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Asian Monsoon Years (2007-2012) extremity of the extreme rainfall events observed in Taiwan

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The extremity of the extreme rainfall events observed in Taiwan is evaluated using sixty years (1951-2010) of hourly rainfall data collected at twenty-five weather stations. Five extremity categories are defined based on the return period of the rainfall event estimated from the simulated Generalized Pareto Distribution. Eight types of rainfall events separated by their durations of 1, 2, 3, 6, 12, 24, 48, and 72 hours are analyzed. Typhoon is the most influential factor of the extreme rainfall events in Taiwan, in particular the events with duration longer than 12 hours. Typhoon Morakot in 2009 was identified as the most extreme typhoon since 1951, in terms of the fact that it caused the 200-year extremes of 48- and 72-hour accumulated rain at one third of the 21 stations of study. Clear increase of the frequency of extreme events and typhoons was observed after mid-1990s, but for extreme rainfall events the increase is more evident for long duration events than short ones. The long-term variations are interpreted as a result of changing strength of the westward extension of the western Pacific subtropical anticyclone that has direct influence on the weather systems over the Philippine Sea and South China Sea. The complex terrain effect can significantly modify the large-scale influence and result in distinct contrast in the local climate responses.