



MAX-DOAS measurements and profile retrievals of tropospheric trace gases at the Amazonian Tall Tower Observatory (ATTO) in the Brazilian rain forest

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Multi-AXis (MAX)-DOAS measurements observe scattered sun light under different elevation angles. From such measurements tropospheric vertical column densities (VCDs) and vertical profiles of different atmospheric trace gases and aerosols can be determined. In October 2017 we installed a MAX-DOAS instrument at the Amazonian Tall Tower Observatory (ATTO) measurement site. The ATTO site is located in a pristine rain forest region in the central Amazon Basin, about 150 km northeast of the city of Manaus (Andreae et al., 2015). The measurement site is equipped with various measurement systems to study different trace gases and aerosols.

For our measurements under the quite challenging conditions (a lot of rain, high humidity and hot climate) at this location a new instrument was developed by the electronics workshop of our institute which is supposed to run unattended with a minimum of maintenance. The instrument is placed at the 80 m platform of the ATTO tower which is located at around 40 meters above the canopy. This allows quite long light paths (up to around 20 km) in the lowest atmospheric layers and thus relatively low detection limits for the different trace gases. Measurement data is available starting from 12th of October 2017.

In this study we first retrieve differential slant column densities (dSCDs) of different trace gases such as NO₂, HCHO, CHOCHO and O₄. From the obtained dSCDs we derive vertical profiles of NO₂, HCHO and aerosol extinction for altitudes below about 3 km using the MAInz Profile Algorithm MAPA. We compare these results with other trace gas and aerosol measurements and investigate the influence of biomass burning and intercontinental transport of desert dust across the Atlantic Ocean.