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Utilizing Satellite Imagery to Analyze the Relationship between Surface Temperature and Recent Land Use/Cover Change in San Antonio, Texas

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ABSTRACT

Recent growth in the San Antonio Metropolitan Area has led to urban expansion and sprawl. This research seeks to detect the relationship between the urban heat island (UHI) effect and recent land use/land cover changes, particularly urbanization, in San Antonio utilizing Moderate Resolution Imaging Spectroradiometer (MODIS) satellite imagery. The primary objective of the study is to detect recent urbanization effects on land use/cover and surface temperatures (UHI) within the San Antonio Metropolitan Area from 2003–2011. The initial analyses focused on the land surface temperature patterns, including the magnitude of the UHI using geographic information systems (GIS) and remote sensing tools. The second part of the project includes identification of urban versus non-urban landscape change utilizing Normalized Difference Vegetation Index (NDVI) from 2003 and 2011. Results confirm the strong relationship between higher temperatures and urban (impervious) surfaces, with the greatest change in the UHI occurring along and near the outer edge of the city, particularly along the 1604 Anderson Loop Highway. Results from this project are expected to aid city policy makers in San Antonio to determine where heat mitigation techniques could be implemented to lower impacts from the UHI.