**Seasonal prediction of Arctic sea ice extent from a coupled dynamical forecast system**

Wanqiu Wang, Mingyue Chen, and Arun Kumar

Climate Prediction Center, National Centers for Environmental Prediction, Camp Spring, Maryland

**Abstract**

Past studies on the seasonal sea ice prediction have been based on statistical methods or ocean-only dynamic models without atmospheric feedbacks. In this study, sea ice predictions from the recently developed NCEP Climate Forecast System version 2 (CFSv2) which includes a fully interactive dynamical sea ice component are analyzed. The focus of the analysis is the performance of the CFSv2 in reproducing observed northern-hemisphere sea ice extent (SIE). The SIE climatology, its interannual variability and predictability, and its long-term trend are assessed. A comparison of SIE climatology shows that the CFSv2 contains systematic biases that are dependent more on the forecast target month than the initial month, with a positive SIE bias for the forecast starting from January to September and a negative SIE bias for forecasts from October to December. A large source of seasonal prediction skill is from the long-term trend, which is underestimated in the CFSv2. Prediction skill of interannual SIE anomalies is found to be primarily within the first three target months and is largest in the summer and early fall, consistent with the seasonal variation of interannual variability which shows larger amplitude from July to October than in other months. The performance of the prediction of sea ice interannual variations is found to vary from year to year and to depend on initial sea ice thickness. Potential predictability based on forecast ensemble, its dependence on the forecast model’s deficiencies, and implications of the results from this study for improvements in the seasonal sea ice prediction are discussed.