

UNIVERSITI TEKNOLOGI MARA

**COMPARISON OF AEROSOL SPECIES DUE TO
TRANSBOUNDARY HAZE OVER MALAYSIA IN
THE YEARS 2015 AND 2019**

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**BACHELORS IN SURVEYING SCIENCE AND
GEOMATICS (HONOURS) - AP220**

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SITI NURATHIRAH BINTI NORLIZAN

Thesis submitted in fulfilment
of the requirements for the degree of
Bachelors in Surveying Science and Geomatics (Honours)

College of Built Environment, CBE.

August 2023

AUTHOR’S 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 Under - Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

Biomass burning (BB) refers to the combustion of organic substances such as forests, grasslands, agricultural residues, and other vegetation. Several aerosols, including black carbon (BC), organic carbon (OC), and inorganic particles, are released during the BB. Aerosols are produced directly by BB or indirectly as a result of chemical reactions in the atmosphere involving emitted gases. Air quality, climate and human health may all be significantly affected by emissions from BBs. Two major fires in 2015 and 2019 have worsened air quality in Malaysia due to increased aerosols in the air. Nevertheless, there were no studies that identified aerosol species in 2015. Therefore, this study aims to measure the Aerosol Optical Depth (AOD) and aerosol species and identify the correlation between AOD and aerosol species. Then, a study to identify the most aerosol species that contributed to the fires that occurred in 2015 and 2019. This study uses Modern-Era Retrospective Analysis (MERRA-2) as a global atmospheric reanalysis dataset that provides a comprehensive image satellite of weather and climate variables, including aerosol-related parameters such as AOD. MERRA-2 reanalysis data were used for the AOD (550 nm) and other five aerosol species of BC, OC, sulphate, dust, and sea salt in the years 2015 and 2019. The trend of AOD from Merra-2 data shows that during the Southwest monsoon (May to September) in 2015 and 2019, it increased dramatically and occurred at the same time as BB in Indonesia. The findings show that BC and OC provide a significantly strong positive correlation with AOD for the years 2015 and 2019. The correlation result ranges from 0.981 to 0.991 for both species. In conclusion, this study proves that these two species are of high value during the southwest monsoon due to the release of BB, which is influenced by the El Nino condition factor until the occurrence of cross-border haze in Malaysia.

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