Geophysical Research Abstracts,
Vol. 11, EGU2009-10002, 2009
EGU General Assembly 2009

Changes in precipitation patterns derived from an ensemble of high resolution RCM simulations

H. Feldmann, G. Schädler, and H.J. Panitz

University/Forschungszentrum Karlsruhe, Institute of Meteorology and Climate Research, Tropospheric Research Division, Eggenstein-Leopoldshafen, Germany (hendrik.feldmann@imk.fzk.de)

Global climate change has become an obvious fact and entails a need for adaptation measures on local and regional scales. In view of the large small-scale variability of quantities like temperature and precipitation and their future changes, this requires detailed considerations and uncertainty assessments.
The 4th IPCC report summarizes the effects on precipitation for Europe based on global climate models (GCM) simulations as follows: In northern Europe the climate will become moister – especially during winter – and the Mediterranean region will be much drier in the future – especially for the summer months - than it is today. Central Europe lies in the transition region between these two regimes.
The current GCMs do not give a consistent picture of the precipitation characteristics for this region in the 21st century. One of the reasons for that is that mountain ridges like the Alps are not adequately accounted for in the coarse resolution of GCMs. Therefore, high-resolution simulations with regional climate models (RCMs) are necessary to derive more reliable estimates of the upcoming changes in the precipitation pattern.
In our study we use a number of long-term simulations performed with the RCMs COSMO-CLM (with 18 km and 7 km resolution) and REMO (with a horizontal resolution of 10 km) for Central Europe. All simulations obtain their boundary conditions from ECHAM5. The models have comprehensively been evaluated against gridded observation data. The models simulations cover different realization of present day and future climate as well as different IPCC scenarios for future emissions. The study is focussed on the expected precipitation changes in Central Europe until the middle of the century.
We will discuss climatological precipitation as well as extreme events with return periods of several years.
An important aspect is the assessment of the uncertainty of regional projections. For that purpose, ensemble methods are used to establish estimates and indicate the risk of changes in the precipitation in certain regions. The use of a set of realizations provides the opportunity to broaden the data basis for an extreme values analysis for a given period. The inter-comparison of climate projections from different regional models enables a check of the consistency of the regional structures in the climate change signals.
It is shown that changes in the pattern of heavy precipitation events are not necessarily coincident with the respective changes in the climatological precipitation.
The results for the different models and setups show discrepancies especially in some regions with complex topography. But there are other regions where the near future climate signals are quite consistent among the different simulations. Such a consistency gives confidence that the regional climate change signals are robust. Modified by topographical structures there seems to be a northwest to southeast gradient in the precipitation changes indicating an overlay of the transition from the Mediterranean to northern European regime and the transition from Atlantic to continental conditions.