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Initiation of deep convection over the Black Forest mountains during COPS IOP 8b: A multi-model approach

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The initiation of precipitating deep convection in an ensemble of convection-resolving mesoscale models is investigated. Results of eight different model runs from five non-hydrostatic models are compared for a case of the Convective and Orographically-induced Precipitation Study (COPS). An isolated convective cell initiated east of the Black Forest crest located in southwest Germany, although convective available potential energy was moderate only and convective inhibition was high. Measurements revealed that, due to the absence of synoptic forcing, convection was initiated by local processes related to the orography. In particular, the lifting by low-level convergence in the planetary boundary layer is assumed to be the dominant process on that day. The models used different configurations as well as different initial and boundary conditions. By comparing the different model performance among each other and with measurements, the processes which need to be well represented to initiate convection at the right place and time are discussed. Besides an accurate specification of the thermodynamic and kinematic fields, the results highlight the role of boundary layer convergence features for quantitative precipitation forecast in mountainous terrain.