Spatiotemporal reconstruction of precipitation fields using the effective distribution methodology with compound Poisson gamma marginals

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Abstract

Modeling daily precipitation remains a challenge due to the intermittent, non-Gaussian, and spatially dependent structure of the process. We propose a novel stochastic spatio-temporal precipitation generator which uses the compound Poisson gamma distribution (CPG) to handle simultaneously the intermittency and non-Gaussianity of daily precipitation combined with the effective distribution method (EDM) to model spatial dependence. We present an estimation approach for the model parameters from daily precipitation time series at a number of sampling locations. In addition, we employ EDM with computationally efficient simulation algorithms that account for intermittency and correlations at neighboring sites, in order to generate realistic precipitation fields. The performance of the proposed CPG-EDM method is assessed by fitting the model to reanalysis datas

Keywords: space, time models, Poisson, gamma marginals, effective distribution method

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