HyetosR: An R package for temporal stochastic simulation of rainfall at fine time scales

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A complete software package for the temporal stochastic simulation of rainfall process at fine time scales is developed in the R programming environment. This includes several functions for sequential simulation or disaggregation. Specifically, it uses the Bartlett-Lewis rectangular pulses rainfall model for rainfall generation and proven disaggregation techniques which adjust the finer scale (hourly) values in order to obtain the required coarser scale (daily) value, without affecting the stochastic structure implied by the model. Additionally, a repetition scheme is incorporated in order to improve the Bartlett-Lewis model performance without significant increase of computational time. Finally, the package includes an enhanced version of the evolutionary annealing-simplex optimization method for the estimation of Bartlett-Lewis parameters. Multiple calibration criteria are introduced, in order to reproduce the statistical characteristics of rainfall at various time scales. This upgraded version of the original HYETOS program (Koutsoyiannis, D., and Onof C., A computer program for temporal stochastic disaggregation using adjusting procedures, European Geophysical Society, 2000) operates on several modes and combinations thereof (depending on data availability), with many options and graphical capabilities. The package, under the name HyetosR, is available free in the CRAN package repository.