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Geostatistical Assessement of Spatial Patterns in Precipitation Extremes over Europe

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At a previous study the authors have shown that that the spatial continuity of extreme precipitation events has increased in the last 30 years in southern Portugal (Durão et al., Costa et al., 2008). It also demonstrates a decrease in spatial variability, which means that extreme precipitation events tend to be more spatially homogeneous, which may have a severe impact on water resources, agriculture and soil erosion, particularly when associated with desertification risks.
The main objective of this present work is to apply the same analysis to the ECA precipitation data set (http://eca.knmi.nl/) in order to validate this method over Europe and Mediterranean countries. We intend to check if the Portuguese results are local or regional and/or if they there are other regions with similar patterns.
For this purpose two indices of extreme precipitation were selected: one representing the frequency of extremely heavy precipitation events (R30) and another one characterizing dry conditions events (RL10) – from daily precipitation observation series. The spatial-temporal dynamics of extreme precipitation events in southern Portugal will be evaluated by using a Direct Sequential Simulation algorithm (DSS models) in order to assess the relationships between spatial and temporal extreme rainfall patterns. Local probability density functions (pdfs) and spatial uncertainty are evaluated by a set of equiprobable simulated images of the chosen extreme precipitation indices.
The proposed methodology allows the study of other regions under environmental stress, such as drought and desertification, giving rise to a new approach that accounts for spatial patterns for characterizing and evaluating climate change effects.

Keywords: Precipitation Extremes, Spatial Patterns, Geostatistics, Europe