Sea Ice Outlook, September 2011

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Summary

This statistical method uses previous years' daily extent change rates from August 31 through September 30 to calculate projected daily extents starting from June 30. 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 project is based on the rates for 2002-2010, yielding a **September 2011 average of 4.45 million square kilometers, which is 0.07 million square kilometers lower than the August projection**; the range is now much narrower with **a standard deviation of only 99,000 square kilometers**. Using all years (1979-2010) yields a slightly higher estimate of 4.53 million square kilometers (about 150,000 square kilometers below the August projection), but a narrow range of 110,000 square kilometers. None of the 32 scenarios would yield a new record minimum September extent. This suggests the **chance for a record low this year is now very low,** though this may underestimate the probability because recent years have tended to follow faster decline rates. On the other hand, declines did slow the last few days of data used in this projection. Thus, **a new record low September extent this year is very unlikely, but not out of the realm of possibility**. However, total daily extent is now second lowest in the record. Thus, unless the decline rate is slower than any of the previous 32 years, **this year will be likely be the second lowest** of the satellite record.

One unusual factor this year is that there is a considerable amount of low concentration, likely thin ice. How that ice behaves – whether it melts completely and/or whether it is driven together by the winds (decreasing extent) will factor in to how low the final extent is. This is in contrast to 2007, where by this time the ice had already been packed closely together. There is also likely a considerable amount of ocean heat that will need to be dissipated, slowing the freeze-up and extent increase.

UPDATE: With the most recent data through 7 September, with the minimum daily extent fast approaching, the projection is honing in on a **daily minimum extent of 4.1 – 4.3 million square kilometers** and a **monthly extent of 4.37 +/- 0.07 million square kilometers** (years 2002-2010) and 4.44 +/- 0.11 million square kilometers (all years). Because the decline rate is slowing and the daily minimum extent will be reached within the next 1-2 weeks, the monthly extent will likely depend greatly on the rate of extent increase after the daily minimum is reached.

NOTE: NSIDC estimates the consistency of its monthly sea ice extent data to be +/-50,000 square kilometers. Thus any final extents within +/-0.05 million square kilometers of the current extent (4.30 million square kilometers) should be considered "tied" for the lowest on record.

Details

The method is the same as is described in the July Outlook, but projecting from September 1 instead of July 1. Table 1 shows the average and range of potential September monthly extents based on previous years' trajectories.

Range/Category (million sq km)	*All Years (1979-2010) 32 total years*	*Recent Years (2002-2010) 9 total years*
Average [St. Dev.]	4.53 [0.11]	4.45 [0.10]
Maximum [Year]	4.92 [1987]	4.60 [2004]
Record Low (< 4.30)	0	0
2nd Lowest (< 4.67)	26	9
Minimum [Year]	4.30 [1991]	4.33 [2010]

Table 1. Average, maximum, minimum and ranges of potential extents based on extent rates from all 32 years (middle column) and the most recent 9 years (right column). Based on projections from August 31.

An image of the trajectories of sea ice extent for the remainder of the melt season (through September 30) is provided in Figure 1. For clarity trajectories are only provided from the past 5 years. However, it is clear that no trajectory approaches the average climatological values, even for years not shown. The maximum projected September average (using 1987 rates) is over two million square kilometers below the 1979-2000 average of 7.04 million square kilometers and over 1.5 million square kilometers below the 1979-2010 average of 6.58 million square kilometers.

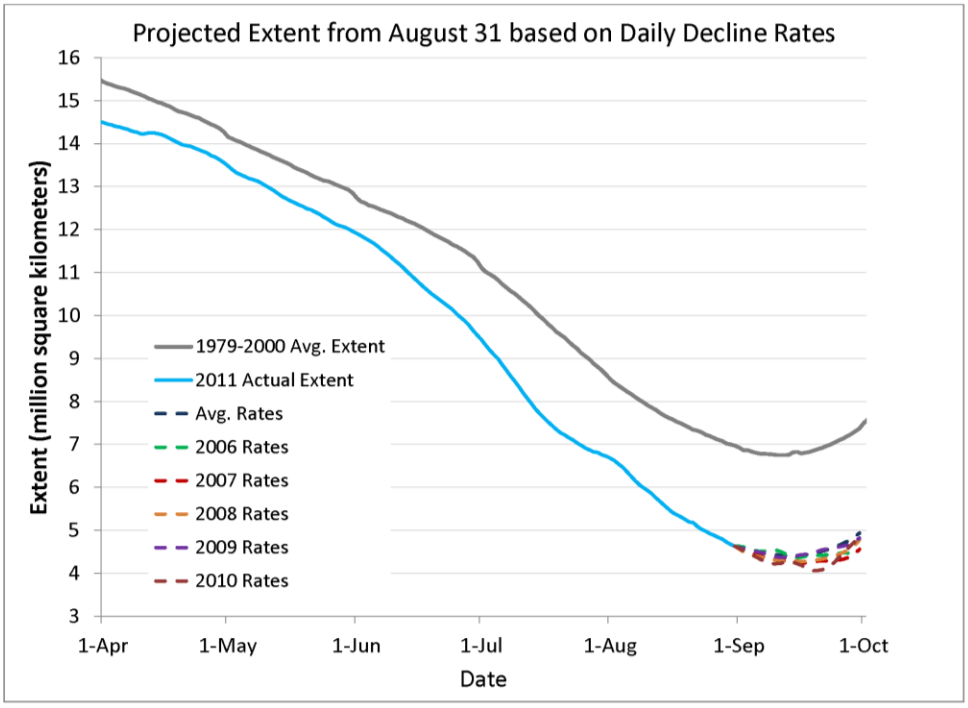

Figure 1. Timeseries of daily total sea ice extent with projections using extent change rates from the previous five years (2006 – 2010).