



An objective daily Weather Type classification for Iberia since 1850; patterns, trends, variability and impact in precipitation

A. M. Ramos (1), R.M. Trigo (2), M.N. Lorenzo (1), J.M Vaquero (3), M.C. Gallego (4), M.A. Valente (5), and L. Gimeno (1)

(1) Universidade de Vigo, Grupo de física de la Atmosfera y del Oceano, Ourense, Spain (alexramos@uvigo.es), (2) Universidade de Lisboa. CGUL, IDL, Lisboa. Portugal, (3) Departamento de Física, Escuela Politécnica, Universidad de Extremadura, Cáceres, Spain, (4) Departamento de Física, Facultad de Ciencias, Universidad de Extremadura, Badajoz, Spain, (5) Instituto Geofísico do Infante D. Luiz, CGUL, IDL

In recent years a large number of automated classifications of atmospheric circulation patterns have been published covering the entire European continent or specific sub-regions (Huth et al., 2008). This generalized use of objective classifications results from their relatively straightforward computation but crucially from their capacity to provide simple description of typical synoptic conditions as well as their climatic and environmental impact. For this purpose, the vast majority of authors has employed the Reanalyses datasets, namely from either NCEP/NCAR or ECMWF projects. However, both these widely used datasets suffer from important caveats, namely their restricted temporal coverage, that is limited to the last six decades (NCEP/NCAR since 1948 and ECMWF since 1958). This limitation has been partially mitigated by the recent availability of continuous daily mean sea level pressure obtained within the European project EMULATE, that extended the historic records over the extra-tropical Atlantic and Europe (70°-25° N by 70° W-50° E), for the period 1850 to the present (Ansell, T. J. et al. 2006).

Here we have used the extended EMULATE dataset to construct an automated version of the Lamb Weather type (WTs) classification scheme (Jones et al 1993) adapted for the center of the Iberian Peninsula. We have identified 10 basic WTs (Cyclonic, Anticyclonic and 8 directional types) following a similar methodology to that previously adopted by Trigo and DaCamara, 2000 (for Portugal) and Lorenzo et al. 2008 (for Galicia, northwestern Iberia). We have evaluated trends of monthly/seasonal frequency of each WT for the entire period and several shorter periods. Finally, we use the long-term precipitation time series from Lisbon (recently digitized) and Cadiz (southern Spain) to evaluate, the impact of each WT on the precipitation regime. It is shown that the Anticyclonic (A) type, although being the most frequent class in winter, gives a rather small contribution to the winter precipitation amount, observed on a daily basis. On the other hand, the three wettest WTs, namely the Cyclonic (C), South-westerly (SW) and Westerly (W) types, together representing roughly a third of all winter days, do account for more than 60% of the observed daily precipitation. It is shown that the large inter-annual variability of precipitation in both cities is highly related with the corresponding inter-annual variability of the wet WTs.

Ansell, T. J. et al. (2006) Daily mean sea level pressure reconstructions for the European - North Atlantic region for the period 1850-2003, *Journal of Climate*, 19, 2717-2742, doi: 10.1175/JCLI3775.1

Huth R., Beck C., Philipp A., Demuzere M, Ustrnul Z, Cahynová M., Kyselý J., Tveito O.E. (2008) Classifications of atmospheric circulation patterns: recent advances and applications. *Trends and Directions in Climate Research: Ann. N.Y. Acad. Sci.* 1146:, 105-152

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

Lorenzo M.N., Taboada J.J. and Gimeno L. (2008) Links between circulation weather types and teleconnection patterns and their influence on precipitation patterns in Galicia (NW Spain). *Int. J. Climatol.* Published Online: Nov 12 2007 5:30AM DOI: 10.1002/joc.1646.

Trigo R.M. and Da Camara C.C. (2000) Circulation weather types and their influence on the precipitation regime in Portugal. *Int. J. Climatol.*, 20, 1559-1581.