



Daily rainfall simulation at multiple sites by bivariate copula-based mixed distributions

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This study describes a simple and parsimonious multisite first-order Markov model deduced from bivariate copula-based mixed distributions useful for modeling and generating daily rainfall series. The structure of the model involves only joint probabilities of wet/dry condition, a copula, the distribution of positive rainfall values, and a spatial cross-correlation matrix. The copula approach allows building a discrete-continuous conditional distribution able to simulate time-dependent sequences mimicking at-site rainfall series, which preserve temporal intermittency and several other properties such as wet spell length, daily rainfall amount, rainfall accumulated on wet spells, and first steps of the autocorrelation function. The spatial dependence and intermittence is accounted for by simulating temporally independent but spatially correlated standard uniform random sequences. The performances of the model are assessed by comparing summary statistics of observed rainfall time series and Monte Carlo simulations.