Sea Ice Outlook

2022 June Report

Individual Outlook

Name of contributor or name of contributing organization:

Met Office

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.

Met Office

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.)

[Do you want your contribution for this month to automatically be included in subsequent reports?]

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.

3.7

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.

"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.

A dynamic model forecast made using the Met Office's seasonal forecasting system (GloSea). GloSea is a fully coupled Atmosphere-Ocean-sea Ice-Land (AOIL) model that produces a small 2-member ensemble of 210-day forecasts each day. Forecasts initialised over a 21-day period are used together to create a 42-member lagged ensemble or forecasts of September sea ice cover.

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

Ensemble coupled model seasonal forecast from the GloSea6 seasonal prediction system [based on, MacLachlan et al., 2015], using the Global Coupled 3 (GC3) version [Williams et al., 2018] of the HadGEM3 coupled model [Hewitt et al., 2011]. Forecast compiled together from forecasts initialized between 22 May and 11 June (2 per day) from an ocean and sea ice analysis (FOAM/NEMOVAR) [Blockley et al., 2014; Peterson et al., 2015] and an atmospheric analysis (MO-NWP/4DVar) [Rawlins et al., 2007] using observations from the previous day. Special Sensor Microwave Imager Sensor (SSMIS) ice concentration observations from EUMETSAF OSI-SAF [OSI-SAF] were assimilated in the ocean and sea ice analysis, along with satellite and in-situ SST, sub surface temperature and salinity profiles, and sea level anomalies from altimeter data. No assimilation of ice thickness was performed.

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

Sea ice concentration (as all variables) is initialised using the operational FOAM ocean-sea ice analysis. SSMIS sea ice concentration is assimilated using the EUMETSAT OSI-SAF (OSI-401b; See http://osisaf.met.no/docs/osisaf_cdop3_ss2_pum_ice-conc_v1p6.pdf)

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

Sea ice thickness (as all variables) is initialised using the operational FOAM ocean-sea ice analysis. Sea ice thickness is not assimilated in FOAM.

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:

Model: HadGEM3 [Hewitt et al., 2011], Global Coupled Model 3.2 [Williams et al., 2018] in use within the GloSea6 seasonal prediction system. The model configuration has been updated, but all other details of the system (forecast members, hindcast members, anomaly calculations) are as described in MacLachlan et al. (2015).
Sea ice component: CICE5.1 [Hunke et al., 2015] model using Global Sea Ice 8.1 configuration [Ridley et al., 2018]. Initialised using the Met Office FOAM ocean and sea ice analysis [Blockley et al., 2014], which assimilates the SSMIS sea ice concentration observation product from EUMETSAT OSI-SAF.
Ocean component: NEMO [Madec, 2016] ocean model using Global Ocean 6.0 configuration [Storkey et al., 2018]. Initialised using Met Office FOAM ocean and sea ice analysis [Blockley et al., 2014] assimilating in-situ and satellite observations of SST [GHRSST], satellite observations of sea level anomaly [AVISO/CLS] and temperature and salinity sub-surface profiles.
Atmospheric Component: Met Office Unified Model (MetUM) [Brown et al., 2012] using Global Atmosphere 7.2 configuration [Walters et al., 2019]. Initialised using Met Office operational numerical weather prediction (NWP) 4D-Var data assimilation system [Rawlins et al., 2007].
Land Component: Joint UK Land Environment Simulator (JULES) [Best et al., 2011] using Global Land 7.0 configuration [Walters et al., 2019]. Soil temperature, soil moisture, and snow over land are initialised from running the land surface model forced with the JRA-55 analysis.
Coupling: Ocean and sea ice are hard coupled. Atmosphere and land are hard coupled. The combined ocean/ice and atmosphere/land configurations are coupled using the OASIS3 coupled [Valcke et al., 2015].

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

Median

Lower error bound

2.4

Lower error bound

5

Standard Deviation

0.65

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

Uncertainty range is provided as +/- 2 two standard deviations of the (42 member) ensemble spread around the ensemble mean.

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

Bias correction in each hemisphere, calculated by evaluation of hindcasts over 1993-2016. Bias correction calculated from hindcast evaluation over 1993-2016. Arctic: +1.4 million sq. km; Antarctic: -0.1 million sq. km