

**Sea Ice Outlook**  
2023 July Report  
Individual Outlook

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**Name of contributor or name of contributing organization:**

HEU Group (Zhao and Yang)

**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.**

HEU Group (Zhao and Yang)

**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.**

4.95

**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.**

The outlook is based on two statistical methods: climate trends regression prediction and previous bias correction. Based on the consensus that arctic sea ice is significantly decreasing, we calculate the trend of sea ice concentration in each grid in the Arctic region and then use this trend to predict the value of sea ice concentration in that grid this year. The satellite observation data of this year before the prediction are used to calculate the real change of this year, and further correct the change trend obtained by the regression of climate trend. This is the meaning of the previous bias correction. By combining the above two methods, a more reasonable distribution field of sea ice concentration is obtained, and then the sea ice extent is calculated.

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

When obtaining the regression prediction results of climate trend, we used the FY-3/NSIDC-0051 sea ice concentration dataset of NSIDC NASATEAM algorithm, with a time range of 1989-2022 and a spatial resolution of 12.5km for FY-3 and 25km for NSIDC. Firstly, we calculated the linear regression coefficients of each grid during 1989-2022. The trend of climate change in the grid is analyzed, and the sea ice concentration of each grid in 2022 is calculated by using the linear regression coefficient. In the previous bias correction part, we also used the value of sea ice concentration from January to June 2023 of FY-3/NSIDC-0081, calculated the curve of sea ice extent retrieved by satellite from January to June 2023, and compared it with the change of sea ice extent from January to June 2023 predicted by climate trend regression. The average difference between the two was obtained as a basis for previous bias corrections, climate trend predictions for September 2023 were then revised to obtain the final results.

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

FY-3 NWRI daily sea ice concentration ; <http://www.nsmc.org.cn/nsmc/cn/home/index.html> ;  
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**

4.95

**Lower error bound**

4.3

**Lower error bound**

5.6

**Standard Deviation**

0.65

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

estimated from two predictions based on FY-3 and NSIDC datasets

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