

## PAN-ARCTIC OUTLOOK — ASI Blog

### 1. Extent Projection

In July through early August, participants in the Arctic Sea Ice blog posted 65 individual predictions for the mean NSIDC September Arctic sea ice extent. The median value of these 65 predictions was **3.6 million km<sup>2</sup>**, with an interquartile range (approximately the middle 50% of predictions) from 2.92 to 4.25 million km<sup>2</sup>.

### 2. Methods / Techniques

In July 2013, participants in the Arctic Sea Ice blog were invited to post their individual predictions of mean September Arctic sea ice extent, to be summarized as a single crowd-sourced contribution to the SEARCH Sea Ice Outlook (SIO) in August:

*The third and final SEARCH SIO deadline for this year will be in early August. Once again ASI blog participants are invited to submit, as comments to this post, your best guess for the mean September extent of Arctic sea ice (NSIDC). Your numerical prediction should be in the first line of the comment, followed by at least a sentence or two explaining the basis for your prediction — whether pure intuition, elaborate calculations, whatever you've got. Predictions are not bound by what you did or did not guess last month. As always, general discussion is welcome too.*

*Results from this crowd-source experiment will be research data in their own right. Individuals can submit their own predictions directly to SEARCH, of course. The analysis here will focus on collective skill and uncertainty rather than individual. I will summarize the results after each cycle, possibly forming the basis for a research paper as well as future blog posts. The whole process should be completely transparent, because the raw data — predictions submitted here as comments — remain public and accessible to anyone.*

<http://neven1.typepad.com/blog/2013/07/foo.html>

This blog post received 136 comments including 65 predictions, which ranged from 0 to 4.9 million km<sup>2</sup>, with a median of 3.6 and an interquartile range (approximately the middle 50%) from 2.92 to 4.25. Medians and quartiles are used as basic summaries here because they offer high resistance to outliers, are easy for anyone to replicate, and support more detailed analysis through graphics or quantile regression.

The distribution of August estimates is visualized below as a stem-and-leaf display (all analysis done using Stata):

```
. stem asi_blog if cycle==8, lines(2) digits(1) round(.1)
```

Stem-and-leaf plot for asi\_blog  
(Predicted September mean sea ice extent, million km<sup>2</sup>)

asi\_blog rounded to nearest multiple of .1  
plot in units of .1

```
0* | 00
0. | 89
1* | 03
1. | 58
2* | 22
2. | 5789999
3* | 011123333344
3. | 556666888899
4* | 0001222333344
4. | 55566788999
```

A complete set of summary statistics is below. The negative skew (-1.157) is reflected in a mean (3.39) lower than the median (3.6). Kurtosis of 3.996 reflects the drawn-out lower tail. The observed outliers (values more than 1.5IQR beyond the first or third quartile) are all low values — four predictions less than 1 million km<sup>2</sup>.

```
. summarize asi_blog if cycle==8, detail
```

Predicted September mean sea ice extent, million  
km<sup>2</sup>

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Percentiles		Smallest		
1%	0	0		
5%	.9	0		
10%	1.5	.75	Obs	65
25%	2.92	.9	Sum of Wgt.	65
50%	3.6		Mean	3.390769
		Largest	Std. Dev.	1.168357
75%	4.25	4.8		
90%	4.6	4.9	Variance	1.365057
95%	4.8	4.9	Skewness	-1.157215
99%	4.9	4.9	Kurtosis	3.996165

### **3. Rationale**

Participants in the Arctic Sea Ice blog are mainly non-scientists, or non-Arctic specialists, who nonetheless show a keen interest in scientific research on this topic. Their interest includes well-informed but diverse speculation about future sea ice extent. With many individual predictions some are bound to be near the final value of September ice extent, but interest here will focus on collective prediction and *change in the distributions* of estimates — how they compare with other predictions, and how different methods behave as they assimilate new information over the course of the melt season.

Our analysis will employ graphs and robust statistical methods that have good resistance to outliers, and do not assume Gaussian distributions. Data collection and analysis should be transparent and open to discussion at each step.

### **4. Estimate of Forecast Skill**

The forecast skill of this crowd-sourcing approach is unknown. In October, we will examine how the distribution of ASI blog predictions shifted as new information became available over the course of the summer. The analysis will include comparison with other SEARCH SIO predictions, and with the observed September ice extent.