

Characterizing aerosol impacts on the distribution of water in the tropospheric column during the monsoon season in the Philippines

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Abstract

The Republic of the Philippines (RP) possesses a complex topography and extensive regional urban air pollution that may influence precipitation variability. Within the country, precipitation variability induces localized extremes in rainfall intensity creating pronounced floods and droughts. Cloud and precipitation formation depend upon the availability and physical properties of particulates suspended within the atmosphere and the distribution of water in the atmospheric column. Therefore, it is important to examine the impact of local and regional pollutants on the distribution of water in the atmospheric column and precipitation variability within the archipelago.

The data obtained in this study is taken from the years 2001 to 2010 during the Western North Pacific Summer Monsoon (WNPSM). Monthly averaged Level-3 MODIS (Moderate Resolution Imaging Spectroradiometer) Terra global data retrievals and the Tropical Rainfall Measurement Mission version seven (TRMM V7) precipitation data during June through December are employed. MODIS cloud retrieval and aerosol properties include the mean atmospheric water vapor, mean cloud optical thickness (in the liquid and ice forms), mean cloud effective radius (for liquid and ice forms), the mean cloud water path (in the liquid and ice forms), precipitable water, aerosol optical depth, and angstrom coefficients. This study aims to identify zones of frequent extreme rainfall occurrences and shifts in seasonal precipitation trends. This investigation seeks to determine whether relationships exist between urban aerosols, cloud optical properties, and precipitation variability in equatorial regions.