



Centralised reprocessing of CINDI-2 MAX-DOAS slant column data sets

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As part of the second Cabauw Intercomparison campaign for Nitrogen Dioxide measuring Instruments (CINDI-2), slant column measurements of NO₂, O₄, HCHO and O₃ performed by 35 DOAS and MAX-DOAS spectrometers were intercompared following a semi-blind protocol, with the aim to assess the consistency of instruments to be used for the validation of TROPOMI/Sentinel-5 precursor and the future GEMS, TEMPO and Sentinel 4 and 5 sensors. Results from this semi-blind exercise where each group contributed data sets analysed using prescribed retrieval settings have shown residual discrepancies that may be linked to instrumental and/or retrieval issues (see Kreher et al., 2018).

In the present study, we investigate the potential of further harmonising the CINDI-2 slant column data sets by deploying a centralised slant column processing system applied to original spectral data from all instruments. Accordingly, after common formatting and initial quality control, CINDI-2 spectra were reprocessed using the QDOAS software tool developed at BIRA-IASB, and results statistically analysed in comparison to data from the original semi-blind exercise. We show that central reprocessing leads to a significant improvement of the overall agreement between the different data sets. The potential reasons for this improvement are investigated using various diagnostic tools, in particular the derivation of slit function parameters from measured spectra as well as an analysis of instrument-related parameters such as shift/stretch, offset, fitting residuals and their dependency on viewing and solar geometries. Lessons learned from this study will be used within the ESA FRM4DOAS project which aims at setting up a centralised MAX-DOAS processing service in support of satellite validation programmes.

Kreher, K. et al., Intercomparison of slant column measurements of NO₂, O₄, O₃ and HCHO by MAX-DOAS and zenith-sky UV-Visible spectrometers, to be submitted to AMT (2018)