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# The influence of prescribed soil type distribution on a regional climate models representation of observed climate

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Regional climate models (RCM) are usually validated against observation data. Previous investigations show that a consistent dry and warm bias during summer north and east of the Black Sea is a commonly known major issue in a variety of regional climate models. It was found out for some of the models systematic errors in the dynamics are one possible reason for the phenomena of summer drying. But also deficiencies in parameterisation of land surface can be a reason.

We compare two 13-year RCM simulations forced by NCEP/NCAR reanalysis data for the period 1993-2005. The simulations are initialized on January 1,1989, allowing a four years spin-up time (to reduce influence of initial soil moisture). Both simulations differ in the prescribed soil type distributions, which mainly influence the soil moisture field. The control simulation uses the soil type distribution derived from World Reference Base for Soil Resources (WRB former FAO) soil porosity. In the modified simulation we used the same distribution as in control simulation adding areas of silt loam from the “International soil map of Europe” and introducing the corresponding soil characteristics to the model. The conventional soil type distribution defines sandy loam in Southeast of Europe; the modified one defines a large area of silt loam instead. The regional model simulations have been performed with the Climate Local Model (CLM) the weather forecast model of the German Weather Service (DWD). For the time period 1993 to 2002 we compared model results for temperature and precipitation to CRU observation data. To quantify changes in other surface fields

and within the soil layers we compared both simulation results for the whole analysis period 1993-2005.

Due to higher porosity silt loam is able to assimilate more water e.g. during rainfalls than sandy loam. We detect increased soil moisture (30% to 75%) during the whole year in the modified simulation compared to the control simulation. The wet ground leads to a decrease of surface albedo and further an increase of net radiation. In the same time surface temperature decrease up to -1.5K because more energy is needed for evaporation. We find a 30% higher evaporation rate with increased humidity in air in the modified simulation than in the control one during the summer. The increase of latent heat flux and the decrease of sensible heat flux lead to a reduction of boundary layers depth. The higher concentration of water within the boundary layer in the modified simulation causes more precipitation in summer month in Southeast of Europe. Furthermore we find small changes in pressure and wind field. Our results indicate that improvement of simulating surface variables within the atmosphere will depend mainly on the improvement of soil moisture simulation.