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Conditional simulations for fields of extreme precipitation

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Many environmental models, such as hydrological models, require input data, e.g. precipitation values, correctly simulated and distributed, even at locations where no observation is available. This is particularly true for extreme events that may be of high importance for impact studies.

The last decade has seen max-stable processes emerge as a powerful tool for the statistical modeling of spatial extremes. Recently, such processes have been used in climate context to perform simulations at ungauged sites based on empirical distributions of a spatial field conditioned by observed values in some locations. In this work conditional simulations of extremal t process are investigated, taking benefits of its spectral construction.

The methodology of conditional simulations proposed by *Dombry et al. [2013]* for Brown-Resnick and Schlather models is adapted for the extremal t process with some improvements which enlarge the possible number of conditional points. A simulation study enables to highlight the role of the different parameters of the model and to emphasize the importance of the steps of the algorithm.

In this work, we focus on the French Mediterranean basin, which is a key spot of occurrences of meteorological extremes such as heavy precipitation. Indeed, major extreme precipitation are regularly observed in this region near the “cévenol" mountains. The modeling and the understanding of these extreme precipitation – the so-called “cévenol events" – are of major importance for hydrological studies in this complex terrain since they often trigger major floods in this region. The application of our methodology on real data in this region shows that the model and the algorithm perform well provided the stationary assumptions are fulfilled.