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Spatio-temporal characteristics of floods in the largest basin of the Indian Peninsula

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The intensification of the hydrological cycle is a consequence of the rising global temperatures caused by global warming. This has worsened extreme hydrological occurrences, including floods. Flooding is a substantial global hazard that endangers human livelihoods, infrastructure, and economies. Furthermore, the combination of rising temperatures and human activities has significantly modified the flood patterns that have been documented worldwide by several scientists. More precisely, a substantial area of the Indian sub-continent is greatly impacted by regular instances of flooding. Previous studies have indicated an increase in both the magnitude and frequency of flood events in the Indian river basins during the past several decades. The Godavari River Basin (GRB), which is the biggest peninsular basin in India with an area of 312,812 square kilometers, has been prone to frequent and devastating flood events in recent decades. Nevertheless, the comprehensive flood attributes, such as the maximum intensity, total amount, and length, in the GRB remain unidentified. Hence, in this study, we have employed the peak-over-threshold and Master Recession Curve (MRC) techniques to evaluate the flood features in the GRB. We have utilized the daily recorded water flow information obtained from the Central Water Commission (CWC) from 21 gauging stations in the Godavari River Basin (GRB). The 21 gauging stations are categorized into four main geographical zones. The results of our research indicate that there are notable differences in the regional flood characteristics of the GRB in terms of both spatial and temporal scales. The majority of stations in the GRB exhibit substantial fluctuations in flood characteristics after 1995. More precisely, the western GRB exhibits a notable decrease in the amount, length, and intensity of floods after 1995. The data suggest that human actions have a significant role in the flood generation process in the western GRB area. The conclusions derived from this research will be valuable to policymakers and many stakeholders in their efforts to reduce flooding and promote equitable growth in the GRB.