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Numerical study on sensitivity of convective precipitation to cumulus convection parametrization and initial soil moisture content at 5 km horizontal resolution

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In this study the Weather Research Forecast Model is used to analyze the sensitivity of convective precipitation to cumulus convection parameterization and soil moisture content. Soil moisture content affects the surface energy budget and moisture exchange between the atmosphere and the land surface. The amount of energy and moisture supplied by the surface affects the buoyancy available for convection cloud development. Compared to satellite and in-situ measurements the model initial soil moisture content can deviate with about 40%. Creating simulations in which the soil moisture content is changed with $\pm$15% and $\pm$30% the effect of such differences on summer convective precipitation is investigated. However prediction of convective precipitation is highly dependent on the application of cumulus parameterization schemes. Simulations are carried out over the Carpathian Basin, using 5 km horizontal resolution for 33 summer days with convective precipitation applying both explicit and parameterized convection. Initial results show that the latent heat flux is about 10% and the convective available potential energy is about 25% lower in case of explicit cumulus cloud development description, however vertical velocities are higher. Considering precipitation, the decrease of soil moisture results an increment in precipitation area but lowered the amount in both cumulus convection cases. Soil moisture increment increased the amount of precipitation but decreased the area. When cumulus parameterization is chosen, the weaker updraft results less precipitation compared to explicit cumulus convection. Also irrespective of soil moisture condition, the spatial distribution of precipitation is significantly different comparing explicit and parameterized cases over plains.