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Influence of Boundaries on Regional Climate Precipitation Modelling

A. Elizalde, H. Göttel and D. Jacob

Max Planck Institute for Meteorology, Hamburg, Germany. (alberto.elizalde@zmaw.de)

Some simulations for the Mediterranean region were conducted for the "CIRCE" project using the regional climate model REMO. A period of 4 years was covered. Some unrealistic precipitation pattern was found in summer near the northern boundary of the model domain which has a big influence on temperature and fresh water flux for the surrounding area. This disturbs the coupling (atmosphere-ocean) for the Mediterranean, therefore, some sensitivity studies were carried out to try to understand this phenomenon. Some hypothesis that could explain it are: 1) In climate models, the relative humidity is an important value to control the formation of clouds and therefore also for the precipitation. The threshold of relative humidity in the driving model (ERA40) could be different in the driven model (REMO), so the temperature and moisture fields are not any more balanced at the boundaries. This could lead to high precipitation near the boundary. 2) Beside the relative humidity, there are other parameters which controls the precipitation. Maybe these parameters could be not well tuned. 3) Current treatment of data in the boundary zone could lead to reflections which cause this unrealistic precipitation pattern. 4) Position of the boundary zone respect to the model topography.