Sea Ice Outlook
2021 June Report
Individual Outlook

Name of contributor or name of contributing organization:

SYSU/SML-KNN

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

No

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.

SYSU/SML-KNN

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.)

Include this submission in this month's report ONLY

What is the type of your Outlook projection?

ML/Other

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.

4.8

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.

A machine learning KNN model is used to predict the daily sea ice concentration (SIC) and the sea ice extent (SIE) of September 2021 in pan-Arctic. Daily averaged sea ice concentration("NSIDC NASA Team, https://nsidc.org/data/nsidc-0081)and sea surface temperature("NOAA National Centers for Environmental Information", "https://www.ncdc.noaa.gov/oisst") fields between 1978 and 2020 were used to predict. The model predicts a pan-Arctic sea ice extent of 4.80(±0.31) million square kilometers and has a positive anomaly of 0.32.

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

Machine learning algorithm KNN (K-Nearest Neighbors) is used in this prediction. The principle is to find the K nearest neighbors of the input variables from the training data set and the prediction is the mean of the k-NN. In this SIC forecast, we considered the sea ice-related variables, SIC, SST as the training data. At the same time the library comprises simulated climate states selected in the same and adjacent date as the target states. We first compute the distance and pattern correlation for all states in the library. Then we sort the library in descending order based on the pattern correlation between fields to get the prediction od SIE. Then the SIC is obtained by point-by-point calculation and weighting according to the distance.

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:

NA

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

Median

4.8

Lower error bound

4.49

Lower error bound

5.11

Standard Deviation

0.31

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

We estimate our uncertainty with root-mean-square-error(RMSE) calculated from 2015-2020 hindcasts.

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

NA