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Cimate change scenarios in terms of the weather generator parameters

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In assessing impacts of the forthcoming climate change, the climate change scenarios related to a specific time horizons and emission scenarios are required. These scenarios typically consist of changes in means (and, if possible, in variability) of climatic characteristics and are mostly derived from outputs of Global Climate Model simulations. Having the scenario, the time series (commonly with daily step) required as an input to the impact models (e.g. crop growth models and rainfall runoff models) may be produced by the weather generator (WG) whose parameters were modified according to the climate change scenario. The climate change scenarios are affected by various uncertainties, which should be properly accounted for in the impact studies. One of the uncertainties is related to natural climate variability. If the underlying model of the weather generator is properly selected and calibrated, it may reproduce the natural climate variability (both low-frequency and high frequency) of the real-world weather series.

In the present contribution, the climate change scenarios are developed in terms of selected parameters of the M&Rfi weather generator (the stress will be put on the WG parameters which control the climate variability and occurrence of extreme climatic characteristics). M&Rfi is the WGEN-like weather generator: precipitation occurrence is modelled by the Markov chain model, daily precipitation amount is fitted by the Gamma distribution, and the non-precipitation daily variables are simulated by the first-order autoregressive model. In developing the scenarios, the weather generator parameters are derived from the future period (e.g. 2070-2099) and compared with those derived from the present period. The changes (additive or multiplicative) of the parameters may be then applied to the parameter set derived from the observed

weather series, and the resultant set of parameters may be used to generate synthetic series representing the changed climate. The contribution will focus on: (i) Comparison of WG parameters derived from GCM simulations with those derived from observed weather series (using weather data from various locations in the world). (ii) Assessing significancy of projected change of WG parameters: the changes will be compared with uncertainty involved in determining WG parameters from the input series. (iii) Comparing scenarios derived from various GCMs and from various runs of single GCM.

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