



July 2024 SIO Report (Released July 26 2024)

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 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) 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 initialized from July; of these, 13 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 July 2024 median forecasted value for pan-Arctic September sea-ice extent is 4.45 million square kilometers with an interquartile range of 4.14 to 4.77 million square kilometers. The lowest sea-ice extent forecast is 3.4 million square kilometers, which would be a new record low for the satellite period (1979-present), and the highest sea-ice extent forecast is 5.21 million square kilometers.

Thirteen groups submitted September-mean Arctic sea-ice extent anomalies. These 13 forecasts range from -0.20 to +1.09 million square kilometers with a median of +0.30 million square kilometers, suggesting that the 2024 September Arctic extent will likely be above the long-term trend line.

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

Pan-Arctic Sea Ice Forecasts

The July 2024 Outlook received 22 pan-Arctic contributions (Figure 1). This year's median forecasted value for pan-Arctic September sea-ice extent is 4.45 million square kilometers with an interquartile range of 4.14 to 4.77 million square kilometers. This is slightly lower than the 2022 (4.66 million square kilometers) and 2023 (4.64 million square kilometers) July median



forecasts for September. The July 2024 median forecast of 4.45 million square kilometers is also slightly lower than the June 2024 median forecast of 4.48 million square kilometers. The lowest sea-ice extent forecast is 3.4 million square kilometers, from the UK Met Office, which would be a new record low for the satellite period (1979-present); the highest sea-ice extent forecast is 5.21 million square kilometers, submitted by SYSU/SML-KNN, which would be the highest September extent since 2014. 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).

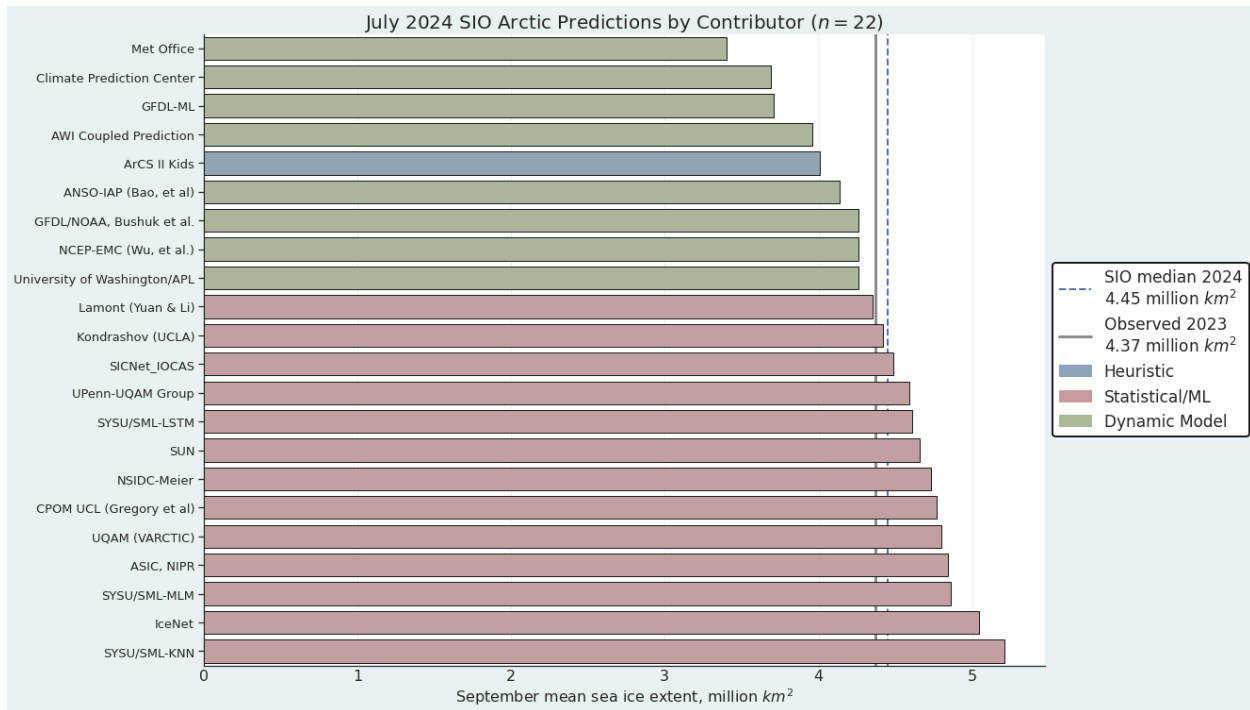


Figure 1. Distribution of SIO contributors for July estimates of September 2024 pan-Arctic sea-ice extent. Public/citizen contributions include: Sun and ArCS II Kids. Image courtesy of Matthew Fisher, NSIDC.

