

# Classification of 3h extreme precipitation spatial patterns and their influencing factors in Guangdong Province, China

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## Abstract

Extreme precipitation events (EPEs) on a sub-daily scale are an important factor in triggering urban flooding and flash flooding. However, corresponding studies on the spatial patterns of sub-daily extreme precipitation in Guangdong Province are lacking. We objectively classified the spatial patterns of extreme precipitation (EPSPs) in Guangdong Province, calculated the importance of influencing factors on EPSPs, and finally analyzed the weather background corresponding to various EPSPs and explained the causes of extreme precipitation. We have found that the incidence of most EPSPs has tended to increase significantly over this 40-year period, and the increase has been particularly pronounced since the 21st century. The Pacific Decade Oscillation (PDO) was the main influence on EPEs in Yangjiang, Maoming and Shanwei, and the weakening of PDO has contributed to the occurrence of EPEs in these areas. Urbanization is the main factor contributing to the increase in EPEs in the PRD, Zhanjiang and coastal areas of Guangdong Province. The cause of the EPSP in central Guangdong Province was the southwest jet stream and topographic uplift. The extreme precipitation in Yangjiang, the PRD, Maoming and Shanwei was mainly triggered by the convergent shear of the southwesterly winds. The cause of the EPSP over Zhanjiang was the low vortex in western Guangdong and the influx of large amounts of water vapour over land from the south over the ocean.

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