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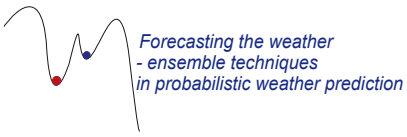

Climate characteristics of the Carpathian Basin: comparison of ENSEMBLES and Hungarian simulation results using the ALADIN-Climate and REMO regional climate models

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Climate simulations comprise several uncertainties, which are derived (1) from the natural variability of the climate system; (2) the scenarios applied in the global climate models for description of the future anthropogenic activities; and (3) the differences of the global and regional climate models (RCMs) in terms of dynamical model formulation, physical parameterisations, spatial resolution, integration domain and lateral boundary conditions.

Over the last decade many projects were initiated to examine and specify the climate simulations and the related uncertainties. In the framework of the ENSEMBLES project a number of RCM experiments was achieved with 25 km resolution for Europe mostly covering the 21st century. The large-scale forcings for the regional simulations were provided by A1B scenario runs of different atmospheric-ocean global coupled models, consequently, the ENSEMBLES simulation results serve as good basis for investigation of the model uncertainties. In the project methods were also developed for ensemble evaluation of the model outputs and for quantification of the uncertainties. At the Hungarian Meteorological Service (HMS) two regional climate models were adapted for providing regional climate estimations for the next few decades particularly over the Carpathian Basin. At the same time, the two adapted RCMs, ALADIN-Climate and REMO were also used in ENSEMBLES with different resolutions, domains, and model versions. Therefore, the two-member Hungarian RCM set was augmented with the adequate results from ENSEMBLES, in order to obtain a more detailed overview about the regional climate characteristics of the Carpathian Basin and to deeply understand the behaviour of the applied models.

First, the ERA40- and GCM-driven regional model simulations were compared with respect to the ECA dataset for 1961–1990. The validation indicates some differences for the Hungarian territory: while the 10 and 25 km resolution Hungarian ALADIN-Climate simulations provide too low temperature values, the ENSEMBLES results show rather summer and winter temperature overestimation over the Carpathian Basin. As for REMO a summer drying deficiency was identified both in the reanalysis- and GCM-driven simulations for the version 5.7 applied in ENSEMBLES, whereas for REMO5.0 used at the HMS this shortcoming was only seen using ERA-40 lateral boundary conditions. The projections for the future were investigated for 2021–2050 concentrating on Hungary. The results mainly confirm the outcomes of the Hungarian simulations: a general temperature increase and a slight annual precipitation change can be expected; the different REMO versions project summer decrease and winter increase in precipitation. The ALADIN-Climate simulations are uniform in the winter precipitation reduction, however, for summer one version indicates some chance for increase. The poster presentation aims to give an overview about the results of the abovementioned evaluation and put special emphasis on the uncertainty assessment in the simulations for the territory of Hungary.