Geophysical Research Abstracts
Vol. 12, EGU2010-8308, 2010
EGU General Assembly 2010

The Climate Shift and the Climate Variability in the Mediterranean region

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The so-called "climate shift" (CS) was defined at the beginning of the nineties as a dramatic change between 1976-77 in the basic state of the tropical Pacific and in the ENSO dynamics. Nowadays, the 1976-1977 shift is interpreted as a phase change in a decadal scale oscillation (the Pacific Decadal Oscillation, PDO, Mantua et al. 1997) lasting from about 1976 to 1988 (Trenberth and Hurrell 1994, Miller et al. 1994). However, several changes in the global climate have been reported after the CS; as changes in the air-sea interactions and in the tropical and extratropical teleconnection patterns.

The climate variability of the Mediterranean area is influenced by the North Atlantic Oscillation (NAO, Hurrell, 2003), which frequency and positive phase intensity has suffered an increase after the CS unprecedented in the instrumental period, in coincidence with extreme drought conditions in the Mediterranean region. This results remark the non-stationary variability of the NAO (Vicente-Serrano and López-Moreno, 2008b) and the existence of changes in the underlying dynamics. In addition, Tropical Atlantic Variability (TAV) and ENSO have also shown to exhibit a strong and non- stationary influence in the Mediterranean basin, with maximum correlations at the beginning of the twenty century and since the CS (Mariotti et al. 2002), in concordance with the Atlantic Multidecadal Oscillation (AMO) evolution. A recent singular discovery show the influence of the Atlantic Niño on its Pacific counterpart (Rodríguez-Fonseca et al. 2009; Losada et al. 2009), a relation that was statistically pointed out in Polo et al. (2008a). These results remark the increasing importance of the TAV on the global climate and on the observed change, from the late 70's, in the global teleconnections.

Although some studies point out the seasonal dependence of the leading modes of precipitation variability over Europe (Zveryaev, 2006), in this work, a gridded monthly terrestrial gauge-based precipitation for the second half of the twenty century is used to investigate the precipitation variability over Europe and their links to the CS and the multidecadal variability. The seasonal modes are analyzed, using time series before and after the CS. To carry out this study, the NCEP-NCAR reanalysis field, the NCEP sea surface temperature (SST) and the ERA40 reanalysis data for the second half of the twenty century are used. To achieve a better understanding of the teleconnections linked to these changes, and its possible link to the SST variability, a long set of simulations with a General Circulation Model (AGCM), run with observed SSTs, has been analysed for the same time period.

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