Click to verify



```
The Arctic Ocean touches the continents of North America, Europe, and Asia. What three continents touch the Arctic Circle is an imaginary line drawn around the northern part of the world at approximately 66° North. It is one of the two polar circles and also one of the five major circles of latitude that mark the maps of the Earth. It
passes through Asia, Europe, and North America. How many continents border the Arctic Ocean: Europe, Asia, and North America. Some of the countries that border the Arctic Ocean: Europe, Asia, and North America. Some of the countries that border the Arctic Ocean: Europe, Asia, and North America. Some of the Arctic Ocean: Europe, Asia, and North America. Some of the Countries that border the Arctic Ocean: Europe, Asia, and North America.
The Arctic Ocean is surrounded by the land masses of Eurasia (Russia and Norway), North America (Canada and the U.S. state of Alaska), Greenland, and Iceland. Which ocean touches three continents? The Indian Ocean touches Asia, Africa, Australia, and Antarctica. It also connects and links the continents called the Old World, in contrast to the
New World, which is touched by the Atlantic, Pacific, and Arctic Oceans. The Arctic vs. the Antarctic - Camille Seaman There is no information available for this specific article. Which 3 continents are defined strictly as discrete landmasses, embracing all the contiguous land of a body, then Africa, Asia, and
Europe form a single continent which may be referred to as Afro-Eurasia. What country is between 3 continents? The lands of Turkey are located at a point where Europe and Asia meet. In which continent is the Arctic ocean?
The Arctic Ocean is centered approximately on the North Pole. The ocean is almost completely encircled by the landmasses of North America, Eurasia, and Greenland. What continent includes Russia, Finland, Norway, and Sweden,
and the North American coast includes Canada and the U.S. (Alaska). What are 3 characteristics of the Arctic Ocean is Earth's northernmost body of water. It encircles the Arctic Ocean is Earth's northernmost body of water. It encircles the Arctic Ocean is Earth's northernmost body of water. It encircles the Arctic Ocean is Earth's northernmost body of water. It encircles the Arctic Ocean is Earth's northernmost body of water. It encircles the Arctic Ocean is Earth's northernmost body of water. It encircles the Arctic Ocean is Earth's northernmost body of water. It encircles the Arctic Ocean is Earth's northernmost body of water. It encircles the Arctic Ocean is Earth's northernmost body of water. It encircles the Arctic Ocean is Earth's northernmost body of water. It encircles the Arctic Ocean is Earth's northernmost body of water. It encircles the Arctic Ocean is Earth's northernmost body of water. It encircles the Arctic Ocean is Earth's northernmost body of water.
stark on the surface, the Arctic Ocean is home to a stunning array of life. Is Arctic still a continent? The Arctic ocean and nearby seas. Unlike Antarctica, it is not a continent. However, various countries lay claim to different parts of the Arctic Ocean and nearby seas. Unlike Antarctica, it is not a continent? The Arctic still a continent.
the Law of the Sea. What ocean? Asia is bordered by the Arctic Ocean, also known as the Antarctic Ocean, is the coldest and wildest ocean in the world. It surrounds Antarctica and is characterized by extreme cold temperatures. Does Asia border the Arctic ocean? Asia is bordered by the Arctic, Pacific, and Indian Oceans. Asia's physical geography,
environment, and resources, and human geography can be considered separately. What is the biggest ocean of the world? The Pacific Ocean is the largest and deepest of the world? The Pacific ocean basins. Covering approximately 63 million square miles and containing more than half of the free water on Earth, the Pacific is by far the largest of the world's ocean
basins. Which is the only continent covered with ice? Antarctica is the only continent covered with ice. It is Earth's fifth-largest continent and is mostly covered by ice sheets and glaciers. Is Iceland in the Arctic Ocean. Iceland is not in the Arctic Ocean. The northern coast of Iceland is not in the Arctic Ocean. Iceland is not in the Arctic Ocean.
is located in the Atlantic Ocean. Is Arctic Greek or Latin? The word Arctic comes from the Greek word "arktios," which means "near the Bear, northern," and from the word "arktios," which means "near the Bear, northern," and from the word "arktios," which means "near the Bear, northern," and from the word "arktios," which means "near the Bear, northern," and from the word "arktios," which means "near the Bear, northern," and from the word "arktios," which means "near the Bear, northern," and from the word "arktios," which means "near the Bear, northern," and from the word "arktios," which means "near the Bear, northern," and from the word "arktios," which means "near the Bear, northern," and from the word "arktios," which means "near the Bear, northern," and from the word "arktios," which means "near the Bear, northern," and from the word "arktios," which means "near the Bear, northern," and from the word "arktios," which means "near the Bear, northern," and from the word "arktios," which means "near the Bear, northern," and from the word "arktios," which means "near the Bear, northern," and from the word "arktios," which means "near the Bear, northern," and from the word "arktios," which means "near the Bear, northern," and from the word "arktios," which means "near the Bear, northern," and from the word "arktios," which means "near the Bear, northern," and from the word "arktios," which means "near the Bear, northern," and from the word "arktios," which means "near the Bear, northern," and from the word "arktios," which means "near the Bear, northern," and from the word "arktios," which means "near the Bear, northern," and from the word "arktios," which means "near the Bear, northern," and the Bear, northern, and the Bear, nort
landmasses. It is attached to the North American tectonic plate and is not its own separate plate like Australia. Is Antarctic or Arctic bigger? The Arctic covers an area of about 14.2 million square km, while Antarctic or Arctic bigger? The Arctic covers an area of about 14.2 million square km, while Antarctic or Arctic bigger? The A
than Antarctica. Which continent is surrounded by the Arctic ocean to the north? North America is bordered to the north by the Arctic Ocean to the south. Why is Antarctica a continent but not the Arctic? Antarctica is considered a
continent because it is a landmass surrounded by the Southern Ocean. The Arctic, on the other hand, mainly consists of an ocean surrounded by the Southern Ocean. The Arctic ecosystem has a unique, complex food web that is fashioned by its distinctive plankton, animal species, and environmental factors.
