

# A Field Guide to Sea Ice



**THE ARCTIC INSTITUTE**  
CENTER FOR CIRCUMPOLAR SECURITY STUDIES

# Our Field Guide to Ice

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This field guide is inspired by a virtual discussion within the U.S. Interagency Arctic Research Committee's Collaboration (IARPC) web forum on the misuse and misunderstanding of ice terminology. It is the result of a collaboration between IARPC members, The Arctic Institute, and graphic designer Brittney Larko.

Definitions are derived from the U.S. National Snow & Ice Data Center website, a bibliography is found on the last page of this guide.

For more work by Brittney Larko, please visit <https://www.behance.net/brittneylarko>.

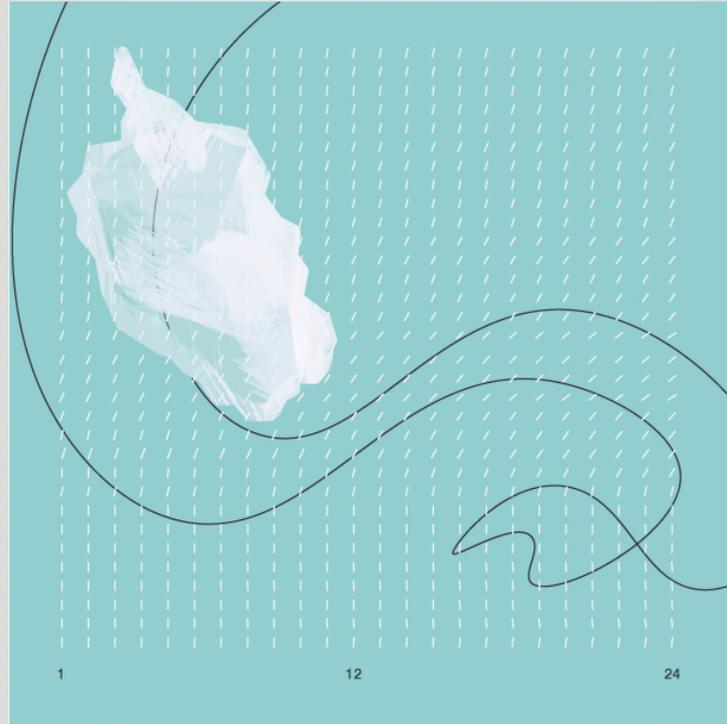
The Arctic ice cover plays an important role in maintaining the Earth's temperature—the shiny white ice reflects light and heat that the ocean would otherwise absorb, keeping the Northern Hemisphere cool.

This guide is intended as educational material for frequently used sea ice terms. If you would like .jpg versions of any image for education use, please contact Victoria Herrmann at [victoria.herrmann@thearcticinstitute.org](mailto:victoria.herrmann@thearcticinstitute.org).

# Sea Ice

Ice that is found at sea and originates by the freezing of seawater. It grows and melts in the ocean, and is typically covered with snow.

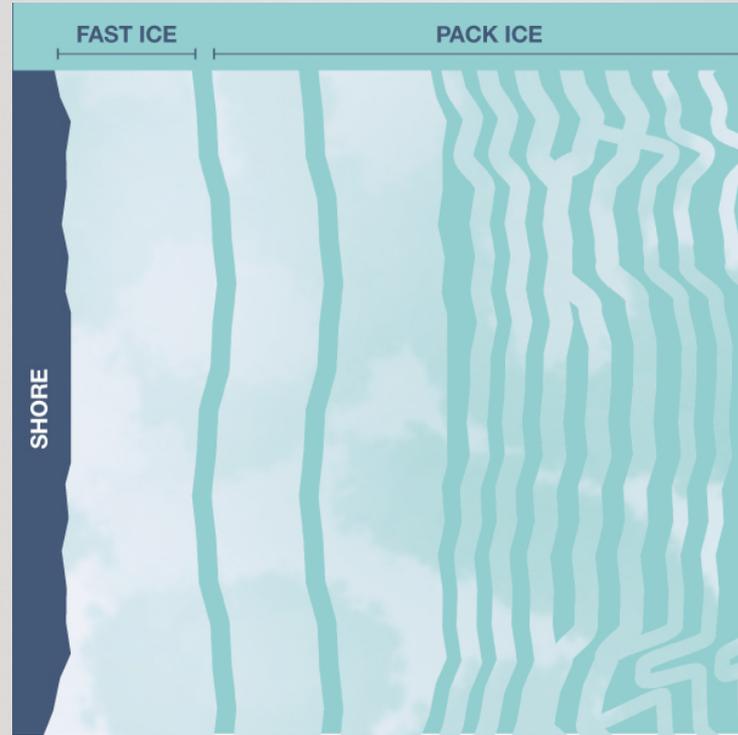
Sea ice is dynamic. It is almost always in motion from winds, currents, water temperature, and air temperature.



