

Definition of heat wave

- Glossary of Meteorology: "A period of abnormally and uncomfortably hot and usually humid weather."
https://glossary.ametsoc.org/wiki/Heat_wave
- IPCC: "a period of abnormally hot weather, often defined with reference to a relative temperature threshold, lasting from two days to months." https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_Annex-II.pdf → Heat index (air temperature and relative humidity) → Only suitable for night-time use and only partially suitable for assessing heat stress in German climates
- WMO (2023): 'Therefore, a heatwave can be defined as a period of marked and unusually hot weather persisting for at least two consecutive days.'
https://library.wmo.int/viewer/58396?medianame=1310_Guidelines_on_DEWCE_en_#page=1&viewer=picture&o=bookmark&n=0&q

The definition should include:

- Intensity → Labeling as an extreme event in the climate context: deviation from the climate normal
- Duration → Period of high temperature values
- Spatial extent, if applicable
- Potential hazard, if applicable

Conclusion: The purpose of application (e.g. climate analysis, extreme weather warning, application of specific impact models, human heat stress in open spaces, indoor climate, etc.) should be taken into account in order to select the appropriate definition.

Short description/Variable	Definition/description	Application reference	Sources/Links
DWD - Temperature-Heatwave/ Air temperature	Reference periode 1961-90 → Tmax at any location → S for each day corresponding to the 98th percentile of the distribution (30 values and 15 days before and after the date → 930-value distribution) → Tmax > S AND > 28°C on 3 consecutive days → Heatwave	Climate: climate maps DWD	https://www.dwd.de/DE/service/lexikon/Functions/glossar.html?lv3=624852&lv2=101094
DWD - Heat load/ Perceived temperature (from energy balance model, with radiation variables, air temperature, humidity, wind speed)	Strong heat load: Perceived temperature (GF) afternoon $\geq 32^{\circ}\text{C}$ extreme heat load: GF afternoon $\geq 38^{\circ}\text{C}$	Weather: Heat warning if GF threshold reached on at least 2 days	https://www.dwd.de/DE/leistungen/hitzewarnung/hitzewarnung.html
WMO/ Air temperature	Reference period 1961-90 → mean Tmax = S, Tmax > 5K+S on 5 consecutive days → heatwave Note: there is no specific definition on the current WMO website!	Weather: Heat warning e.g. in India	https://www.ifrc.org/sites/default/files/2021-06/10-HEAT-WAVE-HR.pdf
Climate index HWMId (Heat Wave Magnitude Index daily)/ Air temperature	Reference period 1981-2010 → Tmax at each location → S for each day corresponding to the 90th percentile of the distribution (31-day window, centered) → Tmax > S on 3 consecutive days → Heatwave Definition Magnitude, application also to Tmin	Climate: Reanalyses, RCP analyses	Russo et al., 2015 DOI 10.1088/1748-9326/10/12/124003
MetOffice - Heat wave/ Air temperature	Reference period 1981-2010 → Tmax in July in various UK areas → S corresponding to 90th percentile → Tmax \geq S on 3 consecutive days → Heatwave	Weather	https://rmets.onlinelibrary.wiley.com/doi/pdf/10.1002/wea.3629

Tmax... daily maximum air temperature, S... threshold value