Carbon also cycles through the web from atmosphere to seawater and back. Phytoplankton and algae take up carbon dioxide from seawater and transform it into the organic carbon into their own tissues or into sinking fecal pellets. Along the way,
some carbon dioxide escapes back to the atmosphere through the organisms' respiration. Phytoplankton; *see Abiotic vs Biotic* Sponges; Sponges are some of the world's simplest multi-cellular organisms. The sponge's scientific classification is "Porifera", which means pore-bearing, and refers to the countless tiny openings or holes visible on all
sponges. Sponges grow in all different shapes, sizes, colors and textures. Some of the Arctic Ocean's sponge species include; Choanites Luetkeni, Phakellia Cribrosa and Reniera Rufescens. Echinoderms; Adult Echinoderms are usually recognised by their (usually five point) radical symmetry. They are found at the ocean depth. What makes them so
important to an ecosystem is that they reproduce asexually, meaning they can reproduce from only a single limb. Species found in the Arctic Ocean include; Sea Stars, Brittle Stars, Sea Cucumber, Basket Stars, Sea Lilies and Sold Dollars. Ice Algae is one of the most important producers in the Arctic Ocean. Ice Algae grows underneath the
ice surface. Although phytolankton produces faster than ice algae provide food resources for higher trophic level organizations that nisms in seasons and regions where water column biologial production is low or negligible. Arctic Seaweed,
Arctic Seaweed is also a primary producer in the Arctic Ocean. It is located on the ocean floor. Krill; Krill are small crustaceans of the order Euphausiacea, and are found in all the world's oceans. The name krill comes from the Norwegian word krill, meaning "small fry of fish",[1] which is also often attributed to species of fish. Krill feeds on
phytoplankton, so they are considered near the bottom of the food web, at the second trophic level. Clam; Clams belong to the class bivalve, meaning "a shell with two hinged parts." The Arctic Ocean is home to 140 species of bivalves, which vary in their appearance, habitats, feeding mannerisms and defences against predators. Arctic Ocean clams
live on continental shelves and in deeper waters. Some clams, such as Macoma moesta, are sublittoral. This means that they live just below the shoreline. Other clams such as Ennucula tenuis live deeper in the bathyal zone, which is upward of 3,280 feet deep. Clams live and feed on different substrates depending on the depth at which they live. Such
substrates include algae, silt, sand and gravel. Arctic Cod; The Arctic Cod; The Arctic Cod has an unusually short lifespan living only 6-7 years. It feeds on mostly phytoplankton, but is the primary food of many other marine animals. They are small fish, averaging at about 25 cm in length. They only spawn once in their lifetime, with about 11 900 eggs per female.
Bowhead Whale; The head of the bowhead whale comprises a third of its body length, creating an enormous feeding apparatus. The diet consists of mostly zooplankton which includes copepods, amphipods, and many other crustaceans. Approximately 2 tons of food is consumed each day. While foraging, bowheads are solitary or occur in groups of two
to ten or more. Polar Bear, Although it is the sister species of the brown bear, the Polar Bear has evolved to occupy a narrower ecological niche, with many body characteristics adapted for cold temperatures, for moving across snow, ice, and open water, and for hunting seals, which make up most of its diet. Polar Bears will also eat an entire walrus.
Sometimes, they will eat seabirds and their eggs. Here are our Top Ten Arctic Ocean is located in the northern hemisphere north
of 60 degrees North latitude and borders the Eurasian and North American continents and several islands. Below you can see a map showing the Arctic Ocean? The Arctic Ocean? The Arctic Ocean derives its name from the Greek word 'arktos' which means 'bear'. 3. Size: How big is the Arctic Ocean? The
Arctic Ocean is the smallest ocean on earth and covers less than 3% of the earth's surface. Much of the ocean is covered by ice, however the thickness of the ice varies depending on the season. Polar Bear in the Arctic Ocean? The average depth is about 1,038 m/ 3,406 ft - which makes it much less deep than
the Southern Ocean is. The deepest point is the Litke deep with 5,450 m/ 17,880 ft. The ocean has deep trenches and also some ridges, the biggest ridge is Lomonosov Ridge which divides the ocean has deep trenches and also some ridges, the biggest ridge is Lomonosov Ridge which divides the ocean has deep trenches and also some ridges, the biggest ridge is Lomonosov Ridge which divides the ocean has deep trenches and also some ridges, the biggest ridge is Lomonosov Ridge which divides the ocean has deep trenches and also some ridges, the biggest ridge which divides the ocean has deep trenches and also some ridges, the biggest ridge which divides the ocean has deep trenches and also some ridges, the biggest ridge which divides the ocean has deep trenches and also some ridges, the biggest ridge which divides the ocean has deep trenches and also some ridges, the biggest ridge which divides the ocean has deep trenches and also some ridges, the biggest ridge which divides the ocean has deep trenches and also some ridges, the biggest ridge which divides the ocean has deep trenches and also some ridges, the biggest ridge which divides the ocean has deep trenches and also some ridges, the biggest ridge which divides the ocean has deep trenches and also some ridges.
the oceans surface will be covered by ice during June to October. Due to climate change and global warming the ice packs melt in spring and summer and re-freeze in the colder autumn and winter. Ice-breaker ships on their passage through the frozen Arctic Waters. Icebreaker in the Arctic Ocean More Arctic Ocean Facts 6.
Temperature: The sea temperatures of the Arctic Ocean is quite constant and is around -2 degrees C Celsius/ 28 degrees Fahrenheit all year round. The sea ice-packs are affected by wind and ocean currents
On the artic region's islands one will experience permafrost. Permafrost means that soil is frozen for more than two years! The Arctic ice is decreasing because of the increasing temperatures of the ocean waters due to global warming. More ice-packs are melting during summer and less water is freezing in winter every year. Polar bear with cub The
low temperatures in the region, however, do not deter tourists exploring the area on special adventure travels and expeditions. Many visitors experience the Arctic region every year. Most travels are started from Svalbard island in Norway or Nuuk in Greenland. Nuuk in Greenland 7. People in the Arctic Region: Only few explorers ventured beyond
the Arctic circle before the 19th century. The first known explorer who successfully crossed the Arctic Ocean was the Norwegian scientist Fridtjof Nansen in 1896 on his North Pole expedition. Nansen was awarded the Nobel Peace Prize in 1922 for his work with refugees during and after the First World War. People in the Arctic Ocean Several
cultural groups of indigenous people live today in the Arctic region, among them the Inuit, Yupik, Aleut and Saami people as well as Nenets in Russia, They try to still uphold their centuries old traditions such as reindeer herding, fishing and hunting, 8, Arctic Ocean Facts; Animals in the Arctic Ocean, The Arctic Ocean is home to whales, walruses,
polar bears and seals. Walruses on the Beach In the Arctic, seals are hunted for their fur and food. Most of the fur is exported mainly to Asian countries. Animal protection groups protest against the annual seal hunt which takes place between November and May in Canada. It is
illegal to hunt seal pups. Bearded Seal 9. Ports: There are several ports in the Arctic Ocean. The biggest ports are Murmansk in Russia, Kirkenes in Norway and Nuuk in Greenland, Churchill in Canada and Barrow in Alaska/USA. The main Arctic research stations are located along the coastline. Interesting Fact: In Churchill in northern Canada,
there are more polar bears during summer than people! There polar bears can be observed by tourists in their natural habitat. As the ice is melting they come to the settlements to look for food. Read more here. Northern Lights in Norway Another popular attraction for visitors to the polar region are the Northern Lights, also called the Aurora
Canada and the United States of America (USA), Russia, Norway, Iceland and Greenland. "The Northern Lights." VisitGreenland. "Everything Churchill. Last accessed 9 January 2025Travel Manitoba." Everything Churchill. Last
accessed 9 January 2025 Popular Pages Greenland Canada Norway Russia Sweden Finland Image Credits: All images used on this site are sourced from shutterstock.com, freeimages.com and Canva.com or own photos, if not otherwise mentioned.Denmark/Little Mermaid image- Pocholo Calapre/ shutterstock.com, Return from Arctic Ocean Facts to
