

Exploring the Impact of El Niño–Southern Oscillation (ENSO) on Temperature Distribution Using Remote Sensing: A Case Study in Kuching City

ABSTRACT

Malaysia's location in Southeast Asia exposes it to various weather patterns influenced by El Niño–Southern Oscillation (ENSO), monsoons, the Madden–Julian Oscillation (MJO), and the Indian Ocean Dipole (IOD). To overcome the limitations of previous studies due to insufficient spatial information, this study utilizes remote sensing (RS) data from Landsat and MODIS satellites, along with the Oceanic Niño Index (ONI), to analyze the spatial distribution of temperature affected by El Niño–Southern Oscillation (ENSO). This study employs radiometric and atmospheric corrections on remote sensing (RS) data, converting them to surface temperature data. Our analysis reveals a correlation coefficient of 0.73 (MODIS) and 0.71 (Landsat) between the ONI and RS temperature data. During El Niño events, Landsat recorded temperature increases of 0–1.6 °C, while MODIS showed increases of 2.2–2.8 °C. The spatial information obtained assists in identifying affected areas and facilitating the implementation of mitigation measures by the government. By utilizing RS data, this research enhances our understanding of the ENSO–temperature relationship, surpassing previous limitations and providing valuable insights into climate dynamics.