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Heat waves over Central Europe in regional climate models: evaluation and future projections

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The aim of the study is to evaluate capability of regional climate models (RCMs) to simulate Central European heat waves and to assess possible changes of their characteristics in a future climate. The ensemble of RCM simulations driven by various global climate models, with the historical forcing till 1990 and the SRES A1B emission scenario thereafter, originates from the ENSEMBLES project. The E-OBS gridded dataset is used to represent observed data. Possible changes of heat wave characteristics are assessed for the near future (2020-2049) and the late 21st century (2070-2099). Heat waves are defined based on temperature magnitude, length, and spatial extent over Central Europe, using the 90th percentile of daily maximum temperature. Their severity is measured through the extremity index that takes into account all three variables (cf. Lhotka and Kyselý 2015). The model ensemble tends to simulate more heat wave days, considerably intensifies the peak temperature of heat waves and overestimates their average and total extremity index. By contrast, average length and spatial extent of heat waves are reproduced reasonably well. In the near future, the number of heat waves is projected to increase by a factor of 2 and their total extremity index by a factor of 2-3. Pronounced changes are simulated for the late 21st century, when the number of heat waves is projected to increase by a factor of 3-4, along with enhanced peak temperature, length, and spatial extent. This framework will also be applied in a follow-up study, utilizing RCMs from the EURO-CORDEX project, to study effects of different emission scenarios and model resolution.

Reference:
Lhotka O, Kyselý J (2015) Spatial and temporal characteristics of heat waves over Central Europe in an ensemble of regional climate model simulations. Clim Dyn. doi: 10.1007/s00382-015-2475-7