



## **Will there be more dry spells in the future? Results from regional climate models for Central Europe**

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)

Although it is not expected that a shortage of water supply due to climate change will be a problem in Central Europe during the next decades, there is concern about adverse effects on ecological stability and navigability of rivers and cooling of power plants due to extended dry spells.

The 4th IPCC report summarizes the effects on precipitation for Europe based on global climate models (GCMs) simulations as follows: In northern Europe the climate will get moister – especially during winter – and the Mediterranean region will become much drier during this century than it is today. Central Europe lies in the transition region between the two regimes and simulations with current GCMs do not give a consistent picture of the precipitation characteristics during the 21st century. On the other hand, results of regional climate models (RCMs) suggest that there is a large small-scale variability of precipitation changes with increases and decreases just a few tens of kilometers apart.

In this study we will use a set of high-resolution RCM simulations – based on different GCM realizations and emission scenarios - to obtain estimates of the upcoming changes in the occurrence of droughts in Central Europe. The simulation results are taken from the COSMO-CLM with a horizontal resolution of 18 km and 7 km and the REMO model with 10 km resolution. All RCM simulations obtain their boundary values from ECHAM5 simulations. The evaluation and reference period is 1971-2000 and the main scenario period is 2011-2040 to account for the time frame of planning purposes. In addition, there will be an outlook towards the changes expected towards the end of the 21st century.

We will first discuss the evaluation of the simulations against observation data with respect to their ability to represent the frequency distribution of dry episodes especially during summer when the impact of dry spells will be largest. A reasonable agreement was found for episodes with return periods up to about 10 years. The RCM climate projections indicate a decrease in summer precipitation and an increase in the number of dry days, especially in some river valleys.

Finally, the consistency of the regional change patterns will be discussed by considering an ensemble of simulation results consisting of different models, realizations and scenarios.