An analysis of ENSO impact on global extreme rainfall using a Bayesian regional model

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El Niño Southern Oscillation (ENSO) effects on rainfall and streamflow have been extensively reported in the Pacific region, but also in Europe and Africa. In this study, we apply a non-stationary regional extreme value model to a new global database of 11,588 high-quality sites worldwide to describe the global pattern of ENSO impact on extreme rainfall. The data are available at monthly intervals, and we focus on approximately 7000 observation sites which have series longer than 40 years. The Southern Oscillation Index (SOI), a measure of ENSO, is used as a covariate. Parameters are estimated with an MCMC method under the Bayesian framework, which allows quantifying the ENSO impact and estimating the associated credibility intervals. Three aspects are mainly considered in this study. One is to identify the regions where extreme rainfall is significantly influenced by ENSO. Another is to evaluate the extent to which ENSO exhibits asymmetric impacts between the El Niño and La Niña phases. The third aspect is to describe the spatial pattern of the impact intensity.