



On the Relationship Between Atmospheric Rivers, Weather Types and Floods in Galicia (NW Spain)

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Atmospheric Rivers (ARs) -long and narrow anomalies of water vapor flux located in the warm sector of extratropical cyclones- are closely related to extreme precipitation, floods and damages in the Spanish region of Galicia. This study will analyze the connection between ARs and Flood Events (FE) under different WT synoptic situations. The scope of this work is twofold. First, we identify the relationship between ARs and flood events under different synoptic conditions over the studied region. And second, this study may be useful to properly understand and predict the damages caused by flood events. Hence, no ordinary precipitation databases have been used, but instead, we have employed a flooding events database published by the Spanish Emergency System (Protección Civil de España), where only occurrences with serious implications in terms of damage are considered. As the main flood database, the rainfall database has been used only to quantify the exact amount of precipitation on flooding days.

The main result is that flooding episodes in the months between October and March in the coastal areas of Galicia (SW Spain) is associated with Weather Types of W, SW and C. These Weather Types are related to the arrival of baroclinic structures, Atlantic storms and atmospheric rivers to the Galician coast. The results support the critical role that Atmospheric Rivers play in the intensification of the flood episodes, being present in 70% of the most important flood events in coastal areas, and providing enough moisture to increase the accumulated rainfall.

The link between ARs and flood events is not so evident in coastal areas in the summer months or for the inland basin during any season. It is likely that this is due to a more convective nature of precipitation in extreme events far from the coast, and in the extended summer months. It should be noted that most of the flood events in Galicia do not coincide with an AR, in both coastal and inland areas and in both summer and winter months. However, the expected precipitation of the flood event is more than double if an AR is detected, under any synoptic condition.