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Trends in Extreme Rainfall Events in Tasmania, Australia

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Abstract : Climate change will affect various aspects of hydrological cycle such as rainfall. A change in rainfall will affect flood magnitude and frequency in future which will affect the design and operation of hydraulic structures. In this paper, trends in sub-hourly, sub-daily, and daily extreme rainfall events from 18 rainfall stations located in Tasmania, Australia are examined. Two non-parametric tests (Mann-Kendall and Spearman's Rho) are applied to detect trends at 10%, 5%, and 1% significance levels. Sub-hourly (6, 12, 18, and 30 minutes) annual maximum rainfall events have been found to experience statistically significant upward trends at 10 % level of significance. However, sub-daily durations (1 hour, 3 and 12 hours) exhibit decreasing trends and no trends exists for longer duration rainfall events (e.g. 24 and 72 hours). Some of the durations (e.g. 6 minutes and 6 hours) show similar results (with upward trends) for both the tests. For 12, 18, 60 minutes and 3 hours durations both the tests show similar downward trends. This finding has important implication for Tasmania in the design of urban infrastructure where shorter duration rainfall events are more relevant for smaller urban catchments such as parking lots, roof catchments and smaller sub-divisions.

Keywords : climate change, design rainfall, Mann-Kendall test, trends, Spearman's Rho, Tasmania
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