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Performance of two weather generators at different climates

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Stochastic weather generators (WGs) are tools, whose main purpose is to produce arbitrarily long synthetic weather series statistically similar to "learning" data, mostly being observations. By appropriate modification of WG parameters, one may, however, produce also weather data representing changed climate conditions or weather series, which fit the weather forecast. WGs are usually used to provide input weather series for various weather-dependent models. Coupled with crop growth models, WGs play an important role in assessing impacts of climate change on crop yields and in probabilistic crop yield forecasting. Applicability of a WG is conditioned on its quality, which may be measured by the WG's ability to reproduce statistical features of real-world data.

The present contribution assesses the quality of two single-site multi-variate stochastic weather generators, M&Rfi and GeNNeR, both being designed to be used mainly with the crop growth models. M&Rfi is a new parametric generator, which is currently being developed as a more flexible follower of Met&Roll generator. Time series are modelled by a multi-variate autoregressive (AR) model. Precipitation is modelled either together with other variables by the AR model, or separately using a combination of Markov-chain model for precipitation occurrence and Gamma distribution for precipitation amount. In the latter case, parameters of the AR model are optionally conditioned on precipitation occurence. The user may set various degrees of complexity of the underlying model, thus adjusting the number of parameters to be derived from the learning (= observed) weather series. GeNNeR is a non-parametric weather generator based on a nearest-neighbours resampling technique, which makes no assumption on the distribution of the variables being generated. The resampling algorithm may be driven by several parameters, which, for example, allow for conditioning on pre-

cipitation and/or randomisation of resampled values. Both weather generators may be run with various numbers of variables (precipitation, solar radiation and daily extreme tamperatures are typically involved) and at various time steps (1d, 3d, 5d, 7d, 10d, 1/2mo, 1mo). The contribution will assess the ability of the two weather generators to reproduce selected climatic characteristics at various time steps and in various climate zones throughout the world. Special emphasis will be put on the reproduction of characteristics of variability and extremes (including duration characteristics of hot/cold/dry/wet spells).

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