ANALYSIS - SEA ICE TODAY

# Sea ice climbs to second lowest January

Arctic daily sea ice extent continued to hover near record daily lows during January, with the ice edge well north of its long-term average position in most areas. In contrast to the cold conditions dominating the contiguous United States, much of the Arctic experienced above-average January temperatures. In the Antarctic, daily sea ice extent fell below the long-term average after a brief period of above-average daily extents, ending the month just below the lowest 10 percent of ice extents for the day.

## Overview of conditions

Arctic sea ice extent for January 2025 averaged 13.13 million square kilometers (5.07 million square miles), second lowest for the month in the satellite record, following a record lowest extent for December 2024. The January extent was 50,000 square kilometers (19,000 square miles) above the record low for the month set in 2018 (Figures 1a and 1b), and 1.29 million square kilometers (498,000 square miles) below the 1981 to 2010 average. Ice advanced primarily in Hudson Bay and the Bering Sea, with some ice growth also seen in the Labrador Sea along the coast of

Canada and in the Sea of Okhotsk. By contrast, the ice edge retreated in the Barents Sea and also in the Labrador Sea along the west coast of Greenland.

By the end of January, ice extent remained low off the Labrador Coast and in the Barents Sea, Sea of Okhotsk, and Bering Sea. Sea ice finally covered the southeastern area in Hudson Bay (eastward of the Belcher Islands) at the end of the month after an unusually prolonged open water period stretching well into winter.

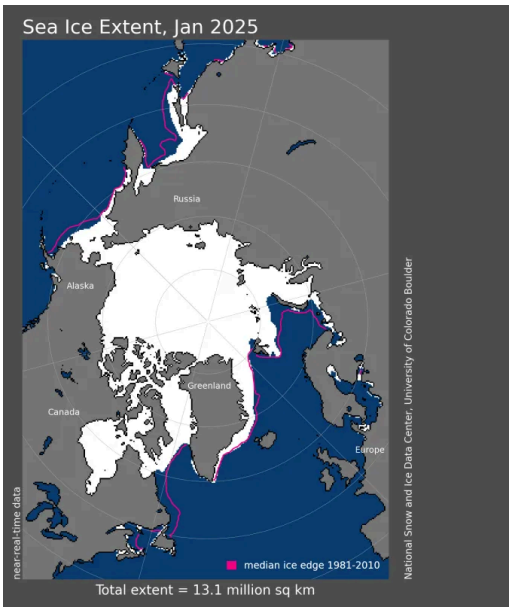


*Figure 1a. Arctic sea ice extent for January 2025 was 13.13 million square kilometers (5.07 million square miles). The magenta line shows the 1981 to 2010 average extent for that month. Sea Ice Index data. About the data — Credit: National Snow and Ice Data Center*

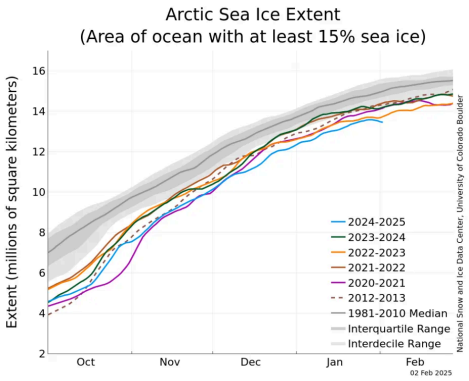


*Figure 1b. The graph above shows Arctic sea ice extent as of February 2, 2025, along with daily ice extent data for four previous years and the record low year. 2024 to 2025 is shown in blue, 2023 to 2024 in green, 2022 to 2023 in orange, 2021 to 2022 in brown, 2020 to 2021 in magenta, and 2012 to 2013 in dashed brown. The 1981 to 2010 median is in dark gray. The gray areas around the median line show the interquartile and interdecile ranges of the data. Sea Ice Index data. — Credit: National Snow and Ice Data Center*

# Conditions in context

January air temperatures at the 925 millibar level (about 2,500 feet above the surface) were above average over much of the Arctic Ocean (Figure 2a). It was particularly warm north of Greenland and over central Alaska—as much as 8 degrees Celsius (14 degrees Fahrenheit) above average for the month. It was also warm across the coast of Labrador. The atmospheric pattern at sea level featured higher pressure north of Alaska coupled with low pressure centered over the Barents Sea (Figure 2b).

