EGU2020-2703
https://doi.org/10.5194/egusphere-egu2020-2703
EGU General Assembly 2020


# Nonlinearity in the Tropospheric Pathway of ENSO to the North Atlantic

**Bernat Jiménez-Esteve** and Daniela I.V. Domeisen
Institute for Atmospheric and Climate Sciences, ETH Zurich, Zurich, Switzerland (bernat.jimenez@env.ethz.ch)

El Niño Southern Oscillation (ENSO) can exert a remote impact on North Atlantic and European (NAE) winter climate. This teleconnection is driven by the superposition and interaction of different influences, which are generally grouped into two main pathways, namely the tropospheric and stratospheric pathways. In this study, we focus on the tropospheric pathway through the North Pacific and across the North American continent. Due to the possible non-stationary behaviour and the limited time period covered by reanalysis data sets, the potential nonlinearity of this pathway remains unclear. In order to address this question, we use a simplified physics atmospheric model forced with seasonally varying prescribed sea surface temperatures (SST) following the evolution of different ENSO phases with linearly varying strength at a fixed location. To isolate the tropospheric pathway the zonal mean stratospheric winds are nudged towards the model climatology. The model experiments indicate that the tropospheric pathway of ENSO to the North Atlantic exhibits significant nonlinearity with respect to the tropical SST forcing, both in the location and amplitude of the impacts. For example, strong El Niño leads to a significantly stronger impact over the North Atlantic Oscillation (NAO) than a La Niña forcing of the same amplitude. For La Niña forcings, there is a saturation in the response, with no further increase in the NAO impact even when doubling the SST forcing, while this is not the case for El Niño. These findings may have important consequences for long-range prediction of the North Atlantic and Europe.