Geophysical Research Abstracts
Vol. 20, EGU2018-4690, 2018
EGU General Assembly 2018

Determining spatial distributions of aerosols and trace gases within a satellite ground pixel with 4 azimuth MAX-DOAS measurements

Julia Remmers, Steffen Beirle, and Thomas Wagner
MPI for Chemistry, Satellite remote sensing, Mainz, Germany

MAX-DOAS measurements are mainly used to retrieve vertical profiles of aerosols and trace gases in the lower troposphere. Due to the measurement principle these observations are sensitive for distances of about 3-20km, depending on wavelength and atmospheric conditions. For satellite validation this is an advantage over in-situ measurements which usually give only point values.
With the new generation of satellites the spatial resolution largely improved and therefore the effects of horizontal gradients on satellite validation also became more important. Here it is important to note that close to strong emission sources usually also strong horizontal gradients occur.
Up to now horizontal homogeneous distributions of trace gases and aerosols are usually assumed within the MAX-DOAS profile retrievals. This leads to systematic over and underestimation of the aerosol and trace gas load in the atmosphere, especially close to cities or other sources. Here we show a novel method which considers and retrieves horizontal gradients of aerosols and trace gases from multi-azimuth MAX-DOAS observations.
We use the 4-Azimuth MAX-DOAS located in Mainz, Germany, at the Max Planck Institute for Chemistry. This instrument measures simultaneously in four fixed azimuth directions and performs elevation scans. The measurements at the 4 azimuth angles are used together in a combined profile inversion algorithm, which yields a profile above the location of the instrument together with horizontal gradients for every viewing direction. This algorithm is applied for both, aerosol and trace gas inversions. This presentation describes the algorithm, shows first inversion results and comparison to TROPOMI data. The derived aerosol distributions are also compared to Ceilometer and Aeronet data.