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On the dynamical-stochastic dualism of rainfall intermittency

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Intermittency and its non-universal signature in rainfall scaling functions still impose limitations on the modeling of precipitation across different temporal and spatial scales. Whether rainfall intermittency can be considered (and modeled) as a dynamical phenomenon connected with the precipitation generation mechanism or a predominantly stochastic process remains in fact an open question.

Fat-tail probability distributions and red-noise spectra were found characterizing the rainfall process over a wide range of scales and climatic regimes – in analogy with some classical non-linear systems displaying "dynamical" intermittency. However, stochastic processes with infinite degrees of freedom can likewise generate signals with alternating persistent laminar periods and highly bursting phases.

This talk explores the dynamical-stochastic dichotomy of precipitation, by presenting some recent advancement in the description of temporal rainfall intermittency. We focus on the connection between intermittency and the rainfall generation process, as well as the dependence of intermittency statistics on different climatic regimes, with particular emphasis on arid and semi-arid climates, where intermittency and convection are the main hallmark of the rainfall regime.