



The changing nature of the precipitation regime in the Iberian Peninsula

R. Trigo (1,2), D. Paredes (3), R. Garcia-Herrera (3) and I. Trigo (1)

(1) Centro de Geofísica da Univ. de Lisboa, Ed. C8, Campo Grande, 1749-016 Lisboa, Portugal, rmtrigo@fc.ul.pt (2) Departamento de Engenharias da Univ. Lusófona, Campo Grande, 1749-016 Lisboa, Portugal, (3) Departamento Física de la Tierra II, Facultad de Física, Universidad Complutense, Ciudad Universitaria, 28040, Madrid, Spain, danitopb@yahoo.es, rgarciah@fis.ucm.es

The Iberian Peninsula precipitation regime is characterised by large values of intra and inter-annual variability, favouring the occurrence of large disparities between wet and dry years. Recent studies by the authors have highlighted the possibility of major changes on this precipitation regime, affecting both the shape of seasonal cycle and the occurrence of droughts; a) March precipitation is dramatically decreasing over the western and central regions of the Iberian Peninsula revealing a monotonic descend of 50% since the early 60's (Paredes et al., 2005). This outstanding trend in early spring implies a shorter wet winter season and less soil moisture availability during spring and summer months. b) The 2004-2005 hydrological year was characterised by an intense drought throughout most of the Iberian Peninsula. The southern half of Iberia received less than 40% of the usual precipitation between October 2004 and June 2005. This was the most intense drought episode in Lisbon since precipitation data is recorded continuously (1865), the same holds for several Iberian observatories, although based on shorter time-series (Garcia-Herrera et al., 2006). Both phenomena (March trend and 2005 drought) have been analysed on the basis of the atmospheric circulation (Storm-tracks and weather types) over the North Atlantic and European sectors providing a reliable physical framework to explain these precipitation anomalies. The important role of the North Atlantic Oscillation has been also assessed objectively. These factors may increase political tensions between both Iberian countries (Portugal and Spain) as they portray a major problem for water resources management in Iberia, particularly in agriculture and production of hydroelectricity (Trigo et al., 2004). Daily accumulated precipitation anomalies for several stations in western,

central and southern Iberia show that besides 2004/05 there have been other drought episodes in recent years, namely 1991/92 1994/95, 1998/99 and 2001/02. The long term analysis made in this paper shows that, using monthly precipitation data from the longest records available for the region (Lisbon and Gibraltar) it is possible to conclude that between 1920 and 1935 there were considerably more drought episodes (including several major events) than in the corresponding last 15 years. Using a 30-year moving window we have evaluated, since the middle of the 19th century, the occurrence of droughts in Iberia based on changes of annual (and seasonal) average precipitation as well as of the corresponding variance. Finally these results are put in perspective of climate change scenarios recently derived by several groups for the Iberian Peninsula.

- Garcia-Herrera R., Paredes D., Trigo, R.M., Trigo, I.F. (2006) “The outstanding 2004-2005 drought in the Iberian Peninsula: Impacts and atmospheric circulation associated”, (submitted)
- Paredes D., Trigo, R.M., Garcia-Herrera R., Trigo, I.F. (2005) “Understanding precipitation changes in Iberia in early Spring: weather typing and storm-tracking approaches”, *J. Hydrometeorology* (in press)
- Trigo R.M., Pozo-Vazquez D., Osborn T.J, Castro-Diez Y., Gámis-Fortis S., Esteban-Parra M.J. (2004) “North Atlantic Oscillation influence on precipitation, river flow and water resources in the Iberian Peninsula”. *Int. J. Climatology*. 24, 925-944.