



Regional distribution of PM2.5 over a megacity Osaka in Japan derived from satellite, AERONET and/or LIDAR measurements

I. Sano (1), S. Mukai (1), M. Nakata (1), B. Holben (2), and N. Sugimoto (3)

(1) Kinki University, Higashi-Osaka, Japan (sano@info.kindai.ac.jp), (2) NASA/GSFC, USA, (3) National Institute for Environmental Studies, Japan

Monitoring of particulate matter near the surface is very important for the Earth environment, especially for human health and atmospheric environment. In Japan, concentration of suspended particulate matter (SPM), which is similar to PM10 but sharply cutting at $10 \mu\text{m}$ for the particle diameter, has been monitored since 1975 and is still now widely available for a daily monitoring. New PM2.5 rule was defined in 1997 in the United States, however the standard rule for PM2.5 monitoring has not yet made in Japan until 2009. As a result, the number of PM2.5 instruments is very limited in Japan. In practice the PM2.5 samplers are only used for scientific objects. Therefore estimation of PM2.5 over the wide area as possible as in Japan is an urgent issue.

Anthropogenic small particles dominate the air especially over the urban areas because of local emissions by diesel vehicles and industries. The distribution of these particles is complicated due to the increasing emissions of sulfuric, nitric, carbonaceous and other aerosols in association with economic growth in East Asia. The goal of this work is to estimate PM2.5 distribution over the second big city Osaka in Japan based on satellite measurements. A brief processing line of PM2.5 estimation is as follows:

1. Acquisition of surface reflectance based on satellite data to retrieve aerosol characteristics.
2. Retrieval of columnar aerosol optical thickness (AOT) over Osaka from the fine resolved satellite image.
3. Vertical profile of aerosol concentration with NIES-LIDAR measurements.
4. Surface level aerosol optical depth (AOD) derived from columnar AOT and LIDAR dataset.
5. Estimation of PM2.5 based on the relationship between AOT, surface AOD, LIDAR and in-situ PM2.5 dataset simultaneously accumulated at AERONET/Osaka site since 2008.

Note that, collocated data set of in situ PM2.5, AERONET AOT, and NIES-LIDAR data are available at Kinki University's AERONET site as mentioned in the above item 5. It is of interest to mention that a number of AERONET instruments are planned to be set within the Osaka of Japan during the international field campaign DRAGON in spring of 2012. Naturally these new gridded AOT data set will be useful not only for the present our work but also for further validation of satellite results and so on.