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Extreme Precipitation Events over the Iberian Atlantic Margin: The Role of Atmospheric Rivers

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Between 90%-95% of precipitable water meridional transport is concentrated in narrow and elongated structures (hundred of km wide and thousands of km long), labelled as Atmospheric Rivers (ARs). These areas, classically associated to the pre-cold frontal warm conveyor belt region; are located within the warmest and wettest sector of extra-tropical cyclones. Such cyclones are mostly associated to the polar front but occasionally originated as tropical storms, acquiring baroclinic structures when leaving the tropical latitudes.

ARs inject water vapor and latent heat from the tropics to mid-latitudes, with a predominant zonal-wind component tracking. The Northern Hemisphere has its main impact areas on the West US and European coast.

Atmospheric Rivers are associated to extreme precipitation events (EPE) within the continents. This association is due to the huge amount of precipitable water that they carry and the fact that they are located in a 850hPa-900hPa level, exposing them to an orographic lift that is usually translated into heavy rainfall and flood events.

We examine the impact of the advent of Atmospheric Rivers from the North Atlantic Corridor (with origin in the Gulf of Mexico), over the Iberian Peninsula, and its relationship with extreme precipitation and flood events over the Iberian Atlantic Margin. We precisely investigate the Extreme Precipitation Event-Atmospheric River advent ratio, and analyze the advent-annual cycle and the correlation with the NAO-Index.

We use a Spain-Portugal interpolated precipitation Database, together with ECMWF ERA-Interim ($0.7^\circ \times 0.7^\circ$ horizontal resolution) vertical integrated column of eastward and northward water vapor flux to identificate the AR presence, extreme precipitation and EPE-AR coincidence events, using a detection algorithm based on water vapor integrated flux.

We find a substantial EPE-AR coincidence ratio, with an slight correlation with negative NAO and running predominantly in the winter time of the year.