Comparison of floods non-stationarity detection methods: an Austrian case study

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Non-stationarities in flood regimes have a huge impact in any mid and long term flood management strategy. In particular the estimation of design floods is very sensitive to any kind of flood non-stationarity, as they should be linked to a return period, concept that can be ill defined in a non-stationary context. Therefore it is crucial when analyzing existent flood time series to detect and, where possible, attribute flood non-stationarities to changing hydroclimatic and land-use processes.

This works presents the preliminary results of applying different non-stationarity detection methods on annual peak discharges time series over more than 400 gauging stations in Austria, central Europe. The kind of non-stationarities analyzed include trends (linear and non-linear), breakpoints, clustering beyond stochastic randomness, and detection of flood rich/flood poor periods. Austria presents a large variety of landscapes, elevations and climates that allow us to interpret the spatial patterns obtained with the non-stationarity detection methods in terms of the dominant flood generation mechanisms.