Sea Ice Outlook
2017 June Report
Individual Outlook

Name of Contributor of Name of Contributing Organization:

Navy Earth System Model (NESM)

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.

E. Joseph Metzger1 (primary contact), Neil Barton2, Pamela Posey1, Alan Wallcraft1 and Michael Phelps3
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3Jacobs Technology Inc., Stennis Space Center MS

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.)

No do not use my prediction this month in later months

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.

6.0 Mkm2

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

0.89 Mkm2. Max possible extent is 3.89 Mkm2 using NSIDC region definition.

"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 projected Arctic minimum sea ice extent from the Navy's global coupled atmosphere-ocean-ice modeling system is 6.0 million km2. This projection is the average of an 11 member ensemble. The range of the ensemble is 5.4 to 6.4 million km2. Note that our ensemble range does not represent a full measure of uncertainty, and the system is currently in a development stage.

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

Forecasts were initialized from the pre-operational US Navy Global Ocean Forecasting System (GOFS) 3.1 for the ocean and sea ice using the Navy Coupled Ocean Data Assimilation (NCODA) system. Atmospheric initial conditions were from the operational NAVy Global Environmental Model (NAVGEM) using the Naval Research Laboratory Atmospheric Variational Data Assimilation System (NAVDAS-AR). Eleven ensemble members were completed using a time-lagged approach. Model forecasts started at 12Z for the following days: May 3, 4, 6, 7, 9, 10, 12, 13, 15, 18 and 20. Each ensemble member was integrated through the end of September 2017.

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.

SSMIS and JAXA AMSR2, May 2017

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

GOFS 3.1 SIT, May 2017

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 Initialization
Atmosphere NAVGEM DA: NAVDAS-AR
Ocean HYCOM DA: NCODA
Ice CICE DA: NCODA assimilating SIC only

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).

Pan-Arctic: 5.4 to 6.4 Mkm2; Alaskan regional outlook: 0.71 to 1.2 Mkm2

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

The uncertainty estimate is the range of the 11 member ensemble, and does not represent a full measure of uncertainty. Projections of September sea ice extent with this system have not been fully validated.

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.**

The only post-processing performed was the calculation of the mean September sea ice extent from sea ice concentrations.

For Sea Ice Probability (SIP): We computed SIP as requested: converted Sept mean SIC into SIE for each ensemble member. Then averaged the ensemble across the Sept mean SIE. Hence, SIP is the probability of sea ice cover in the ensemble and ranges from 0 to 100%.

For Ice-Free Day (IFD): We computed the first ice-free day when SIC falls below 15% for all points where there is at least 15% SIC on the day we initialized the model. If the point is ice free (SIC<15%) at initialization, IFD will be ordinal day 121 (May 1). If the point is always covered in ice (SIC>=15%), the IFD will be ordinal day 273 (Sept 30). We then computed the average and standard deviation of IFD across the ensemble.

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).

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