

Sea Ice Outlook
2021 September Report
Individual Outlook

Name of contributor or name of contributing organization:

KOPRI (Chi 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.

KOPRI (Chi 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.)**

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.

5.04

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.

Korea Polar Research Institute (KOPRI) initiated a project to develop AI-based Arctic sea ice prediction in 2020. The prediction model is currently in development using a combination of different types of neural networks. KOPRI's prediction model was trained using the past 12-month data for the future six-month of Arctic sea ice concentration (SIC). The predicted September extent for 2021 is 5.04 million square kilometers using data from September 2020 to August 2021.

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

KOPRI's fully data-driven model was trained on historical NSIDC's daily SIC data from 1979 to 2020 using a combination of convolutional and recurrent neural networks. Since we observed a large visual discrepancy according to the neural network's loss functions, a new loss function was developed to capture both statistical accuracy and visual agreement. The 6-month prediction model is currently tuning up to improve predictability. Please find our recent published paper:

Chi J, Bae J, Kwon Y-J. Two-Stream Convolutional Long- and Short-Term Memory Model Using Perceptual Loss for Sequence-to-Sequence Arctic Sea Ice Prediction. *Remote Sensing*. 2021; 13(17):3413. <https://doi.org/10.3390/rs13173413>

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

NSIDC NASA Team, <https://nsidc.org/data/nsidc-0051>, <https://nsidc.org/data/nsidc-0081>

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

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).