# Fast Ice & Pack Ice

Pack ice is sea ice that moves. It drifts in response to winds, currents, or other forces.

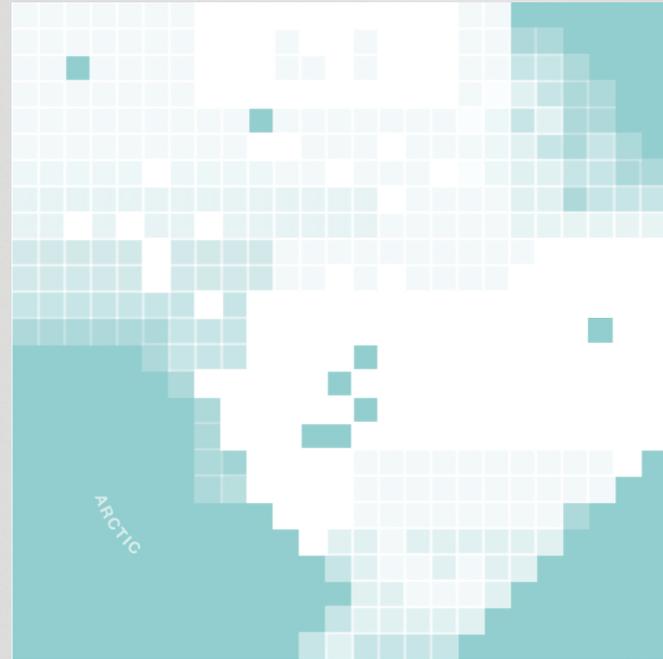
Fast ice, or shore fast ice, is sea ice that is stationary because it is fastened to the shore.





# Sea Ice Area

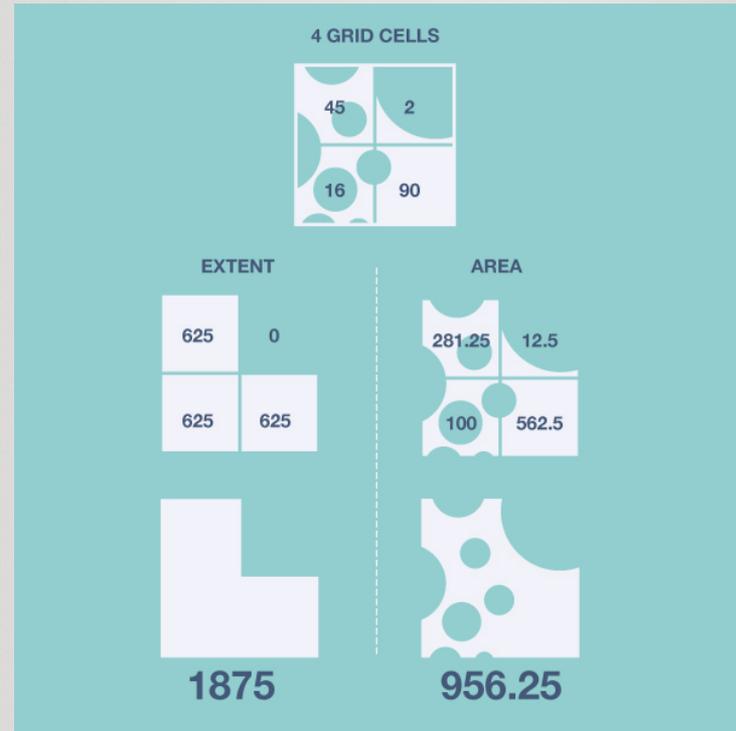
The area of the ocean where there is sea ice, usually calculated in square kilometers. For a grid cell – the data unit used for sea ice measurements – it is only the area of the portion of the cell covered by ice.



# Understanding the difference between area and extent

Imagine a slice of Swiss cheese. **Extent** is the measurement of the edges of the slide of cheese and all the space inside it. **Area** is the measure of where there is only cheese, not including the holes.

