



The impact of the Atmospheric Rivers in the hydro-geomorphologic event of February 1979

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Intense mid-latitude cyclones coming from the North Atlantic often impinge extreme weather conditions over large swaths of the Iberian Peninsula and are frequently associated with major human and economic damages. In recent years, a number of works have shed new light on the role played by Atmospheric Rivers (ARs) in the occurrence of extreme precipitation events in Europe and in the Iberian Peninsula (Ramos et al., 2015).

An AR is a long, narrow and transient corridor of strong horizontal water vapor transport that is typically associated with a low-level jet stream ahead of the cold front of an extratropical cyclone. The water vapor in atmospheric rivers is supplied by tropical and/or extratropical moisture sources. Atmospheric rivers frequently lead to heavy precipitation where they are forced upward—for example, by mountains or by ascent in the warm conveyor belt.

This study evaluates the major impacts and driving meteorological mechanisms that triggered the 5-16 February 1979 extreme precipitation and hydro-geomorphological event. According to the DISASTER database, the February 1979 event corresponds to the top ranked episode regarding the total number of evacuated people (4244), displaced people (14322) and also on the number of days of event duration (12 days) for the period 1865-2015. In this event 62 damaging floods and 5 damaging landslides were recorded in Portugal.

During this event Iberia was affected mainly along the margins of the Douro, Mondego and Tagus rivers. For the Douro and Mondego basins the damaging floods tend to concentrate in the cities of Oporto and Coimbra, while in the Tagus basin the damaging floods and landslides were registered along several riverside places of the lower Tagus valley, where more than 10,500 displaced people and 4,000 evacuated people were recorded by daily newspapers.

We show that for the period between 2 and 16 February 1979, the multiday accumulated precipitation event produced an outstanding anomalous precipitation value over most of the Iberian Peninsula domain with the highest standardized anomalies being found in the NW Iberian Peninsula (> 10 std).

During this period, the predominance of westerly winds over or near Iberia points towards the presence of a significant low pressure system driving the North Atlantic atmospheric circulation dynamics at the synoptic scale. Moreover the presence of ARs reaching consecutively the western Iberia added to the advection of Atlantic moisture towards the continent, enhancing the precipitable water content.

References:

Ramos A; Trigo R; Liberato M; Tomé R. Daily Precipitation Extreme Events in the Iberian Peninsula and Its Association with Atmospheric Rivers. *Journal of Hydrometeorology* 2015, vol. 16, issue 2, pp. 579-597.

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