Kids World Travel Guide Homepage Enjoy this page? Please pay it forward. Here's how... Would you prefer to share this page with others by linking to it? Click on the HTML link code below. Copy and paste it, adding a note of your own, into your blog, a Web page, forums, a blog comment, your Facebook account, or anywhere that someone would find
this page valuable. The Arctic Ocean includes the North Pole region in the middle of the Northern Hemisphere and extends south to about 60°N. The Arctic Ocean is surrounded by Eurasia and North America, and the borders follow topographic features: the Bering Strait on the Pacific side and the Greenland Scotland Ridge on the Atlantic side. What
does the Arctic Circle Cross? An invisible line sweeps across Sweden, Finland, Russia, Alaska, Canada, Greenland, and Iceland - a line that also splits Norway in two. What two oceans is the Arctic Connected to? The Arctic Ocean at the Bering
Strait. Where are the Arctic Circle? Arctic Circle? Arctic Circle, parallel, or line of latitude around the Earth, at approximately 66°30′ N. Because of the Earth's inclination of about 23 1/2° to the vertical, it marks the southern limit of the area within which, for one day or more each year, the Sun does not set (about June 21) or rise (about December 21). What
continents do not touch the Arctic Ocean? Antarctica. Which continents touch the Arctic Ocean not touch? The Arctic Ocean are Canada, the United... What three
continents touch the Arctic Circle? The Arctic Circle runs through three continents: Asia, Europe, and North America. The primary difference between the Arctic acontinent or ocean? The primary difference between the Arctic acontinent or ocean? The primary difference between the Arctic acontinent or ocean? The primary difference between the Arctic acontinent or ocean? The primary difference between the Arctic acontinent or ocean? The primary difference between the Arctic acontinent or ocean? The primary difference between the Arctic acontinent or ocean? The primary difference between the Arctic acontinent or ocean? The primary difference between the Arctic acontinent or ocean? The primary difference between the Arctic acontinent or ocean? The primary difference between the Arctic acontinent or ocean? The primary difference between the Arctic acontinent or ocean? The primary difference between the Arctic acontinent or ocean? The primary difference between the Arctic acontinent or ocean? The primary difference between the Arctic acontinent or ocean? The primary difference between the Arctic acontinent or ocean? The primary difference between the Arctic acontinent or ocean? The primary difference between the Arctic acontinent or ocean? The primary difference between the Arctic acontinent or ocean?
perennial sea ice and surrounded by land. Antarctica, on the other hand, is a continents does the Arctic Circle pass through? The Arctic Circle passes through three continents: Asia, Europe and North America. This includes eight
countries: Russia, Canada, Norway, Sweden, Finland, the United States (Alaska), Denmark (Greenland) and Iceland. The Arctic Circle is defined as the area above 66 degrees 32 minutes north... What is the region north of the Arctic Circle is defined as the area above 66 degrees 32 minutes north...
Northern Temperate Zone . Where is the only city in the world directly on the Arctic Circle. In contrast, the largest North American community north of the Arctic Circle, Sisimiut (Greenland), has approximately 5,000 inhabitants. What is the largest community in
the Arctic Circle? The largest such community in Canada is Inuvik in the Northwest Territories, with 3,200 people living there. The Arctic Circle is about 20,000,000 km (9,900 mi) in circumference. The accessibility of this article is in
question. The specific issue is: animation fails MOS. Relevant discussion may be found on the talk page. (January 2025) Oceanic division "Arctic Sea" redirects here. For the cargo ship, see MV Arctic Sea. The Arctic Ocean, with borders as delineated by the International Hydrographic Organization (IHO), including Hudson Bay (some of which is south
of 57°N latitude, off the map) and all other marginal seas. Earth's ocean, showing common divisions arth's ocean division: Antarctic/Southern Arctic Atlantic Indian Pacific Further subdivision: Marginal seas vte The Arctic Ocean is the smallest and
shallowest of the world's five oceanic divisions.[1] It spans an area of approximately 14,060,000 km2 (5,430,000 sq mi) and is the coldest of the world's oceans. The International Hydrographic Organization (IHO) recognizes it as an ocean, although some oceanic divisions.[1] It spans an area of approximately 14,060,000 km2 (5,430,000 sq mi) and is the coldest of the world's oceans.
of the Atlantic Ocean.[3][4] It is also seen as the northernmost part of the North Pole region in the middle of the North Pole region in the middle of the Northern Hemisphere and extends south to about 60°N. The Arctic Ocean is surrounded by Eurasia and North America, and the borders follow topographic features: the Bering
Strait on the Pacific side and the Greenland Scotland Ridge on the Atlantic side. It is mostly covered by sea ice throughout the year and almost completely in winter. The Arctic Ocean's surface temperature and salinity vary seasonally as the ice cover melts and freezes;[5] its salinity is the lowest on average of the five major oceans, due to low
evaporation, heavy fresh water inflow from rivers and streams, and limited connection and outflow to surrounding oceanic waters with higher salinities. The summer shrinking of the ice has been quoted at 50%.[1] The US National Snow and Ice Data Center (NSIDC) uses satellite data to provide a daily record of Arctic sea ice cover and the rate of
melting compared to an average period and specific past years, showing a continuous decline in sea ice extent (1979-2000), the sea ice had diminished by 49%.[7] Decrease of old Arctic Sea ice 1982-2007 Human habitation in the North
American polar region goes back at least 17,000-50,000 years, during the Wisconsin glaciation. Falling sea levels allowed people to move across the Bering land bridge that joined Siberia to northwestern North America (Alaska), leading to the Settlement of the Americas.[8] Thule archaeological site Early Paleo-Eskimo groups included the Pre-Dorse
(c. 3200-850 BC); the Saqqaq culture of Greenland (2500-800 BC); the Independence I and Independence I and Independence I and Independence II cultures of northeastern Canada and Greenland (c. 2400-1800 BC and c. 800-1 BC); and the Groswater of Labrador and Nunavik. The Dorset culture spread across Arctic North America between 500 BC and AD 1500. The Dorset were the last
major Paleo-Eskimo culture in the Arctic before the migration east from present-day Alaska of the Thule people, ancestors of the modern Inuit.[9] The Thule Tradition lasted from about 200 BC to AD 1600, arising around the Bering Strait and later encompassing almost the entire Arctic region of North America. The Thule people were the ancestors of
the Inuit, who now live in Alaska, Northwest Territories, Nunavit, Nunavit (northern Quebec), Labrador and Greenland. [10] For much of European history, the north polar regions remained largely unexplored and their geography conjectural. Pytheas of Massilia recorded an account of a journey northward in 325 BC, to a land he called "Eschate
Thule", where the Sun only set for three hours each day and the water was replaced by a congealed substance "on which one can neither walk nor sail". He was probably Norway, though the Faroe Islands or Shetland have also been suggested.[11] Emanuel
Bowen's 1780s map of the Arctic features a "Northern Ocean". Early cartographers were unsure whether to draw the region around the North Pole as land (as in Johannes Ruysch's map of 1507). The fervent desire of European merchants for a northern
passage, the Northern Sea Route or the Northwest Passage, to "Cathay" (China) caused water to win out, and by 1723 mapmakers such as Johann Homann featured an extensive "Oceanus Septentrionalis" at the northern edge of their charts. The few expeditions to penetrate much beyond the Arctic Circle in that era added only small islands, such as
Novaya Zemlya (11th century) and Spitzbergen (1596), though, since these were often surrounded by pack-ice, their northern limits were not so clear. The makers of navigational charts, more conservative than some of the more fanciful cartographers, tended to leave the region blank, with only fragments of known coastline sketched in. The Arctic
region showing the Northeast Passage, the Northeast Passage, the Northeast Passage via Canadian Inland Waters. This lack of knowledge of what lay north of an "Open Polar Sea" was persistent. John Barrow, longtime
Second Secretary of the British Admiralty, promoted exploration of the region from 1818 to 1845 in search of this. In the United States in the 2850s and 1860s, the explorers Elisha Kane and Isaac Israel Hayes both claimed to have seen part of this elusive body of water. Even quite late in the century, the eminent authority Matthew Fontaine Mauryse both claimed to have seen part of this elusive body of water.
