Sea Ice Outlook

2022 September Report

Individual Outlook

Name of contributor or name of contributing organization:

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.

AWI consortium

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?

Dynamic Model

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.

"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.

Forced sea ice - ocean model initialized in March and April with satellite products. Ensemble forecast is generated by using the forcing from the ten previous years. Prediction potential comes from the initialization in March and April with satellite observations (sea ice thickness, snow depth, SST, and sea ice concentration). Deliberately no observations are assimilated later in the year because the potential of state estimation in March and April with respect to summer sea ice conditions should be evaluated.

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

For the present outlook the coupled sea ice-ocean model NAOSIM has been forced with atmospheric surface data from January 1948 to September 7th 2022 (combination of NCEP-CFSR and NCEP-CFSv2). All ensemble model experiments have been started from the same initial conditions on September 7th 2022. The model setup is identical to the SIO 2019-2021 setup - a forecasting model (about 25km horizontal resolution) with optimized parameters (with the help of a generic algorithm (Sumata et al, 2019, https://doi.org/10.1175/MWR-D-18-0360.1)) is employed. We used atmospheric forcing data from each of the years 2012 to 2021 for the ensemble prediction and thus obtain 10 different realizations of potential sea ice evolution for summer of 2022. The use of an ensemble allows to estimate probabilities of sea-ice extent predictions for September 2022. A variational data assimilation system around NAOSIM is applied to initialize the model using the Alfred Wegener Institute's CryoSat-2 ice thickness product, University of Bremen's snow depth and the OSI SAF ice concentration product 430b (interim Climate Data record). In contrast to previous years no sea surface temperature is assimilated due to the lack of this data stream. Only observations from March and April were used. The assimilation system (Kauker et al, 2015, http://www.the-cryosphere-discuss.net/tc-2015-171) is unchanged but no bias correction is

applied any more to the CryoSat-2 ice thickness - this is not necessary anymore due to the optimization of the forecast model.

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

OSI SAF EUMETSAT OSI-430b, https://osi-saf.eumetsat.int/products/osi-430-b - complementing-osi-450

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

CryoSat-2 SIT from Alfred Wegener Institute v2.4, Hendricks, S. and Ricker R. (2020): Product User Guide & Algorithm Specification: AWI CryoSat-2 Sea IceThickness (version 2.3), Technical Report, https://epic.awi.de/id/eprint/53331/1/AWI-CryoSat2-ProductUserGuide-v2p3.pdf

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:

NAOSIM v36, 1/4 degree, parameter optimized (opt5.3)

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

Median

Lower error bound

Lower error bound

Standard Deviation

0.15

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

Ensemble spread

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

None performed.