PAN-ARCTIC OUTLOOK – August 2012

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1. Extent Projection   4.1 ± 0.2 million km^2

2. Methods/Techniques

A variety of publicly available monthly data from 1978 forward (including area, extent, volume, regional extent, NCEP Reanalysis Data, and various climate indices) was collected.   For each year, monthly data up to 24 months before the September minimum extent was organized and correlated with the minimum extent. Multiple regression analysis was also performed on a variety of combinations of these explanatory variables, seeking sets of data that correlate well with September extent, while trying to avoid overfitting. In addiction, analysis was also performed using the annual change in extent as the dependent variable (which, together with the extent the previous September, also allows predictions of the upcoming minimum).

These simple regression and multiple regression results were then used to predict the minimum extent for September 2012. Several different predictions were made using different sets of independent variables; the predictions were combined to come up with a final prediction.

For August, the regression predictions coalesced around 4.1 million km^2. In 2012, June & July showed exceptionally low extent, area, and volume. In addition, the temperatures were exceptionally high. These factors helped produce predictions lower than for any previous year.

More details can be found at https://sites.google.com/site/sciencestatsandstuff/sea-ice

3. Rationale

It is reasonable to assume that past conditions of the ice, the Arctic climate, and wide-area climate indices should be correlated with future ice conditions.   Because these relationships can be subtle and complex, statistical models combining multiple parameters are expected to be more effective than individual monthly data at making predictions.

4. Executive Summary

This analysis is based purely on a statistical analysis of climate and ice data, using commercial statistical software.   The goal was to use techniques and data available to the public.

5. Estimate of Forecast Skill (if available).

The regression models typically have R^2 values of 0.7 to 0.9 for the September minimum extent from the period 1979 – 2011, with typical RMS errors of the fits of approximately 0.25 million km^2.