included a description of the Open Polar Sea in his textbook The Physical Geography of the Sea (1883). Nevertheless, as all the explorers who travelled closer and closer to the polar ice cap is quite thick and persists year-round. Fridtjof Nansen was the first to make a nautical crossing of the Arctic Ocean, in the Fram Expedition
from 1893 to 1896. The first surface crossing of the ocean was led by Wally Herbert in 1969, in a dog sled expedition from Alaska to Svalbard, with air support.[12] The first surface nautical transit occurred in 1977 by the icebreaker NS Arktika. Since
1937, Soviet and Russian manned drifting ice stations have extensively monitored the Arctic Ocean. Scientific settlements were established on the drift ice and carried thousands of kilometres by ice floes.[13] In World War II, the European region of the Arctic Ocean was heavily contested: the Allied commitment to resupply the Soviet Union via its
northern ports was opposed by German naval and air forces. Since 1954 commercial airlines have flown over the Arctic Ocean (see Polar route). A bathymetric/topographic map of the Arctic Ocean and the surrounding lands. The Arctic Ocean (see Polar route).
north having an average temperature of less than 10 °C (50 °F) in July. The Arctic Ocean occupies a roughly circular basin and covers an area of about 14,056,000 km (28,200 mi) long.[14][16] It is the only ocean smaller than Russia, which has a land area of
16,377,742 km2 (6,323,482 sq mi). The Arctic Ocean is surrounded by the land masses of Eurasia (Russia and Norway), North America (Canada and the U.S. state of Alaska), Greenland, and Iceland. Arctic exclusive economic zones[17] Country segment Area km2 sq mi Laptev Sea to Chukchi Sea, Russia 2,088,075 806,210 Kara Sea, Russia 1,058,129
408,546 Barents Sea, Russia 1,199,008 462,940 Mainland Norway 935,397 361,159 Svalbard Island, Norway 804,907 310,776 Jan Mayen Island, Norway 804,907 310,776 Jan Mayen Island, Norway 292,189 112,815 Mainland Iceland 756,112 291,936 Mainland 756,112 291,936 Mainla
connected to the Pacific Ocean by the Bering Strait and to the Atlantic Ocean through the Greenland Sea and Labrador Sea.[1] (The Iceland Sea is sometimes considered part of the Greenland Sea, and sometimes separate.) The largest seas in the Arctic Ocean:[18][19][20] Barents Sea—1.4 million km2 (540,000 sq mi) Hudson Bay—1.23 million km2
(470,000 \text{ sq mi}) (sometimes not included) Greenland Sea-476,000 \text{ km2} (358,000 sq mi) East Siberian Sea-926,000 \text{ km2} (358,000 sq mi) East Siberian Sea-476,000 \text{ km2} (358,000 sq mi) East Siberian Sea-476,000
Bay, the Norwegian Sea, and Hudson Strait. Main article: List of islands in the Arctic Ocean The main islands and Baffin Island) Wrangel Island (Russia) New Siberian
Islands (Russia) Severnaya Zemlya (Russia) Novaya Zemlya (Russia) Novaya Zemlya (Russia, includes Severny Island) There are several ports and harbours on the Arctic Ocean. [29] Alaska Utgiagvik (Barrow) Prudhoe Bay Canada Manitoba: Churchill (Port of Churchill) Nunavut: Nanisivik
(Nanisivik Naval Facility)[30] Tuktoyaktuk and Inuvik in the Northwest Territories Greenland: Nuuk (Nuuk Port and Harbour) Norway Mainland: Kirkenes and Vardø Svalbard: Longyearbyen Iceland Akureyri Russia Barents Sea: Murmansk White Sea: Arkhangelsk Kara Sea: Labytnangi, Salekhard, Dudinka, Igarka and Dikson Laptev Sea: Tiksi East
Siberian Sea: Pevek The ocean's Arctic shelf comprises a number of continental shelf, which is sometimes called the "Arctic Shelf" because it is larger. The Russian continental shelf consists of three separate, smaller shelves: the
Barents Shelf, Chukchi Sea Shelf and Siberian Shelf is the largest such shelf in the WSSR-USA Maritime Boundary Agreement. The whole area is subject to international territorial
claims. The Chukchi Plateau extends from the Chukchi Plateau extends from the Chukchi Sea Shelf. An underwater ridge, the Lomonosov Ridge, divides the deep sea North Polar Basin into two oceanic basins: the Eurasian Basin, which is 4,000-4,500 m (13,100-14,800 ft) deep, and the Amerasian Basin (sometimes called the North American or Hyperborean Basin), which is about
4,000 m (13,000 ft) deep. The bathymetry of the ocean bottom is marked by fault block ridges, abyssal plains, ocean deeps, and basins. The average depth of the Arctic Ocean is 1,038 m (3,406 ft).[31] The deepest point is Molloy Hole in the Fram Strait, at about 5,550 m (18,210 ft).[32] The two major basins are further subdivided by ridges into the
Canada Basin (between Beaufort Shelf of North America and the Alpha Ridge), Makarov Basin (between the Gakkel Ridge and the continental shelf that includes the Franz Josef Land). See also: Petroleum exploration in the Arctic
The crystalline basement rocks of mountains around the Arctic Ocean were recrystallized or formed during the Ellesmerian orogeny, the regional subsidence in the Jurassic and Triassic periods led to significant sediment deposition, creating many of the reservoirs for current day
oil and gas deposits. During the Cretaceous period, the Canadian Basin opened, and tectonic activity due to the assembly of Alaska caused hydrocarbons to migrate toward what is now Prudhoe Bay. At the same time, sediments shed off the rising Canadian Rockies built out the large Mackenzie Delta. The rifting apart of the supercontinent Pangea,
beginning in the Triassic period, opened the early Atlantic Ocean. Rifting then extended northward, opening the Arctic Ocean as mafic oceanic crust material erupted out of a branch of Mid-Atlantic Ridge. The Amerasia Basin may have opened first, with the Chukchi Borderland moved along to the northeast by transform faults. Additional spreading
helped to create the "triple-junction" of the Alpha-Mendeleev Ridge in the Late Cretaceous epoch. Throughout the Cenozoic Era, the subduction of the Pacific plate, the subduction of the Pacific plate, the collision of India with Eurasia, and the continued opening of the North Atlantic created new hydrocarbon traps. The seafloor began spreading from the Gakkel Ridge in the Paleocene
Epoch and the Eocene Epoch, causing the Lomonosov Ridge to move farther from land and subside. Because of sea ice and remote conditions, the geology of the Arctic Ocean is still poorly explored. The Arctic Coring Expedition drilling shed some light on the Lomonosov Ridge, which appears to be continental crust separated from the Barents-Kara
Shelf in the Paleocene and then starved of sediment. It may contain up to 10 billion barrels of oil. The Gakkel Ridge rift is also poorly understand and may extend into the Laptev Sea. [33] Distribution of the major water mass in the Arctic Ocean. The section sketches the different water masses along a vertical section from Bering Strait over the
geographic North Pole to Fram Strait. As the stratification is stable, deeper water masses are denser than the layers above. Density structure of the upper 1,200 m (3,900 ft) in the Arctic Ocean. Profiles of temperature and salinity for the Amundsen Basin, the Canadian Basin and the Greenland Sea are sketched. In large parts of the Arctic Ocean, the
