Current State of Sea Ice Cover

A. C. Bliss, J. C. Comiso, C. L. Parkinson, R. Gersten, and T. Markus

Background

The sea ice cover is one of the key components of the polar climate system. It has been a focus of attention in recent years, largely because of a strong decrease in the Arctic sea ice cover and modeling results that indicate that global warming is amplified in the Arctic on account of ice-albedo feedback. This results from the high reflectivity (albedo) of the sea ice compared to ice-free waters. A satellite-based data record starting in late 1978 shows that indeed rapid changes have been occurring in the Arctic, where the ice coverage has been declining at a substantial rate. In contrast, in the Antarctic the sea ice coverage has been increasing although at a lesser rate than the decreases in the Arctic. Shown below are up-to-date satellite observations of the sea ice covers of both the Arctic and the Antarctic, along with comparisons with the historical satellite record of more than 4 decades. The plots and color-coded maps are chosen to provide information about the current state of the sea ice cover and how the most current daily data available compare with the record lows and record highs for the same date during the satellite

era. Sea ice concentration is the percent areal coverage of ice within the data element (grid cell). Sea ice extent is the integral sum of the areas of all grid cells with at least 15% ice concentration, while sea ice area is the integral sum of the product of ice concentration and area of all grid cells with at least 15% ice concentration. The dashed vertical line indicates the date of the latest plotted and mapped data.

