

### **Preconditioning vs. weather**

The main preconditioning considered in our outlook is the area of robust multiyear ice in spring (April-May), the thickness of the FY ice as determined by the number of freezing degree days during winter/spring and the winter/spring total ice extent at the time of issue of the outlook. In our regression we represent these parameters by multiyear ice area determined from QuickSCAT scatterometer data, North Pole freezing degree days and the winter or spring ice extent. The weather conditions during spring and summer are not part of our regression though we acknowledge that the summer weather is very important. We experimented with using e.g. the melt onset date which is important for the snow albedo and radiation balance as a proxy but found insufficient correlation. The uncertainty in the long term development of the Summer weather is a severe weakness in our model and explains why our predictions are only accurate when the summer has started and affected the early summer ice extent. Also, we do not consider long term trends in the ocean which may effect the heat flux from the ocean to the ice.

Multiyear ice is fairly robust to summer melt in the Arctic Ocean. However, during the last 6 years the area covered by multiyear ice has shrunk due to melt and export. During winter this lost multiyear ice has been replaced by thinner first-year ice. This means that the sea ice cover is more sensitive to weather forcing than it was before (>6 years ago). A warm summer like 2007 gives a significant reduction in sea ice extent while a later than normal melt onset date (e.g. a colder than normal summer) like the situation in 2008 results in some replenishment of the MY ice (survival of some of the FY-ice).

### **How did 2007 and 2008 differ?**

- We had less multiyear ice in 2008 than 2007.
- The number of North Pole freezing degree days were larger in 2008 than 2007.
- The winter ice extent was larger in 2008 than in 2007.

### **Prediction skill**

A smaller multiyear ice area in the Arctic Ocean means that the sea ice summer extent is more sensitive to weather conditions during summer. This makes it more difficult to predict using statistical regression analysis. In the spring 2008 it looked like another minimum extent record with very high retreat rates and our first prediction in May (3.66mill. km<sup>2</sup>) and second in June (3.41mill. km<sup>2</sup>) was below the 2007 minimum. Our third prediction in July (4.46mill km<sup>2</sup>) when the summer melt had started was about the same as last year and quite close to the actual 2008 extent (4.52mill km<sup>2</sup>).

### **Needed for better outlook**

Long range (seasonal) weather forecasts.  
State of the ocean at the beginning of the Summer.