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ENSO impact on North Atlantic/European region in a changing climate

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Extratropical atmospheric response to El Niño/Southern Oscillation (ENSO) forcing in a changing climate is examined using regional climate model (RegCM3) simulations under the IPCC A1B scenario. Time period under the study (1951-2100) is divided into three 50-yr sub-periods: present climate (1951-2000), intermediate period (2001-2050) and future climate (2051-2100). The composite analysis based on ENSO phases is performed for each sub-period separately and for 1951-2100 as a whole. ENSO events are detected in such a way that the year which belongs to the particular time period is classified as a warm (cold) if associated winter (JFM) Niño3.4 index is larger (smaller) than 0.5•sig (-0.5•sig), where sig is standard deviation of the index calculated over considered time period. Different atmospheric variables indicate on a discernible extratropical signal excited by ENSO. Mainly, the spatial distribution of anomalies associated with warm and cold ENSO events resembles positive-negative image effect (the same spatial distribution but with reversed sign of anomalies). Amplitude of the atmospheric response is generally larger for cold composites as a consequence of the contribution of very strong cold events. Both spatial pattern and amplitude of the atmospheric response to ENSO forcing over the NAE region strongly depend on the time period which is considered. Thus, bipolar spatial distribution is obtained for present and the future climate, while response for the intermediate period rather has a quadruple structure. Different form of the spatial structure which is found for three successive time periods under the study suggests a possible interdecadal variability of tropical-extratropical teleconnections in a changing climate.