. Anjou tried to find the S. L. searching for thousands of sq. miles in different directions, but he found nothing. In 1902 Baron E. V. Toll with his companions tried to find this land, but died. In 1937 the Soviet icebreakers “Joseph Stalin” and “Yermak” were searching for S. L., in 1937–1938 – the icebreakers “Sadko” and “G. Sedov.” They proved that S. L. does not exist. Its existence was not confirmed by the arctic aviation trips either. In due course of the ship’s documents recorded, the existence of Makarov Land, Bradley Land, Gillis Land, Kenan Land, Harris Land, Tak-Puk Land, and others turned out to be disappearing lands.

It was S. L. that the Arctic expeditions of Baron E. V. Toll aimed at. He was sure that there used to be Arctida, a northern polar continent, the coast of which, in his opinion, Y. Sannikov observed.

In 1893 E. V. Toll saw a stripe of mountains in the horizon as well and decided that it was S. L. In the same year, F. Nansen navigated on his ship “Fram” past the New Siberian Islands and reached the altitude 79°N, but he found no traces of S. L.

Observations over migratory birds, namely, polar geese and others, gave food to another testimonials for the existence of vast lands in the north. In spring the birds left further to the north and in autumn they returned with young ones. As the birds could not live in an ice desert, it was suggested that S. L., lying in the north, was rich and fertile and that it was there when the birds would migrate. Finding arguments for and against S. L.’s existence was linked with significant difficulties. The New Siberian Islands lie close to the edge of the permanent northern ice cap: even in warm years, the ocean around the islands was prepared for navigation only 2–3 months a year, in late summer and early autumn. In cold years the islands can be frozen all through the summer. The hypothetical new land at the distance of several 100 km from the New Siberian Islands could be frozen constantly during several dozens of years.

Some scientists believe that S. L., just like many arctic islands, including the majority of the New Siberian Islands, was not formed from rock,

but from the so-called fossil ice (permafrost), covered with a layer of soil. In due course, the ice would melt and S. L. disappeared like some other islands, formed by fossil ice: Mercury, Diomedé, Vasilyevskiy, and Semenovskiy Islands. The name “S. L.” was first used by the academic secretary of the Imperial Russian Geographical Society A. V. Grigoriev. In 1926 the Academician V. A. Obruchev published a sci-fi novel *Sannikov Land*. In 1944 he requested to observe all the remaining white spots from the planes, but nothing was found. In 1973 there appeared a Soviet famous screen adaptation of V. A. Obruchev’s novel with the same name.

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## Sannikov Strait

Sannikov Strait – located between the Archipelago (islands) Anjou in the north and the Lyakhovsky Islands in the south (the New Siberian Islands) and connects the Laptev Sea and the East Siberian Sea. Its length is 238 km, width up to 55 km, and depth 10–20 m. Covered with ice throughout the year. Polar station “Sannikov Land” (from 1942). Discovered in 1773 by merchant from Yakutia, Lyakhov. In 1909 named after manufacturer from Yakutia, Yakov Sannikov. The strait is often regarded as a part of the East Siberian Sea.

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## Sannikov, Yakov (1780: The Beginning of the Nineteenth Century)

Sannikov, Yakov (1780: The Beginning of the Nineteenth Century) – was a merchant from Yakutia, manufacturer, and explorer of the New Siberian Islands. He was the head of the guild engaged in fish and fur business on the shore of the Laptev Sea. In spring 1800 S. found in sea a rocky island with several crosses on its shore, which meant that it had been visited before. S. discovered and described Stolbovoy Island anew. In 4 years he visited Kotelny Island. As a member of

M. Gedenstrom’s expedition, aimed at exploration of the New Siberian Islands in 1808–1810, S. crossed the island of New Siberia from south to north, described the landscape of its inner part, carried out astronomic investigation, and mapped significant heights. In 1811 S. walked around the Faddeyevskiy Island with his son and surveyor P. Pshenitsyn to find out that it was connected with the Kotelny Island with a low sandy neck of land, which goes underwater during tide. (Later on, the eastern part of the Kotelny Island was named the Bunge Land; the Faddeyevskiy Island lost independence in the middle of the twentieth century and turned to a peninsula of the same name.) S. saw a mysterious land from the New Siberian Islands many times, which was later named after him. Eduard von Toll also reported on the existence of this land and marked it on the map on the basis of his observations over migration of birds and animals. Later on Sannikov Land was searched for by Pyotr Anjou, with no result.

The name of S. is given to the strait between Archipelagos Lyakhovsky and Anjou, connecting the East Siberian Sea and the Laptev Sea, a polar station, a river on the New Siberian Islands, and the famous “Sannikov Land.”

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## Sardine Cisco (Latin *Coregonus sardinella*)

Sardine Cisco (Latin *Coregonus sardinella*) – semi-anadromous, less often lake fish of *Coregonus* family. It is large; its length is over 40 cm and weight 500 g. Dorsal fin is shifted to the front. Gains weight in fresh and brackish water in estuaries. Matures at 3–7 years. Spawning run from June to October. Spawns in autumn. Lays eggs in sand 1–1.5-m deep. Average fertility is 17,000 eggs. After spawning some fish die. Juvenile fish hatch out in May and roll down to gain weight. Feeds on plankton and juvenile fish. Life span is 8–11 years. Inhabits Siberian waters from the Kara River to Kolyma River and can be met in the Anadyr River. A very important commercial species.



Sardine Cisco (Source: [https://en.wikipedia.org/wiki/Coregonus\\_sardinella](https://en.wikipedia.org/wiki/Coregonus_sardinella))

## Sarychev Island

Sarychev Island – an island located in the mouth of the Shimarev Bay, in the Lowland Kotzebue-Kobuk, the Chukchi Sea, Alaska, United States. The island is elongated and narrow and its length is 5 km, width 400 m, and the peak point 6 m over sea level. Distance to the mainland is 8 km. Shishmaref settlement and an airport are located on the island.

The island was named in 1816 by Russian navigator lieutenant Otto von Kotzebue in memory of vice admiral Gavriil Sarychev.

## Sarychev, Gavriil (Gavrila) Andreevich (1763–1831)

Sarychev, Gavriil (Gavrila) Andreevich (1763–1831) – was a Russian admiral (1830), scholar, geographer and hydrographer, explorer of the northeastern part of the Pacific Ocean and the Baltic Sea, an honorable member of St. Petersburg Academy of Sciences, and writer. In 1778 graduated from Sea Cadet Corps. Navigated in the Baltic, the White Sea, and the Mediterranean Sea. In 1785 in the rank of lieutenant, he was assigned to the “secret” northeast geographical and astronomical expedition of Joseph Billings. Traveling through Siberia he arrived to Okhotsk and then to Verkhnekolymsk. In 1787 he went down the River Kolyma to its mouth on the ship “Yasashna” that was built there. He tried to leave the Kolyma mouth to the East Siberian Sea and went round the Chukotka Peninsula, but

heavy ice prevented him from doing that, leaving the way only to Cape Baranov Kamen. On the shore S. found and excavated a camp of “shelags” (a tribe of the Kolyma Region), collected their household items, and determined settlement borders. These were the first ever excavations of the Arctic region ancient artifacts. Returned to Okhotsk and in spring 1789 described common mouth of the Okhota and Kukhtuy rivers, drawn the plan of the Okhotsk Port, and described and mapped out the seashore to the west from Okhotsk to Aldoma. In autumn went from Okhotsk to Petropavlovsk onboard the ship “Slava Rossiya” under the command of Billings. On the way to the Kuril Islands, discovered an unknown rocky island, named Ostrov Svyatogo Iony (Saint Jonas’ Island). In 1790 onboard the ship “Slava Rossiya,” took part in hydrographic works near the Aleutian Islands and reached the Kodiak Island (the Gulf of Alaska). Basing on his visual observation (from the sea), S. described islands Amchitka and Amlya. Explored gulfs of islands Unalaska and Kodiak, examined Chugach Bay, and returned to Petropavlovsk. In 1791 he took the same ship to the Unalaska Island, from where he went to St. Matthew Island. Explored St. Lawrence Island and then the eastern shore of the Bering Strait and the Gvozdev Islands. Near Chukotka coast, in St. Lawrence Bay, headed the expedition and returned to Unalaska.

In the beginning of 1792, S. within 40 days explored the shore (except the southern side) of Unalaska on the kayak accompanied by Aleuts and compiled its first description. In June both ships returned to Petropavlovsk. In autumn he took the boat “Cherniy Orel” to return to Okhotsk. In July 1793 started to Yakutsk and returned to St. Petersburg in April 1794, having crossed Siberia. In 1802 S. headed hydrographic research in the Baltic Sea, which continued until 1817. In 1803 S. was awarded the rank of rear admiral and became a member of the Admiralty. As a result of many years of exploration in the Baltic Sea, S. published an atlas and sailing directions. Since 1809 S. was an honorable member of St. Petersburg Academy of Science. S. is the author of the first geographic *Atlas of the*





Sarychev G.A. (Source: [https://en.wikipedia.org/wiki/Gavril\\_Sarychev](https://en.wikipedia.org/wiki/Gavril_Sarychev))

*North-Western America, Northeastern Asia and waters dividing them* (1826). In 1827 in the course of reorganization of the naval ministry appointed chief hydrographer of General Maritime Headquarters.

S's main works are as follows: *Journey of Captain Sarychev's Fleet in the Northeastern Part of Siberia, the Arctic Sea and the Eastern Ocean During Eight Years with Geographical and Astronomical Sea Expedition, Headed by Fleet Captain Billings from 1785 to 1793* (1802); *Journey of Captain Billings through Chukotka Land from the Bering Strait to Nizhniy Kolyma stockade town...* (1811); *Sea Atlas of all the Baltic Sea with the Gulf of Finland and Kattegat...* (1812); *Directions for Safe Navigation in the Gulf of Finland, the Baltic Sea and Kattegat* (1817); and *Geodesic and Hydrographic Instructions on How to Take Measurement of Landscapes, Sea Depths, Gulfs, Rivers, and Mark all of the Above on Sea Maps* (1825).

A mountain on the Novaya Zemlya Islands in the Barents Sea, a cape and a strait in the Bering Sea, a volcano in the Okhotsk Sea, and an island in the Chukchi Sea are named after S..

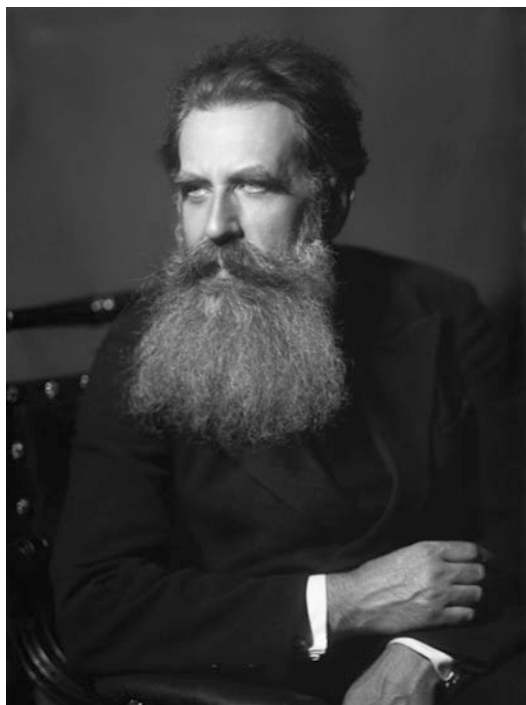
## Schmidt, Otto Yulievich (1891–1956)

Schmidt, Otto Yulievich (1891–1956) – is a prominent Soviet scientist, astronomer, mathematician, geophysicist, Arctic explorer, state figure, Moscow State University Professor, Academician (1935), Vice President of the Russian Academy of Sciences (1939–1942), and Hero of the Soviet Union (1937). In 1913 he graduated from the physics and mathematics department of Kiev University and was the privatdozent of the University since 1916. In 1920–1923, he was a Professor of Moscow Forestry Engineering University; in 1923–1926, the Second Moscow University; and in 1926–1955, Moscow State University. After 1917 he was one of the developers of the tertiary education, sciences, and publishing. He was one of the founders and editor in chief of the first *Big Soviet Encyclopedia* (1924–1941) and a number of scientific journals. In 1930–1932 he served as the Director of the Arctic Institute and in 1932–1939, the Head of the Directorate of the Northern Sea Route (Glavsevmorput).

Expedition activity played a significant role in Schmidt's life. In 1929–1930 he led the expedition on the steam ice breaker "G. Sedov," which set up the first research station on the Franz Joseph Land. In 1930 he headed another expedition on "G. Sedov," which made a second trip to the Franz Joseph Land, surveyed the northeastern part of the Kara Sea, and then explored the western shores of Severnaya Zemlya Archipelago, having discovered a number of islands. In 1932 Schmidt's expedition on the icebreaker steamship "A. Sibiryakov" went from Arkhangelsk to the Pacific Ocean, in one navigation. In 1933–1934 he was the head of the expedition, which made another attempt to pass along the Northeastern Passage in one navigation, on the steamship "Chelyuskin," and after the ship sank, Schmidt headed the ice camp of the "Chelyuskin" crew.

A network of Arctic stations was built on the Arctic seacoast under his leadership. That was Schmidt who suggested the idea of drifting Arctic research stations. In May 1937, he headed the air expedition on setting up the "Severnnyy Polyus" (North Pole) station and then in 1938 r., the expedition on the rescue of the Papanin crew.





Schmidt O. Yu. (Source: <http://geographyofrussia.com/shmidt-otto-yulevich/>)

The Theoretical Geophysics Research Institute was established under his initiative. In the mid-1940s, Schmidt suggested the new theory of the formation of the Earth and the planets of the solar system, which he continued to develop in collaboration with other Soviet scientists until the end of his life.

An island and a peninsula in the Kara Sea, a cape on the Chukotka Coast, and the Earth Physics Research Institute of the Russian Academy of Sciences were named in his honor.

### Sea Hare or Bearded Seal (*Erignathus barbatus*)

Sea Hare or Bearded Seal (*Erignathus barbatus*) – one of the largest species of the seal family (Phocinae) and the largest species in the fauna of Russia. The Atlantic subspecies inhabit the western part of the Laptev Sea. The body

length is up to 250 cm. The total mass of adults, depending on the nutritional status of summer–autumn, is usually up to 265 kg; in winter it reaches 300 kg and sometimes even more. The size of males and females is almost identical. The color of hair is solid brownish gray. S. H. is mainly spread in the marginal seas of the Arctic Ocean and in the northern parts of the Atlantic and Pacific oceans and occasionally appears in the central parts of the Arctic Ocean. S. H. prefers shallow coastal areas, especially those where the shore is rugged by bays and gulfs, with a group of islands. It intentionally avoids open deep sea areas where the depth is greater than 50–70 m, which usually does not occur there. Such dislocation is due to the fact that S. H. feeds mainly on benthic and demersal animals: lamellibranchiates, bivalves and gastropods, shrimps, and crabs. Sometimes eats *Boreogadus saida* (polar cod). S. H. is relatively a sedentary species. So, with the formation of heavy continuous fast ice, most of S. H. go farther out to sea and to the zone of drifting ice. Coastal rookeries occur around the end of October – early November, when, with the appearance of ice, seals move onto them and keep themselves singly or in groups of 2–3 animals. Later, they occur on the ice more often and, at the same time, there could be a few dozen species on ice floes. Some individuals remain in the coastal strip even in winter, making creepholes in ice through which they emerge from the water. Sometimes creepholes are heavily snowed in, and the animals build a lodge in them. Spring accumulations of S. Hs on ice are not of mass, concentrated events; the animals are dispersed on ice floes, or ashore. They haul out onto fast ice or pack ice at this time to mate, molt, and raise young. S. Hs are slow, burly animals and cannot move quickly on ice. Puppies are born in March–May. The body length of a newborn is about 120 cm. Females reach puberty at the age of 4–6 years, and males at 5–7 years. S. Hs are of significant commercial value. It is hunted by the local population and special seal-hunting ships. For industrial purposes subcutaneous fat (40–100 kg from each animal) and skin-like rawhide are used. Sometimes meat is also used (mainly for feeding fur animals).

Sea Hare (Source: [https://en.wikipedia.org/wiki/Bearded\\_seal](https://en.wikipedia.org/wiki/Bearded_seal))



## Sea Hunting

Sea Hunting – traditional hunting for sea animals, seals, walruses, and whales, by indigenous northern peoples who provide themselves with meat, fat, hides, and bones. This activity developed for several 1,000 years and gave way to common elements of culture. The main tools for hunting were harpoons with cork floats and fish spears. Today traditional tools are used alongside the new types of hunting weapons and transport.

1997 was the year of establishment of the Council of Sea Hunters with three committees: for whale hunting, for Pacific walrus hunting, and for Polar bear hunting.

formation starts at a temperature below 0 °C, the melting at a temperature above –2.3 °C. Water in the Arctic seas with the highest salinity (approx. 35 ‰) begins to freeze at a temperature of –1.9 °C. S. I. is more flexible and more difficult to get crushed into pieces than freshwater ice. By its structure, S. I. may be needlelike, spongy, and grainy. The sea area covered by ice varies from month to month and from year to year, depending on the amount of heat in the ocean, the duration of sea cooling, ice melting, etc. A S. I. condition is important for shipping.

## Sea Ice

Sea Ice – formed in seas due to the freezing of seawater. Its specific properties are salinity and porosity. It represents a smooth mass of Arctic ice with lower density as compared with freshwater ice (from 0.85 to 0.94 g/cm<sup>3</sup>); because of their small areas, floes rise up to 1/7–1/10 of their thickness above the water surface. The sea ice

## Sea Lion (Northern Sea Lion) (*Eumetopias jubatus*)

Sea Lion (Northern Sea Lion) (*Eumetopias jubatus*) – a mammal, the largest species in the family of *Otariidae*. Body length of adult males averages 3.0–3.5 m, females around 2.3 m; the weight of an adult male is 700–800 kg, sometimes reaching 1,000 kg, and females around 300–350 kg. The face is broad and blunt. The neck is long and flexible. Neck and shoulders of males are covered with long hair (main). Color

Sea ice (Source: [https://en.wikipedia.org/wiki/Sea\\_ice](https://en.wikipedia.org/wiki/Sea_ice))



differs depending on sex, age, and season – from dark reddish to light brown. Lives in herds, which take one and the same plot every summer. Endemic of the Pacific Ocean northern part, inhabits the area from the Bering Strait to the Korean Peninsula. Lives on rocky capes stretching out into the sea, stones, or shingle beaches separate tiny islands in the coastal zone. S. L. is polygamic; in breeding season (May–July), they make harems of 5–20 females. Breeding rate is low: pregnancy lasts around a year, usually with one cub. S. L. matures at 4–7 years. Adults are cautious; they can be signaled of danger by birds. Animals lying on steep cliffs can dive into the sea from several meters height. S. L. eats fish (codfish, Alaska Pollack, navaga, flounder, halibut), squids (octopus, calamari, ink fish), and other invertebrate. In very rare cases, they can eat sea dogs. Perfect for training. Listed in the Red Book of Russia and the International Red Book.

## Sea Mammal Hunting

Sea Mammal Hunting – a traditional occupation of the inhabitants of the ocean coast. Among the

Chukchi, Koryak, and Eskimos, this industry has been developed for several 1,000 years, creating common elements of culture. They hunted seals, walruses, and whales, fully providing themselves with meat, fat, skins, and bones. The main tools of fishing were harpoons with floats and spears. To scare the animal and kick it out of the water, firecrackers made of whalebone were used. Currently, along with new types of hunting guns and transport, the old weapons still apply.

The Union of Marine Mammal Hunters was established in 1997; it has three commissions: whaling, pacific walrus, and polar bear.

## Seahorse Islands

Seahorse Islands – (“seahorse” is an old name of the walrus) – a chain of long and narrow sandy islands in western North Slope Borough, Alaska, United States. S. I. is located between Peard and the Chukchi Sea, 1.7 km east of Point Franklin. The length of the island is around 5 km; the highest point of the island is 2 m. The shape of the island changes every year.



Sea Lion (Source: [https://en.wikipedia.org/wiki/Sea\\_lion](https://en.wikipedia.org/wiki/Sea_lion))

S. I. was named in 1826 by Royal Navy Captain F. W. Beechey.

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## Seas of Chukotka

Seas of Chukotka – often referred to three offshore seas surrounding the Chukchi Peninsula: East Siberian and Chukchi (Arctic Ocean Basin) and the Bering Sea (Pacific Basin). Particular features of the S. C. are heavy ice conditions, storms, fog, and strong tidal currents.

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## Seas of the Siberian Shelf

Seas of the Siberian Shelf – often in Russian science so-called the Kara, Laptev, East Siberian, and Chukchi seas.

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## Selawik

Selawik – a city in Northwest Arctic Borough, Alaska, USA. It is located at the mouth of the Selawik River where it empties into Selawik Lake, about 112 km southeast of Kotzebue. S. is near the Selawik National Wildlife Refuge, a breeding and resting area for migratory waterfowl. A Lt. Lavrenty Zagoskin of the Imperial Russian Navy first reported the village in the 1840s as “Chilivik.” In 1880, Ivan Petrov counted 100 “Selawigamute” people. Today population is of 850 (2014).

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## Selawik Lake

Selawik Lake – located 11 km southwest of Selawik, Alaska, United States. The lake is adjacent to the Selawik National Wildlife Refuge and



the Baldwin Peninsula, feeding into the Hotham Inlet and Kotzebue Sound. S. L. is the third largest lake in Alaska after Iliamna Lake and Becharof Lake and seventeenth largest lake in the United States. Its Eskimo name “Chilivik” (meaning probably an Eskimo tribe or village) was first reported by Lieutenant L. Zagoskin.

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## Selawik National Wildlife Refuge

Selawik National Wildlife Refuge – refuge located to the east of Kotzebue Sound in north-west of Alaska in the Waring Mountains. SNWR was officially established in 1980 with the passage of the Alaska National Interest Lands Conservation Act (ANILCA). Area – 8,700 km<sup>2</sup>. SNWR is bounded on the north by the Waring Mountains and Kobuk Valley National Park; and to the south by the Selawik Hills and the Purcell Mountains. Refuge lands extend eastward toward the headwaters of the Selawik River and the Continental

Divide. SNWR is administered from offices in Kotzebue. The SNWR lands include alpine tundra, arctic tundra, taiga, lake and wetland complexes, large river deltas, open grass and sedge meadows, and previously glaciated mountains and river valleys. Rolling, vegetated sand dunes were formed by the last glaciers retreat. These dunes are the remnant of a much larger system that once included the Great Kobuk Sand Dunes to the north.

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## Selawik River

Selawik River – a river, 230 km long, in the northwestern part of Alaska, USA. Originating in the Purcell Mountains near the Zane Hills, it flows generally west through the Selawik National Wildlife Refuge to Selawik Lake, which runs into the Kotzebue Sound in the Chukchi Sea. Selawik village is located at the mouth of S.R. S.R. is used by residents for fishing and for rafting and sport fishing by tourists.



Selawik National Wildlife Refuge (Source: [https://en.wikipedia.org/wiki/Selawik\\_National\\_Wildlife\\_Refuge](https://en.wikipedia.org/wiki/Selawik_National_Wildlife_Refuge))





Selawik River (Source: [https://en.wikipedia.org/wiki/Selawik\\_River](https://en.wikipedia.org/wiki/Selawik_River))

## Sellakhskaya Bay

Sellakhskaya Bay – shallow (up to 14 m) bay in the southeastern part of the Laptev Sea, between the Manyko Peninsula in the west and Turuktakh Cape in the north, the Sakha Republic (Yakutia), Russia. Its length is around 60 km, width up to 25 km, and depth at the entrance over 10 m. The area is 1,800 km<sup>2</sup>. The coasts are low and befringed by shallows. The coast is largely a heavy-going swampy area. By wind surge they are covered with water, getting dry by offshore wind. Numerous rivers (the Sellakh, the Danilkina, the Maksunuokha), creeks, and brooks flow into S. B.

## Semyonovsky Island

Semyonovsky Island – was an island in the New Siberian Islands, located 63 km to the west from the northern end of the Stolbovoy Island. The island was stretched in the direction northeast–southwest; its length was 2 km (according to other

sources 15 km) with the maximum length around 600 m. It was formed by sand and clay deposits with inclusions of fossil ice. The surface of the island was plain of up to 25 m high. The coasts were steep with cliffs 14–16 m high. In the 1950s the island eroded down (fossil ice melted) into a sandbar. It was discovered by M. Lyakhov, a merchant from Yakutsk, in 1815.

## Serditse-Kamen (Stone Heart)

Serditse-Kamen (Stone Heart) (Chukchi “Pyttelgyyanrakvyn”) – a separate stone at the end of a headland, Chukchi Autonomous Area, Russia. Located to the east from Kolyuchinskaya Bay, it is the eastern edge of the mountain mass, to the southeast of Kitsetun Cape. The cape is precipitous and rocky. To the north from it, the coastal cliffs get higher, and to the south, lower. It is the resting place of walrus. The cape was named Serdtse-Kamen by J. Cook, who was there on September 1, 1778. Its shape reminds that of a heart. In 1920, the expedition of the Norwegian explorer R. Amundsen stayed for winter around the place.

## Serykh Gusey Islands ("Grey Geese Islands")

Serykh Gusey Islands ("Grey Geese Islands") – an island group in the Chukchi Sea, located west of the entrance to Kolyuchinskaya Bay, Chukotka Autonomous Area, Russia. The islands are aligned from north to south, being on average 5 km from the coast of the Chukotka Peninsula. They are in the area of Belyaka Spit, which encloses Kolyuchinskaya Bay, isolating it from the rest of the Chukchi Sea. S. G. I. are located 26 km to the south of the Kolyuchin Island forming a 33-km-long chain along the west side of the entrance to the Kolyuchinskaya Bay, isolating Kunergvin Lagoon from the sea. The islands are low, pebbly, and sandy and largely flooded at the time of upsurge. Passages between the islands are shallow and dangerous for boating. The largest three of them are called Severny, Maly, and Yuzhny. Yuzhny Island is the largest in the group, being about 12 km in length. The island is marked by sandy flats, beaches, and crowberry tundra. Shingle beaches give way to flat, turfey surfaces. The island is dotted with small brackish pools.

The sea around the archipelago is frozen for about 9 or 10 months on a yearly average, so the islands are merged with the mainland most of the year.

The islands are important for seabirds covering long distances. The average stay of birds lasts 26 days.

## Severnaya Zemlya

Severnaya Zemlya – an archipelago which separates the Kara Sea and the Laptev Sea, to the north of the Taymyr Peninsula, across the Vilkitsky Strait (60–90 km wide). It is the northernmost part of Asia. It is the western border of the Laptev Sea. Administratively it refers to Taymyr (Dolgano-Nenets) Autonomous Area, Russia. It was the last vast land discovered on our planet. The archipelago consists of four major

islands – the October Revolution Island, the Bolshevik Island, the Komsomolets Island, the Pioneer Island, and lots of minor islands of total area around 37,000 km<sup>2</sup>.

In the south S. Z. (the Bolshevik Island) is separated from the mainland coast (the Taymyr Peninsula) by the Vilkitsky Strait (60–90 km). The S. Z. Islands Bolshevik and October Revolution are separated by the Shokalsky Strait (20–50 km); Krasnoyarmy Strait separates the October Revolution Island from the Komsomolets and the Pioneer Islands, with the latter being separated by the Yuzhny Strait. Near the eastern coast of S. Z., to the east from the Bolshevik Island, two large islands are located – the Maly Taymyr Island and the Starokadomsky Island.

S. Z. is a strongly denuded and lowered folded older mass, like the Taymyr Peninsula. The Proterozoic and Paleozoic layers contain large folded strata of sand rock, shale rock, chalkstone, lava, structural accumulations, gabbro–diabase dikes, and granite intrusions. Afterward the Taymyr folded structure was elevated two times. S. Z.'s present landscape developed due to rock displacement in the following geologic ages. The most part of S. Z. is represented by high plateau, formed by metamorphic rocks of old folded structures. A dense network of hollows with smooth slopes is widely represented. Plateau tops are covered with ice and are cup shaped, often with block deposits and stone polygons, stretched into straps along the slope, agglomerations of glacial clay boulders. Plateaus are separated by deep canyons with waterfalls at the bottom. Rocks of the eastern coast of the October Revolution Island and the western coast of the Bolshevik Island form vertical cliffs plunging into the sea. They are 400–500 m above the sea level and covered with troughs filled with ice. Some troughs flooded with seawater form fjords, e.g., Matusevich Fjord wedging into the land for almost 80 km. Fragile carbonate and shale rocks formed flat land and are stepped due to stops during retreat of glaciers. Solifluction is developing over smooth slopes adjacent to glaciers and snow patches. Fine earth mounds, sometimes encircled by stone circles, and polygon structures with vegetation in tiny spots of low ground occur. Low coastal plains

are to be mainly found on the western shore of the islands. For smaller islands low coastal plains are the only type of landscape. The coasts here are edged with lagoons, small bays, and tongues of sand and pebble. Shallows are widespread, so the shoreline changes considerably during tides. The surface of coastal plains is typical, small-scale polygonal, covered with the network of rivers and streams, and speckled with lake-like lagoons. Strong inland ice, the most characteristic feature of S. Z. nature, 18,300 km<sup>2</sup> in area (47.6 % of surface), hides almost a half of the archipelago surface. Principal forms of ice cover are separate glacial sheets and caps. Akademiya Nauk ice cap, covering 70 % of the Komsomolets Island surface, is an ice sheet. The Schmidt Island is fully covered with ice cap. The Karpinsky ice cap on the October Revolution Island is where the highest point of S. Z. – 965 m – is located. Multiple nunataks tower over ice caps. Shifting ice tongues jut out of ice covers, the largest of them reaching the sea. Ice boulders 200 × 500 m in size come off them. S. Z. is where the lowest snow line in Asia is to be found (50–100 m, on the Bolshevik Island – 300–400 m). Land surface here was strongly influenced by ice. Traces of glacier retreat are to be found everywhere in the form of old boulder trains, hanging valleys, and stones, but distinct glacial relief forms are created only where the ice stream is constrained and the bed slope is steep. There is no dead ice at all.

Hydrographic network of S. Z. is well developed, in spite of the fact that the rivers are small in size. Comparatively dense river network exists on the October Revolution Island, the Bolshevik Island, and the Komsomolets Island, where large land plots are free from ice.

The largest water flows are the Ushakov River (58 km long) and the Ozernaya River (55 km long) on the October Revolution Island, the Tora River (54 km) and the Lagernaya River (49 km) on the Bolshevik Island, the Mnogostruynaya River (36 km) on the Komsomolets Island, and the Kruglaya River (32 km) on the Pioneer Island. Water content of rivers is very diverse. Melting and release of melt water into rivers occur only in relatively short warm season. The rivers are mostly of glacier-derived nourishment.

A significant part of the S. Z. hydrographic network belongs to lakes, with the largest ones on the October Revolution, Komsomolets, and Bolshevik Islands. Total area of lakes equals to 233 km<sup>2</sup>.

The climate of the archipelago is one of the harshest in the world. Average air temperatures (–13...–16 °C) are aggravated by strong winds in January – from 18 to 34 m/s. Due to the crystalline dusty snow structure, the storm starts if the wind is 4–5 m/s, and if it reaches 8 m/s, snow-storm starts. Snow cover settles in the end of September and goes by the beginning of June. Average monthly temperatures are –28...–33 °C in winter and +0.5...1.6 °C in summer. In July, subzero temperature holds up to 18 days in average. Annual precipitation amounts to 150–300 mm, with most of it falling in August. In some years the seas washing S. Z. are covered with pack ice and ice mounds even in summer. When ice mounds and icebergs hit the ground, they form high (up to 20 m) picturesque ice hummocks. The Vilkitsky Strait is free from ice in summer only in the warmest years. The Shokalsky Strait is more accessible for navigation: near its eastern coast, open water can be seen even in winter. A cloudy weather is a characteristic of S. Z., especially in October and March. It is often foggy in summer. From April to June, transparent Arctic air dominates for longer periods. In the midday stones can warm up to 10–12 °C, forming thaw holes around them. In the night their temperature falls down to –40 °C. The soil of the islands is mostly desert arctic and typically arctic. Areas of the archipelago free from snow are arctic deserts, scant even in comparison with other arctic islands. The Bolshevik Island is the only one where moss and lichen cover 20–30 % of the surface; on the other islands, they are tiny spots on the stony land. Coastal plains covered with gramineous and moss tundra and dense hemispheric bunches of hair grass and snow grass are richer in vegetation. On drained plots moss is substituted by lichen (*Cetraria*). Moss is covered by crawling polar willow, scattered flowers of arctic poppy, saxifrage, forget-me-not, and ranunculus – near snow spots.

Typical faunal forms of S. Z. are lemmings and arctic foxes; on the Bolshevik Island, reindeer can sometimes be met. The Bolshevik Island is one of

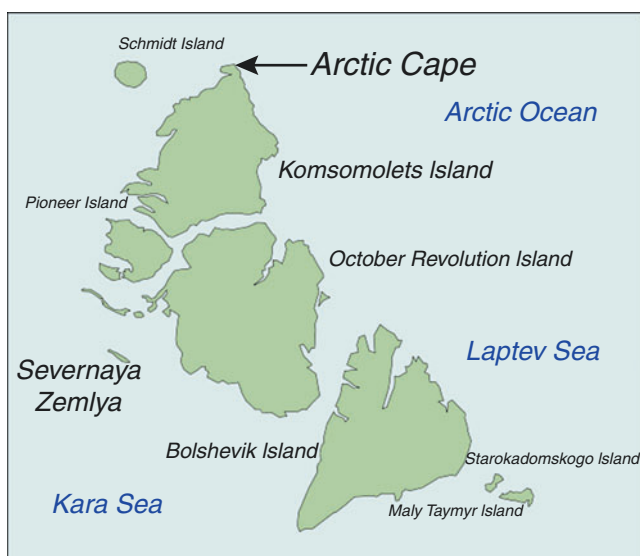
the main “maternity homes” of polar bears. By number of bird species (20), S. Z. holds the last place among polar islands. Bird colonies are abundant only in the Matusevich Fjord and on the rocks of the eastern coast, weathered by frost. Colonies having thousands of seagulls, guillemots, and kittiwakes are located there. S. Z. is the eastern border of little auk areal, the smallest and the most agile northern bird. The substrate of bird colonies is the soil for saxifrage and starwort. The seas washing the archipelago are home to bearded seals and Greenland seals. Shore floe is the usual habitat of ringed seal. Walruses can be met there. Polar navaga and cod are followed by beluga (polar dolphin); schools counting thousands of them were seen near the eastern coasts.

The Sredny Island is where the famous Arctic airport is located, with air routes to the Franz Josef Archipelago and to drifting stations “North Polar.” Groups of researchers and ships arrive here. Industrially, S. Z. is as attractive as the Taymyr Peninsula: on the archipelago of copper, tin, wolfram, ferrum, coal, and oil. But first of all, it needs establishing natural reserve, which would include unique inland ice and coasts with ice holes and water leads, where birds, walruses, and polar bears are feeding. In terms of geological time, S. Z. ecosystems might be the youngest existing, which have been covered with ice until recently.

S. Z. was discovered in the beginning of the twentieth century, though islands to the north of Taymyr had been mentioned since the sixteenth to seventeenth centuries. The guesses on the existence of the unknown land were based on the observations of local people, who watched migration of geese, Arctic foxes, and polar bears. However, neither S. Chelyuskin nor, much later, N. Nordenskiöld, F. Nansen, and E. Toll could find S. Z. It was the expedition of B. Vilkitsky, which was traveling the Northern Sea Route in 1913, that hit rocky coasts of an unknown land. The discovered eastern coast was named Emperor Nicholas II Land and the Russian flag was raised there. First physiographic data on S. Z. was received by the expedition of G. Ushakov and N. Urvantsev in 1930–1932.

The participants of the expedition on the icebreakers “Taymyr” and “Vaygach” described this land as a big island and named it Tayvay in the honor of their icebreakers “(Tay)myr” and “(Vay)gach.” This name even appeared in press. However, under the Emperor’s personal decree, in January 1914, the Tayvay Land was named Emperor Nicholas II Land. Further shooting showed that it was not a single island but a large archipelago. After 1917 the archipelago changed a number of names: Respublika Land, Pakhtusov Land, Brothers Laptev Land, V. Lenin Land

Severnaya Zemlya (Source:  
[http://en.wikipedia.org/  
wiki/Severnaya\\_Zemlya](http://en.wikipedia.org/wiki/Severnaya_Zemlya))



(1924), the USSR Severnaya Zemlya, and, finally, in January 1926 by the ruling of the Presidium of the USSR Central Executive Committee the Archipelago, Severnaya Zemlya.

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## Seward Peninsula

Seward Peninsula – located in the west of Alaska between Norton Sound and Kotzebue Sound, United States. S. P. is extended in direction of the Chukchi Peninsula, being separated from it by the Bering Strait. Its terminal point is Cape Prince of Wales. The area is around 54,000 km<sup>2</sup>. Most part of the surface is solid mass (up to 1,438 m high), formed by volcanic and sedimentary rocks. The vegetation is mostly tundra, in some areas of river valleys (mainly in the eastern part) – fir forest. The population is concentrated on the south coast. Reindeer breeding and fur animal hunting. Deposits of stannum and gold. The south coast is also where the port and the city of Nome – the center of the gold-bearing region – are located.

West off the cape is Clarence Bay, formed by a sand spit stretching from the mainland. Port Clarence is located in the inner part of the bay.

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## Shalaurov Island

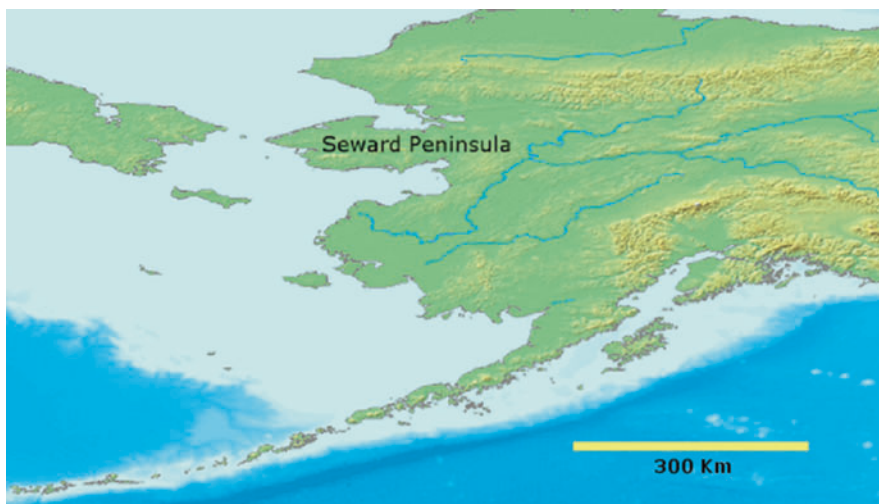
Shalaurov Island – situated in the Chaun Bay, the East Siberian Sea. It was described in 1823 by the members of the Siberian expedition under the command of Lieutenant F. P. Wrangel and named after the Arctic explorer N. Shalaurov.

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## Shalaurov, Nikita Pavlovich (?–1764)

Shalaurov, Nikita Pavlovich (?–1764) – Russian merchant from Ustyug, one of the first traders' seamen, who were determined to explore the Northern Sea Route, and an Arctic explorer.

In 1748–1749 he performed the navigation from Anadyr stockade town to Nizhnekamchatskiy Island, having spent the winter on the Commander Islands. At the beginning of the 1750s, S. together with Ivan Bakhov submitted a claim to the government about searching for the Northern Sea Route from the Lena Delta to the Pacific. In 1755 the senate issued a decree, according to which S. and Bakhov were granted a vacation for the search. In the period from 1757 until 1762, he conducted the navigation from



Seward Peninsula (Source: [https://en.wikipedia.org/wiki/Seward\\_Peninsula](https://en.wikipedia.org/wiki/Seward_Peninsula))



Yakutsk down the Lena and then to Cape Shelagskiy by sea on the vessels “Vera,” “Nadezhda,” and “Lyubov.” During the navigation of 1758, S’s vessel could only reach Cape Bykovsky. In 1759 the vessel left the Lena Delta and reached Cape Chokurdakh, where it was crushed in the ice and stranded at the distance of 12 km from the Yana Delta. S. made two winter breaks at the Kolyma during that period. His navigation in 1761–1762 resulted in mapping of 600 km of the East Siberian Sea coast from Cape Bolshoy Baranov to Cape Shelagsky; from the Kolyma River to the Chaun Bay, he also surveyed the Chaun Bay from Ayon Island and was the first to describe the character of the depth and salinity of the eastern part of the East Siberian Sea, determined the magnetic declination in a number of points, conducted sea current surveys, and was the first to draw a scheme of Bolshoy Lyakhovsky Island and the Medvezhiy Islands. In 1763 he went to Moscow and succeeded in making the senate to pass the decision on converting the expedition from a private enterprise to a state one. Before returning to Siberia, S. complied and submitted to the senate two documents: “Project of setting up of private and state-owned whaler and hunting companies in the North-East” and “News of the Chukchi people.” At the beginning of 1764, S. sent a report to St. Petersburg with the map of the eastern branch of the Kolyma “The Map of the right delta of the Kolyma complied on the way of the sea vessel “Vera,” “Nadezhda,” “Lyubov” ...” In July 1764, he repeated the attempt to cross the East Siberian Sea to the east to Cape Dezhnev, entering from the Kolyma Delta, and vanished together with his mates. According to one of the versions, S. died in the mouth of the Verona River, being the first after the trips of F. Alekseev (Popov) and S. Dezhnev to go beyond the meridian of Cape Shelagsky.

A mountain on the East Siberian Sea coast, to the east from the Chaun Bay, the cape on Bolshoy Lyakhovsky Island (the New Siberian Islands), an island and a cape (Shalaurov Izba) in the East Siberian Sea, and Shalaurov Island in the Kolyma Delta were named in his honor.

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### **Shcherbinin, Mikhail Yakovlevich (Approx. 1705–1742)**

Shcherbinin, Mikhail Yakovlevich (approx. 1705–1742) – Russian midshipman (warrant officer), a participant of the Great Northern (Second Kamchatka) expedition, and an explorer of the Laptev and North Siberian Seas. In 1719 he was admitted in the marine academy and 7 years later he was “assigned to the fleet” as a navigator’s apprentice. He served on a number of ships of the Baltic Fleet. In 1733 he was granted the rank of navigator’s mate “according to examination results” and he was assigned to the Great Northern expedition, following his own request. Since 1735 he served in the detachment of D. Y. Laptev, engaging in the expedition’s cargo transportation on boats along the branches of the Lena basin to the Yudomskoy Krest Hole. In the summer of 1736, he organized the rescue of the survived members of “Irkutsk’s” crew (the detachment of P. Lasinius). In 1738 he was granted the position of navigator. In 1739–1741 (with two winter breaks), he participated in the survey of the Arctic Ocean from the Lena Delta to Cape Bolshoy Baranov; he also described the middle and eastern branches of the Indigirka Delta, mapped the banks of the Yana, and explored the routes from the Bolshoy and Anuy River to Anadyr. He was granted the rank of warrant officer, and in the beginning of September, he carried the map with the results of the survey of his team from Nizhnekolymsk to St. Petersburg (under the order of D. Y. Laptev). He fell ill on the way and died in Irkutsk.

A cape on the Taymyr Peninsula was named in his honor.

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### **Shelonsky Islands**

Shelonsky Islands – is a small archipelago in the Laptev Sea. They are situated in the coastal plains of the Yana Bay, to the east of the Yana Delta. Like the continental Yana-Indigirka

Plain, which is separated from the islands by a narrow 1.5-km channel, the islands have flat lowland and extremely swampy relief. They are divided by a number of narrow shallow small rivers. Some of the islands are nameless and they are mostly formed by the alluvia of the Yana, Suruktyakh, Chandan, and Muksunuokha rivers. The archipelago is an administrative division of the Sakha Republic, Yakutia. The largest of the islands is East Shelonsky Island, located at the northern coast of Manyko Peninsula. It is 17 km long and 7.2 km wide (max). The island has a lot of small lakes and is narrowed toward its eastern end. The fairly deep Shelyakhskaya Bay is located to the east of this island. The West Shelonsky Island is of 2.5 km in diameter. It is separated from the East Shelonsky Island by a 2-km channel. The South Shelonsky Island is 20 km to the west from the previous ones, with the length of 3 km and the width of 0.7 km.

