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The ENSO influence on the mediterranean rainfall. A multidecadal modulated relationship?

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Several studies have shown how the anomalous precipitation over the Euro-Mediterranean region is influenced by the ENSO phenomena. However, this influence is not stationary, with maximum correlations in the beginning of the twenty century and since the 1976-1977 Climate Shift and no influence during the 1940's-50's-60's. The role of Natural Multidecadal Variability in the non-stationary relationship between ENSO and the precipitation over the Euro-Mediterranean region is analysed for the 20th century. The correlation along this period between the Nino3.4 index and the Mediterranean rainfall for a 20-year sliding window shows a significance multidecadal modulation, particularly with the Atlantic Multidecadal Oscillation (AMO). The influence of Pacific Decadal Oscillation and the Global Warming (GW) Sea Surface Temperature (SST) signature is also studied.

Also, a Gram-Schmidt orthogonalization methodology has been used to generate an orthogonal base able to discriminate the the AMO, PDO and GW SST influence on the interannual rainfall modes. Next, Principal Component Analysis (PCA) of the interannual anomalous rainfall is performed considering or not the projection on each elements of the base.

The results show again an important multidecadal modulation of the interannual ENSO influence on the precipitation over the Euro-Mediterranean region, which is affected by GW in the last decades of the 20th century. In winter (JFM) this modulation influences the atmospheric variability, with changes in the Sea Level Pressure anomalous projection, from a zonally-symmetric dipolar NAO-like pattern to an undulatory pattern.