



Characterization of the atmospheric circulation over the Iberian Peninsula using ERA40 reanalysis and projected changes in an ensemble of GCMs.

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Climate change projections performed with different GCMs under several GHGs scenarios show significant changes of temperature and precipitation for the Iberian Peninsula IP, which has been identified as one of the hot spots. These changes are related with modifications in the atmospheric dynamics that can be estimated by studying the frequency of appearance of weather types (WT).

In this work, firstly we obtain a WT seasonal classification based on the daily data of SLP and Z500 over a window that contains the whole IP extracted from ERA40 reanalysis and analysis from ECMWF for the last 50 years. Some methods were tested. The most satisfactory results were obtained by using the K-means method applied to main principal components of the correlation matrix in S mode of SLP and Z500. The k-means clustering procedure was initialized using the weights of the rotated PC (varimax) coming from a PC analysis of the correlation matrix in T mode. Twelve WTs were obtained for each season and most of them are coincident with previous classifications.

On the other hand, the skill of GCM outputs in reproducing the observed climate should be tested since the credibility of climate change projections should depend on that. One method can be based on the estimation of the capability of the GCM in reproducing the observed circulation under present forcing conditions.

Several GCMs outputs for 20C3M runs were interpolated to the same grid of ERA40. WTs were obtained applying the same procedure and using the same initialization as before. A comparison between the WT obtained from ERA and from the GCMs were performed in terms of frequency appearance persistence and transitions between WTs. Results indicate that although all GCMs employed in these comparisons have some deficiencies in reproducing the observed circulation, most of them are able to simulate satisfactorily the observed WTs.

Finally, changes in frequency appearance of WT in GCMs experiments is calculated. The relationship between the projected changes in temperature and precipitation and changes in circulation is discussed.