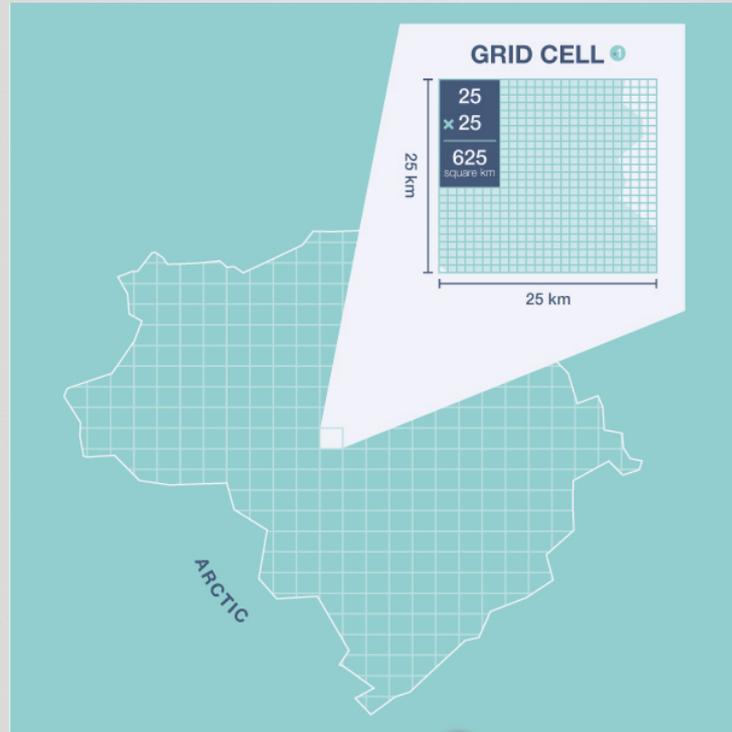
In the same time period, sea ice extent is always bigger than sea ice area.



# Calculating the difference between area and extent

In this grid cell, where 90% of the grid is covered in ice, the cell is considered “ice covered,” or 100% ice in sea ice extent. Sea Ice extent is 625 square km for this grid

The sea ice area of this grid is found by multiplying the area covered by ice, 90%, by the sea ice extent. The sea ice area of this grid cell is 562.5 square km.



# Ice Floe

A separate patch of floating ice or a flat sheet of unbroken pack ice that is greater than 20 meters (22 yards) across.

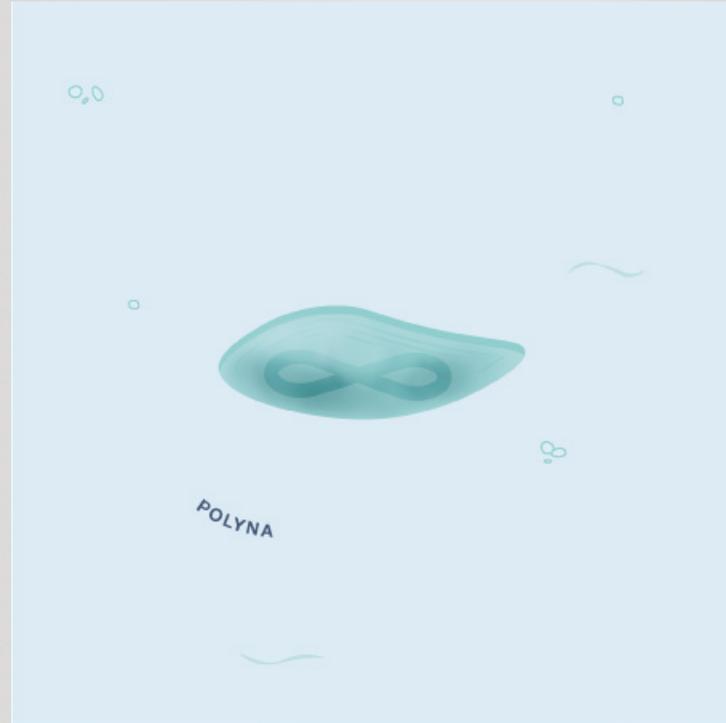
Floes are divided into small (20 - 100m), medium(100 – 500m), big (500m -2km), vast (1 - 10.8 km), and giant (>10.8 km).

\*Floe not Flow!



# Polynya

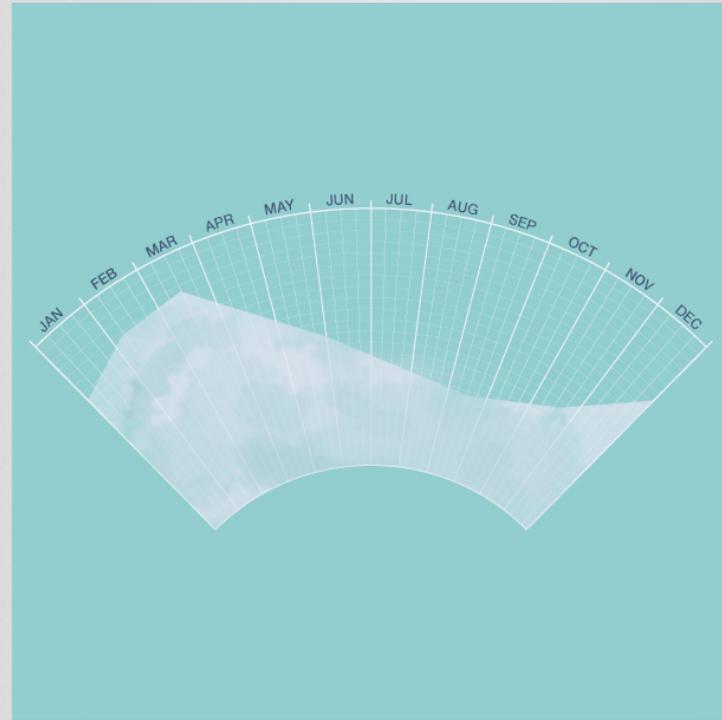
Enclosed areas of persistently open water among fields and floes of pack ice where scientists would expect to find ice. Usually oval or circular in shape, the water remains open because of processes that prevent ice from forming or quickly move sea ice out of the region.



