Sea Ice Outlook
2017 August Report
Individual Outlook

Name of contributor or name of contributing organization:

MPAS-CESM (Cavallo, Szapiro, and Skamarock)

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.

Steven Cavallo, University of Oklahoma. Nicholas Szapiro, University of Oklahoma. Bill Skamarock, NCAR

Do you want your June contribution to automatically be included in subsequent reports? (If yes, you may still update your contribution via the Google form.)

Yes automatically include my contributions in July and August 2017

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.

5

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.

18.1

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.

0.6

"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 August 1 predictions are the means and standard deviations from an ensemble of forecasts from July 31st using MPAS-CESM as a fully-coupled atmosphere-land-ocean-sea ice model. The control member is initialized from GFS analysis for the atmosphere and a restart from member 20 of the CESM Large Ensemble for the other components. An 11 member initial condition ensemble is constructed in 2 sets: a perturbed atmosphere (GEFS members 1-5) and perturbed other components (with Large Ensemble members 5-9).

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

For our experimental forecast, we use CAM-MPAS on an Arctic-refined (92-25 km) atmospheric mesh coupled to 1 degree land, ocean, and sea ice in CESM. For the control member, the atmosphere is cold-started with GFS analysis and the other components are initialized from a spun-up analog member of the CESM Large Ensemble. An 11 member initial condition ensemble is constructed in 2 sets: a perturbed atmosphere (GEFS members 1-5) and perturbed other components (with Large Ensemble members 5-9). Forecasts are integrated as if in 2021 under an RCP8.5 scenario to match the Large Ensemble's climatological trend to a linear extrapolation of NSIDC's Arctic Sea Ice Index for September 2017. September time mean SIC is used directly with a 15% threshold for extent. Note that while we aggregate all members for our outlook, the LE members have larger spread than the GEFS members.

Tell us the dataset used for your initial Sea Ice Concentration (SIC). Include name and date (e.g., "NASA Team, May 2017"). We also encourage you to submit initial fields to the dropbox, see https://www.arcus.org/sipn/sea-ice-outlook/2017/june/call in the section on "Submitting Figures and Gridded Data of Full Spatial Fields (Optional) of Forecasts and Initial Conditions" for detailed instructions. Required if sea Ice concentration is used.

No external SIC is used. CESM Large Ensemble members are used for initial conditions.

Dataset of initial Sea Ice Thickness (SIT) used (include name and date):

No external SIT is used. CESM Large Ensemble members are used for initial conditions.

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:

Component | Name | ICs
Atmosphere | CAM5-MPAS | GFS FNL (and GEFS) for 2017-07-31 00Z
Ocean | POP2 | CESM Large Ensemble restart
Sea ice | CICE4 | CESM Large Ensemble restart
Land | CLM4 | CESM Large Ensemble restart
River | RTM | CESM Large Ensemble restart

If available from your method for pan-Arctic extent prediction, please provide

a) Uncertainty/probability estimate such as median, ranges, and/or standard deviations (specify what you are providing).

Standard deviations:
Arctic: 0.6
Antarctic: 0.5
Alaska: 0.1

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

Standard deviation across the individual ensemble members

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