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Using the Quantile Mapping to improve a weather generator

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We developed a weather generator (WG) by using statistical and stochastic methods, among them are quantile mapping (QM), Monte-Carlo, auto-regression, empirical orthogonal function (EOF). One of the important steps in the WG is using QM, through which all the variables, no matter what distribution they originally are, are transformed into normal distributed variables. Therefore, the WG can work on normally distributed variables, which greatly facilitates the treatment of random numbers in the WG.

Monte-Carlo and auto-regression are used to generate the realization; EOFs are employed for preserving spatial relationships and the relationships between different meteorological variables.

We have established a complete model named WGQM (weather generator and quantile mapping), which can be applied flexibly to generate daily or hourly time series. For example, with 30-year daily (hourly) data and 100-year monthly (daily) data as input, the 100-year daily (hourly) data would be relatively reasonably produced. Some evaluation experiments with WGQM have been carried out in the area of Austria and the evaluation results will be presented.