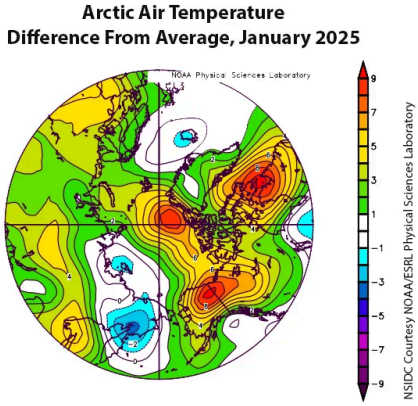


*Figure 2a. This plot shows the departure from average air temperature in the Arctic at the 925 hPa level, in degrees Celsius, for January 2025. Yellows and reds indicate above average temperatures; blues and purples indicate below average temperatures. — Credit: NSIDC courtesy NOAA Earth System Research Laboratory Physical Sciences Laboratory*

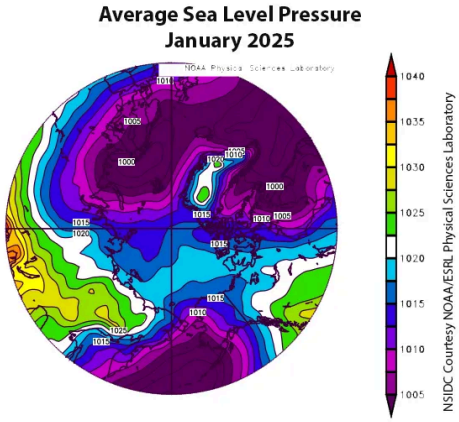


*Figure 2b. This plot shows average sea level pressure in the Arctic in millibars for January 2025. Yellows and reds indicate higher air pressure; blues and purples indicate lower pressure. — Credit: NSIDC courtesy NOAA Earth System Research Laboratory Physical Sciences Laboratory*

## January 2025 compared to previous years

Including 2025, the downward linear trend in Arctic sea ice extent for January is 41,000 square kilometers (16,000 square miles) per year, or 2.8 percent per decade relative to the 1981 to 2010 average. Based on the linear trend, since 1979, January has lost 1.88 million square

kilometers (726,000 square miles) of sea ice, which is slightly larger than Alaska.

