



Observed Climate Extremes in Global Urban Areas

Dennis Lettenmaier (1), Vimal Mishra (2), Auroop Ganguly (3), and Bart Nijssen (1)

(1) University of Washington, Seattle, WA USA (dennisl@uw.edu), (2) Indian Institute of Technology, Gandhinagar, India (vmishra@iitgn.ac.in), (3) Northeastern University, Boston, USA (a.ganguly@neu.edu)

Global urban population and number of urban areas have been increasing at an unprecedented pace during the last few decades. Climate extremes have profound implications for urban infrastructure and human society, but studies examining observed changes in climate extremes over the global urban areas are few. Here, using observed station data for 217 urban areas across the globe, we show that these urban areas have experienced significant increases in the number of heat waves during the period 1973-2012, while the frequency of cold waves has declined. Almost half of the urban areas experienced significant increases in the number of extreme hot days, while almost 2/3 showed significant increases in the frequency of extreme hot nights. Extreme windy days declined substantially during the last four decades with statistically significant declines in about 60% in the urban areas. Significant increases in the frequency of daily precipitation extremes and in annual maximum precipitation occurred at smaller fractions (17 and 10% respectively) of the total urban areas, with about half as many urban areas showing statistically significant downtrends as uptrends. Changes in temperature and wind extremes for urban and (nearby) non-urban stations differed, while changes in precipitation-related extremes were generally similar for urban and nearby non-urban stations.