



Dynamical Mechanisms and Variability of Dry and Wet Spells in Iberia

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Dry and wet spells in Iberia have widespread ecological and environmental negative impacts resulting in major socioeconomic damages such as crop yield losses or increasing forest fire risk [Gouveia et al. 2009; Amraoui et al. 2013] and flash flooding, urban inundations, landslides and associated human and infrastructure damages [Liberato et al. 2013].

The 20th century was characterized by a negative trend on precipitation and a positive trend on temperature in southern Europe. On the other hand recent results suggest that there are opposite tendencies in the duration of wet and dry spells over the Iberia. At the monthly and seasonal scales, the North Atlantic Oscillation (NAO), the Eastern Atlantic (EA) and the Scandinavian (SCAN) patterns are important large-scale variability modes that control the Iberian precipitation regime. The NAO modulates the westerly atmospheric flow by shifting the polar jet and the associated storm-tracks. At the sub-monthly scale, extratropical cyclones have a significant impact on Iberian climate and are one of the primary causes of extreme events occurrence over the region [Liberato et al. 2011; 2013].

In this work we investigate the connection between midlatitude cyclones and the onset and recurrent character of droughts, heavy precipitation and spell duration in Iberia. Our results confirm the links between unusual circulation patterns with these extreme events. Moreover we show how the frequency on the occurrence of extratropical cyclones on the Euro-Atlantic region is critical in explaining the tails of the precipitation distribution in Iberia.

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References:

- Amraoui M., M. L. R. Liberato, T. J. Calado, C. C. DaCamara, L. P. Coelho, R. M. Trigo, C. M. Gouveia (2013) Fire activity over Mediterranean Europe based on information from Meteosat-8. *Forest Ecology and Management*, 294: 62-75, doi: 10.1016/j.foreco.2012.08.032
- Gouveia, C., , R. M. Trigo, , C. C. DaCamara (2009) Drought and Vegetation Stress Monitoring in Portugal using Satellite Data, *Natural Hazards and Earth System Sciences*, 9: 185-195 doi:10.5194/nhess-9-185-2009
- Liberato M. L. R., J. G. Pinto, I. F. Trigo, R. M. Trigo (2011) Klaus - an exceptional winter storm over Northern Iberia and Southern France. *Weather* 66: 330-334 doi:10.1002/wea.755
- Liberato, M. L. R., A. M. Ramos, R. M. Trigo, I. F. Trigo, A. M. Durán-Quesada, R. Nieto, L. Gimeno (2013) Moisture Sources and Large-Scale Dynamics Associated With a Flash Flood Event, in *Lagrangian Modeling of the Atmosphere* (eds J. Lin, D. Brunner, C. Gerbig, A. Stohl, A. Luhar and P. Webley), *Geophys. Monogr. Ser.*, 200: 111-126, American Geophysical Union, Washington, D. C. doi: 10.1029/2012GM001244