



High resolution regional climate simulations for hydrological impact studies in Germany

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Many climate impact studies require regional climate simulations in high spatial resolution, for example for the assessment of changes in flood hazard for small and medium sized river catchments. Furthermore, the aspect of uncertainties of simulation results is crucial in this kind of impact studies. Uncertainties arise from several sources, e.g. model construction and set-up, parameter calibration, natural variability and future scenarios to name a few. Therefore, a hydro-meteorological ensemble approach is applied in this project "Flood hazard in a changing climate" which is funded by the Center for Disaster Management and Risk Reduction Technology (CEDIM). The ensemble will sample at least some of the range of uncertainties to make a statement on the robustness of the results. The hydro-meteorological ensemble approach consists of three levels: First, two GCMs (ECHAM5, CCCma3) and for one GCM (ECHAM5) three realizations with different initial conditions are used in order to assess the uncertainty due to different GCMs and natural variability. Second, GCM simulations are dynamically downscaled to a horizontal resolution of 7 km using two RCMs (WRF, COSMO-CLM). Third, results of RCM simulations are used as driving data for at least two hydrological models for each catchment. Hence, the ensemble approach allows an assessment of potential changes in flood hazard and an evaluation of the uncertainties in the future projections.

Research area for the high resolution RCM simulations is Germany. For the assessment of changes in flood hazard for the near future, regional climate and hydrological simulations are performed for an evaluation phase (1971-2000) and a future time period (2021-2050). The hydrological simulations are performed for three representative small to medium sized catchments in Germany (Ammer, Mulde, Ruhr) with catchment areas between 700 and 6000 km².

The presentation focuses on the RCM results and includes a detailed statistical evaluation of the different RCM simulation results of WRF and COSMO-CLM.