



Sensitivity to sea ice initial conditions in the Hadley Centre Climate Model (HADCM3) on timescales from seasonal to decadal

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The impact of sea ice initial conditions is analysed within the context of GCEP (Grid for Coupled Ensemble Prediction) applying a fully coupled atmosphere - ocean - sea ice general circulation model. A HADCM3 version with an Elastic Viscous Plastic sea ice dynamics scheme was chosen as reference run. Extreme sensitivity experiments were performed in which the total initial sea ice was removed or the ice area was strongly increased. In view of these extreme modifications the impact is small. The sea ice area nearly adjusts during the first winter month to its "normal" extent due to the unchanged ocean temperature. Further experiments with a modified mixed layer ocean temperature show clear differences during the first 10 years with respect to the reference run. The different behaviour of recovering is striking between the two hemispheres. In the Arctic, the sea ice itself recovers during the first years, but the ocean temperature at a depth of 100 m takes more than 10 years to reach its "normal" values, whereas in Antarctica, sea ice and mixed layer ocean temperature simultaneously recover after about 8 years. This is caused by the very stable oceanic stratification beneath Arctic sea ice and the stronger vertical exchange in the Antarctic Ocean, respectively. The different behaviour is of importance how sea ice is affected by climate change. Altogether, no hints can be found so far demonstrating sea ice is more than a climate indicator and plays an active role in climate change. Further investigations about global connections (e.g. impact on meridional overturning circulation) will be performed.