

## **What are the projected climate conditions for the Carpathian Basin? – A comprehensive regional analysis of ENSEMBLES outputs**

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Global climate models (GCMs) provide a useful tool to describe and simulate large scale circulation for the past, the present and the future. However, their spatial resolution is inappropriate to describe regional climate processes, including temperature and precipitation (especially, their extremes). Therefore, GCM outputs may be misleading to compose regional climate change scenarios for the 21st century. In order to provide better estimations for regional climate parameters, fine resolution regional climate models (RCM) can be used. RCMs are limited area models nested in GCMs, i.e. the initial and the boundary conditions of RCMs are provided by the GCM outputs. In order to estimate the regional climate change projected for the Carpathian Basin located in Central/Eastern Europe, outputs from several RCMs (from the completed EU-project ENSEMBLES) are summarized and analyzed using A1B scenario. For the selected target region, composite maps of expected change in temperature and precipitation are generated using the RCM simulations (with 25 km spatial resolution) for the periods of 1961-1990 (as the reference period), 2021-2050, and 2071-2100.

In order to estimate the bias of the different RCMs, ERA-40 (European Centre for Medium-range Weather Forecast, ECMWF, re-analysis dataset) driven runs are compared to the so-called E-OBS datasets containing gridded daily temperature and precipitation values. The validation results suggest that the models are able to reconstruct the temperature sufficiently. In case of the precipitation, simulated values usually significantly overestimate the observations, except in summer when mostly underestimations are found.

Then, for the evaluation of annual, seasonal, and monthly expected climatic changes, GCM-driven runs of the reference and the future periods are compared. The results suggest that the temperature of the selected region is expected to increase in the whole year. This warming is about 1-2 °C, and 3-4 °C for 2021-2050, and 2071-2100, respectively. In case of precipitation, the annual sum is not expected to change significantly in the Carpathian Basin. The winter and autumn precipitation is likely to increase while summer and spring precipitation is projected to decrease during the 21st century.