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Predictability of rainfall and teleconnections patterns influencing on Southwest Europe from sea surfaces temperatures

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This work assesses the possibility of doing a forecast of rainfall and the main teleconnections patterns that influences climate in Southwest Europe by using sea surface temperature anomalies (SSTA). The area under study is located in the NW Iberian Peninsula. This region has a great oceanic influence on its climate and has an important dependency of the water resources. In this way if the different SST patterns are known, the different rainfall situations can be predicted. On the other hand, the teleconnection patterns, which have strong weight on rainfall, are influenced by the SSTA of different areas. In the light of this, the aim of this study is to explore the relationship between global SSTAs, rainfall and the main teleconnection patterns influencing on Europe.
The SST data with a 2.0 degree resolution was provided by the NOAA/OAR/ESRL PSD, Boulder, Colorado, USA. A monthly averaged data from 1 January 1951 through December 2006 was considered. The monthly precipitation data from 1951-2006 were obtained from the database CLIMA of the University of Santiago de Compostela with data from the Meteorological State Agency (AEMET) and the Regional Government of Galicia. The teleconnection indices were taken of the Climate Prediction Center of the NOAA between 1950 and 2006.
A monthly and seasonal study was analysed considering up to three months of delay in the first case and up to four seasons of delay in the second case. The Pearson product-moment correlation coefficient r was considered to quantify linear associations between SSTA and precipitation and/or SSTA and teleconnection indices. A test for field-significance was applied considering the properties of finiteness and interdependence of the spatial grid to avoid spurious correlations.
Analysing the results obtained with the global SSTA and the teleconnection indices, a great number of ocean regions with high correlations can be found. The spatial patterns show very high correlations with Indian Ocean waters which could be related with the Monsoon. Another area with high correlation is Equatorial Pacific Ocean, the area related with the ENSO phenomenon. These SSTAs could be used to forecast rainfall anomalies in spring season in the area of NW Iberian Peninsula. Results show that La Niña years almost always announces dry spring in NW Iberian Peninsula. Nevertheless, El Niño years do not preclude the appearance of wet spring. Because of the progress that has been made in its prediction, the relation between ENSO and climate in NW Iberian Peninsula is of interest with respect to potential seasonal predictability and the results can be extended to the south west of Europe.

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