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## Understanding the climate-driven role in the abrupt eighties shift of Iberian hydrological resources

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Since the early 1980s, several studies have noticed an abrupt decrease of inflows in the main reservoirs of the western Mediterranean basin. This decline has been more noticeable in the Iberian Peninsula (IP) during the extended winter season (DJFM) where mean inflows decreased until 40% during 1981-2010 compared to 1951-1980. Higher inflows reductions have been found over the western IP where precipitation is mainly modulated by Atlantic fronts. Several plausible causes have been attributed to this phenomenon; changes in land uses, improved datasets or changes in the atmospheric dynamics, among others.

In this work, we assess what is the role of the changes in the large-scale to induce the eighties abrupt precipitation decrease. The analysis consists on the computation of the Wintertime Circulation Types (WCTs) during 1951-2010 using the SLP from ERA20C Reanalysis over a window encompassing the North Atlantic and the Western Europe (-30W, 30E, 65N, 25S). The precipitation associated to these WCTs is analysed using the high-resolution database SPREAD (Serrano-Notivoli et al., 2018). Results show that retaining a group of WCTs may be enough to represent the synoptic situations during reference period over the target region. The frequency of some anticyclonic WCTs (associated with a high pressure over the Iberian Peninsula) showed a significant positive trend for 1951-2010. In contrast, WCTs associated with Atlantic fronts had a significant negative trend. The WCTs promoting westerly flow lead close to the 50% of the annual precipitation over western and central IP during 1951-2010. Then, an abrupt decrease of the frequency of these WCTs directly affects to the precipitation decline in this region (~200 mm). In contrast, the abrupt increase of the anticyclonic WCTs lead to an increase of the precipitation over the eastern IP (~50 mm). Similar significant abrupt shift in precipitation was observed during WCTS associated with cyclones and anticyclones. These results are in agreement with Gómez-Martínez et al. (2018) who found evident links between an increasing NAO index and the decreasing inflows in two basins of the Iberian Peninsula.

Henceforth, there is a need to fulfil the lack of scientific knowledge regarding this abrupt shift in the hydrological resources of the western Mediterranean basin. Precisely, the results of this study shed some light on the causes for the decrease of inflows and run-off over this area and whether

they are driven by changes in the regional atmospheric circulation since the early 1980s, related to the internal variability or a global warming forcing. Hence, these results will enable us to identify mitigation and adaptation policies for optimizing the water management.

## **References**

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