Sea Ice Outlook Monthly Report – June 2025

Executive Summary

We would like to heartily express our gratitude to the Sea Ice Outlook (SIO) community for contributing seasonal forecasts to the SIO in 2025. The June–September SIO reports will be 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) is planned to be shared and discussed in a post-season report (in early 2026). 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 27 contributions of September pan-Arctic sea-ice extent forecasts; of these, 13 included predictions of pan-Arctic sea-ice anomalies, nine included predictions for the Alaska region (Bering, Chukchi, and Beaufort seas), and seven included predictions for pan-Antarctic sea-ice. The June 2025 median forecasted value for pan-Arctic September sea-ice extent is 4.35 million square kilometers with an interquartile range of 4.03 to 4.54 million square kilometers. The lowest sea-ice extent forecast is 3.39 million square kilometers, which would be a new record low for the satellite period (1979-present), and the highest sea-ice extent forecast is 5.70 million square kilometers.

Thirteen groups submitted September-mean Arctic sea-ice extent anomalies. These 13 forecasts range from -1.16 to +0.52 million square kilometers with a median of +0.29 million square kilometers, suggesting that the 2025 September Arctic extent will likely be above the long-term trend line.

This June Outlook Report was developed by lead author Mitch Bushuk, NOAA's Geophysical Fluid Dynamics Laboratory, with contributions from Uma Bhatt, University of Alaska Fairbanks, Walt Meier and Matt Fisher, National Snow and Ice Data Center at the University of Colorado (submission management and image creation), Edward Blanchard-Wrigglesworth, University of Washington (report coordination and editing), and Audrey Taylor, ARCUS (report coordination and editing).

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.

1. Forecasts

Pan-Arctic Extent Forecasts

The June 2025 Outlook received 27 pan-Arctic contributions (Figure 1). This year's median forecasted value for pan-Arctic September sea-ice extent is 4.35 million square kilometers with an interquartile range of 4.03 to 4.54 million square kilometers. This is slightly lower than the 2023 (4.54 million square kilometers) and 2024 (4.48 million square miles) June median forecasts for September. The lowest sea-ice extent forecast is 3.39 million square kilometers, from Nico Sun, which would be a new record low for the satellite period (1979-present); the highest sea-ice extent forecast is 5.70 million square kilometers, submitted by BCCR, which would be the highest

September extent since 2006. Three Outlook submissions from Nico Sun, NCEP-EMC, and PNKU-KOPRI forecast a new record minimum September extent below the 2012 observed value of 3.57 million square kilometers. 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).

There is one heuristic Outlook, with a value of 4.05 million square kilometers (Figure 2). Statistical submissions total seventeen Outlooks with a median of 4.39 million square kilometers and an interquartile range of 4.18 to 4.50 million square kilometers. There are nine dynamical model contributions. The dynamical models have a median forecast of 4.35 million square kilometers with an interquartile range of 3.69 to 4.57 million square kilometers.

The median of both the statistical and dynamical outlooks is close to last year's observed September extent of 4.38 million square kilometers (Figure 2).

