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Analyses of climate and extreme indices in Central and Eastern Europe within the CECILIA project

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The EU-project CECILIA (Central and Eastern Europe Climate Change Impact and VulnerabiLIty Assessment) aims at delivering a climate change impacts and vulnerability assessment in targeted areas of Central and Eastern Europe. This region appears particularly vulnerable with regard to future changes in extremes (Christensen and Christensen 2003, Schär et al. 2004), likely due to regional specificities such as highly varying topography and continentality, and due to changes in soil moisture content (Seneviratne et al. 2006). In the project, emphasis is given to applications of regional climate modeling studies at a resolution of 10 km for local impact studies in key sectors of the region.

The project includes the analysis of extreme weather events in present day and future climate in the target region. For this purpose, an extensive list of precipitation and temperature indices was defined. Observational data used for the indices calculation comes from the European Climate Assessment & Dataset project (ECA&D, Klein Tank et al. 2002), from the ENSEMBLES gridded observations (E-Obs, Haylock et al. 2008), and from station data of the local partners in Central and Eastern Europe. Moreover, the same indices were calculated consistently for a selection of pre-existing RCM datasets (PRUDENCE, ENSEMBLES), and for the CECILIA driving models. Later on, the 10 km high-resolution climate simulations from CECILIA will be included in the analysis.

Here we focus on the analysis of a selection of temperature indices, and on the validation of the model-derived indices with the observations. Generally, the spatial agreement between the models and the observations is very good for mean, maximum and minimum temperature (both in terms of the spatial variability and the spatial correlation). The spread between the models is larger for the daily temperature range, with most models showing larger spatial variability compared to the observations. When it comes to heat and cold wave indices, the models perform relatively well for the mean heat and cold wave occurrence, although the spread between the models is large. The results are worse for the percentile-based heat and cold wave durations. In these cases, the spatial correlations between the models and E-Obs decrease to around zero, with some models even showing negative correlations.

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