Assessment of Urban Versus Rural In Situ Surface Temperatures in the Contiguous United States: No Difference Found

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ABSTRACT

All analyses of the impact of urban heat islands (UHIs) on in situ temperature observations suffer from inhomogeneities or biases in the data. These inhomogeneities make urban heat island analyses difficult and can lead to erroneous conclusions. To remove the biases caused by differences in elevation, latitude, time of observation, instrumentation, and nonstandard siting, a variety of adjustments were applied to the data. The resultant data were the most thoroughly homogenized and the homogeneity adjustments were the most rigorously evaluated and thoroughly documented of any large-scale UHI analysis to date. Using satellite night-lights–derived urban/rural metadata, urban and rural temperatures from 289 stations in 40 clusters were compared using data from 1989 to 1991. Contrary to generally accepted wisdom, no statistically significant impact of urbanization could be found in annual temperatures. It is postulated that this is due to micro- and local-scale impacts dominating over the mesoscale urban heat island. Industrial sections of towns may well be significantly warmer than rural sites, but urban meteorological observations are more likely to be made within park cool islands than industrial regions.