Sea Ice Outlook
2019 June Report
Individual Outlook

Name of contributor or name of contributing organization:

McGill Team

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.

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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.)

This is a new submission.

What is the type of your Outlook projection?

Statistical

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.

3.99

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.

Our research focuses on seasonal predictability of sea ice in the Arctic Ocean, using observations-based approaches. We are interested in the winter preconditioning effect on the pack ice before the summer melt. Specifically, we investigate how dynamic processes affect preconditioning, in other words, we ask how anomalies in the general circulation of sea ice will influence later conditions of the Arctic Ocean pack ice under a typical melt season. We investigate the skill of different sea ice predictors, including atmospheric forcing parameters that physically connect to wintertime sea ice dynamics.

The dovekSIE method builds on the correlation between winter Fram Strait sea ice export and the following September minimum sea ice extent, presented in Williams et al., 2016. A positive anomaly of the winter Fram Strait sea ice export is associated with enhanced circulation of ice through the Transpolar Drift Stream and positive anomalies of coastal divergence of sea ice along the Eurasian coastlines. Increased coastal divergence late in the winter causes anomalies of

younger and thinner ice in the peripheral seas, which is more vulnerable to melting in the summer.

The dovekSIE forecasts are generated using the sea level pressure difference between Greenland and Svalbard as a proxy for area of ice exported through Fram Strait. Sea ice tends to flow parallel to isobars and the pressure difference across Fram Strait correlates with sea ice export (r=0.44). Sea level pressure fields are available in near-real-time and therefore enable the continuous update of dovekSIE forecasts during winter via the web app.

We are supporting the activities of the Sea Ice Prediction Network with great enthusiasm. This is our third contribution to the Sea Ice Outlook.

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

The dovekSIE prediction for the minimum September ice extent is 3.99 million square kilometers. The dovekSIE prediction is computed as a sum of the linear trend (climatology) and departure from the trend (interannual variability). We take the long-term linear trend in a time series of the minimum September sea ice extent over the 1993-2018 period. A negative departure from the trend is projected for the 2019 September minimum sea ice extent. We use the integrated sea level pressure difference across Fram Strait from November 1 to May 31 in a linear least squares fit model as a predictor for the anomaly of monthly mean September sea ice extent over the same period. Using this method, the September mean sea ice extent predictions are only marginally different from the minimum sea ice extent predictions.

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

NOAA/NSIDC, Sea Ice Index, Version 3. https://doi.org/10.7265/N5K072F8

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

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:

Not Specified

If available from your method.
a) Uncertainty/probability estimates:

Median

Ranges

Standard Deviations

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

RMSE: 0.50 million square kilometers. From comparison of hindcasts to the observed minimum September sea ice extent.

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