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EFFECT OF TEMPERATURE AND VEGETATION ON THE SPATIAL VARIATION OF CARBON MONOXIDE

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AUTHOR DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

Urbanisation and population significantly affect the environmental condition and are always associated with building construction and traffic combustion. The increase in temperature and the reduction of vegetation may impact the variation of air pollution like Carbon Monoxide (CO) in urban areas. However, the local spatial variation of CO due to temperature and vegetation is unidentified at the micro-scale area. Thus, this study aims to determine the effect of temperature and vegetation on the spatial variation of Carbon Monoxide in the Northern Region of Peninsular Malaysia year 2018 and 2021 using Sentinel-5 Precursor and Landsat 8 OLI/TIRS satellite images and Multiscale Geographically Weighted Regression (MGWR) geospatial approach. The objectives of this research are to 1) To identify the CO concentration using Sentinel-5 Precursor, 2) to generate Land Surface Temperature (LST) and Normalised Difference Vegetation Index (NDVI) using Landsat 8 OLI/TIRS satellite images and 3) to determine the spatial variation of CO based on the relationships between CO concentrations with LST and NDVI using MGWR. In this study, the global and local approaches from the Ordinary Least Square (OLS) and the MGWR respectively were used to determine the relationships between CO, Land Surface Temperature (LST), and Normalised Difference Vegetation Index (NDVI), which were derived from satellite images. The results indicate significant positive relationships between LST, NDVI, and CO spatial variation, with MGWR in 2018 (r^2=0.885) over OLS (r^2=0.079) while MGWR in 2021 (r^2=0.910) over OLS (r^2=0.016). It shows that temperature and vegetation affect CO in large-scale areas. The findings of this study can benefit town planners to prepare guidelines and control air pollution in urban areas such as motor vehicle emissions control with the development of traffic-free zones and providing more urban green spaces.

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