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### **Shestakov, Afanasiy Ivanovich (1677–1730)**

Shestakov, Afanasiy Ivanovich (1677–1730) – was a Cossack colonel from Yakutsk and a navigator. In 1725 he offered the government in St. Petersburg to organize an expedition aimed at the subjugation of the Chukchi and conquering the islands in the Arctic Ocean, as well as the conquest of the Kuril Islands and their inhabitants. The government was assigned to create a special expedition with the base in Anadyr stockade town, in the region of the Okhotsk Sea coast, Chukotka, and Kamchatka. Shestakov was appointed the head of the expedition, and the captain of Tobolsk dragon regiment D. I. Pavlutsky was the commander of the military team. But the heads of the expedition had an argument and it was split into two. Shestakov set off to Okhotsk where he was killed in the battle against the Chukchi, in the Penzhina Delta. A bay and a cape in the Tauyskaya Bay and an island in the Penzhina Bay of the Okhotsk Sea were named after Shestakov.

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### **Shirokostan Peninsula**

Shirokostan Peninsula – is situated in the north of Van'kina Guba in the Laptev Sea, the Sakha Republic, Yakutia. It is protruded 40 km from the continent. The width of the central part is approx. 28 km the west coast of the peninsula is divided into two parts by a small shallow bay with a river flowing into its mouth (Tyuryut River). The south part, which ends with the Cape Kurtakh, forms a wide ledge to the south. The northwest end of the peninsula is the low Cape Churkin.

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### **Shirshov Institute of Oceanology, Russian Academy of Sciences (IORAS), Federal State Budgetary Scientific Institute**

Shirshov Institute of Oceanology, Russian Academy of Sciences (IORAS), Federal State Budgetary Scientific Institute – one of the oldest and the largest Russian research centers in the field of oceanology, the core research establishment of RAS that explores nature and conducts a complex study of the World Ocean relying on the idea of unity of physical, chemical, biological, and geological processes observed there. SIO lays scientific foundations for Earth climate variability prediction, marine resources conservation, and environmental safety in the interests of stable human development. It was established on the premises of the Oceanology Laboratory of the USSR Academy of Sciences by a resolution of the Presidium of the USSR Academy of Sciences in 1946. In 1968, it was named after Academician P. P. Shirshov who was its founder and first Director. Academician L. A. Zenkevich, corresponding member of RAS V. G. Bogorov, S. V. Bruevich, as well as A. D. Dobrovolskiy, P. L. Bezrukov, I. D. Papanin, V. B. Shtokman, G. A. Ushakov, and others took active part in the formation of the institute.

The scientific interests of the Institute are:

- (1) Physical research – hydrology, hydrophysics, hydrooptics, and acoustics; the formation of

- physical structure and water motion systems of seas and oceans as they accumulate solar energy and interact within the ocean-atmosphere-continent system;
- (2) Biological research – anthropogenic ecology, primary production and the ways of its monitoring, commercial populations; development of fundamental principles of the organization and functioning of the ecosystems of the Russian seas and the World Ocean and biodiversity conservation;
  - (3) Geological research – mineral resources, paleoceanology, global tectonics, geophysics, elucidation of peculiarities of the geological structure and evolution of the ocean floor, geophysical fields and geochemical process;
  - (4) Chemical research – biogeochemistry of organic matter, oil and gas genetic characteristics of the World Ocean, physical-chemical state of sea water; chemical composition analysis of the major elements of ecosystems in seas and oceans, biogeochemical transformation and evolution processes;
  - (5) Marine engineering – technical means for ocean studies and for ocean information retrieval, development of technical methods and means for long-term observations of physical, chemical and biological parameters of the ocean based on distributed intellectual networks of self-contained submerged and remote-operated bed scanning stations with observation data reading function.

The institute is a team of more than 1,000 scientists and specialists that work in the following areas: ocean physics (13 laboratories that study hydrodynamics, hydrology, hydrooptics, and hydroacoustics of seas and oceans, as well as climatology and the ocean–atmosphere–continent system interactions), marine geology (13 laboratories that carry out research of tectonics, geomorphology, lithology and mineralogy, geochemistry, geophysics, micropaleontology, shore and depth processes, stratigraphy, and paleoceanography, along with seabed mineral resources), marine ecology (seven laboratories that conduct inquiries into hydrochemistry; phyto-, micro-, and zooplankton ecology; benthos and ichthyofauna; interactions

between physical and biological processes in ecosystems, taxonomy, modern and historical biogeography, ecology, and acoustics of marine mammals), and marine facilities department (seven laboratories that develop and operate oceanological equipment and improve measurement methods and data processing).

In the Institute of Oceanology, there is a subdivision of scientific expeditions and fleet that manages vessel operations and subdivisions in charge of interagency and international ocean exploration coordination, IT department, and the IORAS History Museum.

The Institute has several branches: Atlantic (the city of Kaliningrad), Southern (the city of Gelendzhik), and Northwest (the city of Arkhangelsk). Besides, it has a Caspian subdivision in Astrakhan and a Saint Petersburg Department. Scientists of the Institute contributed substantially to world oceanology. Thus, in 1946, V. B. Shtokman was the first to show a fundamental role of spatial inhomogeneity of wind in the formation of ocean circulation and create a theory of equatorial countercurrents in the oceans. Very long distance sound propagation in the ocean was discovered, the so-called underwater sound channel. The concept of ocean biological structure as a global natural law governing life distribution in the ocean was advanced, which allowed to estimate total biological resources of the ocean. In 1957, scientists of the Institute pioneered in ultra-abyssal research and registered the maximum depth of the World Ocean – 11,022 m in the Marianas Trench (Pacific Ocean). In 1966, generalizing 9-volume monographic work, “The Pacific Ocean” was presented for publication and, later, awarded the USSR State Prize. In 1967, the theory of ocean turbulence was developed. In 1970, a large-scale experiment undertaken in the Atlantic Ocean resulted in a discovery of synoptic eddies; the discovery was registered in the State Register of Discoveries of the USSR. In 1977, the first expedition with Pisces-manned submersibles (diving depth, 2 km) marked the beginning of a new stage in ocean exploration. In 1978, the theory of phosphorite formation in the upwelling zones of the World Ocean was advanced, registered later as a discovery. In 1980s, the Institute conducted a

series of unique laboratory experiments which showed that divers can survive under 500-m depth pressure. Man's capability of active behavior under respiratory mixture pressures corresponding to 2,000-m depth was proved.

In 1987, MIR-1 and MIR-2 deep manned submersibles (DMS) capable of operating as deep as 6,000 m performed an introductory dive. Together with the carrier ship "Mstislav Keldysh," MIR submersibles form the unique research complex that made possible the largest discovery of the twentieth century – hydrothermal systems on the ocean floor. Ore formation processes were studied at ocean depths of 3,000–5,000 m under 300–500 atm pressure and at a hydrothermal fluid temperature of 300–400 °C. Various investigations carried out during the IORAS marine expeditions allowed to describe, for the first time, the ecosystem of hydrothermal fields in the World Ocean, estimate its biological productivity, explain principle laws governing the functioning of pelagic ecosystems, and study and give a quantitative description of sedimentation processes in the World Ocean. The recent decade saw a conceptually new step in exploration of the Arctic Ocean by means of long-use self-contained instrumentation under the "Acoustic Thermometry of Ocean Climate" project. In the North Atlantic, a new type of hydrothermal ore formation system was found; data on the ecosystem of the high-latitude ice regions was obtained for the first time; a sharp

change in the heat flows at the North Atlantic surface was recorded as a cause of essential variations in the water structure and circulation regime; and detailed studies of the ecosystems in the frontal zones of the North Atlantic gyre were made.

From 1949 to 2003, academic fleet of the Institute was composed of altogether 23 vessels varying in tonnage. The "Geolog" and the "Truzhenik" displacing 51.4 t each are the lightest of those. In 1949, the Institute obtained its first research ship "Vityaz" that displaced 5,700 t.

The Institute's research fleet homeported in Kaliningrad and Gelendzhik included three large-capacity research vessels (displacement more than 6,000 t) ("Akademik Sergey Vavilov," 6,700 t (1988); "Akademik Ioffe," 6,700 t (1989); "Akademik Mstislav Keldysh," 6,300 t (1980)), two medium-capacity research vessels (exceeding 1,000 t) ("Professor Shtokman," 1,700 t (1979); "Rift," 1,300 t (1989)), and three small-capacity research vessels (less than 1,000 t) ("Shelf," 280 t (1977), "Akvanavt," and "Akvanavt-2," alongside with deep (to 6 km)-manned submersibles "Mir-1" and "Mir-2").

The vessels are equipped with up-to-date navigation systems, scientific instruments, and hardware for comprehensive field research. Fleet of the Institute had five manned underwater vehicles – two "Mir" class diving up to 6 km, two "Pisces" class that can submerge to 2 km, and "Argus" for operations at a depth of up to 600 m.

P.P. Shirshov Institute of Oceanology in Moscow  
(Source: [https://en.wikipedia.org/wiki/Shirshov\\_Institute\\_of\\_Oceanology](https://en.wikipedia.org/wiki/Shirshov_Institute_of_Oceanology))



The institute performs a set of research projects devoted to investigation of the Arctic and Sub-Arctic seas.

## Shishmaref

Shishmaref – is a settlement on Sarychev Island in the Chukchi Sea to the north of the Bering Strait, 5 miles from Alaska, United States. It is included in the Bering Land Bridge National Preserve. The population is 580 people (2014). Shishmaref is a traditional Eskimo–Inupiat settlement. They are mainly sea animal hunters. The settlement is a well-known region of seal skin manufacturing, high-quality seal fat, and fermented meat production. Gathering cloudberry is popular, which is then preserved in Eskimo style (in seal fat). The residents are known to be very friendly and are famous for their bone carving skills. There are well-known traditions of using sledge dogs (the drivers are called “masheri”). Alcohol is completely banned on the island.

The inhabitants of Shishmaref were the first in Alaska to suffer from the catastrophic impact of the global warming which causes melting of the ice and pergelisol; Shishmaref is exposed to storms and developing erosion processes. Waves erode the shores of the island which used to be protected by the permafrost and Arctic shelf ice. The shore is reduced at an average speed of 3.3 m/ year despite the shore protection measures. In 2000 88 % of the locals voted in favor of transporting the settlement either to Tin-Trink (20 km to the south of Shishmaref, with the cost of relocation at \$170 million) or to Nom and Kotzebue (\$140 million).

It was named after the Russian navigator O. Kotzebue and the member of his expedition Captain-Lieutenant G. S. Shishmarev in 1821.

## Shishmaref Inlet

Shishmaref Inlet – is a bay, situated in the northwest of Seward Peninsula, Alaska, United

States. It is the southernmost point of the Chukchi Sea border. Shishmaref settlement is located on the eastern shore of the bay. It was named after the Russian circumnavigator G. S. Shishmarev.

## Shishmarev, Gleb Semenovich (1781–1835)

Shishmarev, Gleb Semenovich (1781–1835) – was a Russian circumnavigator and a Counter Admiral. In 1804 he graduated from the Marine Cadet Corps. In 1805–1807 he conducted voyages in the Baltic and North Seas. In 1815–1818 he performed a circumnavigation with calls to Petropavlovsk and Unalaska Island as the senior officer of the brig “Rurik” under the command of the famous O. E. Kotzebue. He took part in the discovery and description of the Kotzebue Bay, Shishmaref Bay, Sarychev Island in the Kotzebue Bay, and Chukchi Sea and hydrographical surveys in St. Lawrence Bay, St. Lawrence Island, and the Aleutian Islands. In 1819 he was made a captain-lieutenant, and in the same year, he was appointed the commander of “Blagonamerennyi” sloop, included in the so-called North Division (the “South Division” consisted of “Vostok” and “Mirnyi” sloops under the command of F. F. Bellisgauzen and M. P. Lazarev), including “Otkrytie” sloop under the command of Lieutenant M. N. Vasiliev – the expedition with the objective to search for the way from the White Sea to the Atlantic through the Arctic Ocean. In 1819–1822 he performed the second circumnavigation with the calls to Kamchatka, Petropavlovsk, Unalaska Island, and Novoarkhangelsk. He participated in the survey of the southeastern coast of the Chukchi Sea, St. Lawrence Island, and Mechiginskaya Bay. He was awarded captain of the second rank for this voyage. From 1824 till 1827, he commanded the fleet crew in Kronstadt and St. Petersburg and then “Imperatritsa Aleksandra” ship. In 1829 r., Shishmarev was made counter-admiral.

A bay and settlement in Alaska Peninsula, islands in the Care Sea, the passage (the Marshall





Shishmarev G.S. (Source: <https://ru.wikipedia.org/wiki/%>)

Island), and a peak in the Antarctic (Queen Maud Land) were named in his honor.

## Shores of the Chukchi Sea

Shores of the Chukchi Sea – a vast system of lagoons and barriers. The most important conditions of the shore formation are the shelf character of the sea, severe climate, difficult ice conditions, a small degree of compartmentalization of the coastal line, and the peculiarities of the coastal land relief. These peculiarities are as follows: the sea is approached either by the offshoots of the coastal pressure ridge formed by the slate–limestone complex of the Paleozoic period or by the narrow lowland separating the mountains from the sea and formed by loose depositions of different origin (mostly lacustrine–alluvial and

marine). This lowland is covered by permafrost. The winds and subsequently the waves spread predominantly from the north to the northwest.

The shores of the western and central coast of the Chukchi Sea in the region of Cape Schmidt and Cape Vankarem are characterized first of all by great development of the shore bars and lagoons separated by them. Their natural borders are Mys Yakan (Cape Yakan) in the west and the Serykh Gusey Islands in the east. The shore from Cape Billings to Cape Schmidt is straightened along the length by offshore bars and barrier spits. The only exception is Cape Schmidt, formed by traprock, quartz porphyry, and albitophires. The peculiarities of barrier spits are, firstly, that they are very large (e.g., the barrier spit of the lagoon Tenkergynpilgyn is about 100 km long) and, secondly, they are formed by pebbles and gravel from rock debris originating from the mountains away from the coast, that is, the products of fluvial forms abrasion currently partly flooded and frequent on the sea bottom. This proves that these barrier spits are formed mainly due to settled bottom sediments. The barrier spits often include bedding rock buttes.

On the offshores of all the barrier spits, it is easy to see a step of abrasion at the depth of 4–5 m which is interpreted as a trace of the barrier spit shift in the direction of the land under the influence of the waves.

The lagoons are also quite unique. Their mainland shores are usually high and formed by permafrost rocks. Under the warming influence of water and atmosphere, there starts a process of thermal abrasion and thermal denudation of these steep shores, and there develop soliflual phenomena on a great scale, that is, the flow of table soil.

Another peculiarity of lagoons is their stretching along the general direction of the shore, along the direction of the predominant local winds which even not being parallel to it far from the shore obtain the same direction as soon as they reach a lagoon surface. Some lagoons (Amguema, Pyngopilgyn) in their configuration are rather limans than lagoons. They are along with other limans the result of water logging of the lower reaches of the river and the subsequent cutoff of the bay that has been formed.

The eastern entrance Cape of Kolyuchinskaya Guba presents Belyaka Spit. All the other shores of Kolyuchinskaya Guba are not high, though steep. These are thermo-abrasive soliflual cliffs with the exception of several accumulative forms like spits. The abovementioned cliffs serve as the areas of buildup for these spits.

The head of Kolyuchinskaya Guba is marked by the development of foreshores. Originally Kolyuchinskaya Guba is a large liman created as a result of the sea ingression into the Ioniveyem River and its tributaries. The bay is shallow, and its head gets shallow in an especially intensive way as local waves stimulate beach drifts directed southward and at strong upsurges created by north and northwestern winds.

Belyaka Spit is a large accretion form morphologically resembling a double barrier. The geological structure of the second branch of Belyaka Spit is that of an original peninsula formed by frozen argillaceous and sand-loam deposits of the plain which genetically belong to glacial sea depositions. Belyaka Spit itself is a free accumulative form that was formed due to the beach drift directed westward. The source for buildup of this spit is the material borne due to abrasion of a small thermo-abrasive soliflual cliff lying to the east of this spit and Mys Dzhenretlen (Cape Dzhenretlen) formed by granite gneisses that are intensively eroded here. The offshore is formed by badly sorted sand and pebbles and even rubbly material which was obviously washed out by waves, while thermo-abrasive erosion of glacier and sea sediments had formed the retreated shore.

The movement of the material westward to Belyaka Spit is due to the significant deviation of the shore configuration from its general course, thanks to which the energetic resultant of the waves obtains the direction favorable for the transfer of material to the west, to the mouth of Kolyuchinskaya Guba.

To the east of Mys Dzhenretlen, there is a lagoon named Neskynpilgyn with low abrasive shores. At the entrance to this lagoon, there forms a small spit, but the main part of the barrier separating the lagoon from the sea is formed by argillaceous glacier and marine depositions that are badly sorted. This barrier is subject to thermo-

abrasion from the lagoon. From the side of the sea, a part of this barrier is protected by a mixed sand and shingle bar separating a narrow lagoon. Genetically the Gulf of Neskynpilgyn should be obviously considered a liman which formed as a result of the sea ingression into the valleys of several small rivers which are now flowing into the gulf.

The promontories formed by Cape Nettan, Cape Serdtse-Kamen, and Cape Ikigur and located to the east of the Lagoon Neskynpilgyn are made of granites and syenites. Granite shores are usually subject to very slow sea erosion. The main factor in erosion of this part of the shore as well as in debris flowing into the littoral zone is denudation processes: landing slips, sloughing of the debris formed as a result of mechanical weathering. Between Cape Ikigur and the limans of the Inchoun River, the shore is straightened, abrasive, and formed in shale phyllitic metamorphosed rock.

Cape Dezhnev is formed by granites, quartz, and nepheline syenites. The shore here is eroded to quite a small extent. The cape is more than 740-m high; it is very steep and more sloping in the west. Between Cape Inchoun and Cape Dezhnev, there is Uelen Lagoon consisting of two heterogeneous areas. Its southwestern part presents a liman and the area stretching along the shore is a lagoon proper. The barrier spit of the lagoon is formed predominantly by pebbles and has a steep continental slope. It was presumably formed, like other barrier spits of the Chukotka coast, due to the bottom deposits, but at the moment is being build up by alongshore depositions, judging by the orientation of the wave resultant.

Generally the coast of the Chukchi Sea is the largest region of the lagoon coast in the Arctic Ocean.

Northern Alaska, a significant part of which is washed by the waters of the Chukchi Sea (from Cape Prince of Wales to Cape Barrow), is located in the zone of Cimmerian Orogeny. Here the scientists single out three main structural elements: the Yukon Massif, the upheaval of the Brooks Range, and Colville deflection. The Seward Peninsula lying at the beginning of the Chukchi Sea

coast of Alaska belongs to the massif. It submerges to the north and to the east creating a depression occupied by Kotzebue Sound and its coastal plain. The relief of the Seward Peninsula is of middle altitude (maximum height is 1,445 m) and of hummocky topography, mostly lytomorphic with the traces of ancient mountain glaciation.

The Brooks Range consisting in the western part of two mountain chains – De Long and Bird – almost never approaches the seashore, except some capes in the zone of the western immersion of the uplands.

Colville depression is a submontane depression advancing to the Brooks Range. It is formed by Mesozoic deposits and in the coastal area manifests itself in the relief as a broad coastal tundra plain exceeding eastward the boarder of Alaska and joining here with the estuary of the biggest Canadian river Mackenzie. The biggest part of this plain forms the coast of the Beaufort Sea.

The shore of the Chukchi Sea within Alaska begins with Cape Prince of Wales. This is an intrusive granite massif, rising 700 m above the sea level like Cape Dezhnev. This is a typical denuded shore with sloughing and gliding masses accompanying it. Further to the northeast, there stretches a straightened coast formed by the largest offshore bar which is partly an island one with the total outstretch of 200 km separating lagoons Long, Arctic, and Shishmaref Inlet.

The above mentioned bar finishes at the entrance to Kotzebue Bay with Cape Espenberg. The shores of Kotzebue Sound are almost entirely thermo-abrasive except the area close to the mouth of the Kobuk River, presented by the mouth of this river.

The characteristic of the Seward Peninsula coast is its terracing. Here there are terraces at the height of 7, 12, and 24 m and on the continental slope – at the depth of 6 and 10 m. American scientists speak about six transgressions in Pliocene quaternary period which left their traces in the form of depositions and marine terraces. The latest of them named Kruzenshtern transgression left its terrace at the height of 2–4 m and is 4,000–10,000 years old.

The main element of Cape Kruzenshtern is a mixed sand and shingle bar 18 km long and

0.1–3 km wide. In the broad areas, the microrelief of the bar's surface is formed by more than a 100 beach ridges separated by swamps and lagoons. The youngest ridge approaches a currently existing beach and is home to a camp of the Eskimo. The most ancient of them keeps archeological material that makes it possible to date them back to 4,000 or 5,000 years ago.

The coast from Kotzebue Sound to Cape Hope is straightened, complex, and accretion-thermo-abrasive. Cape Hope is a mixed sand and shingle bar blocking the entrance to the lagoon. To the north of Cape Lisburne, there stretches a slightly sloping bow of a straightened thermo-abrasive coast. Cape Lisburne is formed by Paleozoic metamorphosed rock and is structurally connected with the western depression of the Brooks Range. The coast here presents a high cliff (up to 300 m high) and can be classified as abrasive and denuded. The same is true for Cape Thompson where the coast is built from grit in the area covering 30 km.

Between Cape Lisburne and Cape Barrow, the shore is very versatile. Its contour includes several intersecting bows. The southern bow, right to the east of Cape Lisburne, is a straightened thermo-abrasive and soliflual shore. This indentation into the coastal contour changes into a convex bow of an island bar, which separates the Kasegaluk Lagoon and stretches up to Icy Cape where this bar joins another which is an element of the following concave bow of the coastal contour. This bow ends with the barrier spit Franklin which separates Peard Bay from the sea. From this bay to Cape Barrow, there stretches one more concave bow which is fully thermo-abrasive.

Thermo-abrasive areas of the coast are formed by loose shore marine deposits, from aleurites to gravel with cavern-load ice insertions. The sea cliffs reach 9 m in height and the speed of shore retreat amounts to 3 m/year. The plain is marked by total absence of glacier depositions. From time to time in the middle of the tundra, it is possible to see pingos (bulgunnyakhs).

Island barriers account for 58 % of the total length of Alaska northern coast. First of all this is due to favorable wave conditions between Point Lay and Cape Barrow, as the Chukchi Sea here is

free from ice at least 3 months a year. This is the time of prevailing winds which account for the waves approaching the coast at a right angle. The geological and geomorphological conditions are not less favorable. The shallow continental coast presents a submerged plain formed by loose bottom settlements consisting of coarse sand, gravel, and pebbles. The island barriers to the south of Icy Cape are very prominent. Here there are seven islands with the total length of 120 km and the barrier width reaches 350 m while the islands' height is 2–3 m. The islands are formed by sand and gravel, thrust over lagoon aleurite sediments. The continental slopes of the islands are marked by fine-grained sand. There is an obvious tendency to the movement of the islands toward the land. To the north of Icy Cap, the barrier islands are lower and narrower.

What is peculiar about these barrier islands or island barriers is their moderate width and height. This proved quite clearly that they were formed after the Holocene transgression of the World Ocean as all the islands and island barriers, formed at that time and belonging to relict formations at the present moment, are 5–7 m high.

## Shores of the East Siberian Sea

Shores of the East Siberian Sea – length of coastline comprises 5,918 km including the islands. The formation of the East Siberian Sea shores was influenced by general weakness of wave processes, caused by high ice coverage and good development of fast ice as well as evolution of thermo-abrasive processes and instances of frost weathering. The coast of the East Siberian Sea within its official boundaries (the eastern boundary of meridian 108°E) is divided in two distinctive parts. The bigger western part of the coast, stretching from the New Siberian Islands to the mouth of the Kolyma, is low and flat. Here the sea is being approached for almost 1,000 km by a vast Yana-Indigirka lowland which is formed by the most recent fluvialacustrine and alluvial, occasionally marine sediments and is covered by permafrost. All the northern part of this lowland that

is adjacent to the sea is 200–250 km wide and presents a tundra with thousands of thermokarst lakes and alases. It is cut by big rivers such as the Indigirka and the Kolyma and dozens of smaller rivers and streams.

The eastern part of the East Siberian Sea coast is an upland. Here mountain structures of the Kolyma Upland and the Chukotka Upland approach the sea. However, the mountains come close to the sea only in several limited areas. In most of this eastern part of the coast, the mountains are separated from the sea by chains of lagoons and coastal spits (from a kilometer to several dozen kilometers wide).

According to their geomorphic characteristics, the shores of the East Siberian Sea are divided into three areas: Oygossko-Kolymskaya (Merkushinskiy, Indigirskiy, and Indigiro-Kolymskiy Districts), Kolymsko-Chaunskaya (Letyatkinskiy and Rauchanskiy Districts), and Shelagsko-Billingskaya (Vapkaraiskiy and Pegtymelskiy Districts).

Oygossko-Kolymskaya area is characterized by low relief of the land and extremely shallow continental slope (bottom slope ranges from 0.0003 to 0.0005), formed by very mobile silt. Coefficient of ice-free period here is from 16 % in the west to 14 % in the east. The ice line in the summer is very close to the shore. All of this put strict limits to the intensity and terms of wave impact on the shores. The Indigirka, Kolyma, and Alazeya carry away about 26 million tons of dredge annually. The surf zone displays mainly weak flows of wave energy, most of which is spent away from the coast due to the shallow continental slope. Energetic resultant of waves comprises from 140 ton-meter/year in the west to 85 ton-meter/year in the east.

To this it is necessary to add that almost all along the coast here, the sea is approached by the sediments constrained by permafrost. Thus, the shallowness of the continental slope, low relief of the coast, and permafrost and fluvial factor activity together with the limited chances of active wave processes determine all the peculiarities of the coastal morphology and dynamics within the coastal area under analysis.

From Cape Svyatoy Nos for more than 100 km, there stretches a flat thermo-abrasive coast known

as Oygossky Yar, formed by an ice complex. A flat thermo-abrasive ledge is occasionally complicated by baidzherakhi. Deposits resulting from stream-bank erosion move eastward. According to the shore outline, it is possible to assume that in front of the entrance to Omulyakhskaya Guba, the deposit drift gets unloaded which has caused the appearance of Merkushin Spit here. In fact this low and flat coastal form, fringed with foreshores and fully flooded in times of big upsurge, is more likely to be a relict formation subject to thermo-abrasion. To its east there is also a thermo-abrasive coast stretching.

To the east of Guba Gusinaya, there is a vast mouth of the Indigirka River. To the east of the mouth, there is a large Alazeya projection in the shape of a bow curved in the direction of the sea. This is a straightened thermo-abrasive accretion coast characterized by weak flows of wave energy along the shore. Around Cape Krestovy the deposits migrate in two directions. The speed of thermo-abrasion in separate areas reaches 11 m/year. The accumulative areas of the shore are fringed with wind foreshores.

The Kolyma River forms a vast mouth with an area of more than 3,000 km<sup>2</sup>. The river flows into the East Siberian Sea in three arms named Chukochya, Prokhodskaya, and Kolymskaya.

Kolyma-Chaunskaya coastal area. To the east of the Kolyma mouth, there is a complex straightened coast formed by alternating areas of thermo-abrasive and soliflual and original abrasive cliffs and low accretion areas with beaches and wind foreshores. Soliflual and thermo-abrasive coasts are also very typical of Ayon Island lying at the entrance to Chaunskaya Guba, one of the biggest gulfs in the East Siberian Sea. On the northern shore of Ayon Island, there is a stretch of seashore terraces; the coast here is shallow and fringed with a wind foreshore.

The shores of Chaunskaya Guba are rather versatile which is due to both their exposure with respect to the resultant of waves and the direction of the local waves and their lithologic heterogeneity. Most of the coast of Chaunskaya Guba is low and formed by cryogenic lacustrine-alluvial deposits. This is where thermo-abrasive processes develop. Some areas of the

shore have heavy soliflual and avalanche masses accumulated at the cliff foot; the cliffs die out or their activity has long been stopped. In the shore indentations or in front of the river mouths, beaches and foreshores have appeared. In the region of Pevek, Cape Shelagskiy, and in some other places where the shore is formed by original (chalk and intrusive) rocks, abrasive cliffs in these rocks have developed.

Shelagsko-Billingskaya coastal area is special because branches of the Chukotka Upland come right up to the sea here. The shore is bold; the bottom slope is 0.01–0.02. Energetic resultants on the sea border of the coastal area are directed to southwest; their value ranges from 100,000 to 160,000 ton-meter/year. Long-term average annual ice edge comes almost right up to the shore, and the ice-free period comprises not more than 10 %. In the area from Cape Shelagskiy to Nolde Gulf, it is typical to find high abrasive cliffs formed in the original bedrock. The coastal area accepts fragmental products of rock frost weathering which become pebble depositions as they are immediate products of abrasion. Pebbled barriers isolate small lagoons from the sea. In general this part of the shore may be considered abrasive and accretion straightened.

Cape Billings is a complex of a heavy and complicated accretion form and not less complicated Valkakimanka Lagoon, separated from the cape by this barrier.

The New Siberian Archipelago consists of three groups of islands. The closest to the continent group is called Lyakhovsky Islands and consists of three large islands – Stolbovoy, Maly, and Bolshoy Lyakhovsky. Further to the north, there are the Anjou Islands consisting of huge islands: Kotelny, Faddeyevsky with Bunge Land and Novaya Sibir, as well as relatively small island Belkovsky. The northernmost group is the De Long Islands with small islands Bennett, Zhokhov, Vilkitsky, Henrietta, and Jeannette.

Kotelny, Faddeyevsky, and Bunge Land islands have long combined to form a single land massif. It is believed to have happened as a result of the contemporary upheaval of the islands. However, it is not unlikely that the fusion of the abovementioned islands was caused by



accumulation of depositions and the subsequent drying up of the gulfs that previously separated them. This is proven first of all by the high intensity of thermo-abrasive processes on the island shores. The retreat of shores as a result of thermo-abrasion goes at a speed of 4 m on Novaya Sibir Island to 12 m on Bolshoy Lyakhovsky Island. Loose deposits of the recent time composing the coastal plains contain much cavern-load ice which forms high thermo-abrasive shores quite often complicated by numerous baidzherakhi. In the foundation of such shores, melt-out niches can be very prominent. The shores of Bunge Land are occasionally accumulative and present a unique Arctic sandy desert with typical wind-borne forms of relief that formed as a result of deposition accumulation in the decay zone between Faddeyevsky and Kotelny islands. There are high (up to 220 m high) denuded shores formed by massive rock. They are characteristic of the De Long Islands, Stolbovoy Island, and Belkovsky Island, sometimes in certain areas of the coast of Kotelny and Bolshoy Lyakhovsky islands. Bennett and Henrietta islands are covered by an ice sheet, and in the areas where it goes down to the sea, ice coast is developed.

A very shallow offshore zone of the New Siberian Islands is characterized by an unusual relief of submarine ridges that are parallel to the general direction of the shore. Formation of these forms of relief is connected with the wave activities, and these formations themselves present a series of large submarine bars surrounding Novaya Sibir Island, Zhokhov Island, and the Medvezhiy Islands.

Most of Wrangel Island is washed by the Chukchi Sea, a smaller part – by the East Siberian Sea. Here the scientists have pointed out a variety of rocks, predominantly metamorphically altered sediments. The rocks of Wrangel Island have been exposed to folding. The geologic structure of the island is based on two latitudinal anticlines, directed to the north. Half of the island's surface has a mountain relief. Its base is formed by two mountain ranges corresponding to the two abovementioned latitudinal anticlines. In the east both the ranges get lower and turn into a plateau.

The mountain slopes are dissected by numerous river valleys. There are various glacial relief forms proving the former glacier covering of the whole island. At the moment there are about ten small cirque glaciers, one of them descending right to the sea in the western part of the island. The mountainous part is almost surrounded by a piedmont plain mostly of fluvio-glacial or alluvial origin. The plains boast of various cryogenic forms of microrelief, particularly polygonal forms. The shores of the island are different in the north, south, west, and east. The northern shore is low and fringed with a coarse sand and pebble bar which is mostly insular. To the south of the bar, there is a narrow lagoon connected to the sea by several straits. The southern shore is mostly characterized by alternation of low accretion areas and rock outcrops. This shore can be considered as one of an abrasive and accretion bay coast. In the east and west parts of the island, pre-quaternary rocks come right up to the sea forming high coastal ledges mostly developing under the influence of denudation processes.

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## Shores of the Laptev Sea

Shores of the Laptev Sea – stretch for 7,253 km. High ice coverage of the region limits the wave action to a great extent. Ice-free period in the western part of the Laptev Sea comprises 14 % and in the Eastern part 20 % of the whole number of days in the year. At the same time, storm upsurges and downsurges are quite big and their amplitude sometimes amounts to 5 m. They are to a large extent formed by loose marine, alluvial and marine, and alluvial and lacustrine-alluvial deposits. The latter are the deposits forming the so-called yedoma – the higher level of the tundra lowland plain presented by “a glacier complex” and characterized by a high concentration of dusty material and ice. Due to this the coastal plains are characterized by the relief of alases that is of cavities and lakes formed at the place of ground ice melting. Expansion of permafrost rocks accounts for their numerous exposures at the coastal area which influences thermo-abrasive processes here.

These processes show themselves quite clearly in many coastal regions (Bykovsky Island and Muostakh Island, the Buor-Khaya Peninsula, etc.).

The continental coast of the Laptev Sea is often divided in two coastal areas according to the peculiarities of formation conditions. These are Lena-Anabar and Yana areas which are subdivided into Anabar, Terpyay-Tumus and Olenyok, Buor-Khaya, and Yana Districts. This scheme is completed by the districts of Bereg Pronchishcheva, the Khatanga Bay, and the Lena Delta.

The eastern lowland area of the coastal Taymyr known as Bereg Pronchishcheva is mostly formed by loose marine and alluvial deposits. Their width in rare cases amount to 180 m. In the southern part, the sea is approached by the exposures of sandstone and schists.

The northern parts of Bereg Pronchishcheva still preserve rugged shores with fjards, but here they are already influenced by wave action. In particular there are numerous offshore and island bars, the latter being more typical of the external parts of the islands lying close to the mainland coast. The bars consist of sand, gravel, and pebbles. The southern part of the coast that is being described here is characterized by alternation of straightened abrasive (and possibly thermo-abrasive) cliffs and small accretion forms like spits.

The shores of the Khatanga Gulf which presents a large estuary deteriorate under the action of thermo-abrasion. Along the cliffs close to the Khatanga mouth silt, foreshores are getting wider. They are obviously formed by water upsurges.

The Anabar District is marked by great development of abrasive shores. There are limited thermo-abrasive fields; in the west the waves deteriorate the bedding rock of Jurassic and Cretaceous periods. The straightened thermo-abrasive shore stretches from the Anabar to the Olenyok Gulfs. It is terminated by a wide accretion spit of Terpyay-Tumus formed by sand material. The northern part of this accretion peninsula is also subject to thermo-abrasion. The shore here draws back at a speed of 4 m/year.

The Anabar Bay is a tidal mouth of the Anabar River which does not have an estuary. But a small river named the Peschanaya forms an estuary protruding into the sea. The shore between Terpyay-Tumus spit and the Lena mouth has a complex structure. To the south of the spit, a small part of the fossil thermo-abrasive cliff is changed into an accretion field obtaining the material from rivers flowing down the slopes of Kryazh Pronchishcheva. Further there is a coast formed by alluvial upper quaternary deposits covered with permafrost. This is where the intensive retreat of the thermo-abrasive shore takes place. Further there is a multiarmed estuary of the Olenyok River protruding into the sea. To the east of this estuary, there is a small district of a foreshore changing into an abrasive steep cliff formed in Mesozoic terrigenous rocks, and after it there is an estuary of the Olenyok Protoka of the Lena Delta. This district can boast of frequent wind foreshores and barrier beaches.

The Lena Delta has an area of 28,500 km<sup>2</sup>. This is the largest delta on the coast of the Arctic Ocean. It is usually pointed out that it consists of two parts (eastern and western) formed in different times. However it would be more correct to divide the Lena Delta into three heterochronous parts: southern, western, and eastern.

The southern part includes the Olenyok Protoka of the Lena and Khardang-Sise Island. The region of this delta (that is close to Khardang-Sise Island) is the oldest. It is a butte of lower quaternary alluvial and deltaic plain. Certain parts of its surface lie at the height of more than 50 m. From the north it is separated by obsolete but contemporarily existing Arynskaya Protoka and from the south – by a large Olenyok Protoka which forms an independent stream flowing into the Olenyok Gulf. Its near shore zone is very shallow and abounds in islands and banks. Zaliv Kuba (Kuba Bay) between the estuary of Olenyok arm and the western part of the estuary is marked by a thermo-abrasive shore where the water erodes the upper quaternary estuary deposits covered by permafrost.

The western part of the Lena Delta is a large island named Arge-Muora-Sisse intersected by numerous obsolete creeks and speckled by

thermokarst lakes. It is formed by frozen upper quaternary aleurite sediments. Many parts of the rugged sea coast of this island are subject to thermo-abrasive erosion. From the products of erosion working on the deltaic coast, the waved construct a large sandy island barrier consisting of several islands separated by straits. Their total length is more than 70 km. Besides to the north of it, there are two more island barriers (Samoleta Island and Aeros'emki Island), located at the edge of a shallow near shore zone. Along the edge of the part of the delta that is being described, there are numerous small islands, many of which seem to be buttes separated from the mainland part of the ancient upper quaternary delta due to the process of thermo-abrasion.

The eastern part of the Lena Delta is its current delta. It includes a plenty of islands and arms. When the floods are high, many islands get submerged. At the same time during seasonal floods, the island surface gets gradually higher due to the accumulation of silt depositions. Because of this rise, the islands gradually cease to be influenced by seasonal floods. Here at first gramineous and then dumetous vegetation start to grow. Most of the islands are 5 m high and their surface currently presents a typical low-bush tundra. It must be noted that all large arms form stream-mouth bars with numerous midstream sandbank islands on them. These stream-mouth bars are usually cut by channels, the underwater continuations of the arms.

The surface of the Lena Delta is not only cut by many arms with the total length of 6,500 km but also speckled by a great number of lakes (more than 30,000). Ninety percent of them are shallow with an area of less than 0.25 km<sup>2</sup>. Most of the lakes and almost every large lake are situated in the ancient western delta which is obviously a consequence of long-term thermokarst processes in this area.

Buor-Khainskiy shore district begins with the Bykovsky Peninsula and the well-known Tiksi Bay. The Bykovsky Peninsula is formed by frozen sea depositions and is being actively eroded from the eastern side. One of the first discoveries of mammoth remains is known to have been made

here in 1799. The remains showed up from the eroding thermo-abrasive shore. The land bridge connecting the submeridionally oriented part of the peninsula with the mainland possibly presents a tombolo with a lagoon in the northeast.

Intensive thermo-abrasive erosion is happening on a small island named Muostakh which lies to the south of Bykovsky Island. In the south end of the island, the erosion products from the northern shores of the island build a spit.

The western shore of Buor-Khaya Guba, a large bay that gave its name to this district, is formed by terrigenous deposits of Permian-Triassic period. In the regions formed by bedding rock, the shore is high and denuded, with avalanche and glide forms. The Khara-Ulakh River has a small promote estuary in the mouth of the bay. The shore here is clearly estuarine. To the north of this estuary, there is a small piece of the coast formed by frozen quaternary lacustrine-alluvial deposits subject to thermo-abrasion with clear-cut soliflual forms. In the apex of Buor-Khaya Guba, the shore is very shallow and has a clear-cut wind foreshore. This very type of shore can be seen still further to the north along the eastern shore of the bay up to the estuary of the river Omoloy. To the north of the Omoloy, there stretches a straightened thermo-abrasive shore with proofs of soliflual processes. The sand material outwashed from finely granular deposits of lacustrine-alluvial origin that form the Buor-Khaya Peninsula is moved by the waves to its northern end where it builds a looped spit diverging from the general direction of the coast to the east and the south.

The Yanskiy coastal district is marked by a large-scale compartmentalization of coastal line. To the east of the Buor-Khaya Peninsula, there is a significant indentation of the coastal line which is further changed into the river Yana estuary. Still further to the east, there are three large bays: Chondonskaya Guba, Sellyakhskaya Guba, and Van'kina Guba; to the north of the latter, there lies the Shirokostan Peninsula and the bay named Ebelyakhskaya Guba which protects the Svyatoy Nos Peninsula from the north. Further to the north, there is Dmitry Laptev Strait,

connecting the Laptev Sea with the East Siberian Sea and separating the Lyakhovsky Islands.

The eastern shore of the Buor-Khaya Peninsula is more stable unlike the western one. Here predominant are obsolete thermo-abrasive cliffs with beaches and soliflual forms, and in the upper part of the abovementioned indentation of the coastal line, there is a shore with a wide wind foreshore.

The Shirokostan Peninsula is formed by frozen lacustrine–alluvial depositions of yedoma. Its shores consist of alternating thermo-abrasive areas and low accumulative areas with wind foreshores. Svyatoy Nos Cape is built from bedding rocks and has high steep abrasive shores.

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### **Shpanberg (Shpangenberg, Shpanbergkh), Martyn Petrovich (1698–1761)**

Shpanberg (Shpangenberg, Shpanbergkh), Martyn Petrovich (1698–1761) – was a Russian sea navigator, a captain of the first rank, a participant of the First and the Second Kamchatka Expeditions, and an explorer of the northern part of the Pacific Ocean and the Kuril Islands. He was a descendent from Denmark. In 1720 he was admitted in the Russian Fleet in the rank of lieutenant. In 1725–1730 he was involved in the First Kamchatka Expedition. He conducted the passage from Okhotsk to Bolshretsk (on the west coast of Kamchatka) twice. In 1728 on “St. Gabriel” boat (under the command of V. Bering), he went from Nizhnekamchatsk through the Bering Strait into the Chukchi Sea to 67° 19'N. M. Shpanberg took part in the survey of the Chukchi Peninsula and the discovery of the Kresta Bay, St. Lawrence Island, one of the Diomed Islands, Preobrazheniya Bay. In 1730 he returned to St. Petersburg through Siberia. In 1731–1743 he commanded a detachment of the Second Kamchatka Expedition. In 1734 he arrived in Okhotsk and the next year he started the supplement of the first two vessels for this expedition. Under his command, the brigantine “Archangel Mikhail” and the packet boat “St. John” performed three voyages to the Kuril

Islands. As a result, the northern route to Japan was discovered and mapped, and, for the first time, the whole Kuril Archipelago was sailed over and surveyed from the east. The detachment visited the northeastern coast of Hokkaido and Honshu Islands and the Malaya Kuril Archipelago, where no Europeans had been there before, in order to produce a map and a description of their navigation. In 1743 Shpanberg replaced the deceased V. Bering as the head of the Second Kamchatka Expedition. The senate ordered him “not to take part in sea voyages any longer” and reside in Siberian towns with his team. In 1745 he arrived in St. Petersburg without an unauthorized permission, was taken to court, and was sentenced to capital punishment, which was then replaced with reduction to the rank of lieutenant. In 1749 r. served in the Baltic Sea. Here “Varakhail” boat which was under his command was wrecked with the death toll of 28 people, but the court dismissed all charges from Shpanberg. In 1751 he was “enrolled in the captains of the first rank.” He served in the Baltic Sea until 1761.

A number of capes in the Anadyr Bay and on Hokkaido (Shiretoko) Island, a mountain in Sakhalin, several islands in the Kara Sea and the Alexander Archipelago at the southern coast of Alaska, and the channel between the islands of Polonskiy and Shikotan were named in his honor.

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### **Shrimps**

Shrimps – represented in the Chukchi Sea by six species of the Crangonidae family, five species of the Hippolytidae family, and one species of the family Pandalidae. The most frequently are encountered kuro shrimps *Argis lar* (82 %), Belcher evalus *Eualus gaimardii belcheri* (82 %), lean evalus *Eualus macilentus* (47 %), and humpy shrimps *Pandalus goniurus* (42 %). By biomass Belcher evalus *Eualus gaimardii belcheri* dominates significantly. Kuro shrimps *Argis lar*, lean evalus *Eualus macilentus*, and humpy shrimps *Pandalus goniurus* are greatly inferior to Belcher evalus in the shrimp biomass.

