Drought characterization for the Miño-Limia River basin and its link with atmospheric moisture transport.

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The Miño and Limia River basins (MLRB) are located on the northwestern corner of the Iberian Peninsula. They have an extension of about 14873 km^2 within which both rivers extend to discharge into the Atlantic Ocean; favoring a strong biodiversity and the socioeconomic development of the primary sectors. The eminently rural characteristics of the region make it especially vulnerable to extreme events of the hydrological cycle like droughts, floods, etc. The deficit on precipitation have several effects on the basins; affecting crops development, the farming, the availability of freshwater and making the basin more vulnerable to the wildfire threat.

Despite the importance of previous studies that investigate droughts in the region, it worth to develop a re-characterization of dry conditions and to identify drought episodes in the basin. To do it, here we utilized the Standardized Precipitation Evapotranspiration Index (SPEI) to identify dry conditions in the MLRB along the period 1980-2016. A crucial advantage of the SPEI over other commonly used drought indices is that consider the effect of the potential evapotranspiration (PET) on drought severity and its multi-scalar characteristics permit the identification of different drought types and impacts in the context of global warming. Besides, the river discharge data were utilized to calculate the Standardised Streamflow Index (SSI); permitting to illustrate the impact of rainfall deficit along several temporal scales on the occurrence of hydrological droughts.

In addition, the Lagrangian dispersion model FLEXPART v9.0 was used to track backward in time the air masses residing over the basins and to calculate along the trajectories the budget of (E – P), permitting to identify the sources of moisture for the MLRB and their role on drought episodes onset, duration and intensity. FLEXPART has been successfully utilized for the same objective in other studies. This is a new approach for understanding the causes and variability of drought in the MLRB and support further studies in this region and worldwide.