



First results of the CINDI-2 semi-blind MAX-DOAS intercomparison

Karin Kreher (1), Michel Van Roozendael (2), Francois Hendrick (2), Arnoud Apituley (3), Udo Friess (4), Johannes Lampel (4), Ankie Pipers (3), Andreas Richter (5), Thomas Wagner (6), and all CINDI-2 Participants ()
(1) BK Scientific GmbH, Mainz, Germany (karin@bodekerscientific.com), (2) Belgian Institute for Space Aeronomy (IASB-BIRA), Brussels, Belgium, (3) Royal Netherlands Meteorological Institute, de Bilt, The Netherlands, (4) Institute for Environmental Physics, University of Heidelberg, Heidelberg, Germany, (5) Institute for Environmental Physics, University of Bremen, Bremen, Germany, (6) Max Planck Institute for Chemistry, Mainz, Germany

The second Cabauw Intercomparison campaign for Nitrogen Dioxide measuring Instruments (CINDI-2) took place at the Cabauw Experimental Site for Atmospheric Research (CESAR; Utrecht area, The Netherlands) from 25 August until 7 October 2016. The goals of this inter-comparison campaign are to support the creation of high-quality ground-based data sets (e.g. to provide reliable long-term time series for trend analysis and satellite data validation), to characterise and better understand the differences between a large number of MAX-DOAS and DOAS instruments and analysis methods, and to contribute to a harmonisation of the measurement settings and retrieval methods. During a time period of 17 days, from 12 to 28 September 2016, a formal semi-blind intercomparison was held following a detailed measurement protocol. The development of this protocol was based on the experience gained during the first CINDI campaign held in 2009 as well as more recent projects and campaigns such as the MADCAT campaign in Mainz, Germany, in 2013. Strong emphasis was put on the careful synchronisation of the measurement sequence and on exact alignment of the elevation angles using horizon scans and lamp measurements.

In this presentation, we provide an overview and some highlights of the MAX-DOAS semi-blind intercomparison campaign. We will introduce the participating groups, their instruments and the measurement protocol details, and then summarize the campaign outcomes to date. The CINDI-2 data sets have been investigated using a range of diagnostics including comparisons of daily time series and relative differences between the data sets, regression analysis and correlation plots. The data products so far investigated are NO₂ (nitrogen dioxide) in the UV and visible wavelength region, O₄ (oxygen dimer) in the same two wavelength intervals, O₃ (ozone) in the UV and visible wavelength region, HCHO (formaldehyde) and NO₂ in an additional (smaller) wavelength range in the visible. The results based on the regression analysis are presented in summary plots and tables, addressing MAX-DOAS and twilight zenith sky measurements separately. Further information on instrumental details such as the alignment of the viewing direction and elevation and the field of view are also summarized and included in the overall interpretation.