



Extreme rainfall distribution tails: Exponential, subexponential or hyperexponential?

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The upper tail of a probability distribution controls the behavior of both the magnitude and the frequency of extreme events. In general, based on their tail behavior, probability distributions can be categorized into two families (with reference to the exponential distribution): subexponential and hyperexponential. The latter corresponds to milder and less frequent extremes. In order to evaluate the behavior of rainfall extremes, we examine data from 3 477 stations from all over the world with sample size over 100 years. We apply the Mean Excess Function (MEF) which is a common graphical method that results in a zero slope line when applied to exponentially distributed data and in a positive slope in the case of subexponential distributions. To implement the method, we constructed confidence intervals for the slope of the Exponential distribution as functions of the sample size. The validation of the method using Monte Carlo techniques reveals that it performs well especially for large samples. The analysis shows that subexponential distributions are generally in better agreement with rainfall extremes compared to the commonly used exponential ones.