

# Beyond Ambient Temperature: A Comparative Analysis of Heat Metrics for Detecting Heatwaves on a Country Level

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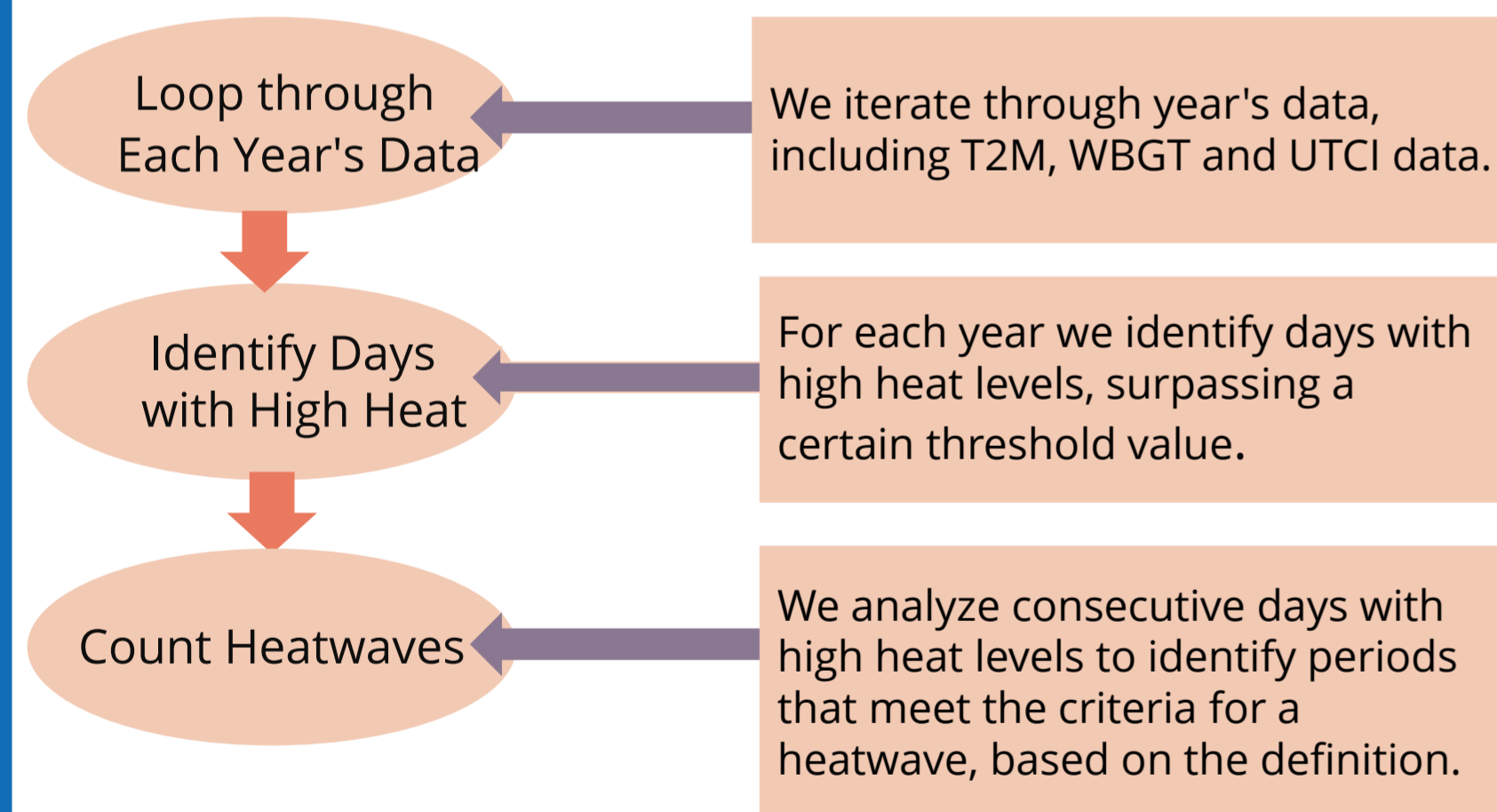
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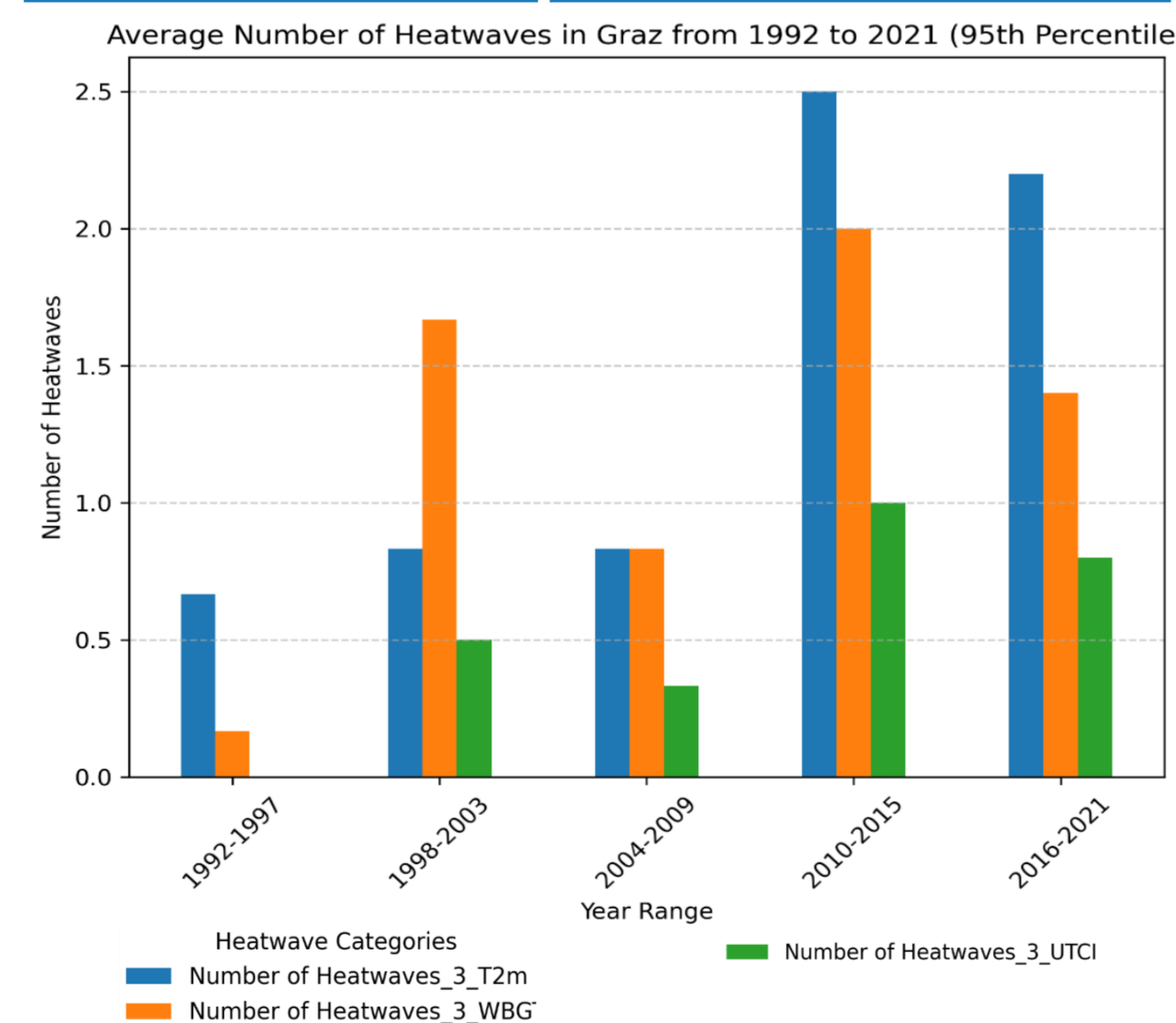
## Background

