A seasonal Bartlett-Lewis Rectangular Pulse model

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Precipitation time series with a high temporal resolution are needed as input for several hydrological applications, e.g. river runoff or sewer system models. As adequate observational data sets are often not available, simulated precipitation series come to use. Poisson-cluster models are commonly applied to generate these series. It has been shown that this class of stochastic precipitation models is able to well reproduce important characteristics of observed rainfall. For the gauge based case study presented here, the Bartlett-Lewis rectangular pulse model (BLRPM) has been chosen.

As it has been shown that certain model parameters vary with season in a midlatitude moderate climate due to different rainfall mechanisms dominating in winter and summer, model parameters are typically estimated separately for individual seasons or individual months. Here, we suggest a simultaneous parameter estimation for the whole year under the assumption that seasonal variation of parameters can be described with harmonic functions. We use an observational precipitation series from Berlin with a high temporal resolution to exemplify the approach. We estimate BLRPM parameters with and without this seasonal extention and compare the results in terms of model performance and robustness of the estimation.