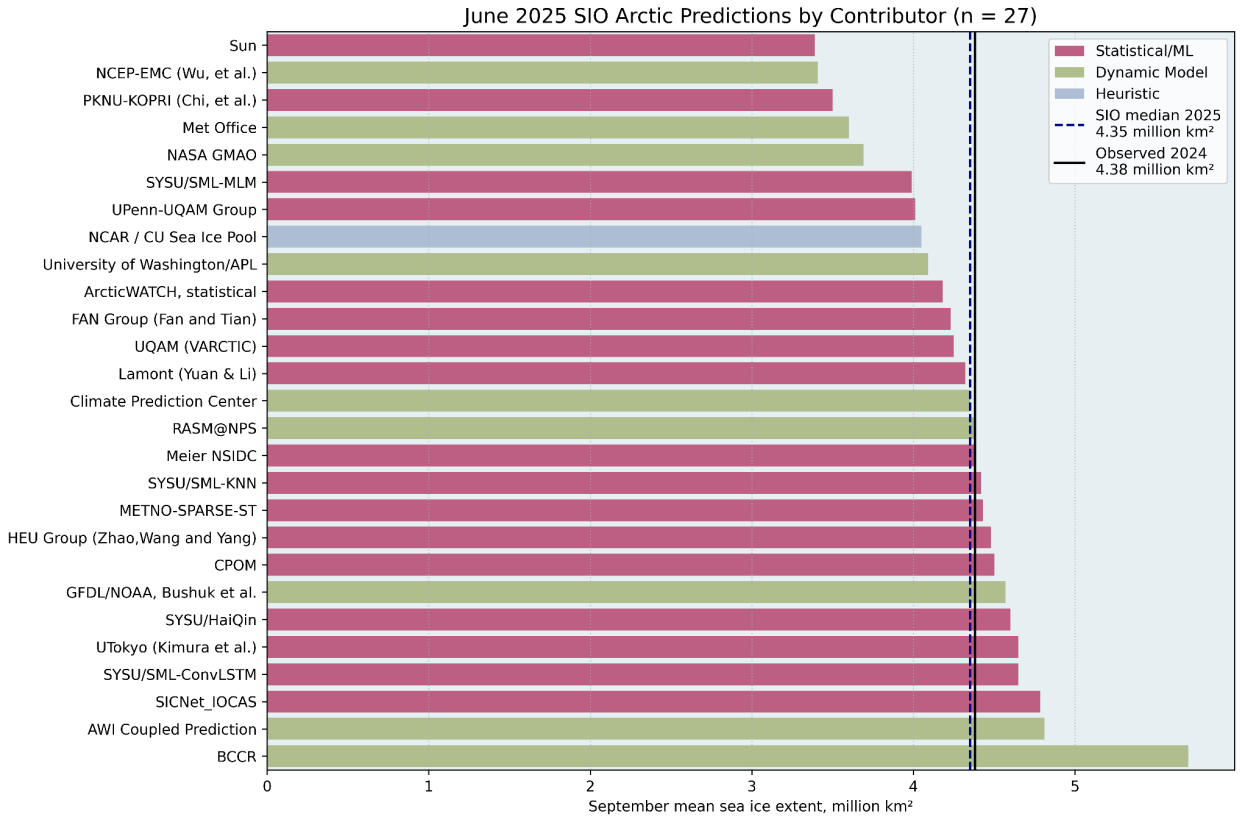

Figure 1. Distribution of SIO contributors for June estimates of September 2025 pan-Arctic sea-ice extent.

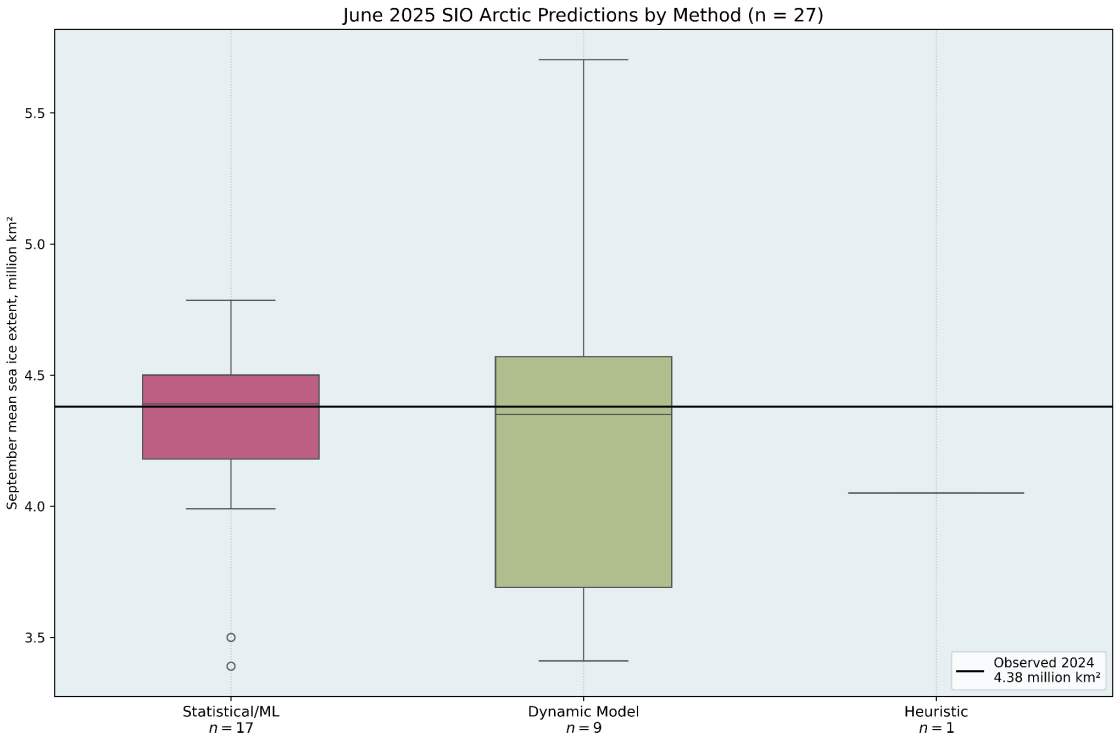

Figure 2. June 2025 pan-Arctic Sea Ice Outlook submissions, sorted by method. The median of each method (from left to right) is 4.39 (Statistical/ML), 4.35 (Dynamical), and 4.05 (Heuristic).

Pan-Arctic Anomaly Forecasts

The SIO began soliciting forecasts of September mean sea-ice extent anomalies in 2021; therefore 2025 represents the fifth year of this parameter being included in the Outlook reports. 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 13 anomaly forecasts range from -1.16 to +0.52 million square kilometers, with four above and nine at or 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 2005–2024 linear trend. The pan-Arctic 2025 June SIO anomaly forecast has a median of +0.29 and an interquartile range of -0.1 to +0.36 million square kilometers.

