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Assessing the performance of Bartlett-Lewis model on the simulation of Athens rainfall

Panagiotis Kossieris, Andreas Efstratiadis, Ioannis Tsoukalas, and Demetris Koutsoyiannis

National Technical University of Athens, School of Civil Engineering, Department of Water Resources and Environmental Engineering, Heroon Polytechneiou 5, GR-157 80, Zographou, Greece

Many hydrological applications require the use of long rainfall data across a wide range of fine time scales. To meet this necessity, stochastic approaches are usually employed for the generation of large number of rainfall events, following a Monte Carlo approach. In this framework, Bartlett-Lewis model (BL) is a key representative from the family of Poisson-cluster stochastic processes. Here, we examine the performance of three different versions of BL model, with number of parameters varying from 5 up to 7, in representing the characteristics of convective and frontal rainfall of Athens (Greece). Apart from the typical statistical characteristics that are explicitly preserved by the stochastic model (mean, variance, lag-1 autocorrelation, probability dry), we also attempt to preserve the statistical distribution of annual rainfall maxima, as well as two important temporal properties of the observed storm events, i.e. the duration of storms and the time distance between subsequent events. This task is not straightforward, given that these characteristics are not described in the theoretical equations of the model, but they should be empirically evaluated on the basis of synthetic data. The analysis is conducted on monthly basis and for multiple time scales, i.e. from hourly to daily. Further to that, we focus on the formulation of the calibration problem, by assessing the performance of the BL model against issues such as choice of statistics to preserve, time scales, distance metrics, etc.