

Quantitative Analysis of Urban Thermal Environmental Effect with TM+ Data

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Abstract: Urbanization makes progress in human society, at the same time it brings a series of environmental issues to city. The urban heat island effect is one of the obvious byproducts brought by urbanization. In this paper, taking an Enhanced Thematic Mapper Plus (ETM+) data of the study region in Shanghai city, as the data source, the moderate resolution transmittance (MODTRAN) radiation model and the spectral response function of TM+ TIR bands have been applied in atmospheric correction, then land surface temperature (LST) were retrieved from the TM+ TIR by using an integrated algorithm based on the PLANCK function and radioactive transfer equation. At the same time, the NDVI was calculated from the TM VNIR and RED bands. Then compared the LST with normalized difference vegetation index (NDVI) and urban land use type, the results demonstrate that LST possessed evidently stronger negative correlation with the NDVI and that mean LST values associated with different land use types are significantly different. Multiple comparisons of mean LST values associated with pairings of each land use type are also shown to be significantly different. According to the above results, LST and NDVI can be considered to be basic indices to study urban ecological environment and to contribute to further validation of the applicability of relatively low cost, moderate spatial resolution satellite imagery in evaluating environmental impacts of urban land function zoning, then to examine the impact of urban land use on the urban environment in City. And this provides an effective tool in evaluating environmental influences of zoning in urban ecosystems with remote sensing and spatial analysis of geographic information system.

Key words: urban thermal environment; land surface temperature; NDVI; TM+

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