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# Clustering analysis of air temperature time series over Europe: quantile regression approach

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Studies of the temporal evolution of temperature extremes often focus on the fitting of trends to pre-defined extreme indices or to data percentiles. From a methodological point of view it is preferable to characterise extreme values by means of extreme value theory. However, extreme value theory focus on the tails of the data distribution, while the trend approaches have the appealing feature of characterising moderate extremes, representing return periods of the order of some weeks (trends on more extreme values would be difficult to detect as they would be computed from fewer data). Quantile regression is somewhere in-between these two methodological strategies for the analysis of extreme values. As for the case of trends in percentiles and extreme indices, quantile regression does not address specifically the tails of the data distribution. And as extreme value theory, it is based on a solid theoretical foundation, providing a well defined statistical framework for estimating the rate of change not only in the mean, as ordinary regression, but in all parts of the data distribution. Quantile regression has the same intuitive aim as the computation of trends in percentiles but overcomes the sampling issue that plagues the fit of a trend to a subset of the data distribution which impacts the correct assessment of the significance of the derived slope.

Not only the temporal evolution but also the spatial distribution of extreme events is of scientific interest, particularly for regional studies. The regional variability of extreme temperatures is often analysed by taking each individual temperature time series and summarising the information for the region of interest in terms of maps of individual features. An alternative approach is to consider simultaneously the whole data set of temperature records from a given region, and characterize regional variability in terms of locations exhibiting similar behavior, through clustering techniques.

The aim of this talk is to describe regional extreme temperature variability over Europe by combining quantile regression and a time series clustering procedure in the analysis of European daily temperature records.