## Seasons of Sea Ice

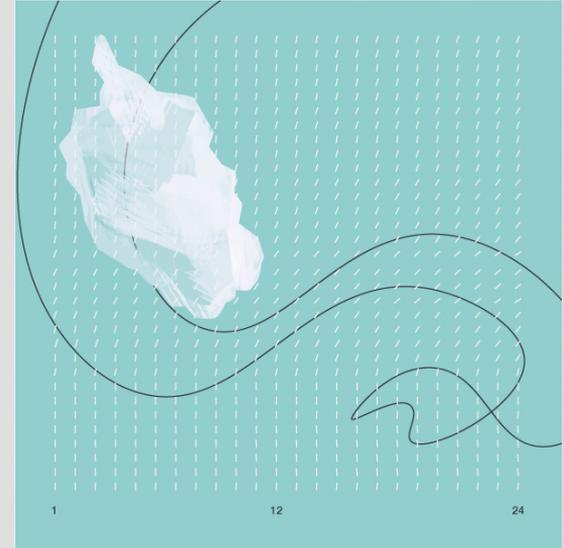
Sea ice in the Arctic Ocean and surrounding seas shrinks in a seasonal cycle from mid-March to mid-September, known as the ice loss season.

As temperatures drop in autumn and winter, ice cover grows until it reaches its early maximum extent, typically in March. With warmer temperatures during the summer, sea ice retreats, reaching its minimum extent in September.



# The Impact of Climate Change

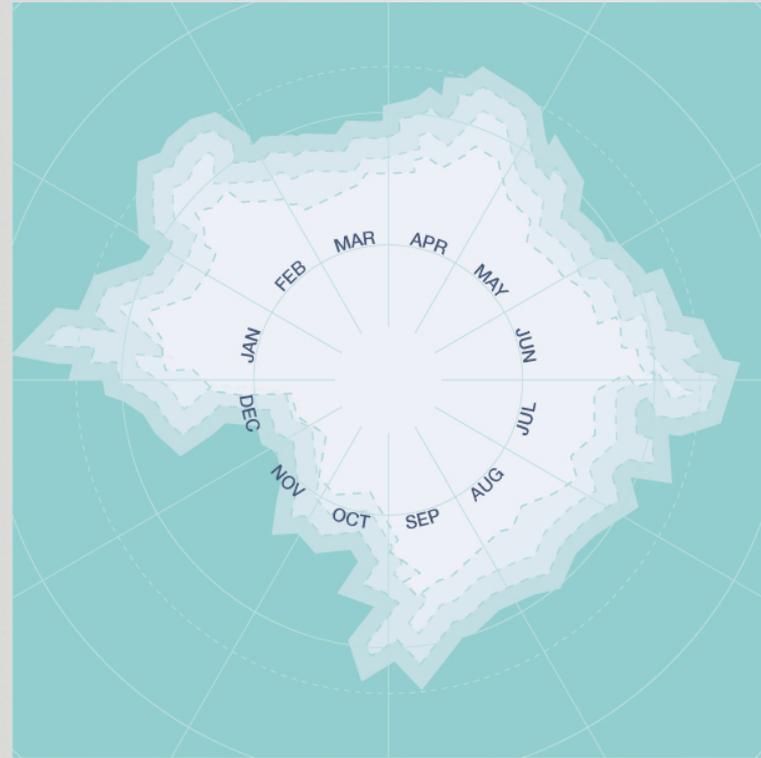
While sea ice extent varies from year to year, it is on a long-term decline and remains very low compared to historical record. Sea ice is much thinner than in the past, making it more vulnerable to further decline.



## What would it mean for sea ice to recover?

To recover, sea ice extent would need to return to within the range of natural seasonal variation, and continue over multiple years. A series of sea ice minimums would need to exceed the previous year's measurement, and Arctic sea ice cover would need to be dominated by thicker, multiyear ice.

Scientists do not anticipate sea ice to recover.



# Bibliography

“Data: Terminology.” *National Snow & Ice Data Center.*  
<https://nsidc.org/cryosphere/sealice/data/terminology.html>

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