



Global intensification in observed short-duration rainfall extremes

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Extreme rainfall events are expected to intensify with a warming climate and this is currently driving extensive research. While daily rainfall extremes are widely thought to have increased globally in recent decades, changes in rainfall extremes on shorter timescales, often associated with flash flooding, have not been documented at global scale due to surface observational limitations and the lack of a global sub-daily rainfall database. The access to and use of such data remains a challenge. For the first time, we have synthesized across multiple data sources providing gauge-based sub-daily rainfall observations across the globe over the last 6 decades. Because of the physical connection between global warming and the moisture budget, we sought to infer long-term changes in sub-daily rainfall extremes contingent on global mean temperature. Whereas the potential influence of global warming is uncertain at regional scales, where natural variability dominates, aggregating surface stations across parts of the world may increase the global warming-induced signal. Changes in terms of annual maximum rainfall across various resolutions ranging from 1-h to 24-h are presented and discussed.