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ENSO-North Atlantic European climate: a nonstationary teleconnection?

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The climate variability over the North Atlantic European Sector (NAES) is usually associated with the North Atlantic Oscillation (NAO), which is characterized by a Sea Level Pressure (SLP) seesaw between the Azores High and the Icelandic low. The NAO is mainly related to internal variability of the atmosphere. Then, the seasonal predictability skill over the NAES is scarce. Several studies have shown, however, a significant impact of El Niño-Southern Oscillation (ENSO) over Europe, which could introduce a source of seasonal forecasting. This ENSO signal seems to be nonstationary on time, and some authors point to natural multidecadal variability modes, such as Atlantic Multidecadal Oscillation (AMO), or Interdecadal Pacific Oscillation (IPO), as modulators of the mentioned link at interannual timescales. Other studies have also shown how ENSO presents some Non-Linearities, with most intense Central Pacific events for la Niña and Eastern Pacific events for El Niño. Thus, the aim of this study is twofold: on the one hand to analyze the Non-Linearity of the ENSO-NAES link and, on the other hand, to test the role of low frequency SST variability as a possible modulator of the atmospheric teleconnection. To conciliate both some sensivity experiments have been carried out with a low resolution version (3.75º x 2.5º) of the UK Meteorological Office Unified Model atmospheric GCM. In this way, the AGCM model has been forced with idealized SSTs ENSO patterns over the tropical Pacific. Different El Niño/La Niña anomalous patterns are prescribed but considering different climatologies over the Atlantic and the tropical Pacific basins. These prescribed SSTs climatologies are based on periods along the 20th century which show different links between the Nino34 index and the leading rainfall mode over the Euro-Mediterranean region. The results suggest a combined role of the Atlantic and Pacific basin on the changing link identified in the observations. As a consequence, a same El Niño/La Niña pattern could differently impact over Europe depending on the SST background state over the Atlantic and the Pacific. These results could have important implications in the understanding of the role of changes in the ocean mean state on the interannual teleconnections.