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An "H-index" for summer heat waves

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Heat waves are among the most severely impacting natural disasters with which we contend. Recent summer “mega-heatwave” extremes in France (2003) and Russia (2010) lead to impacts on ecosystems and economic sectors, as well as increased mortality rates. Appropriate adaptation measures and improved early warning systems are necessary to cope with more frequent phenomena such as those that occurred in the last decade. A simple scale, that allows both identification, definition and ranking of individual heat wave events based on environmental conditions and potential for societal impact, is lacking. Such magnitude scale could also help to evaluate the evolution of heat waves in multi-model climate projections as compared to current climate.

A simple index, easy to calculate and communicate, is designed to capture both the intensity and duration of summer heat waves. The index, analogous to the Hirsch index for citations, expresses the magnitude of a heat wave event (H) by the number of subsequent days H over which the daily average apparent temperature anomaly exceeds H K. It accounts for the magnitude of the day- and night-time temperature anomalies, humidity and wind, as well as for the duration of the heat wave episode. As a preliminary application, we calculated H over a 36 year-long global set of meteorological station data, after a careful quality check procedure. We show that these events, as characterised by H, have doubled in number over the past few decades. We also show that large magnitude heat waves (say $H \geq 8$) occur essentially in mid to high latitudes and over continental areas.