Northern Hemisphere Sea Ice Cover

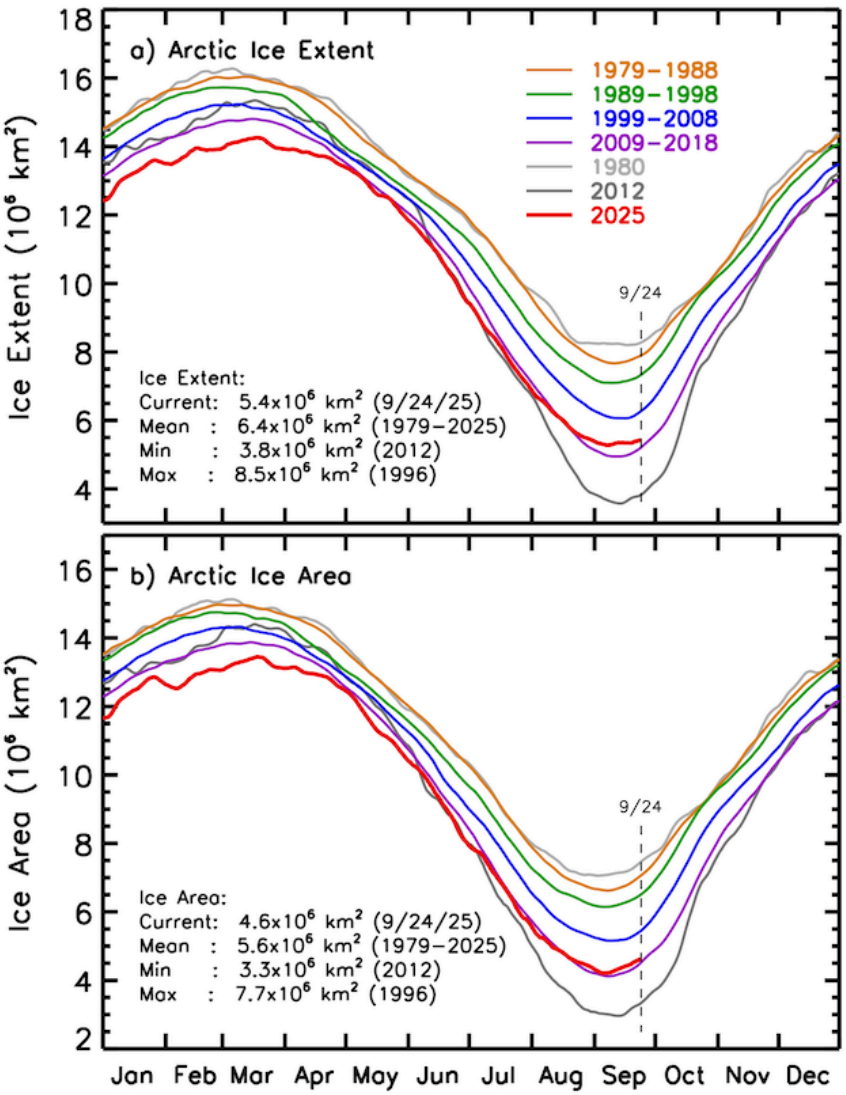

Figure 1. 10-year averages between 1979 and 2018 and yearly averages for 1980, 2012, and 2025 of the daily (a) ice extent and (b) ice area in the Northern Hemisphere and a listing of the extent and area of the current, historical mean, minimum, and maximum values in km^2.

Data source: Comiso (2023)[1]

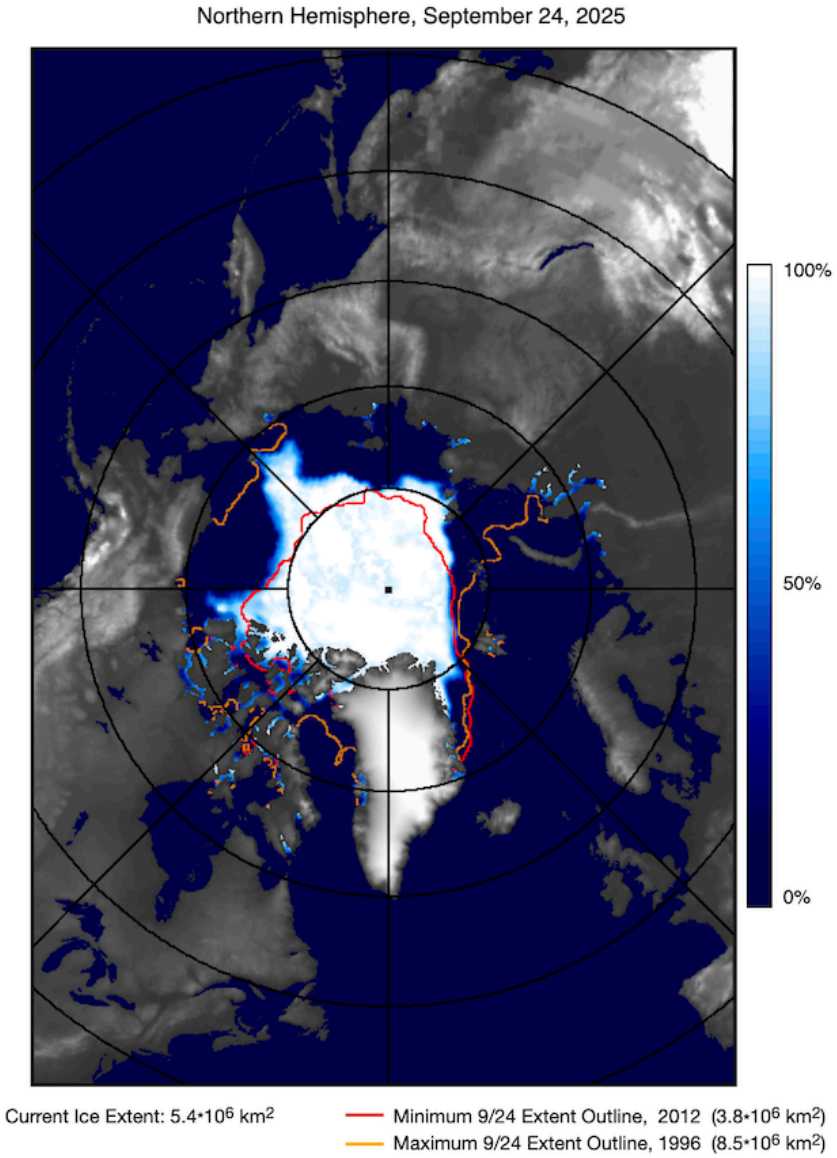

Figure 2. Color-coded map of the daily sea ice concentration in the Northern Hemisphere for the indicated recent date along with the contours of the 15% edge during the years with the

least extent of ice (in red) and the greatest extent of ice (in orange) during the period from November 1978 to the present. The extents in km^2 for the current and for the years of minimum and maximum extents are provided below the image. The different shades of gray over land indicate the land elevation with the lightest gray being the highest elevation.

