MAX-DOAS retrieval of aerosol extinction properties in Beijing, China

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Multi-Axis Differential Optical Absorption Spectroscopy (MAX-DOAS) measurements were performed in the campus of Chinese Academy of Meteorological Sciences (CAMS) in Beijing, China. The O_4 absorption in the visible (VIS) and ultraviolet (UV) spectral regions were used to retrieve the aerosol extinction profiles and aerosol optical depths (AODs) using the Heidelberg Profile (HeiPro) algorithm in haze days and non-haze days, respectively. The results show that the correlation between retrieved AODs and the correlative Aerosol Robotic Network (AERONET) AODs in VIS region (R = 0.86) is better than that in UV region (R = 0.62) in haze days. However, the correlations described above are similar in VIS region (R = 0.96) and UV region (R = 0.97) in non-haze days. There is a considerable overestimation on AODs in UV region than in VIS region under hazy conditions, which could be attributed to the light diffusion and the uncertainties in aerosol physical and chemical input parameters in the Radiative Transfer Model (SCIATRAN) simulations. The retrieved aerosol extinction profiles using the exponential decreasing a priori show a great agreement with that measured by light detection and ranging (lidar), especially under clear-sky conditions. Moreover, we found that the retrieved sensitvity (averaging kernel) at different altitudes in UV region is smaller that in VIS region, which propably results in the overestimation on the aerosol extinction at low altitudes in UV region under hazy conditions.

Keywords: MAX-DOAS, aerosol, pollution process

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