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ENSO influence on Western Europe in summer: observational analysis and sensitivity experiments.

Maialen Martija-Diez (1), Belén Rodríguez-Fonseca (2), and Jorge López Parages (3)

(1) Tecnalia Research & Innovation, Donostia, Spain (maialen.martija@tecnalia.com), (2) Belén Rodríguez-Fonseca: Departamento de Física de la Tierra y Astrofísica, Facultad de Física, Universidad Complutense de Madrid, Madrid, Spain (brfonsec@fis.ucm.es), (3) Jorge López-Parages : Climate Modelling and Global Change Team, CERFACS. Paris France(parages@fis.ucm.es)

El Niño-Southern Oscillation (ENSO) is the dominant global climate mode at interannual timescales and the main source of predictability. Several studies point out that El Niño influence over the European North Atlantic sector is consistent and statistically significant. Some hypotheses show that this influence, which lacks of stationarity, seems to be modulated by multidecadal oscillation of the anomalous Sea Surface Temperature (SST) over the Atlantic and Pacific basins (AMO and PDO respectively). Nevertheless, the most important atmospheric mode impacting on Europe climate variability is the North Atlantic Oscillation (NAO) and some authors have found how the NAO can be forced from the Tropical Pacific through an "ENSO-warm – NAO-negative" link. Therefore, discerning in observations the internal NAO signal versus the forced one is a challenge. Thus, the analysis of regions in Europe with weaker NAO influence could be of special interest when looking for ENSO teleconnections.

The present study selects an area of Europe where the NAO influence is weak, with the aim of disentangling possible ENSO teleconnections. Some authors found that the second mode of rainfall variability over the Iberian Peninsula (IP) is not influenced by NAO. Furthermore, this pattern presents a structure that, over the whole European region, resembles the leading mode of interanual rainfall linked with a strong teleconnection with ENSO that other authors showed. These latter patterns have a center of action over the Northern IP and we choose this area as a Base Point (BP) in order to analyze and to understand the ENSO influence on a larger region of Europe.

This study focuses on a thoroughly analysis of the behavior of ENSO influence on different variables -as anomalous precipitation, minimum and maximum temperature-, along the whole seasonal cycle over the selected BP. We examined the atmospheric conditions and the possible teleconnection mechanisms. Sensitivity experiments performed with the Australian Community Climate and Earth System Simulator (ACCESS) model, are used in order to test the robustness of the observational hypotheses. These experiments take into account the lack of stationarity of ENSO – Europe teleconnection, considering different periods according with different AMO phases.

The results show a non-stationary relationship between precipitation, minimum and maximum temperature in the BP, and ENSO. This relation depends on the Pacific region considered and seems to be maximum in summer.