Sea Ice Outlook
2020 June Report
Individual Outlook

Name of contributor or name of contributing organization:

Sun, Nico

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

X

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.

Nico Sun

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 the June report only.

What is the type of your Outlook projection?

Statistical

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.

4.84

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.

0.561

"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 forecast model is based on ice persistence. It uses incoming solar radiation and sea ice albedo derived from a predicted Sea Ice Concentration (SIC) value to calculate daily thickness losses for every NSIDC 25km grid cell. The initial thickness is calculated from AMSR2 sea ice volume and NSIDC SIC data.
The mean forecast uses the 2007-2019 mean SIC (1/4 weight) and mean SIC change per day (3/4 weight) to predict future SIC. The low forecast reduces the predicted SIC by 0.38Stdv for previously observed SIC for this day and a 10% increased bottom melt. The high forecast increases the predicted SIC by 0.20Stdv and a 10% decreased bottom melt.

The 2020 model includes an extra cooling/heating layer to simulate sea ice drift. In re-forecasts it eliminated the persistent underprediction of sea ice in the Eastern Beaufort Sea, the Canadian Archipelago and Eastern Greenland Sea during the late melt season.

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

Each grid-cell is initialized with a thickness derived from the AMSR2 Sea Ice Volume model (https://cryospherecomputing.tk/SIT). For each day the model calculates average thickness loss per grid cell using the exact solar radiation energy and the predicted sea ice concentration as an albedo value.
Ice-loss(m) = Energy(solar in MJ)*(1-SIC) / icemeltenergy

SIC = sea ice concentration
icemeltenergy = Meltenergy per m3, (333.55 KJ/kg*1000(m3/dm)*0.92(density)/1000(MJ/KJ)

For 2020 the model was upgraded with an icedrift simulation layer.

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

NSIDC NASA Team, https://nsidc.org/data/nsidc-0081, https://doi.org/10.5067/U8C09DWVX9LM. Initial SIC 1st June 2019. The model used observed SIC until 9th June 2020 to calculate melt.

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

AMSR2 Sea Ice Volume model (v1.5), 31st May 2020, developed by Nico Sun (https://cryospherecomputing.tk/SIT)
The average thickness of this model was used to initialise thickness on the NSIDC SIC field on the 1st June.

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:

[DynamicModelType]

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

Median

4.84

Ranges

4.09-5.41

Standard Deviations

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).