Oral | Symbol A (Atmospheric, Ocean, and Environmental Sciences) | A-AS Atmospheric Sciences, Meteorology & Atmospheric Environment

[A-AS22_1PM2]Atmospheric Chemistry

Convener:*Nobuyuki Takegawa(Research Center for Advanced Science and Technology, University of Tokyo), Yousuke Sawa(Geochemical Research Department, Meteorological Research Institute), Yugo Kanaya(Research Institute for Global Change, Japan Agency for Marine-Earth Science and Technology), Kenshi Takahashi(Research Institute for Sustainable Humanosphere, Kyoto University), Hiroshi Tanimoto(National Institute for Environmental Studies), Chair:Nobuyuki Takegawa(Research Center for Advanced Science and Technology, University of Tokyo)

Thu. May 1, 2014 4:15 PM - 6:00 PM 511 (5F)

This session provides a forum for the presentation of the broad spectrum of tropospheric and stratospheric chemistry, including various research topics (air quality and climate), approaches (modeling, field measurements, satellite data analysis, and laboratory studies), and species (gas and aerosol). This session also provides an opportunity for discussing possible future collaboration with other research fields relevant to atmospheric chemistry.

4:15 PM - 4:30 PM

[AAS22-P24_PG]Validation observation for the derivation of lower tropospheric ozone by remote sensing

3-min talk in an oral session

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Keywords:Remote Sensing, Lower tropospheric ozone

The lower tropospheric ozone is a major component of photochemical oxidant which causes photochemical smog, adversely affecting human health and vegetation when it comes to high concentration. Therefore knowing their behavior as air pollution is an important. In recent years, contrary to the reduction of lower tropospheric ozone precursor gases, their amount is increasing. It has been suggested that the long-range transport of the lower tropospheric ozone from Asian Continent affects air quality in Japan and other wide areas. Remote sensing from a satellite is effective to observe such extensive/transboundary air pollution. However it has been quite difficult to measure the lower tropospheric ozone from satellite. We have proposed that it can be evaluated with simultaneous measurement of solar backscattering spectra in the ultraviolet(UV) and visible(Vis) regions. Because the atmospheric Rayleigh scattering cross-section is much larger in UV than that in Vis, lower tropospheric light path length of the solar scattered radiation observed from space is significantly different in these two wavelength regions. This difference of light path enables us to detect the lower tropospheric ozone by the simultaneous measurement of UV and Vis solar backscattered spectra from space. For the validation of this technique, we carried out aircraft experiments to validate this method over Tsukuba on 10th and 13rd September 2012. UV and Vis backscatter spectra were measured with two spectroscopes (Maya2000pro, Ocean Optics, USA) at two altitudes 2500 ft (760 m) and 25000 ft (7600 m). Simultaneously, ozone profile was measured with ozone monitors on-board the aircraft, with

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ozonesonde launched near Tsukuba, and the tropopheric ozone lidar. Because aerosol scattering may significantly affect the evaluation of the lower tropospheric ozone amount, in situ aerosol observation with the CRDS, PSAP, and PASS instruments and the lidar observation were carried out in the Meteorological Research Institute. From the aircraft, we observed solar scattered radiation from zenith, nadir and 20 degree oblique directions in ultraviolet(300 - 380nm wavelength) and visible(400 - 700nm wavelength) spectral range. Because the surface reflected light greatly contribute to the scattered light from nadir, especially in the visible spectral range, for accurately estimation of the ozone amount, it is particularly important to understand the surface reflection spectrum. In this experiment, ground reflection spectra at different surface conditions such as rice paddy, forest, urban, farm areas and so on were measured at a low altitude of 2500ft (760m). It is necessary to consider the effect of scattering near the aircraft to estimate the surface reflected light. We estimated it with SCIATRAN (Rozanov et al., 2005). Results of these observations will be presented at this session.

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