

# Urban Heat Island Assessment: Metadata Are Important

THOMAS C. PETERSON AND TIMOTHY W. OWEN

*NOAA/NESDIS/National Climatic Data Center, Asheville, North Carolina*

(Manuscript received 17 September 2004, in final form 10 January 2005)

## ABSTRACT

Urban heat island (UHI) analyses for the conterminous United States were performed using three different forms of metadata: nightlights-derived metadata, map-based metadata, and gridded U.S. Census Bureau population metadata. The results indicated that metadata do matter. Whether a UHI signal was found depended on the metadata used. One of the reasons is that the UHI signal is very weak. For example, population was able to explain at most only a few percent of the variance in temperature between stations. The nightlights metadata tended to classify lower population stations as rural compared to map-based metadata while the map-based metadata urban stations had, on average, higher populations than urban nightlights. Analysis with gridded population metadata indicated that statistically significant urban heat islands could be found even when quite urban stations were classified as rural, indicating that the primary signal was coming from the relatively high population sites. If ~30% of the highest population stations were removed from the analysis, no statistically significant urban heat island was detected. The implications of this work on U.S. climate change analyses is that, if the highest population stations are avoided (populations above 30 000 within 6 km), the analysis should not be expected to be contaminated by UHIs. However, comparison between U.S. Historical Climatology Network (HCN) time series from the full dataset and a subset excluding the high population sites indicated that the UHI contamination from the high population stations accounted for very little of the recent warming.