- Heat metrics like wet-bulb globe temperature (WBGT) and the universal thermal climate index (UTCI) offer a more comprehensive evaluation of extreme heat risks, particularly in terms of their impact on human health.<sup>1</sup>
- For example, using WBGT instead of air temperature for defining heatwaves revealed longer and more impactful heatwave durations, notably increasing hospitalizations from heat disorders in South Korea.<sup>2</sup>
- By developing an algorithm which reads gridded reanalysis data we aim to compare 3 different heat metrics (T2M, UTCI & WBGT) on the territory of Austria for the years 1992 to 2020. In our approach we define a heatwave by the exceedance of the 95<sup>th</sup> percentile of a specific day for three consecutive heat days.

## Heatwave Detection



## Example Graz



## References

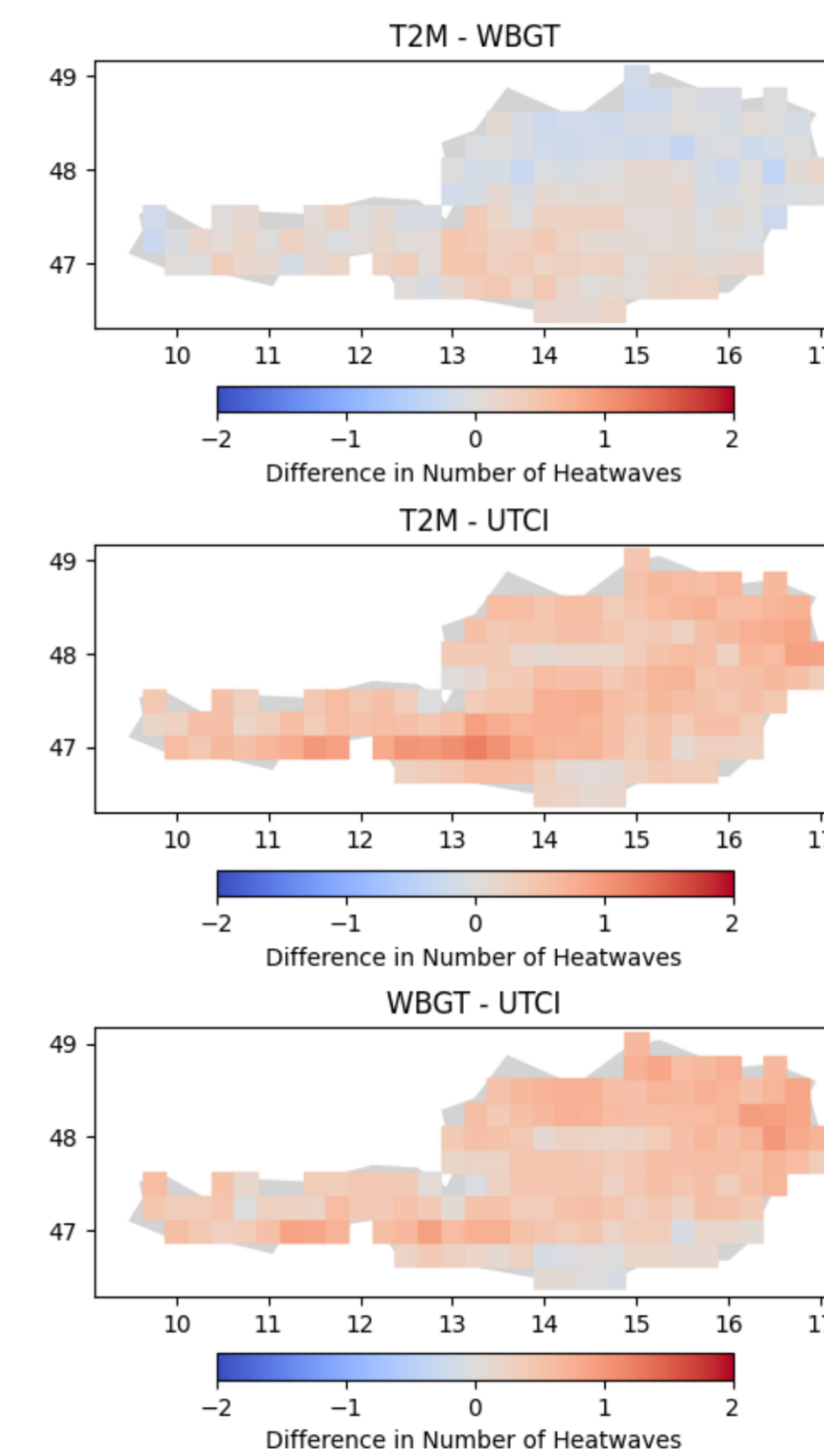
- <sup>1</sup>McGregor, G. R., & Vanos, J. K. (2018). Heat: A primer for public health researchers [Special issue on Health and high temperatures]. *Public Health*, 161, 138-146. <https://doi.org/10.1016/j.puhe.2017.11.005>
- <sup>2</sup>Heo, S., Bell, M. L., & Lee, J.-T. (2019). Comparison of health risks by heat wave definition: Applicability of wet-bulb globe temperature for heat wave criteria. *Environmental Research*, 168, 158-170. <https://doi.org/10.1016/j.envres.2018.09.032>

