Sea Ice Outlook
2019 August Report
Individual Outlook

Name of contributor or name of contributing organization:

GFDL/NOAA (Bushuk et al.)

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.

Mitch Bushuk, Mike Winton, Rym Msadek, Tom Delworth, Liwei Jia, Colleen McHugh, Matt Harrison, Tony Rosati, Xiaosong Yang, and Yongfei Zhang

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.)

Include this submission in the July report only.

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.

3.19

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

0.08

"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 July 1 prediction for the September-averaged Arctic sea-ice extent is 3.19 million square km, with an uncertainty range of 2.87-3.57 million square km. Our prediction is based on the GFDL-FLOR ensemble forecast system, which is a fully-coupled atmosphere-land-ocean-sea ice model initialized using a coupled data assimilation system. Our prediction is the bias-corrected ensemble mean, and the uncertainty range reflects the lowest and highest sea ice extents in the 12-member ensemble.

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

Our forecast is based on the GFDL Forecast-oriented Low Ocean Resolution (FLOR) model (Vecchi et al. 2014), which is a coupled atmosphere-land-ocean-sea ice model. The model is initialized from an Ensemble Kalman Filter coupled data assimilation system (ECDA; Zhang et al. 2007), which assimilates observational surface and subsurface ocean data and atmospheric reanalysis data. The system does not assimilate any sea ice concentration or thickness data. The FLOR atmospheric initial conditions are produced from an AMIP run forced by observed SST and sea ice. Historical radiative forcing is used prior to 2005 and the RCP4.5 scenario is used for predictions after 2005. For the predictions initialized after 2004, the aerosols are fixed at the RCP4.5 scenario year of 2004. The performance of this model in seasonal prediction of Arctic sea ice extent has been documented in Msadek et al. (2014), Bushuk et al. (2017), and Bushuk et al. (2018). For an evaluation of the model's September sea ice extent prediction skill from a July 1 initialization, see attached report.

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

No SIC data is explicitly used in our initialization procedure.

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

No SIT data is explicitly used in our initialization procedure.

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:

[DynamicModelType]

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

Median

3.15

Ranges

2.87-3.57

Standard Deviations

0.24

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

These statistics are computed using our 12 member prediction ensemble.

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

These forecasts are bias corrected based on an additive correction using a suite of retrospective forecasts spanning 1980-2019.