

# **The relationship between aerosol optical depth and PM from satellite and ground-based data**

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**Abstract:** This study used sunphotometer, lidar, and surface particulate matter measurements to assess SPOT 5 AOD products for air quality monitoring in Taiwan. In the past, many research focus on the relationship between satellite aerosol optical depth (AOD) and particulate matter (PM). The relationships between PM and AOD derived from both satellite data and AEROENT show a strong seasonality as a result of aerosol profile. The correlations in cold season (September ~ February) appear to be slightly better than the counterparts in warm season (March ~ August). The high correlations obtained in autumn between PM and AOD normalized by boundary layer height are attributed to stable and well-mixed boundary layers as opposed to the summer lows resulted from strong convection associated with unstable weather systems. Since the boundary layer height is different in seasonal weather system, the change of boundary layer should be taken into account to improve the relationship of AOD and PM, as well as the influence of the long-range transport of Asian dusts, pollutants and biomass burning from Southeast Asia in winter and spring under the prevalent flows. In this paper, we use the aerosol profile and boundary layer height from Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observation (CALIPSO) products and collocate MPLNET Lidar data to propose the approach of PM concentration retrieved from SPOT image.

**Keyword:** SPOT, CALIPSO, AERONET, MPLNET, Aerosol optical depth,

Particulate matter