

# Using Landsat Imagery to Study Spatio-Temporal Relationship between Surface Temperature and Energy Consumption: A Case Study of a Public University Campus

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## ABSTRACT

It is estimated that colleges and universities in the United States spend an average of more than a dollar per square foot on electricity annually that corresponds to large recurring expenditures. As university campuses continue to grow, it causes an increase in the energy demand impacting the land surface temperature. Energy audits of campuses are performed annually, however, they are mostly manual and require physical inspections that are time and resource-intensive. The technological advancement in satellite imagery provides an environment that can acquire rich, meaningful information in a time- and cost-effective manner. This study utilizes a medium-size urban campus in the United States with a hot and dry climate as a case study to evaluate the relationship between energy consumption intensity and land surface temperature using the remote sensing and geographic information system (GIS) tools. The study aims to explore the variations in total energy and cooling energy demand on campus due to changes in land surface temperature over the past five years. The study will help in better understanding the micro-climate changes as well as the thermal behavior of the campus landscape to identify hotspots. The results of this study will provide the basis for decision-makers to better understand energy consumption patterns on campus and adopt effective mitigation measures to save energy and ultimately reduce the carbon footprint of the campus.