



## **Advances in the understanding of heavy precipitation in the western Mediterranean region**

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Extreme precipitation events greatly affect the Mediterranean societies. The Mediterranean basin is prone to heavy precipitation because of its distinctive topography and geographical location. Most of these events occur in autumn over the Western Mediterranean. With the goal of improving our understanding of the processes shaping these extremes and providing a better model representation, in this study we focus on two components of the water cycle: the soil and the atmospheric moisture. Several studies have shown that soil-atmosphere interactions and atmospheric water vapour evolution are important factors contributing and determining the occurrence and location of heavy precipitation extremes. Uncertainties associated with their model representation contribute to the uncertainty in modelling of heavy precipitation.

In this study, we explore the sensibility of the western Mediterranean heavy precipitation to soil moisture conditions and atmospheric water vapour evolution. The sensitivity to soil moisture extreme dry and wet initial scenario conditions and soil moisture initialization are examined using high-resolution convection permitting simulations and state of the art soil moisture satellite observations, namely the SMOS disaggregated 1 km product over the Iberian Peninsula. Moreover, the relevance of an accurate representation of atmospheric water vapour distribution and evolution is investigated through assimilation of a state-of-the-art GPS-derived Integrated Water Vapour data set and radiosounding profile information.