

Sea Ice Pan-Arctic Outlook, August 2012

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Projection

Our projection for the September 2012 Arctic sea ice extent is **4.47 ± 0.34 million square kilometers** based on a statistical method of climatological ice extent loss rates over last five summers. This is lower than the July estimate of 4.58 ± 0.54 million square kilometers because the July extent decline was faster than the 2002-2011 average.

Executive Summary

This statistical method uses previous years' daily extent change rates from August 1 through September 30 to calculate projected daily extents starting from July 31. The September daily extents are averaged to calculate the monthly extent. Rates from recent years are more likely to occur because of the change in ice cover. Thus, the official projection is based on the rates for 2002-2011, yielding a **September 2012 average of 4.47 million square kilometers**; the range however is still quite large with a **standard deviation of 335,000 square kilometers**. Using all years (1979-2011) yields a slightly higher estimate of 4.66 million square kilometers, but a similar range of 337,000 square kilometers. Five out of the 33 scenarios (using rates from 1979, 1999, 2004, 2007 and 2008) would yield a new record minimum September extent. This suggests the **chance for a record low this year is ~15%**, though this probably underestimates the probability because recent years have tended to follow faster decline rates. For example, decline rates for the past five years (2007-2011) yield a projection of 4.33 million square kilometers, which would nearly match the current record low of 4.30 million square kilometers in September 2007. Thus, **a new record low September extent this year is more likely than last month, but still far from certain.**

There is a **very high probability that this year will be among the five lowest** of the satellite record. The decline rates from all 33 years yield a final extent among the five lowest, with the highest estimate, using 1980 rates, of 5.23 million square kilometers. Thus, for this year to not rank in the top, a rate slower than previously seen in the satellite record would be necessary. Selected years and average extent trajectories are shown in Figure 1.

Method/Technique

This is a purely statistical method that applies daily rates of extent change from all previous years to project 2012 daily extents from the July 31, 2011 daily extent. This results in an ensemble of 33 (1979-2011) daily extent timeseries from August 1 to September 30. The daily extents for each September are averaged to yield 33 monthly September extent estimates. The method presented here is similar to the NSIDC method used in the June Outlook but relies only on changes in extent whereas the earlier submission included the influence of ice age (and hence thickness). Thickness/age is an important constraint on potential ice loss, but over a shorter forecast period late-June extent is better correlated

with the September extent and thus becomes suitable for a projection. The fact that the extent-based estimate is consistent with the original age-based estimate indicates that the melt season is generally progressing as expected so far.

Rationale and Forecast Skill

The rationale for this method is that by the end of June, the sun is beginning to set and solar insolation is decreasing. Thus, the potential range of the ice extent evolution begins to become constrained and range of extents will encompass the likely actual trajectory this year. Comparison with previous years' rates and climatological averages of year ranges are assessed to yield a most likely range. The forecast skill is discussed in the July contribution.

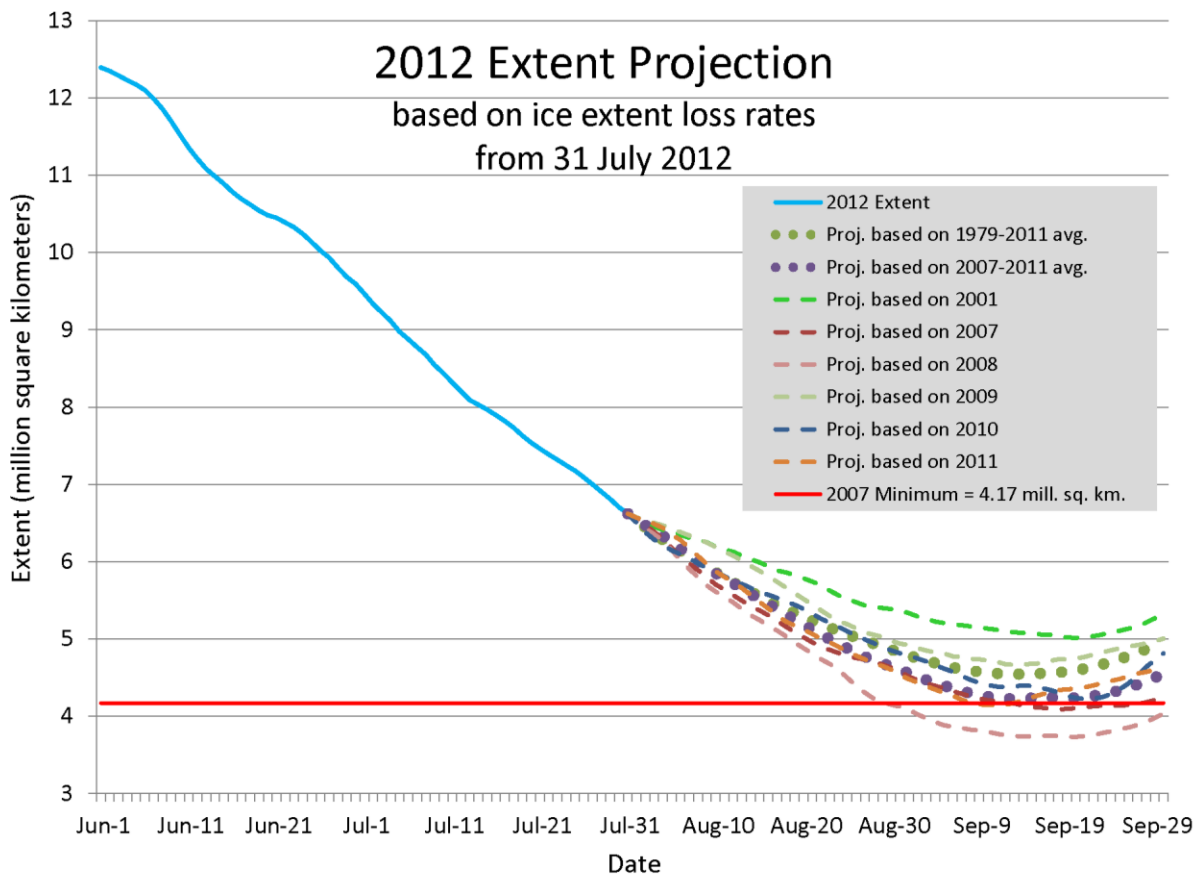


Figure 1. Sea ice extent projected trajectories from 31 July 2012 using decline from different years and climatological averages.