Data source: Comiso (2023)[1]

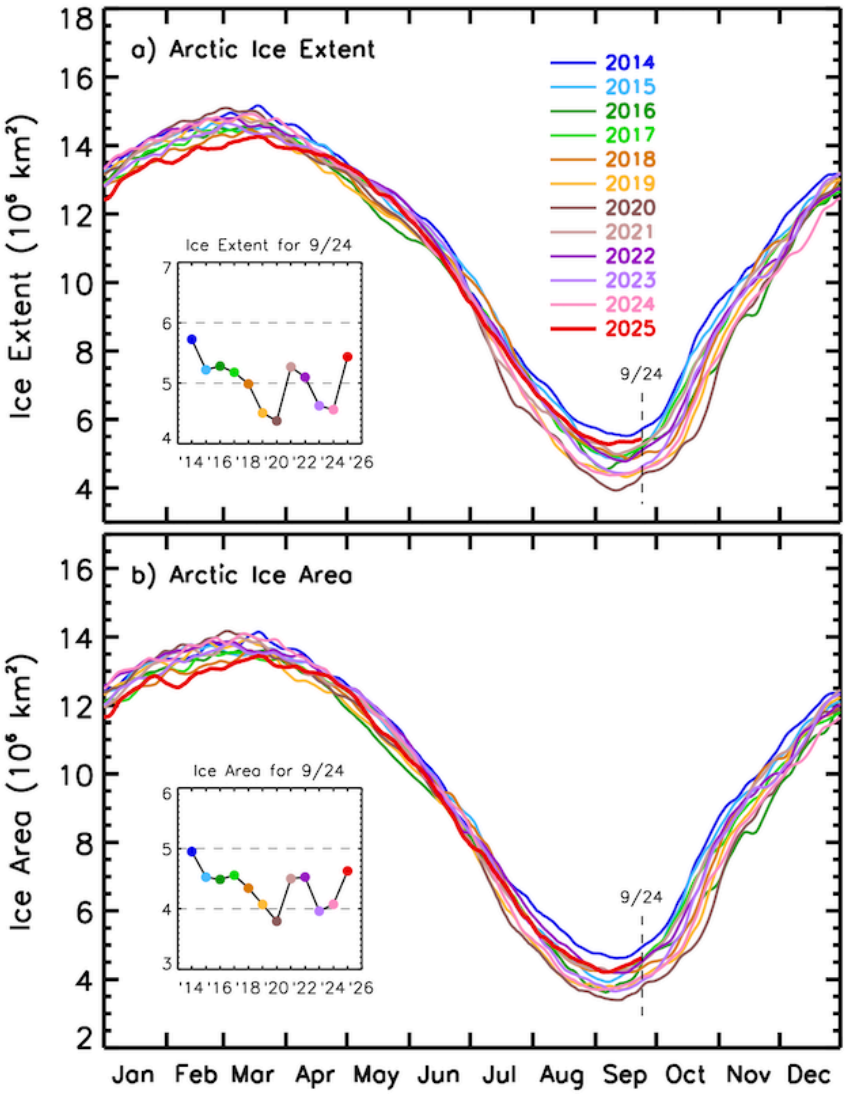

Figure 3. Seasonal cycle of Northern Hemisphere sea ice

extents (a) and areas (b), given as daily averages, for the years 2014 through 2025. The vertical line represents the last data point plotted.

