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1960-2019年长江流域极端降水变化及其与全球变暖、ENSO和局部影响的关系



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Extreme precipitation events can pose great risks to natural ecosystems and human society. Investigating past changes in the frequency, intensity, and duration of such events and understanding the possible driving factors are critical for reliable projections of future changes and for informing adaptation strategies planning. Here we analyze trends in a complete list of extreme precipitation indices (EPIs) over the Yangtze River Basin (YRB) during the period of 1960-2019. Also, we examine the possible influences of global warming, ENSO, and local effects on the spatiotemporal variability of the EPIs. Our results show that average and extreme precipitation intensities, and the frequency of extreme heavy precipitation in the YRB have significantly increased, while precipitation frequency and maximum duration of wet spells have significantly decreased. A regional difference in trend occurrence and magnitude is also observed, showing the intensity and frequency of precipitation extremes over the Middle and Lower reaches are more likely to increase and increase faster, compared with

those of the Upper reach of the YRB. Furthermore, our correlation analysis shows global warming, ENSO, and local effects all are significant driving factors that control the spatiotemporal variability of precipitation extremes over the YRB. Global warming tends to enhance the frequency and intensity of precipitation extremes. The La Nina phase of ENSO often corresponds to an increase of frequency and intensity of precipitation extremes in the current year, but a decrease of frequency and intensity in the coming year. Local warming mainly exerts a reducing effect on precipitation extremes, which is likely a response to the significant decrease of relative humidity in the YRB. Our findings highlight the need for a systematic approach to examine global, regional, and local drivers of trends in precipitation extremes in the YRB, and contribute to the understanding of precipitation changes in this region.

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