

Influence of different large-scale driving data and soil-vegetation model on the results of the CLM regional model

C. Meissner, G. Schädler, M. Haller and C. Kottmeier

Institut für Meteorologie und Klimaforschung Karlsruhe, Forschungszentrum Karlsruhe /
Universität Karlsruhe, Germany

Since regional climate models always need driving data it is important to determine how strongly the results of the regional model are influenced by the driving model. To quantify this influence for an orographically structured region we have performed an ensemble of simulations with the CLM, the climate version of the “Lokal-Modell” of the German Weather Service (DWD), with different driving models for the year 2001. CLM was driven by GME (global model of DWD) Analysis, ERA40 Reanalysis and NCEP Reanalysis data. The simulated region in the Southwest of Germany contains three low mountain ranges: the Black Forest, the Vosges and the Suebian Alb. Because reliable results in such a region can only be obtained if the orography is represented adequately we used a grid size of 7 km for the simulations. The results of the simulations and the average of the three simulations are compared to measurements. This makes it possible to assess both; the influence of the driving data on the model results as well as whether an ensemble of simulations can provide better results compared to the measurements than a single simulation. We compare daily and monthly means of near surface parameters, e.g. 2m-temperature and precipitation, at measurement sites and for the whole area. Selected statistics of meteorological parameters will be presented to show the differences and similarities between the simulations and a summary of the influence of driving data will be given.

For regional climate simulations the lower boundary data for the atmospheric model provided by the soil vegetation model (SVAT) is very important. The incorrect modelling of the soil moisture content, soil temperature and surface properties can cause a drift in the long-term results and can cause false partitioning of the water and energy budget. Also local atmospheric processes like convection and wind circulations are very sensitive to soil-vegetation representation. To assess the impact of the SVAT on atmospheric model results we implemented an alternative SVAT with an explicit vegetation layer and a different soil hydraulic parameterization in CLM. We performed simulations for the year 2001 and compared them with the measurements and the results with the standard SVAT. The influence of SVAT on convective and grid scale precipitation and on near surface parameters will be presented and the development of the soil parameters like soil water content and soil temperature will be shown.