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SPAGETTA, a Gridded Weather Generator: Calibration, Validation and its Use for Future Climate

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Spagetta is a new (started in 2016) stochastic multi-site multi-variate weather generator (WG). It can produce realistic synthetic daily (or monthly, or annual) weather series representing both present and future climate conditions at multiple sites (grids or stations irregularly distributed in space). The generator, whose model is based on the Wilks' (1999) multi-site extension of the parametric (Richardson's type) single site M&Rfi generator, may be run in two modes:
In the first mode, it is run as a classical generator, which is calibrated in the first step using weather data from multiple sites, and only then it may produce arbitrarily long synthetic time series mimicking the spatial and temporal structure of the calibration weather data. To generate the weather series representing the future climate, the WG parameters are modified according to the climate change scenario, typically derived from GCM or RCM simulations. In the second mode, the user provides only basic information (not necessarily to be realistic) on the temporal and spatial auto-correlation structure of the surface weather variables and their mean annual cycle; the generator itself derives the parameters of the underlying autoregressive model, which produces the multi-site weather series. In the latter mode of operation, the user is allowed to prescribe the spatially varying trend, which is superimposed to the values produced by the generator; this feature has been implemented for use in developing the methodology for assessing significance of trends in multi-site weather series (for more details see another EGU-2017 contribution: Huth and Dubrovsky, 2017, Evaluating collective significance of climatic trends: A comparison of methods on synthetic data; EGU2017-4993).
This contribution will focus on the first (classical) mode. The poster will present (a) model of the generator, (b) results of the validation tests made in terms of the spatial hot/cold/dry/wet spells, and (c) results of the pilot climate change impact experiment, in which (i) the WG parameters representing the spatial and temporal variability are modified using the climate change scenarios and then (ii) the effect on the above spatial validation indices derived from the synthetic series produced by the modified WG is analysed. In this experiment, the generator is calibrated using the E-OBS gridded daily weather data for several European regions, and the climate change scenarios are derived from the selected RCM simulation (taken from the CORDEX database).