

# Modeling rainfall data by copula-based mixed distributions

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**Abstract:** This memory describes a simple Markov model deduced from a bivariate copula-based mixed distribution useful for modeling and simulating daily rainfall series. Exploiting copula properties, suitable marginal distributions and temporal dependence structures of pairs  $(X_{t-1}, X_t)$  can be assumed without resorting to Gaussian hypotheses (unrealistic for heavy tailed rainfall data). The structure of the model (involving only transition probabilities, a copula and distribution of positive rainfall values) allows preserving intermittency and the main properties of hydrological interest, such as distribution of event volumes, event durations, and length of dry periods. The performance of the model is illustrated comparing several characteristics of observed rainfall series with Monte Carlo simulations. Preliminary results show that the approach appears to be a viable tool to simulate daily rainfall sequences in a rather easy way.

**Keywords:** 2-copula; bivariate mixed model; rainfall; zero-inflated data.