

Sea Ice Outlook
2023 August Report
Individual Outlook

Name of contributor or name of contributing organization:

CSU-REU21

Is this contribution from a person or group not affiliated with a research organization?

Name and organization for all contributors. Indicate primary contact and total number of people who may have contributed to your Outlook, even if not included on the author list.

CSU-REU21

**Do you want your June contribution to automatically be included in subsequent reports?
(If yes, you may still update your contribution via the submission form.)**

[Do you want your contribution for this month to automatically be included in subsequent reports?]

What is the type of your Outlook projection?

Statistical/ML

Starting in 2017 we are accepting both pan-Arctic and pan-Antarctic sea ice extent (either one or both) of the September monthly mean. As in 2016, we are also collecting Alaskan regional sea ice extent. To be consistent with the validating sea ice extent index from NSIDC, if possible, please first compute the average sea ice concentration for the month and then compute the extent as the sum of cell areas > 15%.

a) Pan-Arctic September extent prediction in million square kilometers.

4.49

b) same as in (a) but for pan-Antarctic. If your method differs substantially from that for the Arctic, please enter it as a separate submission.

c) same as in (b) but for the Alaskan region. Please also tell us maximum possible extent if every ocean cell in your region were ice covered.

"Executive summary" of your Outlook contribution (using 300 words or less) describe how and why your contribution was formulated. To the extent possible, use non-technical language.

We consider the importance of the boreal winter mean large-scale atmospheric circulation (Icelandic Low, Arctic Oscillation) and the state of Arctic sea-ice concentration and thickness at the beginning of summer for predicting September sea ice. In particular, our simple statistical model uses mean Arctic sea-ice thickness in the Beaufort Sea region as an important predictor for September sea-ice extent.

Myint, H., & Labe, Z. M. (2022). Predicting September Arctic Sea-ice Using a Hierarchy of Statistical Models. In 102nd American Meteorological Society Annual Meeting. AMS.

Brief explanation of Outlook method (using 300 words or less).

We use a multiple linear regression model with regional climate predictors from boreal winter (focused on sea ice motion/drift) and early summer (focused on the mean state of sea-ice concentration and sea-ice thickness). Our data is derived from ERA5 reanalysis and PIOMAS. This work was supported by the National Science Foundation Research Experiences for Undergraduates Site in Earth System Science at Colorado State University under the cooperative agreement No. AGS-1950172.

Tell us the dataset used for your initial Sea Ice Concentration (SIC).

ERA5 Reanalysis - Hersbach, H., Bell, B., Berrisford, P., Hirahara, S., Horányi, A., Muñoz-Sabater, J., ... & Thépaut, J. N. (2020). The ERA5 global reanalysis. *Quarterly Journal of the Royal Meteorological Society*, 146(730), 1999-2049. <https://doi.org/10.1002/qj.3803>

Tell us the dataset used for your initial Sea Ice Thickness (SIT) used. Include name and date.

Pan-Arctic Ice Ocean Modeling and Assimilation System (PIOMAS) - Zhang, J., & Rothrock, D. A. (2003). Modeling global sea ice with a thickness and enthalpy distribution model in generalized curvilinear coordinates. *Monthly Weather Review*, 131(5), 845-861.
[https://doi.org/10.1175/1520-0493\(2003\)131<0845:MGSIWA>2.0.CO;2](https://doi.org/10.1175/1520-0493(2003)131<0845:MGSIWA>2.0.CO;2)

If you use a dynamic model, please specify the name of the model as a whole and each component including version numbers and how the component is initialized:

If available from your method.

a) Uncertainty/probability estimates:

Median

Lower error bound

Lower error bound

Standard Deviation

b) Brief explanation/assessment of basis for the uncertainty estimate (1-2 sentences).

c) Brief description of any post-processing you have done (1-2 sentences).

None