

Moisture sources of the Atmospheric Rivers making landfall in western Europe

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An automated atmospheric river (AR) detection algorithm is used for the North Atlantic Ocean basin, allowing the identification of the major ARs affecting western European coasts between 1979 and 2012. The entire western coast of Europe was divided into five domains, namely the Iberian Peninsula (9.75W, 36–43.75N), France (4.5W, 43.75–50N), UK (4.5W, 50–59N), southern Scandinavia and the Netherlands (5.25E, 50–59N), and northern Scandinavia (5.25E, 59–70N). Following the identification of the main ARs that made landfall in western Europe, a Lagrangian analysis was then applied in order to identify the main areas where the moisture uptake was anomalous and contributed to the ARs reaching each domain. The Lagrangian data set used was obtained from the FLEXPART model global simulation from 1979 to 2012.

The results show that, in general, for all regions considered, the major climatological areas for the anomalous moisture uptake extend along the subtropical North Atlantic, from the Florida Peninsula (northward of 20N) to each sink region, with the nearest coast to each sink region always appearing as a local maximum. In addition, during AR events the Atlantic subtropical source is reinforced and displaced, with a slight northward movement of the sources found when the sink region is positioned at higher latitudes. In conclusion, the results confirm not only the anomalous advection of moisture linked to ARs from subtropical ocean areas but also the existence of a tropical source, together with midlatitude anomaly sources at some locations closer to AR landfalls (Ramos et al., 2016).

References:

Ramos et al., (2016) Atmospheric rivers moisture sources from a Lagrangian perspective, *Earth Syst. Dynam.*, 7, 371-384.

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