



## Drought impacts on cereal yields in Iberia

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In the present context of climate change, land degradation and desertification it becomes crucial to assess the impact of droughts to determine the environmental consequences of a potential change of climate. Large drought episodes in Iberian Peninsula have widespread ecological and environmental impacts, namely in vegetation dynamics, resulting in significant crop yield losses. During the hydrological years of 2004/2005 and 2011/2012 Iberia was affected by two extreme drought episodes (García-Herrera et al., 2007; Trigo et al., 2013).

This work aims to analyze the spatial and temporal behavior of climatic droughts at different time scales using spatially distributed time series of drought indicators, such as the Standardized Precipitation Evapotranspiration Index (SPEI) (Vicente-Serrano et al., 2010). This climatic drought index is based on the simultaneous use of precipitation and temperature. We have used CRU TS3 dataset to compute SPEI and the Standardized Precipitation Index (SPI). Results will be analyzed in terms of the mechanisms that are responsible by these drought events and will also be used to assess the impact of droughts in crops. Accordingly an analysis is performed to evaluate the large-scale conditions required for a particular extreme anomaly of long-range transport of water vapor from the subtropics. We have used the European Centre for Medium-Range Weather Forecasts (ECMWF) ERA Interim reanalyses, namely, the geopotential height fields, temperature, wind, divergence data and the specific humidity at all pressure levels and mean sea level pressure (MSLP) and total column water vapor (TCWV) for the Euro-Atlantic sector (100°W to 50°E, 0°N–70°N) at full temporal (six hourly) and spatial (T255; interpolated to 0.75° regular horizontal grid) resolutions available to analyse the large-scale conditions associated with the drought onset.

Our analysis revealed severe impacts on cereals crop productions and yield (namely wheat) for Portugal and Spain in both considered drought events, however slightly less severe for 2012 than for 2005. In conclusion, and from an operational point of view, our results reveal the ability of the developed methodology to monitor droughts' impacts on crops productions and yields in Iberia.

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García-Herrera R., Paredes D., Trigo R. M., Trigo I. F., Hernandez E., Barriopedro D. and Mendes M. A., 2007: The Outstanding 2004/05 Drought in the Iberian Peninsula: Associated Atmospheric Circulation, *J. Hydrometeorol.*, 8, 483–498.

Vicente-Serrano, Sergio M., Santiago Beguería, Juan I. López-Moreno, 2010: A Multiscalar Drought Index Sensitive to Global Warming: The Standardized Precipitation Evapotranspiration Index. *J. Climate*, 23, 1696–1718.

Trigo R.M., Añel J., Barriopedro D., García-Herrera R., Gimeno L., Nieto R., Castillo R., Allen M.R., Massey N. (2013), The record Winter drought of 2011-12 in the Iberian Peninsula [in "Explaining Extreme Events of 2012 from a Climate Perspective". [Peterson, T. C., M. P. Hoerling, P.A. Stott and S. Herring, Eds.] *Bulletin of the American Meteorological Society*, 94 (9), S41-S45.