

## **Spatial Characteristics of Extreme Rainfall over China with Hourly through 24-Hour Accumulation Periods Based on National-Level Hourly Rain Gauge Data**

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Hourly rainfall measurements of 1919 national-level meteorological stations from 1981 through 2012 are used to document, for the first time, the climatology of extreme rainfall in hourly through 24-h accumulation periods in China. Rainfall amounts for 3-, 6-, 12- and 24-h periods at each station are constructed through running accumulation from hourly rainfall data that have been screened by proper quality control procedures. For each station and for each accumulation period, the historical maximum is found, and the corresponding 50-year return values are estimated using generalized extreme value theory. Based on the percentiles of the two types of extreme rainfall values among all the stations, standard thresholds separating Grade I, Grade II and Grade III extreme rainfall are established, which roughly correspond to the 70th and 90th percentiles for each of the accumulation periods. The spatial characteristics of the two types of extreme rainfall are then examined for different accumulation periods. The spatial distributions of extreme rainfall in hourly through 6-h periods are more similar than those of 12- and 24-h periods. Grade III rainfall is mostly found over South China, the western Sichuan Basin, along the southern and eastern coastlines, and in the large river basins and plains. There are similar numbers of stations with Grade III extreme hourly rainfall north and south of 30°N, but the percentage increases to about 70% south of 30°N as the accumulation period increases to 24 hours, reflecting richer moisture and more prolonged rain events in southern China. Potential applications of the extreme rainfall climatology and classification standards are suggested at the end.