Sea Ice Outlook
2017 July Report
Individual Outlook

Name of contributor or name of contributing organization:

CNRM System 6 (Chevallier 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.

Matthieu Chevallier, Constantin Ardilouze, Lauriane Batté (CNRM, Meteo France, Toulouse, France), Clotilde Dubois (Mercator Ocean, Toulouse, France) ; CNRM PASTEL and IOGA teams (~10 people).

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.)

Yes automatically include my contributions in July and August 2017

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.

4.67

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.

17.9

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.

This second CNRM outlook has been run with Meteo France system 6. This pre-operational system is based on a new version of CNRM global climate model, CNRM-CM6, and on new ocean-sea ice initial conditions produced by Mercator Ocean. The system used to produce this outlook differs with the other ("CNRM") with respect to (i) model horizontal and vertical resolution (ii) model physics in the atmosphere and ocean and (iii) new initial conditions.

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

The "CNRM System 6" outlook is a model estimate based on a dynamical ensemble forecast. Initial conditions from the weeks before 1 July 2017 are used. We generate a total 51 members by adding statistical perturbations during the run.

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.

Initial conditions for the ocean and sea ice (concentration and thickness) are provided by Mercator Océan. Basis is the Mercator Océan operational analysis, run at a 1/4° horizontal resolution using NEMO-LIM2 and the SAM ocean data assimilation system. There is no data assimilation of sea ice concentration in this analysis. The 1/4° analysis is upscaled to the 1° horizontal grid of CNRM-CM. These fields are used to nudge the ocean-sea ice component of CNRM-CM (NEMO3.6-Gelato6, 1° resolution), run in forced mode (forced by ECMWF Op. analysis). A strong restoring is applied towards Mercator SST, which acts as a constraint on sea

ice concentration. Sea ice fields (concentration, thickness...) from this 1° run are used to initialize CNRM-CM (as well as ocean fields from this run).

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

Sea ice thickness information is output from the 1° simulation described above.

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:

Météo France System 6

Component	Name	Initialization
Atmosphere	ARPEGE-Climat v6	ECMWF Operational Analysis
Ocean	NEMO3.6	Based on Mercator (DA SEEK)
Sea ice	GELATO 6	Based on Mercator (no DA)

Basis of System 6 is the global coupled model CNRM-CM-6-1, which will be used for CNRM contribution to CMIP6.

Horizontal resolution of the atmosphere component is T359 (50km). Nominal resolution of the ocean-sea ice component is 1° at the equator (nearly 50km in the Arctic), with a ~1m vertical resolution close to the surface. The sea ice model uses 4 sea ice categories (0-0.3; 0.3-0.8, 0.8-3 and >3m).

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).

For pan-Arctic SIO
Median : 4.69
25% : 4.52
75% : 4.86
Min : 3.92
Max : 5.32

For pan-Antarctic SIO
Median : 17.92

25% : 17.57
75% : 18.18
Min : 16.94
Max : 18.76

Statistics are based on the 51-member ensemble.

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

Standard deviation of the ensemble is 0.30 million km2 for Arctic, 0.41 million km2 for Antarctic.

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

For the sea ice extent, data are corrected for bias and (linear) trend, using only the hindcast (the hindcast of System 6 is run over the period 1993-2016).