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Simulation of Temperature-Precipitation Compound Events by a Spatial Weather Generator vs. Regional Climate Models

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Weather generators (WGs), which are one of the statistical downscaling approaches, are often used to produce input weather data for climate change impact studies. To justify their use in such experiments, WGs are validated for their ability to represent various features of statistical structure of the real-world weather data. The validation indices may generally include characteristics of (a) probability distribution functions of individual weather variables (mean, variability, quantiles, extremes), (b) temporal and (c) spatial (only for the spatial WGs) structure, and (d) relationships between variables. This contribution will present results of the validation experiment, in which the spatial (gridded) parametric weather generator SPAGETTA is validated in terms of the spatial temperature-precipitation compound events, which are affected by characteristics of all 4 above mentioned categories.

The contribution consists of following parts: 1. Model of SPAGETTA weather generator, 2. Validation of the generator in terms of the spatial hot/cold/dry/wet spells and temperature-precipitation compound events. The latter are defined here as spells of days in which both temperature and precipitation simultaneously are either relatively high or low at sufficiently high fraction of grids; the compound events thus include hot-dry, hot-wet, cold-dry and cold-wet spells. The validation is performed for 8 European regions using E-OBS gridded daily weather data. 3. The performance of the weather generator will be compared with the performance of regional climate models (CORDEX database), which are also commonly used for creating meteorological inputs for the climate change impact studies.