top layer (about 50 m [160 ft]) is of lower salinity and lower temperature effect. It is fed by the freshwater input of the big Siberian and Canadian rivers (Ob, Yenisei, Lena, Mackenzie), the water of which quasi floats on the saltier, denser,
deeper ocean water. Between this lower salinity layer and the bulk of the ocean lies the so-called halocline, in which both salinity and temperature rise with increasing depth. A copepod Because of its relative isolation from other oceans, the Arctic Ocean has a uniquely complex system of water flow. It resembles some hydrological features of the
Mediterranean Sea, referring to its deep waters having only limited communication through the Fram Strait with the Atlantic Basin, "where the circulation is dominated by thermohaline forcing".[35] The Arctic Ocean has a total volume of 18.07 × 106 km3, equal to about 1.3% of the World Ocean. Mean surface circulation is predominantly cyclonic on
the Eurasian side and anticyclonic in the Canadian Basin.[36] Water enters from both the Pacific and Atlantic Oceans and can be divided into three unique water mass is called Arctic Bottom Water and begins around 900 m (3,000 ft) depth.[35] It is composed of the densest water in the World Ocean and has two main
sources: Arctic shelf water and Greenland Sea Deep Water. Water in the shelf region that begins as inflow from the Pacific passes through the narrow Bering Strait at an average rate of 0.8 Sverdrups and reaches the Chukchi Sea, freezing the surface water and pushing this newly a surface water and pushing this newly a surface water and pushing this newly a surface water and pushing the surface water and pushing this newly a surface water and pushing this new surface water and pushing thin
formed ice out to the Pacific. The speed of the ice drift is roughly 1-4 cm/s.[36] This process leaves dense, salty waters in the sea that sink over the continental shelf into the western Arctic Ocean and create a halocline.[38] The Kennedy Channel. This water is met by Greenland Sea Deep Water, which forms during the passage of winter storms. As
temperatures cool dramatically in the winter, ice forms, and intense vertical convection allows the water to become dense enough to sink below the water below.[35] Arctic Bottom Water is critically important because of its outflow, which contributes to the formation of Atlantic Deep Water. The overturning of this water plays a key role in
global circulation and the moderation of climate. In the depth range of 150-900 m (490-2,950 ft) is a water mass referred to as Atlantic Water. Inflow from the halocline, where it circles the Arctic Basin counter-clockwise. This is the highest
volumetric inflow to the Arctic Ocean, equalling about 10 times that of the Pacific inflow, and it creates the Arctic Bottom Water but is much warmer (up to 3 °C [37 °F]). In fact, this water mass is actually warmer than the surface water
and remains submerged only due to the role of salinity in density, [35] When water reaches the basin, it is pushed by strong winds into a large circular current called the Beaufort Gyre. Water in the Beaufort Gyre is far less saline than that of the Chukchi Sea due to inflow from large Canadian and Siberian rivers, [38] The final defined water mass in
the Arctic Ocean is called Arctic Surface Water and is found in the depth range of 150-200 m (490-660 ft). The most important feature of this water mass is a section referred to as the sub-surface layer. It is a product of Atlantic water mass is a section referred to as the sub-surface layer. It is a product of Atlantic water mass is a section referred to as the sub-surface layer. It is a product of Atlantic water mass is a section referred to as the sub-surface layer. It is a product of Atlantic water mass is a section referred to as the sub-surface layer. It is a product of Atlantic water mass is a section referred to as the sub-surface layer. It is a product of Atlantic water mass is a section referred to as the sub-surface layer. It is a product of Atlantic water mass is a section referred to as the sub-surface layer. It is a product of Atlantic water mass is a section referred to as the sub-surface layer. It is a product of Atlantic water mass is a section referred to as the sub-surface layer.
cools and acts a heat shield for the surface layer on account of weak mixing between layers.[40][41] However, over the past couple of decades a combination of the warming[42] and the shoaling of Atlantic water heat in melting sea ice in the eastern Arctic. The most recent estimates, for
2016-2018, indicate the oceanic heat flux to the surface has now overtaken the atmospheric flux in the eastern Eurasian Basin.[44] Over the same period the weakening halocline stratification has coincided with increasing upper ocean currents thought to be associated with declining sea ice, indicate increasing mixing in this region.[45] In contrast
direct measurements of mixing in the western Arctic indicate the Atlantic water heat remains isolated at intermediate depths even under the 'perfect storm' conditions of the Great Arctic Cyclone of 2012.[46] Waters originating in the Pacific and Atlantic both exit through the Fram Strait between Greenland and Svalbard Island, which is about
2,700 m (8,900 ft) deep and 350 km (220 mi) wide. This outflow on the Atlantic side of the Arctic Ocean. Because of this, it is influenced by the Coriolis force, which concentrates outflow to the East Greenland Current on the western side and inflow to the
Norwegian Current on the eastern side.[35] Pacific water also exits along the west coast of Greenland and the Hudson Strait (1-2 Sv), providing nutrients to the Canadian Archipelago.[37] As noted, the process of ice formation and movement is a key driver in Arctic Ocean circulation and the formation of water masses. With this dependence, the
Arctic Ocean experiences variations due to seasonal changes in sea ice cover. Sea ice movement is the result of wind forcing, which is related to a number of meteorological conditions that the Arctic experiences throughout the year. For example, the Beaufort High—an extension of the Siberian High system—is a pressure system that drives the
anticyclonic motion of the Beaufort Gyre.[36] During the summer, this area of high pressure is pushed out closer to its Siberian and Canadian sides. In addition, there is a sea level pressure (SLP) ridge over Greenland that drives strong northerly winds through the Fram Strait, facilitating ice export. In the summer, this area of high pressure is pushed out closer to its Siberian and Canadian sides. In addition, there is a sea level pressure (SLP) ridge over Greenland that drives strong northerly winds through the Fram Strait, facilitating ice export. In the summer, this area of high pressure is pushed out closer to its Siberian and Canadian sides.
