



The outstanding drought of 2004/2005 in Iberia

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The 2004-2005 hydrological year was characterised by an intense drought episode throughout western Europe. In Iberia, the drought spanned from November 2004 to June 2005, therefore affecting almost the entire hydrological year. In particular, the southern half of Iberia received roughly 40% of the usual precipitation between October 2004 and June 2005. Long-term precipitation time-series available for Lisbon (since 1865) put this episode as the driest event in the last 140 years. Daily accumulated precipitation anomalies for Granada and Barcelona clearly put this episode among the top three droughts over the last 60 years. Obviously, this outstanding event had major impacts on the hydrological cycle, particularly on river flow (that recorded minimum historical levels at certain locations) and on soil moisture content, immediately affecting environmental variables such as vegetation health. Thus, large socio-economic impacts were recorded in both Iberian countries (Portugal and Spain), particularly in what concerns hydroelectricity and agricultural production. Furthermore, several Spanish regions suffered intense and consecutive cold waves and severe snow storms between late December and early March.

We have applied an extensive analysis to the atmospheric circulation over the North Atlantic and European sectors in order to explain the physical mechanisms responsible for these precipitation anomalies. In fact, strong and persistent positive 500 hPa geopotential height anomalies, corresponding to intense blocking events, were detected along the November 2004 - February 2005 period, dramatically impacting the areas under their influence. From March 2005 to June 2005 the area was affected by a new series of positive geopotential height anomalies with a southern origin. A storm-track analysis applied to the entire European and North Atlantic regions revealed important departures from the average, in the location of cyclones between

November 2004 and April 2005 over the Iberian Peninsula. The combined analysis of precipitation and atmospheric circulation at synoptic scale by means of a Weather Type classification showed that the major rainfall contributors (cyclonic and westerly flows with an Atlantic origin) for Iberia display significantly lower than average frequencies, while anticyclonic Weather Types prevailed. The role of the North Atlantic Oscillation throughout the drought months was also evaluated.