

Aerosol retrieval and PM2.5 from space using GOSAT/TANSO-CAI

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Aerosol in the atmosphere has a great impact not only for the Earth's radiation budget and changing the Earth's climate, but also on human health. Especially, the fine particle, which is often called PM2.5, has drawn attention as a cause of health damage.

The urban area is a source of anthropogenic aerosol, which is mostly composed of small particles, and the particles are transported to other regions. Satellite remote sensing provides effective means to monitor the atmospheric aerosols in wide area including urban areas.

Accurate retrieval of fine mode aerosol optical thickness (AOT) is necessary to calculate an equivalent value of PM2.5 from space. Therefore, an aerosol retrieval algorithm for satellite remote sensing of urban areas to improve the retrieval accuracy of aerosol properties, which is called MWPM (Multiple wavelengths and pixels method) (Hashimoto and Nakajima, 2017), was developed. The method simultaneously retrieves fine and coarse mode AOT and single scattering albedo by using several wavelengths and spatial difference of surface reflectance. The method is useful for aerosol retrieval over spatially inhomogeneous surface like an urban area.

The algorithm was applied to GOSAT (Greenhouse Gases Observing Satellite) / TANSO-CAI (Cloud and Aerosol Imager, CAI) data. The GOSAT launched ten years ago (on January 23th, 2009) is a satellite to monitor greenhouse gases (GHG) such as carbon dioxide and methane with TANSO-FTS (Fourier Transform Spectrometer, FTS). The CAI is a supplementary sensor of the FTS, detecting cloud and deriving aerosol optical properties.

PM2.5 using retrieved fine mode AOT by MWPM in East Asian region from 2009 was calculated. The poster presents a retrieval result of PM2.5 over the East Asian region from space in several years and discusses the seasonal and annual variations.

Monitoring of aerosol properties such as AOT, PM2.5 and soot mixing ratio over land is added to the mission of GOSAT-2 that was launched on October 29th 2018. As a near-future plan, the algorithm will be applied to GOSAT-2/TANSO-CAI-2 data to generate standard PM2.5 data products.

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