



## **Evaluating Bartlett-Lewis models for stochastic downscaling of regional climate model precipitation**

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Regional climate models (RCMs) provide daily precipitation data. However, for many hydrological applications, this time scale is too coarse, as data at hourly or sub-hourly scale are required. Although several statistical downscaling techniques exist, we investigate whether Bartlett-Lewis rectangular pulses models could be used for generating time series of precipitation at 10-minute or hourly resolution based on precipitation statistics calculated from (RCM-modelled) daily precipitation. To assess this hypothesis, the 105-year 10-minute time series of precipitation observed at Uccle (Belgium), is used as test case. First, it is shown that the Bartlett-Lewis models maintain the temporal scaling behaviour of different moments (mean, variance, auto-covariance) and zero depth probabilities. Then, Bartlett-Lewis models are calibrated using statistics at aggregation levels of one, two and three days, in order to model precipitation time series at a 10-minute resolution. Statistics including moments and extreme values, calculated at subdaily levels (10 min., 1 hour, ...) , are then compared to those of the original time series. It is found that the Bartlett-Lewis models permit to model precipitation time series at (sub-)hourly levels given daily statistics and therefore allow for a stochastic downscaling regional climate model precipitation predictions.