producing weaker winds. A final example of seasonal pressure system movement is the low pressure system that exists over the Nordic and Barents Seas. It is an extension of the Icelandic Low, which creates cyclonic ocean circulation in this area. The low shifts to centre over the North Pole in the summer. These variations in the Arctic all contribute
to ice drift reaching its weakest point during the summer months. There is also evidence that the drift is associated with the phase of the Arctic Ocean, showing the median, 2005 and 2007 coverage[47] Main article: Arctic ice pack On the sea ice of the Arctic Ocean
temporary logistic stations may be installed, Here, a Twin Otter is refueled on the pack ice at 86°N, 76°43′W. Much of the Arctic Ocean is covered by sea ice that varies in extent and thickness seasonally. The mean extent of the Arctic Ocean is covered by sea ice that varies in extent of the Arctic Ocean is covered by sea ice that varies in extent of the Arctic Ocean is covered by sea ice that varies in extent of the Arctic Ocean is covered by sea ice that varies in extent of the Arctic Ocean is covered by sea ice that varies in extent of the Arctic Ocean is covered by sea ice that varies in extent of the Arctic Ocean is covered by sea ice that varies in extent of the Arctic Ocean is covered by sea ice that varies in extent of the Arctic Ocean is covered by sea ice that varies in extent of the Arctic Ocean is covered by sea ice that varies in extent of the Arctic Ocean is covered by sea ice that varies in extent of the Arctic Ocean is covered by sea ice that varies in extent of the Arctic Ocean is covered by sea ice that varies in extent of the Arctic Ocean is covered by sea ice that varies in extent of the Arctic Ocean is covered by sea ice that varies in extent of the Arctic Ocean is covered by sea ice that varies in extent of the Arctic Ocean is covered by sea ice that varies in extent of the Arctic Ocean is covered by sea ice that varies in extent of the Arctic Ocean is covered by sea ice that varies in extent of the Arctic Ocean is covered by sea ice that varies in extent of the Arctic Ocean is covered by sea ice that varies in extent of the Arctic Ocean is covered by sea ice that varies in extent of the Arctic Ocean is covered by sea ice that varies in extent of the Arctic Ocean is covered by sea ice that varies in extent of the Arctic Ocean is covered by sea ice that varies in extent of the Arctic Ocean is covered by sea ice that varies in extent of the Arctic Ocean is covered by sea ice that varies in extent of the Arctic Ocean is covered by sea ice that varies in extent of the Arctic Ocean is covered b
1980 from the average winter value of 15,600,000 km2 (6,023,200 sq mi).[48] The seasonal variations are about 7,000,000 km2 (2,702,700 sq mi), with the maximum in April and minimum in September. The sea ice is affected by wind and ocean currents, which can move and rotate very large areas of ice. Zones of compression also arise, where the
ice piles up to form pack ice. [49][50][51] Icebergs occasionally break away from northern Ellesmere Island, and icebergs are not sea ice but may become embedded in the pack ice. Icebergs pose a hazard to ships, of which the Titanic is one of the most
famous. The ocean is virtually icelocked from October to June, and the superstructure of ships are subject to icing from October to May, [29] Before the advent of modern icebreakers, ships sailing the Arctic Ocean untended for decades despite these
hazards). See also: Climate change in the Arctic Changes in ice between 1990 and 1999 The Arctic Ocean is contained in a polar climate characterized by the polar night, extreme cold, frequent low-level temperature inversions, and stable weather
conditions.[52] Cyclones are only common on the Atlantic side.[53] Summers are characterized by continuous daylight (midnight sun), and air temperatures can rise slightly above 0 °C (32 °F). Cyclones are more frequent in summer and may bring rain or snow.[53] It is cloudy year-round, with mean cloud cover ranging from 60% in winter to over
80% in summer.[54] The temperature of the surface water of the Arctic Ocean is fairly constant at approximately -1.8 °C (28.8 °F), near the freezing point and thus it tends to sink. It is generally necessary that the upper 100-150 m (330-490 ft) of sea water.
ocean water cools to the freezing point for sea ice to form. [55] In the winter, the relatively warm ocean water exerts a moderating influence, even when covered by ice. This is one reason why the Arctic does not experience the extreme temperatures seen on the Antarctic continent. There is considerable seasonal variation in how much pack ice of the
Arctic ice pack covers the Arctic Ocean. Much of the Arctic ice pack is also covered in snow for about 10 months of the Arctic region has varied significantly during the Earth's history. During the Paleocene-Eocene Thermal
Maximum 55 million years ago, when the global climate underwent a warming of approximately 5-8 °C (9-14 °F), the region reached an average annual temperature of 10-20 °C (50-68 °F).[56][57][58] The surface waters of the northernmost[59] Arctic Ocean warmed, seasonally at least, enough to support tropical lifeforms (the dinoflagellates
Apectodinium augustum) requiring surface temperatures of over 22 °C (72 °F).[60] Currently, the Arctic region is warming twice as fast as the rest of the planet.[61][62] Three polar bears approach USS Honolulu near the North Pole. Due to the primary
production of photosynthesizing organisms such as ice algae and phytoplankton is limited to the spring and summer months (March/April to September).[64] Important consumers of primary producers in the central Arctic Ocean and the adjacent shelf seas include zooplankton, especially copepods (Calanus finmarchicus, Calanus glacialis, and
Calanus hyperboreus)[65] and euphausiids,[66] as well as ice-associated fauna (e.g., amphipods).[65] These primary producers and higher trophic levels. The composition of higher trophic levels in the Arctic Ocean varies with region (Atlantic side vs. Pacific side) and with the sea-ice cover
Secondary consumers in the Barents Sea, an Atlantic-influenced Arctic species including herring, young cod, and capelin. [66] In ice-covered regions of the central Arctic Ocean, polar cod is a central predator of primary consumers. The apex predators in the Arctic Ocean, polar cod is a central predator of primary consumers.
polar bears—prey upon fish. Endangered marine species in the Arctic Ocean include walruses and whales. The area has a fragile ecosystem, and it is especially exposed to climate change, because it warms faster than the rest of the world. Lion's mane jellyfish are abundant in the waters of the Arctic, and the banded gunnel is the only species of
gunnel that lives in the ocean. Minke whale Walruses on Arctic ice floe See also: Natural resources of the Arctic, and Marine mammal Petroleum and natural gas fields, placer deposits, polymetallic nodules, sand and gravel aggregates, fish, seals and whales can all be found in abundance in the region. [29][51] The
political dead zone near the centre of the sea is also the focus of a mounting dispute between the United States, Russia, Canada, Norway, and Denmark.[67] It is significant for the global energy market because it may hold 25% or more of the world's undiscovered oil and gas resources.[68] Main articles: Climate change in the Arctic, Ozone depletion
and Pollution in the Arctic Ocean Further information: Atlantification of the Arctic ice pack is thinning, and a seasonal hole in the ozone layer frequently occurs. [69] Reduction of the area of Arctic sea ice reduces the planet's average albedo, possibly resulting in global warming in a positive feedback mechanism. [51][70] Research shows that
last intraglacial period.[73] Warming temperatures in the Arctic may cause large amounts of fresh melt-water to enter the north Atlantic, possibly disrupting global ocean current patterns. Potentially severe changes in the Earth's climate might then ensue.[70] As the extent of sea ice diminishes and sea level rises, the effect of storms such as the
Great Arctic Cyclone of 2012 on open water increases, as does possible salt-water damage to vegetation on shore at locations such as the Mackenzie Delta as stronger storm surges become more likely.[74] Global warming has increased encounters between polar bears and humans. Reduced sea ice due to melting is causing polar bears to search for
new sources of food.[75] Beginning in December 2018 and coming to an apex in February 2019, a mass invasion of polar bears into the archipelago of Novaya Zemlya caused local authorities to declare a state of emergency. Dozens of polar bears into the archipelago of Novaya Zemlya caused local authorities to declare a state of emergency.
