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SPATIAL VARIATION OF AEROSOL OPTICAL DEPTH (AOD) DUE TO LAND SURFACE TEMPERATURE (LST)

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Thesis submitted to the Universiti Teknologi MARA Malaysia in partial fulfilment for the award of the degree of the Bachelor of Surveying Science and Geomatics (Honours)

JULY 2024

DECLARATION

I declare that the work on this project/dissertation was carried out in accordance with the regulations of Universiti Teknologi MARA (UiTM). This project/dissertation is original and it is the result of my work, unless otherwise indicated or acknowledged as referenced work.

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ABSTRACT

A haze was formed by airborne particles like Aerosol Optical Depth (AOD) and molecules scattering which absorb sunlight, comprising pollutants and tiny particulate pollution such as PM2.5 and PM10. Land Surface Temperature (LST) may influence the AOD of the area and possibly be detected with remote sensing and analysed with GIS technique. Thus, the study aims to determine the spatial variation of Aerosol Optical Depth (AOD) due to Land Surface Temperature (LST) during the 2019 haze episode in Peninsular Malaysia using satellite remote sensing and spatial regression model. The methods involve retrieving AOD values from the Aerosol Index (AI) of Sentinel 5P satellite images, computing LST using MODIS Terra satellite images, and determining the relationships between LST and AOD using the Multi-Scale Geographically Weighted Regression (MGWR) Model. Findings based on Ordinary Least Square (OLS) with r-squared = 0.1 and 0.02 have shown no relationships between LST and AOD. However, the results of MGWR prove the significant effects of AOD due to LST in the local area but in weak relationships (r-squared = 0.31 and 0.33). The weak relationships could be due to daytime satellite image acquisition and the AOD is highly influenced by LST at night. Overall, this study shows the potential use of remote sensing satellites and spatial regression models to detect the effect of LST on the spread of haze. This approach can be utilised by the Department of Environmental (DoE), and the general public to take action and alert.

Keyword : Air pollution, Land Surface Temperature (LST), Aerosol Optical Depth (AOD), Multi-Scale Geographically Weighted Regression (MGWR) Model.

TABLE OF CONTENTS