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Revealing the role of long-term drought in the record-shattering April 2023 heatwave in the Western Mediterranean

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In April 2023, the Western Mediterranean region was hit by an exceptional and unprecedented heatwave that broke several temperature records. In Cordoba (Spain), the previous April maximum temperature record was exceeded by almost 5°C. In this study, we investigated the interaction between soil moisture and the extreme temperatures reached during this event, using the latest available observational data and several statistical techniques capable of quantifying this relationship. Our results revealed that soil moisture deficit preconditions, concurring with a strong subtropical ridge as a synoptic driver, had a key contribution to the amplification of this record-breaking heatwave. Specifically, we estimated that the most extreme temperature records would have been 4.53 times less likely and 2.19°C lower if the soils had been wet. These findings indicated that soil moisture content may be a crucial variable for seasonal forecasting of early HW in this region and other Mediterranean climate regimes that already suffering an increment in the frequency of compound drought–heatwave events.