



## **Urban interactions with heatwaves in India**

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Heatwaves are synoptic scale events with extremely high temperatures and are among major causes of mortality around the world. There are several studies which suggests that urban built-up regions amplify the temperatures during heatwaves, rendering the urban population at higher risk. These studies show that urban heat island (UHI) intensity, which is the difference in temperatures between urban regions and their surrounding non-urban regions amplifies during heatwaves. This amplifications is attributed to urbanisation and thus the risk associated with it increases in such events. However, the amplification in UHI intensity does not help us understand if the urban system actively induces risks during heatwaves or not, or if there exists an absolute amplification in and outside the urban region. Here we show that urbanization in India does not amplify heatwave temperatures and the surrounding rural regions are at higher risks during heatwaves than their urban counterparts. These non-urban regions show higher amplification of Land Surface Temperature (LST) during heatwaves. Furthermore, we found a decline in frequency of hot nights and negligible changes in hot day frequency in the Indo-Gangetic plains. Using Community Land Model (CLM) simulations, we suggest that this decline in hot nights and negligible changes in hot days in the Indo-Gangetic plain regions are as a result of intensive irrigation in the region. These results puts another perspective to the ongoing debate of impact of urbanization on local warming and their associated risks. Furthermore, our results on impact of intensive irrigation on local cooling during heatwaves, provide a glimpse into plausible mitigation strategies.