Data source: Comiso (2023)[1]

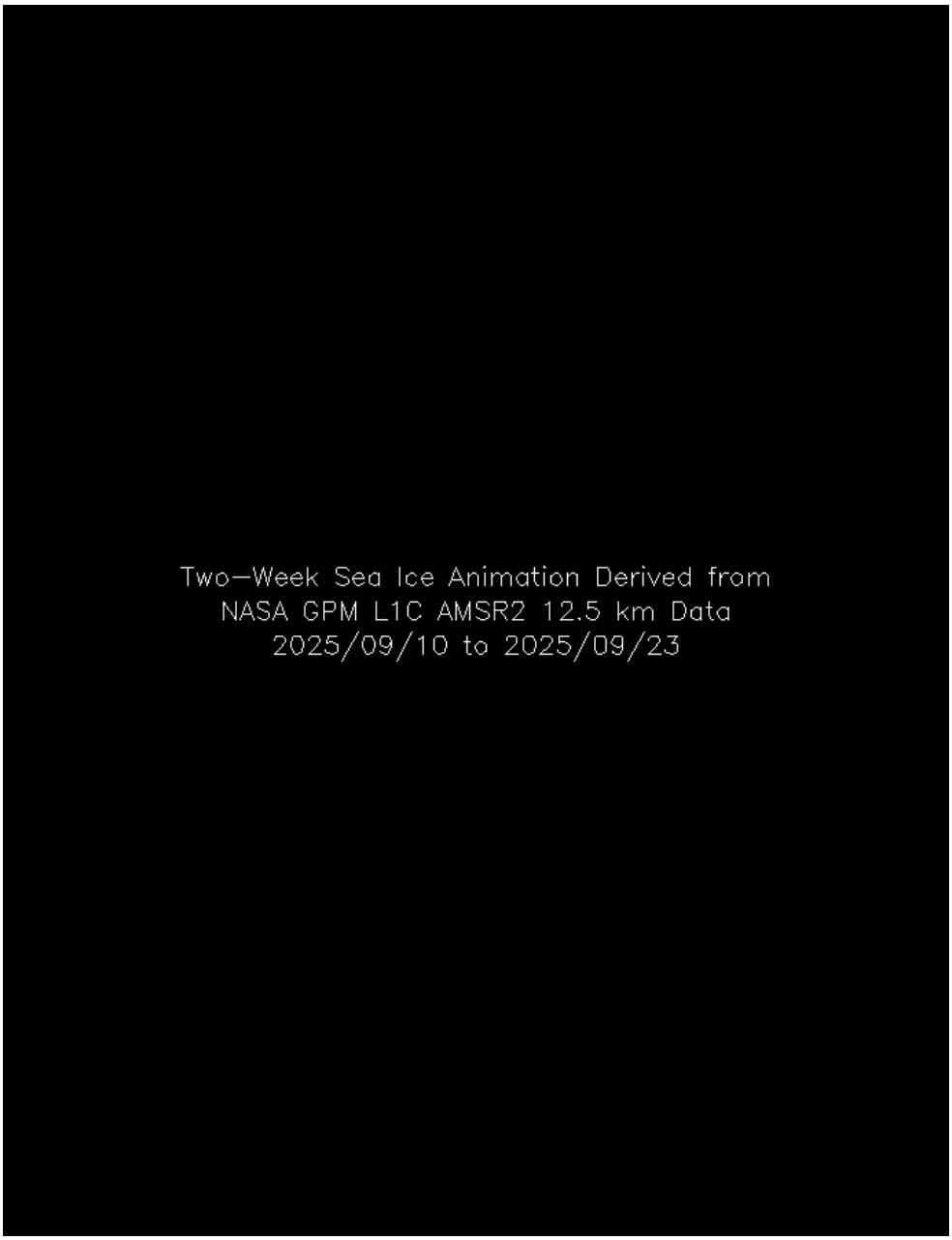

Figure 4. Color-coded animation displaying the last 2 weeks of

the daily sea ice concentrations in the Northern Hemisphere. The different shades of gray over land indicate the land elevation with the lightest gray being the highest elevation.

