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Retrieval of NO2 profile using ground-based MAX-DOAS measurements from the DANDELIONS-II campaign

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The DANDELIONS-II campaign (second iteration of the 'Dutch Aerosol and Nitrogen Dioxide Experiments for vaLIdation of OMI and SCIAMACHY') was held in September 2006 at Cabauw (52N, 4.9E) in the Netherlands. The objectives of this campaign were the validation of satellite instruments and the intercomparison between ground-based instruments for the measurements of tropospheric NO2 and aerosols. Several groups (IUP-Bremen and Heidelberg, KNMI, and IASB-BIRA) contributed with simultaneously operating Multi-Axis (MAX-) DOAS (Differential Optical Absorption Spectroscopy) spectrometers. Since they collect light scattered from different viewing directions above the horizon and at zenith, these instruments can provide information on the vertical distribution of absorbers in both the stratosphere and troposphere. This is particularly important for a site like Cabauw where conditions are often polluted and therefore large amounts of NO2 in the troposphere are expected.

Here, we focus on the retrieval of NO2 profiles using the MAX-DOAS measurements performed by two IASB-BIRA spectrometers, a first one operating from the ground and the second one on top of the Cabauw mast at 200 m of altitude, allowing to scan negative elevation angles. The validated IASB-BIRA profiling algorithm, based on the Optimal Estimation Method and initially developed for the retrieval of stratospheric NO2 profiles from zenith-sky UV-visible observations, is adapted in order to take into account all viewing directions and therefore to retrieve the vertical distribution of NO2 also in the troposphere. The retrieved tropospheric profiles and columns will be compared to the evaluations made by the other groups, including Lidar and in-situ

measurements. The gain in vertical resolution for the retrieval of NO2 in the boundary layer, which is expected with the use of two spectrometers operating from the ground and at 200 m of altitude, will be also characterized.