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ENSO teleconnections over the Euro-Mediterranean region: the role of PDO modulation

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At the interannual timescale, El Nino Southern Oscillation (ENSO) is known to be one of the major driver of climate variability on the global domain. However, the detection of the ENSO influences over the Euro-Mediterranean region is made difficult by the large variability of the atmospheric circulation in the North Atlantic-European sector. In the literature, observational and model-based studies have fostered a long-standing debate on the shape and the mechanisms ruling the ENSO teleconnections over the Euro-Mediterranean sector. The proposed mechanisms driving the spread of the ENSO signal remotely involve the propagation of atmospheric planetary waves, and changes in the zonal and meridional atmospheric circulation. The background sea surface temperature (SST) state may indeed influence these mechanisms, and for this reason a deeper understanding on the role of the low frequency SST variability in enhancing the ENSO teleconnection is needed.

In this research, we focus on the effects of the low frequency SST variability in shaping the influence of ENSO over the Euro-Mediterranean region, with particular emphasis on the role of the Pacific Decadal Oscillation (PDO). We present a set of idealized numerical experiments accounting for a standard ENSO and PDO SST forcing in an AMIP-like model setup. Moreover, in order to increase the signal to noise ratio and to evaluate the internal variability associated with these processes, an ensemble approach has been adopted. The comparison across simulations, including different combinations of ENSO and PDO SST forcing, permits to reveal the ENSO fingerprint over the Euro-Mediterranean region, and to evaluate the role of the PDO modulation. This process-oriented approach allows to advance the understanding on the connection between mid-latitude climate variability and tropical forcing, and to enhance a deeper insight on the key mechanisms driving the atmospheric circulation over the Mediterranean sector on a number of different time-scale. Furthermore, it will contribute to improve our understanding of possible sources of predictability for the Euro-Mediterranean region.