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## Clustering dependence structures of environmental extremes

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Identifying hidden spatial patterns that define sub-regions characterized by a similar behaviour is a central topic in statistical climatology. This task, often called regionalization in hydrology, is helpful for recognizing areas in which the variables under consideration have a similar stochastic distribution and thus, potentially, in reducing the dimensionality of the data. Many examples are available in this context, spanning from hydrology to weather and climate science. However, the majority of regionalization techniques focuses on the spatial clustering of a single variable of interest. Given the often severe impacts of climate extremes at the regional scale, here we develop an algorithm that identifies homogeneous spatial sub-regions that are characterized by a common bivariate dependence structure in the tails of a bivariate distribution. In particular, we use a novel nonparametric distance able to capture the similarities and differences in the tail behaviour of bivariate distributions as the core of our clustering procedure. We apply the approach to identify homogeneous regions with varying coherence in the co-occurrence of sea level pressure and precipitation extremes in Great Britain and Ireland.