

Harry Stern
2008 Sea Ice Minimum Summary Report

When you ask us for predictions of future sea ice extent, we are free to try many different things—running complicated models, doing statistical analysis, or just making a seat-of-the-pants guess. When you ask us what actually happened in September 2008, we are not free to improvise—there IS a right answer. Finding the right answer requires digging into data and making comparisons between years. I have not done that with sufficient rigor to give definitive answers to your questions. Others are working on it—see Ron Lindsay's submission for example. The best I could do would be to reiterate what others have found, but that would not be an independent result for your survey, so I'll refrain.

What I can do is address the success or failure of the estimate that I made for September 2008 back in May and June. I used linear extrapolation of September 1997–2006 to estimate September 2008 at about 5.5 million sq km with standard deviation about 0.2 million (that's the standard deviation of the residuals of the linear fit of 10 Septembers). This is a purely statistical method, and my prediction did not use September 2007 in the regression because it appeared to be an "outlier." Note also that my prediction was for the September MONTHLY AVERAGE ice extent, not the absolute minimum daily extent. The monthly average will come in somewhere between 4.5 million and 5.0 million. So, what can I conclude...?

1. My estimate was at least 3 standard deviations too high, i.e., very wrong, way too high.
2. September 2007 was not an "outlier," in the sense that September 2008 did not bounce back to the trend line. This is also supported by CC's statistical prediction. She fit a quadratic to all Septembers, back to 1979 and including 2007, and came up with an extrapolated value of 5.3 million for September 2008, which is also way too high (although I don't know how many standard deviations too high, as she did not report the standard deviation of the residuals).
3. Therefore it appears that year-to-year persistence has an effect—September 2008 was low partly because September 2007 was low.
4. The factors that lined up to create the September 2007 minimum did not all line up again in September 2008 (winds in particular), hence the slight upward bounce from 2007 to 2008. Note that we have still never had 2 record minima in consecutive years. This is not surprising for a process that is at least partly random (i.e., short-term weather conditions).
5. To speculate on your last two questions:
Yes, some skill in predictability is possible based on the sea ice thickness distribution in spring. To make use of that potential we would need good estimates of sea ice thickness such as might be obtained from ICESat or CryoSat (i.e., complete spatial coverage).