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Linking Teleconnection Patterns to European Temperature and Precipitation – a systematic evaluation

Henning Rust (1), Andy Richling (1), Uwe Ulbrich (1), and Peter Bissolli (2)

(1) Freie Universität Berlin, Institut für Meteorologie, Berlin, Germany (henning.rust@met.fu-berlin.de, +49 30 838 71128),
(2) Deutscher Wetterdienst (DWD), Offenbach, Germany

We systematically establish and quantify the link between 12 (mostly northern hemispheric) atmospheric teleconnection patterns (data from the NOAA Climate Prediction Center) and European temperature (E-OBS data) and precipitation (GPCC data) on a regular 0.5° grid. Links are investigated on annual, seasonal and monthly time scales for the period 1951-2010. A first exploratory analysis yields Pearson and Spearman correlation coefficients between the circulation indices and temperature/precipitation and is used to guide the selection of predictors, which are relevant for Europe. For these indices, we build a grid-point based multiple regression model, studying the linear temperature/precipitation response of each index as well as higher orders and interactions between indices and climate variables. The resulting regression coefficients are used to find signals of the teleconnection patterns in temperature/precipitation variability. With these signals we get information about the percentage of the absolute temperature/precipitation anomaly, which is expected to be attributed to an index anomaly.

First results indicate significant (positive and negative) correlations between the temperature in large parts of Europe and the teleconnection indices NAO, AO, EA, EAWR, SCAND and to a minor degree the POLEUR index. While the temperature is highly correlated especially with NAO, AO and partially SCAND during the winter months, the EAWR pattern has the strongest correlation during summer and autumn. For Precipitaton, the strongest relationships result for NAO and AO as well as SCAND index during winter months. EA and EAWR also show significant correlations over large regions in Europe, though with weaker amplitude.