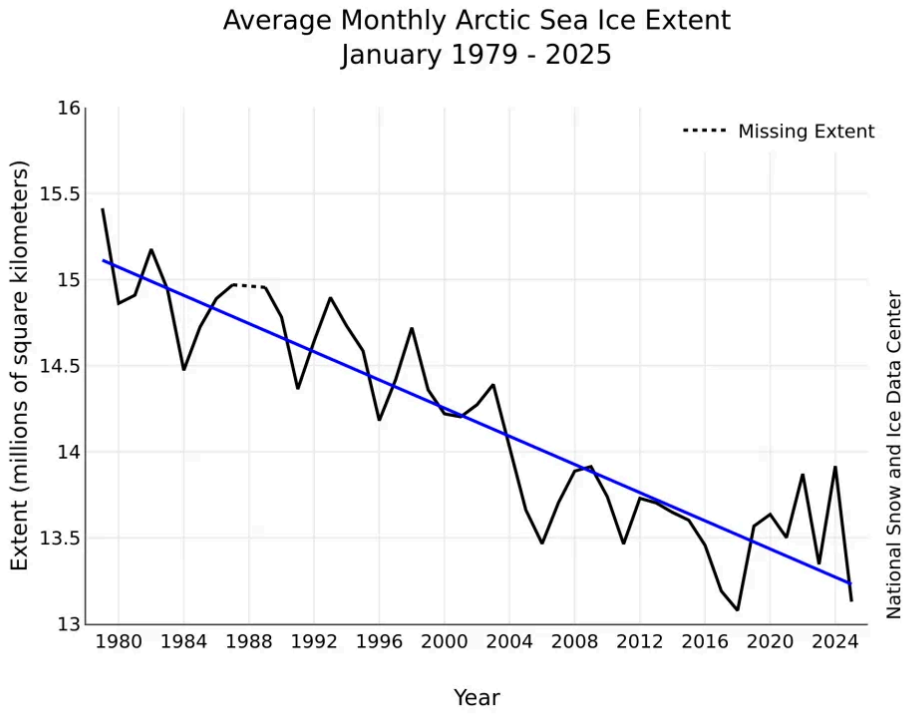


*Figure 3. Monthly January ice extent for 1979 to 2025 shows a decline of 2.8 percent per decade. — Credit: National Snow and Ice Data Center*

# Hudson Bay finally freezes

Persistent winds from the west and northwest in the second half of January drove sea ice from the previously frozen areas of Hudson Bay into the area east of the Belcher Islands and along the eastern coast of the bay. The area typically freezes in mid-December.