hypothesis Marine extinction intensity during Phanerozoic % Millions of years ago (H) K-Pg Tr-J P-Tr Cap Late D O-S The Permian-Triassic extinction event (the Great Dying) may have been caused by release of methane from clathrates. An estimated 52% of marine genera became extinct, representing 96% of all marine species. Sea ice, and the cold
conditions it sustains, serves to stabilize methane deposits on and near the shoreline, [78] preventing the clathrate breaking down and outgassing methane into the atmosphere, causing further warming in a strong
positive feedback cycle and marine genera and species to become extinct.[78][79] Other environmental concerns relate to the radioactive contamination of the Arctic Ocean from, for example, Russian radioactive waste dump sites in the Kara Sea,[80] Cold War nuclear test sites such as Novaya Zemlya,[81] Camp Century's contaminants in Greenland
[82] and radioactive contamination from the Fukushima Daiichi nuclear disaster.[83] On 16 July 2015, five nations (United States, Russia, Canada, Norway, Denmark/Greenland) signed a declaration committing to keep their fishing vessels out of a 1.1 million square mile zone in the central Arctic Ocean near the North Pole. The agreement calls for
those nations to refrain from fishing there until there is better scientific knowledge about the marine resources and until a regulatory system is in place to protect those resources. [84][85] Oceans portal Arctic Science Committee List
of rivers of the Americas by coastline Nordicity Seven Seas Subarctic ^ a b c Pidwirny, Michael (2006). "Introduction to the Oceans". physicalgeography. an introduction (2nd ed.). New York: Wiley. 1980. p. 501. ISBN 0471021024.
OCLC 6200221. ^ Tomczak, Matthias; Godfrey, J. Stuart (2003). Regional Oceanography: an Introduction (2nd ed.). Delhi: Daya Publishing House. ISBN 978-81-7035-306-5. Archived from the original on 30 June 2007. Retrieved 22 April 2006. ^ "'Arctic Ocean' - Encyclopædia Britannica". Encyclopædia Britannica. Retrieved 2 July 2012. As an
approximation, the Arctic Ocean may be regarded as an estuary of the Atlantic Ocean. Some Thoughts on the Freezing and Melting of Sea Ice and Their Effects on the Ocean Archived 8 November 2017 at the Wayback Machine K. Aagaard and R. A. Woodgate, Polar Science Center, Applied Physics Laboratory University of Washington, January
2001. Retrieved 7 December 2006. ^ "Arctic Sea Ice News and Analysis | Sea ice data updated daily with one-day lag". Retrieved 1 September 2020. ^ Goebel T, Waters MR, O'Rourke DH (2008). "The Late Pleistocene Dispersal of Modern Humans in the
Americas" (PDF). Science. 319 (5869): 1497-502. Bibcode: 2008Sci...319.1497G. CiteSeerX 10.1.1.398.9315. doi:10.1126/science.1153569. PMID 18339930. S2CID 36149744. ^ "The Prehistory of Greenland" Archived 16 May 2008 at the Wayback Machine, Greenland Research Centre, National Museum of Denmark, accessed 14 April 2010. ^ Park,
Robert W. "Thule Tradition". Arctic Archaeology. Department of Anthropology, University of Waterloo. Retrieved 1 June 2015. ^ Pytheas Archived 18 September 2006. ^ "Channel 4, "Sir Wally Herbert dies" 13 June 2007". ^ North Pole drifting stations (1930s-1980s) Archived 13
November 2017 at the Wayback Machine. Woods Hole Oceanographic Institution ^ a b Wright, John W., ed. (2006). The New York Times Almanac (2007 ed.). New York: Penguin Books. p. 455. ISBN 978-0-14-303820-7. ^ "Oceans of the World" (PDF). rst2.edu. Archived from the original (PDF) on 19 July 2011. Retrieved 28 October 2010. ^ "Arctic
Ocean Fast Facts". wwf.pandora.org (World Wildlife Foundation). Archived from the original on 29 October 2010. Archived from the original or
World Including Geography Facts and Flags - WorldAtlas.com". WorldAtlas. ^ "List of seas". listofseas.com. ^ Wright, John (30 November 2010. ^ "IHO Publication S-23 Limits of Oceans and Seas; Chapter 9: Arctic Ocean"
International Hydrographic Organization. 2002. Archived from the original on 2 February 2014. Retrieved 1 July 2017. ^ Calow, Peter (12 July 1999). Blackwell's concise encyclopedia of environmental management. Wiley-Blackwell. p. 7. ISBN 978-0-632-04951-6. Retrieved 29 November 2010. ^ Lewis, Edward Lyn; Jones, E. Peter; et al., eds. (2000).
The Freshwater Budget of the Arctic Ocean. Springer. pp. 101, 282-283. ISBN 978-0-7923-6439-9. Retrieved 26 November 2010. A Retrieved 26 November 2010. A Earle, Sylvia A.; Glover, Linda K. (2008). Ocean: An Illustrated Atlas.
National Geographic Books. p. 112. ISBN 978-1-4262-0319-0. Retrieved 26 November 2010. A Reddy, M. P. M. (2001). Descriptive Physical Oceanography. Taylor & Francis. p. 8. ISBN 978-0-8160-5327-8. Retrieved 26 November 2010.
November 2010. ^ a b c Arctic Ocean Archived 4 December 2022 at the Wayback Machine. CIA World Fact Book ^ "Backgrounder - Expanding Canadian Forces Operations in the Arctic". Canadian Forces Operations in the Arctic Training Centre. 10 August 2007. Archived from the original on 2 June 2008. Retrieved 17 August 2007. ^ "The Mariana Trench - Expanding Centre."
