

3D4) Atmospheric Extinction Coefficient Measurement using the Long-Path Differential Optical Absorption Spectrometer System

이정순 · 김영준¹⁾ · 김문규

한국과학기술원 인공위성센터, ¹⁾광주과학기술원 환경공학과

1. 서 론

The study on the atmospheric chemistry with aerosol particles requires simultaneous information about trace gas concentrations and aerosol properties. For this purpose, a DOAS is a very useful technique as a candidate for detection of gases and particles simultaneously. DOAS has been considered a powerful technique for detecting pollutants since 1980's for the many advantages, for example, like most other spectroscopic techniques, inherent calibration, sub-parts per trillion (ppt) to ppb sensitivity and precision (1-10%), good specificity, well-ness operation, and the capability for remote measurements.

2. 연구 방법

The present DOAS system allows automatic spectrally resolved measurements of $\sigma_e(\lambda)$ in the UV/Visible region. The spectral slope of the particle extinction coefficient $\sigma_e(\lambda)$ is parameterized by a angstrom law. Also a turbidity of each event is obtained from the Angstrom exponent . Spectral extinction coefficients measurements were carried out over a semi-urban area, Gwangju, Korea, from October 20 to November 20, 2002, to investigate the variations of air quality by using DOAS system. The ratio of measured air spectrum to the spectrum of clean day condition, determined attenuation measurements for different atmospheric distances and are needed to determine the extinction coefficient. In order to avoid absorption bands of H₂O, NO₂ and O₃, 7 spectral channels, 325, 394, 472, 550, 580, 680, and 753 nm, with 3 nm width are selected to determine extinction.

3. 결과 및 고찰

The hourly averaged extinction coefficients (Figure 1) measured by LP-DOAS in the wavelength region of 290-760 nm during the entire measurement period ranged from around 0.1 (very clean day) to 2.0 (biomass burning episode). To compare the extinction coefficients at 550nm, the measurement results of transmissometer (Optec LPV-2) or PM10 was operated at the same place.

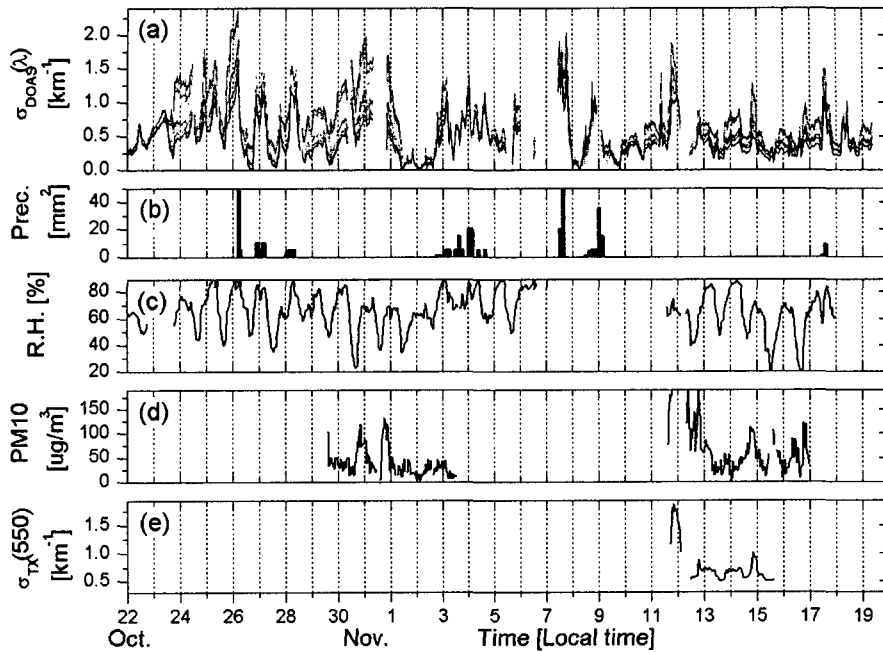


Fig. 1. Time series of spectral extinction coefficients measured by DOAS (a), amount of precipitation (b), PM₁₀ mass concentration (c), relative humidity (d), and extinction coefficient at 550 nm measured by a transmissometer (e).

The results of extinction by DOAS system were in agreement with those by TX system. The LP-DOAS system has the potential to be an alternative in open path instrument for simultaneous measurement of gaseous pollutants as well as atmospheric extinction coefficient

참 고 문 헌

Flentje, H., Dubois, R., Heintzenberg, J. and Karbach, H.-J., 1997, Retrieval of aerosol properties from boundary layer extinction measurements with a DOAS system, *Geophys. Res. Lett.* 24(16), 2019-2022

Mueller, T., 2001, Spectral extinction measurements with LP-DOAS, *1. International DOAS workshop*, Heidelberg, German