Data source: Comiso & Nishio (2008)[2], Berg (2022)[3]

Southern Hemisphere Sea Ice Cover

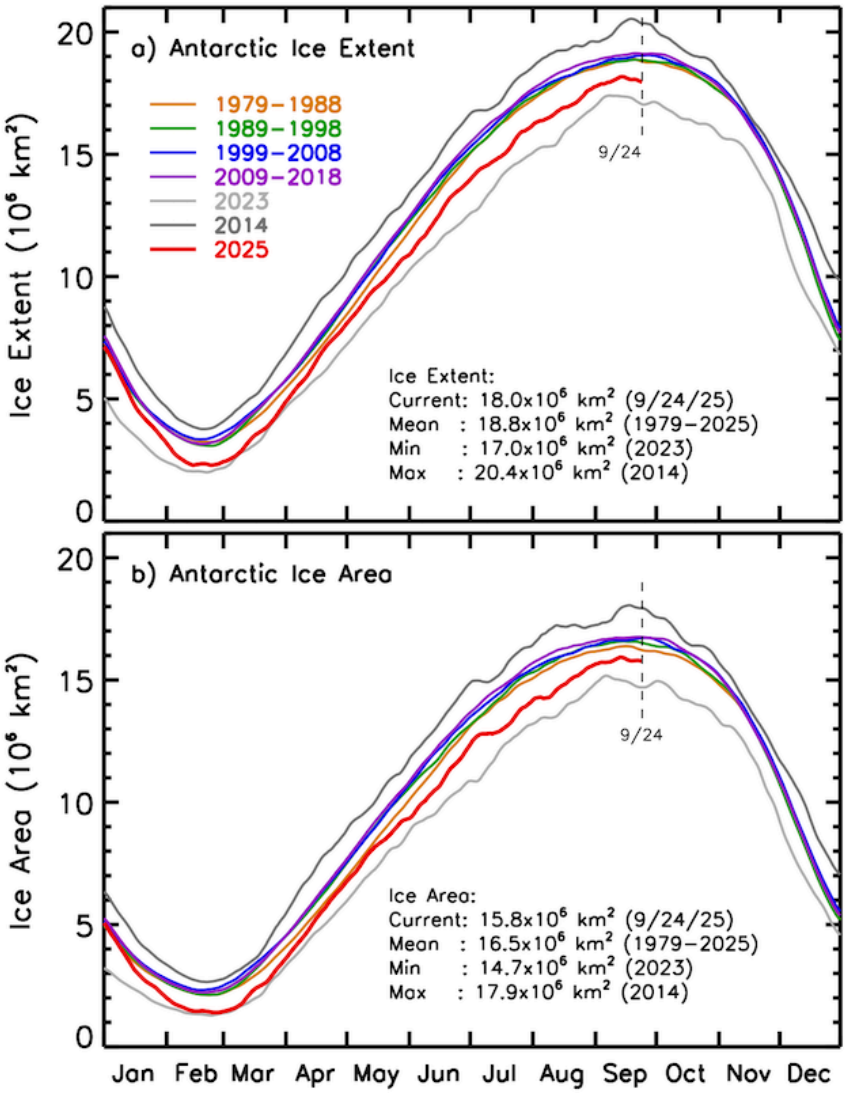

Figure 5. 10-year averages between 1979 and 2018 and yearly

averages for 2023, 2014, and 2025 of the daily (a) ice extent and (b) ice area in the Southern Hemisphere and a listing of the extent and area of the current, historical mean, minimum, and maximum values in km^2.

Data source: Comiso (2023)[1]

