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## Compound dry and hot extreme events in the Mediterranean region

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Over the last few decades, the frequency, duration, magnitude of heatwaves in Europe have increased considerably, with major natural and socioeconomic impacts (Basarin et al., 2020; K.P. Tripathy et al., 2022). In climate change scenarios, these events are expected to present an increasing trend (Zscheischler et al., 2018) due to variations in dynamic and thermodynamic mechanisms, triggering unusually longer and more intense periods of drought and causing a reduction in agricultural production and the supply of water reservoirs. The Mediterranean region is a climate change hotspot and therefore a region susceptible to the development and intensification of single or compound hot and dry events (Giorgio and Linello, 2008).

This work aims at studying single and compound heatwaves and droughts based on ERA5 and ERA5-Land databases for Southern Europe on a  $0.25^\circ \times 0.25^\circ$  and  $0.1^\circ \times 0.1^\circ$  spatial resolution, respectively.

The results show positive trends for the duration and intensity of heatwaves and droughts and, conversely, negative trends for soil moisture. Most of the study area shows statistically significant negative trends when aggregating spatially. On the other hand, the annual temperature means tends to migrate towards higher values and precipitation means show a small decrease. Furthermore, the relation between large scale climatic patterns such as the North Atlantic Oscillation (NAO) and compound drought and heatwaves are studied here.

It is expected that compound hot and dry events will have a positive trend in their frequency, duration and intensity, as a consequence of climatic phenomena, such as the synoptic systems, or even due to previous dry characteristics of the soil. Our findings highlight the intricate interplay between different mechanisms in the occurrence of extreme events in Mediterranean Europe, putting into evidence the need for better representation this interplay in climate models.

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