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Climate change and changing monsoon patterns

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This study presents the possible regional climate change over South Asia (SA) with a focus over India as simulated by three very high resolution regional climate models (RCMs). First the ability of RCMs to simulate the monsoon climate is analyzed. For this purpose all the three RCMs are executed with ECMWF reanalysis data for the period 1989-2008 at a horizontal resolution of ∼25km. The results are compared against independent observations. In order to simulate future climate the models are driven by lateral boundary conditions from two global climate models (GCMs: ECHAM5-MPIOM and HadCM3) using SRES A1B scenario, except for one RCM, which only used data from one GCM. The results are presented for full transient simulation period 1970-2099 and also for the time slices 1970-1999, 2021-2050 and 2070-2099. The analysis concentrates on precipitation and temperature over land. All models show a clear signal of gradual wide-spread warming throughout the 21st century. The ensemble-mean warming evident at the end of 2050 is 1°C-2°C, whereas it is 3°C-5°C at the end of century. The projected pattern of the precipitation changes shows considerable spatial variability. With an increase in precipitation over the peninsular India and coastal areas and, either no change or a decrease over areas further inland. The influence of the driving GCM on the projected precipitation change simulated with each RCM is as strong as the variability among the RCMs driven with one GCM. Some results of the first uncertainties assessment are presented.