Shrimp (Source: <http://en.wikipedia.org/wiki/Crangonidae>)



## Siberian Ice Sea

Siberian Ice Sea – an old name of the part of the Arctic Ocean adjacent to the coast and Siberia marginal seas.

maximal length is from the White Sea “gorlo” to the Kolyma mouth; there is no continuous polynya in the Canadian Arctic). S. P. is the main source of multiyear ice formation in the Arctic Ocean and oxygen for the sea fauna. It is used for navigation.

## Siberian Polynya, Great Siberian Polynya

Siberian Polynya, Great Siberian Polynya – water area in the Arctic Ocean free from ice (10–15 km wide, around 1,800 km long), where the moving mass of multiyear ice meets fixed ice near the mainland. The polynya consists of several parts – Vostochno-Severozemelskiy, Taymyrsky, Lenskiy, and Novosibirskiy. North from the polynyas, drifting ice is located. S. P. was discovered in 1810 by M. M. Hedenstrom between the New Siberia Island and (yet unknown at the time) the Bennett Island. S. P. influences the local climate, hydrological regime, and other processes. The salinity of its water is 35 ‰ and lower; the temperature is 1.8 °C. A. V. Kolchak was right to explain the existence of S. P. by interaction of currents and south winds, but he made a mistake assuming its circumpolar character (in fact its

## Siberian Sturgeon (*Acipenser baerii*)

Siberian Sturgeon (*Acipenser baerii*) – fish of the sturgeon family (Acipenseridae), includes semi-anadromous and freshwater species. S. inhabits the rivers of Siberia from the Ob to the Kolyma and further to the Indigirka. In the Irtysh, it was common to the Lake Zaysan (and the Black Irtysh), in the Ob – from the Ob-Taz Bay (from Cape Drovyanoy) up to the upper reaches of the Ob and the Katun, entered the Teletskoye Lake. In the Ob and the Yenisei, S. lives together with sterlet; in the Lena and the Kolyma, it is the only representative of the sturgeon. S. S. has blunt-nose (typical) and sharp-nosed forms. Spawning grounds in the Ob are located in the middle and upper Ob up to the confluence the Biya and the Katun, in the Katun and the Anuya. In the Yenisei River, spawning grounds are located along the Yartsevo-Vorogovo line (1,500 km from the





Siberian Sturgeon (Source: [https://en.wikipedia.org/wiki/Siberian\\_sturgeon](https://en.wikipedia.org/wiki/Siberian_sturgeon))

mouth). S. S. grows slowly. Sexual maturity of males in the Ob comes at the age of 9–14 years (rarely), females – at 11–20 years (rarely 10). In the lower reaches of the Yenisei River, sturgeon reaches sexual maturity at 18–23 years, and males of the Baikal sturgeon mature at age of 15 and females 1 year and later. The Ob sturgeon females spawn every 3–4 years and males every 1–2 years; in the lower reaches of the Yenisei River, sturgeon spawns at least every 4 years. The maximum age of S. S. is 60 years. It feeds on crustaceans (amphipods), insect larvae (caddisflies, chironomidae), shellfish, and fish. S. S. forms a hybrid with Siberian sterlet, the so-called koster.

### **Siberian Whitefish (*Coregonus lavaretus pidschian*)**

Siberian Whitefish (*Coregonus lavaretus pidschian*) – semi-anadromous fish, inhabits lakes and rivers, subspecies of sea whitefish, genus *Coregonus*. S. W. has a variety of forms with different numbers of gill rakers and behavior. Body length is 20–40 cm, rarely up to 50 cm; weight is up to 1.6 kg. Inhabits lakes and rivers of the European North and Siberia. Matures at 5–9 years. Spawning is in rivers, in autumn, and in early winter, on shingle. Fertility is 8,000–50,000 eggs, egg diameter 1.2 mm. Juvenile fish lives in rivers for 4–5 years and feeds on zooplankton; grown fish feeds on shellfish,

maggots of chironomids, and crustaceous. S. W. grows with different speed, and especially quick growth is characteristic for S. W. in rivers (in the Ob). A valuable commercial species.

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### **Siberian–Alaskan Railroad**

Siberian–Alaskan Railroad – a project of transport channel across the Bering Strait, presuming construction of 4,000-km railroad, that would connect Trans-Siberian Railway, Baikal-Amur Main-line and Yakutsk, and a railroad bridge across the Bering Strait to Alaska, United States. Construction of the railroad bridge would connect transport systems of Europe, Asia, and North America. Estimated construction cost is 50–60 billion dollars. After S. A. R. construction, Trans-Siberian Railway will partly take cargo turnover between North America, Europe, and Asia. The implementation of this intercontinental channel lies far in the future.

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### **“A. Sibiryakov”**

“A. Sibiryakov” (up to 1916 “Bellaventure”) – an icebreaker of the USSR Arctic fleet, which was the first to pass along the Northern Sea Route in one navigation.

S. was built by "Henderson and Co." in Glasgow, England, in 1909, for a Canadian hunting company and purchased by Russia in 1915 for winter navigation in the Barents Sea, being renamed in the honor of A. N. Sibiryakov, an explorer, merchant, and gold industry entrepreneur, who did a lot for the Northern Sea Route exploration. The length is 76.5 m, width 10.8 m, draft 5.1 m, deadweight 3,200 t, speed 13 knots, crew 50 people, and scientists 12. After the Civil War in Russia (1917–1922), she was used for hunting in the "gorlo" of the White Sea and as a transport supply vessel. In 1932 she undertook the first famous voyage along the Northern Sea Route from West to East, for the first time sailing along Severnaya Zemlya in one navigation, in 2 months and 5 days (65 days) (Captain V. I. Voronin, the head of the expedition O. Yu. Shmidt, scientific leader V. Yu. Vize), despite the fact that in the East Siberian Sea all the four blades of the propeller went wrong and the end of the propeller shaft broke off. In 1932 "A. S." expedition connected previously isolated parts of the Arctic navigation and drew the line under the first stage of the USSR Arctic experience. The same year "A. S." was awarded the Order of the Red Banner of Labour. In 1936 it crashed into the rocky chain off the Novaya Zemlya coast in the Kara Sea and sank. But in the following

year, it was lifted by Special Purpose Underwater Work Expedition (EPRON) and repaired in Arkhangelsk. Since the beginning of the Great Patriotic War (1941–1945), the icebreaker served in the icebreaker unit of the White Sea Fleet under the name "LD-6." She was reinforced by arms, two guns 76.2 mm and 45 mm, and machine guns. In August 25, 1942, in the Kara Sea, when "A. S." (Captain A. A. Kacharava) was heading to Molotov (now Arkticheskiy) Cape (Severnaya Zemlya) to bring workers to the polar station, near the Belukha Island, it was met by German heavy cruiser "Admiral Scheer." "A. S." perished after an unequal fight; it was sunk by the crew, which opened its flood holes. After this fight it got yet another name "Arctic Varyag." From 104 crew members and passengers (personnel of the arctic station), only a coal passer managed to reach the Belukha Island, from which he was taken by hydroplane in 38 days. Nineteen crew members were captured, with only 13 returning to Russia after the war. In 1965 the coordinates where "A. S." fought and perished were declared place of fighting glory. By order of the navy commander in chief, military honors are given in the area of "A. S" perish. A model of the vessel is in the museum of Murmansk steam navigation. A beacon is set on the Belukha Island in honor of the icebreaker's feat.

"Sibiryakov": a Soviet postage stamp (Source: [https://en.wikipedia.org/wiki/A.\\_Sibiryakov\\_\(icebreaker\)](https://en.wikipedia.org/wiki/A._Sibiryakov_(icebreaker)))



A bank in the Barents Sea and a mountain in the Antarctic on the Enderby Land are named after the vessel. In honor of the “A. S.” crew, a strait in the Kara Sea north from the Dikson Island is named Sibiryakovtsev Strait. In 1945 “Yaakarkhu” (“Polar Bear”) transferred to the USSR as reparation and, being part of the USSR Arctic Fleet, was renamed “Sibiryakov”.

### **Sidorov, Mikhail Konstantinovich (1823–1887)**

Sidorov, Mikhail Konstantinovich (1823–1887) – a gold producer, writer, and mining pioneer in the north of Siberia. The son of a merchant from Arkhangelsk. After graduating from gymnasium, he worked as a teacher in Krasnoyarsk. S. invested family money in the exploration of gold-bearing placers near Yeniseysk, got rich, and became the owner of 170 gold mines. A large fortune allowed S. to explore the Yenisei North and invest in the exploration of deposits of mineral salt, coal, graphite, iron and copper ore, gold placers, and agricultural development. In 30 years (1852–1882), 1.7 million roubles were spent on these purposes – a gigantic sum for that time. S. traveled along Kolyma and Chukotka; he visited the Lena, the Yana, the Angara, and Obdorsk (Salekhard), the Kola Peninsula. He initiated construction of the channel connecting the Ob and the Yenisei. In an attempt to facilitate the delivery of the Siberian riches to markets, S. took measures to use the Northern Sea Route: he financed hydrographic research in the estuaries of the Yenisei and the Ob and organized the expedition of P. I. Krusenstern on the schooner “Ermak,” which in 1862 ventured to reach the Yenisei through the Kara Sea, but failed. In 1863 S. entered the Kara Sea on the steamer “Georgiy,” which he bought, but thick fog stopped the voyage. S. established an inducement fund for a pioneer who would find a sea route to Siberia, and he promised a pud (16 kg) of gold to the one who would go along the northern end of Novaya Zemlya. In 1874 Scottish captain W. Wiggins on

the steamer “Diana,” funded by S., for the first time reached Gulf of Ob and further to the Dikson Island, and in 1876 on the steamer “Thames,” he reached the Yenisei and went up to the Kureika River, where the steamer was loaded with graphite. The next year S’s schooner “Utrennyaya Zarya” sailed from the Yenisei Estuary to Saint Petersburg. Along with other merchants, S. financed the expedition of N. A. E. Nordenskiöld on “Vega” (1878–1879), which was first to travel polar route from west to east.

S. published over 50 works, including a scientific study “On Riches of the North Siberia Marginal Areas” (Saint Petersburg, 1873). S. died in Germany; his widow brought his remains to Saint Petersburg. S’s services were recognized worldwide; he was elected member of the ten geographical societies.

The highest peak of Spitsbergen is named after S.; the map of the Krasnoyarsk Territory shows “Sidorovskiy Track” (the place where S. intended to make a channel between the rivers Turukhan and Taz).



Sidorov M. K. (Source: <http://www.centrosib.info/2013/06/19/vyisshee-obrazovanie-kovalos-100-let/>)

## Simsa Bay

Simsa Bay – a gulf in the Laptev Sea, on the northeast coast of the Taymyr Peninsula, to the east from Chelyuskin Cape, Taymyr (Dolgano-Nenets) Autonomous Area, Russia. It is narrow with embayed coastline, jutting out into the mainland for 26 km to the southwest. The width of the opening in the sea is 3.5 km, average width around 14 km. In the west, it is divided from a larger Teresa Klavenes Bay by the Lassinius Peninsula. To the north from the Simsa mouth lie the Komsomolskaya Pravda Islands. For administrative purposes, the S. B. belongs to the Krasnoyarsk Territory.

The climate of the gulf is severe, arctic. The gulf is covered with ice most of the year, sometimes remaining frozen even in summer. The coasts of the gulf are covered with moss and lichen tundra. The coasts and water area of the gulf belong to the “Chelyuskin Peninsula” part of the Great Arctic Reserve.

The gulf was named in 1919 by participants of a Norwegian polar expedition on the “Maud” ship headed by R. Amundsen in honor of an American Admiral W. Sims.

## Somov, Mikhail Mikhailovich (1908–1973)

Somov, Mikhail Mikhailovich (1908–1973) – was a Soviet oceanologist, polar explorer, Doctor of Geographical Sciences, and Hero of the Soviet Union. In 1928 he started to work as a turner in a mechanical workshop of Far Eastern University and in 1929 entered shipbuilding department of Far Eastern Polytechnic University (FEPU) but, however, did not finish his studies, returning to the mechanical workshop. In 1933 took a job in Pacific Research Fisheries Centre (TINRO) and spent 6-month sailing on the vessels of scientific expeditions. After that S. resumed his studies on the second course of FEPU and took a job in the Directorate for Navigation Security. In 1937

graduated from Moscow Hydroreclamation Institute and was sent to Central Forecast Institute, where he continued his studies of the North Cape Current thermal regime. Since 1938, when he participated in ice reconnaissance for the first time, S. casts in his lot with the Arctic Region. In 1939 S. took part in convoying of “Josef Stalin” icebreaker – the first in the history of navigation through passage of two vessels along the Northern Sea Route from the Atlantic to the Pacific Ocean and back. In 1940 S. entered PhD program of the Arctic Institute, choosing the development of the Kara Sea ice coverage forecast as a subject for his thesis (passed defense in 1947). In the beginning of the Great Patriotic War (1941–1945), S. was allocated to the White Sea Military Fleet for hydrological assistance in the White Sea ice operations. In August 1942, took part in meeting of an attack of the Dikson settlement by Nazi heavy cruiser “Admiral Scheer.” In 1943–1944 S. was on the Dikson Island. In October 1945 carried out ice reconnaissance during the first postwar flight to the North Pole. In 1948–1949 headed research groups of high-latitude expeditions “North-2” and “North-3,” dropped from planes on the ice of Central Arctic for hydrometeorological and hydrophysical research. The main result was the first data on the existence of underwater ridge (Lomonosov). In 1950–1951 headed a drifting station “North Pole-2,” which drifted in high latitudes of the Eastern Arctic Region in extreme conditions and in top secrecy for 376 days. For valor and bravery demonstrated during the drifting, S. was awarded the title of the Hero of the Soviet Union. “North Pole-2” pioneered regular operation of drifting stations in the Arctic Region. Main scientific achievement of S. was the discovery of an unknown underwater object called the Chukchi Plateau. S. also established a fact of penetration of waters from the Atlantic into the Chukchi Sea. In 1954 S. became a Doctor of Geographical Sciences. In 1955 S. headed the first Soviet Complex Antarctic expedition. In 1962 and 1963, S. also visited Antarctic. S. was awarded the golden medal of the British Royal Geographic Society and the Swedish Royal Society for Anthropology and Geography. He is the



Somov M. M. (Source: <http://www.polarpost.ru/forum/viewtopic.php?f=8&t=372&start=45>)



author of the book of recollections *On the Domes of Earth* (1989).

A sea in the Antarctic washing the coast of Victoria Land, a glacier in Queen Maud Land, and a research vessel are named after S..

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### **South Chukotka Oil-and-Gas Basin (OGB)**

South Chukotka Oil-and-Gas Basin (OGB) – is located to the southeast of Wrangel Island in a difficult of access area in the Chukchi Sea, characterized by severe ice condition. It is formed by volcanic–aqueous layers of Paleogene and chalk, up to 4 or 5 km wide. Its oil-and-gas content is based on the possibility of oil-and-gas formation in the deeply submerged central area.

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### **Special Purpose Northeastern Expedition**

Special Purpose Northeastern Expedition – organized during the Arctic navigation of 1932 for delivery of goods, about 600 Dalstro

employees and 200 prisoners under the control of the OGPU from Vladivostok to Ambarchik. The expedition was headed by experienced arctic explorer N. I. Yevgenov. The expedition consisted of five ships with a cargo of 12,000 t, which towed metal barges and boats, as well as the steam-sailing schooner “Temp.” The expedition was led by the icebreaker “Litke” (commander – Captain Nikolayev).

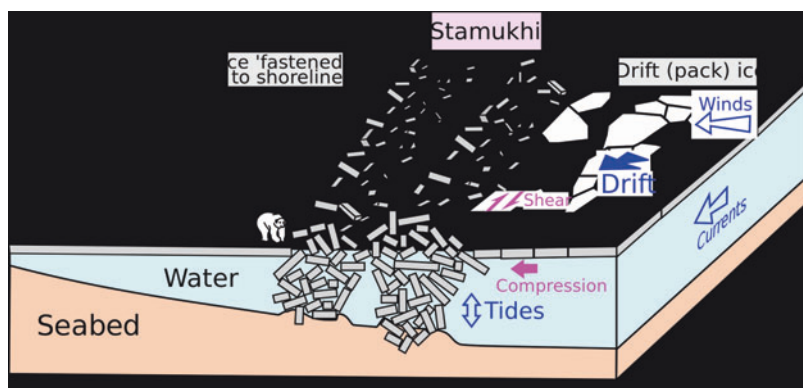
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### **Stadukhin, Mikhail Vasilyevich (?–1665)**

Stadukhin, Mikhail Vasilyevich (?–1665) – was a Cossack from Yakutia, polar navigator, and pathfinder. In 1630, to gather tribute paid off in furs, he traveled from the Yenisei to the Lena, in 1642 – from the Lena to the Indigirka (to Oymyakon). In 1643, he sailed off the Indigirka mouth on a koch (a decked sailing ship) to the East Siberian Sea and discovered the Kolyma River mouth. At the confluence of the Kolyma and the Anyuy, S. founded Nizhnekolymsky village. Having gathered the data on hunting lands to the east from the Kolyma in 1645, he returned to the Lena by sea. In 1648 he visited the Kolyma again.



Stamukha (Source: <http://en.wikipedia.org/wiki/Stamukha>)



In a year S. tried to reach its mouth by sea, sailing on a koch. He apparently reached Shelagiski Cape, where he obtained lots of walrus tusks, and turned back. In 1650 he went from the Kolyma to the Anadyr by land. Next year he discovered the Penzhina and the Gizhiga rivers. In 1653 he went by sea from Gizhigin Bay along the coast to Tauy Bay. In 10 years, Stadukhin's team traveled along all of Northeastern Siberia. In 1663 S. for the first time reported on the Kamchatka River to Moscow. For his discoveries in Siberia, S. was made a Cossack chieftain. Until 1665 S. was the head of Alazeyskoye Zimovye. S. was killed on his way to the Kolyma.

## Stamik

Stamik – an underwater shallow with rocky reefs (usually many of them), which catches ice hummocks or accumulations of ice, forming stamukhas.

## Stamukha

Stamukha – fixed ice which remained on a shallow of the coast or on a stamik. S. can form on nameless banks, not designated on maps, at the depths over 20 m. The cases are known when

S. was formed at a much bigger depth. Around S. ice belt is formed up to 10 miles and more. In summer S. melts and disintegrates, forming mass of crushed and chafed ice, dangerous for vessels, especially in poor visibility conditions. Such hummock ice in shoals of the Arctic Region is a hazard for navigation. The East Siberian Sea has the maximum quantity of S. in the Russian Arctic Region – 71 %, due to harsh weather conditions and shallowness of the sea. In the eastern part of the sea, the largest S. is registered with the maximum draft 35 m. S. often form in the southwest along the borderline of the land ice from the New Siberia Island to the Ayon Island, along the Chukchi coastline, and on banks to the west of the Wrangel Island.

## Standing Committee of the Parliamentarians of the Arctic Region (SCPAR)

Standing Committee of the Parliamentarians of the Arctic Region (SCPAR) – established in 1994 by the decision of the International Conference of Parliamentarians of the Nordic Council for Development and Protection of the Arctic Region held in 1993 in Reykjavik, Iceland. The Committee is a working body of the Conference of Parliamentarians of the Arctic Region. The membership in the Standing Committee corresponds

to the membership of states in the Arctic Council. Members of the Committee are Denmark, Iceland, Canada, Norway, Russia, the US, Finland, Sweden, and the European Parliament. The observer status in the Standing Committee and in the Conference of Parliamentarians of the Arctic Region is given to the Saami Council, the Inuit Circumpolar Conference, and the Russian Association of Indigenous Peoples of the North. The Standing Committee itself has the observer status in the Arctic Council and as a guest takes part in meetings of the Barents/Euro-Arctic Region Council.

The activity of the Standing Committee is focused on organizing the Conference of Parliamentarians of the Arctic Region (held every 2 years in a Member State of the Standing Committee), as well as monitoring the implementation of the decisions of the resolutions adopted by results of regular sessions. The main activities of the Standing Committee are focused on the following areas: participation in the meetings of the Arctic Council as an observer and in meetings of the Barents/Euro-Arctic Council as a guest; promotion of sustainable development, assistance to indigenous peoples of the Arctic by facilitating the development of the own potential in the region; liaising with the World Bank, the Global Environment Facility, and the United Nations Commission in the field of sustainable development and environment; development and approval of the project of the Arctic University; and support of the “Northern Dimension” of the European Union, the Canadian foreign policy of the “Northern Dimension,” and the US initiative on Northern Europe.

The purpose of the Conference of Parliamentarians of the Arctic Region is to put forward initiatives for cooperation in the Arctic; work as a forum for discussions and exchange of information between parliaments, governments, indigenous organizations, as well as international governmental and nongovernmental organizations; close cooperation with the governments of the Arctic region for the implementation of the decisions taken by the Arctic Council; discuss on issues relevant to the work of the Arctic Council; etc.

In SCPAR, every parliament member state is represented by one participant (from a bicameral parliament – usually a member of the upper house). The Russian Federation in the Standing Committee is represented by two members – one representative from the Council of the Federation and one from the State Duma.

Provisions of the Procedure of the Standing Committee and the Conference of Parliamentarians of the Arctic Region were approved in 1999 at a meeting of the Standing Committee in Brussels. The Standing Committee shall be held on the proposal of its Chairman, at least twice a year. The Committee shall elect a chairman for the period beginning from the tabulation of a conference held and ending by summarizing the next Conference. The Committee shall appoint a secretary and makes decisions on matters concerning the composition, formation, and the location of its secretariat.

Neither SCPAR nor the Conference has their own headquarters. Technical support is provided by the International Department of the Finnish Parliament in Helsinki.

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## Starokadomsky Island

Starokadomsky Island – located in the northwestern part of the Laptev Sea 5.5 km west off the Maly Taymyr Island, Taymyr (Dolgano-Nenets) Autonomous Area, Russia. S. I. is separated from Severnaya Zemlya by 26-km-wide strait. The island is small and low; the area is around 110 km<sup>2</sup>. In the southwestern part, there is a cairn put up by R. Amundsen’s expedition in 1919. It has two parts connected by a narrow neck of land; the south part is hilly (35–40 m high), and the northern part is low. The coasts are strongly rugged, covered with grass, moss, and lichen. S. I. was discovered in 1913 during the Arctic Ocean Hydrographic Expedition on the “Taymyr” and “Vaygach” icebreakers headed by Captain II rank B. A. Vilkitsky, and in 1914 it was named after doctor onboard L. M. Starokadomsky, who was the first to notice the island from board of the ship.

## Starokadomsky, Leonid Mikhailovich (1875–1962)

Starokadomsky, Leonid Mikhailovich (1875–1962) – was a sea doctor, traveler, expert in the area of health service support in the navy, and Doctor of Medical Sciences (1943). In 1899 graduated from Naval Academy with honors. From 1903 S. worked in the naval hospital in Kronshtadt. In 1910–1915 he took part in the hydrographic expedition in the Arctic Ocean as a senior doctor of “Taymyr” icebreaker. In 1914–1915 S. passed the Northern Sea Route on this icebreaker from Vladivostok to Arkhangelsk with wintering and discovered in the Laptev Sea, off the shores of Severnaya Zemlya, an island named after him. During this expedition he made a unique collection of sea fauna and wrote a book “Five Names in the Arctic Ocean” (1910–1915)



Starokadomsky L. M. (Source: <http://www.2spbg.ru/alumnus1.php?id=64>)

describing his adventures. In 1915–1920 S. worked in the Northern Fleet. In 1920–1930 he was chief sanitary officer of the Workers’ and Peasants’ Red Fleet (WPRF). S. participated in creation of the first Soviet “WPRF Ships Health Protection Rules” (attachment to “The Sea Duty Regulations,” 1926). From 1930 S. was in the trade fleet. Took part in the Northeastern (1932–1934) and 2nd Kolymaskaya (1934–1935) expeditions of the People’s Commissariat for Water Transport. After that he worked in public health research institutes.

S. was the author of over 120 published works on ship hygiene, conditions of sailing and wintering in the Arctic Ocean, and healthcare during polar expeditions.

An island in the Laptev Sea is named after S.

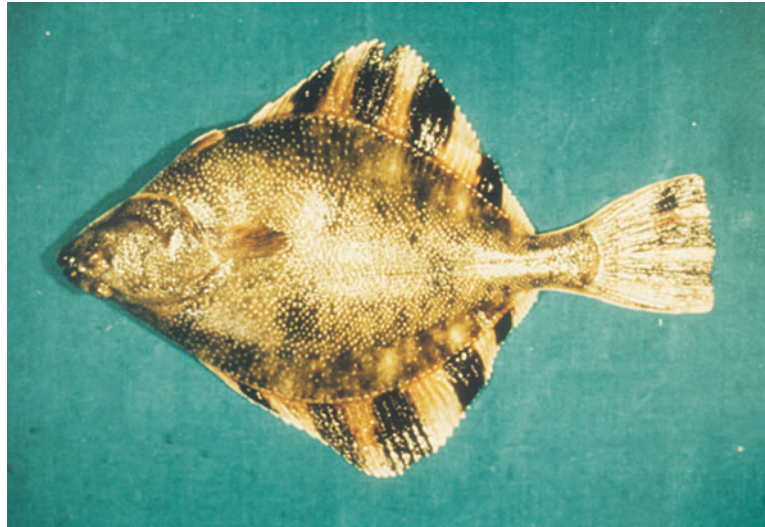
## Starry Flounder (*Platichthys stellatus*)

Starry Flounder (*Platichthys stellatus*) – a marine fish of the Pleuronectidae family. Its length is up to 54 cm (sometimes to 90 cm); weight is 2–4 kg (sometimes to 9–10 kg). Eyes are on the left side. The eyed side is gray, dark brown, or dark olive; reddish brown is less frequent. There are rare black bars on the dorsal and anal fins. No scales are present. It occurs in the Chukchi Sea and seas of the Far East. S. F. is an inshore fish living as deep as 10–20 m that can enter the freshwater zone. It spawns in desalinated seawater in February–March. S. F. feeds on worms, crustaceans, and small fish. Its commercial significance is low.

## State Natural Preserve “Bolshoy Arkticheskiy,” Federal State Institution

State Natural Preserve “Bolshoy Arkticheskiy,” Federal State Institution – a state environment-oriented research which is educational in the sphere of ecology institution of federal significance which is aimed at preserving and researching the progress of natural phenomena,

Starry Flounder (Source:  
[https://en.wikipedia.org/wiki/Starry\\_flounder](https://en.wikipedia.org/wiki/Starry_flounder))



the genetic fund of the flora and the fauna, certain species and groups of plants and animals, and typical and unique ecological systems. The largest natural preserve in Russia on the Taymyr Peninsula and in Eurasia. Was established in 1993 by the decree of the Cabinet Council – the Government of the Russian Federation. The area is about 42,000 km<sup>2</sup> together with an affiliate – the Biosphere Reserve “Taymyrsky.” Occupies 35 isolated parts formed by both separate islands and groups of islands, archipelagoes of the mainland parts of the Taymyr Peninsula with the adjacent water area of the Kara Sea, its gulfs and bays. The preserve consists of seven cluster areas: Dikonsko-Sibiryakovsky, “The Kara Sea Islands,” Pyasinskiy, “Middendorff Bay,” “the Nordenskiöld Archipelago,” “the Taymyra,” and “the Chelyuskin Peninsula.” The state natural reserve of federal significance “Severo-Zemelskiy” with an area of about 420,000 ha and the state natural reserve of regional significance “Brekhovskiy Islands” with an area of 288,500 ha report to the “Bolshoy Arkticheskiy” Natural Preserve. Its central part is occupied by the areas of the Kara Sea coast in the district of the Pyasina River mouth, the Taymyra mouth, and the Lenivaya River. The natural reserve is a part of the biggest habitat of the Taymyr population of a wild reindeer in the world. The water area is home to polar bears, walruses, bearded seals, ringed seals,

and belugas. Eighteen species of animals are in the endangered-species list (Red Book). The WWF participates in the financial support of the natural preserve.

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## State Polar Academy

State Polar Academy – the idea of establishing the Polar Academy appeared in 1990 in course of the first Soviet-French Expedition in Chukotka, which was conducted under the auspices of the city of Leningrad (USSR). The Soviet Cultural Fund and the French Center for Arctic Research participated in the process of the expedition organization. The equipment for this international expedition was provided by the Arctic and Antarctic Research Institute (USSR). In 1991 St. Petersburg saw the establishment of the Academy’s predecessor, the Arctic Circle Organization. Its international study center was first to prepare the national managing personnel for the Northern regions, Siberia, and the Russian Far East.

Starting from 1992 the Center stayed under the auspices of the National Administration School of France. Then the Russian party signed the contract for long-term cooperation with the French School for Advanced Studies in the Social

Sciences. The International study center became the place of work of the highly qualified Russian and foreign teachers. Thanks to the Center's experience the creation of the Polar Academy as a unique institution of education became possible. It embodied the idea of international solidarity in securing good future for the peoples with traditional cultures.

The first founding shareholders of the Academy were the Ministry for the National Affairs and the Federative Relations, the State Committee for the Development of the North, the Ministry of Education of the Russian Federation, the Government of the Sakha Republic (Yakutia), and the Arctic Circle Organization.

The venerable president of the Academy was Jean Malaurie, a writer, a famous French Polar researcher, and the Director of the French Center for Arctic Research who led the first Soviet-French Expedition in Chukotka.

In 1998 the Polar Academy was bestowed the status of the State Higher Professional Institution for the peoples with traditional cultures to commemorate the UN proclamation of the Decade of the Indigenous People of the World.

The Head of the supervisory board of the State Polar Academy is A. N. Chilingarov, the eminent Russian scientist, polar explorer, the Hero of the Soviet Union, and the Hero of Russia.

One of the founders and the first provost of the Academy (2000–2008) was A. T. Shaukenbaeva, a member of the Russian Geographical Society, the honorary member of the French Geographic Society, and an organizer and coordinator of the first Soviet-French Expedition (Chukotka-90).

The State Polar Academy actively cooperates with the administrative and subnational entities having contracts with most of them for preparing the personnel and scientific cooperation.

In 2008 the Academy was accredited by the state in seven educational programs and got a license. The same year saw the opening of post-graduate department. In 2011 the Academy started hosting the department of the UNESCO chair "Theory of Education in a Multicultural Society" of the Herzen State Pedagogical University, the stream of project realization "Cultural Heritage and the Traditional Environmental

Management of the Peoples in the North, Siberia and the Far East."

The Academy has four faculties of Economics and Management, of Ecology and Environmental Management, of Philology, and of National Art.

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## "Stavropol"

"Stavropol" – a vessel built in Szczecin, Poland, in 1907. The body is fitted with continuous double floor and outer lining. The maximum length is 65 m, width 10 m, hold depth – 7 m, and capacity around 1,210 reg. tons. In 1926 "S." sailed to the Wrangel Island, carrying G. A. Ushakov and 59 other people (Russian and Eskimo) aboard.

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## Stefansson, Vilhjalmur (1879–1962)

Stefansson, Vilhjalmur (1879–1962) – was a Canadian Arctic explorer, ethnologist, and writer. S.'s family originated from Iceland. In 1906–1907 S. studied Eskimo tribes in the Mackenzie River mouth, along the Beaufort Sea coastline, and in the north of Alaska. Together with an American zoologist R. Anderson, S. in 1908–1912 explored the shores of Northern Canada from Point Barrow to Victoria Land, having passed several 1,000 km. In 1913 S. led the Canadian Arctic Expedition, which explored the coasts of the Beaufort Sea and the Canadian Arctic Archipelago. In 1914, accompanied by a Canadian hunter S. Storkerson, S. undertook 93-day long trip to the Banks Island and stayed for winter there. Sledging on the Beaufort Sea ice, S. moved further to the north, explored the Prince Patrick Island, and discovered the "Borden Land"; in 1916 S. went 80°30'N and discovered islands Meighen and Lougheed. In 1921 S. set up a sea-hunting company on the Wrangel Island, the activity of which was stopped in 1924 by representatives of the Soviet power, which restored the USSR to its right on the Wrangel Island. It was S. who said outright: "We want to have the Wrangel Island to develop our air routes, to make it a





Stefansson V. (Source: [http://commons.wikimedia.org/wiki/File:Vilhjalmur\\_Stefansson\\_crop.jpg](http://commons.wikimedia.org/wiki/File:Vilhjalmur_Stefansson_crop.jpg))

base for airships and planes, as the Falkland Islands serve as a base for our ships and cruisers.”

The author of the books *My Life with the Eskimo* (1913), *The Friendly Arctic* (1922, in Russian in 1935 and 1948), and *The Adventure of Wrangel Island* (1926).

An island off the coast of Victoria Island and a bay in the Cooperation Sea, the Southern Ocean, are named after S..

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### **Sterlegov, Dmitry Vasilyevich (Around 1707–1757)**

Sterlegov, Dmitry Vasilyevich (around 1707–1757) – was a Russian navy mariner and explorer of East Arctic. Graduated from Navy Academy (1726) and served in the Baltics for 7 years. In 1734–1742 participated in the Great Northern (Second Kamchatka) expedition – in the crews of D. L. Ovtzyn and F. A. Minin. S. carried out shooting and measuring in the southern part of

the Gulf of Ob and in the Yenisei Bay. S. explored in a dogsled and made topographic mapping of the Taymyr Peninsula’s western shore.

Two capes on Taymyr and a channel in Minina Skerries are named after S.

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### **Stolbovoy**

Stolbovoy – an island off the southwest side of the New Siberian Archipelago (the Lyakhovsky Islands group), in the eastern part of the Laptev Sea, the Sakha Republic (Yakutia), Russia. The length of an island is 48 km and width 8–9 km. The area is around 170 km<sup>2</sup>. The height is up to 222 m. The island is formed mainly of granite. The flora is represented by the Arctic tundra. The Semenovskoye Shallow is located west of S. I. – an area dangerous for navigation discovered by Soviet hydrographers in 1937. The landscape of the middle part of the island is slightly sloping hills 200 m high. In some places 30–40 m high, rocky cliffs of the coast plunge into the sea. Where flat and broad plains descend to the sea from hills in the center of the island, the coast is pebbled, low, and smooth. A number of small rivers go down into the sea along the plains. The biggest of them is the Surovetsky River up to 45 m wide in the mouth. The island was discovered and described in 1800 by Y. Sannikov. The island is part of the State Nature Reserve “Ust-Lenskiy.” In 2010 the Arctic Controlling and Correcting Station of the Global Navigation Satellite System GLONASS/GPS was put into operation.

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### **Strategy for the Development of the Arctic Region of the Russian Federation and National Security Protection Up to 2020**

Strategy for the Development of the Arctic Region of the Russian Federation and National Security Protection Up to 2020 – “the strategy that determines principal mechanisms, ways and means to reach strategic goals and priority tasks of



Stolbovoy Island (Source: <http://wikimapia.org/8340081/ru/%>)

sustainable development of the RF Arctic Region and ensure national security protection. The strategy is aimed at implementation of sovereignty and national interests of the RF in the Arctic Region and facilitates solving of basic tasks of the RF national policy in the Arctic Region, outlined in the “Principles of the State Policy of the Russian Federation in the Arctic Region for the period till 2020 and beyond” (approved by the RF President in 2008). The strategy envisages consolidation of resources and efforts of all the concerned subjects of the RF national policy in the Arctic Region. To solve key issues of the RF Arctic Region development and provide national security in the Arctic region.” The aim of the S. is the implementation of national interests and achieving of main objectives of the RF national policy in the Arctic Region through settling of principal tasks, considering strategic priorities determined in the “principles,” and providing national security and sustainable social and economic development of the RF Arctic Region. The priority tasks of the Arctic Region development are harmonized social and economic development of the RF Arctic Region, development of science and technology, creation of up-to-date informational and telecommunication

infrastructure, environmental security, international cooperation in the Arctic Region, and military security, protection, and security of the RF state border in the Arctic Region. Principal mechanisms of the S. implementation are as follows: state program of social and economic development of the Arctic Region in the RF up to 2020; other state programs of the RF, federal, and departmental policy objectives and sectoral strategies; regional and municipal programs; and programs of large companies offering measures aimed at complex development of the RF Arctic Region. The implementation of the S. has two stages, first to 2015 and second to 2020, when transfer to sustainable innovative social and economic development of the RF Arctic Region will take place. The strategy is approved by the RF President V. V. Putin in February 2013.

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## Sukharnyi Island

Sukharnyi Island – located at the mouth of the Kolyma mouth, isolating Ambarchik Bay from the west.

## Sverdrup, Harald Ulrik (1888–1957)

Sverdrup, Harald Ulrik (1888–1957) – was a Norwegian polar explorer; geophysicist and oceanographer; member of Norwegian Academy of Science and US National Academy of Sciences; Professor of Geophysical Institute in Bergen (1926–1930), University of California (1936–1948), and University of Oslo (since 1949); and Director of Scripps Institution of Oceanography in California (1936–1948) and Norway Polar Institute (since 1948). In 1911 graduated from university and dedicated several years to meteorological investigation. In 1917 took a doctor's degree for PhD thesis on North Atlantic trade wind. In 1918–1925 was at the head of the scientific research of R. Amundsen's expedition on the “Maud” ship. Spent three winters in a row – near Chelyuskin Cape (1918/1919), having determined its exact location for the first time, near the Ayon Island (1919/1920), near Cape Serdtse-Kamen (1920/1921). S. conducted a thorough research and obtained an important data on water dynamics and the regime of the East Siberian Sea. In 1926–1928 was onboard the first nonmagnetic ship “Carnegie” in the Pacific and Atlantic Oceans. In 1931 headed scientific research in George Wilkins polar expedition on

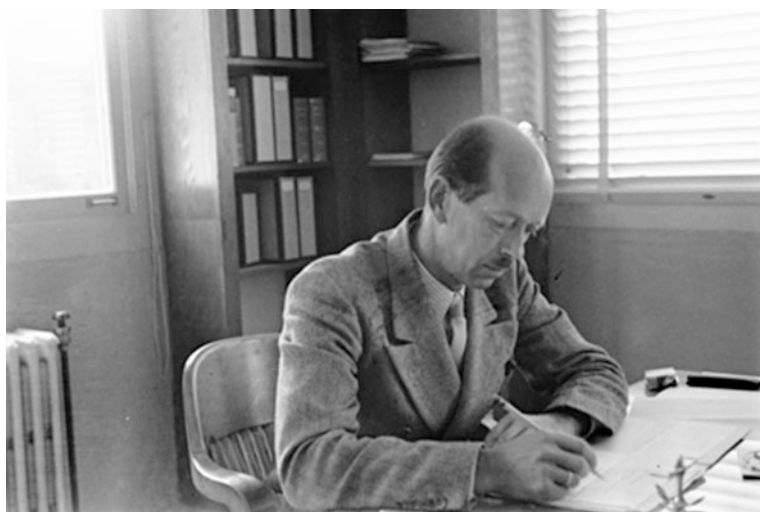
the “Nautilus” submarine, which reached 82°N. This navigation was the first attempt to use a submarine in the history of the Arctic Region exploration. In 1942 a monograph on oceans written together with Johnson and Fleming was published; it became one of the principal manuals for oceanographers all over the world.

S. is the author of over 50 works in Norwegian, English, and German languages. The books published in the Russian language are *Navigation in the “Maud” Ship in the Laptev Sea and the East Siberian Sea* (Leningrad, 1930) and *To the Ice in the Submarine* (Moscow, 1958).

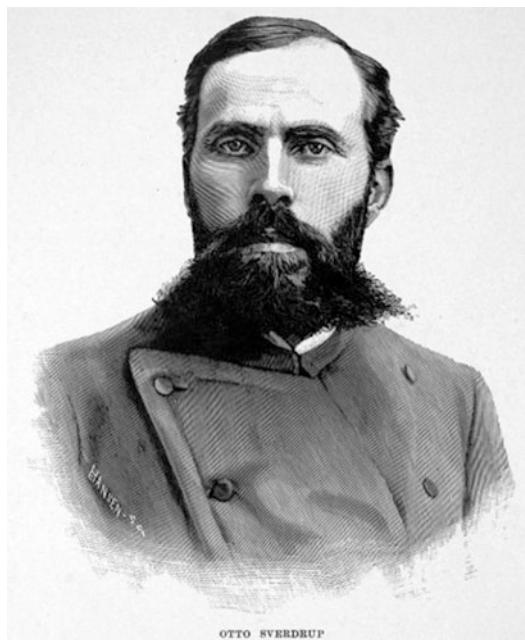
## Sverdrup, Otto Neumann (1854–1930)

Sverdrup, Otto Neumann (1854–1930) – was a Norwegian polar explorer and navigator. In 1888 together with Fridtjof Nansen was the first to cross South Greenland on ski. In 1893–1896 S. was the captain of Nansen's ship “Fram” at the time of its leeway through the waters of the Arctic region. After Nansen left “Fram” to reach the North Pole by foot, S. replaced him as the head of the expedition and navigated the ship to Norway. In 1898–1902 S. directed explorations on “Fram”

Sverdrup H. U. (Source: <http://library.ucsd.edu/dc/object/bb61785687>)



in the northwestern part of the Canadian Arctic Archipelago; mapped all the western shore of the Ellesmere Island; discovered several islands from the group of islands, which were later named the Sverdrup Islands; and explored almost all the straits between them. In 1914–1915 headed the expedition of the Main Hydrographic Authority of Russia on the steamboat “Eclipse” organized to find the expedition of V. Rusanov, G. Sedov, and G. Brusilov and wintered on the steamboat near the northwestern coast of Taymyr, where he found a wintering ground of B. Vilkitsky’s hydrographic expedition in the Arctic Ocean. He reached the ground on sledge with some of his crewmembers and saved people in distress sending them to the Yenisei’s mouth through tundra. In autumn 1915 he was the first to visit the Uyedineniya Island in the Kara Sea and hoist a Russian flag there. In 1920, being at the command of the Soviet icebreaker “Svyatogor,” rescued from ice captivity in



Sverdrup O. N. (Source: <http://ageofex.marinersmuseum.org/index.php?type=explorer&id=9&gallery=1>)

the Kara Sea the icebreaker “Solovey Budimirovich.”

Islands in the Kara Sea and in the Lincoln Sea and straits between the islands Axel Heiberg and Misk and in the Nordenskiöld Archipelago, the Kara Sea, a rock in Maud Bay, Taymyr Peninsula, the Laptev Sea, and a mountain on the south shore of the Vilkitsky Strait are named after S.

### “Svyatoy Gavriil” (“St. Gavriil”)

“Svyatoy Gavriil” (“St. Gavriil”) – was a Russian single-masted boat, which participated in the First Kamchatka Expedition 1725–1730. Length is 18.3 m, width 6.1 m, and water draft 2.3 m. Built in Nizhnekamchatsk in 1728 under the personal observation of Vitus Bering. The same year under command of Bering, navigated from Nizhnekamchatsk to the strait between Asia and America, reaching 66°17'N. In 1730 the boat under the command of I. Shestakov was sent to Udskeya Guba in the Okhotsk Sea for its exploration. In 1732 the boat of the expedition under the command of M. Gvozdev navigated along the coast of Chukotka to the coasts of Alaska. In 1738 “S. G.” suffered a wreck near the coasts of Kamchatka. “S. G.” was dismantled in 1755.

### Svyatoy Nos

1. A most conspicuous cape of the coast between the Yana and the Indigirka at the entry to the Dmitry Laptev Strait. It is an end of the mountain chain up to 400 m high, which stretches out into the sea and separates Ebelyakhskaya Guba from it. There are granites in its coastal cliffs.
2. A cape on the Timanskiy coast in the Barents Sea (the Arkhangelsk Region).
3. A cape of the Kola Peninsula on the coast of the Barents Sea between the Tersk coast and the Murmansk coast.

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**Sychoy, Vasily (?-?)**

Sychoy, Vasily (?-?) – was an explorer, Arctic navigator, and one of the pioneers of the East Siberia north. In 1643 S. led an expedition from Turukhansk to Khatanga Bay, entering the middle part of the Anabar River, which he discovered. In 1648 S. went down to the Anabar mouth, where he met a group of Cossack Y. Semyonov's riflemen, arriving from Turukhansk to release S. Semyonov's continued exploration of Khatanga Bay, initiated by S., and found Anabar Bay. Semyonov and S. discovered no less than 500 km of the Asian north coast. In 1648 they discovered the North Siberian Lowland.

