Sea Ice Outlook
2017 July Report
Individual Outlook

Name of contributor or name of contributing organization:

Rob Dekker

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

Yes this contribution is from a "Citizen Scientist"

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.

Individual

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?

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.

5.4

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.

My projection is based on an estimate of how much heat the Northern Hemisphere absorbs during spring and early summer. I use three variables (land snow cover, ice concentration, ice area) that are available in June, in a formula which shows particularly strong correlation with Sept sea ice extent. Regressed over the1992 - 2015 period, the formula projects 4.1 M km^2 for September 2016, with a standard deviation of only 340 k km^2.
Past performance of this June forecast method for September ice extent over the past 24 years shown in a graph here :
http://i1272.photobucket.com/albums/y396/RobDekker/JunePredict_zpsquedrtdc.png

The interesting finding is that the June land snow cover signal is clearly present in the September ice extent numbers.

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 '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 2017 of 5.4 M km^2 with a standard deviation over the residuals of the (hindcast) prediction of 342 k km^2. Which is considerably better than the (hindcast) SD of a linear trend (550 k km^2).

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.

NSIDC monthly June sea ice 'extent' and 'area' numbers :
ftp://sidads.colorado.edu/DATASETS/NOAA/G02135/Jun/N_06_area_v2.txt Rutgers Snow Lab Northern Hemisphere monthly land snow cover :
http://climate.rutgers.edu/snowcover/table_area.php?ui_set=1&ui_sort=0

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).

342 k km^2 (hindcast) standard deviation over the residuals

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).