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Dependence of heavy rain and storm tide during Typhoons in a coastal area of China

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For coastal areas, flooding can be caused by heavy rains directly or high storm tide over the sea embankment or flow backward due to high storm tide. Therefore, the dependence of rainfall and tide level would be critical to determine the flooding risk and severity. Typhoon is a devastating weather system and often accompanies by heavy rainfall and high storm tide. So in this study, the dependence of rainfall and tide level during Typhoons is discussed. First, the trend of Typhoons in a coastal area is detected. Then we quantify the correlation characteristics between rainfall and tide level with Kendall's τ approach. Also we estimate the tail correlation coefficient and joint probability of rainfall and tide level with a bivariate copula-based probability distribution model. Finally trends in the dependence are detected by Mann-Kendall test. The results indicate that the occurrence probability of rainfall and storm tide significantly increases during Typhoons. The results may provide a scientific base for flood risk assessment and management in the coastal area.