

Heat waves and the urban heat island - A clear case?

Daniel Fenner, Achim Holtmann, Fred Meier, Alexander Krug, and Dieter Scherer

Technische Universität Berlin, Institute of Ecology, Chair of Climatology, Berlin, Germany (daniel.fenner@tu-berlin.de)

Heat waves (HWs) as natural hazards pose health risks to humans and are responsible for more human fatalities than any other natural hazard in Europe. At the same time, due to the urban heat island (UHI) effect, people living in cities are at even higher risk to be adversely affected by high temperatures. While some studies show that more and longer HWs are found in urban regions compared to the surrounding regions, and that the UHI effect is amplified during HWs, other studies show unchanged or reduced UHI intensities during hot weather conditions. Here we take the urban region of Berlin, Germany, as an example to address two aspects of the topic: Firstly, we compare different HW definitions to investigate if and how the city is subject to aggravated HW conditions in comparison to the surroundings and how the choice of definition might lead to contrasting results. Secondly, we investigate how the choice of location and time of day to identify hot weather conditions affects the results concerning UHI intensity. For Berlin we find contrasting results, showing reduced or amplified UHI intensity during HWs. High-quality near-ground observational data from several decades and crowdsourced data from citizen weather stations are used for the investigation. With the use of crowdsourced data of several hundreds of stations we can obtain statistically significant results that are not achievable with the limited number of high-quality reference stations. It is thus demonstrated that crowdsourced data are an important addition to 'traditional' observational data in urban climate research. Furthermore, the results clearly highlight that methodological aspects play a crucial role for results concerning heat waves and their interaction with urban atmospheres.