2010 Sea Ice Outlook
June Report based on May Data

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Wu and Grumbine:

Model Prediction for September 2010 average ice extent:
5.13 million km2, standard deviation 0.25 million km2

This prediction is based on the coupled Air-Sea-Ice Climate Forecast System (CFS) at NCEP. These predictions are based on the CFS Reanalysis and Reforecast model, the improved CFS version which will be implemented in operations later this year. The CFSRR is currently only up to December, 2009, so the prediction is based on a forecast from that period. An ensemble of 24 forecasts were made to provide estimates of mean and model variability. At this lead time, the model shows a consistent high bias in its forecasts of September ice extent. We have, therefore, attempted bias correction. One method is to subtract the extent bias observed from the prediction of September 2009 from December 2008. This lead to an estimate of 5.16 million km2. The second is to consider the model's bias as being excessive thickness, and then find the thickness greater than which the extent in September would match observed. This lead to an estimate of 5.11 million km2. We then averaged these two predictors.

Grumbine and Wu:

Statistical: 4.78 million km2, 0.45 million km2 sdev

This prediction continues the statistical approach used by Grumbine in 2009. The approach is to consider the growth of open water as proceeding according to a population growth (positive feedback of more open water leading to more open water) with a constraint. The constraint is that the open water area cannot exceed the original area of ice. The resultant curve for growth of open water is logistic curve -- exponential growth of open water in the early phase, exponential approach to zero ice extent in the later phase. Using the data for 1979 through 2009, the absolute best fitting parameter set (K, P0, r) predicted extent for September 2010 is 4.59 million km2. The standard error in this fit is 0.45 million km2 to date. The best fit logistic curve paramaters are K = 7.43 million km2, P0 = 0.074 million km2, and r = 0.133 per year. On the other hand, there are many parameter sets which are unbiased (bias less than 0.01 million km2) and have rms error less than 0.5 million km2. For our prediction, we are taking the average prediction from all these high quality logistic curves. That gives a prediction of 4.78 million km2.