Geophysical Research Abstracts
Vol. 15, EGU2013-8433, 2013
EGU General Assembly 2013

Impacts of using spectral nudging on regional climate model RCA4 simulations of the Arctic

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The performance of the Rossby Centre regional climate model RCA4 is investigated for the Arctic CORDEX region, with an emphasis on its suitability to be coupled to a regional ocean and sea-ice model. Large biases in mean sea level pressure (MSLP) are identified, with pronounced too high pressure centred over the North Pole in summer of over 5 hPa, and too low pressure in winter of a similar magnitude. These lead to biases in the surface winds, which will potentially lead to strong sea-ice biases the coupled system. The large scale circulation is believed to be the major reason for the biases, and an implementation of spectral nudging is applied to remedy the problems by constraining the large scale components of the driving fields within the interior domain. It is found that the spectral nudging generally corrects for the MSLP and wind biases, while not significantly affecting other variables such as surface radiative components, two metre temperature and precipitation.