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A soil moisture network to study the impact of soil moisture on convective precipitation

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Within the framework of the newly funded project SOMONET, a combined monitoring and modelling approach is used to study the effects of soil moisture, evapotranspiration and water vapour in the planetary boundary layer on convective precipitation forecast on different scales (local to regional). The aim is to identify the dependence of convectively and orographically induced precipitation on the variability of the soil moisture field and the corresponding processes in the planetary boundary layer. This is made possible by a unique data set realised during the Convectively and Orographically induced Precipitation Study (COPS) campaign 2007 using a very high number of soil moisture sensors on various scales within the COPS area in South-West Germany. In addition to the 60 soil moisture stations, data on water and energy fluxes at the surface and in the planetary boundary layer are available. The combination of dense observations with simulations with the operational weather forecast system GME/COSMO-DE permits a rigorous analysis of the water transfer process chain from soil moisture and fluxes in the planetary boundary layer to convection initiation and precipitation. In a first step, the obtained soil moisture and atmospheric fields are compared to their related representation within COSMO-DE and the global model GME. During a later project phase, COSMO-DE model runs will be initiated with the observed soil moisture fields to study the impact of surface and planetary boundary layer processes on convective precipitation for several COPS case studies. The present contribution shows first results from comparisons between model simulations and soil moisture observations as well as model sensitivity studies regarding initial soil moisture fields.