Sea Ice Outlook
2018 June Report
Individual Outlook

Name of contributor or name of contributing organization:

MPAS-CESM

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.

Steven Cavallo, University of Oklahoma. Nicholas Szapiro, University of Oklahoma. William Skamarock, NCAR.
Primary contact: Nick Szapiro

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.)

No

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.

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.

17.7

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.

0.3

"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.

Our June outlook is an experiment with a fully coupled dynamical atmosphere-sea ice-ocean-land-river model and small initial condition ensemble. Focusing on Arctic SIE, the sampled uncertainty is remarkable. Perturbing the initial atmosphere creates a difference of ~3 M sq. km while using a different climate member to initialize the other components is ~1/10th of that. With the drivers of this variability a focus, note that the differences in the summer (JJA) mean atmospheres are global in scale, requiring a coupled system perspective for consistency.

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

Using CESM-CAM-MPAS (v2.0.b05), an Arctic-refined (~90-25 km) atmospheric mesh is coupled to ~1 degree other components. For the control, the atmosphere is cold-started from GFS initial conditions (0.25 degree) on 2018-05-31 and the other components startup from a spun-up restart of CESM Large Ensemble member 020 in 2021 (to match the expected 2018 Arctic SIE from CESM-LE and NSIDC). Additional atmospheric IC ensemble members are from perturbing the initial GFS resolution (0.5 degree) and using GEFS member 1 (available at 1 degree on nomads). An additional non-atmospheric IC ensemble member is from using CESM-LE member 005 for the other components. A 15% threshold on the daily model sea ice concentration is used to calculate extent. Simulations are in 2018 using an RCP 8.5 forcing.

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

Restarts of CESM Large Ensemble members 020 and 005, using 2021-05-31.

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

Restarts of CESM Large Ensemble members 020 and 005, using 2021-05-31.

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:

Coupled dynamical models

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

Median

3.3, 17.6, 0.23 (Arctic, Antarctic, and Alaska)

Ranges

3.1-5.8, 17.6-17.9, 0.1-0.6

Standard Deviations

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

Experimental IC ensemble, perturbing atmosphere (GFS at several resolutions, GEFS) or other components (CESM-LE members).

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

For Arctic SIE, Sea Ice Index V2 and V3 time averaging differ < 0.3 M sq. km