



## **The long-term correlation properties of precipitation**

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A number of studies have shown the instrumental observation of rainfall process acts as white noise, which means an uncorrelated random process. However, observation facts indicate extreme precipitation always occur in clusters which reflects the long-term correlation exists in the precipitation variable. The existence of long-term memory for precipitation is strongly doubted. Here we find the reason why previous studies have underestimated the correlation results and present some new results using multiple analysis methods to quantify the correlation properties of rainfall time series. The analysis methods include detrended fluctuation analysis and probability density function of return intervals. More complete precipitation series are analyzed, which range from 45 to 130 years for geographically and meteorologically distinct regions. Results show the long-term correlation in precipitation can be detected in all of the stations analyzed. We also focus on the variable of return intervals between extreme rainfall. The statistics of return intervals provide us a new look on extreme rainfall occurrence and a better understanding on the cause of catastrophe like floods.