



Aerosol and trace gas profile retrievals from MAX-DOAS observations using simple least squares methods

Thomas Wagner, Steffen Beirles, and Reza Shaiganfar

Max Planck Institute for Chemistry, Mainz, Germany (thomas.wagner@mpch-mainz.mpg.de, +49-(0)6131-305388)

Multi-AXis (MAX-) DOAS observations have become a widely used technique for the retrieval of atmospheric profiles of trace gases and aerosols. Since the information content of MAX-DOAS observations is limited, usually optimal estimation techniques are used for profile inversion, and a-priori assumptions are needed. In contrast, in our retrieval we limit the retrieved parameter to few basic profile parameters (e.g. profile shape and integrated column density), which are retrieved without further a-priori assumptions. The retrieval is instead based on simple least squares methods. Despite the simple retrieval scheme, our method has the advantage that it is very robust and stable. It also yields the most important parameters with good accuracy (e.g. total aerosol optical depth, total tropospheric trace gas column density, surface aerosol extinction, surface trace gas mixing ratio). Some of these parameters can even be retrieved for cloudy conditions. We present MAX-DOAS results from two measurement campaigns: The CINDI campaign in Cabauw, The Netherlands, in 2009 and the FORMAT campaign in Milano, Italy, in 2003. Results for aerosols, NO₂, and HCHO, are presented and compared to independent measurements.