



## **Retrieval of tropospheric NO<sub>2</sub> vertical column densities from multiple ground-based MAX-DOAS measurements in Vienna and comparison with satellite data**

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Since December 2016, April 2017, and August 2018, spectral measurements (UV and Vis) with three MAX-DOAS instruments are performed at selected viewing directions in the northeast, northwest, and south of the city center of Vienna, Austria, respectively, as part of the VINDOBONA (VIenna horizontal aNd vertical Distribution OBServations Of Nitrogen dioxide and Aerosols) project.

In this study, nitrogen dioxide (NO<sub>2</sub>) slant column densities (SCDs) as determined with the DOAS algorithm are converted into tropospheric NO<sub>2</sub> vertical column densities (TVC NO<sub>2</sub>). The conversion is based on three different methods: i) profile retrieval algorithm BOREAS, ii) geometric approximation, and iii) zenith-sky observations only. TVC NO<sub>2</sub> as obtained from measurements of the three MAX-DOAS instruments by applying the three different methods is compared with satellite observed TVC NO<sub>2</sub>. In addition, a comparison of near-surface NO<sub>2</sub> concentrations derived from BOREAS with in situ NO<sub>2</sub> from nearby air quality monitoring stations is presented.