UNIVERSITI TEKNOLOGI MARA

AEROSOL AND CLOUD DISTRIBUTION USING MODIS SATELLITE IMAGE AT PENINSULAR MALAYSIA

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ABSTRACT

Aerosol have a significant impact on global and regional climate change. Aerosol and clouds distribution are widely acknowledged to be one of the most significant sources of uncertainty in our estimates of human impacts on the Earth's energy budget. Several researchers investigated the effect of clouds on aerosols using a variety of approaches as part of their efforts to reduce these uncertainties. This research used the MODIS satellite data to analyse aerosol and cloud distribution at Peninsular Malaysia in 2019. To achieve the aim, the objectives of this study are i) to extract the aerosol and cloud using MODIS satellite image and ii) to evaluate relationship between aerosol and cloud. The method that will be used in this study such as ENVI software for the processing image MODIS satellite and IBM SPSS Statistics that used to calculate the correlation coefficient between aerosol and cloud. The results of this research is there any relationship between aerosol and cloud used in the MODIS satellite data which proved resolution suitable to aerosol and cloud distribution at Peninsular Malaysia. Finally, this study can also identify to better understand the relationship of aerosol and cloud and contribute to climate change studies.

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CHAPTER ONE
INTRODUCTION

1.1 Introduction

This chapter will discuss about the introduction and together with the detail of research studies such as research background, problem statement, significance of study, objective and research question.

1.2 Research Background

Aerosol and clouds interactions are all hot topics in modern atmospheric remote sensing research. Aerosol and clouds both have an impact on climate and weather. Their properties may change over time, resulting in a global energy imbalance. According to Lohmann, (2015), because of aerosol-radiation interactions, aerosol particles can affect the climate by scattering and absorbing radiation and thus exerting a radiative forcing (RFari). Furthermore, aerosol particles can exert a radiative forcing by acting as CCN and IN, it is because of due to aerosol-cloud interactions (RFaci). Since preindustrial times, both RFari and RFaci have partially offset greenhouse gas warming. Whereas radiative forcing means that the atmospheric state remains constant, anthropogenic aerosols can cause changes in cloud lifetime, coverage or phase. Cloud changes occur on much shorter time scales than the warming caused by greenhouse gases. As a result, it has proven useful to include an effective radiative forcing that takes into account both macroscopic and microphysical perturbations.

The term RFaci refers to an increase in cloud droplet concentration caused by an increase in anthropogenic aerosols. If the cloud water cloud remains constant, the cloud's surface area grows and more solar radiation is reflected back to space. Previously, this effect was known as the Twomey effect (Quaas et al., 2020). RFaci is defined as the global annual mean change in net top-of-atmosphere radiation due to aerosol-induced changes in cloud optical properties since preindustrial times.

Other than physical aerosol-cloud interactions, there are a number of ways for aerosols and clouds to be linked. One possibility is that the aerosol is influenced by meteorological conditions with nearby clouds. Relative humidity raises the aerosol