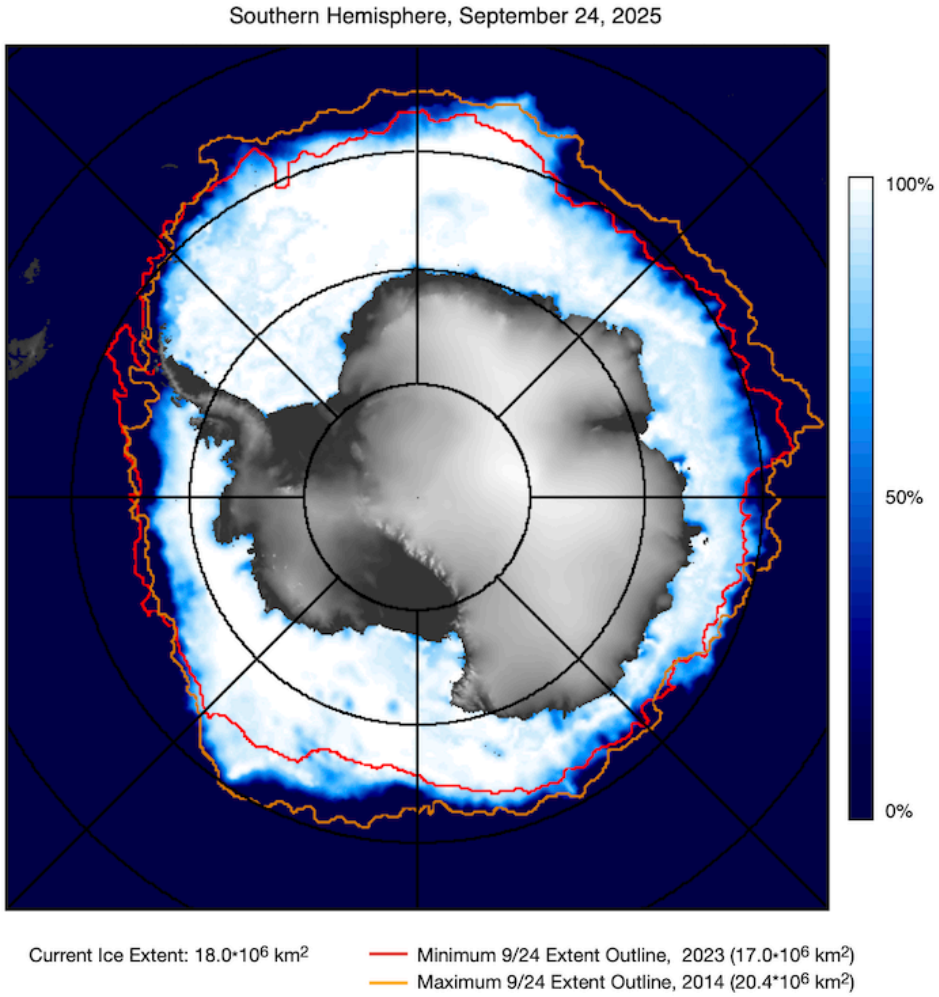

Figure 6. Color-coded map of the daily sea ice concentration in the Southern Hemisphere for the indicated recent date along with the contours of the 15% edge during the years with the least extent of ice (in red) and the greatest extent of ice (in

orange) during the period from November 1978 to the present. The extents in km^2 for the current and for the years of minimum and maximum extents are provided below the image. The different shades of gray over land indicate the land elevation with the lightest gray being the highest elevation.

Data source: Comiso (2023)[1]

