



Stratospheric influence on Mediterranean climate: Western Mediterranean precipitation in March 2018

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Stratospheric polar vortex variability has already been proven to affect North Atlantic surface weather and climate. For instance, a negative phase of the North Atlantic Oscillation (NAO) tends to follow the occurrence of a sudden rise in polar stratospheric temperature, so-called Sudden Stratospheric Warming (SSW). This pattern might persist up to two months after the stratospheric event. Accordingly, SSWs can impact the western Mediterranean, modulating the precipitation in that area. However, there is still large uncertainty in the magnitude of the tropospheric response to SSWs since tropospheric conditions sometimes prevail over the stratospheric signal.

In March 2018 the western Mediterranean region experienced extraordinary weather, including a very rare snow episode in Rome and persistent rainy and windy conditions in the Iberian Peninsula that ended the most severe drought since 1970 at continental scale. In Portugal, renewable energies, mainly hydroelectric and wind power, became for the first time in history the only sources of the entire electric power generated in that month. Two weeks earlier an SSW took place, preceded by the strongest planetary wave activity on record. In this study we show that the extraordinary surface anomalies in southwestern Europe during March 2018 were associated with the extreme stratospheric conditions. This case is a good example of the stratosphere-troposphere dynamical coupling that can ultimately help to improve seasonal forecast predictions in the Mediterranean region.