Oceanography". marianatrench.com. 4 April 2003. Archived from the original on 7 December 2006. ^ "Five Deeps Expedition is complete after historic dive to the bottom of the Arctic Ocean" (PDF). GEO ExPro. Archived from the original (PDF) on 3
October 2022. Retrieved 26 November 2019. ^ Piskarev, Alexey; Poselov, Victor; Kaminsky, Valery, eds. (2019). Geologic Structures of the Arctic Basin. Springer. ISBN 9783319777429. ^ a b c d Pickard, George L.; Emery, William J. (1982)
Descriptive Physical Oceanography. Pergamon. ISBN 978-1-4832-7877-3. ^ a b c d "Arctic Ocean Circulation: Going Around at the Top of the World. Retrieved 12 November 2013. ^ a b Arctic Ocean Circulation Archived 15 January 2013 at the Wayback Machine. Polar
Discovery ^ Lenn, Y., Rippeth, T. P., Old, C., Bacon, S., Polyakov, I., Ivanov, V. & Holemann, J. (2011). Journal of Physical Oceanography. 41(3), 531-547 ^ Lenn, Y. D., Wiles, P. J., Torres-Valdes, S., Abrahamsen, E. P., Rippeth, T. P., Simpson, J. H., Bacon, S., Laxon, S. W., Polyakov, I., Ivanov, V. & Kirillov, S. (2009). Vertical mixing at intermediate
depths in the Arctic boundary current. Geophysical Research Letters. 36, p. L05601 ^ Fer, I. (2009). Weak vertical diffusion allows maintenance of cold halocline in the central Arctic. Atmospheric and Oceanic Science Letters 2(3):148-152. ^ Barton, B., Lenn, Y-D. & Lique, C. (2018). Observed atlantification of the Barents Sea causes the Polar Front
to limit the expansion of winter sea ice, Journal of Physical Oceanography, 28(8), 1849-1866 ^ Igor V. Polyakov1, Andrey V. Pnyushkov, Matthew B. Alkire, Igor M. Ashik, Till M. Baumann, Eddy C. Carmack, Ilona Goszczko, John Guthrie, Vladimir V. Ivanov, Torsten Kanzow, Richard Krishfield, Ronald Kwok, Arild Sundfjord, James Morison, Robert
Rember, Alexander Yulin (2017). Greater role for Atlantic inflows on sea-ice loss in the Eurasian Basin of the Arctic Ocean. Science, 356(6335), 285-291 ^ Polyakov, I., Rippeth, T., Fer, I., Alkire, M., Baumann, T., Carmack, E., Ivanov, V., Janout, M. A., Padman, L., Pnyushkov, A. & Rember, R (2020). Weakening of the cold halocline layer exposes sea
ice to oceanic heat in the eastern Arctic Ocean. Journal of Climate, 33(18), 8107-8123 Polyakov, I., Rippeth, T., Fer, I., Baumann, T., Carmack, E., Ivanov, V., Janout, M. A., Padman, L., Phyushkov, A. & Rember, R (2020). Intensification of Near-Surface Currents and Shear in the Eastern Arctic Ocean. A More Dynamic Eastern Arctic Ocean.
Geophysical Research Letters, 47(16), e2020GL089469 ^ Lincoln, B., Rippeth, T., Lenn, Y-D., Timmermans, M-L., Williams, W. & Bacon, S (2016). Wind-driven mixing at intermediate depths in an ice-free Arctic Ocean, Geophysical Research Letters, 43(18), 9749-9756 ^ "Continued Sea Ice Decline in 2005". Graph by Robert Simmon, Earth
Observatory, and Walt Meier, NSIDC; photo by Nathaniel B. Palmer, NOAA. Archived from the original on 7 October 2006. {cite web}}: CS1 maint: others (link) ^ Change, NASA Global Climate Change: Vital Signs of the Planet. Retrieved 10 September 2006. {cite web}}: CS1 maint: others (link) ^ Change, NASA Global Climate Change: Vital Signs of the Planet. Retrieved 10 September 2006. {cite web}}: CS1 maint: others (link) ^ Change, NASA Global Climate Change: Vital Signs of the Planet. Retrieved 10 September 2006. {cite web}}: CS1 maint: others (link) ^ Change, NASA Global Climate Change: Vital Signs of the Planet. Retrieved 10 September 2006. {cite web}}: CS1 maint: others (link) ^ Change, NASA Global Climate Change: Vital Signs of the Planet. Retrieved 10 September 2006. {cite web}}: CS1 maint: others (link) ^ Change, NASA Global Climate Change: Vital Signs of the Planet. Retrieved 10 September 2006. {cite web}}: CS1 maint: others (link) ^ Change (
2020. ^ Sea Ice Index Archived 2 February 2020 at the Wayback Machine. Arctic.atmos.uiuc.edu (23 September 2007). Retrieved on 2011-03-06. ^ a b c Buixadé Farré, Albert; Stephenson, Scott R.; Chen,
Linling; Czub, Michael; Dai, Ying; Demchev, Denis; Efimov, Yaroslav; Graczyk, Piotr; Grythe, Henrik; Keil, Kathrin; Kivekäs, Niku; Kumar, Naresh; Liu, Nengye; Matelenok, Igor; Myksvoll, Mari; O'Leary, Derek; Olsen, Julia; Pavithran .A.P., Sachin; Petersen, Edward; Raspotnik, Andreas; Ryzhov, Ivan; Solski, Jan; Suo, Lingling; Troein, Caroline;
Valeeva, Vilena; van Rijckevorsel, Jaap; Wighting, Jonathan (16 October 2014). "Commercial Arctic shipping through the Northeast Passage: Routes, resources, governance, technology, and infrastructure". Polar Geography. 37 (4): 298-324. doi:10.1080/1088937X.2014.965769. ^ Serreze, Mark C; Barry, Roger G (2014). The Arctic Climate System
(2nd ed.). New York: Cambridge University Press. pp. 168-172. ISBN 978-1-107-03717-5. a b Simmonds, Ian; Burke, Craig; Keay, Kevin (2008). "Arctic climate change as manifest in cyclone behavior". Journal of Climate. 21 (22): 5777. Bibcode:2008JCli...21.5777S. doi:10.1175/2008JCLI2366.1. A Serreze, Mark C; Barry, Roger G (2014). The Arctic
Climate System (2nd ed.). New York: Cambridge University Press. pp. 56-59. ISBN 978-1-107-03717-5. ^ "NSIDC sea ice". Archived from the original on 17 January 2010. Retrieved 10 February 2010. ^ McInerney, Francesca A.; Wing, Scott L. (25 April 2011). "The Paleocene-Eocene Thermal Maximum: A Perturbation of Carbon Cycle, Climate, and
Biosphere with Implications for the Future". Annual Review of Earth and Planetary Sciences. 39 (1): 489-516. Bibcode:2011AREPS...39...489M. doi:10.1146/annurev-earth-040610-133431. ISSN 0084-6597. ^ Nunes, Flavia; Norris, Richard D. (1 January 2006). "Abrupt reversal in ocean overturning during the Palaeocene/Eocene warm period". Nature
439 (7072): 60-63. Bibcode:2006Natur.439...60N. doi:10.1038/nature04386. PMID 16397495. S2CID 4301227. Shellito, C.J.; Sloan, L.C.; Huber, M. (2003). "Climate model sensitivity to atmospheric CO2 levels in the Early-Middle Paleogene". Palaeogeography, Palaeoecology. 193 (1): 113-123. Bibcode:2003PPP...193..113S.
```

doi:10.1016/S0031-0182(02)00718-6. ^ Drill cores were recovered from the Lomonosov Ridge, presently at 87°N ^ Slujjs, A.; Schouten, S.; Pagani, M.; Woltering, M.; Brinkhuis, H.; Damsté, J.S.S.; Dickens, G.R.; Huber, M.; Reichart, G.J.; Stein, R.; et al. (2006). "Subtropical Arctic Ocean temperatures during the Palaeocene/Eocene thermal maximum"