There are thirteen statistical submissions with a median of 4.73 million square kilometers and an interquartile range of 4.56 to 4.85 million square kilometers (Figure 2). There are eight dynamical model contributions. The dynamical models have a median forecast of 4.05 million square kilometers with an interquartile range of 3.70 to 4.26 million square kilometers. There is one heuristic Outlook, with a value of 4.01 million square kilometers.

The median of the statistical Outlooks is above last year's observed September extent, while the medians of the dynamical forecasts is below the 2023 September mean sea ice extent (Figure 2).

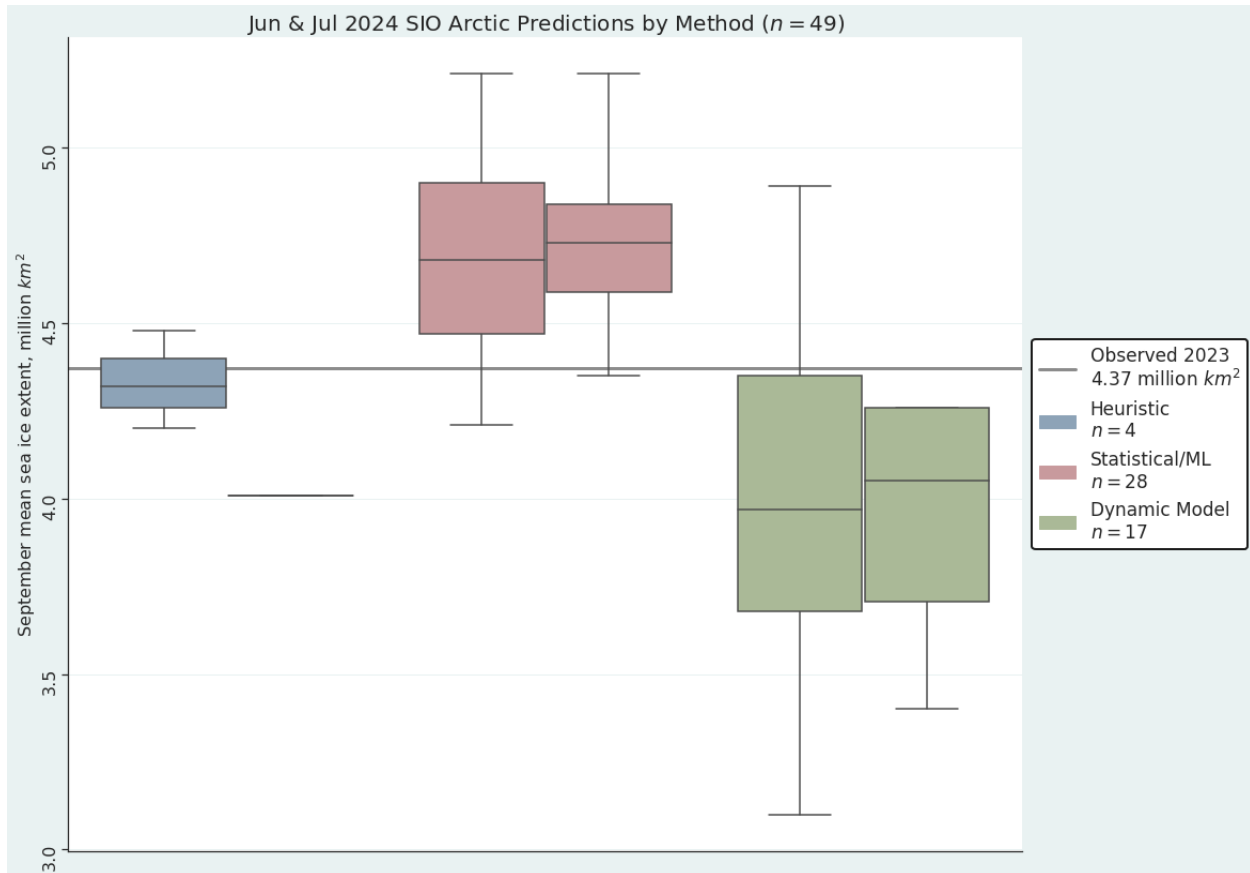


Figure 2. June and July 2024 pan-Arctic Sea Ice Outlook submissions, sorted by method. The median July forecast of each method (from left to right) is 4.01 (Heuristic), 4.73 (Statistical/ML), and 4.05 (Dynamical). Image courtesy of Matthew Fisher, NSIDC.

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 13 anomaly forecasts range from -0.20 to +1.09 million square kilometers, with 10 above and three 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 2005–2023 linear trend. The pan-Arctic 2024 July SIO anomaly forecast has a median of +0.30 and an interquartile range of +0.08 to +0.61 million



square kilometers. This median anomaly forecast is slightly lower than the June predicted value of +0.40 million square kilometers.

