A methodology to describe spatial dependencies of extremes

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Extreme rainfall events are of particular importance due to their severe impact on the economy, the environment and the society. The ongoing global climate change stimulates growing demand for new measurement techniques and analysis methods of the precipitation processes. The degree of association between concurrent rainfall extremes at different locations can be examined using the concept of tail dependence coefficient. Accurate knowledge of the spatial characteristics of extremes can help improve the existing models of the occurrence probability of extreme storms. In this paper, a non-parametric approach is introduced for tail dependence analysis. Several satellite-based precipitation estimates including GPCP, TMPA and PERSIANN are used in case studies. The introduced methodology is compared extensively with other nonparametric tail dependence estimators and copula-based parametric approaches. The results indicate that the presented method is superior to other alternatives in describing the dependence structure of extremes.