



Measurements of tropospheric NO₂ column at a rural site southwest of Beijing using Mini-MAX-DOAS instruments

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Tropospheric vertical column density (VCD) of NO₂ retrieved from satellite observations has been widely used in atmospheric chemistry research in China. An underestimation of tropospheric NO₂ has been found for satellite with respect to passive DOAS ground measurement in megacities, e.g., Beijing and Shanghai. Therefore, MAX-DOAS ground measurements in the non-urban sites are specially needed to validate the satellite data for a wide area in China.

The Gucheng site (39 deg 08 min N, 115 deg 40 min E, 15.2 m asl) is located in the polluted rural area of North China, with a distant about 110km southwest of Beijing, 130 km west of Tianjin, and 160 km northeast of Shijiazhuang. We performed ground-based MAX-DOAS measurements in Gucheng from 1 September 2008 through 30 September 2010. The two year's DOAS spectra data are analyzed with a focus on tropospheric NO₂ at the first stage. Here we present the results of the retrieved tropospheric NO₂ VCDs at this site, including the diurnal, weekly and seasonal variations and cloud effects.

We find a prominent seasonal variation pattern of tropospheric NO₂ VCD over Gucheng, with a monthly mean minimum occurring during summertime and a monthly mean maximum in wintertime. We also find two peaks in the tropospheric NO₂ VCD diurnal variations in spring, autumn and winter, occurring around 8:00 BJT and 17:00 BJT respectively. These retrieved results will be used to validate satellite products of tropospheric NO₂ VCDs.