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**"System of the Laptev Sea"**

"System of the Laptev Sea" – a Russian–German program (Russian Academy of Science, Moscow State University, Arctic and Antarctic Research Institute, Permafrost Studies Institute, Yakutsk, Wegener Institute for Polar and Marine Research, Potsdam, Hamburg University Soil Sciences Institute), which started in 1994, to research cryolithic zones of the shelf. The project envisages a large scope of research in oceanology, the quaternary geology, history of geological development, biology, etc. Most of the received data belongs to Germany.



# T

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## Taimen (*Hucho taimen*)

Taimen (*Hucho taimen*) – a species of fish in the *Hucho* genus of Salmonidae family. Being the largest salmon in the world, 1.5–2 m long and with a weight of 60–80 kg, T. is found in rapid mountain rivers and cold-water lakes. It matures at 4–6 years. The spawning is in spring in small rivers with shingle bed. The fertility is 10,000–34,000 eggs, the eggs are large, laid in redds, and juvenile fish hatches out in approximately a month. During spawning the body is copper red. After spawning, as well as in autumn and winter, T. gains weight. T. is a typical predator. In summer it eats almost nothing at all and stays in small tributaries. By autumn it goes down and enters channels of big rivers and lakes. T. lives in freshwater – rivers and drainage cold-water lakes; it never enters seas. T. is found in a vast territory in Russia: from the Cis-Urals Region (the Pechora and the Kama basins) to the eastern margins of Yakutia and the south of the Far East (the Yana River, the Aldan River, the Uda River, the Tugur River, the Amur River with tributaries). T. also lives in Siberian rivers – the Angara, the Malaya Belaya, and the Bolshaya Belaya rivers, the Belaya River, the Onot, the Urik, and the Oka, but in limited numbers. T. is listed in the Red Book of the Russian Federation.

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## “Taymyr”

“Taymyr” – a Russian icebreaker built in 1909 in St. Petersburg at Nevsky Shipbuilding Plant along with “Vaygach” icebreaker, for hydrographic works in the Arctic seas. The building of the ship was inspected by F.A. Matisen, who was later appointed its captain by an Imperial Edict. The length of the ship was 54 m, the width 11 m, the draft 3.46 m, the deadweight 1,280 t, and the capacity of the steam engines 1,200 h/p. The operating range at cruising speed (7–8 knots) is 11,000 miles. The body of the icebreaker was egg-shaped, which allowed it to withstand heavy ice pressure. The floor was double-decked, and the ice lining strengthened. The speed in open water was 10.5 knots. The first big voyage of “T.” in 1910 was transferred from the Baltic Sea to Vladivostok along the southern route. From 1910 “T.” and “Vaygach” served as a basis for the expedition in the Arctic Ocean, which described anew almost all the coasts of Russia and made a number of geographical discoveries. In 1932 under command of A.M. Lavrov “T.” reached Severnaya Zemlya for geodesic survey and depth measurement off the Pioneer Island. The researchers on board “T.” discovered the Central Kara Elevation in the northern part of the Kara Sea and eight Krasnoflotskiy Islands in Shokalsky Strait. In 1938, along with the icebreaker “Murman,” “T.” took winterers





Taymyr Peninsula (Source: [https://en.wikipedia.org/wiki/Taymyr\\_Peninsula](https://en.wikipedia.org/wiki/Taymyr_Peninsula))

the Russians 67.1 %, the Ukrainians 8.6 %, and other nationalities 9.6 %. The density of the population is 0.1 person for 1 km<sup>2</sup>. The administrative center is the town of Dudinka (over 25,000 people). The area was established on December 10, 1930, as a national district, since 1987, an autonomous area, and since 1992, a constituent entity of the Russian Federation being a part of the Krasnoyarsk Region.

Half of the area's territory is the Taymyr Peninsula and the adjacent territory, Severnaya Zemlya and Nordenskiöld Archipelagos, and a number of islands in the Arctic Ocean: the Sibiryakova Island, the Arctic Institute Island, the Izvestiy TSIK Island, the Uedineniya Island, and the Sergey Kirov Island.

The rivers are the Yenisei (500 km within the area's boundaries), the Khatanga, the Pyasina, the Upper and Lower Taymyra, and the Popigay. The lakes are Taymyr (the area is 4,500 km<sup>2</sup>, and the length is 250 km), the largest lake after Baikal. Other large lakes are Pyasino, Glubokoe, Lama, Kata, and Khantayskoye.

In the north the climate is arctic, and in the south subarctic (continental), the permafrost is widespread, and average temperatures in January are from −29 °C to −31 °C and in July from 2 °C to 12 °C. The precipitation level is 120–300 mm a year, with three quarters from it falling in summer. Natural and mineral resources are nonferrous metals, natural gas, phosphates, oil, and iron ores; huge water (surface and underground); and wind resources. In freshwaters of the Yenisei, lakes, and bays, valuable fish species are found: nelma, cisco, omul, muksun, vendace, etc. Seawater is home for ringed seal, bearded seal, walrus, and white whale; land species are Arctic fox, common fox, glutton, wolf, weasel, ermine, squirrel, muskrat (near the lakes), elk, and reindeer; in coastal areas, on islands, and ice, polar bear is found. Commercial species are Arctic fox, squirrel, muskrat, and wild reindeer. On the Taymyr Peninsula, the musk oxen is acclimatized. Among the bird kind are snow bunting, ptarmigan, and snipes; waterfowl – ducks, geese, seagulls, etc. In the territory of the area, the Big Arctic Reserve, the



Taymyr (Dolgano-Nenets) Autonomous Area (Source: [https://en.wikipedia.org/wiki/Taymyrsky\\_Dolgano-Nenetsky\\_District](https://en.wikipedia.org/wiki/Taymyrsky_Dolgano-Nenetsky_District))

Putoranskiy Reserve, and the Taymyr Reserve are established. As for the gross national product, in 2002 the industry accounted for 4.3 %, agriculture for 0.3 %, construction for 29.3 %, transport for 6.7 %, and trade and commercial activity on sale of goods and services for 8.1 %. Principal branches of industry: food (bread, fishery), fuel (coal), and electric utility. In the territory of the area, the city of Norilsk is located. In agriculture reindeer breeding, caged-animal farming (blue fox, black fox), fur trapping dominate. Milk and meat farming is underdeveloped.

## Taymyr Biosphere Reserve

Taymyr Biosphere Reserve – located in the basins of the rivers Lagata and Upper Taymyr. It also includes two areas of the northernmost “forest

islands” on the planet – Ary-Mas and Lukunskiy. It was established on February 23, 1979, to preserve typical tundra landscape of the Taymyr Peninsula, migration routes of the Taymyr population of wild reindeer, and nesting locations of semi-aquatic birds (including the red-breasted goose). It is one of Russia’s largest reserves located in the north of the Krasnoyarsk Region, on the Taymyr Peninsula. The T.B.R. is formed of clusters and includes four plots. The area is 1,781,928 ha; a subdivision includes 37,018 ha of the Laptev Sea. The flora is mostly represented by low-bush, suffrutescent and moss tundra, and tundra bogs. In 1995 by decision of MAB UNESCO, the reserve was awarded the status of the biospheric one. All the territory of the reserve is located in the permafrost zone. Temperature below zero and snow occur even in July. In winter, ice cover around 2 m wide is formed over the water.

The reserve enjoys 21 species of mammals (let alone some pinnipeds and cetaceans entering the waters of the Arctic area) and the world’s largest herd of wild reindeer. 430 species of higher plants (tracheophytes), 222 species of moss, and 265 species of lichen grow in the territory of the reserve. The number of bird species is 116, with 74 from them breeding; over 15 species of fish are found in rivers and lakes – salmon, mainly of whitefish family: broad whitefish, nelma, muksun, vendace, Arctic whitefish, and omul; chars are found in lakes (lacustrine and fluvial). Burbot, Siberian grayling, peled, and Siberian smelt are also common. One of the most remarkable species of bird fauna in tundra lowland is the red-breasted goose. Over 20 years ago, a trial on musk oxen acclimatization was started in Taymyr tundra. Now about 8,000 of these fascinating animals (first species were brought from Canada and the United States) are spread around eastern Taymyr.

## Taymyr Ice Massif

Taymyr Ice Massif – a branch of the central Arctic sheet, covering most of the Laptev Sea’s southern part east off Vilkitsky Strait. T.I.M. is a navigation difficulty for the Laptev Sea routes.



## Tennergynpilgyn

Tennergynpilgyn – a lagoon at the mouth of the Amur River (in Chukchi Tankergyn Pilgyn – “Tankergyn Neck”), Chukchi Autonomous Area, Russia. T. lagoon is the biggest of the Chukchi Sea coastline; it spreads along the coast for 65 km southwest off Akatan Lagoon. T. Lagoon is connected by narrow distributaries with Akatan and Amguema lagoons. The southwest coast of T. is hilly with occasional bogs. Sea connection is due to the Pilgyn Strait located 58 km southeast of Cape Schmidt. The width of the strait is around 300 m, and depths are 2.5–3 m, up to 8 m in some places. T. is named after a Chukchi who lived near the lagoon. The Russian name is Two Pilots’ Sandspit.

## Terezy Klavenes Bay

Terezy Klavenes Bay – wedges into the Taymyr Peninsula in the southwest direction for approximately 46 km. It is funnel-shaped. The width is up to 16 km. In the outer part of the bay, small islands from the Vilkitsky and the Komsomolskaya Pravda groups of islands are located. The southeast coast of T.K.B. is formed by the northwest shore of the peninsula with narrow Cape Lassiniusa jutting out into the sea for almost 7 km. The shores are mostly flat, boggy, and covered with tundra vegetation. Several small rivers flow into the bay, the largest from them being the Goltsovaya River. The bay is covered with ice for the most part of the year.

The coast of the bay is part of the “Chelyuskin Peninsula” of the Big Arctic Reserve.

The T.K.B. was first seen from a distance by V.V. Prontchishchev in August 1736, who mistook it for the mouth of the Taymyr River. The Kh. Laptev expedition which took place in the 1730s knew about the bay.

The bay was first mapped in 1742 by a participant of the Great Northern Expedition of 1733–1743, navigator S.I. Chelyuskin, but was not named by him. The bay was named and

described in 1919 by the head of the Norwegian polar expedition R. Amundsen. Amundsen named the bay after his acquaintance, a wife of a major ship owner from Norway Teresa Gron Klavenes, who headed the Committee on Keeping of Nansen’s famous polar ship “Fram.”

## Terpey-Tumus

Terpey-Tumus – a vast accumulative peninsula located on the western coast of Olenyok Gulf, the Sakha Republic (Yakutia), Russia. T.-T. is formed by sand material. Its northern edge is exposed to thermal abrasion, with the coast retreating by 4 m/year, up to 7 m/year in some years. T.-T. has been a resource reserve since 1977.

## The Encyclopedia of Oceanography

The Encyclopedia of Oceanography – published in 1966 in New York, USA; published in Russian in Leningrad in 1979. It was compiled by renowned scientists from different countries including the Soviet Union, edited by Rhodes W. Fairbridge. It contains more than 200 articles, which provides information about the oceans, its hydrology, geology, hydrobiology, hydrochemistry, mineral, and energy resources. Among the descriptions of the World Ocean seas, the description of the Laptev Sea is written by members of the Arctic and Antarctic Research Institute E.G. Nikiforov, V.V. Pavlov, and O.A. Shpaikher; the East Siberian Sea description is written by A.S. Ionin; Chukchi Sea description is written by K. Hankins (USA) and P.A. Kaplin (USSR).

## Thermal Abrasion

Thermal Abrasion – the process of destruction of the shorelines composed of ice or multiyear



frozen rocks, resulting from combination of the mechanical action of breaking waves and thermal action of water and air (mechanical and heat energy). The processes of thermal abrasion are most intensive in the Laptev Sea, with the shoreline retreating up to 18 m/year. T.A. in the Laptev Sea led to disappearance of the islands, the length of which at the time of their discovery in the nineteenth century exceeded 10 km. This way, former Vasilyevsky Island, which was around 7 km long and 0.5 km wide in 1823, totally disappeared by 1936. Former Semyonovsky Island, 14 km long in 1823, stopped to exist in 1951. During 2 years – from 1944 to 1946 – the record speed of shoreline erosion, 55 m/year, was recorded there. Within decades the Figurin, Diomedé, and Mercury Islands disappeared.

## Tiksi

1. A bay in the Laptev Sea, east off the Lena River Delta, south off the Bykhovskiy Peninsula. Its length is 21 km and width by the entrance is 17 km. The hydrographic conditions of the bay are favorable for navigation. The bay sports three small but conspicuous rocks, as if covering the entrance to it – Karaulnye Kamni. From west and south the bay is bounded by the mainland coast. The northern coast consists of soft rocks and fossil ice. The bay is covered with ice from October to July. In summer it is susceptible to large tidal fluctuations. Tides are semidiurnal, 0.3 m. T. was first mapped on Russia's northern coast in 1739 by D.Y. Laptev as Gorelaya Guba, and since 1823 it has been called Tiksi ("the place where the land can be reached"). It is for trans-shipping roadstead for sea and river transportations of the Northern Sea Route. The port of Tiksi is located on the western coast of the bay. In 1902 the bay became the final abode of E. Toll's schooner "Zarya."
2. An urban locality (since 1939), the Sakha Republic (Yakutia). The population is around 4,560 people (2015). The settlement was based around the port of Tiksi. T. is located on the permafrost. The seaport is on the coast of Tiksi Bay (the Laptev Sea), near the Lena Delta (Bykovskaya Protoka). The airport belongs to the Defence Ministry. An air lane passes over Tiksi – around 15 planes follow from Europe to Asia, so a meteo station located there plays an important role. In the navigation period, steamers travel the Lena between T. and Yakutsk. The climate is harsh, with up to 120 days of snow storms a year. Average January temperature is  $-35^{\circ}\text{C}$ , and June  $11^{\circ}\text{C}$ . Winter lasts 8 months, and summer, 2. The polar day is from 10 May to 2 August; the polar night is from 17 November to 25 January. Near T., in the Lena Delta, detention camps of the People's Commissariat for Internal Affairs were located. Ship repairing facility. In T. offices of the Northern Sea Route, Arctic Ocean Company, a laboratory of the Space Physics Institute, the Administration of the State Hydrometeorological Committee, production center "Lamu" (national fur clothes, gifts), and People's Museum of the Arctic Ocean Company (picture gallery and the department of the exploration of the Central Arctic coasts) are located. The historical part of the museum includes the history of the Arctic navigation in the eighteenth to twentieth centuries, the history of T., and the history of T. seaport and the Arctic Ocean Company; the exhibition also has ethnographic and paleontological branches; a monument in memory of M.I. Brusnev, an engineer exiled for political reasons, who took part in the expedition of V.A. Vollosovich.
3. The main seaport in the east of the Arctic Region. Located on the coast of the Laptev Sea, 120 km off the Lena Delta, in the low reach of which the Sangarskoye coal mine was situated. This was a prerequisite for creation of a bunkering base in T. It was decided to build port facilities on the southeast coast of Bulunkan Bay in the western part of Tiksi Bay. In 1934 the construction started in one of the least accessible areas. By 1941 T. became the



Tiksi (Source: <https://ru.wikipedia.org/wiki/>)

third largest port after Igarka and Dudinka. At present this is a well-equipped facility with motor transport service and port vessels, transferring cargos from sea ships in a spring roadstead to river vessels for further transportation along rivers to settlement on the shores of the Khatanga, the Olenyok, the Yana, the Indigirka, and the Kolyma rivers. Anchorage is possible only off the shore. T. is the main base supporting sea cabotage in the eastern part of the Russian Arctic and the basis of the large transpolar settlement Tiksi, one of the key hubs of the Northern Sea Route, a large transfer base of cargo from the Lena River being transshipped from river to sea vessels, and their delivery to Pevek, the Yana, the Indigirka, the Kolyma, the Anabar, the Khatanga, and islands of the Arctic Basin. Construction materials, containers, coal, and flax are exported. Cargo transfer capacity is 0.5 mln tons a year. Apart from that, cargo operations are carried out in the Khatanga Bay, Nordvik, Kozhevnikova Bay, and in the mouth of the Yana – Nizhneyansk. The transfer of cargo for its further transportation along the rivers is located there. To reduce the waterway from the Lena Delta to the port of Tiksi, it was planned to dig the channel through Koytchev Isthmus, to connect Bykovskaya Protoka with Tiksi Bay through Neelov Gulf.

## TINRO-Centre

TINRO-Centre – was established in 1925 as the Pacific Scientific and Commercial Station (TONS); since 1934 it has been called the Pacific Research Institute for Fishery and Oceanography (TINRO); it became the Center in 1994. T.-C. has branches in Khabarovsk, Magadan, and Anadyr and a base of research fleet in Vladivostok; coordinates research activity of Kamchatka and Sakhalin Fishery Research Institutes. T.-C.'s scope of activities is as follows: research works in the Pacific Ocean Basin, seas, and freshwater bodies in the Far East, to ensure resource basis for the country's fishery; controlling fishery grounds' resources, ecological stability in the fishery areas; studying of basics of biological productivity of the Far East seas and Pacific open water from the point of view of oceanology; creation of biotechnics and methodology of breeding fish, invertebrates, and seaweeds; study of anthropogenic influence over bioresources and productivity of water bodies; development of up-to-date means and methods of fishery; and study of chemical composition, food, and technical value of fishery objects. To reach its objectives, T.-C. has a fleet of 16 vessels equipped with modern navigation, search and scientific equipment, biostations, and an experimental facility. T.-C.

includes an oceanarium and dolphinarium, in laboratory and demonstration aquariums and sea enclosures of which the behavior of sea mammals and fish in captivity is studied and the mode of their treatment is developed.

### **Toll, Eduard Vasilyevich (1858–1902)**

Toll, Eduard Vasilyevich (1858–1902) – was a geologist and polar explorer, a baron of Baltic German origin. T. was born in Reval (Tallinn) and a magister of geology (1889). He graduated from the University of Dorpat (1882, the faculty of zoology), where he later worked as a zoologist. In 1884 T. was invited to St. Petersburg, to the Mineralogical Museum. He explored north-eastern Siberia (from the low reaches of the Yenisei to the Yana-Indigirka Lowland) and adjacent islands in 1885–1886 under the command of A.A. Bunge and in 1893–1894 as the head of the expedition of the Academy of Science. T. made vast collections and drew first route geological maps of many areas he visited. He was the first to explore the geology of the New Siberian Islands. In the north of Siberia and on the adjacent islands, he discovered moraines and boulder rocks, which were evidences of ancient (Pleistocene age) land glaciation. T. was right to determine Taymyr as its center. T. gave scientific explanation to a number of objects; particularly, he proved that the “Wooden Mountains,” one of the miracles of the New Siberian Islands, on the New Siberia Island, are not the logs cast by sea, but an opened Miocene forest, which grew in place of the Arctic desert 25 million years ago. T. brought up a question (still unanswered) on the reasons of the drastic climate change. T. concluded that mammoths and rhinoceros of the beginning of the Holocene (40,000 years ago) sank; T. made a correct assumption that the vast land plot (“The Mammoth Mainland”), where they lived, went underwater at the time, and animals became extinct after most of their pastures disappeared. T. explained the sinking of land by deflection of

the Earth’s crust (now the rise of the ocean level as a result of ice melting is seen as the main reason). T. stressed the geological similarity of the New Siberian Islands and the mainland, on which basis he predicted with certainty the existence of the land yet undiscovered, known as the Sannikov Land at the time (it was allegedly seen in 1811 by Y. Sannikov). To discover and explore this land, T. arranged and headed the Russian Polar Expedition on the ship “Zarya” in 1900. Emperor Nikolay I granted 240,000 roubles for it. Prominent scientists took part in the expedition: land surveyor and meteorologist F.A. Matisen, topographer A.V. Kolchak, zoologist A.A. Byalynitskiy-Birulya, and astronomer F.G. Seeberg. Two winterings off the Kotelný Island brought significant scientific results; however, there arose a conflict between T., who regarded the ship only as a means of the team’s transportation, and captain N.N. Kolomeitsev, who considered the undamaged condition of “Zarya” an affair of honor. T. sent N.N. Kolomeitsev away already during the first wintering, which reduced the effectiveness of the works. In spring 1902 T. realized that “Zarya” could not navigate to the Sannikov Land and decided to reach it without the ship. He took two dog sleds and two boats and food enough for 3 months, and together with three members of his team – F. Seeberg, manufacturers V. Gorokhov and N. Dyakonov, and dog drivers – he headed down the route the Kotelný Island, the Faddeyevsky Island, the New Siberia Island, and the Bennett Island. “Zarya” was to pick up T.’s group in the end of summer, but was unable to do that due to complicated ice situation. The expedition members returned to St. Petersburg on the steamer “Lena.” In January 1903 a search group headed by A.V. Kolchak tried to find T. The expedition found T.’s camp, his collections, and documents on the Bennett Island. One of the notes said that T. and his companions went south. However, they were never found. Valuable and extensive materials of T.’s expedition were studied by a special commission of St. Petersburg Academy of Science in 1900–1919. T.’s work “Navigation onboard



Toll E.V. (Source: <https://ru.wikipedia.org/wiki/%>)

‘Zarya’ Ship” was published in 1909 by the widow of the scientist. T. was awarded the Przhevalsky big Silver Medal by the Russian Geographical Society and the Norwegian order for his dedicated and courageous assistance to F. Nansen’s expedition.

The author of the books *The Description of Geology of the New Siberian Islands and Principal Objectives of the Arctic Land Investigation*, Physics and Mathematics Department, West Empire Academy of Sciences, 1899, Volume IX, № 1; *Navigation onboard “Zarya” Ship*, Moscow, 1959 (incomplete and occasionally incorrect translation of T.’s diary written in the German language).

Mountains on Novaya Zemlya and the Bennett Island, the bay in the northwest of Taymyr, the cape on the Tsirkul Island, and a plateau on the Kotelny Island are named after T..

## Tolmachev, Inokkenti Pavlovich (1872–1950)

Tolmachev, Inokkenti Pavlovich (1872–1950) – was a geologist and geographer and an explorer of Altai, the north of East Siberia, and the Far East. In 1896 T. graduated from the physico-mathematical faculty of the Siberian University. T. worked in Leipzig and in Munich, as an assistant in the University of Tartu. In 1898 T. was invited by St. Petersburg Academy of Science as a curator of its geological museum. In 1898–1899 and 1902 T. worked in Altai and Kuznetsk Alatau. In 1905 T. was commissioned by the Russian Geographical Society to head the Khatanga expedition, in which topographer M. Kozhevnikov took part. T. surveyed the Verkhniy Kotuy Basin, while Kozhevnikov explored Lake Yessey. After that they followed all along the course of the Moyero, the main tributary of the Kotuy River (825 km). Then they rafted along the Kotuy and reached the Khatanga, discovering the Anabar Plateau. They went down the Khatanga, reached its mouth, and traveled along the eastern coast of Khatanga Bay (the Laptev Sea) on reindeers. Kozhevnikov was the first to map it correctly. Due to the reindeer food shortage, they returned to the Anabar River mouth, going up the river ice to reach its origin, following the course of the river (939 km). During this voyage they finished discovering a plateau named Anabar by T. After that they parted again; T. headed south, reached Olekminsk on the Lena and returned to St. Petersburg. Kozhevnikov went northwest, arrived in Dudinka on the Yenisei, and finished mapping of over 6,000 km. The expedition collected data for mapping of the territory of over 1 mln km<sup>2</sup>. In 1909 T. was appointed head of the North-East Expedition and invited Kozhevnikov to take part in it. Together they mapped the coastline from the Kolyma to Dezhnev Cape (over 2,500 km long), described the topography of the foreland, and collected valuable geological, botanical, and zoological collections. In 1911 T. published the book *Along the Chukotka Coast of the Arctic Ocean*. In the mid-1920s T. emigrated to the United States.

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## "Transcontinental"

"Transcontinental" – an international corporation developing a project of transport and communication connection between Eurasia and North America by constructing a tunnel under the Bering Strait. For the first time the idea was suggested by the team of specialists headed by French engineer Lebel in 1902 and supported by Russian engineers and entrepreneurs headed by S. Yu. Witte, Chairman of the Russia's Council of Ministers, as well as by specialists of the expedition under command of member of the London Geographical Society Windt. Decisions on the beginning of construction were taken in 1906, 1913, 1916, 1937, and 1953, but the project never saw practical implementation. International corporation "T." is registered in Washington and has offices in the United States and Russia.

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## Transpolar Drift Stream

Transpolar Drift Stream – one of the major currents of the Arctic Ocean, transporting sea ice from Alaska to Spitsbergen and Greenland, originates in the Chukchi Sea. T.D.S. is formed, first

of all, by river flows of Asia and Alaska, causing continuous discharge movement of water and ice, which is supported by inflow of Pacific waters infiltrating through the Bering Strait. This leads to formation of T.D.S., which crosses the Arctic Ocean and heads to the strait between Spitsbergen and Greenland in its western part. T.D.S. ensures directional ice drift used for arrangement of drifting polar stations.

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## Tugun (*Coregonus tugun*)

Tugun (*Coregonus tugun*) – a river fish of the Clupeidae family, the *Coregonus* genus. The jaws are of equal length. The body is rounded in cross section; the back is wide. The number of gill rakers is 25–31. T. is not big, up to 20 cm. T. is found in the rivers of Siberia from the Ob to the Yana. It is mostly met in rivers and only occasionally in lakes. The spawning is annual, in autumn, in sandy shallow areas 1–1.5 m deep. T. matures during its second year. The fertility is 1.5–6 thousands eggs. T. feeds on crustaceans, insects falling in water, maggots, and fish eggs. Life span is up to 6 years. A commercial species fished in the Ob, the Yenisei, the Lena.



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## **“Ubekosibir,” Department of Navigation Safety in the Kara Sea and at the Mouths of Siberian Rivers**

“Ubekosibir,” Department of Navigation Safety in the Kara Sea and at the Mouths of Siberian Rivers – established in 1922 based on the Ob-Yenisei Hydrographic Unit (set up in 1920). U. was accountable to the Hydrographic Department. In 1933 it was dissolved following the establishment of the Hydrographic Department of Glavsevmorput (Chief Directorate of the Northern Sea Route) in Leningrad.

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## **Uelen**

Uelen (also known as Whalen in older English-language sources and Ugelen on USCGS charts; the name of Uelen is thought by some sources to derive from the Chukchi “uvelen” meaning “black, thawed patch”):

1. Is a rural locality in Chukotka Autonomous Okrug, Russia, the easternmost settlement in Russia. The first mention of the name Uelen appears on a map from the Billings-Sarychev expedition in 1792. There is a local legend, which offers a second explanation for the origin of the name. It describes the life of a strong local man called Uvelel’yn (literally translated as “slob”), a strong, poorly dressed man. U. is

located in the northeasternmost part of the Chukotka Peninsula, near Cape Dezhnev – the easternmost point of Eurasia. U. is extended along the northern part of the Uelen Lagoon. The settlement is 3 m above sea level and is close to the cape of Uelen. The climate is subarctic. The average July temperature is at +7 °C, and the overall annual average is –6.7 °C. The vegetation is scarce, but the fauna is diverse. Sea mammals are represented by the gray whale and the bow-headed whale and pinnipeds – by bearded seals. The most common animals in the area are wolves, foxes, wolverines, polar foxes, polar bears, Arctic hares, etc. The most common birds are guillemots, snowy owls, willow ptarmigans, Arctic falcons, and ravens. The fish catch is represented by the Arctic char, the Arctic cod, plaice, and the Far Eastern navaga.

Archeological investigation shows that in the past modern U., the area is used to be populated by the Eskimos; however, in the late twelfth to early thirteenth centuries, they were gradually ousted by the Chukchi.

In 1912 U. the headquarters of the local Chukotka region (“Uyezd”) administration was relocated from Providence Bay to U.

In the 1910s U. also became a trade and a cultural center of the Chukotka Peninsula: it was often visited by Russian and American whalers, as well as a subsistence warehouse. The first school in Chukotka was established in



Uelen (Source: <http://www.youtube.com/watch?v=v742LpL7YCY>)

Uelen in 1916, and in 1920, Uelen became one of the first trade cooperatives in Chukotka. In the first half of the twentieth century, Uelen was the site of one of the first Russian Arctic research stations. Its first Arctic station is set up in 1936. Between 1940 and 1942, the local administration was transferred from U. to Lavrentiya settlement. In 1958 U. received former residents of the Naukan settlement located in the narrowest part of the Bering Strait. The present population is about 670 people (2015). The settlement has the administration of its own, a municipal-farming unit (part of a larger farming entity called Zapolarie), a school with residential facilities, a kindergarten, a recreation center, a hospital, and a meteorological station. The village is famous for its walrus ivory carvings. The Uelen Bone Carving Studio established in 1931 became the first of its

kind on the Chukotka Peninsula and contains the world's only museum of walrus ivory carving.

The village also has a number of archeological sites including a burial ground containing burials of Early Whale Hunter cultures (the ancient Eskimo Ekven burial ground and the Uelen burial ground), and the deserted Dezhnyovo settlement founded in the late nineteenth century.

2. The most easternmost cape of Eurasia, located in the East of the Chukchi Peninsula, to the west of Cape Dezhnev, Chukotka Autonomous Okrug, Russia. The rocky scarp is 100 m high.
3. A lagoon, 15 km long and 3 km wide, separated from the Chukchi Sea by the pebble spit of Uelen, with the settlement of the same name extended along the northern part of the Uelen Lagoon.

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## Ukougepilgyn

Ukougepilgyn (the Chukchi name is Vykvvyie, which means “stone breath”) – a lagoon located to the east of the Amguema River mouth. The lagoon is small and shallow and navigable by motorized craft with drafts up to 1.2 m. U. is 150 m in width and is located between two pebble-and-sand spits.

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## Umiak

Umiak (umialak, umiaq, umiac, oomiak, or oomiak) – a large open Eskimo boat used for transporting people and goods. The U. would be anywhere from 6 to 10 m, 1.5–2 m wide, and 70 cm deep. It is usually propelled by two oars and a sail and has a wooden frame covered with skins which are replaced every year. The umiaks are used for fishing and for cargo transportation. They may carry up to 20 people. The U. is also known as a “woman’s boat”, because women usually propel the boat with a spade-like oar while men do the steering.

Umiak (Source: <https://en.wikipedia.org/wiki/Umiak>)

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## Union of Soviet Socialist Republics (USSR), Soviet Union

Union of Soviet Socialist Republics (USSR), Soviet Union – was a state which existed in 1922–1991 over the most part of the territory of the former Russian Empire. Under the Treaty on the Creation of the USSR (December 30, 1922), it comprised Russian Soviet Federative Socialist Republic (RSFSR); Transcaucasian Soviet Federative Socialist Republic (TSFSR); since 1936 the Azerbaijan SSR; and others. Further on, the Turkmen SSR (1925), the Kazakh SSR (1938), and a number of other Soviet Republics were established.

In Viskuli (Bialowieza Forest) in December 8, 1991, heads of the Belorussian SSR, RSFSR, and the Ukrainian SSR signed the agreement that declared the USSR dissolved and established the Commonwealth of Independent States (CISs). Under the Declaration signed in December 21, 1991, in Almaty, 11 former Soviet republics, which became founders of the CIS (the three Baltic Republics had succeeded earlier, and Georgia joined the CIS in December 1993), guaranteed “fulfillment of international commitments,



Union of Soviet Socialist Republics (Source: [https://en.wikipedia.org/wiki/Soviet\\_Union](https://en.wikipedia.org/wiki/Soviet_Union))



resulting from agreements and treaties of the former Soviet Union.” The same day the council of the CIS heads of state supported Russian “membership in the UN, including permanent membership in the Security Council and other international organisations, in succession to the USSR.” In December 25, 1991, the USSR stopped to exist as a subject of the international law.

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### University of the Arctic (UArctic)

University of the Arctic (UArctic) – a project launched in 2001 and presents itself an international cooperative network of universities, colleges, and other organizations with an interest in promoting education and research in the North.

The criteria of U. activity include circumpolarity, variety, and integrity. The overall goal of the U. is to

create a strong, sustainable circumpolar region by empowering indigenous peoples and other northerners through education, mobility, and shared knowledge, contribute to shaping a solid image of the region, and enable the rest of the world to hear “the voice of the Arctic.”

U. is the only university-level truly circumpolar educational program and presents itself one of the world’s largest educational and research networks which incorporates over 130 members and covers 24 time zones within and outside the Circumpolar North.

U. members come from eight Arctic countries. In 2011 associate membership was introduced for non-Arctic countries. The program now also incorporates not only university-level educational establishments but also research institutions and indigenous organizations aimed at promoting higher education and Arctic studies.

U. truly prides itself on the innovative character of its programs. It has developed a



decentralized functional model aimed at joining efforts and reinforcing the creative potential of the educational and research institutions of the North, broadening their geographic scope and facilitating the economic development of the whole region.

The motto of U. – “With Shared Voices” – underscores the university’s commitment to diversity and unity as its primary values. The key element of the U. policy is a solid partnership with the indigenous peoples of the North as a safeguard that their interests will be recognized and observed in all aspects of U. activity.

### **Urvantsev, Nikolay Nikolayevich (1893–1985)**

Urvantsev, Nikolay Nikolayevich (1893–1985) – a Russian explorer, geologist, Doctor of Geological and Mineralogical Sciences, honored master of sciences, and an engineer of the Russian Federation (1974). He graduated from the Tomsk Engineering Institute in 1918. While working at the Geological Committee U. explored the mineral resources of the Taymyr. Between 1919 and 1932, he discovered and explored the copper-nickel-Platinum Group Metal deposits at Norilsk and made the first topographic survey of Norilsk lakes. Together with Nikifor Begichev in the spring of 1922, U. followed the course of the Pyasina River to its mouth, made his way to the west along the Kara Sea coast, explored the boundaries of the Byrranga mountain range, and found evidence of the Amundsen’s Arctic expedition crew members who mysteriously disappeared. In 1930–1932 U. acted as a scientific advisor for the Severnaya Zemlya expedition headed by G. Ushakov. Overall, the expedition headed by U. and Ushakov has covered the distance of 2,200 km. Instead of only two major islands reflected on previous maps, the expedition has discovered three major islands, one medium-sized island and several smaller islands. Urvantsev’s expedition explored the surface topography and the geological structure features

of the archipelago and has made its new, more accurate map. In 1933, for the first time in the history of Arctic research, U. used half-track vehicles. He explored the northern slope of the Taymyr Peninsula and made a topographic survey of 800 km of its coast including the Theresa Clavenes Bay as well as the Komsomolskaya Pravda Islands. In the 1930s U. was the Deputy Director of the Arctic Institute. In 1938 he was wrongfully accused and served his sentence at Norilsk labor camps. In 1955 he was fully exonerated and later became honorary citizen of Norilsk. In 1959 he was awarded the Great Gold Medal by the USSR Geographical Society.

List of works: *At the Severnaya Zemlya* (1969), *Taymyr, my Northern Land* (1978), and *The Discovery of Norilsk* (1981).

A harbor and a cape in the Minina Skerries in the Kara Sea as well as a rock in the Antarctic have been named after Nikolay Urvantsev.



Urvantsev N.N. (Source: <http://npr.su>)



## USA/USSR Maritime Boundary Agreement as of June 1, 1990

USA/USSR Maritime Boundary Agreement as of June 1, 1990 – was signed in Washington, United States, between the USSR and the United States. The Agreement on maritime boundaries in the Bering Strait envisages concessions of territory on the part of the USSR. The Agreement says that “the line described as the ‘Western boundary’ in Article 1 of the 1867 Convention . . . (meaning the Agreement on Sale of Russian Alaska to the United States) is the line of demarcation of maritime space” between the USSR and the United States. The Agreement elaborated on this line and, besides,

introduced notions of “Eastern special region” and “Western special region.” The US Congress ratified this Agreement in 1991. The Supreme Soviet of the USSR refused to ratify the document on the territorial concession to the United States. Having made sure that Moscow would not be forced into ratification, heads of the USSR Ministry of Foreign Affairs E. Shevardnadze and the US Secretary of State J. Baker, in breach of the accepted norms, changed notes on temporary character of the Agreement. In February 1997 the State Duma of the Russian Federation waived a draft law on ratification of this Agreement, having acknowledged it as defective, as this Agreement transfers 70 % of the Bering Sea to the jurisdiction of the United States, which is 13,200 square miles more than if the line would



Names are not necessarily authoritative

USA/USSR Maritime Boundary (Source: [https://en.wikipedia.org/wiki/USSR%E2%80%93USA\\_Maritime\\_Boundary\\_Agreement](https://en.wikipedia.org/wiki/USSR%E2%80%93USA_Maritime_Boundary_Agreement))

have been drawn on an equal distance from the coasts. Russian adversaries of ratification reason that if this paper had entered into force, Russia would have lost 55,000 km<sup>2</sup> of continental shelf in the open part of the Bering Sea, rich, under estimates of geologists, in oil and gas (the Norton and Navarinskiy basins), and Russian fishery would suffer loss. Protagonists of ratification prove that demarcation of 1990 matches with the boundary set forth by the 1867 Agreement, including as it was mapped in the Soviet times. Refusal of the Russian Federation to ratify the 1990 Agreement allows its opponents to claim reconsideration of Russian-American agreement on the grounds that the United States “conceded” to Russia the “Arctic Empire,” including the Wrangel Island and a group of minor islands in the Arctic Ocean, discovered by Americans in 1881. After the ratification of the Agreement, the American party deems it valid and persecutes Russian vessels for breaching the boundaries outlined in it. Yearly loss of the Far East fishermen amounts to 200,000 tons of fish or 200 million dollars.

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### **Ushakov, Georgy Alexeyevich (1901–1963)**

Ushakov, Georgy Alexeyevich (1901–1963) – a Russian explorer of the Eastern Arctic, geologist, Doctor of Geographical Sciences, and son of an Amur Cossack. U. did not receive any systematic secondary education. In his adolescent years, he joined the expedition exploring the Ussuri Taiga headed by V. K. Arsenyev. In 1926–1929, during his 3-year stay on Wrangel Island, U. was the first one to conduct systematic research of that island, to draw up its detailed map, and to collect valuable information on its climate, on the ice regime of the waters surrounding Wrangel Island as well as invaluable ethnographic materials and geological and mineralogical collections. U. founded and headed the first settlement on Wrangel Island inhabited by the Chukchi, the Eskimos, and the Russians. Upon his return to the continent, U. developed a plan of exploring the Severnaya Zemlya Archipelago which had previously been

mapped with a dotted line as an unexplored land. The Severnaya Zemlya expedition headed by G. Ushakov in 1930–1932 is considered to be one of the milestone events for the Geography of the twentieth century. Joined by Nikolay Urvantsev, a prominent geologist, and Sergey Zhuravlyov, a knowledgeable traveler and a professional hunter, U. covered over 7,000 km and mapped over 37,000 km<sup>2</sup> of the ice-clad Archipelago.

Though suffering from the hardships of their expedition and severe climate conditions, making their way on foot and on dog-drawn sledges, U. and his companions have mapped the shores of all the major Severnaya Zemlya islands. The contact with the mainland was maintained by radio communication operator V.V. Khodov. In the wintertime the expedition members succeeded in hunting polar bears and marine mammals, which enabled them to cover some of the costs of the expedition. Sledge dogs proved to be invaluable in this Arctic expedition. U. and his companions even made special “shoes” for the dogs so that they should not hurt their paws against the sharp-edged ice and when needed would even draw the heavily loaded sledge themselves. As a result, U.’s expedition has explored the surface topography and the geological structure features of the Archipelago, has made its first, very precise, map, and has made invaluable collections of mineral, plant, and animal species of the area. In 1934 U., being a plenipotentiary of the Government Committee, was in charge of the rescue operation of the “Chelyuskin” ship crew. In 1935 U. (who was at the time the Deputy Head of Chief Directorate of the Northern Sea Route) led the first Soviet high-latitude expedition on the icebreaker called “Sadko,” after a hero of the Russian lore. The expedition has explored a huge “blank spot” in the northern Kara Sea and has discovered the Arctic branch of the North Atlantic Current as well as the last piece of undiscovered territory in the Russian Arctic – Ushakov Island, named after Ushakov. “Sadko” has reached the latitude of 82°41’N which is a record for the ship of this type and class. In 1935–1941 U. was the Publishing Editor of “Soviet Arctic” Magazine and simultaneously (in 1936–1939) worked at the Chief Directorate of



Ushakov G.A. (Source: [https://en.wikipedia.org/wiki/Georgy\\_Ushakov](https://en.wikipedia.org/wiki/Georgy_Ushakov))

Hydrometeorological Service of the USSR. Between 1940 and 1955, U. worked in the Soviet Academy of Sciences.

U. has written numerous research works and over twenty popular science books, which were reedited several times, including: “The Isle of Shallow Waters. Treading the untrodden land” (1990). Ushakov died in Moscow, but was buried, according to his will, on Domashniy Island – the first base of his expedition to the Severnaya Zemlya Archipelago.

Besides Ushakov Island in the Kara Sea, a settlement, a spit, and a cape on Wrangel Island, a river on October Revolution Island, and two ocean ships have been named after Georgy Ushakov.

### **Ushakov, Pavel Vladimirovich (1903–1992)**

Ushakov, Pavel Vladimirovich (1903–1992) – a prominent Soviet explorer of the Far Eastern Seas of Russia, a hydrobiologist, zoologist and oceanographer, Doctor of Biology, and professor. U. has made a significant contribution to marine life

studies and the fauna of Polychaete worms of the Far Eastern Seas of Russia. In 1924, following his graduation from St. Petersburg University, U. went to work in Russian State Hydrological Institute (SHI) where he worked until 1936, taking part in numerous expeditions. In 1928 U. explored the Amur Liman and discovered its function as a natural barrier preventing a fauna exchange between the Sea of Okhotsk and the Sea of Japan. In 1929 he participated as a hydrobiologist in a scientific research expedition on the “Fyodor Litke” icebreaker from Vladivostok through the Bering Strait toward Wrangel Island. In 1931 U. set up the Kamchatka Marine Research Station of State Hydrological Institute which had conducted hydrobiological research in the Avacha Bay and in adjacent areas of East Kamchatka. In 1935, on the legendary “Krasin” icebreaker, U. succeeded in revealing the character of fauna exchange between the Chukchi and the Bering Seas. Special importance is attached to U.’s research conducted in the Sea of Okhotsk on the “Krasny Yakut” schooner as well as on the “Blyukher” and “Gagara” fishing trawlers in 1930–1932. It was the first time in the history of oceanology that trawling was made at the depth of 3,500 m.

In 1936 U. was awarded the degree of Doctor of Biology, and in 1939 he obtained the title of Professor. In 1936–1939 U. is the Deputy Director of the Murmansk Biological Station of the Academy of Sciences. Between 1939 and 1945, U. conducted research in the State Institute of Oceanography and in 1945 transferred to the Zoological Institute of Russian Academy of Sciences where he worked for 40 years.

In 1948 U. takes part in the Kuril-Sakhalin expedition and thereafter – in the compiling of the “Atlas of Oceanographic Basics of Fish Detection in South Sakhalin and South Kurils.” In 1949 U. again participated in an expedition to the Sea of Okhotsk and Prekuril waters of the Pacific on the “Vityaz” research vessel. This time U. succeeded in retrieving fauna species from the depth of 8,100 m.

U.’s findings are presented in over 200 publications. Among the most significant of them are *Fauna of the Sea of Okhotsk and its habitats* (1953) and *Polychaete worms of the Far Eastern Seas of the USSR* (1955). U. also served as an



Ushakov P.V. (Source: <http://www.kamchatsky-krai.ru/biography/ushakov.htm>)

editor in many scientific publications including *Explorations of the Far Eastern Seas of the USSR* and *Atlas of the Invertebrates of the Far Eastern Seas of the USSR*.

For his exploration of the Sea of Okhotsk in 1958, the Geographical Society awarded U. the Semyonov-Tyan-Shanskiy Medal. In 1972, for his contribution to oceanography and marine biology, the Oceanographic Institute in Paris awarded U. the Prince of Monaco Medal. Over 55 various marine life forms have been named after U.

## Ushakovskoye

Ushakovskoye – a settlement located in Rogers Bay on Wrangel Island, on Chukchi Sea Coast,

Chukotka Autonomous Okrug, Russia. U. was founded by the G.A. Ushakov expedition in 1926. Originally the population of the settlement consisted of the Chukchis, the Eskimos, and the Russians. The settlement grew and developed. In the 1970s it had the local council, a hospital, a post office, a school with residential facilities, a kindergarten, a fuel storage and bulk storage of coal, a local club with the cinema, a modest museum of natural history, an office of the Wrangel Island Nature Reserve, “Rogers” Airport, and other facilities. At the navigation period, the island had a temporary pier for towboats. In the 1980s U. had a checkpoint, a radio communication station, and a restored beacon. In 1984, a monument depicting a map and a bas-relief of Georgy Ushakov was erected in U. by the Geographical Society of the USSR. In 1997, it was decided to relocate the U. inhabitants to the settlement of Mys Shmidt on the continent. Starting from 2003 the settlement almost ceased to exist.

