

EGU22-5448

<https://doi.org/10.5194/egusphere-egu22-5448>

EGU General Assembly 2022

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Geographically varying temperature thresholds for societal attention and health impacts of heat waves

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Heat waves have severe impacts on economy, ecosystems, and society. In many regions, hot temperature extremes are expected to become more frequent and intense in the future. It is not clear, however, to which extent Europeans perceive heat waves as important and potentially pressing issues, which may for example vary according to a region's climatic conditions. We analyze and compare the response of societal attention and public health to heat waves across many European countries for the period 2010-2020. In particular, we consider Google search attention to heat waves (which summarizes relevant search requests with similar search terms and across languages), as well as related excess mortality and press mentions.

We explore several temperature-related variables in this context and find that societal attention and excess mortality are most strongly related to maximum temperatures. Further, these relationships exhibit a threshold behavior with a temperature above which the sensitivity of societal attention or excess mortality to temperature is clearly increased. Applying a piecewise regression analysis, we identify these temperature thresholds in the relationships of societal attention and mortality with temperature in each country. In general, we find higher temperature thresholds in countries with warmer climate. Thresholds vary strongly between relatively cold countries and are more similar across warmer countries. These results are consistent across Google search attention and mortality analyses, even though excess mortality tends to be less strongly related to temperature, as they are potentially affected by other factors.

The country-specific temperature thresholds identified from empirical data will further be used to study the countries' preparedness for future climate conditions. In the next step, applying the thresholds to climate model projections, we will identify the expected annual number of relevant heat wave days and their trends until the end of the century. This allows us to identify regions and time periods with a high sensitivity to heat waves where improved management and adaptation are particularly important.

