CS 06   Refinement and application of a regional atmospheric model for climate scenario calculations of Western Europe

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Context / Social problem

Developing mitigation and adaptation strategies that prepare for the anticipated consequences of climate change only makes sense if we know how and to what extent the climate is going to change. KNMI has recently presented several climate scenarios for the Netherlands. They paint consistent and plausible pictures of a possible future climate and were built on results from a large number of climate models used in international climate research. The degree of uncertainty has been reflected by constructing several climate scenarios, each of which is equally plausible based on current knowledge and scientific understanding. Improved climate models will help to reduce the uncertainty margins in future climate scenarios.

What do we know/not know?

Climate scenario calculations are made using coarse-grained global climate models (General Circulation Models, GCMs) with a horizontal resolution of about 150 km. One of the goals of the CS06 project is to perform climate scenario calculations for the European continent (1950–2100) with the current version of the KNMI RACMO-2 regional climate model. The advantage of reducing the size of the spatial domain is that a fine grid can be used with a horizontal distance of approximately 25 km. This type of zooming in is called 'dynamic downscaling'. The forcing at the edge of the regional model domain is taken from a GCM.

What is being studied?

The focus of the climate scenario calculations in the CS06 project is on generating the spatial and temporal distribution of precipitation in the river basins of the Rhine and the Meuse. The model results for the present climate are evaluated using observations of various parameters such as precipitation, temperature, cloud cover and radiation.

The project also aims to improve the description (parameterisation) of a number of processes in the regional model relevant for precipitation. They are the representations of i) boundary layer clouds, ii) cumulus convection, iii) the role of soil water in the land-atmosphere interaction (with CS03), and iv) the effect of clouds and aerosols on radiation and the formation of precipitation (with CS04).

Once the model components of RAMCO-2 have been adapted, the new model will be evaluated against numerous observations, derived partly from the CESAR project (CS02). Finally, the CS06 project will perform another climate scenario calculation with the improved RACMO-2 model.

What are the results, and who are they for?

The outcome of the multi-year model integration with the current version of RACMO-2 is the input to the CS07 project. A further input to CS07 are the climate scenario calculations with the new RACMO-2, which will be conducted in the final stage of the project. If requested, the direct model output can be delivered, for example multi-year and/or high frequency time series of meteorological parameters at designated model grid points.