Name of contributor or name of contributing organization:

NRL - 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 Metzger 1(primary contact), Neil Barton 2, Pamela Posey 1, Alan Wallcraft 1 and Michael Phelps 3
1 Naval Research Laboratory, Marine Oceanography Division
2 Naval Research Laboratory, Marine Meteorology Division
3 Jacobs technology Inc, Stennis Space Center, MS

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.)

No do not use my prediction this month in later months

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.

3.9

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.

20.5

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.

The projected Arctic minimum sea ice extent from the Navy's global coupled atmosphere-ocean-ice modeling system (Navy Earth System Model - NESM) is 3.9 million km^2. This projection is the average of an 11 member ensemble. The range of the ensemble is 3.7 to 4.4 million km^2. Note that our ensemble range may 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. The ice model assimilated SSMIS and AMSR2 ice concentration products. 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 on 2017-07-01 12Z, 2017-07-02 12Z, 2017-07-03 12Z, 2017-07-04 12Z, 2017-07-05 12Z, 2017-07-06 12Z, 2017-07-07 12Z, 2017-07-08 12Z, 2017-07-09 12Z, 2017-07-10 12Z, and 2017-07-12 12Z, and ran until 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, July 2017

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

GOFS 3.1 SIT, July 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: 3.7 to 4.4 Mkm^2
Pan-Antarctic: 20.0 to 21.3 Mkm^2
Alaskan: 0.2 to 0.6 Mkm^2

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

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 182 (July 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.