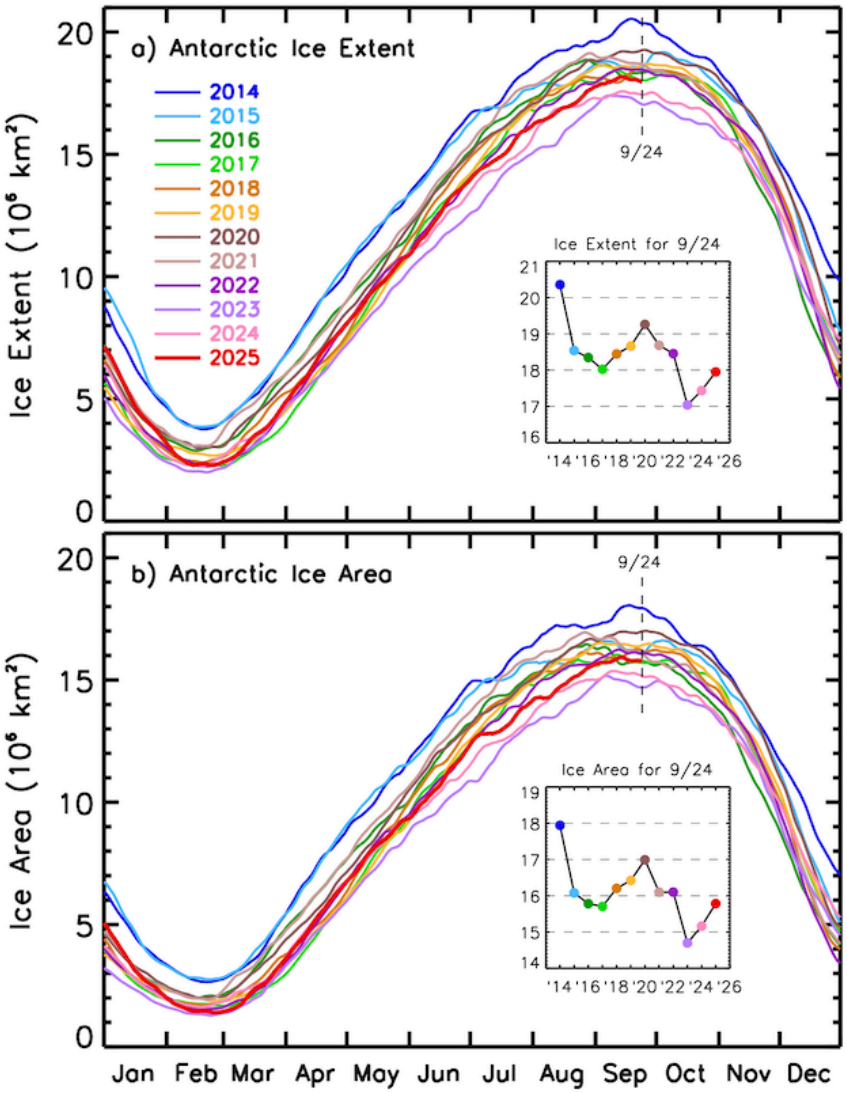

Figure 7. Seasonal cycle of Southern Hemisphere sea ice extents (a) and areas (b), given as daily averages, for the years 2014 through 2025. The vertical line represents the last data

point plotted.

Data source: Comiso (2023)[1]

