Geophysical Research Abstracts
Vol. 19, EGU2017-3272, 2017
EGU General Assembly 2017

Scaling and distributional properties of precipitation inter-amount times

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Scaling and distributional properties of precipitation inter-amount times are investigated for a large number of rain gauges across the United States. Results show that at large scales, IATs are approximately independent and Gaussian. As we move toward smaller scales, autocorrelation and skewness increase and distributions progressively evolve into Weibull, Gamma, log-Normal and Pareto. This procession toward power-laws and fractals is viewed as the typical signature of increasing complexity in a system composed of many interacting components. Perhaps one of the most important advantages of IATs however, is the fact that they can never be zero, no matter how small the scale. This property leads to improved scaling and smaller departures from multifractality than in the classical framework where zeros can be very common. In particular, scaling is shown to be more resilient to dry periods and intra-event intermittency, making IATs a more robust choice in downscaling applications than intensities and amounts. These facts together with other statistical and physical considerations about rainfall extremes highlight the large potential of IATs as a new and powerful tool for the stochastic modeling, simulation and downscaling of precipitation.