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Analyzing the mechanisms of variability in the Asian monsoon with the Rossby Centre regional climate model

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Results are presented from an ensemble of simulations of the south Asian monsoon with the most recent version of the Rossby Centre Regional Atmospheric Climate Model (RCA3). RCA3, was developed primarily for application over Europe and has subsequently been evaluated over North America and the Arctic Ocean. In this study we assess the performance of RCA3 in simulating the tropical climate of South Asia as a contribution to determining the degree of transferability of the model. The focus of our analyses is on the mechanisms and inter-annual variability of the Asian summer monsoon. We focus on dry years such as 1987, that are characterized by a large deficiency of monsoon rainfall (drought), and wet years such as 1988 that have a large excess monsoon rainfall (flood) over the Indian subcontinent. We compare the regional details of precipitation, temperature, cloud cover and surface fluxes over the Asian subcontinent, with an emphasis on regional gradients in these variables and the representation of extreme (sub-seasonal) conditions. A suite of sensitivity experiments are presented that illustrate the impact of model resolution and various assumptions in the parameterizations of the land-surface and convection on the simulation of the Asia monsoon.