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Influence of land surface-atmosphere interaction on deep moist convection in COSMO-CLM

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The ability of climate models to represent deep moist convection (DMC) is crucial to investigate extreme weather events and their long-term statistics. However, the simulation of such small-scale processes remains a challenge for most climate models, including regional climate models (RCM). Even at convective permitting scale (CPS), RCMs do not always represent convective events correctly. In this study it is proposed to evaluate the influence of land surface-atmosphere interaction on the initiation and development of DMC with the RCM COSMO-CLM. For this, an ensemble of simulations is integrated. The simulations within this ensemble include different initial conditions, boundary forcing or physical parameterizations (e.g. varying soil moisture conditions and alternating land surfaces). Based on this strategy, days with different synoptic weather situations are selected to investigate the performance of the COSMO-CLM in reproducing DMC over central Germany. To assess the influence of the land surface on DMC the ensemble is compared to the reference run and the radar dataset of the Deutscher Wetterdienst (DWD). The model outputs and the radar data are compared using a tracking algorithm, which is able to identify and track convective cells using the precipitation field. The added values of the tracking algorithm lies in the possibilities of retrieving convective cells features such as initiation areas, life cycle, precipitation intensity and track lengths. This paper discusses the complex forcing of the land surface characteristics (esp. of soil moisture, land cover and orography) on the simulated features of DMC.