June Report: Outlook Based on May Data
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Extent Projection: 4.6 million sq-km
Method: Statistical, based on ice age survivability

Rationale

The ongoing transition from a spring ice pack characterized by a high percentage of old thick ice to one with younger and thinner ice is a key driver of the strong downward trend in September ice extent. This is because a thinner spring ice pack tends to be more fractured (more leads) and requires less energy to completely melt. Dark open water areas develop earlier in the melt season than they used to. These dark areas readily absorb solar energy, warming the upper ocean and promoting even more melt. .

However, as pointed out by many scientists, September ice extent in a given year is also strongly determined by summertime patterns of atmospheric circulation. As is now well known, the circulation during the summer 2007, featuring high pressure over the central Arctic Ocean and low pressure over Siberia, promoted especially strong summer melt, working in tandem with thin spring ice to yield a record low monthly September ice extent of 4.28 million sq-km. While the 2009 melt season started out more thin ice than observed in the last several decades, making it highly likely that ice extent in September will be well below average, whether or not a new record low is set depends critically on the circulation patterns that set up over the next few months.

One way to estimate the end-of-summer ice extent is to examine survival rates of ice of different ages in the Arctic. In the May 2008 blog entry at NSIDC's Arctic Sea Ice News and Analysis web site(http://nsidc.org/arcticseaicenews/2008/050508.html), survival rates of different ice age classes based on ice age data from (Maslanik et al., 2007) were used to estimate the 2008 September ice extent. This method predicted a new record low would be set in September 2008 since 73% of the Arctic basin was covered by first-year ice in spring 2008, of which typically 60% melts out each summer. However, this method did not account for the fact that at more northern latitudes it is likely that the survival rates will be higher.

Using the same method but breaking up the survivability analysis into 2 degree latitude bins would have given an estimate for September 2008 of 4.77 million sq-km, which was close to the observed value of 4.67 million sq-km.

For 2009 the same method predicts an average monthly mean September ice extent of 4.57 million sq-km (see Figure). Note however, that if survival rates from the last few years are used, the 2007 record minimum would be broken in 2009. The last several years have seen persistent summer high pressure patterns, a pressure pattern that is favorable for ice loss. If this pressure pattern were to continue again in 2009, it is possible a new record low would occur given the fact that the ice is even thinner, and, on average, younger this year than in the previous two years.

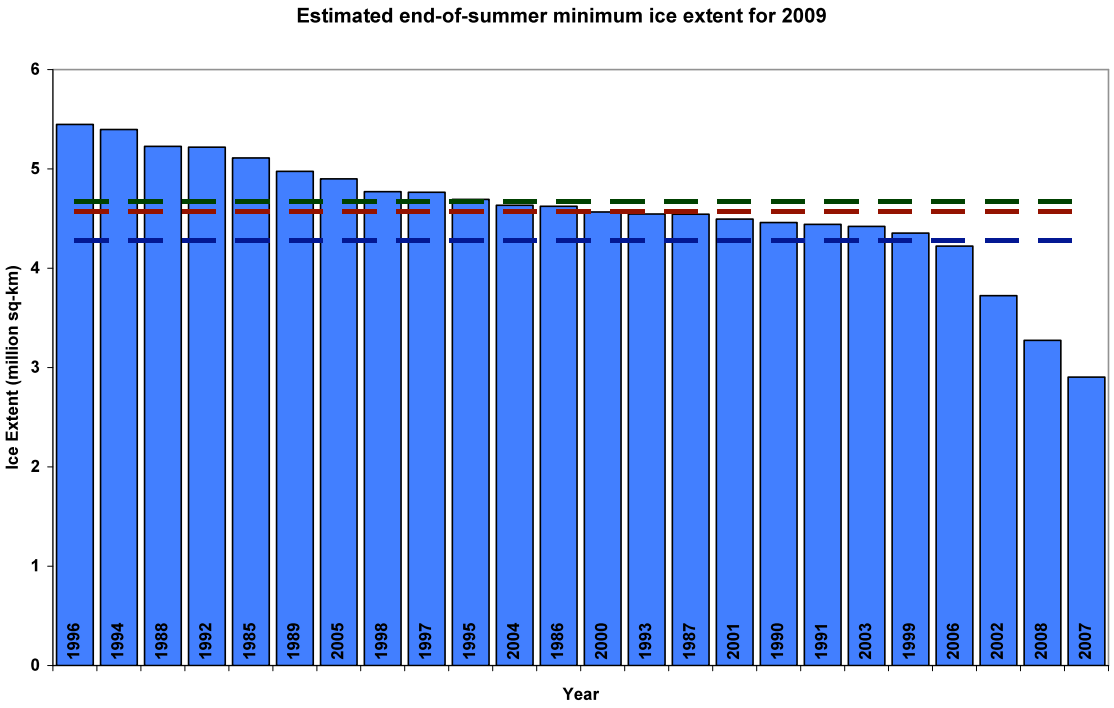

Figure 1. This bar plot shows estimates of monthly mean sea ice extent for September 2009 based on known ice survival rates derived at discrete 2 degree latitude bins. The blue dotted line indicates the record-breaking minimum extent of 2007; the green dotted line shows the minimum extent of 2008; and the red dotted line shows the mean estimate based on all years between 1983 and 2008.

Maslanik, J.A., C. Fowler, J. Stroeve, S. Drobot, J. Zwally, D. Yi and W. Emery. 2007. A younger, thinner Arctic ice cover: Increased potential for rapid extensive sea ice loss, Geophysical Research Letters, 34, L24501, dio:10.1029/2007/GL032043.