UNIVERSITI TEKNOLOGI MARA
College of Built Environment

Poster Book

IIIDBEEX 2023

20 JANUARY 2023

International Invention, Innovation & Design Exposition for Built Environment and Engineering 2023

College of Built Environment
UiTM Puncak Alam
20 January 2023 I Friday

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CLOUD SEEDING POTENTIAL AREA FROM LOW-LEVEL CLOUD AND AEROSOLS OF SATELLITE REMOTE SENSING

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INTRODUCTION

The global drought phenomenon has become a serious issue affecting the availability of water supply for domestic use, agriculture, fishing, and industrial purposes. Cloud seeding operation is one of the alternatives carried out to increase the amount of precipitation that falls from clouds. In Malaysia, the ice crystal method will ignite an ice crystal flare in the middle of the air, thus causing water to gather at a certain spot and form clouds. However, the success rate of cloud seeding in Malaysia is only between 57 to 65 percent. The low-level cloud and aerosols are the main contributing factors in cloud seeding operations. With satellite remote sensing (RS) technology, the parameter can be detected and analysed. In this study, MODIS RS satellite images were used to determine the potential area for cloud seeding operation based on the low-level cloud distribution and the concentration of aerosol optical depth (AOD) in Peninsular Malaysia for April 2019.

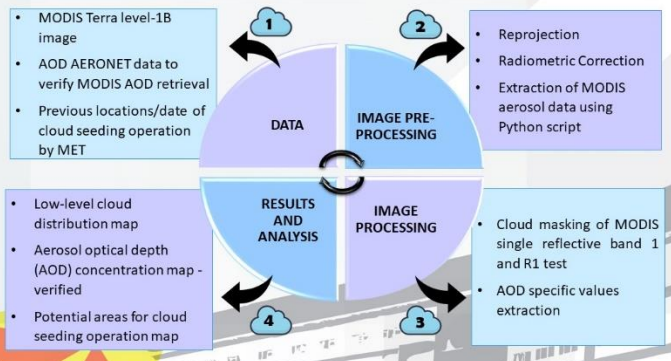
ISSUES/ PROBLEM STATEMENT

1. Hygroscopic or Dry Seeding is one of the cloud seeding method carried out in Malaysia where salts released through flares or explosives in the lower portions of clouds. (MET, 2019)
2. By serving as cloud condensation nuclei, aerosols can influence cloud characteristics, which might impact precipitation efficiency. (Berhane and Bu 2021).
3. It is important to thoroughly review locations for conducting precipitation enhancement experiments and to determine whether clouds suitable for seeding occur. (Kim et al. 2020)

OBJECTIVES

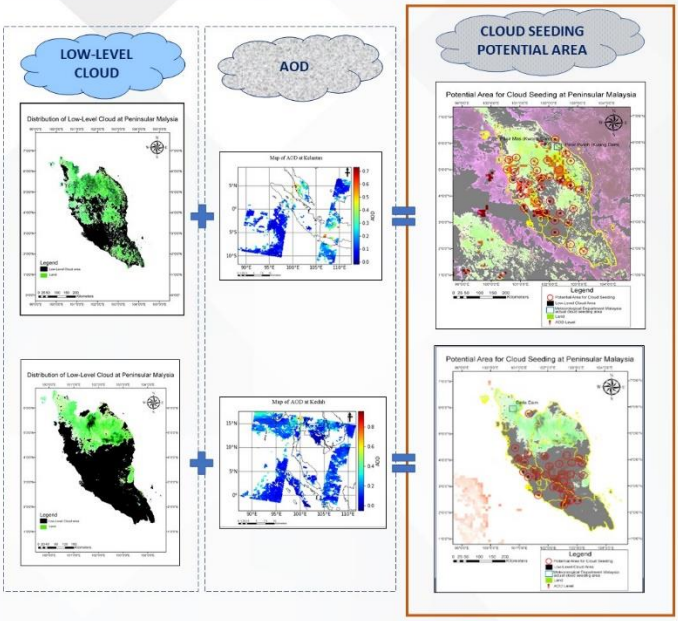
1. To identify the low-level cloud distribution
2. To identify the concentration of aerosol optical depth over study area.
3. To determine the potential areas for cloud seeding operation based on the distribution of low-level cloud and concentration the aerosols.

METHODOLOGY



***AERONET - (AErosol RObotic NETwork) ground-based remote sensing aerosol networks established by NASA and PHOTONS

FINDINGS



The superimposed between the low-level cloud distribution and AOD concentration were also found within the area of the previous cloud seeding operation which was located in Kedah and Kelantan

AREA	DATE OF MODIS DATA ACQUISITION	NO OF POTENTIAL CLOUD SEEDING AREA	NO OF POTENTIAL AREA COINCIDE WITH THE PREVIOUS CLOUD SEEDING AREA BY MET
KELANTAN	16 APRIL 2019	37	1 (Bukit Kwong Dam)
KEDAH	26 APRIL 2019	32	1 (Beris Dam)

NOVELTY

A novel technique for cloud seeding area determination whereby the potential area can be determined and visualised based on the necessary factors and parameters for rain formation in the atmosphere using the technology of satellite remote sensing.

CONCLUSION

The study has proven the cloud-seeding potential areas from the distribution of low-level cloud and AOD concentration of MODIS satellite RS images located within the previous cloud-seeding areas as operated by the Malaysian Meteorological Department (MET). In addition, other potential areas also can be identified and determined. Thus, this technique can be utilized to assist MET or other related agencies to improve the success of cloud seeding operations.

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