

Sea Ice and Products and Services of the National Ice Center

Summary

Ice presents a constant danger for ships operating in the Arctic. Ships can sustain damage from collisions or become trapped and unable to move (beset). There are 2 kinds of ice floating in the Arctic: sea ice and icebergs. They differ in the way they form and the danger they present.

Sea ice forms when seawater freezes. As one might expect, sea ice forms in winter, reaching a maximum in late winter, and melts in summer, reaching a minimum in late summer. In recent years, the thickness and extent of sea ice has been decreasing. This has opened up sea routes across the Arctic in the summer. Long-term climate models indicate ice-free summers by the end of this century.

Sea ice is classified by its thickness and age. It ranges from a soupy mix of crystals to multi-year ice up to 3 meters thick. When sea ice forms, ice crystals expel salt, which accumulates in pockets of salty brine. These pockets weaken the newly formed ice. Over time the brine escapes and is replaced with summer meltwater, which freezes the following winter. The resulting multi-year ice is much stronger and presents a formidable barrier to icebreakers.

With the exception of fast ice, which is fastened to the shore or seafloor, sea ice is in constant motion. Over short time periods, wind is the primary driver. Over longer periods of time, ice tends to follow the major currents, including the Beaufort Gyre and Transpolar Drift.

One consequence of this motion is that open water can be found year-round. Areas of open water are called fractures, leads, or polynyas depending on their size and shape. They are important both operationally as well as ecologically.

Analyses and forecasts for sea ice are available online from the National Ice Center. These products include a daily ice edge, weekly ice analyses, 30-day outlooks, and more.

Sea ice analyses depend on satellite remote sensing. Satellite products include visible, infrared, and microwave images. Each type of imagery has respective strengths and weaknesses.

Icebergs form when ice calves off glaciers into sea. As a result the ice is very fresh and thus very strong. Also, because the ice accumulates on land, icebergs can be much thicker than sea ice.

Icebergs are classified by size and shape. Sizes can range from small bergy bits to hundreds of square kilometers. While Arctic icebergs do not reach the size of their Antarctic cousins, they can still present a formidable hazard.

Most Arctic icebergs form around Greenland (but can be present in many of the Arctic Seas). They are carried by currents that follow the coast of Greenland and Baffin Bay, then down past Labrador and Newfoundland and into North Atlantic shipping lanes.

Because icebergs present such a danger, they are closely monitored by the International Ice Patrol, which produces a daily chart showing their occurrence.