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Multi-model assessment of the late-winter ENSO teleconnection in the Euro-Atlantic sector

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ENSO is known to affect climate in remote areas of the world, including the mid- and high-latitudes. Its impacts are evident and well-understood for some extratropical regions, such as the North Pacific, while its influence on the North Atlantic-European (NAE) region is still under debate, concerning both the amplitude and the underlying dynamics. The difficulties in detecting the ENSO-related signal in the North Atlantic are mainly due to the large internal variability of the region, and to the tendency of the ENSO signature to project on a dipole-like pattern that resembles the North Atlantic Oscillation (NAO), particularly at surface. The nature of the relationship between this "NAO-like" ENSO signal and the actual NAO is controversial, and unravelling this link represents a first step towards better understanding the ENSO-NAE teleconnection and potentially improving seasonal prediction capabilities for this region.

The ENSO signal over the NAE sector is examined in late winter (JFM), when it appears to be strongest and fully-established in observations. The linear response to SST anomalies in the Nino3.4 region is assessed in reanalysis data extending back to the beginning of the 20th century (NOAA-20CR, ERA-20CR) for variables at both surface and upper levels, including the lower stratosphere. The resulting ENSO-related patterns are compared with the corresponding NAO signatures, computed analogously via linear regression onto the PC-based NAO index. Atmosphere-only simulations are used to further assess the distinct dynamics of the two teleconnections: a control experiment with climatological SSTs is contrasted with a sensitivity experiment where a canonical El Niño event is superimposed on the seasonal cycle; the former is analysed to characterize the internally-generated NAO dynamics, while the latter provides the ENSO-forced atmospheric circulation. The multi-model contributes to the ERA4CS-funded MEDSCOPE project and includes: EC-EARTH/IFS (L91, 0.01hPa), CNRM/ARPEGE (L91, 0.01hPa), CMCC/CAM (L46, 0.3hPa).