



Study on O₄ absorption correction on the aerosol profile retrieval from MAX-DOAS observation

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Since Multi AXis Differential Optical Absorption Spectroscopy (MAX-DOAS) observations of the oxygen dimer O₄ are proposed to serve as the index of the atmospheric light path distribution, it is widely used for the determination of atmospheric aerosol properties and in particular, the vertical profile in the lowest troposphere. Many previous studies used a single or elevation-angle-dependent scaling factor to correct O₄ absorption in the aerosol profile retrieval. In this work, we have performed the MAX-DOAS observation of O₄ in Shanghai, China for several months. In order to achieve better agreement between the measured and modelled O₄ absorption, the scaling factor for O₄ correction need to be varied from time to time even during the same day. Moreover, the atmospheric sounding data of temperature and pressure profiles nearby were introduced in the radiative transfer model simulation. Then the modelled O₄ absorption is improved without the usage of the correction factor. Finally, we have classified several conditions and correspondingly used the different methods for O₄ correction. Furthermore, the retrieved aerosol profile information were validated by other ancillary measurements, e.g. in-situ PM_{2.5}, sun photometer, nephelometer and LIDAR.