



## **Dryland ecosystems: The coupled stochastic dynamics of soil water and vegetation and the role of rainfall seasonality**

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In drylands the soil water availability is a key factor ruling the architecture of the ecosystem. The soil water reflects the exchanges of water among soil, vegetation, and atmosphere. Here, a dryland ecosystem is investigated through the analysis of the local interactions between soil water and vegetation forced by rainfall having seasonal and stochastic occurrence. The evolution of dryland ecosystems is represented by a system of two differential equations, having two steady states, one vegetated and the other unvegetated. The rainfall forcing is described by a diffusion process with monthly parameters. In each of the two possible steady states, the probability density functions of soil water and vegetation are derived analytically in terms of the rainfall distribution. The results show how the seasonality of rainfall influences the oscillation of the ecosystem between its vegetated steady state during the wet season and its unvegetated steady state during the dry season.