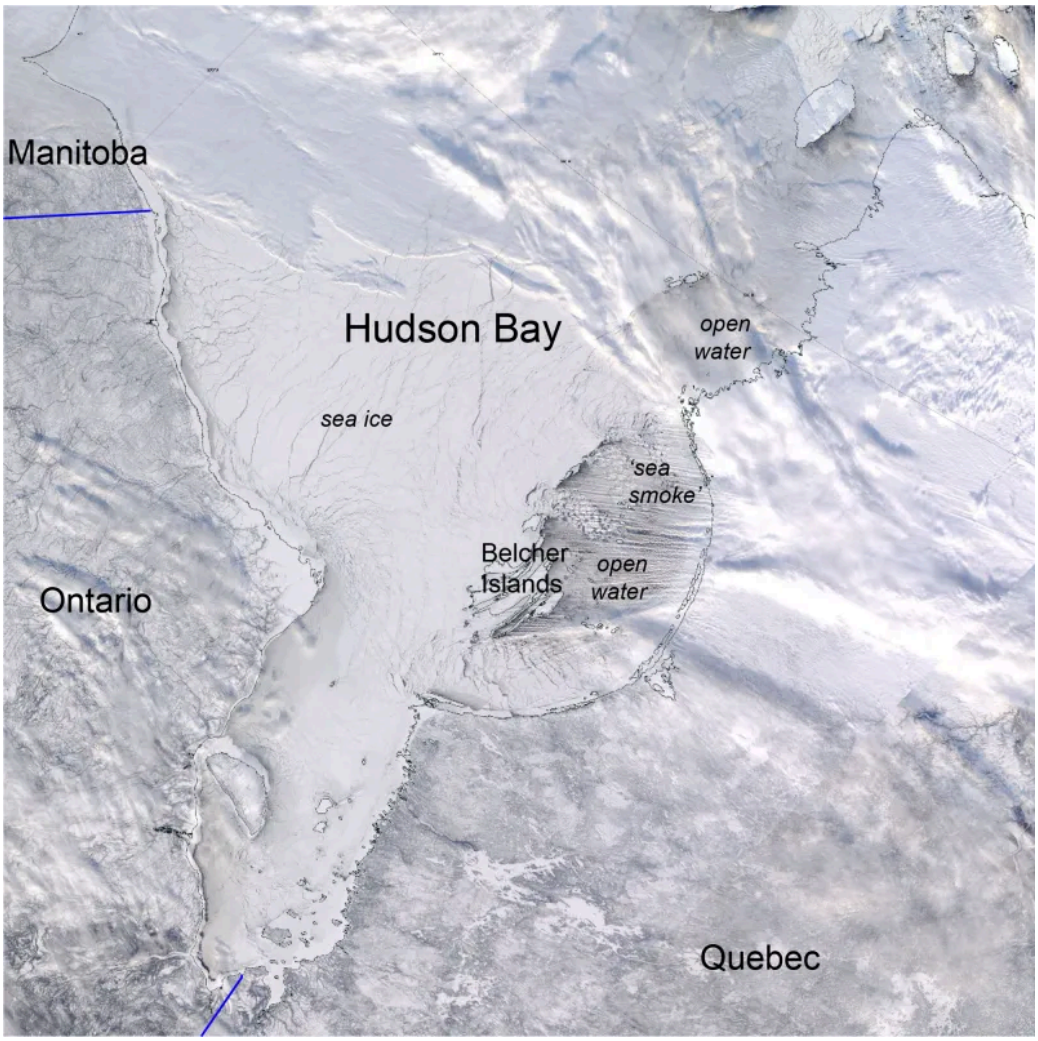


*Figure 4. This January 22 image from NASA's Terra Moderate Resolution Imaging Spectroradiometer (MODIS) sensor shows strong low-level cloud bands ("sea smoke") and advecting sea ice over the eastern portion of Hudson Bay. — Credit: NASA*

## A smoother sea ice pack

Colleagues from the Alfred Wegener Institute have been flying aircraft over the Arctic Ocean since 1993 to estimate how sea ice thickness is changing. According to their new study, pressure ridges, which are formed when sea ice floes are pushed up against each other, are declining in frequency and size, leading to an overall smoother sea ice cover. Depending on the age and thickness of the ice floes, pressure ridges can extend several meters above the surface and tens of meters below the surface, which are known as keels. While they are formidable obstacles to ships, they are important biological habitats for ice algae,

zooplankton, small crustaceans, and larger marine species including seals.

Normally, ice that has survived several summers is characterized by many pressure ridges. As this older ice melts away, it is replaced by first-year ice which tends to be smoother. While thinner ice is more mobile and thus more susceptible to deformation events, the overall heights and frequency of ridge formation has declined, with the largest declines observed in regions that have historically been where the oldest ice has been located  (e.g. Lincoln Sea north of Greenland). In these regions, ridge heights have declined by 5 to 10 percent per decade and the ridge fraction has declined by 12 to 15 percent per decade.

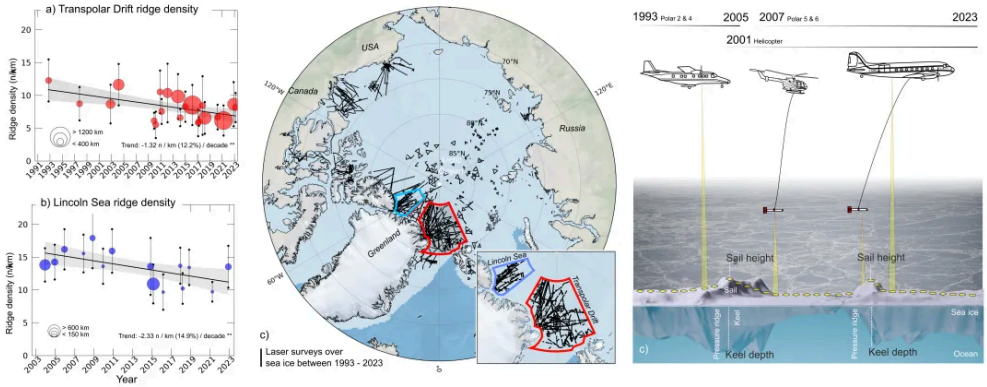


*Figure 5. The plots on the left show the changing frequency of pressure ridges (number per kilometer) in the two monitoring areas: The Transpolar Drift (a) and the Lincoln Sea (b). The map in the center (c) shows the location of laser surveys conducted by research aircraft over the sea ice between 1992 and 2024. In the early 1990s, aerial surveys were carried out with two Dornier DO228 aircraft, Polar 2 and Polar 4; after 2007, activities were continued with two Basler BT-67 aircraft, Polar 5 and Polar 6, and helicopters operated from ships (d). — Credit: Krumpen et. al., 2025*

