



Ground-based MAXDOAS retrievals of formaldehyde during the CINDI campaign

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Over the last years, ground-based multi-axis differential absorption spectroscopy (MAXDOAS) has been proved to be a very promising tool for the automated retrieval of tropospheric pollutants. The MAXDOAS instruments are designed to allow for the quasi simultaneous observation of the scattered sun light in a range of different line-of-sight (LOS) directions from the horizon to the zenith, resulting in an increased sensitivity towards atmospheric absorbers present close to the surface.

One of the main obstacles for the tropospheric trace gas vertical profile retrievals is the sensitivity of the length of the light path –and thus the observed slant column densities (SCD) of an atmospheric absorber– to the presence of aerosol in the atmosphere. To overcome this difficulty we developed an algorithm to retrieve, in a first step, the aerosol extinction vertical profiles from measurements of the O₄ absorptions for different LOS. In a second step, the obtained aerosol profiles are used as input for the retrieval of tropospheric trace gas (e.g., CH₂O, NO₂) vertical profiles. The retrieval of minor trace gases such as CH₂O remains quite challenging, due the overall faintness of the signal.

The CINDI campaign held in June-July 2009 in Cabauw offered the opportunity to explore the possibilities of the MAXDOAS technique for the retrieval of CH₂O slant columns and, in a second step, vertical profile information. Here we will present the first results of the inter-comparison of slant columns and vertical CH₂O profiles. We will discuss the strengths, limitation, and information content of the retrievals. In addition we will show the first results of the inter-comparison of the total tropospheric CH₂O columns retrieved from ground-based MAXDOAS measurements and from satellite UV-VIS nadir sounders. We will explore the possibility of using the CH₂O MAXDOAS measurements for satellite validation.