Sea Ice Outlook
2019 July Report
Individual Outlook

Name of contributor or name of contributing organization:

Dekker, Rob

Is this contribution from a person or group not affiliated with a research organization?

X

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.

Rob Dekker

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.)

This is a new submission.

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.

4.22

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.

The concept behind my method pertains to estimating albedo-based Arctic amplification during

the melting season.

I use the "whiteness" of the Arctic in June as a predictor for how much ice will melt out between

June and September.

I use three variables (land snow cover, ice concentration, ice area) of "whiteness" that are available in June,

in a regression formula which shows particularly strong correlation with Sept sea ice extent minimum.

Past performance of this June forecast method for September ice extent over the past 26 years

shown in a graph here :

https://forum.arctic-sea-ice.net/index.php?action=dlattach;topic=292.0;attach=104209;image

The interesting finding is that the June land snow cover signal is clearly present in the

September ice extent numbers, suggesting land snow cover could be used to improve sea ice estimates in other models as well.

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

The concept behind my method pertains to estimating albedo-based Arctic amplification during the melting season.

I use the "whiteness" of the Arctic in June as a predictor for how much ice will melt out between June and September.

Specifically, I set up a formula which reflects how "dark" areas near the Arctic in June would create heat that will melt out ice over the months until the September minimum.

As an educated guess, such a formula could take the following form :

Melt_formula = 0.25 * Snow - 1.0 * (Extent - Area) + 0.5 * Area

With factors explained like this :

For (Extent - Area): 1.0 (assuming that ALL solar radiation onto melting ice and into polynia will cause ice to melt later in the season.

For (Area): 0.5 (assuming that half of the heat absorbed in the ocean OUTSIDE of the main

pack will cause ice melt (while the other half would cause the ocean to warm up.

For (snow cover): 0.25 (assuming that half the heat from lack of snow cover will be blown North, and half of that will go to ice melt.

Then I set up a regression equation for how much ice will melt out between June and September :

september_extent - june_area = alpha + beta * (Melt_Formula) ;

When I tweek the factors, to obtain the best fit over the 1992-2015 range, the â€˜Melt_Formula' that obtains the best correlation (R=0.94) is this one (centered to (extent - area):

Melt_Formula = 0.434*snowcover - 1.0*(extent - area) + 0.65*area

Which is remarkably close to the "educated guess" factors explained above. This suggests that this formula is realistic, and the effect is physically real.

Using this formula, for the period 1992 - 2015, I obtain R=0.94, beta = 0.368, and a prediction for Sept 2019 ice extent of 4.22 million km^2 with a standard deviation of 339 k km^2, or (when

compensating for three variables) 380 k km^2.

This standard deviation is substantially smaller than the 500 k km^2 SD one obtains for a straight-line prediction,

suggesting the method has real skill.

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

Land snow cover from Rutgers Snow Lab :

https://climate.rutgers.edu/snowcover/table_area.php?ui_set=1&ui_sort=0

Sea Ice Area and Extent from NSIDC :

ftp://sidads.colorado.edu/DATASETS/NOAA/G02135/north/monthly/data/

Tell us the dataset used for your 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:

Not Specified

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

Median

Ranges

Standard Deviations

380 k km^2

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

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