

Regionalization of precipitation for the Iberian Peninsula

A.C. Parracho¹, P. Melo-Gonçalves¹, A. Rocha¹

¹ CESAM and Dept. Physics, University of Aveiro, Aveiro, Portugal

Temporal variability of precipitation over the Iberian Peninsula (IP) has high spatial gradients. Therefore, statistics of the temporal behaviour of precipitation and derived quantities over the IP must be estimated taking into account these spatial gradients. Some statistics can be displayed over a map; however there are statistics, such as Probability Density Functions at each location of the IP, that are impossible to be displayed in a map. Because of this, it is mandatory to reduce the number of degrees of freedom which, in this case, consists of a reduction of the time series representative of the IP domain. In order to overcome this problem, we present here a spatial partition of the IP region into areas of similar precipitation. For that, daily E-OBS precipitation data for the years between 1961 and 1990 was used. The land-only high resolution data was obtained on a regular grid with 0.25° resolution in the IP domain. This data was subjected to a K-means Cluster Analysis in order to partition the IP into K regions. The Clustering was performed using the squared Euclidean distance. Six clusters (IP regions) were identified. Note that in the Cluster Analysis algorithm, the variables are the time values of PRP, and the observations are the grid points. This results on $K = 6$ clusters of IP grid points defining six IP regions that share the same time-varying behaviour of precipitation.

The IP regionalization was identified from annual and seasonal precipitation daily-time varying IP fields. The annual precipitation discriminates the following regions: (i) northwest Iberia (Spanish Galiza and Portuguese Minho); (ii) northwest Portugal (Beira Litoral); (iii) a large region ranging from the center to the western and southwestern shores of the Iberia; (iv) another large region extending from the center to the eastern and southeastern shores of the IP; (v) north (Asturias) and northeast Spain (Pyrenees); and, finally, (vi) a northeastern Iberia near France.

The regions obtained for the four seasons of the year are similar. These results are generally consistent with the thermodynamic characteristics described in the available literature.

Finally we emphasize: (i) that the methodology used here, based on Cluster Analysis, can be used to regionalize other areas of the world, and (ii) the identified regions of the IP can be used to represent the Iberian precipitation by six time series that can be subjected to further analysis whose results can be presented in a concise manner that would be impossible to be presented otherwise.

Keywords

Precipitation, Cluster Analysis, Regionalization of the Iberian Peninsula

Correspondence

Email: claudiabernardes@ua.pt