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Trends in weather type frequencies centred in Northwestern Iberian Peninsula for present and changing climates

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The interannual variability of rainfall in the Western Iberian Peninsula is closely related to variations in the atmospheric configuration in the Northern hemisphere (Trigo et al, 2000 and Lorenzo et al 2008). An automated version of the Lamb weather type classification scheme (Goodess and Jones, 2002) using the NCEP/NCAR reanalysis data was adapted for the Galicia area (Northwestern corner of Iberian Peninsula) by Lorenzo et al 2008. In this analysis the relationship between weather types (WT) and precipitation for Galicia has become evident. Results showed that the cyclonic type is the synoptic pattern producing more precipitation amount, seconded by the western and south-western types. On the contrary, the Northern and Eastern types are associated to smaller precipitation amounts and the anticyclone type is characterised by an almost absence of precipitation.

Using the daily dataset of the weather type classification computed in this recent work (Lorenzo et al 2008), every atmospheric circulation regime was aggregated both at the annual and seasonal temporal scales. Afterwards, linear trends were computed in order to access changes in the frequency of any particular regime not only for the whole period of analysis (1948-2005) but also for two consecutive sub-periods (1948 to 1977 and 1978 to 2005). Results show a significant (at 5% level) increment of the anticyclone pattern in winter during the last sub-period.

We have also studied changes in WT frequency in future climate change scenarios based on the output runs of several GCMs widely used for the IPCC Fourth Assessment Report. For this purpose, we have used Sea Level Pressure (SLP) data from different forcing simulations corresponding to three SRES emission scenarios representing low (B1), medium (A1B) and high (A2) concentration scenarios and from a 20^{th} century control simulation. Using the same methodology as in Lorenzo et al 2008, WTs were calculated for Galicia and then aggregated at the seasonal and decadal basis. The control simulation for the late 20^{th} century was compared objectively to the results obtained using the NCEP/NCAR reanalysis, in order to evaluate the ability of the model to reproduce the present climate. Overall, the obtained results were reasonable, i.e. the GCM control run has shown some skill to reproduce the observed patterns and frequencies of WTs.

Therefore we have confidence to use the same GCMs in order to perform an objective comparison between the frequency of WT for present climate and for future climate scenarios.

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