IS EL NIÑO IMPACT OVER THE EUROPEAN RAINFALL MODULATED BY NATURAL MULTIDECADAL VARIABILITY?

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El Niño phenomena is the main oceanic driver of the interannual atmospheric variability and a determinant source of predictability in the tropics and extratropics. Several studies have found a consistent and statistically significant impact of El Niño over the North Atlantic European Sector (NAES), which could lead to an improvement of the skill of current seasonal forecast systems over Europe. Nevertheless, this signal seems to be non-stationary in time and it could be modulated by the ocean at very low frequencies. Hence, the seasonal climate predictability based on El Niño could be variable and only effective for specific time periods. This study considers the multidecadal changes in the ocean mean state as a possible modulator of ENSO-European rainfall teleconnection at interannual timescales. A long control simulation of the CNRM-CM5 model is used to substantiate this hypothesis and to assess if it can be relevant to explain the non-stationary behaviour seen in the 20th century observations. The model is able to reproduce the leading rainfall mode over the Euro-Mediterranean region, and its non stationary link with El Niño. This teleconnection has been identified in coincidence with changes of the zonal mean flow at upper levels, which influence the propagation of the waves from the tropics to extratropics through the atmosphere and, hence, to explain the changing impact over Europe. However, the non-stationary impact observed along the 20th century could also be related to the observed changes in the interannual oceanic forcing signal itself. The results obtained here suggest, for both hypotheses, an important role of the natural internal variability of the ocean at multidecadal timescales.

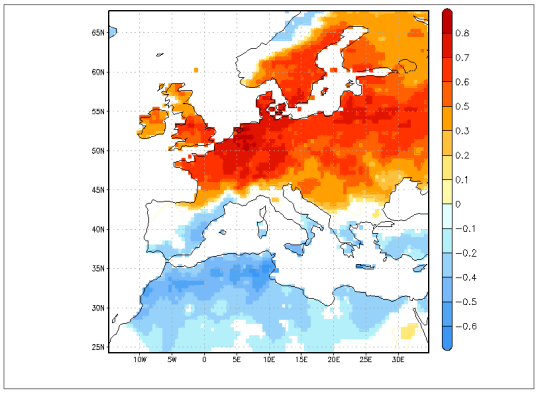

Fig. 1.- Leading Euro-Mediterranean rainfall mode in late Winter-early Spring (FMA). Statistical significant areas, according to a Monte-Carlo test at the 95% level, are shaded.

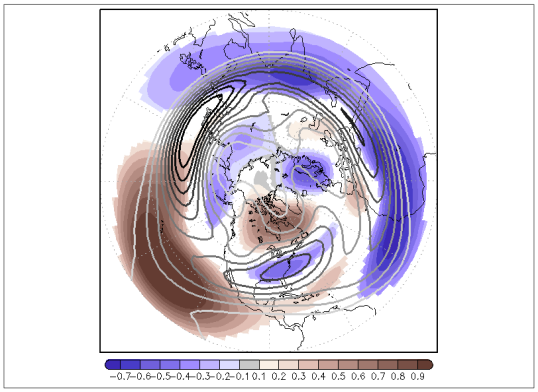

Fig. 2.- Streamfunction at 200hPa associated with the ENSO-European rainfall teleconnection. Statistical significant areas, according to a Monte-Carlo test at the 95% level, are shaded. In contours, the climatological zonal mean flow.