The influence of El Niño Southern Oscillation on urban heat island formation at tropical city: Case of Kuching City, Sarawak

ABSTRACT

El-Niño Southern Oscillation (ENSO) is an opposing natural climate phenomenon in which the El Niño event causes droughts and the La Niña event causes floods. Literature studies stated there is still a lack of studies on the application of remote sensing in studying the effect of ENSO on Urban Heat Island (UHI) distribution patterns. The effect of UHI amplifies temperature, especially during El Niño. The objective of this study is to examine the influence of ENSO on UHI formation in tropical cities on a local scale. This study uses MODIS data and Landsat satellite data from 1988 to 2019. This study uses a combination of both data to investigate the influence of ENSO on UHI formation. The data must undergo pre-processing before the digital number is converted to Land Surface Temperature (LST). This study found that La Niña and El Niño events influenced the pattern of UHI variation. The strength of El Niño and La Niña differences influenced the value of LST and the total UHI area with a temperature of 30 °C. The result discovered that during the El Niño event, the maximum, minimum and mean temperature values of LST were higher than during the La Niña event and the total of the area hot spots that have temperatures above 30 ºC is higher during El Niño than during La Niña. The result of the study is very important to the community, local governments, and urban planners because remote sensing provides spatial information that represents the hot spot and cold spot.