



Temporal and spatial variation of extreme precipitation indices in the Xiangjiang Basin, China and their possible causes during 1961-2005

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Abstract: The deep understanding of temporal and spatial variation and their possible causes of extreme precipitation indices in a river basin and/or a geographic region is of great significance for flood prevention and disaster reduction. It is this connection which motivates the present study. Xiangjiang River basin, one of the most important economic belts in Hunan Province, China and the primary inflow basin of Dongting Lake - China's second largest freshwater lake, is selected as the study region in this paper. Recently, Xiangjiang basin is always in a severe situation for flood control in summer and for drought in winter, which causes great negative influences on the development of economy in Hunan province. It is urgent and necessary to study the temporal and spatial variation of extreme precipitation indices in the basin and explore their possible causes. In this study, regional characteristics of precipitation indices including magnitude, intensity and persistence were analyzed from a daily rainfall dataset containing 60 stations during the period of 1961-2005 in the Xiangjiang basin. The indices used in this study are as following: greatest 5-day total rainfall per year, percent of total rainfall from events > long-term 90th percentile, 95th percentile of rain day amounts, mean dry-day persistence, simple daily intensity (rain per rain day ≥ 1 mm), number of events > long-term 90th percentile, max number consecutive dry days, number of days precipitation ≥ 10 mm and mean dry spell lengths. The Mann-Kendall trend test was used to analyze the trends of the extreme precipitation indices for all stations in the basin. The spatial distribution of temporal trend of the selected indices were regionally mapped and analyzed in different seasons in the basin. In order to ascertain the potential causes of the spatial and temporal variations of precipitation in the basin, the relationship between the extreme precipitation variability and associated atmospheric moisture transport and moisture divergence based on the NCEP/NCAR reanalysis data was analyzed. The results are helpful to better understand and solve the severe situation of flood and drought in Xiangjiang basin.

Key Words: Climate Change; Extreme precipitation indices; Temporal and spatial distribution; Xiangjiang basin, China