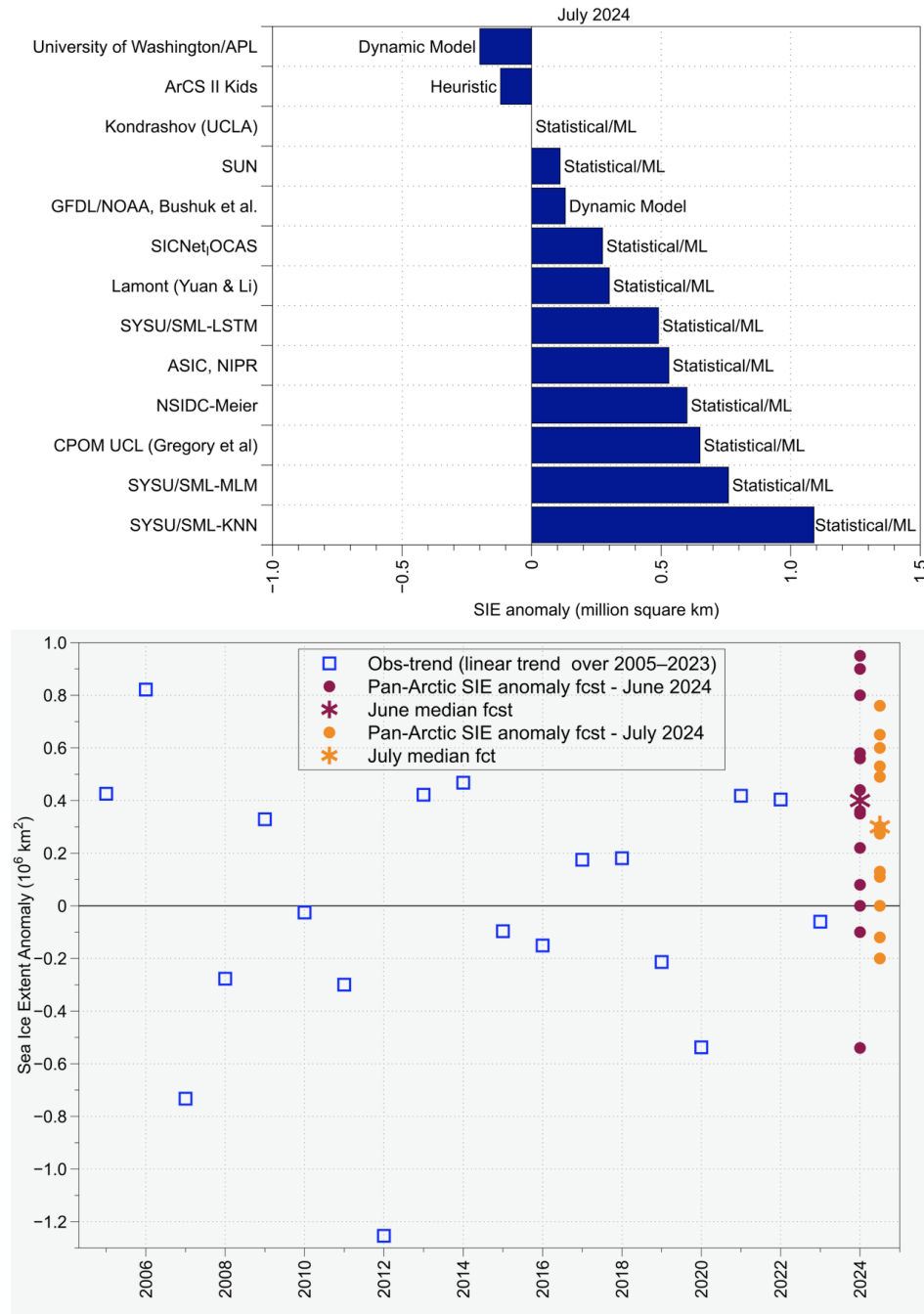


Figure 3. Anomaly pan-Arctic July 2024 forecast ranked by submission (top) and observed anomalies from the 2005–2023 linear trend with June and July 2024 forecasts (bottom). The median July 2024 forecast was 0.30 million square kilometers.



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/arcticseaicenews/>). 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/>).

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 06-20-2023.

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 06-20-2023.

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

Report Credits and Suggested Citation

M. Bushuk, U.S. Bhatt, Meier, W., E. Blanchard-Wrigglesworth, Stoudt, S., and Taylor, A. July 2024. "Sea Ice Outlook: 2024 July Report." (Published online at: <https://www.arcus.org/sipn/sea-ice-outlook/2024/july>)