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Aerosol Optical Depth: A study using Thailand based Brewer Spectrophotometers

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Abstract

The Aerosol Optical Depth (AOD) was retrieved from the direct-sun Brewer observation by the application of the Beer's law for the years 1997–2011 at two monitoring sites in Thailand (Bangkok and Songkhla). AOD values measured in Bangkok exhibited higher values than Songkhla. In addition, AOD values were higher in the morning and evening in Bangkok. In contrast, the AOD values in Songkhla were slightly lower during the mornings and late afternoons. The variation of AOD was seasonal in Bangkok, with the higher values found in summer (from Mid-February to Mid-May) compared with rainy season (Mid-May to Mid-October), whilst there was no clear seasonal pattern of AOD in Songkhla.

Keywords: Aerosol; Atmospheric aerosol; Aerosol Optical Depth; Aerosol optical properties

1. Introduction

This research focuses on total atmospheric column aerosol concentration for locations in central and southern of Thailand. Aerosol concentrations in the environment play an increasingly deleterious role in global climate change, ecosystem processes and human health, as they critically change the balance between the radiation entering and leaving the atmosphere. The measure of Aerosol Optical Depth (AOD) provides a quantitative measure of the extinction of solar radiation in a vertical column of aerosols by way of scattering and absorption (Schmid et al., 1997). The wavelength dependence of the AOD typically decreases with increasing wavelength. Aerosols can significantly reduce UV radiation and also affect the radiative transfer in the Earth's atmosphere (Sellitto et al., 2006). It has been observed that desert dust and aerosols from biomass burning can significantly reduce surface UV levels (WHO, 2002). In addition, absorption of solar UV radiation by anthropogenic aerosol particles in highly polluted urban areas reduces surface UV radiation, resulting in less ozone generation (Sellitto et al., 2006). There is increasing concern that the recent rise in high concentration of aerosol particles in the atmosphere in northern and southern Thailand during summer will cause air pollution and health problems (Sukitpaneenit and Kim Oanh, 2013).

Aerosols attenuate UV radiation at the earth's surface and AOD data can be used to measure the effects of aerosols on UV levels. Recently, there has been increased interest in AOD retrieval in the UV range, visible to infrared (IR) regions of the spectrum, due to the complex properties of aerosols on climate change. Throughout the

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