

# September 2024 SIO Report

#### **Executive Summary**

We would like to heartily express our gratitude to the SIO community for contributing seasonal forecasts to the SIO in 2024. The June–September SIO reports are limited to the pan-Arctic forecasts while we work to secure funding to support the continuation of the SIO. Please note that all the contributed data (e.g., Alaska, Antarctic and spatial forecasts) will be shared and discussed in a post-season report (in early 2025). So please submit your forecasts as usual and we acknowledge that real time sea-ice forecasts are invaluable for advancing our understanding and continuing the SIO record.

We received 22 contributions of September pan-Arctic sea-ice extent forecasts; of these, 10 included predictions of pan-Arctic sea-ice anomalies, nine included predictions for the Alaska region (Bering, Chukchi, and Beaufort seas), and six included predictions for pan-Antarctic sea ice. The September 2024 median forecasted value for pan-Arctic September sea-ice extent is 4.31 million square kilometers with an interquartile range of 4.25 to 4.46 million square kilometers. The lowest sea-ice extent forecast is 3.91 million square kilometers, and the highest sea-ice extent forecast is 4.88 million square kilometers. Ten groups submitted September-mean Arctic sea-ice extent anomalies. These forecasts range from -0.41 to +.38 million square kilometers with a median of +0.16 million square kilometers, suggesting that the 2024 September Arctic extent will likely be above the long-term trend line.

This September Outlook Report was developed by lead author Edward Blanchard-Wrigglesworth, University of Washington, with contributions from Walt Meier and Matt Fisher, National Snow and Ice Data Center at the University of Colorado (submission management and image creation), Uma Bhatt, University of Alaska Fairbanks, Mitch Bushuk, NOAA's Geophysical Fluid Dynamics Laboratory, Stacey Stoudt and Audrey (report coordination and editing) ARCUS. Note: The Sea Ice Outlook provides an open process for those who are interested in Arctic sea ice to share predictions and ideas; the Outlook is not an operational forecast.

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### **Pan-Arctic Forecasts**

The August 2024 Outlook received 22 pan-Arctic contributions (Figure 1). This year's median forecasted value for pan-Arctic September sea-ice extent is 4.31 million square kilometers with an interquartile range of 4.25 to 4.46 million square kilometers. The median forecast of 4.31 million square kilometers is slightly higher than the August median forecast of 4.27, and slightly lower than the June and July 2024 median forecasts of 4.45 and 4.48 million square kilometers.

This reflects relatively neutral ice loss rates during the month of August, resulting in September Outlooks revising estimates slightly upward relative to August. The lowest sea-ice extent forecast is 3.91 million square kilometers, from the RASM@NPS submission); the highest sea-ice extent forecast is 4.88 million square kilometers, submitted by the HEU group.

The observed extent values are from the NSIDC Sea Ice Index (Fetterer et al., 2017), based on the NASA Team algorithm sea ice concentration fields distributed by the NASA Snow and Ice Distributed Active Archive Center (DAAC) at NSIDC (DiGirolamo et al., 2022; Meier et al., 2021).



Figure 1. Distribution of SIO contributors for September estimates of September 2024 pan-Arctic sea-ice extent. Image courtesy of Matthew Fisher, NSIDC.



Figure 2. Distribution of SIO contributors for June through September (from left to right for each method) estimates of September 2024 pan-Arctic sea-ice extent. Image courtesy of Matthew Fisher, NSIDC.



# SEA ICE PREDICTION NETWORK

In figure 2 we show the 2024 SIO September SIE predictions binned by method, and month (June through September, plotted left to right for each method). While earlier in June and July statistical models were consistently producing higher predictions compared to dynamical models, both methodologies have converged, and in September both offer similar predictions; the median statistical prediction is 4.31 million square kilometers, and the median dynamical prediction is 4.30 million square kilometers.

# **Pan-Arctic Sea Ice Extent Anomalies**

This is the fourth year that the SIO has solicited forecasts of September mean sea-ice extent anomalies. The pan-Arctic anomaly is the departure of the contributors' September extent Outlook relative to their adopted baseline trend (e.g., the trend in historical observations, model hindcasts, etc.). This is motivated by the prospect of reducing SIO extent forecast uncertainty that may originate from models having different trends, mean states, and post-processing methodologies. The 10 anomaly forecasts range from -0.41 to +0.38 million square kilometers, with 6 above and four below the contributors' baseline (Figure 3, top). The observed anomalies range from -1.25 (2012) to +0.82 (2006) million square kilometers (Figure 3 bottom) and are calculated as the difference from the 2005–2023 linear trend. The pan-Arctic 2024 September SIO anomaly forecast has a median of +0.16 and an interquartile range of -0.1 to +0.2 million square kilometers. This median anomaly forecast has declined throughout the summer from a maximum of +0.40 in June to a low of +0.16 million square kilometers in September, while forecast spread has declined across the four SIOs, indicating growing forecast confidence.





Figure 3. Anomaly pan-Arctic September 2024 forecast ranked by submission (top) and observed anomalies from the 2005–2023 linear trend with September 2024 forecasts (bottom). The median September 2024 forecast was 0.16 million square kilometers.

### **Current Conditions**

For the 2024 SIO season we will refer readers to available resources for current conditions. The National Snow & Ice Data Center's 'Arctic Sea Ice News & Analysis' summarizes the current state of the sea ice and associated conditions (https://nsidc.org/sea-ice-today/). The NOAA NWS Alaska Sea Ice Program (ASIP) provides current conditions in the Alaska seas (https://www.weather.gov/afc/ice). Rick Thoman provides regular climate summaries including focal topics of sea ice in his substack blog (https://alaskaclimate.substack.com/). Our colleagues at AWI have also produced а summary of the season here (https://www.meereisportal.de/en/news-overview/news-detail-view/arctic-sea-ice-reachessummer-minimum)

### References

Fetterer, F., K. Knowles, W. N. Meier, M. Savoie, and A. K. Windnagel. (2017). Sea Ice Index, Version 3 [Data Set]. Boulder, Colorado USA. National Snow and Ice Data Center. https://doi.org/10.7265/N5K072F8. Date Accessed 08-2-2024.



Sea Ice Prediction Network

Meier, W. N., J. S. Stewart, H. Wilcox, M. A. Hardman, and D. J. Scott. (2021). Near-Real-Time DMSP SSMIS Daily Polar Gridded Sea Ice Concentrations, Version 2 [Data Set]. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. https://doi.org/10.5067/YTTHO2FJQ97K. Date Accessed 08-2-2024.

# Contributor Full Report PDFs and Supplemental Materials will be shared in the postseason report.

# **Report Credits and Suggested Citation**

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