

CLIVAR-SPAIN contributions: Changes in the ENSO signal and their impact on the Southwestern Europe spring rainfall

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ENSO is the most important interannual phenomenon of the global climate variability. Its impact on the mid-latitudes, particularly over the European climate, has been reported at difference seasons. There are different hypothesis to explain this influence, although they can act simultaneously. Nevertheless, multidecadal changes in the atmospheric circulation can change the strength of its related teleconnections. Around 1977, a change in the Pacific basic state and in ENSO dynamics, named as Climate Shift (CS), was observed. The aim of this work is to study the link between ENSO and rainfall on Southwestern Europe taking into account the whole observational period and the decades before and after the CS. We focused our study in the Northwest Iberian Peninsula (NWIP). The Spring NWIP rainfall (NWIPR) has significant correlation with the equatorial Pacific SST of the previous four seasons. This positive correlation overlaps the Niño3 and Niño1+2 indices areas. The correlation between spring NWIPR and those indices is around 0.4 with a 99% significance level for the period 1951-2006. ENSO influence over the European precipitation has varied over time. To analyze this effect, 21-year sliding means were used. Results show a change in Niño 3 winter-NWIPR spring correlation around the 70's which can be related to the CS (Lorenzo et al 2010). To analyze this fact we study changes in the dynamics and its impacts before and after the CS. Results showed that, between 1951 and 1977, Niña events produced dry springs over NWIP while Niño events did not affect the spring rainfall. Between 1978 and 2006, the situation changed, and Niño events produced rainy springs whilst Niño events did not show any significant relationship. To understand this change and ENSO influence over the NWIP, SST anomalies (SSTA) (from the ESRL of NOAA) and streamfunction (from the NCEP/NCAR reanalysis) were examined in the years with extreme events of the spring NWIPR. The SSTA for the dry springs between 1951 and 1977 indicate a Niña developing while the SSTA for wet springs in the period 1978-2006 show the formation of a Niño event in the Equatorial Pacific. The analysis of streamfunction over Europe for dry springs in NWIP between 1951 and 1977 present positive anomalies which can justify the rainfall diminution. After the CS, in the period 1978-2006, a negative streamfunction center is located over NWIP justifying the wet springs. As a conclusion, ENSO variability influences spring NWIPR modifying the atmospheric circulation over the area. This influence has changed over the last decades and it can be an effect of the CS (Iglesias et al 2011). Keywords: Clivar Spain Contributions, Clivar Spain, Climate variability and change, Southwestern Europe REFERENCES MN Lorenzo, JJ Taboada, I Iglesias and M GÚmez-Gesteira (2010): Predictability of the spring rainfall in North-west of Iberian from sea surfaces temperatures of ENSO areas (Accepted in Climate Change) I Iglesias, MN Lorenzo, B Rodrìguez-Fonseca, JJ Taboada and M GÚmez-Gesteira (2011): Changes in El Niño Signal on the North Western Iberian Peninsula (In preparation)