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# Poster Book

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**Unleashing Potentials  
Shaping the Future**

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# Spatio-temporal of Aerosol Optical Depths (AOD) during Southwest Monsoon over Peninsular Malaysia

## DATA & METHODOLOGY

- SATELLITE DATA :
  - MODIS – Terra & Aqua MAIAC Land Aerosol Optical Depth Daily 1km 55nm [Southwest Monsoon (Jun – Sept) years 2018 to 2021)
  - Chirps Perception Data Jun – Sept for the year 2018 to 2021
  - DEM STRM V3 product (STRM Plus) is provided by NASA JPL at a resolution of 1 arc-second (approximately 30m)
- Ground-based data (CAQM) was using only in 2019
- All the data satellite which are MODIS terra and Aqua, Chirps Precipitation and DEM(STRM) were processed using the Google Earth Engine Platform

## INTRODUCTION

In September 2019, a transboundary haze from large forest fires, especially from origins in Sumatra and Kalimantan, significantly worsened measured air quality and reached Singapore and Malaysia. Numerous fires were raging nearby oil palm fields and pulp and paper factories. The fires increased the particulate matter in the air. On the other hand, in 2020, an unprecedented outbreak of COVID-19 occurred worldwide, including in Malaysia. At the same time, it has changed the measurement of air quality for the better due to the Movement Control Order (MCO) carried out by the Malaysian government.

## OBJECTIVES

This study aims to determine the spatial-temporal of Aerosol Optical Depth (AOD) in Peninsular Malaysia during the dry season in Southwest monsoon (June - September) from 2018 to 2021 using remotely sensed satellite measurement.

## PROBLEM STATEMENT

Biomass energy that has a negative impact often involves the burning of forests such as oil palm plantations. The burning of biomass (BB) that occurs in Indonesia due to forest and peat fires has a severe negative impact on air quality in Southeast Asia (SEA). Transboundary haze from large forest fires that occurred in September 2019, mainly originating from Sumatra and Kalimantan, worsened air quality involving Singapore and Malaysia to the extent of increasing particulate matter in the air. In March 2020, there was an outbreak of COVID-19 which simultaneously changed the air quality for the better as a result of the Movement Control Order (MCO) implemented by the government. Therefore, it is important to know the aerosol optical depth (AOD) concentration during haze episodes and throughout the MCO.

## RESULTS

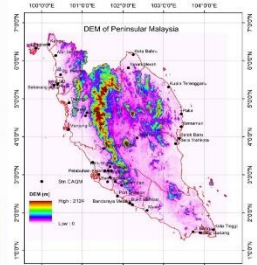


Fig. 1: Map shows the study area in Peninsular Malaysia, location of CAQM, DEM

## RESULTS

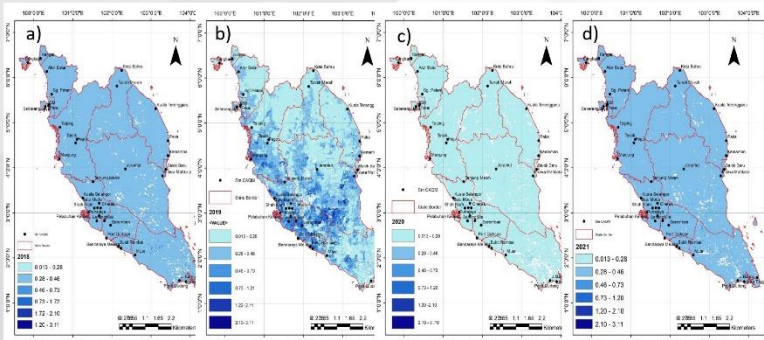


Fig. 2) a) is satellite MODIS image from Jun to Sept 2018, Fig. 2) b) is satellite MODIS image from Jun to Sept 2019, Fig. 2) c) is satellite MODIS image from Jun to Sept 2020, and Fig. 2) d) is satellite MODIS image from Jun to Sept 2021 in Southwest monsoon (Dry Season) over Peninsular Malaysia.