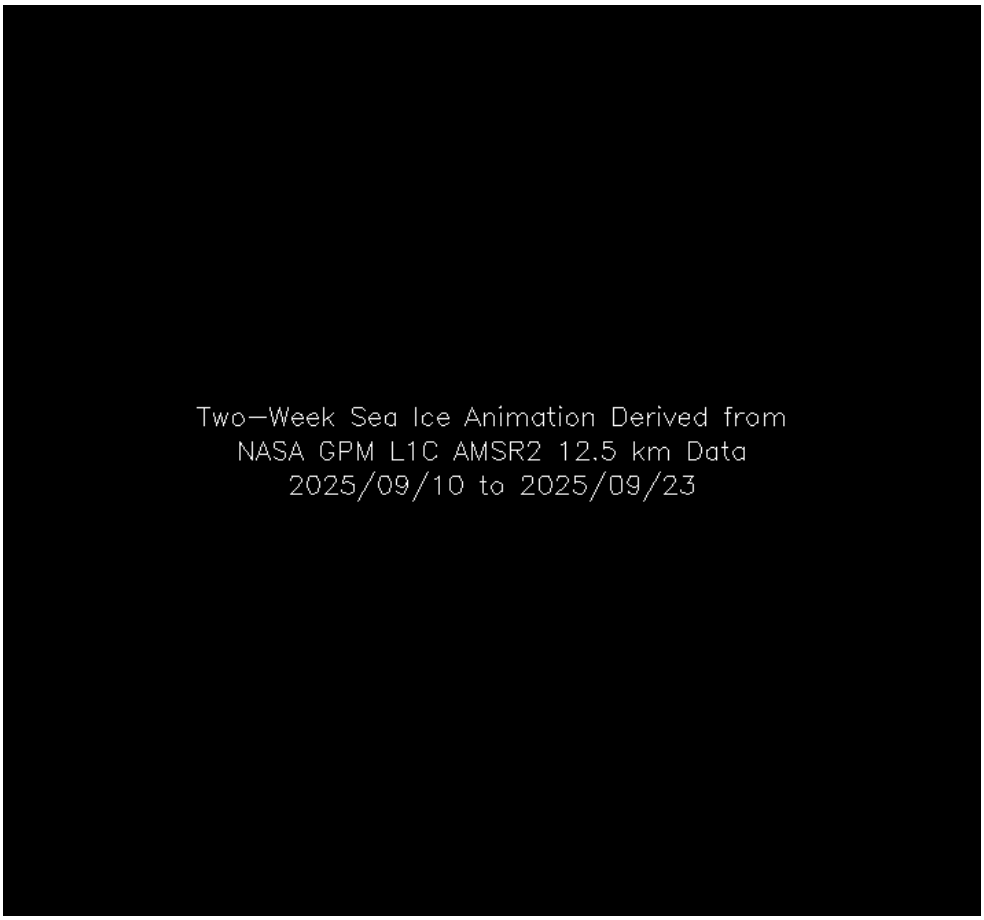

Figure 8. Color-coded animation displaying the last 2 weeks of the daily sea ice concentrations in the Southern Hemisphere. The different shades of gray over land indicate the land elevation with the lightest gray being the highest elevation.

Data source: Comiso & Nishio (2008)[2], Berg (2022)[3]

About these images

These images were produced with daily sea ice concentrations

derived with the Bootstrap Algorithm using satellite observations from the Scanning Multi-channel Microwave Radiometer (SMMR), the Special Sensor Microwave Imager (SSM-I) and Sounder (SSMIS), and the Advanced Microwave Scanning Radiometer 2 (AMSR2) instruments. This webpage is updated with the most recent sea ice data twice weekly. Older images from this page are archived at Zenodo and may be accessed at this link.

Data Sources

The data sets used to generate the above images, animations, and plots are distributed by the NASA Distributed Active Archive Center at the National Snow and Ice Data Center (nsidc.org) and the Goddard Earth Sciences Data and Information Services Center (disc.gsfc.nasa.gov).

Historical sea ice concentration data from the SMMR, SSM-I, and SSMIS satellite record in Figures 1, 3, 5, 7 and the contours in Figures 2 and 6 are available online at https://nsidc.org/data/nsidc-0079/versions/4 (Comiso, 2023). The most recent sea ice concentration data (for the current year) shown in Figures 1, 3, 5, and 7 are produced at NASA Goddard Space Flight Center with near-real-time brightness temperatures (Meier et al., 2022).

Animations of recent daily sea ice concentration in Figures 4 and 8 feature 12.5 km resolution sea ice concentrations from the AMSR Bootstrap Algorithm (ABA; Comiso & Nishio, 2008) produced at NASA Goddard Space Flight Center using AMSR2 data from the NASA Global Precipitation Measurement Level 1C V07 product (Berg, 2022).

How to cite this page

Bliss, A. C., J. C. Comiso, C. L. Parkinson, R. Gersten, and T. Markus (2025), Current State of Sea Ice Cover,

https://earth.gsfc.nasa.gov/cryo/data/current-state-sea-ice-cover, last access: MM-DD-YYYY.

If referencing any current or archived images from this page, please also cite the following:

Bliss, A. C., J. C. Comiso, C. L. Parkinson, R. Gersten, and T. Markus (2025), NASA GSFC Current State of Sea Ice Cover Image Archive, *Zenodo.* https://doi.org/10.5281/zenodo.17184409

Acknowledgement

This page is maintained with funding support from NASA's Cryospheric Sciences Program

References

[1]Comiso, J. C. (2023). Bootstrap Sea Ice Concentrations from Nimbus-7 SMMR and DMSP SSM/I-SSMIS, Version 4. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. https://doi.org/10.5067/X5LG68MH013O

[2]Comiso, J. C. and F. Nishio (2008). Trends in the sea ice cover using enhanced and compatible AMSR-E, SSM/I, and SMMR data, *J. Geophys. Res.*, 113, C02S07. https://doi.org/10.1029/2007JC004257

[3]Berg, W. (2022). GPM AMSR-2 on GCOM-W1 Common Calibrated Brightness Temperature L1C 1.5 hours 10 km V07, Greenbelt, MD. Goddard Earth Sciences Data and Information Services Center (GES DISC). https://doi.org/10.5067/GPM/AMSR2/GCOMW1/1C/07

[4]Meier, W. N., H. Wilcox, D. J. Scott, J. S. Stewart, and J. Calme. (2022). Near-Real-Time DMSP SSM/I-SSMIS Daily Polar Gridded Brightness Temperatures, Version 2. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. https://doi.org/10.5067/WKRY675MV57L