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## Heatwave analysis over the city of Valencia (Spain) for past and future climate change models and scenarios

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Heatwaves have emerged as an increasingly recurrent extreme meteorological event, in the Mediterranean region and throughout Europe, during the summer. This is attributable to shifts in the distribution and magnitude of temperatures. In particular, the Comunitat Valenciana a region in Spain experienced the last summer its highest temperature, registering a 1.6°C increase in the monthly average temperature compared to the reference period (1991-2020). On August 10, the historical record was exceeded by 3.4°C, with temperatures exceeding 40°C in more than 50% of the territory as reported by the Spanish Meteorological Agency (AEMET). During this climatic event, the Mortality Monitoring (MoMo) system reported a substantial spike in excess deaths, reaching 1,990 in August. This figure significantly exceeded the preceding month's tally of 686 fatalities and the subsequent month's count of 186 deaths. This concentration of mortality in the hottest month underscores the severity of the impact.

The analysis of heatwaves is crucial to provide scientific support for the necessary formulation of inform adequate public policies. Additionally, it enables the population to undertake necessary actions to mitigate the adverse effects of high temperatures.

In a context of increasing temperatures due to climate change, foreseeing its future evolution would provide valuable information for better preparedness. The present research analyses future heatwaves and trends in the city of Valencia, Spain. Future temperatures refer to five bias adjusted CMIP6 (Coupled Model Intercomparison Project Phase 6) climate change models across four different scenarios: historical (1979 to 2014), SSP126, SSP370 and SSP585 (2015-2100). Model suitability is evaluated comparing historical runs with reference data from W5E5-ERA5Land. Afterwards, an analysis of future heatwaves is conducted, using the operational definition of heatwave from Spain: periods of at least three consecutive days where maximum temperature exceeds a critical threshold set by each municipality, which in Valencia refers to the 90th percentile of maximum temperatures for the historical period.

For each detected heatwave the selected indicators are: the number, frequency, duration, intensity, amplitude, and risk level associated with these climatic events. Our analysis evaluates how the number of heatwaves vary, as well as to understand the behaviour of heatwaves in Valencia to determine how the risk might evolve in future contexts, and in a future generating a

predictive model providing information on their spatial distribution, intensity, duration and severity.

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