



Climatology of surface wind patterns over the Comunidad Foral de Navarra region

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A classification of daily surface wind fields over the Comunidad Foral de Navarra region (northeastern Iberian Peninsula) into wind pattern types is performed. Daily wind data measured at 41 meteorological stations are employed to represent the surface wind field. Two methodologies are used to develop the classification, one based on the daily wind field spatial similarity and the other on their temporal variance. Both methodologies produce similar results yielding six robust wind patterns. The detected wind field types are more frequent during some months revealing an annual cycle evolution. The patterns with northwestern circulations are dominant (60.9 %) followed by the southeastern ones (30.5 %), showing the strong influence of the orography over surface circulations, since valleys in the region are directed mainly along the NW-SE direction.

Temperature, relative humidity, global radiation and precipitation anomalies of the wind patterns are analysed. They show different advective regimes and, in particular, the cold and dry northwestern strong wind known as *Cierzo* and the warm and moist southeastern wind known as *Bochorno* are recognized. A wind pattern responsible for a high intensity precipitation episodes in the northern region of the Comunidad Foral de Navarra is also recognized.

A sea level pressure map pattern classification is also performed to evaluate the connections between the synoptic circulations and the surface flows. Eight pressure patterns were identified and related to the surface wind patterns already formed. The associations found were clear enough to understand the forcing mechanism of the dif-

ferent wind patterns. The ageostrophic balance and the pressure gradient along the valleys seem to successfully describe the general characteristics of the surface circulations over the study region.