



Instabilities in the relation between European Weather Types and mid-latitude circulation in the Atlantic

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Recently, a new instrumental index (Westerly Index or “WI”) measuring the frequency of the westerlies over the English Channel has been developed for the period 1685-1750 (Wheeler et al. 2009) and further extended to the present (Barriopedro et al. 2014). This index holds a climatic signal similar to the North Atlantic Oscillation (NAO) in the temperature and precipitation over large areas of Europe. Nevertheless we are confident that the WI offers two major advantages: first the WI signatures are not restricted to the winter being significant during the entire year and second, the WI does not rely on proxy data and, as such, it is less prone to the uncertainties associated to the calibration process of the NAO reconstructions.

During the last decades, regional mid-latitude circulation has also been quantified objectively through the widespread use of so-called Weather Types (WT). WT are used to identify and classify the different patterns of Sea Level Pressure configurations originating particular weather in a given area. In consequence, WT over most Western Europe should be closely related to atmospheric circulation indexes such as the WI. Here we adopted a similar WT classification of the classical WTs developed empirically by Hubert Lamb for the UK and automated by Jones et al. (1993) but centered at the English Channel latitudinal band to be compatible with the window used to define the WI (Wheeler et al., 2009).

In this work we compare the long-term (1850-2003) monthly values of WI with the corresponding monthly frequency of directional weather types in the WI area. As expected, we found significant positive (negative) correlation values with WTs dominated by a westerly (easterly) component but interestingly, some quasi periodic intervals of lack of correlation have been found, suggesting an oscillating behaviour on the lack of stationarity between the large-scale north Atlantic circulation and local weather types.

Wheeler, D.; García-Herrera, R.; Wilkinson, C.W. and Ward, C., 2009: Atmospheric circulation and storminess derived from Royal Navy logbooks: 1685 to 1750, *Climatic Change*, DOI: 10.1007/s10584-009-9732-x

Barriopedro, D.; Gallego, D.; Alvarez-Castro, M.C.; Garcia-Herrera, R.; Wheeler, D.; Peña-Ortiz, C.; Barbosa, S.M., 2014: Witnessing North Atlantic westerlies variability from ships' logbooks (1685–2008). *Clim Dym*, 43, 939-955

Jones, P. D., Hulme, M., and Briffa, K. R. 1993: A comparison of Lamb circulation types with an objective classification scheme, *Int. J. Climatol.*, 13, 655–663.