## Future Work

- Classify heatwaves using HWMIId
- Differentiate between seasonal heatwaves
- Link heatwave occurrence to mortality or other health related data
- Expand to other geographic regions

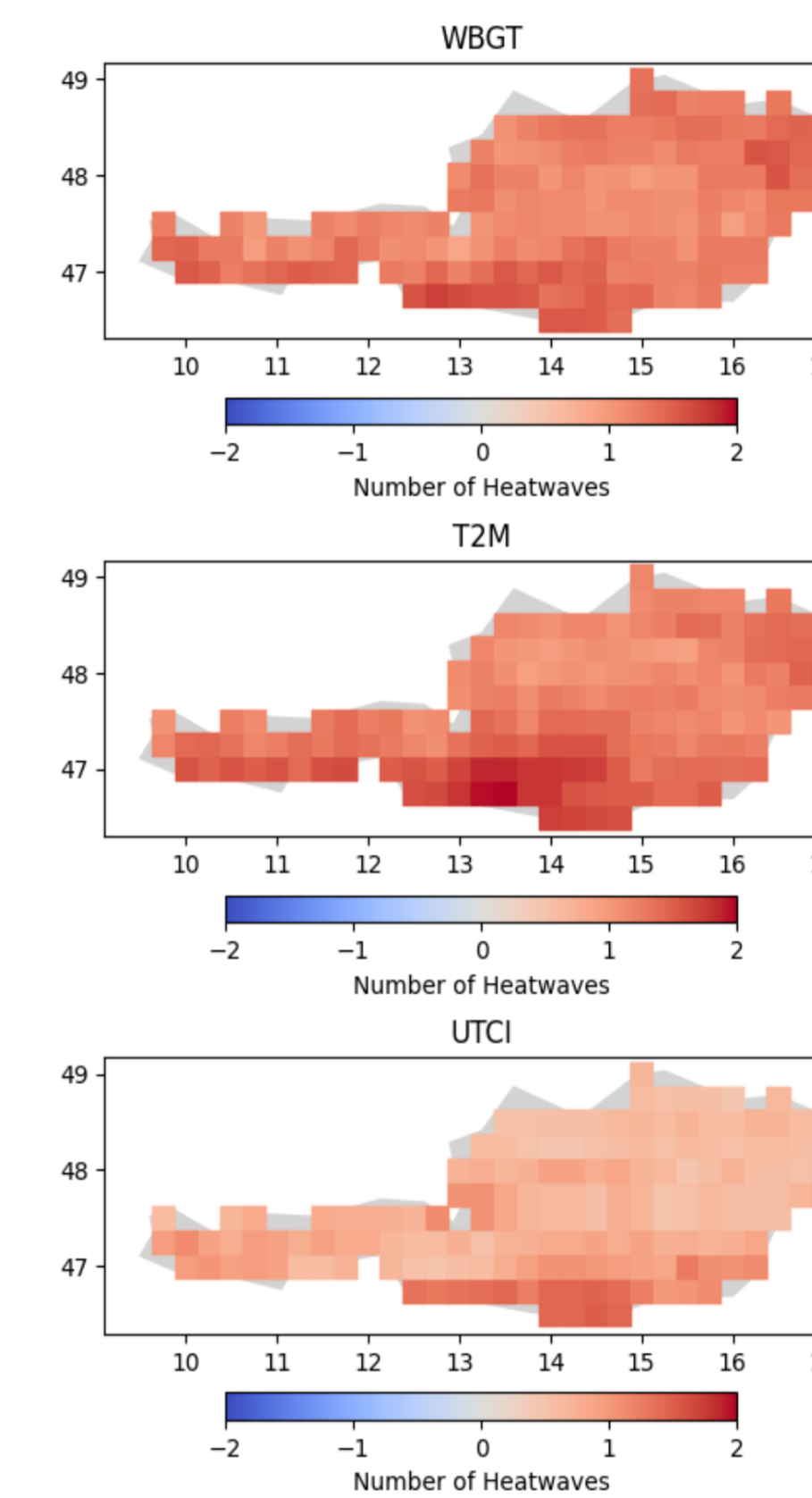
## Differences

Difference in Yearly Average Number of Heatwaves in Austria Ref. 1992-2020

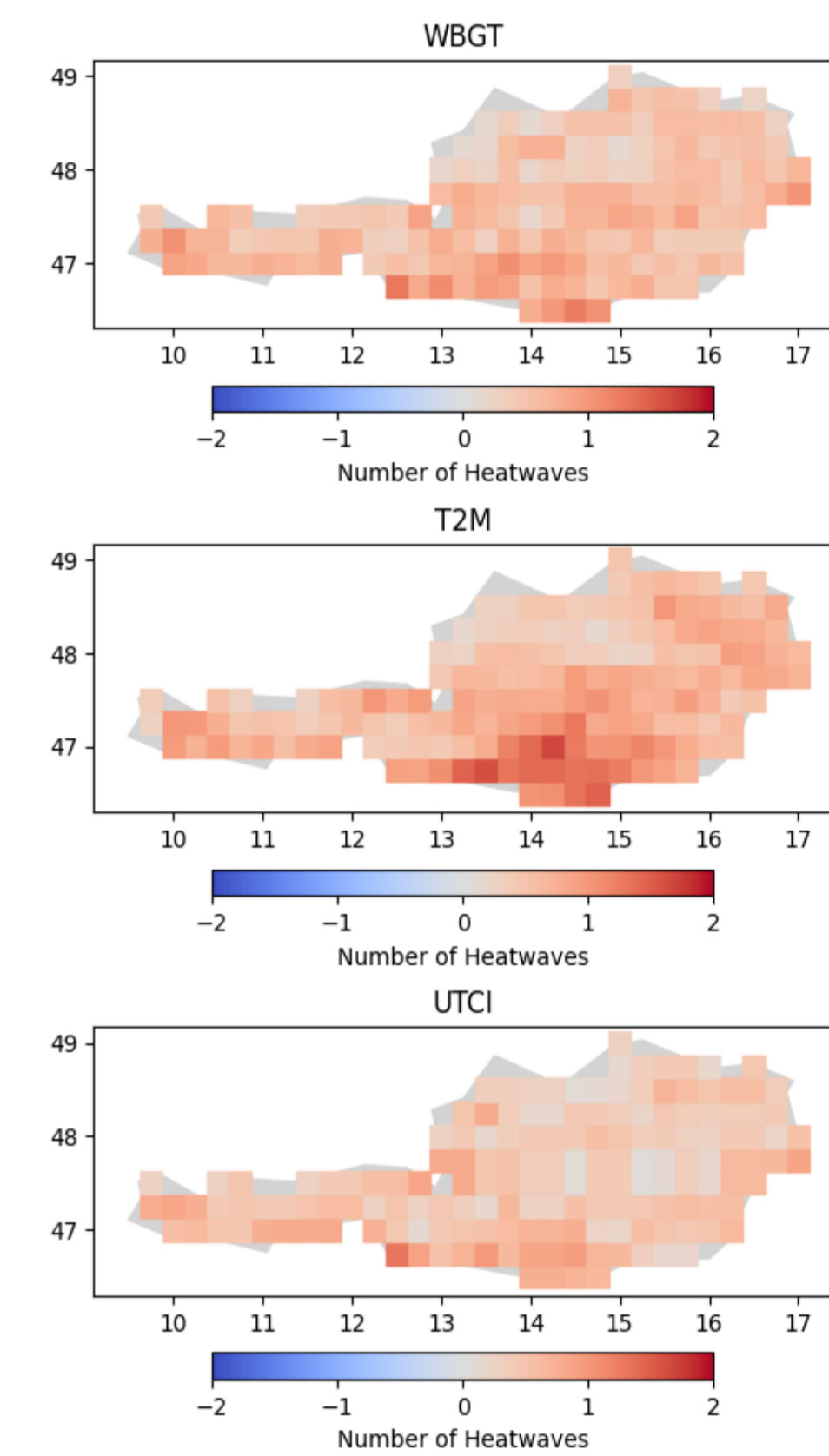


## Heatwave Occurrence in Austria

Yearly Average Number of Heatwaves in Austria Ref. 1992-2020



Changes from Ref 2012-2020



## Key Messages

- Throughout all heat metrics all-year round heatwaves occur the most in the south of Austria while T2M shows the highest and UTCI the lowest number of heatwaves over the reference period 1992 to 2020.
- When calculating the differences, T2M-WBGT shows more heatwaves in the south and less of them in the north. The other comparisons show no spatial changes in sign.
- The results are not robust because with changing heatwave definition the differences in number of heatwaves vary as well.
- Analyzing heatwave distribution based on various metrics can help policymakers pinpoint vulnerable regions, guiding the development of targeted policies to protect at-risk populations.



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