



Optimization of circulation type classifications considering cyclone tracks in Central Europe

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In order to estimate regional extreme events (heavy precipitation and drought periods) in Central Europe under ongoing climate change, an evaluation of the relationship between atmospheric circulation types and regional precipitation takes place in the bi-national research project WETRAX+ (WEather Patterns, Cyclone TRACKs, and related precipitation EXtremes).

To determine regions with similar precipitation variability between 1961 and 2017, S-mode principal component analyses have been applied to monthly aggregated timeseries of 1750 weather stations from southern Central Europe. The precipitation variability of each region is represented by the ten stations with the highest correlation coefficients between timeseries of all stations belonging to one region and the corresponding principal component. Extreme precipitation events have been defined by the 90th percentile.

Large-scale atmospheric circulation types have been derived by using the COST733 classification software. Atmospheric variables (sea level pressure, geopotential height, relative/specific humidity, vertical velocity and relative vorticity) from gridded daily JRA 55 reanalysis data and the precipitation data resulting from the regionalization process were used for the classification. Cyclone Tracks based on the moving maximum of relative vorticity (provided by ZAMG - Zentralanstalt für Meteorologie und Geodynamik) were used as covariate. All input variables were specifically weighted in the classification process.

First results considering extreme precipitation show that for each region different combinations and weights of all input variables lead to the best performance.