



Long-term measurements of trace gaseous pollutants over Beijing using Mini-MAX-DOAS instruments

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Air quality in Beijing megacity has been of great concern in the atmospheric and environmental science community as well as public media. In addition to in situ measurements of ambient concentrations of air pollutants (e.g. NO₂, SO₂) near the ground, satellite data have also been used to analyze the long-term variation trend of urban pollution as well as the special emission control effect. However, the emission sources of pollutants in a megacity like Beijing are diverse and heterogeneously distributed in the urban canopy. Therefore, in situ surface measurement results may be quite different from one site to another depending on the representativeness of the chosen sites. Satellite measurements are found to have large biases in monitoring the air pollutant levels in a city due to both grid-smoothing and aerosol shielding effects.

Multi-Axis Differential Optical Absorption Spectroscopy (MAX-DOAS) is a passive remote sensing technology, which retrieves atmospheric trace gases by using scattered sun light from various elevation angles. Ground-based measurements by MAX-DOAS are especially sensitive to the tropospheric part of trace gas column, and can be used effectively to validate the satellite products for the troposphere. We have performed ground Mini-MAX-DOAS measurements at an urban site (39.95N, 116.32E) in Beijing since August 2008. The diurnal and seasonal variations of tropospheric NO₂ vertical column densities were retrieved by analyzing the MAX-DOAS spectra obtained at this site. Such dataset were also used to validate the SCIMACHY and OMI satellite NO₂ products for the period 2008-2009. Analyses of these MAX-DOAS spectra for SO₂ and HCHO will be done in the near future to investigate the long-term variations of pollution level and character in Beijing over the past years.