Sea Ice Outlook

2023 June Report

Individual Outlook

Name of contributor or name of contributing organization:

CPOM UCL (Gregory et al)

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.

CPOM UCL (Gregory et al)

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.

4.46

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.

0.47

"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.

This statistical model computes a forecast of pan-Arctic September sea ice extent . Monthly averaged May sea ice concentration and sea-surface temperature fields between 1979 and 2023 were used to create a climate network (based on the approach of Gregory et al 2020). This was then utilised in a Bayesian Linear Regression in order to forecast September extent. The model predicts a pan-Arctic extent of 4.46 million square kilometres. Sea ice concentration data were taken from NSIDC (Cavalieri et al., 1996; Maslanik and Stroeve,1999) and sea-surface temperature data were taken from ERA5 (Hersbach et al., 2019)

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

Monthly averaged May sea ice concentration (SIC) and sea-surface temperature (SST) data between 1979 and 2023 were used to create a May SIC-SST climate(complex) network. Individual SIC grid cells were first clustered into regions of spatio-temporal homogeneity (and similarly for SST) by using a community detection algorithm (see Gregory et al, 2020). Links between each of these network regions (covariance) were then passed into a Bayesian Linear Regression to derive an estimate on the prior distribution of the regression parameters. Subsequently a posterior distribution of the regression parameters was then derived in order to generate the forecast of September sea ice extent.

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

NA

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

NA

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

4.08

Lower error bound

4.84

Standard Deviation

0.38

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

Forecasts are Gaussian distributions. Forecast represents the mean, and uncertainties are given by the standard deviation

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