# Antarctic ice goes south again

Sea ice in the Southern Hemisphere dropped in mid-January from near-average overall daily ice extents to below-average extents, ending the month in the lowest 10 percent of daily values (Figures 6a and 6b). Prior to January, the pace of sea ice loss had sufficiently slowed for the daily ice extent to briefly rise above the long-term average for the first half of the month. However, rapid ice loss in the Weddell and Ross Seas through the second half of the month pushed the daily extent downward to the twelfth lowest ice extent for the day in the 46-year record. Sea ice in the

Antarctic is still about 1 million square kilometers (386,000 square miles) above the record low extent for the end of January set in 2023. Warm conditions, generally 1 to 2 degrees Celsius (2 to 4 degrees Fahrenheit) above the long-term average, were the rule in the far southern Southern Ocean and the continent.

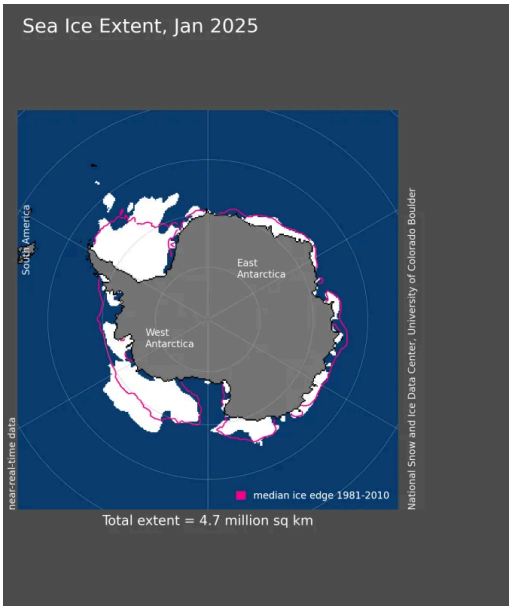


*Figure 6a. Antarctic sea ice extent for January 2025 was 4.72 million square kilometers (1.82 million square miles). The magenta line shows the 1981 to 2010 average extent for that month. Sea Ice Index data. About the data — Credit: National Snow and Ice Data Center*

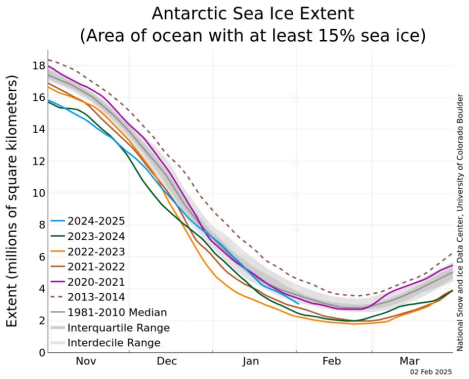


*Figure 6b. The graph above shows Antarctic sea ice extent as of February 2, 2025, along with daily ice extent data for four previous years and the record high year. 2024 to 2025 is shown in blue, 2023 to 2024 in green, 2022 to 2023 in orange, 2021 to 2022 in brown, 2020 to 2021 in magenta, and 2014 to 2015 in dashed brown. The 1981 to 2010 median is in dark gray. The gray areas around the median line show the interquartile and interdecile ranges of the data. Sea Ice Index data. — Credit: National Snow and Ice Data Center*

# Further reading

Krumpen, T. et. al. 2025. Smoother sea ice with fewer pressure ridges in a more dynamic Arctic. *Nature Climate Change*. doi: 10.1038/s41558-