Geophysical Research Abstracts
Vol. 21, EGU2019-6423, 2019
EGU General Assembly 2019

Development of a novel algorithm for retrieval tropospheric Nitrogen Dioxide vertical profile using Optimal Estimation method and hyper-spectral satellite data

Junsung Park (1), Hanlim Lee (1), and Hyunkee Hong (2)

(1) Pukyong National University, Division of Earth Environmental System Sciences, Department of Spatial Information Engineering, Busan, Republic of Korea (junsung2ek@gmail.com; hllee@pknu.ac.kr), (2) Environmental Satellite Center, Climate and Air Quality Research Department, National Institutue of Environmental Research, Incheon, Republic of Korea (wanju77@korea.kr)

For the first time, we proposed a novel algorithm for retrieval tropospheric Nitrogen dioxide (NO_2) vertical profile based on Optimal Estimation (OE) method and hyper-spectral satellite data. The NO_2 vertical profile is retrieved using multiple NO_2 Slant Column Density (SCD) in ultraviolet (UV) and visible (VIS) wavelengths. Synthetic radiances were generated to retrieve the ratio of NO_2 SCD between UV and VIS wavelengths in the various aerosol information (Aerosol Optical Depth; AOD, Single Scattering Albedo; SSA, and Aerosol Peak Height; APH), geometric information (Solar Zenith Angle; SZA, Viewing Zenith Angle; VZA, and Relative Azimuth Angle; RAA), a priori NO_2 vertical profile, and surface reflectance conditions. Spectral fittings were performed at narrow intervals on each wavelength range with fitting window of 30 nm to calculate for the ratio between average NO_2 SCD in the visible (VIS) range and those obtained in the ultraviolet (UV) range. Lastly, the vertical distribution of tropospheric NO_2 is retrieved using the ratio of NO_2 SCD at UV and VIS based on measured radiances and those obtained from LUT. Here we applied OE to finally determine the vertical profile of NO_2. In addition, we retrieved the tropospheric NO_2 vertical profile using OMI LV1B radiance data. We also, calculated the NO_2 Volume Mixing Ratio (VMR) using the retrieved tropospheric NO_2 vertical profile, and compared it with ground observation in-situ data.