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RCAO - a coupled reguional climate model for the Arctic

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RCAO is a coupled atmosphere-ocean regional climate model that recently has been set up for the Arctic Ocean. The performance of the individual model components in stand-alone mode as well as that of the coupled model is investigated in hindcast runs of the ERA-40 period. Models results are compared against data from ERA-40 and satellite observations. Decadal scale ice conditions can be simulated well with the ocean standalone model. The atmospheric component's sea-level pressure of the central Arctic is biased high compared to observations, which is a typical feature of many regional and global models that is likely related to momentum transfer problems. The high bias changes the circulation patterns in the Arctic and prevents low pressure systems to enter the central Arctic, thereby maintaining itself in a sort in a positive feedback. Given this typical problem, its effect on sensitivity studies needs to be taken into consideration. Sea ice extent appears to be very sensitive to radiative changes, however the atmospheric circulation is rather stable and insensitive and is hardly affected by changes in individual thermal or radiative parameterizations. This study points out the need for additional physical processes such as an improved gravity wave drag or others as a precondition for simulated sensitivities to approach reality.