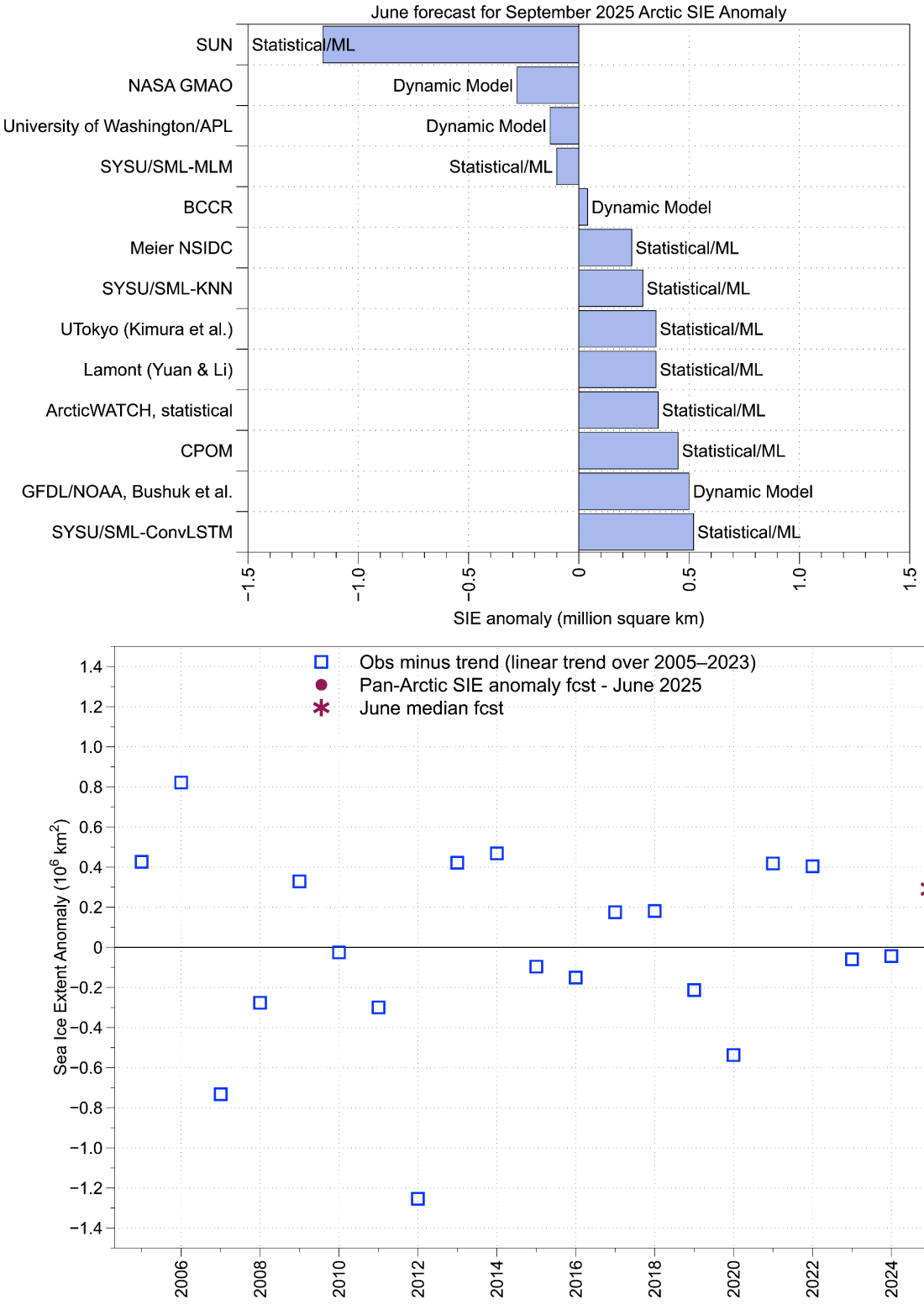

Figure 3. Anomaly pan-Arctic June 2025 forecasts ranked by submission (top), and observed anomalies from the 2005–2023 linear trend with June 2025 forecasts shown in red (bottom). The median June 2025 anomaly forecast was +0.29 million km^2.

2. Current Conditions

For the 2025 SIO season we will refer readers to available resources for current conditions. The National Snow & Ice Data Center's 'Sea Ice Today' 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/).

3. Upcoming Changes in Observational Products

We note that during the 2025 Outlook season, the source for our baseline observations – the SSMIS passive microwave sensor – ceased providing data as of 31 July 2025. NSIDC, which has provided this data via the Sea Ice Index, is switching to the AMSR2 sensor to provide concentration and extent fields. The Sea Ice Index will reprocess to use AMSR2 for all of 2025. The AMSR2 fields provided by NSIDC have been processed to have good consistency with SSMIS. However, extent and concentration values will change. Further documentation and information on the changes will be provided after 1 August.

4. References

DiGirolamo, N., C. L. Parkinson, D. J. Cavalieri, P. Gloersen, and H. J. Zwally. (2022). Sea Ice Concentrations from Nimbus-7 SMMR and DMSP SSM/I-SSMIS Passive Microwave Data, Version 2 [Data Set]. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. https://doi.org/10.5067/MPYG15WAA4WX. Date Accessed 06-20-2023.

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 06-20-2025.

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 06-20-2025.

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

Report Credits and Suggested Citation

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