The settlement was named after G.A. Ushakov, a prominent explorer of the Arctic and founder of the polar station in Rogers Bay.

## Ust-Olenyok

Ust-Olenyok – a settlement on a mountain slope on the right bank of the Olenyok River in the Republic of Sakha-Yakutia, Russia. According to the 2010 census, the 27 residents of U. are involved in fishing and hunting. Outside U. there is a grave of Vasili Pronchishchev and his wife, participants of the Great Northern Expedition. U. also accommodates a hydrometeorological station of the same name (the “Ust-Olenyok” hydrometeorological station). In the 1940s–1950s, the village had a fish-processing plant with the workforce of Finnish workers relocated from the Leningrad Region.

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### Vagin, Merkuriy (?–1712)

Vagin, Merkuriy (?–1712) – a Siberian Cossack who performed the first officially registered trip to the Lyakhovsky Islands. In May 1712 V. with his son accompanied by eight Cossacks and the foreman Yakov Permyakov got the command of the Yakutsk military leader D. A. Traurnicht and reached Cape Svyatoy Nos (Dmitry Laptev Strait) moving by land from Ust-Yansk eastward, after which they went in dogsleds to the north via the frozen sea. The group reached an island which was later called Bolshoy Lyakhovsky, from which they saw another island lying further to the north – Maly Lyakhovsky – but did not risk trying to reach it in unfavorable weather conditions. In the spring V. planned to go to the islands for the second time, but the Cossacks, suffering from starvation and hardships, killed V., his son, and Y. Permyakov and returned to Ust-Yansk, where their crimes were discovered.

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### Valkarkay

Valkarkay – a lagoon of the coast of the East Siberian Sea, Chukotka Autonomous District, Russia. There is a polar station of the same name here, built in 1932.

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### Valkumey

Valkumey – the former (since 1959) urban-type settlement, Chukotka Autonomous District, Russia. It is founded in 1941 with an aim to develop the tin mine named Valkumey. At present the production is partially deactivated, partially suspended. The settlement was liquidated in 2008. The route Pevek-Valkumey is 13 km long to the south – southeast of the town of Pevek. Winter road is Zapadnyi-Valkumey. The closest airport is “Pevek.” A symbolic monument at the entrance to the settlement is “a trolley” in the form of an air-driven mine car loader with a trolley.

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### Vankarem

Vankarem – derived from the Eskimo words “vankat” meaning “a walrus tusk” and “vankareman” meaning “tusk people” and sometimes translated as “temporarily abandoned houses”:

1. A settlement in the northwest of the Chukchi Peninsula, Chukotka Autonomous District, Russia. Population is about 170 people (2015 census). The Chukchi that came here in the eighteenth to nineteenth century found





Vankarem (Source: <http://wikimapia.org/6884152/ru/%>)

well-preserved abandoned dwellings but learned nothing about their origin. The settlement may either have been abandoned long before their arrival or its inhabitants died from an epidemic. The main occupation of the locals is fish hunting. In the winter of 1934, the settlement serves as an airbase of Soviet pilots who were rescuing the members of the expedition on the steamship “Chelyuskin” which had sunk in the Chukchi Sea. The inhabitants of V. had participated in the evacuation of the members, and to thank them, O. Yu. Schmidt later arranged the construction of a school here. The only way to get to the settlement is by plane. A polar station.

2. A cape in the northwest of the Chukchi Peninsula between Cape Schmidt in the west and Kolyuchinskaya Bay in the east, Chukotka Autonomous District, Russia. The cape is situated at the mouth of the Vankarem Lagoon; to the west of it, there is a settlement of the same name. On the cape shores, there is a large walrus rookery. 2 km to the east of the cape,

there is a small Karkarpko Island. To the east of the cape, N. A. Nordenskiöld discovered the remains of ancient dwellings as well as bones of reindeer and bears.

3. A lagoon, the Chukchi Sea, indenting 37 km into the shore to the south of Cape Vankarem and consisting of three almost equal parts that are connected by narrow passages. The lagoon shores are predominantly low, flat, and cliffy only in some places. The Vankarem Lagoon is separated from the sea by two sand and shingle spits. The width of the entrance between these spits is about 500 m. The depth on the off-sea part of the fairway at the entrance to the lagoon is 4–5 m, and at the very entrance, it amounts to 12 m. The lagoon bottom is irregular, there are shoals, the predominant depth is 3–4 m, and in the middle part, it is up to 19 m.
4. A river flowing into the Vankarem Lagoon. It was named by Russian cartographers after Vankarem settlement. The Chukchi people call it “Velmay” which means “a decayed flower shop,” “a load.” There is a legend that

once in old times there happened a big battle of the Chukchi with some invaders, possibly, the Yukagirs, on one of the spits close to the sea. Many people were killed and things abandoned. After the battle, the enemies from the west stopped raiding Chukotka.

## Vankarem Lowland

Vankarem Lowland – stretches on the northern coast of the Chukchi Sea from Cape Schmidt to Kolyuchinskaya Bay. The surface is marked by several buttes that are not very high (220–430 m). The lowland is cut by many rivers, including the Ektyvapat, Amguema, Ekugvaan, Vankarem, Velmai, and others. The coastal area proper is indented by many large lagoons – Tenkergynpilgyn, Ukougepilgyn, Nutauge, Vankarem, and Pyngopilgyn.

## Vankina Guba (Bay)

Vankina Guba (Bay) – situated in the eastern part of the Laptev Sea to the south of Ebelyakh Bay which is separated from it by the Shirokoston Peninsula. It is shallow (up to 17 m), 6–18 km wide. The Khaarstan and the Chokurdakh rivers and many small creeks flow into it. The area of the bay is about 350 km<sup>2</sup>. The water area is fringed with vast foreshores and beaches up to 5 km wide. In the north the bay is separated from the sea by a submerged shoal, by the continuation of the foreshore spit of Cape Nerpichiy, in the west, and by a submerged bar about 7 km long. Certain areas of the shore demonstrate abrasion processes, in the northern part their total length comprises about 19 km and in the south 11 km.

The scientists single out four beach barriers made of pebbles and breakstone. They mark the lines of maximum upsurges. Three of them are 1.5–2 m higher than the average sea level, and the farthest barrier is 7–8 m higher than it. It marks the extreme upsurge when to the east of the ordinary

shoreline there appears a vast "upsurge bay," penetrating into the coastal tundra up to the foot of the original island upland called Khaarstan. This upland along with the bald peak Chokurdakh, lying on the shore of the V.G., are the main source of breakstone and rotted rock which after getting to the coastal zone turn into pebbles and gravel of the beaches under the influence of waves and tides. Both the uplands together with several more form the meridional zone of upheaval which stretches northward as far as Cape Svyatoy Nos and further to the Lyakhovsky Islands. They are formed by chalk deposits with impregnations of granite and are marked by metalizing process which has a big industrial importance.

## "Vaygach"

"Vaygach" – a Russian icebreaker built in 1909 in St. Petersburg on Neva Shipbuilding Plant at the same time with "Taymyr" to perform hydrographical works in the Arctic seas. A. V. Kolchak controlled the construction of the ship and subsequently was appointed as commander by supreme order. Its length is 60 m, width is 11.9 m, draft is 4.8 m, water displacement is 1,359 tons, and duty of its steam engines is 1,200 hp. Endurance at economical propulsion (7–8 knots) is 11,000 miles. The ship hull was of an egg shape which enabled it to tolerate heavy ice pressure; it had a double bottom and an ice belt. The speed in ice-free water reached 10.5 knots. The first long trip of the "V." is the passage from the Baltic Sea to the Far East waters along the southern route. From 1910 to 1915, "V." and "Taymyr" served a base from an expedition in the Arctic Ocean, which remapped almost all the coast of Russia and made a number of geographic discoveries. In 1911 "V." circles Wrangel Island for the first time. In 1913, together with "Taymyr," it discovered a big island within the Severnaya Zemlya Archipelago; in 1914–1915, for the first time in the history of the Arctic navigation, it traversed the Northern Sea Route from the east to the west (from Vladivostok to Arkhangelsk) staying for the winter in the region of Vilkitsky

Strait. "V." got crashed in 1918 having hit by a rock in the Yenisei Gulf.

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## "Vega"

"Vega" – a steam sailing ship from the polar expedition of the Norwegian explorer A. Nordenskiöld. It was the first in history to traverse the Northeastern Route (later called Northern Sea Route). It was built in Bremerhaven (Germany) in 1873 for sea fish hunting. Made of oak, the length is 42 m, width is 8.4 m, draft is 3.5 m, water displacement is 357 gross tons, and speed is 7.5 knots. It was bought by Nordenskiöld and refitted into an expedition ship in Karlskrona (Sweden). In July 1878, it left Göteborg (Sweden) and through the Yugorsky Strait entered the Kara Sea. In August it reached Cape Chelyuskin at the northern end of the Taymyr Peninsula. Later after passing through the Laptev Sea and the East Siberian Sea, it got trapped in ice at the end of September and stopped for winter a little bit more than 200 km from the Bering Strait. Only on the twentieth of July 1879 it reached the Bering Strait, thus proving the existence of a northeast passage from the Atlantic to the Pacific Ocean along the coast of Siberia. On the twenty-fourth of April 1880 the

expedition returned to Sweden through the Indian Ocean. Later the ship was used for fish hunting and sank in the ice of the Greenland Sea at the end of the nineteenth century. The Swedish Society for Anthropology and Ethnography established a medal called "V." to annually reward persons who make significant contributions to geographic explorations.

To commemorate the "V.," its name was given to a cape on Taymyr Island in the Kara Sea, the Nordenskiöld Archipelago, a cape in Vilkitsky Strait, and a strait not far from Dikson Island.

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## Vilkitsky Island

Vilkitsky Island – one of the islands within the De Long group of islands in the East Siberian Sea included into the New Siberian Islands, the Sakha Republic (Yakutia), Russia. It lies in the north-western part of the East Siberian Sea, in the north-eastern part of the New Siberian Islands, and in the southern part of the De Long Islands, of which it is the southernmost and the smallest. Closest islands are Zhokhov Island (40 km to the northwest), Bennett Island (30 km to the northwest), and Novaya Sibir' Island (74 km to the southwest). V.I. is outside the permafrost zone and is

"Vega" (Source: [https://en.wikipedia.org/wiki/SS\\_Vega\\_\(1872\)](https://en.wikipedia.org/wiki/SS_Vega_(1872)))



not covered with continuous glacier. The island is built from deeply eroded basaltic lava of Neogene and Quaternary nephelinic stream flows, as well as from alkali ultrabasic rock. It was discovered and mapped in 1913 by the participants of the Russian Imperial Hydrographic Expedition in the Arctic Ocean on icebreakers “Taymyr” and “Vaygach” under the command of the captain II rank B. A. Vilkitsky. It was named in 1914 in honor of the expedition leader’s father, the Russian hydrographer, geodesist and Arctic explorer, and lieutenant general of the Corps of Fleet Navigators, A. I. Vilkitsky, who died in 1913.

## Vilkitsky Islands

Vilkitsky Islands – a group of islands situated close to the Taymyr Peninsula in the entrance part of Terezy Klavens Gulf, Laptev Sea, Russia. The group includes the islands: Udobny, Sredniy, Krayniy, Sliyanie, and some others. The islands were partially explored in 1919 by the participants of the Norwegian Polar Expedition on the “Maud” during the winter stay near Cape Chelyuskin (former Maud) (1918–1919). The islands were named by the commander of the expedition R. Amundsen in honor of the Russian hydrographer and geodesist, the Navy officer, B. A. Vilkitsky.

## Vilkitsky Strait

Vilkitsky Strait – separates the Taymyr Peninsula, its northern end, and the Severnaya Zemlya Archipelago; it connects the Kara Sea and the Laptev Sea. The length is about 130 km and the narrowest place is 55 km wide. The depth is 200 m. The shores are predominantly high, covered by stony alluvial deposits and tundra vegetation. V.S. is one of the areas on the Northern Sea Route difficult to travel over. Continuous flows by the southern shore move eastward and by the northern shore westward (velocity is 0.1–0.2 m/s). Floating ice

can be found here throughout the year. V.S. was discovered in 1913 by the Hydrographic Expedition in the Arctic Ocean on icebreakers “Taymyr” and “Vaygach” under the command of captain II rank B. A. Vilkitsky. The strait did not have an official name up to 1916 when it was named “Tsesarevich Aleksey Strait” by Nikolay II’s order. In 1918 the strait was renamed into “Boris Vilkitsky Strait” to commemorate the Russian hydrographer. It has been called V.S. since 1954.

## Vilkitsky, Andrey Ippolitovich (1858–1913)

Vilkitsky, Andrey Ippolitovich (1858–1913) – a Russian Arctic explorer, hydrographer and geodesist, and lieutenant general. He graduated from the Marine Academy in St. Petersburg in 1880. In 1881–1886, he did some hydrographical work in the Baltic and the White Seas. In 1887, he led the first expedition in the Russian Arctic Sector which aimed at determining the gravity acceleration in Novaya Zemlya. The results brought V. 2 gold medals of the Russian Geographical Society. In 1894–1901 V. led a number of expeditions, the members of which studied the hydrographical peculiarities of the coast from the mouth of the Pechora to the Yenisei, as well as in the Yenisei Gulf and the Gulf of Ob. The expedition specified the shoreline condition, location of pack ice, and the size of fast ice belt; mapped hundreds of landmarks, shoals, cliffs, and sand ridges; and distributed dozens of navigation signs. The results of these works were published in the work “Materials on studies of the Gulf of Ob and the Yenisei Gulf, collected in 1894–1901.” V. was the author of many scientific works in geodesy and hydrography, meteorology, and oceanography. Starting from 1907 and up to the end of his life, V. was the head of the Main Hydrographical Board.

V. gave his name to the islands in the Nordenskiöld Archipelago in the Kara Sea; an island in the New Siberian Islands, the East Siberian Sea; and an island to the north of the Yavay Peninsula, the Kara Sea, and a bay and a cape in Novaya Zemlya Island, the Barents Sea.



## Vilkitsky, Boris Andreyevich (1885–1961)

Vilkitsky, Boris Andreyevich (1885–1961) – a Rear Admiral and the Arctic explorer. He is the son of the famous Arctic explorer, lieutenant general of the Hydrographic Corps, and the Director of the Main Hydrographical Board A. I. Vilkitsky. In 1903, he graduated from Sea Cadet Corps and was appointed a junior navigating officer to the squadron armor-plated ship “Tsesarevich.” He participated in the Russo-Japanese War, defended Port Arthur, and was wounded. When the fortress surrendered, he was taken captive by the Japanese. He returned to St. Petersburg only in January 1905. Excellent military service brought him a promotion to lieutenants. From 1905 to 1910, he navigated the seas in the capacity of a watch officer and senior navigating officer on various ships of the Baltic Fleet and abroad. In 1908, he graduated from the Naval Academy in St. Petersburg (Hydrographic Department) and was appointed as a first rate navigating officer. In 1912–1913, he served as a staff navigator of the headquarters of the Baltic Sea Admiralty. At the same period of time, V. participated in hydrographic and geodesic works in the Baltic Sea and in the Far East. From April 1913 to October 1915, he led the Hydrographic Expedition in the Arctic Ocean on icebreaker “Taymyr” (V. was the commander) and “Vaygach.” During the 1913 navigation, the expedition discovered and mapped an earlier unknown island which was named Zemlya Nikolay II (in USSR times, it was renamed into the Severnaya Zemlya Archipelago). Also, during the 1913 navigation, the expedition discovered and mapped Tsesarevich Aleksey Island (renamed in 1926 into Maly Taymyr Island) and Starokadomsky Island. The strait between the Taymyr Peninsula and the newly discovered land was named the Strait of Tsesarevich Aleksey (in 1918 renamed into Vilkitsky Strait). The discovery of Severnaya Zemlya Islands became the greatest geographic discovery of the twentieth century. In 1914–1915 the expedition of V. conducted the first thorough navigation from Vladivostok to Arkhangelsk with a single stay for

winter in the history of the Northern Sea Route. The participants discovered Novopashennyi Island (currently named Zhokhov Island); made numerous observations about the predominant winds, currents, thickness and melting of ice, its movements, and sea depths; described a number of capes; and defined the positions of certain points on the southern coast of Severnaya Zemlya Islands. Starting from November 1915, V. commanded the destroyer “Letun.” In 1917–1918, as a captain I rank, he served in the signal service of the Baltic Fleet. In 1918–1919, he commanded the Hydrographic Expedition of the West Siberian district of the Arctic Ocean and the Northern Expedition in the mouth of the Yenisei, mainly aimed at solving the problem of Siberian bread delivery to the European part of Russia as well as the problem of ice escorting.

In 1919, he was promoted to a Rear Admiral. Later, he refused to cooperate with the USSR because of contradictions with the Bolsheviks. In 1920, he immigrated and worked in England and France till 1922. In 1923–1924, he was invited by the Soviet Foreign Trade Organization to control bargaining transactions on the coast of the Kara Sea. V. led the Third and the Fourth Soviet Kara Expeditions laying foundation for annual exploitation of the Kara Sea route. In 1925, he returned to England, plunged into poultry farming, and later served in Belgian Congo (Zaire) as a hydrographer for several years. Then he lived in Brussels till the end of his days, where he worked as an accountant and taught Russian. He was awarded Konstantin Medal of the Russian Geographical Society (1914) and a gold medal “La Roquette” of the French Geographic Society and the “Vega” medal of the Swedish Society for Anthropology and Ethnography.

V. died not far from Brussels. In 1996, his remains were moved to Smolensky Cemetery in St. Petersburg into the family grave site of the Vilkitsky family.

The author of memoirs *When, How and Who I served Under the Bolsheviks*.

His name was given to an island in the Terezy Klavenes Gulf (the Laptev Sea, Taymyr Peninsula) and a strait connecting the Kara and the Laptev Seas.





Vilkitsky B. A. (Source: <http://ru.althistory.wikia.com/wiki/%>)

### Vize, Vladimir Yulyevich (1886–1954)

Vize, Vladimir Yulyevich (1886–1954) – a Soviet oceanologist, Arctic explorer, and associate member of the Academy of Sciences of the USSR (from 1933). His ancestors were of Swedish descent. In 1910, he graduated from the Faculty of philosophy of the University of Göttingen in Germany. In 1912–1914, he participated in the expedition of G. Y. Sedov on the ship “St. Foka” to the North Pole. In 1918, V. started working in the Main Physical Observatory where he studied oceanography and meteorology as well as sorted the materials collected by G. Y. Sedov’s expedition. In 1921–1923, he commanded the oceanographic group in an expedition on the ship “Taymyr.” The expedition mainly worked in the Kara Sea. In 1922, V. was invited to work in the Central Hydromet Bureau, but at the same time continued working in the Main Physical Observatory. In 1923, he published his work titled *On the*

*Possibility of Prediction of the Barents Sea Ice Conditions*. Starting from 1928, he worked in the Institute for North Studies. He led an expedition on the icebreaker “Malygin” which was rescuing Nobile’s expedition members. In 1929–1930, he controlled the expedition on the icebreaker “G. Sedov” aimed at establishing a scientific observatory in Franz Josef Land. In the course of this expedition in the Kara Sea, he discovered an island named after V., who predicted the existence of this island as early as in 1924 when he analyzed the consistent patterns of ice drift in G. L. Brusilov’s expedition and developed his ideas in a work titled “On Surface Currents in the Kara Sea.” In 1932, he led an expedition on the icebreaker “A. Sibiryakov,” which was the first to conduct a thorough navigation from the west to the east along the Northern Sea Route in one navigation. In 1934, the expedition led by V. on the icebreaker “Fyodor Litke” passed the Northern Sea Route in one navigation in an opposite direction, from the east to the west. In 1936–1937, V. commanded the high-latitude expedition on the icebreaker “Sadko.” He spent the years of the Great Patriotic War (1941–1945) in Krasnoyarsk where he had been evacuated with the Arctic Institute, being its director. Starting from 1945, he was a Professor of Leningrad State University and head of the Oceanography Department.

V. is the author of about 400 scientific works in oceanography, meteorology, glaciology, and history of the Arctic explorations, in which he studies the objective laws of atmospheric circulation and its role in the formation of the Arctic ice sheet and the hydrological regime of the Arctic seas. He studied the climate formation processes in the Central Arctic Basin and the impact of ice on the climate of the Northern Hemisphere. He elaborated the methods of ice forecasts and in 1928 started to forecast the ice condition in the Barents Sea and later in other seas as well. These forecasts formed a base for scientific and operational service support of the Northern Sea Route. V. played a significant role in the Northern Sea Route reclamation, and in particular, he initiated a systematic ice aerial reconnaissance. A laureate of State Prize of the USSR (1946).

Vize, V. Yu. (Source: <http://tsarselo.ru/yenciklopedija-carskogo-sela/istorija-carskogo-sela-v-licah/vize-vladimir-yulevich-1886-1954.html#.VRFj5fmsUXw>)



Among the main books are *"To Franz Josef Land"* (1930), *"Northern Sea Route"* (1940), and *On board the "Sibiryakov" and "Litke" through the Arctic Seas*. *"Two historical navigations of 1932 and 1934"* (1946) and *"Morya Sovetskoy Arktiki"* (1948).

The name of V. was given to a glacier, an island to the west of Severnaya Zemlya in the Kara Sea; a cape on Bolshevik Island, Severnaya Zemlya, the Kara Sea; two bays in Novaya Zemlya Island (in Rusanov Bay and in Blagopoluchiya Bay); a cape in the north of Brady Island and a glacier on Greely Island in the Franz Josef Land Archipelago, the Barents Sea; and a cape on Severny Island in Novaya Zemlya. A research ship of the Arctic and Antarctic Research Institute "Professor Vize" is named after him as well.

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### "Vladimir Rusanov"

"Vladimir Rusanov" – (formerly named "Bonaventure") an icebreaker built on the "Napier and Miller" wharf in Glasgow, England. The length is 73.2 m, width is 10.9 m, hull height is 5.8 m, and speed is 14 knots. It was bought in 1915 for the White Sea navigation. "V.R." was used for scientific exploration of the Russian Arctic Seas. In 1932 the expedition in the Kara Sea on board the "V.R." discovered the Izvestiy TSIK Islands and navigated to Rudolf Island (Franz Josef Land). In 1935 "V.R." passed from Arkhangelsk to the

mouth of the Indigirka and back in one navigation. In 1936 I. D. Papanin brought equipment and provision for the polar station "Severny Polyus" and fuel for the air expedition to Franz Josef Land on board the "V.R." It escorted ships in different areas of the Northern Sea route for many times. In 1939 the "V.R." was laid up for repairs to the boatyard "Krasnaya Kuznitsa" in Arkhangelsk, but the ship was not used anymore, was removed from the list of Navy ships in 1950 and was decommissioned in 1956. It was named after the Arctic explorer V. A. Rusanov.

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### Vollosovich, Konstantin Adamovich (1869–1919)

Vollosovich, Konstantin Adamovich (1869–1919) – an exiled Belorussian geologist, to East Siberia, and Arctic explorer. In 1900s, he was exiled to East Siberia for political activities and was accepted into the members of the Russian Polar Expedition of E. Toll (1900–1902) as a geologist. He described some of the New Siberian Islands leading a separate expedition group. In 1901, he was preparing on the islands some safeguard provision warehouses for the expedition. In 1903, he participated in the expedition of A. V. Kolchak, which aimed at searching for E. V. Toll and his companions who had gone missing. In 1908, following the order of the Academy of Sciences in exploring the central part of

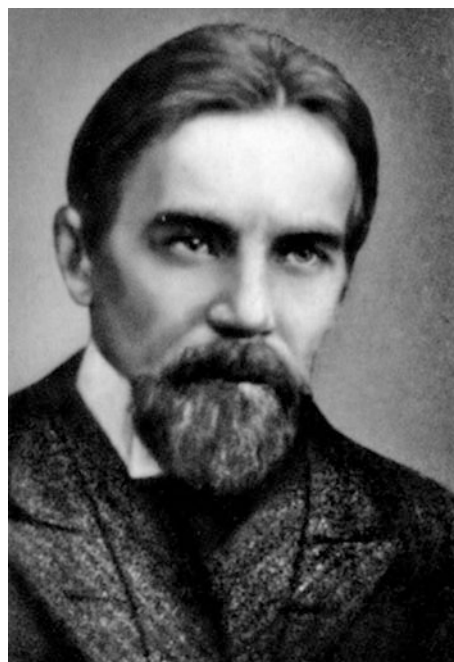


“Vladimir Rusanov” (Source: [https://ru.wikipedia.org/wiki/%D0%A4%D0%B0%D0%B9%D0%BB:Vladimir\\_rusanov\\_icebreaker.jpg](https://ru.wikipedia.org/wiki/%D0%A4%D0%B0%D0%B9%D0%BB:Vladimir_rusanov_icebreaker.jpg))

Yana-Indigirka Lowland, found and transported for studies are the remains of a mammoth from the Sanga-Yuryakh River (lower reaches of the Yana by Cape Svyatoy Nos). In 1909, he commanded the Lena-Kolyma Expedition which helped to map a part of the coast between the Lena Delta and the mouth of the Alazeya (almost 1,400 km long). On Bolshoy Lyakhovsky, V. excavated and arranged the transportation of well-preserved remains of a mammoth body. He died in times of the Civil War in Russia in a train accident.

### Voronin, Vladimir Ivanovich (1890–1952)

Voronin, Vladimir Ivanovich (1890–1952) – a captain of the Soviet icebreaker fleet, polar explorer, and participant of many Soviet expeditions in the Arctic. In 1916, he graduated from the Maritime Academy in Arkhangelsk. He navigated as a navigating officer on several ships transporting cargoes in the Arctic Basin. In 1918, he became a sea captain of the icebreaker fleet. In 1926, he commanded the icebreaker “G. Sedov” and participated in the Kara Sea Expeditions as well as animal hunting campaigns in the White Sea. In 1928, he took part in the Italian expedition of U. Nobile on the airship “Italia”



Vollosovich, K. A. (Source: <http://www.yakutskhistory.net>)

which was involved in an accident over the Arctic Ocean. In 1932, the icebreaker “Sibiryakov” under the command of V. became the first ship in history to pass through the Northern Sea Route in one navigation. V. commanded the steamer-ship “Chelyuskin” during its legendary expedition and wreck in 1933–1934. He was the captain of the



Voronin, V. I. (Source: <http://pro-cto-bg.livejournal.com/12629.html>)

icebreaker “Ermak” in 1934–1938. In times of the Great Patriotic War (1941–1945), he commanded the icebreaker “Joseph Stalin.” In 1946–1947, he was the captain and director of the Antarctic Fleet of Whalers “Slava” and then of the icebreaker “Joseph Stalin” again.

V. gave his name to an island and a channel in the Kara Sea, which was discovered in 1930 during the expedition on the “G. Sedov,” a cape on Novaya Zemlya Islands, as well as the Maritime Academy of the Order of the Red Banner of Labor in Arkhangelsk.

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### **Vostochno-Taymyrskoe (East Taymyr) Current**

Vostochno-Taymyrskoe (East Taymyr) Current – a current in the Laptev Sea which moves along the eastern shores of the Severnaya Zemlya Archipelago and the Taymyr Peninsula to the south and completes general cyclone circulation in the sea. The speed of currents in this circulation is about 2 cm/s, but they may accelerate under the influence of local winds and tides as well as due to the shift in pressure air system over the sea.

## Walrus (*Odobenus rosmarus*)

Walrus (*Odobenus rosmarus*) – the only member of the Odobenidae family and *Odobenus* genus; it is the largest representative of pinnipeds in the Northern Hemisphere. The body length is up to 4.5 m, and the weight is up to 1.5 t. Females are smaller than males. They have teretial torso and rounded head and are small and flattened in front; on the upper lip, there are several rows of tough “moustaches” – whiskers. From the upper jaw, in the corners of the mouth, there are hanging canines (tusks) up to 80 cm in length present in males and 70 cm in females weighing up to 4 kg each. Fins are fleshy and movable. The tail is short and like a barely noticeable skin outgrowth. The skin is thick and wrinkled, in males at the neck, and the chest is covered with bumps and scars. The coat is short, missing in the old W. Painting of adult animals is dull and yellowish red and of young species is brighter, and the belly and bottom limbs are covered with red-orange fur. W. is common in the Arctic seas, where it is subdivided into three independent subspecies – Atlantic, Pacific, and Laptev walruses. Laptev W. (*O. r. laptevi*) lives in the Laptev and the East Siberian Seas. Coastal rookeries are located at the coastal islands and spits of Eastern Taymyr; on the islands of Peschanyi, Preobrazheniya, Big Begichev, Belkovsky, Kotelnyi, and Vikitskiy; in the Lena Delta on the islands of Cuba and Danube; and on the New Siberian Islands. Walruses mainly inhabit shallow waters of the seas. By land or

ice, they move awkwardly. When sailing, W. rows by both rear and front legs. It can dive to depths of 70–80 m and remain submerged for 20 min. W. sleeps in water in both the horizontal and vertical position. It spends a lot of time on ice or land. In some coastal areas from year to year, W. tends to form rookeries, sometimes massive. W. feeds predominantly on mollusks, which it forages on the seabed, plowing it by tusks. “Predator walruses” are rarely met (*kelyuch* in the Chukchi language); they attack seals and are dangerous to humans. In March–April, on ice or shore, females give birth to babies (approx. 1 m long and weighing approx. 40 kg). At the same time, walruses mate and molt.

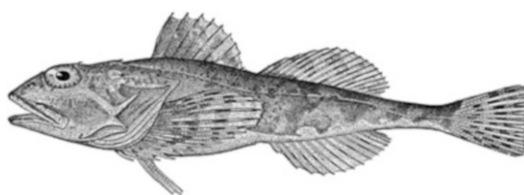
W. is a valuable commercial animal, which has long been hunted for meat and fat; skins were used for the construction of houses and boats, and the tusks or so-called fish teeth were used to produce various jewelry and art items. The aboriginals of the North widely used for their domestic needs other parts of the W. carcass as well as the stomach and intestine, tendons, and bones. In the life of Eskimos and Chukchi, the walrus hunting played a particularly important role; in their languages, there are multiple names for different age and sex categories of W. In the European North, dwellers of the Russian northern areas were engaged in W. hunting. In the past, local population predominantly hunted for W. on coastal rookeries. Hunters often shoot them in the water, from the board of a ship or boat, with some of those killed



Walrus (Source: <https://en.wikipedia.org/wiki/Walrus>)



or injured animals drowning. In the eighteenth to nineteenth centuries, W. populations, especially the Atlantic and Pacific species, were heavily reduced due to their mass killing by European and American hunters. Hunting prohibitions and restrictions, as well as other protective measures, have led in recent decades to increase in their numbers. In Russia, W. hunting is allowed only for the local population of Yakutia and Chukotka. The population of Atlantic and Laptev W. does not exceed (for each subspecies) several 1,000 animals. Both subspecies are listed in the Red Book of the Russian Federation.



Warty Sculpin (Source: [https://en.wikipedia.org/wiki/Myoxocephalus\\_verrucosus](https://en.wikipedia.org/wiki/Myoxocephalus_verrucosus))

spawns in late autumn. It feeds on fish and large shellfish. It has no commercial significance.

### **Warty Sculpin (*Myoxocephalus verrucosus*)**

Warty Sculpin (*Myoxocephalus verrucosus*) – a sluggish bottom fish in the family of sculpins, Cottidae. The fish is olive brown. The belly of males is bright, brown and orange with large milk-white blotches. The fins have dark rays and spots. The females are less bright. The body above lateral line is covered with bone echinulated round plaques. Postorbital and occipital protuberances on the head are well defined. Maximum size of W. S. is 54 cm. Standard length is up to 26 cm for males and up to 35 cm for females. It dwells in the littoral as deep as 15–20 m. W. S. can tolerate temperature and salinity excursions. The fish

### **Whitefish (*Coregonus cylindraceus*)**

Whitefish (*Coregonus cylindraceus*) – a fish of Coregonidae family. The body is plump, cylindrical in cross section. The head is elongated. The upper jaw protrudes over the lower. There are dark round spots on the head. Young fishes have spots in the body as well. The length is 28–85 cm; the weight is 400 g, maximum 700 g. The age of sexual maturity is 5–8 years old. The spawning comes every year, in October–November, and happens in rush current. The average fertility is 14,000 eggs. It feeds on insect larva. It spreads in the rivers of Siberia from the Yenisei to the Kolyma, the Anadyr, and the Penzhina. The economic significance is not very big.

## Wisting, Oscar Adolf (1871–1936)

Wisting, Oscar Adolf (1871–1936) – a Norwegian polar explorer, R. Amundsen's companion in expeditions to the South Pole and along the North-east Passage. He was the first person (together with Amundsen) to reach both the geographical poles of the Earth. Till 1909 he served as a naval gunner in the Norwegian Navy. In 1909 he asked R. Amundsen to take him to an expedition to the North Pole, but Amundsen changed his plan and decided to reach the South Pole first. In 1918–1925, W. participated in the navigation through the Northeast Passage on the "Maud," on which he served as a doctor and treated Amundsen when he broke his arm. W. was one of R. Amundsen's best friends and a time-tried companion. He stayed by his side through the worst moments in 1924 when everything seemed

to be turning against Amundsen. As a sign of gratitude, Amundsen offered W. to participate in his transatlantic flight together with Lincoln Ellsworth, so that he could share the glory of the first person who had a chance to find himself on both the poles in his lifetime. On the airship "Norge," W. was controlling the altitude. Later in 1930, W. published the first book *16 år med Roald Amundsen (16 years with Roald Amundsen)*. In 1936, W. was offered a place of director of the "Fram" Museum. W. agreed and stood on board the "Fram" when it was installed, controlling the construction process. Gennadiy Fish describes this as follows: "When the ship bid farewell to the salty wave and was put on the reinforced concrete rest, the old polar explorer's heart could not bear it. . . Oscar Wisting died of heart failure on board the ship he loved. . ."

A mountain in the Antarctic was named after Wisting.



Wisting O.A. (Source: <http://sorpolen2011.npolar.no/en/did-you-know/2011-11-19-oscar-wisting-was-the-seamstress-of-the-south-pole-expedition.html>)

## "World Ocean": The Federal Target Program (FTP)

"World Ocean": The Federal Target Program (FTP) – a scientific and technical program aimed at a comprehensive solution to the problem of study, development, and effective use of resources and spaces of the World Ocean. The program is approved by the Government of the Russian Federation on August 10, 1998. In order to achieve this goal, it is necessary to ensure the formation of a unified, well-coordinated state policy aimed at consolidating the national and international interests of Russia in terms of the use of the World Ocean and integrating approaches of stakeholders in the field of development of maritime activities of the country. This policy based on the concentration of efforts of the state in key areas of maritime activities should boost Russia's activity in the World Ocean in accordance with the goals and objectives of the country's development and to orient the objects of maritime activities to final practical results in the short term. The program includes ten subprograms, one of which is the development and use of the Arctic.

## Wrangel Island

Wrangel Island – lies in the Arctic Ocean on the border between the East Siberian Sea and the Chukchi Sea on either side of meridian 180, Chukotka Autonomous District, Russia. It is separated from the mainland by the De Long Strait. In form it resembles a broadly elongated oval and is surrounded by an ice reef. The area is 7,500 km<sup>2</sup>. The maximum length from Cape Blossom (the East Siberian Sea) to Cape Waring (the Chukchi Sea) comprises 146 km, and the width is 80 km. In the center of the island, there are mountain ranges up to 1,100 m high. Geologists identify a large diversity of rocks, forming it, but the prevailing are metamorphized sediment rocks. Half of the island surface has a mountain relief. In its base there lie two ranges coinciding with the abovementioned latitudinal anticlines. In the east both the ranges get significantly lower and turn into a plateau. The mountain slopes are heavily cut by the valleys of the rivers (the Nasha, the Khishchnikov, etc.). Everywhere there are different glacier relief forms proving that formerly the whole island was covered with ice. Today about a dozen small cirque glaciers still exist here, and one of them in the western part of the island goes down right to the sea.

The mountainous part of the island is almost surrounded by a piedmont plain, mostly of fluvioglacial and alluvial origin. In the north and the south, there are lowlands. In the north, Tundra Akademii and Yuzhnaya Tundra belong to these lowlands.

In the mountains there are about ten small glaciers that give rise to more than 1,400 rivers and streams with the total length of about 4,000 km. Five of the rivers are more than 50 km long. There are about 900 lakes that are no more than 2 m deep. The climate is Arctic; January temperatures are –21 °C to –24 °C, and July temperatures range from 2 °C to 2.5 °C. There are often heavy winds like bora and foehn. The Arctic tundra is presented by mosses, lichen, and many tracheophytes. Not far from the W. I., there is a branch of Ayonskiy Ocean ice massif.

The shores are different in the northern, southern, western, and eastern parts. The northern shore is low, fringed by a large sand and shingle spit bar, which is an island bar along most of its length. To the south of the bar, there is a narrow lagoon connected to the sea by several straits. The southern shore is marked by alternation of low accretion areas and bedrock exposure. This shore can be considered abrasive and accretion bay type. On the western and eastern ends of the island, prequaternary rocks approach the sea directly and create steep cliffs in the Chukchi Sea.

The flora is presented by lichenous tundra. There are also polygonal tundras here.

The fauna is presented by lemming, polar fox, white owls, many polar bears, and Pacific Ocean walrus rookery (the biggest in the world – about 75,000 animals). It is the only breeding colony of white geese in Asia. In the bay there live ringed seals, belugas, and bearded seals. There are many birds here. In 1975 musk buffalos were naturalized here. Their population in 2013 amounted to 800 animals.

The island was first mapped by a Russian explorer Ivan L'vov (before 1707). On M. V. Lomonosov's map, it had a name "Somnitelnyi Island" ("Island of Doubt"). A more precise geographical definition of the island was suggested by Russian expeditions of G. Sarychev (1787) and F. Wrangel and F. Matyushkin (1820–1824). In 1849 it was noticed by Captain H. Kellett on the ship "Herald." It was discovered in 1867 by the American whale hunter T. Long, the captain of the whale hunting ship "Nile," who named it after F. P. Wrangel. In 1881 the first men from the American revenue vessel "Thomas Corvine" stepped on the W. I.; its captain Hooper named it "New Columbia," planting an American flag into its ground, and the American natural historian John Muir made its first description. In the same year, the expedition of the whale hunting vessel "Rogers" mapped the island. In 1911 the hydrographical expedition in the Arctic Ocean under the command of I. S. Sergeev, which landed from the ship "Vaygach," planted the Russian flag to the W. I. ground. In 1913 the crew of the Canadian brigantine "Karluk" which had been



Wrangel Island (Source: [https://en.wikipedia.org/wiki/Wrangel\\_Island](https://en.wikipedia.org/wiki/Wrangel_Island))

trapped in ice went 130 km across the ice and came to the island after which they lived there for 8 months waiting for help. During this time, 11 of the 25 members of the crew died. In 1921 a Canadian expedition planted its flag over the island and tried to colonize it, but this attempt was not successful. In 1924 the battle boat “Krasny Oktyabr” (Captain B. V. Davydov) reached the island. The expedition banished from the island the American colonists who had been staying on the island illegally. The state flag was planted here, the USSR’s right for the island resumed, and a settlement founded. In 1924–1925 there was a suggestion to name the island “Krasny Oktyabr Island” or “Davydov Island.” The decree of the All-Russian Central Executive Committee of January 11, 1926, authorized the former name of the island. In 1926 the Rogers Bay saw the foundation of a polar station with G. A. Ushakov appointed as its head. The first Chukchi people were brought here. At present there are two phantom settlements exist here from the Soviet times – Ushakovskoe and Zvezdnyi (desolate). In 1976 the island territory was announced a state natural preserve, a specially protected natural territory. This is the main breeding ground of polar bears which are safe here. The island is the leader in the world in the number of polar bear lairs. According to paleontologists, W. I. was the last dwelling place of wool-bearing mammoths up to the eighteenth century that is 6,000 years after the mammoths were extinct in all the other places in the world. Mammoth tusks cover all the island like piles of rusty casks.

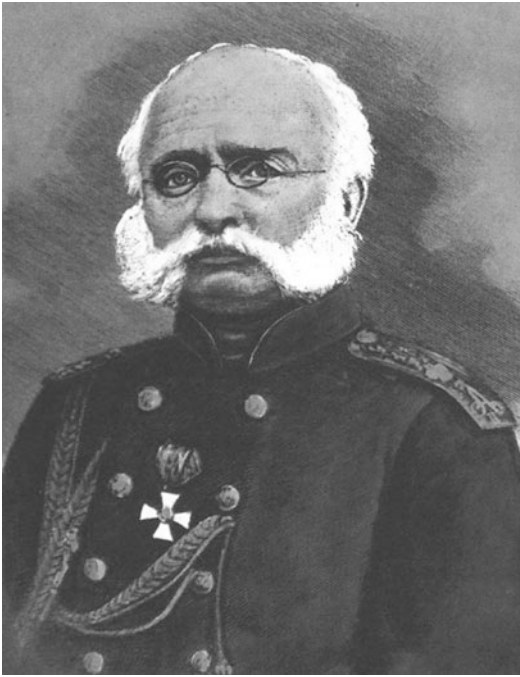
### “Wrangel Island”: The Federal Nature Reserve

“Wrangel Island”: the Federal Nature Reserve – a state nature reserve on the eponymous island and Herald Island in the Magadan Region, Chukotka Autonomous Okrug, Russia. W. I. is the northernmost of all the Far East reserves. It was established by the Council of Ministers of the RSFSR in 1976 to preserve and study the typical and unique ecosystems of the offshore part of the Arctic, as well as the unique place of concentration of such species as polar bears (“main maternity hospital,” ancestral polar bear dens), walruses, northern deer, and Russia’s only breeding population of white goose. The area of the buffer zone is 795,700 ha. The total area is 2.2 million ha, including the water area of 1.4 million ha. Among the protected species, there are 17 animals, 148 birds, and 438 vascular plants. Arctic tundra and coastal landscapes prevail. In the reserve, the population of musk ox brought from the United States has been reacclimatized since 1975.

### Wrangel, Ferdinand Petrovich (1796–1879)

Wrangel, Ferdinand Petrovich (1796–1879) – a baron, admiral (1856), and adjutant general (1856) in charge of the Admiralty, a director of





Wrangel F.P. (Source: <http://www.zapoved.net/index.php/component/content/article/97/92-2009-11-19-19-59-41>)

the Hydrographical Department, a circumnavigator, the Arctic explorer, an honorary member of the Academy of Sciences in St. Petersburg and Paris, and one of the founders of the Russian Geographical Society. In 1815 he graduated from the Sea Cadet Corps. He served in the Baltic Fleet. In 1817–1819 as a midshipman on the sloop “Kamchatka,” he participated in the circumnavigation of V. M. Golovnin through Petropavlovsk and the Russian America. In 1820–1824 as a lieutenant, he commanded the Kolyma group of the expedition for exploration of Northeast Siberia. He found out that to the north of the Kolyma River and Cape Shelagskiy, there is an open sea; he described the coast of Siberia from the Indigirka River to Kolyuchinskaya Guba, mapped the Medvezhiy Islands and Ayon Island, and identified 115 astronomical field stations. In search of the land the Chukchi had been speaking about, he conducted several ice passages (up to 170 miles) from the shore to the north and northeast from the

Medvezhiy Islands, but discovered nothing. The members of the expedition conducted important hydrographical, geomagnetic, meteorological, and ethnographical studies, made the first scientific descriptions of polar ice, and based on the Chukchi tales mapped an island which was later named after W. In 1825–1827 commanding the sloop “Krotkiy,” he circumnavigated the world for the second time through Kamchatka and the Russian America. In this expedition, he was the first to measure the surface temperature of the water twice a day and write the results into a special journal. In 1827 St. Petersburg Academy of Sciences elected him their Corresponding member. In 1829–1835 he was the main administrator of the Russian settlements in America in the rank of Captain I. He struggled against cruel and unreasonable hunting for game animals and founded a magnetic and meteorological observatory in Novoarkhangelsk (now named Sitka). While ruling the Russian America, he explored its shores from the Bering Strait to California, collected many geographic and ethnographic materials, and build Redoubt St. Michael. On his way back from Novoarkhangelsk to the motherland, he reached the shore of Mexico on the sloop “Sitka,” crossed Mexico by land, traveled by sea to New York and across the Atlantic Ocean and the Baltic Sea, and arrived to St. Petersburg, thus finishing his third circumnavigation. In 1837 he was elected a Corresponding member of the Royal Geographical Society in London. In 1840–1847 he was the President of the Russian-American Company. In 1842 he was awarded the Demidov reward for his work. In 1845 he became one of the founders of the Russian Geographical Society and the first chairman of General Geography Department. In 1847 he was promoted to vice admiral and appointed the director of the Ship Timber Department. In 1849 he resigned, but in 1854 he started his service once again and became the director of the Hydrographical Department. A year later, he was appointed the chairman of the Marine Scientific Committee and the inspector of the Baltic Sea navigators. In December 1855, he was elected an Honorary member of St. Petersburg Academy of Sciences.



