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Impact detection of spatiotemporal changes in built-up area on surface urban heat islands in Palembang City using satellite imagery data

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Abstract: Climate change is an issue of global concerns. Urban Heat Island is a phenomenon where the city's air temperature with high building density is higher than the surrounding open-air temperatures in the village and the suburbs with the less dense built-up area. Population in Palembang City has been increased by almost 10% in the last five years. The demand for land for the built-up area has also increased. The population and the demand for housing have increased the surface temperature, which triggered the Urban Heat Island phenomenon (UHI). This paper presents an effort to determine the dynamics effects of built areas changes on urban land surface temperature (LST) during five years (2013-2019) for Palembang City. Remote sensing data of Landsat (i.e. TM, ETM+, and OLI/TIRS) is used with the machine learning algorithms to quantify the effect of land use and land cover changing. The results showed that in the observed period, there was a size increase in built-up area by 13% while the surface temperature raised from 18°C - 33°C to 22°C - 40°C. The biggest changes in the built-up area occurred in 2018, and the highest increase in surface heat occurred in 2019.

Keywords: Urban growth, climate change, urban heat island, remote sensing, machine learning algorithms