

Spatiotemporal Analysis of Land Surface Temperature and Urban Heat Island Evaluation of Four Metropolitan Areas of Texas, USA

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Abstract : Remotely sensed land surface temperature (LST) is vital to understand the land-atmosphere energy balance, hydrological cycle, and thus is widely used to describe the urban heat island (UHI) phenomenon. However, due to technical constraints, satellite thermal sensors are unable to provide LST measurement with both high spatial and high temporal resolution. Despite different downscaling techniques and algorithms to generate high spatiotemporal resolution LST. Four major metropolitan areas in Texas, USA: Dallas-Fort Worth, Houston, San Antonio, and Austin all demonstrate UHI effects. Different cities are expected to have varying SUHI effect during the urban development trajectory. With the help of the Landsat, ASTER, and MODIS archives, this study focuses on the spatial patterns of UHIs and the seasonal and annual variation of these metropolitan areas. With Gaussian model, and Local Indicators of Spatial Autocorrelations (LISA), as well as data fusion methods, this study identifies the hotspots and the trajectory of the UHI phenomenon of the four cities. By making comparison analysis, the result can help to alleviate the advent effect of UHI and formulate rational urban planning in the long run.

Keywords : spatiotemporal analysis, land surface temperature, urban heat island evaluation, metropolitan areas of Texas, USA

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