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Authors: Aneesh Mathew, Sumit Khandelwal, Nivedita Kaul, Shivam Chauhan



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Analyzing the diurnal variations of land surface temperatures for surface urban heat island studies: Is time of observation of remote sensing data important?

Aneesh Mathew¹, Sumit Khandelwal², Nivedita Kaul³, Shivam Chauhan⁴

1,4 Research Scholar, Department of Civil Engineering, Malaviya National Institute of Technology Jaipur, Jaipur, 302017, Rajasthan, India

2,3 Assistant Professor, Department of Civil Engineering, Malaviya National Institute of Technology Jaipur, Jaipur, 302017, Rajasthan, India

Email: aneesh52006@gmail.com

Research Highlights

- This study investigates the contrast diurnal LST variations of three Indian cities.
- Inverse SUHI has been observed during daytime whereas clear SUHI during night period.
- Time of observation is significant for SUHI studies while using satellite data.
- Thermal properties of various surface materials influence diurnal behavior of LST.
- In general, heat island phenomenon is apparent at nighttime.

Abstract

Land surface temperature (LST) images show the nonexistence of surface urban heat island (SUHI) effect over Jaipur and Ahmedabad cities during the daytime, whereas a clear picture of SUHI effect during nighttime. But in Ludhiana, diurnal SUHI effect has been observed. Hence the contrast diurnal LST pattern of three cities in India has been analyzed in the study. The analysis indicates that nighttime images can be used for the analysis of SUHI effect over any area. The use of daytime images for this analysis depends on the surface cover and time of observation which may show a false temporary SUHI effect. Time of observation is very important for analyzing the efficacy of remote sensing data for diurnal LST variations for different land covers and SUHI studies. SUHI varies during the day, and it is more significant during the evening/night. Diurnal LST relationship at different time intervals with various land surface parameters like vegetation, built-up, soil, etc. has also been investigated in the present research. Various land surfaces play a

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