



Large-eddy simulations of the effect of soil moisture on the development of shallow cumulus convection

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The effect of soil moisture on the development of shallow cumulus convection is investigated using a coupled Large-Eddy Simulation (LES) - soil model. Several runs are performed with different amounts of soil moisture and varying atmospheric conditions. At first, five runs with different soil moisture contents are performed to study the general effect of soil moisture on the development of the boundary layer. In further computations different profiles of liquid water potential temperature and specific humidity are used to compare the impact of soil moisture on the development of shallow cumulus convection under different atmospheric conditions. We find that the response of shallow cumulus clouds to a change of soil moisture depends very much on the stratification above the boundary layer. For a weaker stratification the largest cloud cover appears over drier soil while for a stronger stratification the largest cloud cover occurs over wetter soils. The results also show that the cloud cover over a dry soil is much more sensitive to a change of specific humidity of the atmosphere than over wet soil.