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Forecasting the weather
- ensemble techniques
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High-resolution regional climate model simulations with the REMO model over the Carpathian Basin

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The REMO5.0 regional climate model developed by the Max Planck Institute for Meteorology in Hamburg was adapted at the Hungarian Meteorological Service in 2004. Two experiments were accomplished with the model: (1) a simulation of a past period from 1961 to 2000, driven by the ECMWF ERA40 re-analysis data, and (2) a transient run from1951 to 2100 driven by A1B scenario experiment of the ECHAM5/MPI-OM global coupled atmosphere-ocean model. The integration domain was the same in both experiments: continental Europe with 25 km horizontal resolution.

The simulation results for the past were compared with observations and the future changes were evaluated focusing on two main periods, 2021–2050 and 2071–2100. Based on the validation it was concluded, that the re-analysis driven experiment provides warmer and drier past climate over the Carpathian Basin with respect to the observations, whereas lower temperature and higher precipitation values are obtained when the lateral boundary information is derived from global simulations. As far as the climate projections are concerned, unsurprisingly temperature increase is envisaged over Hungary both in the near- and far-future. Annual precipitation will not change significantly, however, seasonally its redistribution can be expected: summer decrease and winter increase are foreseen, which are significant at the end of the century.

A new experiment is planned to be started with REMO on 10 km horizontal resolution. Before starting the model integration on the finer resolution, the optimal domain has to be determined considering all the aspects playing role in this choice (including also computer resources). On the one hand, certainly the model domain has to cover the region of our interest, i.e. Central and Eastern Europe, with sufficient extension towards West. On the other hand, the proper distance of the lateral boundaries has to be ensured from the high mountain ranges (especially from the Alps and the Carpathians), in order to avoid any negative impacts coming from the boundaries and propagating into the target area (i.e. over Hungary).

The presentation is dedicated to provide an overview about the outcomes of the simulations achieved at the Hungarian Meteorological Service and it is going to introduce the preliminary results of the ongoing 10 km resolution experiments.