In 1855–1857 he was in charge of the Ministry of the Navy of Russia, and in 1857 he became a member of the State Board. In 1864 he left the service for good in the rank of an admiral (1856).

His main literary works are “A Trip Along the Northern Shores of Siberia and the Arctic Sea. . .” (1841), “Day Notes of the ‘Krotkiy’ war transport in 1825, 1826 and 1827. . .” (1828), “A Record of the Trip from Sitka to Petersburg” (1836), and

“A Historical Review of the Trips around the Arctic Ocean” (1836).

W. gave his name to islands in the Chukchi and the Barents Seas, a bay and a cape in the Bering Sea, a cape in the Okhotsk and the Kara Sea, a mountain, a strait, a harbor and an island in the Alexander Archipelago (North American Coast), mountains in the Gulf of Alaska, and mountains and a bay in the Aleutian Islands (USA).

## Yakan

Yakan – a cape on the Arctic coast of the Chukchi Sea, 140 km northwest of the village Cape Schmidt, the Republic of Sakha (Yakutia), Russia. The border between the East Siberian Sea and the Chukchi Sea goes along Yakan Cape. It is a rocky steep cliff 40–50 m in height. Yakan Cape is home to a rookery of seabirds – the kittiwake (1,000–8,000 couples), the glaucous gull (40,000 couples), and the guillemot (15,000–20,000 couples). The peregrine was also noticed within the rookery area at nesting.

## Yakut Char (*Salvelinus jacuticus*)

Yakut Char (*Salvelinus jacuticus*) – an endemic form of the lakes in the region of Neelova Gulf (the Lena Delta). The length rarely reaches 35–40 cm and the weight 450 g; usually they are 30 cm and 100 g, respectively. There possibly are two forms, the large and the small one. The body is dark with tiny (less than a diameter of an eye pupil) round pink or orange spots. The fins are red; there are transverse stripes on the sides. The maturity starts at the age of 6–8 years old. Spawning period is in August–September. The fish feeds on maggots of chironomids and flying insects. It is not important for trade and industry.

## Yakutia, The Republic of Sakha

Yakutia, The Republic of Sakha – a territorial entity of the Russian Federation within the Far Eastern Federal District. The area is 3,103,000 km<sup>2</sup> ( $\frac{1}{5}$  of Russia and  $\frac{1}{3}$  of Europe) (33 administrative regions, 13 cities, 57 worker settlements, and 354 village administrative offices). It adjoins seven territorial entities of the RF. The population is about one million (the urban population is 65 %). The population density is 0.3 people per 1 km<sup>2</sup>. The largest cities are as follows: the capital is the city of Yakutsk which was founded in 1633 (208,500), the city of Neryungri (78,000), the city of Mirny (38,000), the city of Lensk (30,000), and the city of Aldan (24,600). Formerly, the entity was a part of the Yakut region in 1922 – the Yakut ASSR (Autonomous Soviet Socialist Republic) within the RSFSR. In line with the formation of the Chukchi and the Evenki national districts in 1930, part of the YASSR was handed over to the formations. In 1990, the Republic announced its sovereignty. Since 1992, the Republic of Sakha (Yakutia) is a territorial entity of the RF. In 2000, it became a part of the Far Eastern Federal District.

The area is located in the northeast of Asia, the northern part of Eastern Siberia, in the basin of the Lena, the Yana, and the Indigirka rivers and in the lower reach of the Kolyma River. The Republic includes a number of the Arctic Ocean islands, such as the New Siberian Islands. Over 40 % of

Yakutia, the Republic of Sakha-Yakutia (Source: [http://en.wikipedia.org/wiki/Sakha\\_Republic](http://en.wikipedia.org/wiki/Sakha_Republic))



the Republic's territory is within the Polar Circle. Yakutia is the most seaside republic of Russia. In the north, it is bounded by the Laptev Sea and the East Siberian Sea along over 4,000 km of its coastline. The sea area that adjoins Yakutia adds up to over 36 % of all Russian Arctic seas. The total coastline length of the Republic is 10,280 km.

It is mostly occupied by mountain chains (the Verkhoyansk Range, the Stanovoy Range, and the Chersky Range; Peak Pobeda (3,147 m) is the fourth highest peak in the RF) and highlands (the Central Siberian, the Yana, and the Oymyakon plateaus). The Central Yakut Plain is located in the middle flow of the Lena River; the Yana–Indigirka and the Kolyma lowlands are in the north. There are 700,000 rivers in the Republic with the total length of about two million km. The Lena River with its tributaries the Aldan, the Vilyui and the Olekma, the Yana, the Indigirka, and the Kolyma is the main water artery. There are over 800,000 lakes with the water surface area of over 1 ha each.

The climate is that of a severe seasonal inland type; the air temperature ranges for over 100 °C (from +40 °C in summer down to –60 °C in winter). The Pole of Cold in the Northern Hemisphere is located here in the place called Oymyakon with the absolute temperature minimum recorded as low as –71.2 °C. In January, the average temperature is –37.1 °C and in July – +16.6 °C. The annual rainfall is 200–700 mm.

The taiga area (in the north and in the mountains) occupies 72 % of Yakutia; the rest is covered with tundra, forest tundra, and the Arctic desert. The Republic is largely located in the continuous permafrost area. The soil is mostly of the cryosolic–taiga type. Forests cover about 47 %. Natural reserves include the Lena Delta Wildlife Reserve, 1.4 million ha (since 1985), and the Olekminskiy Wildlife Reserve, 847,100 ha (since 1984).

Yakutia is abundant in diamonds, gold, tin, tungsten, mercury, polymetallic and iron ores, soft coal and lignite, natural gas, and oil.

The Republic is rich in natural resources. In terms of coal deposits, it is the third richest in the RF after the Kemerovo region and Krasnoyarsk Kray. The Lena coal basin is the richest in the world: lignite is extracted in Kangalasskiy and soft coal in Sangar, Dzhebariki-Khaya, Zyrianskiy (reserved nowadays), and southern Yakut (Neryungri) coal basins. Lignite is developed in Kirovskoe as well. Natural gas deposits are extracted in Talon-Mastakhskoe and Srednevi-lyuiskoye gas fields and oil in Ust-Viljujskiy oil field. Power stations include HPP Viljujskiy, TPP Chulmanskaya, Yakut, and Neryungri. Oil extraction industry in Yakutia is very important. Due to the construction of the key oil pipeline “Eastern Siberia–Pacific Ocean,” full-scale oil extraction in Talakanskoe oil field became feasible. In the near future, Gazprom is supposed to commence the development of Chayanguinskiy oil and gas field followed by the construction of the gas pipeline “Yakutia–Khabarovsk.”

Yakutia is rich in forests and the second richest in the RF in timber after Krasnoyarsk Kray. Yakutia is involved in the production and conditioning of commercial timber (1/10 in the RF) and lumber board.

Iron ore deposits (the Aldan Basin) can be found in Tazhnoe and others (not developed at present). Deposits and development of columbium-containing ores (the largest in the world) are in Tomtorskoe; gold (1/4 in the RF) in Nezhdaninskoe, Kuranakh, and Sarylakh; tin in Ese-Khaya; and Deputatsky has deposits of mercury and uranium ores. Apatite deposits and development are in Aldan, common salt is in Kempendyay, and mica deposits are in Tommot.

The city of Mirny is the monopolist in diamond mining as it has the only mining in the Northern Hemisphere.

Yakutsk has ship repairs and furniture-manufacturing facilities.

Leading industries are mining, forestry, and fishery. Electric power engineering and fuel (coal) industries are well developed.

Agriculture in the Republic specializes in fur, beef, dairy, and potato–vegetable sectors; agricultural areas occupy 0.6 % of the region. Crops (wheat, barley, and oat) are sowed locally. Deer

farming and horse herd farming (the Yakut horse) are widely developed in the north of Yakutia. Hunting, fur trapping, and fishing are developed in northern areas, as well as cage feeding. Water bodies are rich in fish and home to about 90 valued species.

Railways include the Baikal–Amur Mainline (Bamovskaya–Tynda–Berkakit–Neryungri), the “Little BAM” (Berkakit–Tynda–BAM), the Amur–Yakutsk Mainline (connected to the Baikal–Amur Mainline by the Tynda–Berkakit branch line), and the Amur–Yakutsk Highway (Bolshoy Never–Tommot–Yakutsk) which connects Yakutia to the Trans-Siberian Railway. The Berkakit–Tommot–Yakutsk Mainline and the Ulak–Elga branch line leading to the Elga coking coal deposit are presently under construction. The Yakutsk–Magadan road is called the Kolyma Highway. Shipping lanes include the Northern Sea Route, the Lena River, and its tributaries. Ports include the Northern Sea Route port of Tiksi and the Aldan River port of Khandyga. The Taas–Tumus–Yakutsk–Pokrovsk gas pipeline. A major International Cooperation Research Station is already in operation on Samoilovski Island.

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## Yakuts

Yakuts (self-name: Sakha) – a Turkic people, the indigenous population of the Sakha (Yakutia) Republic. There are 478,100 Yakuts residing in Russia, primarily in the Republic of Yakutia (480,000), as well as in the Irkutsk, Magadan, Khabarovsk, and Krasnoyarsk regions. The Yakuts constitute the ethnic majority (49.9 %) of the Sakha (Yakutia) Republic. The second largest ethnic group (37.8 %) is Russians.

Between the eighth and the twelfth centuries, there are believed to have been several waves of migration of the Yakuts from the Lake Baikal area to the basins of the middle Lena, the Aldan, and Vilyuy rivers where the Yakuts partially mixed with and partially ousted other northern indigenous peoples of Russia such as the Evenks and the Yukagirs.



Yakuts (Source: <https://en.wikipedia.org/wiki/Yakuts>)

The traditional occupation of the Yakuts is cattle farming, with their unique practice of breeding cows and horses in the harsh continental climate conditions of high latitudes. The Yakuts have also been involved in fishing, hunting, trade, smithcraft, and military arts.

According to the local legends, the ancestors of the modern Yakuts had been floating down the Lena River with their households and families until they discovered the Tuimaada Valley suitable for breeding cattle. That is where the modern city of Yakutsk is now located. The Yakuts were believed to have been headed by the two people's heroes: Eles Bootur and Omogoi Baai.

Archaeological and ethnographic findings show that the present Yakut ethnicity was shaped as southern Turkic language-speaking settlers assimilated with the tribes residing in the middle Lena area. The last of such migration waves is believed to have occurred between the fourteenth and fifteenth centuries. In terms of their ethnic

affiliation, the Yakuts belong to the Central Asian anthropological type of the South Asian ethnic group. Unlike other Turkic language-speaking peoples of Siberia, they have more pronounced Mongoloid features which had been shaped toward the end of the second millennium already in the Lena River area.

Some ethnic groups of Yakuts (e.g., the reindeer breeders of the northwest) are believed to have been shaped recently as the Evenks mixed with the Yakuts from the central regions of Yakutia.

In the course of their migration to Eastern Siberia, the Yakuts have populated the basins of the Anabar, the Olenyok, the Yana, the Indigirka, and the Kolyma rivers. The Yakuts have modified the Tungus reindeer breeding practices by creating the Tungus–Yakut type of transport reindeer breeding.

The inclusion of the Yakuts into the Russian Empire in 1620–1630s has facilitated their socio-economic development. Between the seventeenth and the nineteenth centuries, the main activity of the Yakuts was cattle farming (breeding cows, horses, and reindeer) with hunting and fishing playing the secondary role. Starting from the second half of the nineteenth century, agricultural farming began to gain prominence for the Yakut economy. In winter, the Yakuts lived in log houses called *balagans* (half dwellings and half barns), and in summer, they moved to the *urasa* made from slender timber pole frame covered in birch bark. The clothing was traditionally made of animal hides and fur. In the second half of the eighteenth century, most of the Yakuts were converted to Christianity, though their traditional shamanism is still practiced.

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## Yana Bay

Yana Bay – a vast Laptev Sea bay located between Cape Buor-Khaya on its western side and the Ebelyakh Bay at its eastern end, the Republic of Sakha (Yakutia), Russia. The south shore of the bay is formed by the coastal part of the Yana River



delta. The width of the bay is 176 km. The bay is named after the Yana River which empties into it. There are several islands in the Yana Bay. The largest of them is Yarok Island. Other islands in the Yana Bay are the island of Makar and the Shelonsky Islands. East of these islands lies a deep inlet known in Russian as Shellyakhskaya Guba. Besides the Yana River which empties into the western part of the Yana Bay, smaller rivers of Chenedan and the Tomsk–Yurga River outflow into to the Bay in the east and in its central part. The Tomsk–Yurga River runs through the marshy coastal area.

The Yana Bay freezing lasts for about 9 months a year. In 1712, Yakov Permyakov and his companion Merkuriy Vagin, the first recorded Russian explorers of the area, crossed the Yana Bay on dogsled from the mouth of the Yana River to Bolshoy Lyakhovsky in order to explore the then unknown island. Unfortunately, Permyakov and Vagin were killed on the way back. In 1892–1894, Baron Eduard von Toll, accompanied by expedition leader Alexander von Bunge, carried out geological surveys in the area on behalf of the Russian Imperial Academy of Sciences.

## Yana River Mouth

Yana River Mouth – has the area of about 6,600 km<sup>2</sup>. Its top lies in the place where a small-arm samogon shoots off at the distance of 140 m from the estuarial range of the main arm – Glavnoe Ruslo (meaning “Main Riverbed”). Seventeen kilometers up the top, there is an outlet of the Yana – a polar station Yubileynaya. The river mouth is limited from the west and the south by 30–60 m drops of yedoma and from the east by the Kargin terrace. The mouth is a vast waterlogged zone. Tundra landscapes are typical of the Yana mouth. The ancient marine terrace and the high deltaic alluvial plain possess polygonal ridge microrelief so characteristic of the tundra. The layer of seasonal deforestation is 0.6–0.8 m. The delta is cut by two major and many minor arms. The marine edge of the

mouth is fringed by an offshore bar which is overlaid in the arm mouths. In the mouths of both the major arms, there form stream-mouth bars cut by channels. Permafrost is widespread, not only at the mouth but in the seashore near the mouth as well.

The delta is formed mainly by marginal marine deposits forming series of offshore bars; river sediments are only spread in relatively narrow stripes along the arms. On the mouth surface, there are numerous thermokarst lakes which form due to ice melt outs in the estuary permafrost. Negative and positive water surges play a significant role in the YRE formation. Wind foreshores are developing all around the estuary.

## Yana River

Yana River – a river in the Republic of Sakha (Yakutia). The river begins at the confluence of the Sartang and the Dulgalakh rivers which rise in the Verkhoiansk Range. The Yana River is 872 km long. Its drainage basin covers 238,000 km<sup>2</sup>. Below the confluence point, the Yana River flows along a wide valley which becomes narrower as the river (with rapids in the main course) crosses the Kular Ridge and further flows along the Yana–Indigirka lowland. The Yana River flows into the Yana Bay of the Laptev Sea, forming a huge river delta (6,600 km<sup>2</sup>) that takes up much of the bay’s coastline. The river delta presents itself lowland marshy tundra intersected by tributaries of various sizes. The principal tributaries are Adycha (right) and Bytantay (left). The annual discharge of the Yana River totals approximately 27–32 km<sup>3</sup>. It is unevenly distributed throughout the year. The period between July and August accounts for 82 % of the annual discharge. The river is fed primarily by rainfall and snowmelt. In summer, however, the river receives considerable glacier feeding from its upstream area. The annual salt runoff of the Yana River is 1.5 million tons. The annual sediment runoff is 3 million tons.



Yana River (Source: <http://www.youtube.com/watch?v=hF8Wq5XB0Yc>)

The mean water discharge in the lower reaches is  $1,000 \text{ m}^3/\text{s}$ .

The freeze-up period is between October and April – early May upstream and October and early June downstream. There are approximately 40,000 lakes in the Yana basin. The navigable part of the river begins from the city of Verkhoyansk. There is commercial fishing of omul, pickerel, broad whitefish, grayling, vendace, muksun, etc. The largest administrative center of the Yana area is the city of Verkhoyansk.

## Yana–Indigirka Lowland

Yana–Indigirka Lowland – located in Northeastern Siberia, in Yakutia. The lowland extends 600 km along the coastlines of the Laptev Sea and the East Siberian Sea (from the Yana River Delta in the west to the Indigirka River Delta in the east). The height of single ridges and coniform hills is up to 300 m. The lowland is formed of alluvial rock and ground ice. There are numerous thermokarst lakes and swamps.

Moss and lichen and low-bush tundra in the north and larch woodland in the south are found in the area.

## Yanranay

Yanranay (which translates from the Chukchi language as “Solitary Mountain” as the settlement is at the foot of a mountain of the same name) – a rural locality (a selo) in Chaunsky District of Chukotka Autonomous Okrug, Russia, located at the mouth of the Chaunskaya Bay. Yanranay was founded in 1960. The Chukchi who live here originally came from Cape Shelag sky. The primary occupations of the local population are reindeer breeding and fishing. The village consists of one- or two-story houses, with basic facilities including a secondary school, stores, a library, the local History and Lore Museum, and a House of Culture (the local community center). There is an unsurfaced road connecting Yanranay to the nearest town of Pevek. It takes an all-terrain bus 40–50 min to cover the 35 km distance between the two settlements.

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## Yarok Island

Yarok Island – an island in the Yana Bay, at the mouth of the Yana River, the Republic of Sakha (Yakutia), Russia. The island is elongated in the east–west direction. Its length is about 48 km and its maximum breadth is 26 km. The western coast of Yarok Island is elevated. To the northeast of Yarok Island, there is the island of Makar as well as the Shelonsky Islands.

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## Yukagir Sea

Yukagir Sea – the name of the part of the East Siberian Sea, situated to the east from the Lyakhovsky and New Siberian Islands, given by A. V. Kolchak in the book *Ice of the Kara and Siberian Seas* (1909). He wrote: “I name this sea ‘Yukagir’, in the honor of the people, who were, according to the legend, numerous on its shores, but who left for some alleged lands, situated in the north of this sea.”

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## Yukola

Yukola – dried salmon, the “Alaska bread.”

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## Yupik

Yupik – one of the native Alaska peoples, relating to the Inuits or Eskimos. They have been populating the spacious swampy plains of the Yukon and Kuskokwim deltas, as well as the coast of the Bering Sea and a part of the Seward Peninsula from time immemorial. Many of the Yupik have moved to the city, but some still keep the hunters’ way of life and spend their summers in family fisherman’s camps.



Yupik (Source: <https://ru.wikipedia.org/wiki>)

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## Yuryung-Tumus

Yuryung-Tumus – a peninsula, serving as the border of the Nordvik Bay of the Laptev Sea from the west and juts out into the eastern channel, thus narrowing the latter to 25 km. It represents an undulating elevation, covered by tundra. The Solyanaya Sopka elevation (Tustakh, 125 m high) is located separately in the northeastern part of the peninsula. The eastern shores of the peninsula are almost steep cliffs above the water, whereas the northern and southern shores are sloping. A long low-lying spit runs out to the south from the southern shore of the peninsula, with a small bay in the west of it.

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## Yuzhak

Yuzhak – the local name of the strong southern wind on the coast of Chukotka, particularly, in the

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area of the Chaunskaya Bay (the Pevek Bay). It arises within an hour, develops the speed of 40 m/s and more, and can blow for 3 or 4 days. In winter, it carries the snow away from the continental shore and destroys small-sized buildings. In summer, it is not only dangerous for small vessels, lying out at the Pevek, but for bigger vessels as well.

## “Zarya”

1. A motor-sailing schooner of the Russian arctic expedition under the command of E.V. Toll to the area of the New Siberian Islands in 1900–1902. It was built as a three-masted whaling bark “Harald Harfager” in 1873 in the city of Christiania (currently Oslo, Norway) for the special purpose of hunting in the polar seas. In 1899 the vessel was purchased by E.V. Toll for his expedition and was renamed into *Z*. The process of choosing and re-equipment of the ship for expedition purposes was conducted upon the recommendation of the famous Norwegian polar explorer F. Nansen. After the refitting process, the *Z*. acquired the rigging of a schooner bark. The ship obtained the rooms for different types of observations: in sea biology and hydrology, geology, and bacteriological research. In June 1900 the *Z*. set off from Petersburg along the route Revel (now Tallinn)–Murman (Murmansk)–Vaygach Island–Kuzkin Island (Dikson). At the western entrance to the Taymyr Strait close to Bonevi Island, the schooner stood for a winter stay on October 1, 1900. At the end of August, having set free from the ice, the *Z*. continued its way to the Chelyuskin Bay and then in search of the mythical Sannikov Land. In September 1901 the schooner stood for the second winter stay in the area of Kotelny Island. In 1902 it passed between the islands Kotelny and Belkovsky for the first time in the history of sea navigation. This strait got the name “Zarya.” The ship also passed between Kotelny Island and Cape Lyakhovsky. In September 1902 the *Z*. badly needing full repair was standing in the ice in Tiksi Bay. Later it was sold to the firm of tradeswoman Gromova but did not put to sea. It was possible to see its destroying remains on the same time for many years. The water displacement is 1,082 t; length, 43.9 m; width, 10.1 m; steam engine power, about 169 kWt; and speed, up to 8 knots.
2. A Soviet research nonmagnetic ship belonging to the Institute of the Earth’s Magnetic Field, Ionosphere, and Radiowave Propagation at the USSR Academy of Sciences. Its purpose was to conduct geomagnetic research in the World Ocean and to study the Earth’s magnetic field. It was built in 1953 in Turku wharf, Finland. It presents a motor sail three-master schooner (since 1976 – with Bermudian rig), the ship hull is wooden without the use of iron, but with bronze and brass. In the forebody, there is not a single part made of steel or iron, and there is a measurement instrumentation that installed the transducers that continuously record the changes in the Earth’s magnetic fields. The main diesel and power generators are kept in the stern as far as possible from the measurement complex. Since 1953 the ship annually conducts geomagnetic research in the Atlantic, the Indian, and the Pacific Oceans. The water displacement is 605 t; length, 37.5 m; steam



engine power, 222 kWt; sails area, 730 m<sup>2</sup>; speed, 7 knots; self-sustaining period, 5,000 miles; and 4 scientific laboratories, with the crew of 24 people and 24 research officers.

## Zarya, Proliv (Strait)

Zarya, Proliv (Strait) – a strait in the Arctic Ocean, separating Kotelny Island in the east from Belkovsky Island in the west, lying in the Laptev Sea, to the west from the New Siberian Islands Archipelago, the Sakha Republic (Yakutia), Russia. The length is about 65 km. In the narrower southern part, its width comprises 24 km. The depth of the eastern part of the strait from the side of Kotelny Island reaches 18–22 m with the maximum of 23 m; in the western part the strait is 1,015 m deep. The shore is cliffy and waterlogged in some areas. On the western shore, there are capes: Plosky, Lagerny (Belkovsky Island), Domashniy, Zapadny, Durnoy, Severny, Walter (Mogilny), and Rozovy (Walter) (Kotelny Island). Many rivers and brooks flow into the strait, the biggest of which are Mikhailova, Odnoboki, and Poteryannyi. On the eastern coast, there are peninsulas: Tas-Ary and Mikhailova. In the eastern part of the strait, there are the following bays: Nerpalkh, Durnaya, Staraya Mikhailova, Stakhanovtsev Arktiki, and Nerpichya Guba. In Stakhanovtsev Arktiki Bay, there is Usuk-Karga Island. The strait was named in 1902 by the head of the Russian Polar Expedition of the Academy of Sciences (1900–1903) E. Toll to commemorate the schooner “Zarya,” which was the first to pass the strait on its way to Kotelny Island, where it stayed for winter.

## Zelenyi Mys

Zelenyi Mys – a port 3 km away from Chersky settlement, the Sakha Republic (Yakutia), Russia, on the right bank of the Kolyma, 130 km away from its mouth. The first mooring berth was built in 1960 in order to develop the mining industry. The port provides services for the cargo

receivers in the Kolyma Basin. Navigations last for 85 days.

## Zhokhov Island

Zhokhov Island – part of the De Long Archipelago (in its southeastern area), in the northwestern part of the East Siberian Sea, within the New Siberian Islands (its northeast area). It is an administrative part of the Sakha Republic (Yakutia), Russia. It lies 440 km away from the mainland Yakutia. The form is prolate and broadening up northward, the length is 11 km from the northwestern cape Vysokiy to the southeastern cape Taymyr, and the width is ranging from 4 km in the south to 10 km from Cape Zapadnyi to Cape Galechnyi in the north. The area is 58 km<sup>2</sup>. There are two uplands on the island, and both are buttes of volcanic origin: in the northeast a 121 m high Konusnaya Mountain and in the center a 123 m high mountain, the highest point on the island. From the upland to the coast, many unnamed brooks flow. The shores are straightened, flat in the east and in the south, and cliffy in the west and in the northwest (6–18 m). On the island there are three lagoon lakes: two small lakes up to two meters deep and several meters away from the southern coast and one rather large lake up to 1.5 m deep, separated from the sea by narrow sand and shingle bars at the northwest shore close to Cape Galechnyi. The sea around the island is 10–20 m deep. The vegetation is typically tundra. On the coastal cliffs, there are colonies of birds, guillemots, gulls, and burgomaster nests. Among the animals of the islands are polar foxes and polar bears coming from the mainland.

It was discovered in 1914 by the participants of the Hydrographical Expedition in the Arctic Ocean on the icebreakers “Taymyr” and “Vaygach” under the command of the captain II rank B.A. Vilkitsky. Approximately a year after its discovery, the island stayed unnamed and was marked on the maps by the date of its discovery “27/VII.” Later the island was named after the commander of the icebreaker “Vaygach” captain II rank P.A. Novopashennyi (in July 1919 he fled

Zhokhov Island (Source:  
<https://de.wikipedia.org/wiki/Schochow-Insel>)



from Petrograd (St. Petersburg) and joined the northwestern army of Yudenich). By the decree of the Presidium of the Central Electoral Commission of the USSR Council dated by 1926, Novopashennyi Island was renamed into Zhokhov Island in honor of the watch officer of icebreaker “Vaygach” A.N. Zhokhov, who had discovered another of the De Long Islands, Vilkitsky Island, and died during the winter stay of 1915. In 1955 the island saw the opening of a polar station with the same name and a base facility at the station. An ice airfield was equipped here. In 1993 a polar station was closed. Today the station and the airfield are used as a transfer point for touristic expeditions, including those to the North Pole. For the tourist there are holiday destinations arranged at the station. The archeological excavations (dwelling sites of ancient hunters) discovered on the island prove that people lived here as early as 8 thousand year ago).

### **Zhokhov, Alexei Nikolaevich (1885–1915)**

Zhokhov, Alexei Nikolaevich (1885–1915) – a Russian lieutenant and the Arctic Seas explorer. In 1905 he graduated from the Sea Cadet Corps as

a midshipman and was appointed a watch officer on the transport “Krasnaya Gorka.” Then up to 1912, he navigated in the Baltic Sea on different ships. In 1909 he was promoted into the rank of a lieutenant. In 1912 he was appointed an assistant chief of the Hydrological Expedition in the Arctic Ocean and transferred to the Siberian Fleet, where he started to work as a commander of the icebreaker “Taymyr.” He participated in the hydrographical works in the Medvezhyi Islands, southern and northern shores of Bolshoy and Maly Lyakhovsky Islands and smaller islands, parts of the mainland coast by Cape Svyatoy Nos and Buor-Khaya, as well as by Tiksi Bay. The survey was accompanied by ship and boat sounding. In June 1913 Z. was admitted a navigation officer of the second rank. In the same year as part of the Hydrological Expedition in the Arctic Ocean, he participated in the discovery of the Severnaya Zemlya Archipelago, Malyi Taymyr Island, and Starokadomsky Island, as well as the Vilkitsky Strait. On August 20, being on watch, he was the first to see an island which was later named after the General of the Hydrographical Corps A.I. Vilkitsky. In winter he stayed in St. Petersburg as an intern in the field of aerological observations in Pavlovsk Observatory. In 1914–1915 as a senior officer on the icebreaker “Taymyr” (later the watch officer on the icebreaker “Vaygach”), he participated in the



Zhokhov A.N. (Source: [http://costroma.k156.ru/d/30\\_zhohov.html](http://costroma.k156.ru/d/30_zhohov.html))

hydrographical work of the initial stage in the first thorough passage in history from the east to the west along the whole Northern Sea Route (winter stay close to Cape Chelyuskin). During the navigation of 1914, he was the first to see an unknown island near the De Long Islands, which was named Novopashennyi. He died during the winter stay of Vilkitsky's expedition and was buried on Cape Mogilny (the Kara Sea, Gulf of Toll).

Since 1926 Novopashennyi Island has been called after Z.

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### **Zubov, Nikolai Nikolaevich (1885–1960)**

Zubov, Nikolai Nikolaevich (1885–1960) – Soviet engineer, rear admiral, oceanologist, Arctic explorer, professor, doctor of geographic sciences, and Honored master of Sciences and Engineering of RSFSR. In 1904 he graduated from the Sea Cadet Corps in a rank of a midshipman. Was accepted to the 14th Baltic Naval Depot and soon became an attendee of a brief course in artillery and mining. In 1904 he served on the fleet battleship “Orel” and then was transferred to the position of a watch officer to the torpedo boat

“Blestyashchiy.” Serving in the Second Pacific Ocean Squadron, he navigated the Pacific Ocean, participated in the Battle of Tsushima, was badly wounded, delivered on an English steamer to Shanghai together with other wounded soldiers, and was put to hospital. In 1905 he returned to Russia. After the leave, a watch officer to the battleship “Slava” was appointed, and a month later, he retired because of illness. In 1909 he graduated from the Marine Academy majoring in Hydrography and Geodesy. Later he served on the ships of the mining division of the Baltic Fleet. In 1911 he was appointed a navigating officer of the first rank. In the same year, he temporarily commanded the torpedo boat destroyer “Burnyi.” In 1912 he navigated as a navigation officer and executive officer on the dispatch vessel “Baran” in the Bering Sea and conducted incidental hydrographical research. In 1913 he was dismissed because of illness; the wounds and shell shock in Tsushima had had a great impact on his health. He started working in the hydrometeorological division of the Trading Ports Department of the Trade and Industrial Ministry and then got the position of a marine research intern in Bergen Institute of Geophysics (Norway).

When the WWI began, Z. was recruited to serve in the Baltic Sea, and at the same time, he taught in the Navigating Officer Class, a course in tactical navigation written by himself. In 1914 Z. commanded the torpedo boat “Poslushnyi.” After several months, he was transferred to the Fleet Commander's Headquarters to serve as a flagship navigating officer for the submarine brigade headquarters. In 1915 the submarine “Kaiman” with the senior lieutenant Z. on board gained possession of a German steamer, and Z. was promoted to captain II rank. At the beginning of 1916, he becomes a flagman navigating officer at the Baltic Sea Fleet Commander's Headquarters and in the autumn gets appointed as a commander of the squadron torpedo destroyer “Moshchnyi.” In 1918–1919 he was conscribed to Kolchak's army, where he served as a commander of a reserve squadron as a lieutenant-colonel. He did not participate in battles. He was taken captive by the Red Army and then sent to the

Republican Naval Forces Commander's Headquarters to serve as the head of the academic office of the naval institutions in Moscow. In 1921 he was transferred to the People's Commissariat for Education. In the same year, he participated in the organization of the Floating Marine Scientific Institute (Plavmornin) in Archangelsk and became the head of its Hydrological Department. He served as a commander of a hydrological squadron on the research ship "Persey" (1923); for many years he was occupied with oceanographic research in the high latitudes of the Arctic Seas and the Arctic Ocean. In the same years, he started writing scientific articles based on expedition observations. In 1924 he was exiled to the town of Cherdyn in the Northern Urals. In 1928–1929 he navigated on the "Persey." In 1930 Z. was arrested on charges of the case of "Promparty," which was famous at that time, and spent about a year in Butyrskaya Prison in Moscow.

In 1930 on the motor sailboat "Nikolay Knipovich," he became the first person in the history of Arctic navigation to navigate around the northern part of Franz Josef Land. In 1931–1933 he served as an academic secretary of the Committee for Organization of the Second International Polar Year. He commanded the scientific expeditions on the ships "Nikolay Knipovich" (1932), "Persey" (1934), and "Sadko" (1935). From the very first days of establishment of the Moscow Hydrometeorological Institute, he became its lecturer and delivered a course in Marine Science. He was bestowed the rank of a professor. In 1932 he organized the first chair of Oceanology in the USSR at the institute and was its head up to 1941. In 1934 he became a member of the Interdepartmental Bureau of Ice Forecasts. He contributed much to the creation of oceanographic research methodology, preparation of the Barents Sea bathymetrical charts, studies in vertical water circulation in the fishing grounds, etc. In 1935 Z. was awarded an automobile for the scientific research conducted on the icebreaker "Sadko." In that navigation Ushakov Island was discovered. In 1937 he was bestowed the doctor's degree in Geographical Sciences (for the total amount of scientific works). In 1938 his famous book *Sea Water and Ice* was published.

When the Great Patriotic War began (1941), he did not agree to evacuate and became the head of the icebreaker squadron of the White Sea Fleet as a captain II rank. He forecast the period of ice formation and ice break and calculated the railroad across the Severnaya Dvina River ice. During the winter campaign of 1941–1942 in Arkhangelsk and in the White Sea, Z. was promoted to an engineer captain I rank. In March 1943, he was transferred to Moscow and appointed the deputy head of the Northern Sea Route Main Authority in scientific field. In the period from 1944 to 1948, he was the first director of the State Oceanographic Institute established in 1943. In 1945 he was appointed the rank of engineering rear admiral. In 1948 he retired and in 1950 was invited to be a professor of the Chair of Land Hydrology in Moscow State University where he delivered lectures in the course called "The USSR Seas." In 1952 he initiated the creation of the Chair of Oceanology at the Geography Department of Moscow State University where he had been working as a professor from 1953 to 1960. In 1960 he bestowed the title of the "Honored master of Sciences and Engineering of RSFSR."

His main works are *Sea Water and Ice* (1938), *Arctic Ice* (1945), *In the Centre of the Arctic* (1948), *Local Mariners – Explorers of Seas and Oceans* (1954), *Introduction into the Theory of Straits of the World Ocean* (1956), and *Oceanological Tables* (1957).

He gave his name to a cape on the shore of Mityushikha Guba in Novaya Zemlya, a submerged ridge in the Pacific Ocean, a bay in Reno Island in the Antarctic (Bisco Islands), and two research ships ("Nikolay Zubov" of the Hydrographical Service of the Navy and "Professor Zubov" of the Arctic and Antarctic Institute of Goskomgidromet). In 2008 the name of N.N. Zubov was given to the State Oceanographic Institute.

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## Zvezdnyi

Zvezdnyi – a former settlement, now a phantom settlement, Chukotka Autonomous District,



Zubov N.N. (Source: <http://rus-travelers.ru/zubov-nikolaj-nikolaevich/>)

Russia. It lies on Wrangel Island, on the bedrock coast of Somnitelnaya Bay, the Chukchi Sea. In 1926 the colonists under the command of G.A. Ushakov landed in Rogers Bay and founded the first permanent settlement on Wrangel Island named Ushakovskoe. Some of them settled close to Somnitelnaya Bay 30 km from Ushakovskoe in the same year. A permanent settlement named “Zvezdnyi” appeared here in 1960s due to the process of construction of defense facilities such as an alternate unpaved airfield of military aviation, a barrack, and a radiodetector. In 1970s the

military facility was eliminated and in 1980s the settlement was fully abandoned.

### **Zyryan, Dmitry Mikhailovich (? – 1646)**

Zyryan, Dmitry Mikhailovich (? – 1646) – a Yenisei Cossack, pathfinder, Arctic explorer and navigator, and one of the discoverers of East Siberia. In the winter of 1640, as a head of a squadron of 11 people riding horses, he conducted a passage from Yakutsk to the Yana River to collect the fur tributary. In the summer of the same year, he moved to the upper reaches of the Indigirka where he stayed for winter during which he built a settlement and two Koches. Together with I. Erastov and 15 of his men who joined the squadron in 1642, Z. went down to the East Siberian Sea and for 2 weeks sailed to the new river of Alazeya where he stayed for winter. In those areas, the pathfinders first saw the Yukagirs from whom they collected a vast tributary of furs. It was here that they encountered the people unknown before, “the Chukchi on deer,” who lived between the rivers Alazeya and Kolyma. They told that in the east “3 days away on a deer” there is “a big river” which the Russians had not known before (the Kolyma). The Cossacks also learnt that the Alazeya “originates from Kamen” (the Alazeya Plateau). Z. sent I. Erastov back to the Indigirka settlement so that he could send a report on the expedition progress. He himself reached the Nizhnyaya Kolyma across the Kolyma Lowland on foot in the spring of 1644. Almost at the same time, M. Stadukhin and S. Dezhnev on Koches entered its mouth from the sea. These three explorers share the status of discoverers of the most important river in Northeast Siberia. In 1645 Z. was appointed the chief of the Nizhnekolymskiy Ostrog (fortress).



## Chronology of the Key Historical Events on the Eastern Seas of the Russian Arctic (the Laptev Sea, the East Siberian Sea, the Chukchi Sea)

	<b>Seventeenth century</b>
1629	At the Yenisei Voivodes' House "The Inventory of the Lena, the Great River" was compiled and it reads that "the Lena River flows into the sea with its mouth."
1633	The armed forces of Yenisei Cossacks, headed by Postnik, Ivanov, Gubar, and M. Stadukhin, arrived at the lower reaches of the Lena River. The Tobolsk Cossack, Ivan Rebrov, was the first to reach the mouth of Lena, departing from Yakutsk. He discovered the Olenekskiy Zaliv.
1638	The first Russian march toward the Pacific Ocean from the upper reaches of the Aldan River with the departure from the Butalskiy stockade fort was headed by Ivan Yuriev Moskvitin, a Cossack from Tomsk. Ivan Rebrov discovered the Yana Bay. He Departed from the Yana River, reached the Indigirka River by sea, and built two stockade forts there.
1641	The Cossack foreman, Mikhail Stadukhin, was sent to the Kolyma River.
1642	The Krasnoyarsk Cossack, Ivan Erastov, went down the Indigirka River up to its mouth and by sea reached the mouth of the Alazeya River, being the first one at this river and the first one to deliver the information about the Chukchi.
1643	Cossacks F. Chukichev, T. Alekseev, I. Erastov, and others accomplished the sea crossing from the mouth of the Alazeya River to the Lena. M. Stadukhin and D. Yarila (Zyryan) arrived at the Kolyma River and founded the Nizhnekolymskiy stockade fort on its bank.
1644	The beginning of mass sea marches of merchants and tradesmen from the Lena River to the Kolyma River and back.
1645	The first attempt to travel from the Kolyma River to the delta of the Anadyr River was undertaken by F. A. Alekseev (Popov) and S. I. Dezhnev.
1647	Departing from the delta of the Kolyma River, S. I. Dezhnev, F. A. Alekseev (Popov), G. Ankudinov, and others went around the Chukotski (Chukchi) Peninsula by "kochi," one-mast sail-rowing boats and entered the Pacific Ocean, providing the proof of the existence of the channel separating Asia from America (the Bering Strait). F. A. Alekseev perished. The results of the expedition were unknown for a long time. The announcement of this discovery was not published until 1758.
1650	Yuri Seliverstov, a soldier, was sent from Yakutsk to the Novosibirsk Islands.
1652	Ivan Rebrov was sent to explore the territories to the north of the delta of the river Yana.
1687	The voivode Musin-Pushkin reported to Jesuit Philippe P. Avril about an island opposite the delta of the Kolyma River.

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	<b>Eighteenth century</b>
1702	M. Nasedkin, a manufacturer, undertaking a sea voyage from the Kolyma River to Indigirka River, saw an island, which according to the local inhabitants constituted a part of America.
1705	Y. Permyakov discovered Bolshoy Lyakhovsky Island during his navigation from the Lena River to the Kolyma River.
1711	The Siberian governor M. P. Gagarin assigned a Cossack V. Stadukhin to explore the territory to the north of the Kolyma River. It was not performed due to the ice condition. The Russian Cossack Petr Popov departed from the Anadyr stockade town to the east of Chukotka expecting to reach the islands of the Bering Strait.
1714	G. Kuzyakov under the authority of the Siberian governor M. P. Gagarin made an unsuccessful attempt to reach the Medvezhiy Islands (the Bear Islands).
1715	The Cossack A. Markov departed from the delta of the Yana River directly to the north, with a detachment using draft dogs. Although they proceeded for 7 days, they failed to approach the dry land.
1716	Johann Goman published "The World Atlas" in Nuremberg where the channel between Asia and America was called "Deschnews Strasse" ("The Dezhnev Strait") on the map of the world.
1716–1719	Colonel Y. Elchin's expedition was supplied for the exploration of the Kamchatka Peninsula and the neighboring territories. It was known as "The Bolshoy Kamchatskiy Naryad." For a number of reasons, the expedition was not successful.
1720	I. Vilegin, a manufacturer, departing from the delta of the Kolyma River, managed to reach the Medvezhiy Islands by ice.
1720–1721	An expedition to search a sea passage from the delta of the Ob River to the east was supplied. The land surveyor P. I. Chichagov and the merchant Miller took part in it.
1724	Peter the Great signed the decree about the organization of the First Kamchatka Expedition. Captain V. I. Bering was put in charge of it and A. I. Chirikov and M. P. Shpanberg were appointed his mates. The Secretary of the Senate I. K. Kirillov compiled a handwritten "Map of the Geographical Part of the Far-Eastern Siberia and Tartar and also the New Lands of Kamchatka and Japan Islands. . ." where the latest Russian discoveries were represented. For the compilation of his map, the author of the first geographical atlas in Russia I. I. Kirillov used the map of I. M. Evreinov, a land surveyor and cartographer, who was sent to a confidential expedition aimed at determining the existence of a channel between Asia and America and who provided the map of Siberia, Kamchatka, and the Kuril Islands.
1732	The Empress Anna Ioanovna signed the decree about sending the Second Kamchatka Expedition headed by Captain-Commander V. Bering (the First Academic or the Great Northern Expedition).
1733–1743	The Great Northern Expedition on northern Eurasian shores investigation.
1735	The boat "Irkutsk" under the command of the major-lieutenant Peter Lassinius, appointed by Vitus Bering, entered the Laptev Sea from the Lena River through the Bykovskiy Channel and went to the east in the direction of Svyatoy Nos Cape.
1741–1742	The Lena- Khatanga detachment of the Great Northern Expedition performed terrestrial operations aimed at describing the coastal line of the Taymyr Peninsula. During these operations the navigator S. I. Chelyuskin reached the terminal northern point of the Eurasia continent.
1753	The Senate lifted the ban which was imposed in 1704, thus permitting free navigation from the Pomorye to the rivers Ob and Taz.
1755	The Siberian tradesmen I. Bakhov and N. P. Shalaurov obtained the permission of the Senate to go around the Chukotskiy Nos in the direction of Kamchatka, with the departure from the Lena River, by their own boat.
1757	The expedition of I. Bakhov and N. P. Shalaurov started the navigation and reached the Yana River, with three breaks for winter stays on the way. Here, I. Bakhov left the crew.
1760	The Siberian governor F. I. Soymonov assigned Colonel F. K. Plenisner, the head of the Okhotsky and Kamchatskiy Districts, to explore the territories to the north of the delta of the Kolyma River and lying opposite the entire coastline of Chukotka.
1761	N. P. Shalaurov, with a new crew of the expedition, started the navigation from the delta of the Yana River.

