Geophysical Research Abstracts
Vol. 14, EGU2012-5302, 2012
EGU General Assembly 2012

Trends in characteristics of daily rainfall in Northern Iberia: Is the NAO signal behind the observed variability?

E. Saez de Cámara, G. Gangoiti, L. Alonso, and J. Iza

(estibaliz.saezdecamara@ehu.es) University of the Basque Country (UPV/EHU), Escuela Técnica Superior de Ingeniería de Bilbao, Alameda de Urquijo s/n, E-48013 Bilbao, Spain

A trend analysis of intensity and frequency of daily precipitation over Northern Iberia (NIB), with a primary focus on extreme events, is presented. It is based on 14 NOAA-NCDC daily records covering the last 35 years (1973-2007) plus two centenarian databases sited in eastern NIB: San Sebastián (1929-2007) (daily resolution) and Bilbao (1857-2007) (monthly resolution). It is the first time that this interfacial region between the Atlantic and the Mediterranean has been studied with such a density of monitoring stations. Spatial and temporal characteristics and changes in rainfall's distribution have been analyzed using the suite of indices developed and recommended by the Expert Team on Climate Change Detection, Monitoring and Indices (ETCCDMI). They include annual and seasonal accumulated precipitation, number of dry and rainy days, and mean precipitation per rainy day, among others. The observed trends have been tested for statistical significance using the Mann-Kendall's non-parametric test. Additionally, links between the North Atlantic Oscillation (NAO) and the precipitation in the aforementioned region have been explored.

The analysis shows a significant tendency towards less intensive rainy days for the whole region together with a decreasing trend in the number of wet days for the Central NIB. The consequence is a decline of total rainfall, statistically significant in Central and Eastern NIB. The evolution to drier conditions may be seen in both annual and seasonal indices. Conversely, strong regional differences have been found in the response to the NAO signal: whereas the rainfall decrease in the Western NIB might be associated to the dominance of a positive mode of the NAO during the last decades, the lack of correlation between the NAO signal and the observed precipitation in the stations with significant decreases rises an important argument against a direct association.

Using the global gridded 6-hourly NCEP-DOE Reanalysis 2 data (1979-2010) we have found that each one of the conventional NAO positive and negative modes include a variety of circulation patterns, which are critical in the precipitation distribution within the Atlantic-Mediterranean interfacial area: the mountain range distribution inside the regional margins of the Mediterranean Sea influences the main moisture pathways triggering or inhibiting precipitation in different ways, depending on differences among the circulation patterns associated to a similar NAO positive or negative signal. This results in no correlation between the NAO signal and the rainfall anomalies within the mountain ranges and their associated rain shade regions surrounding the Mediterranean Basin.

These findings stress the need of caution when using rainfall anomalies in the region as a proxy for NAO or vice-versa: maps will be shown with the influence of the NAO signal in the precipitation anomalies inside the continental area of Europe, including the whole Mediterranean.