

Sea Ice Outlook
2017 June Report
Individual Outlook

Name of Contributor of Name of Contributing Organization:

Dmitri Kondrashov

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.

University of California, Los Angeles (UCLA)

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?

Statistical

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.

N/A

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.

0.58

"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 contribution relies on data-driven approach to predict sea ice conditions over the Pan-Arctic region.

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The prediction model is obtained by data-adaptive harmonic decomposition and stochastic inverse modeling of Multisensor Analyzed Sea Ice Extent – Northern Hemisphere (MASIE-NH) dataset.

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

The forecasting methodology relies on Data-adaptive Harmonic Decomposition (DAH) and Multilayer Stuart-Landau Models (MSLM) techniques [Chekroun and Kondrashov, 2017]. This methodology is applied to the Multisensor Analyzed Sea Ice Extent – Northern Hemisphere (MASIE-NH) 4km dataset subdivided into several Arctic regions. The daily MASIE-NH data was averaged to provide weekly-sampled dataset. DAH-MSLM predictive model has been derived from MASIE-NH anomalies with annual cycle removed. The key features of DAH-MSM model are memory effects conveyed by the non-Markovian model formulation and data-adaptive basis that helps to disentangle complex regional dynamics of MASIE by harmonic spatio-temporal patterns. The stochastic DAH-MSLM model is driven from latest initial conditions of SIE by ensemble of white noise realizations to provide probabilistic regional Arctic forecasts, as well as pan-Arctic ones.

[1] Kondrashov, D., M. Chekroun, and M. Ghil, 2015: Data-driven non-Markovian closure models. *Physica D.*, 297, 33–55.

[2] Chekroun, M., and D. Kondrashov, 2017: Data-adaptive Harmonic Spectra and Multilayer Stuart-Landau Models, *Chaos*, submitted.

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.

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

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:

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).

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

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.

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).