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1762	N. P. Shalaurov, who was a merchant from Veliky Ustyug, conducted the first exploration of the Chaunskaya (Chaun) Bay.
1763	Colonel F. K. Plenisher sent a detachment under the command of Sergeant S. Andreev to the Medvezhyi Islands (the Bear Islands). F. K. Plenisher compiled the first map of the Medvezhyi Islands, based on the data provided by S. Andreev, where he gave the islands their actual name.
1764	N. P. Shalaurov exited the delta of the Kolyma River to the open sea and never returned. S. Andreev was sent to the Medvezhyi Islands for the second time. He saw the sixth island to the northwest of the Medvezhyi Islands, but was unable to reach it.
1770	The Yakutsk merchant I. Lyakhov performed a sledge crossing on the ice of the Laptev Sea and discovered two unknown islands, which he reported to St. Petersburg. The islands were called the Lyakhovsky (Ostrova) Islands.
1773	I. Lyakhov, together with I. Protodyakonov, another merchant from Yakutsk, discovered an island which was called Kotelnyi, Novosibirskiye Islands.
1775–1778	S. Khvoynov described and mapped the Lyakhovsky Islands.
1778	The westernmost point of the American continent was named Cape Prince of Wales by Captain James Cook.
1785–1792	The expedition of I. I. Billings and G. A. Sarychev produced a description of the Commander Islands, the Aleutian (Aleutskiy) Islands, Pribilof Island, St. Lawrence Island, St. Mathew's Island, Gvozdev Island, and the coastline of the Sea of Okhotsk, Chukotka, Kamchatka, and the northwest of America.
1787	The northeastern geography and astronomy sea expedition under the command of I. Billings entered the open sea from Nizhnekolymsk and reached the 11-mile point to the east of Cape Bolshoy Baranov along the northern coast of Chukotka, but was forced to return due to the impassable ice.
1800	Y. Sannikov, the foreman of the merchant Lyakhov's artel, discovered an island, which he named Stolbovoy, Lyakhov's Islands.
<b>Nineteenth century</b>	
1803–1829	A number of separate reconnoitering maritime descriptions of the eastern coastline of the Kamchatka and Chukotka peninsulas, the western coastline of North America, and the Aleutian Islands were made during the circumnavigations and semi-circumnavigations by sailboats, the Russian fleet vessels, and the vessels of the Russian-American Company under the leadership of Y. F. Lisianskiy (1803–1806), O. E. Kotzebue (1815–1818), V. M. Golovnin (1817–1819), M. N. Vasilyev (1819–1822), G. S. Shishmaryev (1819–1822), S. P. Khrushcheyev (1821–1824), M. N. Stanyukovich (1826–1829), and F. P. Litke (1826–1829).
1804	The "Atlas of Maps and Pictures for the Travels to the North-East of Siberia and the Northern Part of the Pacific Ocean" by G. A. Sarychev was published in St. Petersburg.
1805	Y. Sannikov discovered the island of Faddeyevskiy, situated to the east of Kotelnyi Island.
1806	Y. Sannikov discovered the island of Novaya Sibir (New Siberia).
1806–1807	The zoologist of the Academy of Sciences, M. I. Adams, did the first scientific research after the Great Northern Expedition (1735–1740).
1808	The fisherman Belkov discovered an island to the west of Kotelnyi Island, which he called Belkovsky Island.
1809	M. M. Gedenshtrom arrived at Faddeyevskiy Island where he assigned Y. Sannikov to explore the channel between Faddeyevskiy Island and Kotelnyi Island.
1809–1812	The terrestrial expedition of M. M. Gedenshtrom created an aggregate map of the New Siberian Islands including New Siberia Island and made the description of the continental coastline between the mouths of the Yana and Kolyma Rivers.
1810	M. M. Gedenshtrom performed the passing from New Siberia Island to the mouths of the Kolyma River making the first delimitation of borders of the winter land-fast ice.
1811	The book <i>Captain Billings' Travels through the Land of Chukotka from the Bering Strait to Nizhnekolymskiy Stockade Town and the Navigation of Captain Gall's vessel "The Black Eagle" across the North-East Ocean in 1795</i> by G. A. Sarychev was published. It was supplemented by the dictionary of 12 northern dialects, Verkhnekolymskiy temperature observation log, and the recommendations to Captain Billings given by the State Admiralty Collegium. Y. Sannikov and the land surveyor Pshenitsyn continued the works which were started by M. M. Gedenshtrom on the New Siberian Islands.

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1815	The Yakut Lyakhov discovered two islands, Semyenovskiy and Vasilyevskiy, belonging to the group of the New Siberian Islands. These two islands were formed by the prehistoric ice and consequently melted.
1816	The expedition on "Ryurik," under the leadership of O. E. Kotzebue, funded by the state chancellor Count V. P. Rumyantsev, passed through the Bering Strait, entered the Chukchi Sea, and went on along the shores of Alaska, discovering the bay which was later called after Kotzebue (Kotzebue Sound).
1819–1822	The circumnavigation expedition, headed by M. N. Vasilyev and G. S. Shishmarev, by the sloops "Otkrytiye" (Discovery) and "Blagonamerennyi," was aimed at searching for a Northwest Passage from the Pacific to the Atlantic Ocean in the high latitudes. Due to the severe ice condition, the task was not performed. The expedition reached 71°06'N and 166°08'W. A part of the northeastern Asian coast was mapped and described and a number of the islands in the Bering Sea were explored.
1820	In the course of the circumnavigation by the sloop "Otkrytiye," A. P. Avinov (an Admiral to be) took part in the description of the eastern coastline of the Bering and Chukchi seas. The expedition under the direction of the Naval Lieutenant F. P. Wrangel and P. F. Anjou was founded to provide the exact description of the Siberian coast area and discover the islands supposedly situated in the Arctic Ocean. F. P. Wrangel explored the area to the east of the Indigirka. The coastline in the region of the mouths of the rivers Olenyok, Lena, Yana, and the New Siberian Islands were described by P. F. Anjou. The Arctic expedition performed by the sloops "Otkrytiye" (under the command of Captain-Lieutenant M. N. Vasilyev) and "Blagonamerennyi" (headed by G. S. Shishmarev) passed the Bering Strait and made the survey of the northern coast of Alaska, but was forced to return 26 days later due to heavy ice.
1821	P. F. Anjou made a survey of the Siberian coastline from the Yana mouth to the mouth of the Indigirka, on horseback. M. N. Vasilyev repeated the attempt to discover the Northwest Passage, but he could only reach 70°40'N at the shores of Alaska, while the sloop "Blagonamerennyi" went as far as 70°13'N. The first sea ice field trip of the Eastern Search Party headed by F. P. Wrangel, to the Medvezhiy Islands, was aimed at surveying the Siberian coastline to the east of the Lena mouth. The party reached the easternmost island, described it, and called it Chetyryekhstolbovoy Island.
1821–1824	The reconnoitering maritime survey of the northern coast of Russia from the Olenyok River to Kolyuchinskaya Bay including the New Siberian Islands, the Medvezhiy Islands, and Lyakhovskiy Island, headed by P. F. Anjou, F. P. Wrangel, and F. F. Matyushkin.
1823	The third field trip of F. P. Wrangel to the area of Cape Shelagiskiy.
1824	The fourth field trip of F. P. Wrangel, in the course of which the coastline survey to Kolyuchin Island was made.
1826	The expedition of the English Admiralty by the sloop "Blossom" under the direction of Captain Beechey passed through the Bering Strait to the Chukchi Sea and was the first to go around the whole coast of the Chukchi Sea, situated to the east of the Bering Strait. A. F. Kashevarov compiled "The Atlas of the Waters Surrounding East Siberia and Alaska."
1828	F. P. Litke by the sloop "Senyavin" surveyed Karaginsky Island and discovered Arakamchechen Island and the channel separating it from the continent, which was called "Senyavin Strait." He also called one of the Diomed Islands "Ratmanov Island," in the honor of Warrant Officer Ratmanov, a sloop crew member. He mapped the eastern coast of Kamchatka, Karaginsky Island, and the coast of Chukotka.
1838	Captain First Rank I. A. Kupriyanov founded a kayak expedition under the direction of A. F. Kashevarov, to explore the northwestern coastline of America from Cape Lisburne to Cape Barrow.
1846	The survey ship "Herald," headed by Captain Henry Kellett, went all the way to Kotzebue Sound.
1848	The American captain Race was the first whaler who hunted in the Chukchi Sea and the Bering Sea.
1849	The English vessel "Herald" under the direction of Captain Henry Kellett performed the first deepwater hydrological station in the Chukchi Sea. The expedition members from "Herald" landed on the island which was called "Herald Island" after the ship. The second island which H. Kellett saw from Herald was called "Plover Land" (after the second vessel, "Plover"), thereafter renamed Wrangel Island.

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1850	154 American whaling ships, carrying the crews of 4650 people, were sent to the northern parts of the Bering and the Chukchi Seas.
	The survey (hydrographic) sailboat “Herald” entered the Chukchi Sea again, but this time it did not went further than Kotzebue Sound.
	In the search for John Franklin’s expedition, the ship “Enterprise” commanded by Captain Collinson reached 73°23’N in the eastern part of the Chukchi Sea.
1851	There were 144 American whaling ships, hunting in the northern parts of the Bering and the Chukchi Seas.
	The majority of 144 ships of the third whaling campaign perished in the Chukchi Sea while hunting for whales.
	A. P. Sokolov, the author of the first generalizing works on the history of the national navigation, published his book <i>The Northern Expedition of 1733–1743</i> .
1854	The official classified plan of selling Russian territories was born in the bowels of the Russian Ministry of Foreign Affairs. It was called “The Note of Cession of a Right for our Possessions in North America to the United States.”
	The Russian Vice-Consul in San Francisco, the USA, P. S. Kostromitinov, signed the purchase agreement with the representative of the American-Russian Trade Company A. Marcpherson, according to which all the property, fisheries, and other facilities, as well as all the privileges on the territory of North America were transferred for the value of \$7.6 million.
1855	For the exploration of the islands, discovered by Henry Kellett in the Chukchi Sea, the American government sent the expedition on the sail navy survey ship “Vincennes” under the command of John Rogers. The vessel reached Herald Island and ascended to the north as far as 72°05’N on the 177°37’ meridian.
	The Academy of Sciences organized the first scientific research expedition to the New Siberia Islands, headed by A. A. Bunge.
1857	The work “About the Direct Sea Trade of Siberia with Western Europe” by G. Kolmogorov was published.
1859	The Russian attaché Eduard de Stoeckl was assigned to start the negotiations about selling Alaska to the USA.
1866	The official decision about selling Alaska was made in the Russian Ministry of Foreign Affairs in the atmosphere of top secret. Emperor Alexander II, the Grand Duke Konstantin Nikolayevich, the Minister of Foreign Affairs A. M. Gorchakov, the Minister of Finance M. K. Reitorn, the Head of the Maritime Ministry N. K. Crabbe, and the Russian Ambassador in Washington E. A. Stoeckl. France received \$15 million for Louisiana, Mexico received \$15 million for California, and Russia only received \$7.2 million for Alaska.
	28 December Tsar Alexander II signed the agreement about the sale of Alaska.
1867	The American Captain T. Long, by the whaler ship “Nile,” approached the island which he called Wrangel Island.
	M. K. Sidorov submitted the message to the Heir (the Emperor-to-be Alexander III) “About the Means in Order to Save the North of Russia from its Poor State.”
	The American Captain Soul by the ship “St. George” reached 73°10’N on the 173° meridian.
1870	The Committee of the Russian Geographical Society developed the project of the expedition to the northern seas (the report by P. A. Kropotkin).
1870–1874	The Russian expedition by the clipper “Vsadnik” headed by Novosilskiy, reached Cape Schmidt, but further on their way the ice forced the ship to turn back. During this expedition Lieutenant M. Onatsevich conducted physical geography observation.
1876	“Lena” was the first steamship which arrived at Tiksi Bay from the west.
	The American Captain Kinen was the first to start the navigation in the seas to the north of the Wrangel Island.
1878	During the navigation of A. E. Nordenskiöld through the Northeast Passage by the ship “Vega,” the data on the hydrology of the East Siberian Sea were obtained.
	The Swedish expedition of A. E. Nordenskiöld by the ship “Vega,” conducted partial survey and description of the Taymyr Peninsula coastline.
1878–1879	The expedition of the Swedish explorer of the Arctic, A. E. Nordenskiöld, by the ship “Vega,” went through the Bering Strait conducting the passage through the Northeast Passage.

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1879	Three foreign whaler ships were wrecked in the ice of the Chukchi Sea, no member of the crews of two of them survived.
1880	The American customs ship “Corwin,” under the command of Hooper, made an attempt to break through toward Wrangel Island. Numerous measuring and water current observation works were conducted.
1881	<p>The American Eastern Expedition headed by Lieutenant Berry, by the whaler ship “Rogers” went through the Being Strait and explored the islands of Wrangel and Herald. The members of the expedition, which consisted of three parties, conducted the topographic survey and made the first more or less reliable map of the islands.</p> <p>The American customs ship “Corwin” visited the Chukchi Sea and the islands of Wrangel and Herald for the second time; they made landing on Wrangel Island. The Americans called this island “New Columbia.”</p> <p>The American lieutenant G. De Long, who headed the expedition on the yacht “Jeannette,” together with the crew walked toward the New Siberian Islands and proceeded toward the Lean mouth in the wake of the wreck of their ship (in June). After 4 months of the march, De Long and his mates died on the island of Boran-Belkoy in the Lena Delta.</p> <p>Lieutenant G. De Long discovered Henrietta Island.</p>
1882	<p>The Chief Engineer of De Long’s expedition, George W. Melville, found De Long’s doomed camp, buried all the dead on Kyugelkhaya Mountain (which was called American Mountain), and installed a large cross with an inscription in English: “In Honor of 12 Officers and Sailors of the Steamboat Jeannette, Who Died of Hunger in the Lena Delta in October 1881.”</p> <p>The American lieutenant G. V. Harber searched for the third party of the “Jeannette” expedition in the Lena Delta and the coast between the Olenyok River Delta and the Yana Delta.</p>
1882–1883	The First International Arctic Year. A geophysical station was installed in the Lena Delta, the Island Sagastyr.
1883	The place of De Long’s death was visited by the member of the Russian International Arctic Year station in Sagastyr, Doctor A. A. Bunge, and the station research worker, A. G. Eigner. G. V. Harber, transported the bodies of G. De Long and his crew members to America through Yakutsk.
1893–1896	The beginning of the well-known Norwegian Arctic expedition under the direction of F. Nansen, by the sail-motor vessel “Fram,” which conducted the navigation around the northern coast of Siberia and then drifted in the ice of the Arctic Ocean (from the new Siberian Islands to the north of Greenland Sea). The islands of Sverdrup, Scott Hansen, Mona, and the Archipelago of Nordenskiöld were discovered in the Kara Sea.
1896	The bottle message mail was used for the exploration of the currents along the Siberian coastline of the Arctic Ocean.
	<b>Twentieth century</b>
1901–1902	The schooner “Zarya” of the expedition of Baron E. V. Toll stopped for a winter break near the western coast of Koteln’yi Island in the region of the Nerpichya Bay.
1902	E. V. Toll’s expedition was the first to describe and map the Bennett Islands.
1903	The Russian Academy of Sciences organized a rescue expedition to search for E. V. Toll’s party.
1904	F. Nansen’s work “About the Bathymetrical Features of the Northern Arctic Seas” was published.
1905	<p>The summit meeting under the chairmanship of S. Yu. Witte, the Chairman of the Finance Ministry, examined the project by the French engineer Lonk De Lobel offering to give the concession of the construction of the Kanin-Yakutsk-Bering Strait-Alaska railway (with the branches of it going to Okhotsk, Khabarovsk, and Chita) to the “American Syndicate for Building trans-Alaska-Siberia Railway.” The road was to become a part of the giant New York-Paris traffic artery, going through Alaska-Bering Strait-Chukotka-Siberia. After Witte’s resignation, the Finance Ministry declined the project.</p> <p>The Russian Emperor Nikolay II approved of the plan for the construction of the tunnel under the Bering Strait.</p>
1906	The Norwegian explorer R. Amundsen, on the yacht “Gjøa,” was first to go long the Northwestern Passage and, through the Bering strait, arrive in San Francisco.

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1908	The committee for the development of the assistance measures for marine transportation along the Arctic coastline to the east of the Lena Delta was created in Yakutsk.
	Americans went by a whaleboat in the search for gold along the whole Chukchi coastline to the Kolyma Delta.
1909	Lena-Kolyma expedition under the direction of the geologist K. A. Vollosovich determined the outline of the coast from the Lena Delta to the Alazeya River, which had previously been mapped according to the data received by the Great Northern Expedition and the expeditions of P. F. Anjou and F. Wrangel.
	The work of the hydrograph A. V. Kolchak "The Ice of the Kara and Siberian Seas" was published.
	The expedition of the geologist I. P. Tolmachev, with the assignment of the Chukchi coastline survey, went along the whole coastline from the Kolyma to the Bering Strait.
	A. V. Kolchak read the report "The North Eastern Passage from the Yenisei Delta to the Bering Strait" in the Society for the Exploration of Siberia and Improvement of its Life Conditions.
1910	G. Y. Sedov conducted the reconnaissance works in the Kolyma Delta.
	The hydrographic expedition on two icebreaker ships, "Vaygach" and "Taymyr," was organized for the exploration of the Laptev Sea, the East Siberian Sea, and the Chukchi Sea and, also, the possibility of the straight-through navigation by the Northeast Passage.
1910–1911	The Chukotka expedition of I. Tolmachev conducted the route survey of the sea coast from the Kolyma Delta to the Cape Dezhnev.
	The first American schooner "Kittiwake" arrived at the Kolyma Delta.
1911	The steamboat "Kolyma" (the former Norwegian steamboat "Prosper") belonging to the "Dobrohod" company and headed by Captain Contra-Admiral P. A. Trayan conducted the first shipping from Vladivostok to the Kolyma Delta, bringing a supply of provisions to the inhabitants of the Kolyma Region.
	"Vaygach" performed a hydrological cut on the line connecting Cape Serdtse-Kamen, Cape Hope, and Cape Prince Wales.
1912	Under the assignment of Main Hydrographic Office, the party headed by A. Neyelov inspected the Lena Delta with the purpose to find the deepest and most convenient exit to the sea.
	The project of German Arctic expedition headed by the lieutenant of the Keizer Fleet Schreder-Schranz, which covered the examination of the Taymyr Peninsula in order to pass on to the Bering Strait
	The materials of B. V. Davydov were published, which provided the sailing directions for the territory from the Bering Strait to the Kolyma River.
	By the Organic Act of US Congress, Alaska was granted the limited administration status and it was announced to become a part of the USA.
	Russian State Duma, at the urgent request of the deputy group from Siberia, adopted the resolution on the commencement of trade navigation through the Kara Sea to the Ob and Yenisei deltas.
1913	The Canadian government organized the Arctic expedition, which lasted for several years.
	The Canadian Arctic Expedition on the ship "Karluk," under the direction of the well-known Arctic explorer V. Stefansson, was crushed in the ice near the northern shores of Alaska, while passing from the Bering Strait to Herschel Island. V. Stefansson, accompanied by McConnell, G. Wilkins, and two Eskimos, left the ship for deer hunting and never seen it again as the vessel was carried off by the ice.
1914	The vessel of the Canadian Arctic Expedition "Karluk," under the direction of Captain Bartlett, sank to the north of Wrangel Island. There were 24 people left on the ice in the Shipwreck Camp. Later one group of seven people walked on ice toward Herald Island. Three of them returned to the camp (the bodies of the other four were found in 1924). Then another group of four people set off to Wrangel Island and disappeared. Afterward, the 16 survivors, under the leadership of Bartlett, struggled their way to Wrangel Island. R. Bartlett with one Eskimo and seven dogs managed to reach the coast of Chukotka and then arrived at the Providence Bay to get to America, where he embarked on organizing the expedition for saving the rest of his people, who waited on Wrangel Island.
	The Russian Academy of Sciences created the Permanent Arctic Committee.
	The American government sent the customs ships "Bear" and "Corwin" and the fishing schooner "King and Wing" (S. Swenson) to collect the members of V. Stefansson expedition from Wrangel Island.

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1914–1915	The expedition of B. A. Vilkitskiy conducted the first in history straight-through navigation by the Northeast Passage from Vladivostok to Arkhangelsk.
1918	<p>The Norway Arctic expedition on the vessel “Maud” under the leadership of R. Amundsen took place, with the retry of the Nansen’s “Fram” drift in the Arctic Basin as its objective.</p> <p>R. Amundsen on his ship “Maud” spends the winter in the Maud Bay, 20 miles to the east from Cape Chelyuskin.</p> <p>Council of People’s Commissars and Sovnarkom allotted RUB one million for the Arctic Ocean Hydrographic Expedition.</p> <p>The hydrographer K. K. Neupokoyev submitted to the demobilization department of the Russian Arctic Ocean Fleet his proposal concerning the creation of a multifunctional scientific-commercial-hydrographic expedition to the Lena Delta along the Northeast Passage.</p> <p>The volume of navigation directions called “Arctic Pilot” was published in England.</p> <p>The General Directorate of Hydrography published “The Brief Data on Meteorology and Oceanology of the Kara and Siberian Seas”</p>
1919	<p>R. Amundsen’s expedition on the vessel “Maud” spent the winter near the Ayon Island.</p> <p>The Collegium of National Commissariat (Narodnyi Komissariat) on the Trade and Manufacturing created the Committee on Exploration and Practical Use of the Russian North (in brief – the Russian North Committee).</p> <p>On Cape Chelyuskin the expedition of R. Amundsen installed a copper ball with the inscription in Norwegian: “To the Explorers of NO Passage Adolf-Eric Nordenskiöld and his Mates. To the expedition on “Maud”. 1918–1919”.</p> <p>The American schooner “Belvedere” was crushed by the ice in the Chukchi Sea. There are (unverified) data about the death of several hunters.</p>
1920	<p>The expedition under the leadership of F. A. Matisen conducted works in the Lena Delta. One of its objectives was the survey of the Bykovskaya Protoka, the chief way which connected the Lena with the Tiksi Bay.</p> <p>The Siberian Revolutionary Committee set up the Committee of the Severnyi Morskoy Put (the Northeast Passage).</p> <p>Two American schooners “Polar Bear” and “Belinda” arrived at the Kolyma. Afterwards, “Polar Bear” was confiscated by the local authorities. It was left at the Kolyma until 1926 and was renamed “Polyarnaya Zvezda.”</p>
1921	<p>V. Stefansson sent the schooner “Silver Wave” to Wrangel Island. It carried the expedition under the direction of A. Crawford (Canada) which consisted of five people. They raised the English flag over the island and began hunting.</p> <p>The Ust-Lenskaya expedition, headed by N. I. Evgenov, continued working in the deltas of the Lena and the Olenyok Rivers.</p> <p>Knud Rasmussen, together with his wife and a mate, embarked on a walking campaign across all the Eskimo settlements, starting from the Bering Strait to the Hudson Bay.</p>
1922	<p>The American “National Geographic” journal published the article <i>The Arctic as an Air Route of the Future</i> by V. Stefansson.</p> <p>The Directorate on Securing Safety Navigation in the Kara Sea and the Deltas of the Siberian Rivers (Ubekosibir) was founded. It was based on the Ob-Yenisei hydrographic detachment.</p> <p>The schooner “Teddy Bear” was sent to rescue the people on Wrangel Island, but the mission failed due to the heavy ice condition.</p> <p>The American schooner “Eagle” was crushed by the ice in the Chukchi Sea.</p> <p>The Prime Minister of Canada M. King officially announced Wrangel Island to belong to the territory of England.</p>
1922–1924	The vessel “Maud” of R. Amundsen’s expedition, under the command of O. Wisting, spent the winter in the region of Chetyryekhstolbovoy Island in the East Siberian Sea, and it conducted thorough survey works in its northern part.
1923	V. Stefansson sent the steam schooner “Donaldson” to Wrangel Island, the Eskimo Ada Blackjack was the only survivor found. A party of 14 people (under the leadership of the American called Wells) landed on the island. They received the supply of food provisions for 2 years.

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1924	The steamship “Stavropol” performed the first voyage under the Soviet flag from Vladivostok to Kolyma.
	The battle boat “Krasny Oktyabr” (the former port icebreaker “Nadyezhnyi”) conducted the trip from Vladivostok to Wrangel Island under the direction of the hydrograph B. V. Davydov with the objective to install the Soviet flag on the island and collect the party of the people who were left there by V. Stefansson in 1923.
	An attempt of the Americans on the steam schooner “Herman” to approach Wrangel Island and raise the American flag there. Due to the hard ice condition, the boat could not advance further than Herald Island, where the American flag was raised. Four bodies of the deceased members of Bartlett’s expedition were found on Herald Island.
	The representative of Great Britain announced at the English-Soviet conference that his country has no legal claims toward Wrangel Island.
	In August the vessel “Maud” from the Norwegian expedition (Captain O. Wisting, researchers Professor Sverdrup and his assistant, Swedish geophysicist F. Malmgren) entered the Laptev Sea after 2 years of navigation and drifting in the seas of the Arctic Ocean.
1924–1925	The cargo and passenger ship “Stavropol” spent the winter near Shalaurov Island, The East Siberian Sea.
1925	The first voyage of the Soviet vessel “Polyarnaya Zvezda” from the Kolyma Delta to the Lena Delta.
	The well-known American international lawyer David Miller published the article “The Political Rights for the Arctic” in the unofficial organ of the state department “Foreign Office.”
1926	The Decree of the Presidium of the General Executive Committee and the Council of People’s Commissars “To Declare the Territory of the USSR the Lands and Islands Located in the Arctic Ocean.” The decree declared the Soviet Arctic Sector, with the coordinates of 32°04’35’E and 168°48’30’W (with the exception of the eastern islands of the Spitsbergen Archipelago).
	The steamship “Stavropol” (Captain P. G. Milovzorov) delivered nine families of Eskimo and Chukchi (50 people) and six Europeans, together with the Head of the island. G. A. Ushakov, to Wrangel Island. There were also the supplies of building materials and fuel brought with them.
	The steamship “Stavropol” approached Herald Island where the ceremony of raising the national flag of the USSR was held.
	V. Y. Vise’s book <i>The Hydrological Essay of the Laptev and East-Siberian Seas</i> was published in Leningrad.
1927	The Academy of Sciences of the USSR organized a scientific research station on Bolshoy Lyakhovsky Island.
	The sea detachment of the Yakutsk expedition of the Academy of Sciences of the USSR, under the leadership of Y. D. Chirikhin, navigated from the Tiksi Bay to Cape Shalaurov (Bolshoy Lyakhovsky Island) by the sail-motor schooner “Polyarnaya Zvezda.” They chose the site for the construction of the geophysical laboratory and delivered the building materials.
	The navigation of the steamship “Kolyma” (Captain P. G. Milovzorov) from Vladivostok to the Lena Delta set the beginning of the East-Lena operations.
1927–1928	The small-sized motor boat “Pioner,” which was used for shipping between the Kolyma and the Indigirka Rivers, spent the winter in the Indigirka Delta.
	The Yana hydrological detachment of the Yakutsk expedition of the Academy of Sciences of the USSR, headed by P. K. Khmyzhnikov, conducted the hydrographic survey of the Yana River and its delta and determined the hydrological regime of the river.
1928	The navigation of the schooner “Polyarnaya Zvezda” from Yakutsk to Bolshoy Lyakhovsky Island. The first shift of winterers under the leadership of N. V. Pinegin was delivered to the Lyakhovskaya Geophysics Observatory.
	The cargo-passenger steamboat “Kolyma” spent the winter near Shalaurov Island.
	The Committee of the Northeastern Passage (Severnyi Morskoy Put) was reformed to the State North-Siberian joint stock company “Komsevput.”
	The Academy of Sciences of the USSR built a geophysics station on Bolshoy Lyakhovsky Island.
	The work of A. V. Kolchak “The Ice of the Kara and Siberian Seas” was translated into English and published by the American Geographic Society.

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	<p>The organization of the Government Arctic Committee for reinforcement of the scientific research in the Arctic possessions of the USSR.</p> <p>The hydroplane “Sovietskiy Sever” (Soviet North), from the air expedition of Krasinskiy, which was assigned to perform the flight to the Bering Strait and further on along the Arctic Ocean coast to Arkhangelsk, departed from Vladivostok with the mission, but after the landing in the Kolyuchinskaya Guba (Kolyuchinskaya Bay), on the northern coast of Chukotka, was caught in a storm and destroyed.</p> <p>The R. Bartlett schooner “Effie M. Morrissey” failed to reach Wrangel Island due to the heavy ice condition.</p> <p>The first meteorological station was set up in the settlement of Uelen on the northern coast of the Chukchi Sea.</p>
1929	<p>The scientific research on the Arctic began to be included in the National Economy Plans of the Soviet Union.</p> <p>The decree of the All-Russian Central Executive Committee (VTsIK) and the Council of People’s Commissars (Sovnarkom) RSFSR, “About the Management of the Islands of the Arctic Ocean,” was enacted.</p> <p>The hydroplane “W-33,” piloted by O. A. Kalvits, conducted the flight from the region of St. Lawrence Bay in the Bering Sea through Uelen, Cape Otto Schmidt to Wrangel Island, Cape Billings, the Kolyma Delta, the Alazeya Delta, and Bolshoy Lyakhovsky Island, and it landed at Bulun, near the Lena River.</p> <p>The American schooner “Elisif,” after spending the winter near Cape Schmidt, was crushed in the ice in the region of Cape Billings.</p> <p>The icebreaker “Litke” (Captain K. A. Dublitskiy) delivered provisions to Wrangel Island, changed the winterers’ shifts, and built a radio station. For this trip the icebreaker and its captain were awarded the Order of the Labor Red Banner.</p> <p>The well-known pilot of Alaska, USA, Karl Ileson, died near the Chukotka coast.</p>
1929–1930	<p>The motorboat “Pioner” was forced to spend the winter at Krestovsky Island (the Medvezhii Islands group).</p> <p>G. A. Ushakov and his mates undertook a number of sledge crossings on the Severnaya Zemlya Archipelago.</p>
1929–1931	<p>G. L. Travin undertook a solo trip around the Arctic by bicycle, going around the coast of the Arctic Ocean and its islands from the west to the east from the Kola Peninsula to Cape Dezhnev in Chukotka.</p>
1929–1935	<p>Ice observations by L. V. Antonov on the icebreaker “Krasin” in the Kara Sea and the Laptev Sea.</p>
1930	<p>H. U. Sverdrup’s work “The Voyage on “Maud” in the waters of the Laptev and East-Siberian Seas” was published in Leningrad.</p> <p>The navigation of the sail-motor boat “Belukha” from Arkhangelsk to the shores of the West Taymyr with the objective to perform a passage into the Lena. The vessel returned and the objective was not attained.</p> <p>The American schooner “Nanuk” was wrecked near Cape Schmidt. Since that year American schooner stopped navigating.</p> <p>The American schooner “Korisa” was stuck in the ice in the Chukchi Sea and spent the winter to the west from Cape Serdtse-Kamen.</p>
1931	<p>The Soviet schooner “Chukotka,” which was supposed to deliver provisions to Wrangel Island, was crushed in the ice of the Chukchi Sea.</p> <p>The Kolyma Directorate of the River Craft was set up.</p> <p>Another unsuccessful voyage of the sail-motor boat “Belukha” from Arkhangelsk to the shores of the West Taymyr with the objective to pass into the Lena.</p> <p>The Kolyma River Directorate of Dalstroy was set up.</p> <p>The steamship “Lenin” arrived from the Lena to the Kolyma, initiating the Kolyma River Craft.</p> <p>The Arctic Institute suggested the plan of the Soviet marine expedition along the Northeast Passage from Arkhangelsk to Vladivostok in one navigation. The plan was approved of I. V. Stalin.</p>

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1932	The first commercial voyage from the Lena to the Yana on the motor ship “Estafeta.”
	The Arctic stations on the rivers of Kheta (Volchanka) and Khatanga were opened.
	The Arctic station in the Tiksi Bay began operating.
	An Arctic station on Cape Chelyuskin was set up by the expedition on the icebreaker “Rusanov.”
	The resolution of the Council of People’s Commissars of the USSR about the formation of the Chief Directorate of the Northern Sea Route.
	The “Northeastern Arctic Expedition of 1932” was set up, with the objective of transporting cargos from Vladivostok to Kolyma under the steering of the icebreaker “Fedor Litke.”
	The OGPU armada. The icebreaker “Fedor Litke” (Captain N. M. Nikolaev) was leading. Six cargo ships (“Anadyr,” “Sever,” “Suchan,” “Mikoyan,” “Krasnyi Partizan,” “Uritskiy”) and the sail-motor schooner “Temp” towed metal barges and steam cutters, 12,000 t of cargo, 200 prisoners, and 867 passengers. The armada was led by the ice sailor N. I. Evgenov.
	The Special Northeastern Arctic Expedition of “Narkomvod” was set up under the Chief Directorate of the Far North Development (Dalstroy).
	The expedition of Aeroflot on the motorboat “Pioner” conducted the navigation from the Kolyma Delta to the west.
	The Eastern Arctic Expedition was operating in the Chaunskaya Bay.
	The steamboat “Lenin” (Captain A. P. Bochek) performed the passage between the Lena and the Kolyma.
	The research of the hydrological regime of the southern part of the Chukchi Sea on “Dalnevostochnik,” under the leadership of G. E. Ratmanov.
	An unsuccessful attempt of the steamship “Sovyet” (Captain K. A. Dubnitskiy) to reach Wrangel Island.
1932–1933	The Council of People’s Commissars adopted the resolution “About the Development of the North-Eastern Water Routs of the USSR,” with the base in Vladivostok.
	The holding of the Second International Arctic Year.
1933	The Soviet icebreaker “A. Sibiryakov” carrying the expedition of the All-Union Arctic Institute went by the Northeastern Passage from the west to the east in 65 days (under the leadership of O. Y. Schmidt, the head of the scientific research V. Y. Vize, Captain Voronin). Bolshoy and Malyi Islands in the group of Arctic Institute Islands were discovered.
	The hydrological expedition under the leadership of S. D. Lappo on the ship “Pioner” to the southeastern part of the Laptev Sea.
	The beginning of the construction of the Tiksi Port.
	The first Lena transport expedition – a caravan of three cargo ships (“Pravda,” “Volodarskiy,” and “Tovarishch Stalin”), accompanied by the icebreaker “Krasin” – delivered provisions and manufactured goods from Arkhangelsk to Tiksi.
	The Arctic stations on Kotelnii Island (the New Siberian Islands) started operating.
	The steamship “Revolutsionnyi” sank in the region of the Merkushina Strelka Peninsula, while driving five river steamships and six barges for the Lena Delta to the Kolyma. All the barges sank too. The steering was conducted by the icebreaker “Lenin” (Captain P. G. Milovzorov).
	A meteorological station was set up on Chetyryekhstolbovoy Island.
	The steamship “Chelyuskin” following the Northeastern Passage made an attempt to explore the blank space on the map where Zemlya Andreeva was supposed to exist. But the heavy ice did not allow the realization of the plan.
	The State North-Siberian joint stock company “Komseput” was liquidated due to the formation of the Chief Directorate of the Northern Sea Route.
	The schooner “Temp” was the first in the history of navigation to pass by the Eterikan Passage between Bolshoy and Malyi Lyakhovsky Islands.
	The icebreaker “Litke” stopped for a winter break in the Chaunskaya Bay.
	The steamship “Sever” navigated from the Kolyma to the Lena and back.

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	<p>The systematic works on the East Siberian Sea coast and the neighboring territories by special expeditions of the hydrographical department of the Chief Directorate of the Northern Sea Route.</p> <p>The hydrological survey of the southern part of the Chukchi Sea by “Krasnoarmeyets,” under the leadership of G. E. Ratmanov.</p>
1933–1934	<p>The multifunctional Lena-Khatanga expedition of the Chief Directorate of the Northern Sea Route in the lower reaches of the Lena, with the chief objective to choose the location for building the Ust-Lenskiy Port.</p>
1934	<p>The hydrological detachment of the Lena- Khatanga expedition on the schooner “Laptev” under the leadership of S. I. Belov worked in the Khatanga Bay.</p> <p>The hydrological detachment of the Lena- Khatanga expedition on the schooner “Temp” conducted the observations in the Tiksi Bay.</p> <p>An Arctic station was built on Cape Kigili (Bolshoy Lyakhovsky Island).</p> <p>Hydrographic and hydrological surveys were commenced in the Laptev Channel by the schooner “Temp.”</p> <p>The icebreaker “Fedor Litke,” under the leadership of V. Y. Vize, was the first in the history of navigation to pass by the Northeastern Passage from Vladivostok to Murmansk.</p> <p>The expedition on the icebreaker “Krasin” conducted extensive hydrological surveys in the eastern part of the East Siberian Sea and the De Long Channel. The works were supervised by N. I. Evgenov.</p> <p>Four steamships were allotted to perform the Kolyma voyage.</p> <p>The non-icebreaker steamship “Chelyuskin,” which was assigned to deliver cargo to the colony on Wrangel Island, was crushed in the ice in the Chukchi Sea. The superintendent for maintenance and supply B. Mogilevich died. All the rest of the “Chelyuskin” crew, the sailor and winterers who took part in the heroic epopee, were rescued and transported to Alaska and Vankarem (the Chukchi Peninsula) by Soviet planes.</p> <p>After the successful end of the “Chelyuskin” epopee, the USSR instituted the highest distinction of merit, the title Hero of the Soviet Union (Geroy Sovetskogo Soyuza). The first to be awarded this rank were the pilots who rescued the members of the “Chelyuskin” expedition. The title was given to O. Lyapidevskiy, S. Levanevskiy, M. Slepnev, V. Molokov, N. Kamanin, M. Vodopyanov, and I. Doronin. All the members of the expedition (104 people), who had drifted on the ice, excluding the children, were awarded the Order of Red Star (Krasnoy Zvezdy).</p> <p>The USSR started walrus hunting in the Chukchi Sea, by the hunting vessel “Nazhim.”</p> <p>The icebreaker “Krasin” delivered winterers, food, and equipment to Wrangel Island.</p> <p>The decree of the All-Russian Central Executive Committee about erecting a monument in the honor of the Arctic voyage of “Chelyuskin” in Moscow.</p> <p>The three volume edition of “Chelyuskiniana” was published by “Pravda.”</p> <p>The American ship “Victoria” performed its first voyage in the Chukchi Sea.</p> <p>The two-volume book <i>The Voyage of “Chelyuskin”</i> was published.</p>
1934–1935	<p>The biology-fishery expedition of A. A. Romanov between the rivers of the Lena and Khatanga.</p> <p>The hydrographic expedition under the leadership of I. I. Muzylev did a thorough survey of the bar and lowers of the Kolyma River.</p> <p>The expedition of S. V. Obruchev on the survey of the Chaunskaya Bay, which used an aerosledge.</p>
1935	<p>Meteorological stations were set up on Cape Medvezhiy and at the Kolyma Delta.</p> <p>The icebreaker “Vladimir Rusanov” went from Arkhangelsk to the Indigirka Delta and back in one navigation season.</p> <p>The first voyage to the Kolyma was made by the steamship “Rabochiy” (Captain M. P. Panfilov) and it returned to Murmansk the same year. Thus, the West-Kolyma operations were set in motion.</p> <p>Special hydrographic survey parties worked in the deltas of the Indigirka and Kolyma.</p> <p>For the first time, the cargo shipping by the Northeastern Passage were included in the All-Soviet Plan of the Sea Transportation, and the all-way Arctic navigation became the essential part of the Plan.</p> <p>The start of port research in the Kolyma Delta.</p> <p>Special hydrographic survey parties worked in the deltas of the Indigirka and Kolyma.</p> <p>S. D. Lappo published his work “The Data on the Survey of the Coastal Zone of the Laptev Sea from the Lena Delta to Cape Chelyuskin.”</p>

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	The first decree of the All-Russian Central Executive Committee on establishing the unified geographical names of the parts of the Arctic Ocean adjoining the coast of the USSR.
	The steamships "Iskra" and "Vantsetti" performed through voyages by the Northeast Passage from Murmansk to Vladivostok. "Stalingrad" and "Anadyr" went from Vladivostok to Murmansk.
	The expedition on the icebreaker "Krasin." Large-scale scientific research was done in the Chukchi Sea under the leadership of G. E. Ratmanov, while making way for other vessels.
1936	The first steering of the hunting vessels "Kapitan Pospelov" and "Kapitan Voronin" from the Barents Sea to the Pacific Ocean along the coasts of Siberia.
	The expedition on the icebreaker "Sadko" under the leadership of R. L. Samoylovich built a polar station on Henrietta Island.
	The long distance flight of S. A. Levanevskiy and the navigator V. N. Levchenko by the monoplane "USSR H-28" on the route of Los Angeles-San Francisco-Seattle-Fairbanks-Nom-Uelen Bay-Ambarchik Bay-Tiksi-Zhigansk-Yakutsk-Kirensk-Krasnoyarsk-Omsk-Sverdlovsk-Moscow (the trip lasted from 5 August till 13 September and covered 19,000 km).
	The hydrographic vessel "Khronometr," which was working in the southern part of the Laptev Sea, failed to find Vasilkovskiy Island.
	The start of river steam navigation on the Indigirka.
1936–1937	The hydrographic expedition on the vessel "Temp" to the Dm. Laptev Channel.
	The first winter break of the hydrographic expedition under the leadership of N. N. Alekseev on the hydrographic vessel "Toros" worked around the Nordenskiöld Archipelago.
	The hydrographic survey in the region of the Chaunskaya Bay and Ayon Island performed by the hydrograph L. I. Bordyug.
	The expedition of the Arctic Research Institute worked in the Kolyma Delta.
1937	The Chief Directorate of the Northern Sea Route published in Leningrad the book by P. K. Khmyzhnikov <i>The Description of the Navigation in the Laptev Sea and in the Western Part of the East Siberian Sea from 1878 till 1935</i> .
	The icebreaker "Lenin" together with five vessels ("Tovarishch Stalin," "Ilmen," "Rabochiy," "Dikson," and "Kamchadal") spent the winter in the Laptev Sea in the channel between the Island of Begichev and the continent.
	Five ships were sent to the Kolyma Delta from the west, four of which reached the destination and were disembarked ("Pravda," "Krestyanin," "Iskra," and "Kingisepp").
	The third high-latitude expedition of the icebreaker "Sadko" was engaged in the search for the legendary Zemlya Sannikova in the northern part of the East Siberian Sea and the Laptev Sea.
	The plane "H-120" conducted the flight on the route of Moscow-Wrangel Island-Moscow with the objective to test the hardware of the polar aviation. Several landings were made in the region of the East Siberian Sea (Shelag'skiy Cape, Shalaurov Cape, and Ambarchik Bay).
	"The Directions on the Survey of the Laptev and the East Siberian Seas" was published.
	The hydrographic expedition on the icebreaker "Krasin" (under the leadership of I. I. L'vov) took place in the Chukchi Sea and the East Siberian Sea.
	V. Y. Vize observed great numbers of whales near Cape Billings, from the steamship "Belomorkanal."
1937–1938	The winter breaks and drifting in the eastern part of the Laptev Sea of the icebreakers "Sedov," "Sadko," and "Malygin."
	The icebreaker "Krasin" stopped for a winter break in the mouth of the Khatanga Bay.
1938	The timber-carrying steamship "Rabochiy" was wrecked by the ice and sank during the winter break in the western part of the Laptev Sea; there is no death toll information.
	The sail-motor boat "Ost" was crushed in the heavy ice in the region of Ayon Island while conducting a voyage from Arkhangelsk to Providence Bay.
	"The Directions on the Navigation in the Laptev Sea" was published.
	The sea expedition to the Laptev Sea on the hydrographic vessels "Professor Vize" and "Vest."
	The flagman of the second rank L. M. Galler sent the special message to the Defense Committee with the suggestion of building navy bases on Dikson Island, in the bays of Tiksi (the Lena Delta) and Providence (Chukotka) and also the construction of aerodromes for the Navy aviation on all of the large archipelagos.
	The hydrological surveys in the Chukchi Sea were conducted by the hydrographic vessel "Okhotsk."

