Name of Contributor of 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 be automatically included in subsequent reports? (If yes, you may still update your contribution via a form like this one.)

Yes automatically include my contributions in July and August 2017

What is the type of you 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.

4.1

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 the maximum possible extent if every ocean cell in your region were ice covered.

0.3

The September mean concentration has been nearest-neighbor interpolated to the NSIDC masked grid and converted to extent with a 15% threshold. Maximum possible coverage is 4 M km^2.

"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 1 prediction for the September-averaged Arctic sea-ice extent is 4.1 million km^2. Using MPAS-CESM as a fully-coupled atmosphere-land-ocean-sea ice model, we initialized on May 31st using GFS initial conditions for the atmosphere and restarts from members of the CESM Large Ensemble for the other components. From two ensemble members, the uncertainty is greater than 0.2 million km^2.

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. The atmosphere is cold-started with GFS analysis and the other components are initialized from spun-up restarts of the CESM Large Ensemble. Extrapolating the climatological trend for September SIE, we would expect ~4.5 million km^2 for September 2017 Arctic SIE. This corresponds to 2021 in the ensemble mean. Forecasts are integrated as if in 2021 under an RCP8.5 scenario. The September mean SIC is used directly with a 15% threshold for extent.

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 for 2017-05-31 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).

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

c) same as in (b) but for the Alaskan region. Please also tell us the maximum possible extent if every ocean cell in your region were ice covered. See https://www.arcus.org/sipn/sea-ice-outlook/2017/june/call **in the section on "Instructions for Submitting an Alaskan Regional Outlook" for detailed instructions.**

d) Raw (and/or post processed) forecasts for this year and retrospective forecasts in an excel spreadsheet with one year on each row and ensemble member number on columns (specifying whether raw or post processed).