Geophysical Research Abstracts
Vol. 16, EGU2014-6558-1, 2014
EGU General Assembly 2014

The effect of cloud screening on MAX-DOAS aerosol retrievals.

Clio Gielen (1), Michel Van Roozendael (1), Francois Hendrik (1), Caroline Fayt (1), Christian Hermans (1), Gaia Pinardi (1), Hugo De Backer (2), Veerle De Bock (2), Quentin Laffineur (2), and Tim Vlemmix (3)

(1) Belgian Institute for Space Aeronomy, Brussel, Belgium (clio.gielen@aeronomie.be), (2) Royal Meteorological Institute of Belgium, Brussels, Belgium, (3) Department of Geosciences & Remote Sensing, Delft University of Technology, The Netherlands

In recent years, ground-based multi-axis differential absorption spectroscopy (MAX-DOAS) has shown to be ideally suited for the retrieval of tropospheric trace gases and deriving information on the aerosol properties. These measurements are invaluable to our understanding of the physics and chemistry of the atmospheric system, and the impact on the Earth's climate.
Unfortunately, MAX-DOAS measurements are often performed under strong non-clear-sky conditions, causing strong data quality degradation and uncertainties on the retrievals.

Here we present the result of our cloud-screening method, using the colour index (CI), on aerosol retrievals from MAX-DOAS measurements (AOD and vertical profiles). We focus on two large data sets, from the Brussels and Beijing area. Using the CI we define 3 different sky conditions: bad (=full thick cloud cover/extreme aerosols), mediocre (=thin clouds/aerosols) and good (=clear sky). We also flag the presence of broken/scattered clouds. We further compare our cloud-screening method with results from cloud-cover fractions derived from thermic infrared measurements.

In general, our method shows good results to qualify the sky and cloud conditions of MAX-DOAS measurements, without the need for other external cloud-detection systems. Removing data under bad-sky and broken-cloud conditions results in a strongly improved agreement, in both correlation and slope, between the MAX-DOAS aerosol retrievals and data from other instruments (e.g. AERONET, Brewer).

With the improved AOD retrievals, the seasonal and diurnal variations of the aerosol content and vertical distribution at both sites can be investigated in further detail. By combining with additional information derived by other instruments (Brewer, lidar, ...) operated at the stations, we will further study the observed aerosol characteristics, and their influence on and by meteorological conditions such as clouds and/or the boundary layer height.