Recent reversal of mean wind speed and gusts across the Iberian Peninsula and its relationship with modes of climate variability, 1961-2019

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In a context of climate change, near-surface wind speed (SWS) has received less attention than other variables such as air temperature or precipitation, despite its undeniable environmental and socio-economic impacts. Studies suggest a generalized decrease of SWS in continental surfaces located in the middle latitudes from 1979 to 2010, the so-called stilling phenomenon, and an increase in it thereafter, which has been termed reversal or recovery phenomenon. Recent studies indicate that multidecadal oscillations produced by the internal variability of the climate system are responsible for both phenomena. The aim of this work is to advance in the evaluation of the multidecadal variability and causes of the stilling and reversal in the observed SWS, covering the complete 2010s decade and focusing on the Iberian Peninsula region (IP). More specifically, the particular objectives of this study are: (i) to determine for the first time the occurrence of the reversal phenomenon in the IP over the last decade(s), identifying its onset year and its magnitude; (ii) to deepen into the relation between atmospheric teleconnection indices and observed trends in SWS; and (iii) to link atmospheric circulation changes to observed SWS variability. For that purpose, homogenized series of mean wind speed and gusts will be used, as well as data from the ERA5 reanalysis (European Centre for Medium-Range Weather Forecasting). Three SWS parameters will be analysed: monthly mean SWS anomaly; monthly mean daily peak wind gust (DPWG) anomaly; and number of days in which the value of DPWG exceeds the 90th percentile of the series considered. Trends of these parameters will be calculated, as well as the correlation between them and the modes of variability that govern in the region: North Atlantic Oscillation (NAO), Mediterranean Oscillation (MO) and Western Mediterranean Oscillation. Finally, trends of these modes of variability and of other parameters dependent on atmospheric circulation (e.g., geostrophic wind) will be calculated to try to clarify the drivers of the observed changes in the SWS.