Sea Ice Outlook
2021 August Report
Individual Outlook

Name of contributor or name of contributing organization:

GP Regression (Cawley)

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.

GP Regression

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 this month's report ONLY

What is the type of your 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.

3.960695

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.

Prediction based on statistical extrapolation of previous September Arctic sea ice extent observations.

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

A Gaussian Porcess model (similar to Krigging) is fit to previous observations with a squared exponential covariance function and hyper-parameters tuned by conventional marginal likelihood maximisation. A nice feature of the model is that it gives a credible interval on predictions that appropriately broadens as you extrapolate away from the observations.

prediction for 2021 = 3.960695 (+/- 1.090135)
prediction for 2022 = 3.849389 (+/- 1.106513)
prediction for 2023 = 3.738151 (+/- 1.125236)
ice free summer unlikely prior to 2041
ice free summer probable after 2068

(naive interpretation of "ice free" ignoring the multi-year ice that may remain at the coasts?)

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

N/A

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

N/A

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.
a) Uncertainty/probability estimates:

Median

3.960695

Lower error bound

2.8706

Lower error bound

5.0508

Standard Deviation

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

Bayesian credible interval provided by the Gaussian Process model.

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

N/A