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Trends of extreme rainfall in a typical dry-hot valley watershed in Yunnan, China

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Extreme rainfall events have important implications on human society, thus the long-term changes of rainfall and extremes events are of concern, especially for the ecological vulnerable dry-hot valley in China, besides, this concern may be more intensified considering that there are many reservoirs and dams in this region, which may increase the risk under extreme rainfall conditions. The trends of long-term rainfall events have been widely studied worldwide and many valuable results have been reported, however, the relative low intensity of rainfall stations across a large region in many studies may bring uncertainty for the report trend, specially, rainfall stations were usually located in the relative flat area for regions with complex terrain, which may reduce the representativeness for the entire region. In this study, a typical dry-hot valley watershed in the Hengduan Mountains in Yunnan, China, was selected to study the long-term trend of extreme rainfall, the area of Longchuanjiang watershed was about 9251 km2 and Longchuanjiang was a tributary of Yangtze River. Daily rainfall data was measured at 31 rainfall stations from 1950s to present and the elevation of rainfall stations ranged from 900 to 2480 m. Extreme rainfall indices such as daily precipitation >95th percentile (R95), daily precipitation >99th percentile (R99), Annual total precipitation with daily precipitation 95th percentile (R95p), Annual total precipitation with daily precipitation 99th percentile (R99p), Consecutive wet days(CWD), Consecutive dry days (CDD), Maximum 1-day precipitation (RX1 day), Maximum 5-day precipitation (RX5 day), Number of days with daily precipitation >95th percentile or 99th percentile (R95D or R99D) were estimated for each rainfall station and spatial interpolated to the watershed. The results indicated that the linear relationship between the elevation with annual rainfall day was significant, the temporal trends for the watershed was also analyzed and the spatial differences were reported. Understanding the changes of precipitation extremes in the Longchuanjiang watershed, will definitely benefit to the soil and water resource management, optimize the reservoir operation and reduce the risk of natural hazard.