



## **Use of a stochastic approach for description of water balance and runoff production dynamics**

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The present study exploits an analytical model (*Manfreda, NHSS [2008]*) for the description of the probability density function of soil water balance and runoff generation over a set of river basins belonging to Southern Italy. The model is based on a stochastic differential equation where the rainfall forcing is interpreted as an additive noise in the soil water balance; the watershed heterogeneity is described exploiting the conceptual lumped watershed Xinanjiang model (widely used in China) that uses a parabolic curve for the distribution of the soil water storage capacity (*Zhao et al. [1980]*). The model, characterized by parameters that depend on soil, vegetation and basin morphology, allowed to derive the probability density function of the relative saturation and the surface runoff of a basin accounting for the spatial heterogeneity in soil water storage. Its application on some river basins belonging to regions of Southern Italy, gives interesting insights for the investigation of the role played by the dynamical interaction between climate, soil, and vegetation in soil moisture and runoff production dynamics.

Manfreda, S., Runoff Generation Dynamics within a Humid River Basin, *Natural Hazard and Earth System Sciences*, 8, 1349-1357, 2008.

Zhao, R. -J., Zhang, Y. L., and Fang, L. R.: The Xinanjiang model, *Hydrological Forecasting Proceedings Oxford Symposium*, IAHS Pub. 129, 351-356, 1980.