

Variations of Daily Precipitation Extremes over Xinjiang Province, China

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Based on observational daily rainfall data from China meteorological data service center from 1963 to 2017, the temporal and spatial variations of daily precipitation extremes (DPE) over Xinjiang province (the west part of northwest arid zone of China) were investigated. In this work, the statistical characteristics, the concentration degree (CD) and concentration period (CP), along with the persistence and regionality of DPE were discussed for understanding the change features of DPE from different aspects. During recent 55 years, the precipitation in Xinjiang province is becoming more extreme, which is reflected in the significant decrease of low-intensity rainfall but the significant increase of DPE. Both the frequency and intensity of DPE show positive trends at most sites in Xinjiang province, and the increase in DPE frequency is more significant than the increase in DPE intensity. The characteristics of DPE CD and CP in different regions of Xinjiang province vary a lot. The annual DPE CD values of stations over Southern Xinjiang is very large because of the annual occurrences of DPE is very few, which in most years the DPE occurs less than 2 days, therefore the DPE concentration in these stations is high. While the conditions differ in stations over Northern Xinjiang, the average annual DPE of these sites usually more than 3 days, and the annual DPE CD values is relatively low, indicate the occurrence time of DPE is more dispersed in Northern Xinjiang. The annual DPE CP values reflect that DPE occurs most intensively in boreal summer, both in Northern Xinjiang and Southern Xinjiang, but in stations over Northern Xinjiang, there exists a certain number of years that DPE occurs more frequently in spring or autumn, indicate a relatively long season of DPE occurrence. Results of trend analysis show that accompanying with the notable increasing of DPE frequency, this relatively dispersed occurrence time and longer occurrence season over Northern Xinjiang is intensified in the past few decades. Few indices are also calculated for investigate the persistence and regionality of DPE at each station in Xinjiang province, although there are some disparities in different regions, the DPE duration and regionality in Xinjiang stations is generally poor. These results are help for our better understanding the features and changes of climate extremes over arid region under a warming background.

Keywords: Daily precipitation extremes, Concentration degree , Concentration period