Typical Synoptic Weather Patterns Responsible for Summer regional Hourly Extreme Precipitation Events over the Lower Yangtze River Basin, China

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Hourly gauge rainfall measurements and ERA5 reanalysis for the period 1980-2020 are used to identify typical synoptic weather patterns responsible for summer regional hourly extreme precipitation events over the lower Yangtze River basin. It turns out that the Meiyu front or cyclonic shear imbedded in the East Asian summer monsoon (EASM) and landfalling typhoons are the leading contributors. As the dominant synoptic pattern, the EASM accounts for ~93% occurrence of regional hourly rainfall extremes. The double peak diurnal occurrence (morning and late afternoon) of rainfall extremes corresponds to the Meiyu front and cyclonic shear driven by a strengthened and westward extended western North Pacific subtropical high and accelerated low-level southwesterly flow. During 1980-2020, there was a clear increasing trend in the occurrence of regional hourly rainfall extremes over the region. These findings are beneficial to the prediction and risk assessment of extreme rainfall events over the specific region.