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Regional Drought Projections

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Changes in regional climate pose new challenges to society and economy. Possible adaptation options are developed within the BMBF-supported project REGKLAM for the model region Dresden, Germany. Here, we focus on projected changes in frequency, severity and duration of drought events for the 21st Century, using different precipitation-based drought indicators.
Data from different regional climate models and socioeconomic scenarios were analysed and compared, revealing different model capabilities to represent drought conditions and to estimate the bandwidth of possible future developments. Uncertainties related to model architecture and possible future greenhouse gas emission scenarios can be evaluated. All regional models are based on the output of the GCM ECHAM 5/MPI-OM T63, thus limiting the assessment of internal climate variability and uncertainties related to global model selection.
Observation data for the CLINO 1961—1990 were used to evaluate the models' capability to represent dry periods. The regional climate models reproduce the observed statistics to a limited extend only. The statistical models show a better performance than the dynamic models for most drought indicators. Yet, the statistical models must not necessarily be the best choice to evaluate climate change in the late 21st Century.
Most models project increasing drought extremes for the 21st Century, particularly towards its end. Projected changes for the mid 21st Century are modest and not as robust over different models than for the period 2071—2100. The projected increase in drought conditions is particularly robust for the summers, while models more often disagree about drought development in winter.
Generally a considerable bandwidth of model results regarding future drought conditions occurs. Thus, adaptation options need to cover a preferably large array of possible future developments. Drought issues cannot be interpreted independently from projected temperature developments. Rising temperatures and associated higher evapotranspiration may enhance water deficit situations even with unchanged precipitation totals, demanding adaptation options in sensible economic sectors.