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1. What will the sea ice extent for the Arctic as a whole be at the September 2008 minimum? Quantitative estimates in square kilometers are preferred (the value for 2007 was 4.3 million square kilometers), but qualitative estimates are also accepted.

We tend to provide probabilistic forecasts only, and we're really not keen on giving a single number. This is because a single number can be misleading to the public, as it implies a sense of accuracy that we do not have (may never have?) for a seasonal forecast. Also, the AMS and NOAA are spearheading a new effort to push probabilistic forecasts. So, on our web page (<http://ccar.colorado.edu/~arifs>) we just talk about probabilities, and based on April sea ice, temperature, and AO data, we're forecasting a 59% chance of a new record. However, to fully answer the question, our "most likely" model solution is 3.83 million square miles. We can provide probabilities for any number though.

2. A short summary of a few lines that gives the basis of your assessment, and that can be abstracted into a larger synthesis.

The forecast is based on ice age, sea ice concentration, 925hPa temperatures, and the Arctic Oscillation Index. We use a multiple regression framework, as discussed in Drobot (2007), which is available at <http://ccar.colorado.edu/~drobot/publications.html>.

In addition to the specific forecast noted above, our approach also includes an ongoing examination of atmospheric circulation patterns, ice motion, and patterns of formation of leads and changes in ice concentration. This qualitative assessment is then factored into our overall view of likely summer ice conditions. For example, multiyear ice is confined to a smaller portion of the Arctic Basin than any previous year. Unless conditions are such that first-year ice survives summer melt, this suggests substantial reduction in ice extent. Also, persistent easterly winds this spring has probably contributed to earlier-than-normal opening of the ice pack in the eastern Beaufort Sea - a situation similar to that seen in spring 1998, preceding record (for that time) ice area loss in the western Arctic later than summer.

3. A supporting paragraph and possible figures that expand and help explain the basis for your outlook.

Briefly, we expect a good chance for a new record because (a) the ice cover is younger and thinner than at any time in our recorded past; (b) air temperatures were above normal over much of the Arctic this winter; and (c) wind patterns favour light ice conditions. For

example, 63% of the Arctic Ocean is covered by younger-than-average ice and only 2% is covered by older than-average-ice, and above normal sea surface and air temperatures from last summer through the winter also contributed to a delay in sea ice growth in the Chukchi Sea until December, likely leading to a thinner winter ice pack in the western Arctic. The ARIFS site has a nice image of ice age: <http://ccar.colorado.edu/arifs/forecasts.html>. We can provide it at higher resolution if you want it.

4. A brief statement of what type of additional information would help to improve your outlook, if any.

The biggest thing we are lacking is ice thickness information. Of course, there is not enough observed ice thickness information out there, but if we could acquire some modeled ice thickness values, that would surely help. Another valuable parameter would be heat content of the ocean mixed layer. A third factor particularly relevant for survival of the first-year ice is snow cover, so snow depth information is another parameter of particular interest. Snow depth also affects the accuracy of estimates of sea ice thickness obtained from ICESat data, so snow depth is useful in that regard as well.

5. The organizers of this activity also invite brief assessments of the anticipated ice evolution over the course of the summer (June-September) in the following subregions: Bering/Chukchi/Beaufort Seas, Barents Sea, Northern Sea Route, and the Northwest Passage.

We can provide some of this information for the next forecast cycle, but in brief, ice in the Bering Sea has decreased earlier than normal, and wind patterns to date along with preconditioning suggest another large retreat in ice extent in the Chukchi and Beaufort seas. The Northern Sea Route in the past has remained blocked through summer by perennial ice north of Severnya Zemlya. However, only a relatively narrow strip of this ice remained at the end of last summer, and recent satellite imagery suggest that this strip is narrower this spring. Opening of the NSR will likely depend on whether this narrow strip of multiyear ice survives summer melt.

While first-year ice may mostly melt out of the Northwest Passage, scattered multiyear ice floes are likely to continue to be present.