

## A new light on the long-term trends of extreme rainfall characteristics over Central India

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This study examines rainfall characteristics over central India, particularly, extreme rainfall events (EE). We focus on the spatial scale of the EE, which indicates spatial extent of different rainfall systems during summer monsoon season. A flood-fill algorithm is applied on Indian Meteorological Department gridded daily rainfall dataset, which finds the different connected EE rainfall patterns. Using this algorithm, different spatial scale rainfall patterns are categorized into three types sporadic, intermediate and massive systems based on their spatial extent. We found that sporadic EEs occur more frequently and contributes more than 80% to EE rainfall. Moreover, these sporadic EEs are different in size as well as in total rainfall amount and intensity as compared to Intermediate and massive systems. In the long term trend (1901-2018), only sporadic systems are increasing whereas Intermediate and massive have negative and no trend respectively. However, massive systems are increasing more rapidly in recent decades. Therefore, systems based analysis as well as decadal variation has been focused to provide a deep understanding on the variation of characteristics of EE in long term as well as in recent era based on their spatial scale. These different scale systems are linked with different mesoscale and synoptic level convective systems which might have got changed in recent few decades. This kind of understanding of EE is highly useful from the point of disaster identification and management.

Keywords: Extreme Rainfall Events, Flood-Fill Algorithm, Spatial scale, Sporadic Systems