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A Global Assessment of Non-Stationarity in Extreme Precipitation

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Rapid urban development, along with human modifications in river discharge (both frequency and magnitude) increase the need to design safe and resilient infrastructure. In addition, continental-domain studies show that there are significant changes in the intensity and frequency of the extreme rainfall events. Importantly, Earth System Models predict that these changes will continue to grow in the future. Consequently, flood frequency from heavy precipitation events is expected to increase, thereby threatening human society and the environment. Therefore, the stationary climate assumption — the idea that the future variability of the system will remain within the limits observed in the past record — may not be valid and should be carefully examined. Despite the existing awareness of potential non-stationarity, there has been a limited research on analysis of non-stationary of extreme precipitation at the global scale. This motivated us to conduct a comprehensive global study to compare the performance of non-stationary and stationary models in describing precipitation extremes.