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Future projection of drought conditions in Europe: A comprehensive study using the ENSEMBLES regional climate models

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Drought is a natural recurrent phenomenon which occurs in a variety of different temporal and spatial scales and significantly affects natural and socio-economic systems. Under the aspect of the human induced climate change it is of high interest to decision makers how drought conditions might change at regional scale in order to map out adequate mitigation and adaption strategies.

For this study, the most recent regional climate scenarios for Europe with a horizontal resolution of approximately 25 km are used (provided by the EU FP6 Integrated Project ENSEMBLES - http://ensembles-eu.org/). Based on seasonal temperature and precipitation climate change signals, eight scenarios out of the entire ensemble are selected in order to span a large fraction of the uncertainty range. These eight scenarios are analysed in more detail.

A quantile mapping approach based on the E-OBS observational dataset is applied to daily temperature and precipitation to reduce model errors before investigating drought conditions in nine European sub regions.
Two commonly used drought indices are calculated as drought indicators – the Standardized Precipitation Index (SPI) which is solely based on precipitation and the self calibrated Palmer Drought Severity Index (scPDSI) which is additionally based on temperature and available water capacity of the soil. The SPI is calculated for various time scales, accounting for different drought types, and the scPDSI is calculated on monthly basis. Both indices are calibrated in the past (1951 – 2000) and then applied to the future scenarios (2021 – 2050) according to the concept of relative drought indices.

The temporal and spatial characteristics of projected future drought conditions are analysed with focus on moderately and extremely dry and wet conditions and the uncertainty in the projections. Finally, first results will be presented.

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