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Research Analysis of Urban Area Expansion Based on Remote Sensing

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Abstract : The Urban Heat Island (UHI) effect is one of the foremost problems out of other ecological and socioeconomic issues in urbanization. Due to this phenomenon that human-made urban areas have replaced the rural landscape with the surface that increases thermal conductivity and urban warmth; as a result, the temperature in the city is higher than in the surrounding rural areas. To affect the evidence of this phenomenon in the Zhengzhou city area, an observation of the temperature variations in the urban area is done through a scientific method that has been followed. Landsat 8 satellite images were taken from 2013 to 2015 to calculate the effect of Urban Heat Island (UHI) along with the NPP-VRRIS night-time remote sensing data to analyze the result for a better understanding of the center of the built-up area. To further support the evidence, the correlation between land surface temperatures and the normalized difference vegetation index (NDVI) was calculated using the Red band 4 and Near-infrared band 5 of the Landsat 8 data. Mono-window algorithm was applied to retrieve the land surface temperature (LST) distribution from the Landsat 8 data using Band 10 and 11 accordingly to convert the top-of-atmosphere radiance (TOA) and to convert the satellite brightness temperature. Along with Landsat 8 data, NPP-VIIRS night-light data is preprocessed to get the research area data. The analysis between Landsat 8 data and NPP night-light data was taken to compare the output center of the Built-up area of Zhengzhou city.

Keywords : built-up area, land surface temperature, mono-window algorithm, NDVI, remote sensing, threshold method, Zhengzhou
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