



High resolution multi-scalar drought indices for Iberia

Ana Russo (1), Célia Gouveia (1), Ricardo Trigo (1), and Sonia Jerez (2)

(1) Universidade de Lisboa, IDL, Lisbon, Portugal (acrusso@fc.ul.pt), (2) University of Murcia, Murcia, Spain

The Iberian Peninsula has been recurrently affected by drought episodes and by adverse associated effects (Gouveia et al., 2009), ranging from severe water shortages to losses of hydroelectricity production, increasing risk of forest fires, forest decline and triggering processes of land degradation and desertification. Moreover, Iberia corresponds to one of the most sensitive areas to current and future climate change and is nowadays considered a hot spot of climate change with high probability for the increase of extreme events (Giorgi and Lionello, 2008).

The spatial and temporal behavior of climatic droughts at different time scales was analyzed using spatially distributed time series of multi-scalar drought indicators, such as the Standardized Precipitation Evapotranspiration Index (SPEI) (Vicente-Serrano et al., 2010). This new climatic drought index is based on the simultaneous use of precipitation and temperature fields with the advantage of combining a multi-scalar character with the capacity to include the effects of temperature variability on drought assessment. Moreover, reanalysis data and the higher resolution hindcasted databases obtained from them are valuable surrogates of the sparse observations and widely used for in-depth characterizations of the present-day climate. Accordingly, this work aims to enhance the knowledge on high resolution drought patterns in Iberian Peninsula, taking advantage of high-resolution (10km) regional MM5 simulations of the recent past (1959-2007) over Iberia. It should be stressed that these high resolution meteorological fields (e.g. temperature, precipitation) have been validated for various purposes (Jerez et al., 2013).

A detailed characterization of droughts since the 1960s using the 10 km resolution hindcasted simulation was performed with the aim to explore the conditions favoring drought onset, duration and ending, as well as the subsequent short, medium and long-term impacts affecting the environment and the human resources. The understanding of the present-day underlying mechanisms together with the necessary contextualization within a wider past, is essential to understand future projections, and should lastly rebound on the adequacy of the management decision making.

Acknowledgments:

This work was partially supported by national funds through FCT (Fundação para a Ciência e a Tecnologia, Portugal) under project QSECA (PTDC/AAG-GLO/4155/2012)

Gouveia C., Trigo R.M., DaCamara C.C. (2009) Drought and Vegetation Stress Monitoring in Portugal using Satellite Data, *Natural Hazards and Earth System Sciences*, 9, 1-11.

Giorgi, F. and Lionello, P.; Climate change projections for the Mediterranean region. *Global and Planetary Change*, 63 (2-3): 90-104, 2008.

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.

Jerez, S., R.M. Trigo, S.M. Vicente-Serrano, D. Pozo-Vázquez, R. Lorente-Plazas, J. Lorenzo-Lacruz, F. Santos-Alamillos and J.P. Montávez (2013). The impact of the North Atlantic Oscillation on the renewable energy resources in south-western Europe. *Journal of Applied Meteorology and Climatology*, DOI 10.1175/JAMC-D-12-0257.1.