



Extreme precipitation events in the Iberian Peninsula and its association with Atmospheric Rivers

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Extreme precipitation events in the Iberian Peninsula during the winter half of the year have major socio-economic impacts associated with floods, landslides, extensive property damage and life losses. 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 both Europe and USA.

ARs are relatively narrow regions of concentrated WV responsible for horizontal transport in the lower atmosphere corresponding to the core section of the broader warm conveyor belt occurring over the oceans along the warm sector of extra-tropical cyclones. Over the North Atlantic ARs are usually W-E oriented steered by pre-frontal low level jets along the trailing cold front and subsequently feed the precipitation in the extra-tropical cyclones. It was shown that more than 90% of the meridional WV transport in the mid-latitudes occurs in the AR, although they cover less than 10% of the area of the globe. The large amount of WV that is transported can lead to heavy precipitation and floods.

An automated ARs detection algorithm is used for the North Atlantic Ocean Basin allowing the identification and a comprehensive characterization of the major AR events that affected the Iberian Peninsula over the 1948-2012 period. The extreme precipitation days in the Iberian Peninsula were assessed recently by us (Ramos et al., 2014) and their association (or not) with the occurrence of AR is analyzed in detail here. The extreme precipitation days are ranked by their magnitude and are obtained after considering 1) the area affected and 2) the precipitation intensity. Different rankings are presented for the entire Iberian Peninsula, Portugal and also for the six largest Iberian river basins (Minho, Douro, Tagus, Guadiana, Guadalquivir and Ebro) covering the 1950-2008 period (Ramos et al., 2014).

Results show that the association between ARs and extreme precipitation days in the western domains (Portugal, Minho, Tagus and Douro) is noteworthy, while for the eastern and southern basins (Ebro, Guadiana and Guadalquivir) the impact of ARs is reduced. In addition, meteorological large scale influence associated with ARs was also analyzed. The anomalies between the extended winter (ONDJFM) long term mean and the composite for the persistent ARs time steps were computed for the IVT and SLP fields. Negative SLP anomalies are found centered in Ireland with slight positive anomalies of SLP located over northern Africa. It was found that the ARs hitting the IP are strongly correlated with the EA pattern, while the influence of other patterns such as the NAO or SCAND is weak. Main results presented are currently in print (Ramos et al., 2015)

Ramos et al (2014), A ranking of high-resolution daily precipitation extreme events for the Iberian Peninsula. *Atmospheric Science Letters*, doi: 10.1002/asl2.507.

Ramos et al. (2015), Daily precipitation extreme events in the Iberian Peninsula and its association with Atmospheric Rivers. *Journal Hydrometeorology*, in press.

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