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	<p>"The Directions on the Navigation in the Chukchi Sea" was published in Leningrad.</p> <p>The Olenyok Navigation Directorate was performing measuring works in the mouth of the Olenyok River.</p> <p>The hydrographic expedition under the leadership of P. A. Gishchin conducted the preliminary survey (reconnoitering) of the Olenyok Bay.</p>
1938–1939	The hydrographic survey party under the leadership of S. P. Vorobyev conducted the survey and measuring of the Komsomolskaya Pravda Islands.
1938–1940	The winter break and drift of the icebreaker "Sedov."
1939	<p>The hydrographic expedition under the leadership of Y. K. Smiritsky on the icebreaker "Malygin" explored the routes to approach the Dm. Laptev Channel.</p> <p>The beginning of the strategic ice exploration in the Soviet Arctic seas.</p> <p>The "Directions on the Navigation in the East Siberian Sea" was published.</p> <p>The Kolyma-Indigirka River Navigation Directorate was set up.</p> <p>The steamship "Kazakhstan" went from Murmansk to Yana and back.</p> <p>The icebreaker "Malygin" conducted hydrological surveys in the Chukchi Sea.</p>
1939–1940	<p>The Khatanga hydrographic survey party under the leadership of V. P. Shevlyagin worked in the Khatanga Bay.</p> <p>The hydrological wintering expedition on the schooner "Temp" with the objective to do the survey of the Dm. Laptev Channel, headed by A. P. Kibalin.</p> <p>The hydrographic boats "Nord," "Yakutia," "Professor Vize," "Vest," "Akademik Shokalskiy," and the schooner "Temp" worked in the Laptev Sea.</p>
1939–1941	The hydrographic survey party under the leadership of P. A. Pavlov explored the lowers of the Indigirka for the length of 300 km.
1939–1942	The comprehensive hydrographic surveys were conducted throughout the Khatanga Bay.
1940	<p>The steamship "Revolutsioner" went from Murmansk to the Chaunskaya Bay and back in one navigation.</p> <p>Seasonal or portable hydrometeorological stations began operating on the Northern Sea Route track, on Cape Blossom (Wrangel Island) in particular.</p> <p>The Soviet submarine "Shch-423" (the commander I.M. Zaydullin, the backup Bystrov) was the first in the history of the Northern Sea Route to perform a through voyage from the Barents Sea (Murmansk) to the Bering Sea and further to Vladivostok.</p> <p>The first special hydrological expedition in the Laptev Sea and the Vilkitskiy Channel on the expedition vessel "Akademik Shokalskiy" under the command of Y. Y. Gakkel.</p> <p>The book <i>The Laptev Sea and its Coast</i> by D. Tarbeev was published.</p> <p>The hydrological survey was conducted in the southeastern part of the Laptev Sea by a hydrographic vessel "Ost."</p> <p>The German raider "Komet" (Ems) (Captain Eissen) crossed the Laptev Sea, the Chukchi Sea, and the Bering Sea under the intelligence mission "Fall Grün" steered by the icebreaker "Stalin," like the vessels "Semen Dezhnev," "Dunay" (Danube), "Doon," and "Tokyo Mare."</p> <p>The expedition "Ledovyy Patrul" in the Chukchi Sea on the vessel "Smolnyi" (under the leadership of A. A. Kukharskiy).</p>
1940–1941	<p>The expedition of L. I. Leonov performed a hydrological research in the Sannikov Channel.</p> <p>V. I. Vilchinskiy conducted a hydrographic survey of the East Siberian Sea coast from the Kolyma Delta to Ayon Island.</p>
1941	<p>The hydrographic survey in the Chaunskaya Bay was conducted by the expedition on the vessel "Vikhr."</p> <p>The specialists from the Chief Directorate of the Northern Sea Route sent I. V. Stalin their proposals for the routes of transporting military cargos from the USA to the USSR. The first on the list was the route from Vancouver (Canada) and Seattle (USA) to the Bering Strait and then to the west by the Northeastern Passage.</p>

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1942	The transarctic passing of the leadership “Baku” and destroyers “Razyarennyi” and “Razumnyi” from Vladivostok to Murmansk with the objective to reinforce the Northern Fleet. The ships went 7,360 miles in 762 running hours, with the average speed of 9.6 knots during the crossing. 1,000 miles were passed in the ice, with the help of icebreakers.
	The beginning of the steering of American aircraft, delivered to the USSR by the lend-lease, by Alaska-Siberia air route.
1942–1943	The comprehensive hydrographic expedition headed by F. F. Baranov on the hydrographic vessels “Papanin” and “Vest” conducted the survey of the coastal waters between the Khatanga Bay and the Olenyok River.
1943–1944	The expedition under the command of Y. A. Borindo conducted comprehensive hydrographic works along the coast from the Bering Strait to the Kolyuchiskaya Bay.
1945	The hydrographic expedition headed by P. Y. Mikhalev was performing surveys in the region of Bolshevik Island.
	The pilot M. A. Titlov (the navigator V. I. Akkuratov) flew around the Central Arctic Basin with visiting the North Pole, crossing the Siberian Islands, the East Siberian Sea, and the landing on the Chokurdakh aerodrome, near the Indigirka River.
	The research by N. A. Volkov “The Ice of the Chukchi Sea in the Connection of the Hydro-Meteorological Conditions” was published among the Works of Arctic and Antarctic Research Institute (AARI).
	The book by N. N. Zubov, <i>The Ice of the Arctic</i> , was published.
1946	The strategic air exploration of the Laptev Sea.
	The book by D. B. Karelin, <i>The Laptev Sea. The Popular Science and Physical Geography Essay</i> , was published.
	The Eastern Oceanographic expedition on the icebreaker “Severnyi Polyus” in the Chukchi Sea and the East Siberian Sea reached the record free navigation latitude of 73°44'N in the Chukchi Sea.
1947	The USSR government adopted the plan of designing and construction of the power icebreakers for assuring the navigation on the Arctic.
	The vessel “Mossovet” was crushed in the ice in the De Long Channel.
	The lector of the All-Soviet lecturing bureau of the Ministry of Tertiary Education I. I. Ermashev delivered the lecture “The Polar Strategy and Expansion” in the Polytechnic Museum in Moscow.
1947–1957	The all-inclusive physics-geographical expeditions to the New Siberian Islands and the De Long Archipelago under the leadership of B. N. Gorodkov and G. V. Gorbatskiy.
1948	The expedition on the icebreaker “Fedor Litke” conducted a hydrological cut in the Laptev Sea and did the research of the process of the formation of the Taymyr ice massif.
	The Chief Directorate of the Northern Sea Route published the book by V. Y. Vize <i>The Seas of the Soviet Arctic</i> .
	Since the Cold War started, the Eskimos of Chukotka and Alaska were denied the opportunity to maintain their relations.
1949	The Tiksi Port was open to host surface vessels and submarines for their winter breaks.
	The book by the geologist and paleontologist V. N. Saks, <i>The Quaternary Period in the Soviet Arctic</i> , was published.
1950	The Headquarters of the Naval Forces published the “Atlas of the Arctic Ocean,” the first volume of the “Sea Atlas.”
1952	The book by A. A. Kordikov, <i>The Precipitation of the Laptev Sea</i> , was published in Moscow.
1954	The book by N. N. Zubov, <i>Our National Sea Navigators – the Explorers of Seas and Oceans</i> , was published.
1955	The Zhokhov Arctic station came on stream on the Zhokhov Island.
1956	The US operation “Homerun” with the objective of collecting the intelligence data by military aviation on the Soviet territory (156 flights). At the final stage of the operation, six planes penetrated the USSR air space above Ambarchik, the North Siberian Sea coast in Yakutia, flew over Anadyr, and left the USSR over the Bering Strait, landing on the military base of Yaleson in Alaska.
	A large group of the ships of the Baltic Fleet went through the Bering Strait.

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	The Special Mission Expedition “EON-56” took place. The steering of a squadron of ships, consisting of 45 units, two cruisers “Aleksandr Suvorov” and “Akademik Lazarev,” five guarding ships, twelve “big hunters,” two fire cutters, tankers, and 14 submarines, was performed. The trip was provided for by all the icebreakers available in the North.
1957	Eight submarines of the Baltic Fleet, after the wintering in the Kolyma Delta, went through the Chukchi Sea and the Bering Strait and entered the Providence Bay. The book <i>The Geology of the Soviet Arctic</i> was published in Moscow.
1957–1958	Holding the Third International Arctic Year (was called the International Geophysics Year).
1958	The first American nuclear submarine “Nautilus” under the command of Bill Anderson went from Seattle, Alaska, through the Bering Strait, entered the Chukchi Sea, and passed the North Pole under ice.
1959	The book by the corresponding member of the Academy of Sciences of the USSR, A. V. Efimov, <i>From the History of Great Russian Geographic Discoveries in the Arctic and Pacific Oceans in the Seventeenth – the First Half of the Eighteenth Centuries</i> , was published.
1961	The American drifting station “Arlis-2” was set up in the Chukchi Sea, 150 km to the north from Cape Barrow. The Arctic Expedition “North Pole-10” was disembarked off the nuclear ship “Lenin” on drifting ice in the North Siberian Sea. For the first time in history, the passing of icebreakers and transport ships through challenging the Krasnoy Armii Channel and the Severnaya Zemlya Archipelago. Leningrad Research Institute of the Radioactive Hygiene started the radiologic monitoring of the whole Arctic coast of the USSR.
1962	The Soviet diesel electric motor ship “Amguema” was the first to conduct the threefold through voyage by the Northeastern Passage. The US icebreakers “North Wind” and “Burton Island” performed the joint navigation in the Bering and Chukchi Seas. A plane from the American airbase on Cape Barrow, Alaska, dropped two paratroopers from the Intelligence Service Department of the US Ministry of Defense on the discovered Soviet drifting station “North Pole-8” (SP-8). In the wake of that, during the “Cold Sweat” operation, Americans took the load of the samples of the equipment, photographs, and records of SP-8 to deliver them to the USA.
1963	The Soviet nuclear submarine of Pacific Ocean Fleet “K-178,” after conducting several surfacings in the region of the drifting stations “North Pole-2” and “North Pole-12,” passed overwater into the Pacific Ocean through the Bering Strait. The US icebreaker “North Wind” plied near the Bering Strait to Cape Shelaginskiy, the North Siberian Sea. The US icebreaker “Burton Island,” in an attempt to go by the Northeastern Passage, went by the Dmitry Laptev Channel into the Laptev Sea, but was forced to return due to the faulty steering wheel. The first passing of the Soviet nuclear submarine “K-115” by the Northeastern Passage from the west to the east.
1963–1967	The first Pacific Ocean hydrographic expedition by the hydrographic vessels “Vostok,” “Rumb,” and the icebreaker “Peresvet” conducted surveys in the southern part of the Chukchi Sea on their way.
1964	The research by V. A. Esakov, A. F. Plakhotnik, A. I. Alekseev “The Russian Ocean and Sea Exploration in the nineteenth and the beginning of twentieth centuries” was published by “Nauka” (Science).
1965	The timber carrier ship “Vitimles” sank in the region of Shalaurov Island in the result of the damage from the ice. The icebreaker “Admiral Lazarev,” sinking in the region of Ayon Island, was saved by the icebreaker “Leningrad.”
1968	On 21 February, four Englishmen, under the leadership of W. Herbert, departed from Cape Barrow on dog sledges. On 5 April 1969, they reached the North Pole (by a major axis), and on 29 May they arrived at the northern coast of Spitzbergen. The American of Chinese descent, the engineer Tung-Yen-Lin, gave a comprehensive assessment of the Bering Bridge project and estimated its construction to cost four billion dollars.

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1969	The book by M. I. Belov, <i>The History of the Discovery and Exploration of the Northern Sea Route</i> , was published.
1970	A group of tourists from Moscow performed a ski crossing on the route of Lake Taymyr-Faddey Bay-Komsomolskaya Pravda Islands-Cape Pronchishchev-Cape Papanin-Cape Chelyuskin. volume 26 of "The Islands of the Soviet Arctic" of the series "The Geology of the USSR" was published. The book <i>The Soviet Arctic (the Seas and Islands of the Arctic Ocean)</i> was published by "Nauka" in Moscow.
1971	The high-latitude (the northernmost of all the European islands) voyage of the nuclear ship "Lenin" which conducted the steering of the icebreaker "Vladivostok" from Murmansk to the Far East.
1972	The Soviet scientific and athletic expedition, headed by D. Shparo, performed a ski crossing of the De Long Channel from Chukotka to Wrangel Island.
1973	The international Agreement on the Conservation of White Bears was signed in Oslo, Norway, by Denmark, Norway, the USSR, the USA, and Canada. The book by M. I. Belov, <i>The Feat of Semen Dezhnev</i> , was published in Moscow.
1975	Under the agreement with the USA, 20 head of musk buffalo were transported by air from Nunivak Island to Wrangel Island and Taymyr Peninsula for acclimatization.
1976	The fundamental research "Beringia in Cenozoic" was published by the Far-Eastern Scientific Research Centre of the Academy of Sciences of the USSR.
1977	The nuclear icebreaker "Arktika" reached the North Pole in 13 days, having crossed the Barents and Kara Seas, the Matisen and Vilkitskiy Channels, and the central part of the Laptev Sea.
1978	Cape Krusenstern (Alaska, USA) was included in Cape Krusenstern National Monument.
1979	The expedition of the newspaper <i>Komsomolskaya Pravda</i> was lead by D. Shparo set off to the North Pole from Henrietta Island. The translation of "The Bering Strait" (written by L. K. Coachman, K. Aagaard and R. B. Tripp) was published in Leningrad.
1980	"The Atlas of World Oceans. The Arctic Ocean" was published in Leningrad by the Hydrographic Directorate of the Defense Ministry of the USSR.
1982	The book by A. D. Dobrovolskiy and B. S. Zalogin, <i>The Seas of the USSR</i> , was published by Moscow State University Press.
1983	The atomic-powered vessel "Arktika" (Captain A. A. Lemekhov) rescued 32 ships, captured in the ice of the North Siberian and Chukchi Seas. The convoy of ships steered by the icebreaker "Kapitan Sorokin" was crushed in the ice in the Chukchi Sea. The dry cargo ship "Nina Sagaydak" sank under the ice. There were no victims; 51 crew members were saved. The historic-biographic film "Semen Dezhnev" was released.
1984	The decree of the Presidium of the Supreme Council of the USSR "On the Reinforcement of the Nature Conservation in the regions of the Far North and the Maritime Area Surrounding the Northern Coast of the USSR."
1985	The volume "The Arctic and Antarctic Oceans" in the series "The Geography of the World Ocean" was published. It provided the comprehensive characteristics of the Arctic Seas, including the North Siberian Sea. "The Atlas of the Arctic" by A. F. Treshnikov was published in Moscow.
1987	The book by D. Shparo and A. Shumilov, <i>To the North</i> , was published in Moscow. The research (by A. A. Aksenov, N. N. Dunaev, A. S. Ionin, and others) "The Arctic Shelf of Eurasia in the Late Quaternary Period" was published in Moscow by "Nauka."
1988	The American swimmer Linn Cox covered the distance of 4 km between the Diomed Islands. The meeting of the Alaska and Chukchi Eskimos after the end of the Cold War. The fundamental research "The Arctic Seas. Climatology, oceanography, geology, biology" (the editor Ivonne Herman) was published in New York, USA.
1989	"Chelyuskin," lying at the depth of 50 m, was found by the Soviet hydrographical vessel "Dmitriy Laptev." Arctic and Antarctic Research Institute published the atlas "The Manuel on the Consideration of the Dangerous Ice Impact on the Navigation Safety in the Arctic" by A. I. Murzin, V. A. Voyevodin, V. V. Panov, V. Y. Benzeman.

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	The Agreement between the USSR and USA governments on the Regional Committee of the Bering Strait.
	The Resolution by the State Committee under the Council of Ministers of the USSR defined the Arctic zone of the Russian Federation.
1990	The Agreement on the Maritime Demarcation Line between the USSR and the USA in the northern part of the Pacific Ocean and the Arctic Ocean (also known as Shevnamadze-Baker Pact) was signed in the course of the state visit of USSR President Mikhail Gorbachev to the USA. The mutual agreement on the creation of the Soviet-American international park "Beringia" in the region of the Bering Strait was also adopted by the presidents of the USSR and the USA.
	The International Arctic Scientific Committee was set up.
	The book <i>The Ecosystem of the New Siberian Shallow Water and the Fauna of the Laptev Sea</i> was published in Leningrad by "Nauka."
1991	The Declaration on the Environmental Protection of the Arctic (Rovaniemi Declaration) was signed by the Arctic States Canada, Denmark (including Greenland and the Faroe Islands), Finland, Iceland, Norway, Russia, Sweden, and the USA. They also adopted the Strategy of the Arctic Nature Conservation.
	"The Northern Sea Route Navigation Regulations" were adopted in Russia.
	The international nonprofit organization "Interhemispheric Bering Strait Tunnel and Railroad Group" (IBSTRG) was registered in the USA (the Russian name is "Transcontinental").
1992	The Moscow expedition of the All-Soviet Research Institute of the Environmental Protection worked on Bolshevik Island.
	The book <i>The Research on the Ecosystem of the Bering and Chukchi Seas</i> under the edition of Y. A. Izrael and A. V. Tsyban was published in St. Petersburg.
1992–1995	The implementation of the State scientific-technical program "The Comprehensive Surveys of the Seas and Oceans of the Arctic and Antarctic."
1993	The expedition on the American icebreaker "Polar Star" with the objective to survey the radioactive contamination of ice debris.
	The largest national park of Russia, "The Big Arctic National Park" was created.
1993–1998	The realization of the international research program "The Northern Sea Route" (INSROP).
1993, 1995–1998	The Russian-German expedition on the icebreaker "Polarstern" with the objective to explore radioactivity of the bottom deposits of the Laptev Sea.
1994	The book <i>The Scientific Results of the LAPEX-93 Expedition</i> was published in St. Petersburg.
	The book <i>The Hydrological Regime of the Kara, Laptev and East Siberian Seas</i> (by V. K. Pavlov, G. A. Timokhov, M. Y. Balkakov, and others) was published in St. Petersburg.
	The Russian-Swedish expedition "The Ecology of the Tundra-94" on the Russian scientific research vessel "Akademik Fedorov," in the memory of A. E. Nordenskiöld's expedition on "Vega" (1878–1879).
	The Centre-B for the world data "Sea Ice" was established in Russia.
	The Arctic international scientific committee started the project "The Aftereffects of the Climate Change in the Arctic."
	"The Mead Plan for American Siberia" project by the senior political council of the Institute of the World Politics V. R. Mead, on the US purchase of Siberia from Russia was published in the "GQ" journal, USA. It considered the territory to the east of the Yenisei River. It estimated the cost of Siberia at \$3 trillion, at a rate of one hundred dollars per acre (0.4 ha).
1995	The volume of collected articles "Chukotka: the environmental-economical essay" was published in Moscow by "Art-Liteks."
	"The Northern Sea Route Through-Navigation Directions" was published in St. Petersburg.
	The Russian Federation law "On the Continental Shelf of the Russian Federation" was adopted.
1996	The Federal law "On the Basics of the State Regulation of the Social-Economic Development of the Russian Federation" was adopted.
	The first German expedition to the Barents, Kara, and Laptev seas and the eastern region of the Arctic Ocean Basin with the purpose to support the implementation of the oceanographic objectives within the Program of the Arctic Climate System Study (ACSYS).

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	<p>The Arctic Council was set up based on the Arctic Environmental Protection Strategy.</p> <p>The Declaration on establishing the Arctic Council as the intergovernmental forum on collaboration, coordination, and interaction among the Arctic states was signed in Ottawa, Canada.</p> <p>The conference of the working party on collaboration within the intergovernmental committee Gore-Chernomyrdin "Russian Far East – the US West Coast" was held in Anchorage, Alaska, USA.</p> <p>The analytical survey "The Russian Arctic: On the Brink of Catastrophe" under general edition of A. V. Yablokov was published in Moscow by the Russian Ecological Policy Centre.</p> <p>The first stage of research and development of the general conception of the project of the construction of the transcontinental railway America-Siberia and the tunnel under the Bering Strait was completed. Over 50 Russian and American companies took part in the project.</p> <p>The essay "The Ecology of the Bering Strait. The Russian Literature Image" edited by O. A. Mathisen and K. O. Coyle was published in Fairbanks, USA.</p>
1997	<p>The "Valuation Report on the Arctic Monitoring Program and the Arctic Council" and the "Report on the Arctic Environmental Condition" were prepared.</p> <p>The Third International Conference "The Exploration of the Russian Arctic Sea Shelf" took place in St. Petersburg.</p> <p>The essay by A. N. Chilingarov and E. M. Kokorev "Contemplations of the Russian North" was published.</p> <p>The fundamental research "The History of the Russian America. 1732–1867" (in three volumes, edited by Academic N. N. Bolkhovitinov) was published in Moscow by "Mezhdunarodnye Otnosheniya."</p> <p>The scientific research project on the exploration of the aurora Polaris HAARP (High Frequency Active Auroral Research Program) was launched in Gakona, Alaska, USA.</p>
1998	<p>The German Arctic expedition on the scientific icebreaker "Polarstern" conducted large-scale surveys in the Laptev Sea near the borders of the Russian Federation 300-mile economic zone.</p> <p>The Federal law "On the Exclusive Arctic Zone of the Russian Federation" was adopted.</p> <p>The International Codex of the Security of the Vessels Navigating in the Arctic Waters was developed.</p> <p>The book by Y. A. Pavlidis, A. S. Ionin, F. A. Shcherbakov N. N. Dunaev and S. L. Nikiforov <i>The Arctic Shelf: The History of the Late Quaternary Period as the Basis for Projection</i> was published.</p> <p>The book <i>The Dynamics of the Russian Arctic Coasts</i> was published in Moscow by Moscow State University.</p>
1999	<p>The international seminar "The Dryland-Ocean Interaction in the Russian Arctic" was held in Moscow.</p> <p>The expedition of the Archeology Institute of the Russian Academy of Sciences and the "Adventure" Club of Dmitriy Shparo performed an exhumation and reburial of the spouses Pronchishchev remains, in the course of which the reconstruction of their faces was done, their portraits were drawn, and also the cause of V. V. Pronchishchev's death was ascertained.</p> <p>The fundamental research of Russian and German scientists <i>Land Ocean Systems in the Siberian Arctic: Dynamics and History</i> was published in Germany by Springer publishing house.</p> <p>Kluwer Academic Publishers, Amsterdam, published the book <i>National Security and International Cooperation in the Arctic – the Case of the Northern Sea Route</i>, edited by Østreng Willy.</p> <p>The book by B. S. Zalagin and A. N. Kosarev, <i>The Seas</i>, was published in Moscow.</p>
	<b>Twenty-first century</b>
2001	<p>The Russian Ministry of Foreign Affairs submitted a claim on the continental shelf to the UN Committee. It targeted to expand the shelf possessions of the Russian Federation from Siberia to almost the North Pole. The subject of the claim was to include the Lomonosov Ridge in Russian continental shelf.</p> <p>The UN Committee rejected the claim of Russia for the Arctic shelf (the territory of the Lomonosov Ridge, the Mendeleev Ridge, the Podvodnikov Basin, and also parts of the Makarov and Amundsen Basins) with a total area of 1.2 million km<sup>2</sup>, on the grounds of insufficient scientific research.</p> <p>"The Non-Profit Partnership on the Coordination of the Exploitation of the Northern Sea Route" was set up to coordinate the activity of Russian users of the Northern Sea Route.</p> <p>The Maritime doctrine of the Russian Federation was established, for the period until 2020.</p>

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	The essay "The Experience of Systematic Oceanological Research in the Arctic" was published in Moscow.
	The book <i>My Home, the Arctic. The History of North Exploration in the Biographies of the Famous People</i> was published in Moscow (compiled by V. I. Magidovich).
	The monograph by A. Y. Gukov <i>Hydrobiology of the Lena Delta</i> was published in Moscow.
2002	The shallow-draft diesel-electrical icebreaker "Kapitan Dranitsyn" (the only ice breaker in the world with the standard international certification of a passenger carrier) participated in the Russian-American expedition "AVLAP-2002" on the exploration of the Laptev Sea bottom shelf and, also, the state of the sea nature system.
	The Russian-German scientific expedition "Lena-2002."
	The book <i>The Arctic: the Interests of Russia and the International Conditions of Their Realization</i> .
2003	The conference "The Research into the Ecological Changes in the Arctic" was held in Seattle, USA. It was organized by the Bureau of the Arctic programs of the US National Scientific Fund, NASA, NOAA, and the International Arctic Research Committee and attended by 400 scientists.
	A five-meter cross and a memorial plaque were installed on Bennett Island in honor of a centenary since the expedition of A. V. Kolchak rescued the expedition of E. V. Toll.
	The book by N. K. Zheleznov-Chukotskiy, N. A. Sekretarev, T. I. Astakhov, and others <i>The Natural Conditions and Resources of the Chukotka Peninsula</i> was published in Moscow by "GEOS."
2003–2005	The Far East Department of the Russian Academy of Sciences together with the International Arctic Research Center of Fairbanks University realized the project "The Environmental Changes in the East-Siberian Region under the Influence of Global Climate Change and Catastrophic Processes" (All-Academic Program 13).
2004	"Climatic Atlas of the Arctic Seas, Part 1. The Barents, Kara, Laptev and White Sea Oceanographic and Marine Biology Data Base," by G. Matishov, A. Zuev, V. Golubev and others, was published in Germany by Springer publishing house.
	A geological expedition to the Laptev Sea within the Russian-German project "The Laptev Sea System."
	"North Encyclopedia" was published in Moscow by "European Editions and North Spaces."
	The UN Environmental Program (UNEP) and the European Environmental Agency published the report "The Arctic Environment: European Prospects"
	The expedition on the scientific vessel "Akademik Lavrentyev" with the objective to find "Chelyuskin" failed.
	Severe oil contamination of the Chukotka Peninsula in the area between the Neshkan Peninsula and Idlidlya Island. 700 birds died.
	The book by Brubaker R. Douglas, <i>The Russian Arctic Straits</i> , was published by Martinus Nijhoff Publishers, Leiden, Germany.
	The participants of the international project "The Impact of the Arctic Climate Change" presented the report "The Impact of Global Warming in the Arctic."
2005	Russian, Norwegian, and German scientists were awarded Decartes Prize for Arctic Exploration (for the research into the forecast of the future condition of the Arctic ice).
	The book by P. M. Borisov <i>Can Man Change the Climate. Two Projects</i> was published in Moscow. One of the projects under discussion: "The direct flow of the warm Atlantic waters through the Atlantic Basin into the Pacific Ocean as the basis for gradual climatic improvement." This project is based on the construction of a dam across the Bering Strait.
2006	"The Arctic Fund" under the agreement in force between RosGidroMet (the Russian Hydro-Meteorological Service) and the National Oceanic and Atmospheric Administration (NOAA) USA constructed a new building for the climate monitoring observatory in Tiksi.
	Russian underwater archeologists discovered the scene of the steamship "Chelyuskin" wreckage and raised to the surface its fragments which required to be checked in Denmark where the ship had been built on the order from the Soviet government.
2007	The realization of the comprehensive research (during 100 days) in the basins of the Barents, Kara, Laptev, and Eastern Siberian seas within the "BARKALAV" program of the Russian Arctic and Antarctic Research Institute.
	The international conference "Transcontinental Artery Eurasia-America across the Bering Strait."

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	<p>President of the Russian federation V. V. Putin considered and principally approved of the strategy of the development of the Russian railway transport system which included the construction of the transcontinental railway link Pravaya Lena-Zyryanka-Uelen (over 3,500 km long) with the exit to the Bering Strait.</p> <p>Under the initiative of the inhabitants of Vankarem and the support of the World Fund on the Russian Wildlife Conservation, the administration of the Chukotskiy AO (federal district) founded the national park “Cape Vankarem,” with the objective to preserve a large (40,000) Pacific walrus breeding ground.</p> <p>Over 1,000 dead walrus were found on the Chukchi Sea coast from Kolyuchinskaya Bay to Cape Schmidt (about 359 km).</p> <p>The photo album “Arctic Russia. Russian Hydro-Meteorological Stations in the High Latitude Area” was published in Moscow.</p>
2007–2009	The International Polar Year.
2008	<p>The Security Council of the Russian Federation approved of the “General State Policy of the Russian Federation in the Arctic for the period until 2020 and Further Prospects” (published in 2009).</p> <p>The book <i>Stalin: the Arctic Shield</i>, by Y. N. Zhukov, was published in Moscow.</p> <p>The conference of the Ministers of Foreign Affairs from five coastal Arctic states was held in Ilulissat, Greenland. The Declaration was signed.</p> <p>The book by V. Y. Vize (under the general edition of P. V. Boyarskiy and Y. K. Burlakov), <i>The Seas of the Russian Arctic</i>, was published in Moscow by “Evropeiskiye Izdaniya” (European Editions).</p> <p>The book by M. I. Tsiporukh, <i>The Seas of the Russian Arctic</i>, was published.</p> <p>The oil company Royal Dutch Shell paid \$ 2.1 billion for 275 block licenses in the Chukchi Sea.</p> <p>President of the Russian federation D. A. Medvedev approved of the “General State Policy of the Russian Federation in the Arctic for the period until 2020 and Further Prospects” (Russian Arctic Strategy).</p> <p>The American expedition on the icebreaker “Healy” on cartography of the Chukchi Sea basin to the north of Alaska with the area of 400–600 miles.</p> <p>The international scientific conference “Arctic explorations – the prospects of the Arctic and Antarctic research in the period of the International Arctic Year” took place in St. Petersburg.</p> <p>For the first time in many years, the Russian frontier ship wet through the Northeast Passage.</p>
2009	The book by A. N. Chilingarov, V. M. Gruzinov, and Yu. F. Sychoy, <i>Essay on Arctic Geography</i> , was published in Moscow.
2010	<p>The first voyage of the tanker “Baltika” along the Northeast Passage (Northern Sea Route) from Murmansk to Ningbo, China. The ship belonging to “Sovkomflot” is equipped with a gas condensate of the Aphramax dimension type (over 100,000 tons).</p> <p>The first international forum “Arctic is the Territory of Dialogue” was held in Moscow.</p> <p>The NTV channel of the Russian television showed the serial documentary “Battle for the North.”</p> <p>The scientific and practical expedition “Arktika-2010” (Taymyr-the New Siberian Islands-Yakutia-Novaya Zemlya) took place. It was organized by the “Adventure” club of Dmitriy Shparo to celebrate the 165th anniversary of the Russian Geographical Society.</p> <p>The expedition “LAPEKS-2010” on “Nikolay Evgenov” took place.</p> <p>The rescue tugboat “Neotrazimiy” with 37 people on board (the crew, a rescue team, EMERCOM, and the Russian Academy of Sciences specialists) covered over 10,000 miles in 74 days on the route Arkhangelsk-Anadyr. The members of the expedition worked on the Novaya Zemlya Archipelago, in the sea ports of Tiksi, Dudinka, Dikson, Pevek, and Providence Bay Anadyr, and performed works in the eastern part of the Kara Sea.</p> <p>The government of the Russian Federation approved of “The Strategy of the Development of Marine Activity of the Russian Federation until 2030.”</p> <p>The book by E. U. Mironov, <i>Ice Conditions, Dangerous for the Arctic Navigation</i>, was published.</p> <p>The first guidebook on the Far East Federal District <i>Russian Far East</i> was published in Moscow.</p> <p>The book by A. Indzhiev, <i>Battle for the Arctic. Will the North be Russian?</i>, was published in Moscow.</p> <p>The international conference on shipbuilding and construction in the ice conditions, Ice Tech, was held in Anchorage, Alaska, USA.</p>

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	The motor ship “Georg Ots” was the first passenger ship to go through the Northeastern Passage. It covered the distance from St. Petersburg to Vladivostok in 41 days and the Northeastern Passage in 16 days.
	The atomic icebreaker “Rossiya” performed the steering of the Swedish icebreaker towboat “Tor Viking” from the Bering Strait to the ice edge in the Barents Sea. The first in history winter steering through the Northeastern Passage took 9 days.
2011	The expedition “Arktika-2011” took place, which was performed with the help of the atomic icebreaker “Rossiya” from Rosatomflot (Russian Atomic Fleet).
	The WWF (World Wildlife Fund) Report which was published in 2007 by the WWF International Arctic Program in Oslo, Norway “Oil Spills. The Problems Connected with Liquidating the Consequences of Oil Spills in the Arctic Seas” was published in Russian.
	The Russian-German working conference on the scientific research in the area of the Laptev Sea was held in the Arctic and Antarctic Research Institute in St. Petersburg, Russia.
	The 19th Russian-German expedition “Transdrift” took place, within the project “The Laptev Sea System.”
	A Russian-American expedition on the ice of the Buor-Khaya Bay of the Laptev Sea took place.
	The Ministers of Foreign Affairs of Denmark, Iceland, Canada, Norway, Russia, the USA, Finland, and Sweden signed the “Agreement on Collaboration in Air and Marine Search and Rescue in the Arctic”
	The Russian-German seminar “Oceanographic Research in the Arctic took place in Murmansk.
	The second international forum “Arctic is the Territory of Dialogue” was held in Arkhangelsk.
	The International Arctic Forum “Steady Development of the Arctic: Legal Aspects” took place in Salekhard, Russia.
	The book by Honored Polar Explorer Dr. V. S. Koryakin, “ <i>Chelyuskin</i> ” <i>Epopee</i> , was published in Moscow.
	The international conference “Transcontinental Artery Eurasia-America” took place. The Russian representative reported that the current variant of the project implies constructing a poly-artery, combining a speed electric railway, a highway, a power line, and a communication line in one corridor. The cost of the project is estimated at \$30–35 billion, to be repaid in 13–15 years.
	The American expedition on the research icebreaker “Healy” within the research program ICESCAPE with the objective to study the impact of climate change on the ecology of the Arctic.
	The Geology Service of the USA published the report “An Evaluation of the Science Need to Inform Decisions on Outer Continental Shelf” Energy Development in the Chukchi and Beaufort Seas, Alaska”.
	The book by S. A. Terentyev, <i>Arctic and Antarctic</i> , was published in Moscow.
	The collection of articles “Russia in the Arctic,” edited by S. O. Blank, was published by the Institute of Strategic Research, USA.
2012	President V. V. Putin announced that it is necessary to expand the excess of the oil and gas companies to the development of northern locations.
	The 20th Russian-German scientific expedition to the Laptev Sea with the objective to survey the Great Siberian Glade took place.
	The Russian Geographical Society, Ministry of Nature Resources, “Sevmorgeo,” and the Arctic Fund began the works on clearing the Arctic islands of rubbish that had accumulated during the years of their exploration and use.
	The first Russian-Chinese forum on the problems of the Arctic took place in Qingdao, China.
	President V. V. Putin signed the Federal law “On Amendments to Certain Legislative Acts of the Russian Federation Concerning the State Regulation of Maritime Navigation in the Northeast Passage Basin.”
	The conference “Oil and Gas of Russian Arctic” took place in Moscow.
	The book <i>Natural Security of the Arctic Ocean</i> , edited by Prof. A. N. Vylegzhanin and Paul A. Berkman, was published in Germany by Springer publishing house.
	A series of amendments to the Federal law “On the Continental Shelf of the Russian Federation” were approved.

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	The Decree of the government of the Russian Federation on creating a safeguard zone of “Wrangel Island” State Natural Reserve.
	The book by N. Marchenko, <i>The Seas of the Russian Arctic: Navigation Conditions and Accidents</i> , was published in Germany by Springer. It was written under the project “Offshore and Coastal Technology for Oil Production and Transportation from the Arctic Waters” (PetroArctic).
	The French swimmer Fillippe Croizon, who has partially amputated limbs, crossed the Bering Strait between the islands of Ratmanov (Russia) and Krusenstern (USA) in the course of his around-the-world voyage.
2013	Remains of a mammoth were discovered on the Lyakhovsky Islands. They contained preserved blood of the animal, which allowed to raise the question about cloning extinct species.
	The book by V. K. Zilanov, <i>Is Russia Losing the Arctic?</i> , was published in Moscow.
	The Third International Forum “Arctic is the Territory of Dialogue” was held in Salekhard.
	The cruiser “Petr Velikiy” approached the New Siberian Islands for the troops to descend on Kotelniy Island.
	The eighth session of the Arctic Council was held in Kiruna, Sweden.
	President V. V. Putin approved of “Strategy of Development of the Arctic Zone of the Russian Federation and Provision of National Security for the period until 2020.”
	The book by I. S. Zonn and S. S. Zhiltsov, <i>The Arctic Chase – to Seize and Drill Out</i> , was published in Moscow.
	The Arctic Explorer’s Day was established in Russia (21 May).
	The International forum on the White Bear Conservation was held in Moscow.
	The Federal State Official Organization “Administration of the Northern Sea Route” was set up.
	The work of the Scientific Research Institute of War History “The Russian North in Military and Economic Terms” was published.
	The monograph <i>The System of the Laptev and Surrounding Arctic Seas: Contemporary Condition and History of Development</i> edited by K. Kassen, A. P. Lisitsyn, Y. Tide, E. I. Polyakov, L. A. Timokhov, and I. E. Frolov was published in Moscow.
	The decree of the Government of the Russian Federation “On Implementation of Budget Investment into the Construction of Two Series All-Purpose Atomic Icebreakers” was adopted (it implied the construction and commissioning of three all-purpose atomic icebreakers, including the head icebreaker, before the end of 2017).
	The book by I. S. Zonn, A. G. Kostianoy, and M. I. Kumantsov, <i>The Chukchi Sea. Encyclopedia</i> (in Russian), was published in Moscow.
2014	In Moscow, the German Historical Institute hosted international Conference “Soviet Arctic: development, research and images.”
	Russia and South Korea for the first time discussed the ways of cooperation in the Arctic.
	A book-album “Arctic necropolis” by G.P. Avetisov was published in St.-Petersburg.
	A book “Provision of Russia’s national interests in the Arctic” prepared by the Western Military District, the Military Academy of the General Staff of the Russian Armed Forces, the Institute of Military History, the State Polar Academy was published in St.-Petersburg.
	In the Arctic, on the landing site “Temp” on the New Siberian Islands, the Russian Defense Ministry conducted large-scale exercises involving airborne troops.
	In Moscow, a series of “Naval Chronicle” published the book “In ice and under the ice” by V.G. Redanskiy and “Commanders of the polar seas” by N.A. Cherkashin.
	R/V “Akademik Fedorov” in conjunction with atomic icebreaker “Yamal” conducted an expedition “Shelf-2014” on the project “Additional hydrographic work on the definition and justification of the outer limits of the continental shelf of the Russian Federation in the Arctic Ocean.”
	The Russian Ministry of Economic Development established an interdepartmental working group for the organization of works on creation of a National Atlas of the Arctic.
	In the USA, a book “Russia’s Arctic Strategies and the Future of the Far North” by Marlene Laruelle was published.
	On the initiative of the Ministry of Higher Education and Sciences of Denmark a Forum for Arctic research was organized.

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	Korean Institute of Polar Research (KOPRI) and the Norwegian Polar Institute (NPI) opened a joint Center of Polar Research in Tromsø, Norway
	A book "Submariners go under the ice" by M.P. Komarov was published in St.-Petersburg. It includes the description of 400 trips of submarines of USSR, United States, Britain, Russia under the ice in the Arctic Ocean.
	Corporation Daewoo Ship Building & Maritime Corporation has received a contract to build 9 LNG-icebreakers for Russian project on natural gas production on Yamal.
	In Moscow, Center for Strategic Assessments and forecasts published a report "The observer countries in the Arctic Council: the position and motives of activity."
	Interagency and interstate USA, France, South Korea, the UK team of scientists launched an ambitious experiment in the ice marginal zone of the Arctic Ocean with the largest arsenal of robotic equipment. Experiment completion is scheduled for 2017.
	International expedition (SWERUS-S3) with 84 researchers from 14 countries on the Swedish icebreaker "Oden" to assess the massive release of methane from the sea bottom sediments started in the Eastern Arctic.
	A new Strategic Command of Russian Armed Forces in the Arctic was organized on the basis of the Northern Fleet.
	A book of Arthur Conan Doyle "Dangerous work. Diary of an Arctic adventure" was published in Moscow by Paulsen Publishers.
	Russian President Vladimir Putin signed a decree "On the land territory of the Russian Arctic."
	Northern Arctic Federal University, Arkhangelsk published a collection of abstracts of All-Russian conference with international participation "The State of the Arctic seas and areas under conditions of climate change."
	The book by I. S. Zonn and A. G. Kostianoy, <i>The Laptev Sea. Encyclopedia</i> (in Russian), was published in Moscow.
	The book by I. S. Zonn, A. G. Kostianoy, and A. V. Semenov, <i>The East Siberian Sea. Encyclopedia</i> (in Russian), was published in Moscow.
2015	The State Commission on Arctic development, chaired by Deputy Prime Minister D.O. Rogozin was established.
	In Moscow, A.I. Gubanov (Moscow State University) published a monograph "Delimitation of the continental shelf in the Arctic: the international legal problems and prospects".
	Russia has begun "the industrialization of the Arctic." Until 2020, 220 billion Rubles must be invested in the development of the Arctic.
	Deputy Prime Minister D. Rogozin, Head of the Ministry of Economic Development A. Ulyukaev, Minister of Natural Resources S. Donskoy opened the drifting station "North Pole-2015" in the Arctic Ocean. This event marked the resumption of the program of drifting stations after the evacuation of Russian "North Pole-40" station in 2013.
	The US administration has authorized "Shell" oil company to start drilling on the continental shelf in the Arctic.
	Russian Prime Minister Dmitry Medvedev signed a Project on development of the Northern Sea Route.
	In honor of the 70th anniversary of Victory in the WWII Russian company "Rusavia" organized the Russian-American flight of World War II aircrafts: B-25 bomber, two transport aircraft DC 3, and fighter Bell-P-39 "Aerocobra" along the Lend-Lease way Alaska-Chukotka-Moscow.
	A new edition of "Maritime Doctrine of the Russian Federation", in which a special emphasis was made on the Arctic, was approved.
	The world's first asymmetric icebreaker "Baltika" (one side straight, the other convex) has completed testing in the Arctic.
	The Russian government has allocated 205 million Rubles on the resumption of national research expeditions in the Arctic.
	In the Arctic, on Wrangel Island and Cape O. Schmidt, test flights of Russian drones begun.
	Two rescue vessels for the Russian Arctic "Murman" and "Bering Strait" were built.

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	Russia for the second time made an application to the UN Commission on the Continental Shelf on the extension of the continental shelf in the Arctic. The goal is to increase the Exclusive Economic Zone by 1.2 million square kilometers of the Arctic Ocean.
	Paulsen Publishers, Moscow, in the series “Great British Expeditions” published a book “Journey into the world of cold. 8 poles of Frederik Paulsen” by Charlie Buffet and Thierry Meyer. Eight poles are 4 poles in each hemisphere of the Earth – a geographic, magnetic, geomagnetic and relative inaccessibility. F. Paulsen is the only person to visit all of them.
	The American company Shell abandoned oil production projects on the Arctic shelf off the coast of Alaska after the first well drilled in the Chukchi Sea, which did not show industrial stocks of oil.
	Russia has laid in the Arctic the newest radar warning system against the missile attack.
	Trimaran “Qingdao-China” with an international crew (Russia, China, France, Germany) set a new world record for sailing yachts, sailing along the Northern Sea Route, making his way from Murmansk to the Bering Strait for 13 days.
	The book by I.S. Zonn, A.G. Kostianoy, A.V. Semenov “Millenium of discovery and development of the Arctic Ocean” (in Russian) was published in Moscow.
	The book by I.S. Zonn I.S. and A.G. Kostianoy “The Seas of Russia. Encyclopedia. The Laptev Sea” was published in Moscow.
	The book by I.S. Zonn, A.G. Kostianoy, A.V. Semenov “The Seas of Russia. Encyclopedia. The East-Siberian Sea” was published in Moscow.
	The book by I.S. Zonn, A.G. Kostianoy, M.I. Kumantsov “The Seas of Russia. Encyclopedia. The Chukchi Sea” was published in Moscow.
	The book by I.S. Zonn, A.G. Kostianoy, A.V. Semenov “The Arctic Ocean. Encyclopedia” in two volumes was published in Moscow
2016	US archaeologists-divers found the wreckage of the American whaling fleet sank in 1871 in the Chukchi Sea off the coast of Alaska.
	The book by I.S. Zonn, A.G. Kostianoy, A.V. Semenov “The Eastern Arctic Seas Encyclopedia” was published in Springer.
	The book by I.S. Zonn, A.G. Kostianoy, A.V. Semenov “The Western Arctic Seas Encyclopedia” was published in Springer.



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