



A coupled model system to examine ocean-atmosphere-sea ice and ice sheet processes in the Arctic: HIRHAM5 – HYCOM – CICE

Ruth Mottram, Kristine Skovgaard Madsen, Jens Hesselbjerg Christensen, Ole Bøssing Christensen, Till Rasmussen, and Mas Ribegaard

Danish Meteorological Institute, Danish Climate Centre, København, Denmark (rum@dmi.dk)

We introduce a high resolution fully coupled regional model system that describes ocean, atmosphere and sea ice processes in the Arctic Ocean and North Atlantic. The system has been developed using three existing models, the high resolution regional climate model HIRHAM5, the regional ocean model HYCOM and the CICE model that describes sea ice dynamics. These models have been interactively coupled which enables us to perform experiments examining the relative importance of ocean and atmospheric forcing as well as internal dynamics, to explain the recent rapid decline of Arctic sea ice. Analysis of the model results indicates the model can successfully reproduce the interannual and seasonal variability in sea ice extent. This opens up the possibility of a range of process based experiments as well as simulations to project the future of Arctic sea ice that we plan to run using the EC-Earth GCM as boundary forcing.

The inclusion of a sophisticated surface snow scheme in the RCM means that we can also examine the impact of sea ice on the surface mass balance of the Greenland ice sheet as well as more generally on the climate of the Arctic region. Future work aims to use the model system to make climate projections for the Arctic.