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Interannual drought index variations in Central Europe related to large-scale atmospheric circulation types

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In this contribution it is analysed in how far interannual drought index variations in Central Europe during the period 1950 to 2010 are related to corresponding changes in large-scale atmospheric circulation characteristics.
To this end varying circulation type classifications are performed on the basis of 2.5° by 2.5° gridded daily 12 UTC sea level pressure (SLP) data from the NCEP/NCAR reanalysis 1 data archiv. Circulation type classifications comprise one method based on non-hierarchical k-means cluster analysis and one threshold based method. Both approaches have been applied for varying numbers of classes (circulation types) to spatial domains of varying size and location.
Monthly SPI (Standardized Precipitation Index) data for varying time periods (3, 6, 9 months) are taken from the respective gridded (0.5° by 0.5°) data set provided by the CliSAP-Integrated Climate Data Center (ICDC) at the University of Hamburg derived from daily precipitation data from the E-OBS gridded dataset Version 4.0.
The relationship between circulation types and gridded SPI has been quantified via stepwise multiple linear regression analyses using monthly circulation type frequencies from varying classifications as predictor data. The skill of the resulting regression models has been quantified via a leave one out cross validation procedure and the determination of several skill scores (e.g. squared pearson correlation, reduction of variance) from the observed and the modeled SPI series.
Results show considerable spatial and seasonal variability with respect to model skill in terms of explained variance (reaching from more than 80% during winter in more oceanic regions to less than 20% during summer in more continental regions) and as well concerning most important predictors (circulation types) or most appropriate classification settings (e.g. domain size, number of circulation types).
Despite the distinctly varying model-skill the obtained results document the potential usefulness of classification based approaches for downscaling of drought indices in Central Europe.