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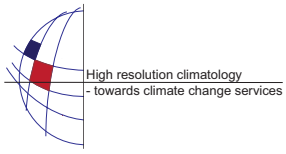

Seasonal potential predictability of the Arctic sea ice in the ENSEMBLES and CMIP3 simulations

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Sea ice is a major component of the climate system. It acts as an insulator and regulates exchanges between the atmosphere and the ocean in the polar regions, and influences surronding regions, especially through freshwater transport. As it is a slow-varying medium, it may represent a source of predictability on seasonal or possibly decadal time scales in the high latitudes.
The main patterns of sea ice predictability are investigated. As a first step, a FP6/ENSEMBLES stream 2 1000-year pre-industrial simulation of the CNRM-CM Global Coupled Model (GCM) is studied. Such a simulation allows us to study the intrinsic variability of climate components, in particular sea ice, in the framework of a stabilized climate, devoid of any trend. The persistance of pan-Arctic and regional ice extent and ice volume is investigated, showing that the information on sea ice volume is lost for lead times greater than about three months. The importance of the ocean heat content in the peripherial seas (Nordic and Siberian seas) is also studied. Results of this study are promising, however possibly model-dependent. Hence, as a second step, we use the IPCC fourth assessment report panel of GCM simulations to assess the spread of potential predictability of the Arctic sea ice extent and volume, under pre-industrial forcing as well. Results of this study may potentially suggest possible improvements in sea ice modelling, such as melt ponds parametrization in sea ice albedo scheme or more realistic sea ice dynamic model. This study is also meant to be the base for a model-based system of seasonal forecast of sea ice in the Arctic Ocean.