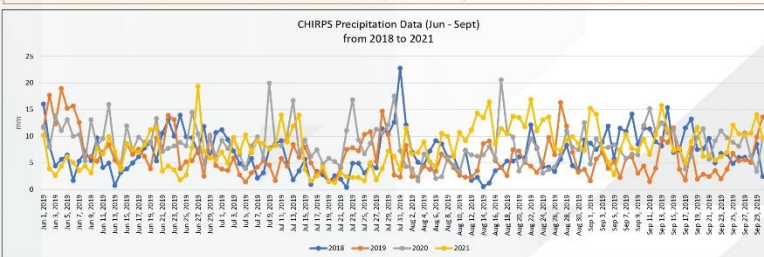


Fig. 3: A graph of multiple years for daily rainfall from Jun to Sept in 2018, 2019, 2020 and 2021 data extracted from CHIRPS Precipitation data.

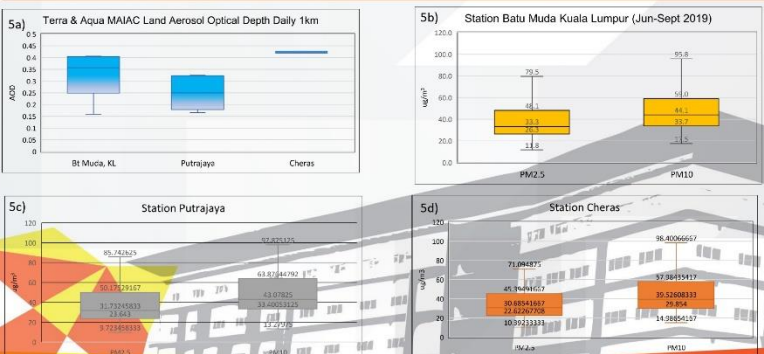


Fig. 5 a) is satellite MODIS image from Jun to Sept 2019 for station Bt. Muda, Putrajaya and Cheras  
Fig. 5b to 5d are ground data from CAQM station in Malaysia

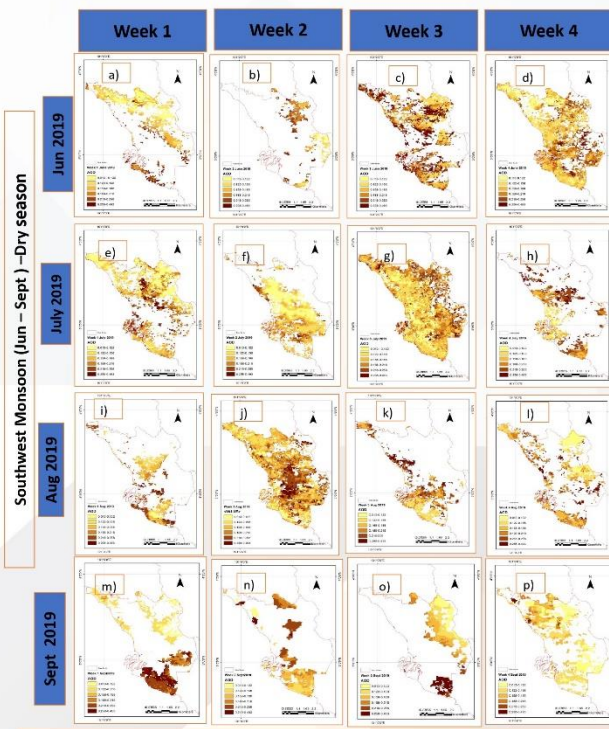


Fig. 4 Map shows weekly spatial temporal of AOD data from Jun to September in 2019

## CONCLUSION

- ❑ High AOD values (>2) were obtained in most of the southern parts of the Klang Valley.
- ❑ Decreasing patterns of AOD were observed in 2020 for all states in Peninsular Malaysia.
- ❑ MODIS data needs to be supported with other satellite data to improve the result of no data AOD at certain places because of clouds.
- ❑ The future study can focus on method of combining MODIS data with other satellite using machine learning technique.

## NOVELTY

This study focuses to measure AOD value increasing during transboundary haze and decreases during COVID-19