



The influence of spectral nudging in simulating Vb-events with COSMO-CLM

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In previous studies certain European cyclones have been investigated in terms of related extreme precipitation events in Austria. Those systems passing the Mediterranean are of special interest as the atmospheric moisture content is increased. It has been shown in recent investigations that state-of-the-art RCMs can approximately reproduce observed heavy precipitation characteristics. This provides a basic confidence in the models ability to capture future changes of such events under increased greenhouse gas conditions as well.

In this contribution we focus on high spatial and temporal scales and assess the currently achievable accuracy in the simulation of Vb-events. The state-of-the-art regional climate model CCLM is applied in a hindcast-mode to the case of individual Vb-events in August 2002 and Mai/June 2013. Besides the conventional forcing of the regional climate model at its lateral boundaries a spectral nudging technique is applied. This means that inside the model area the regional model is forced to accept the analysis for large scales whereas it has no effect on the small scales. The simulations for the Vb-events mentioned above covering the European domain have been varied systematically by changing nudging factor, number of nudged waves, nudged variables, and other parameters. The resulting precipitation amounts have been compared to E-OBS gridded European precipitation data set and a recent high spatially resolved precipitation data set for Austria (GPARD-6). Varying the spectral nudging setup in the short-term Vb-cases helps us on one hand learn something about 3D-processes during Vb-events e.g. vorticity and formation but on the other hand identify the model deficiencies.

The results show, that increasing the number of nudged waves from 1 to 7 as well as the choice of the variables used in the nudging process have a large influence on the development of the low pressure system and the related precipitation patterns. On the contrary, the nudging factor or the definition of the uppermost pressure level for the nudging are of low impact on the results.