

On space-time extreme simulations of rainfall in Mediterranean France

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Abstract: Mediterranean France is a region marked by heavy precipitation that can lead to not only material damage but also an important number of fatalities. Therefore, a better understanding of the consequences of the temporal and spatial variability of rainfall patterns on impact models is needed. To this end, the construction of stochastic simulation methods of scenarios incorporating realistic spatio-temporal extreme fields is crucial. In this work, we develop a semiparametric method to simulate space-time scenarios for extreme rainfall. A key benefit of the proposed method is to allow the generation of an unlimited number of realizations of these extreme fields. Our simulation framework utilizes the asymptotic theory on generalized Pareto processes, which arise as natural limits for extreme episodes. Such episodes are identified by the exceedance over a high threshold of a summary value defined for precipitation observed over a space-time window. The method is applied to a gridded hourly rainfall dataset in a region in Mediterranean France.