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Nonstationary relationship between atmospheric teleconnection patterns and Weather types in NW Iberian Peninsula

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The teleconnection patterns play a major role in variability in our climate system in different time and spatial scales. Although the NAO explains a substantial portion of the low-frequency climate variability in Europe, it is also necessary to consider other teleconnection patterns such as the Scandinavian Index (SCA), the Eastern Atlantic (EA) or the Eastern Atlantic/Western Russia (EA-WR) indices. On the other hand, this relationship between teleconnection patterns and the climate in Europe cannot be considered stable since there are some studies which point out the non stationarity of this relationship, not only in surface temperature (Gimeno et al, 2003) but also in precipitation (Vicente-Serrano and López-Moreno, 2008).

The main objective of this work is to assess the influence of the inter-decadal variability in the position and intensity of the teleconnection patterns pressure centers affecting Europe on the local circulation regimes in Galicia (NW Iberian Peninsula).

An automated version of the Lamb weather type (WT) classification scheme (Jones et al 1993) using the NCEP/NCAR reanalysis data (from 1948 to 2005) was adapted for the Galicia area (Northwestern corner of the Iberian Peninsula) by Lorenzo et al (2008) in order to compute the daily local circulation regimes in the study area.

In order to identify the changes over time of the regional climate modes in the European domain (30N - 76N and 37W - 56E) we computed a moving-window Principal Component Analysis (PCA) (30-year period) between 1948-2005 which allow us to study changes not only in the spatial patterns over time but also in terms of position and intensity of the regional climate modes.

Results show an increase of explained variance of the NAO pattern in the last two decades and a displacement of the NAO centers to East. We also computed the correlation between the four leading principal component of the PCA analysis (moving window (30 years)) and the local WT circulation. In general, we prove that the value of these correlations varies strongly with the time, moving from non significant to statistically significant depending on the selected 30 year period.

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