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Intercomparison of MAXDOAS HCHO slant columns during the CINDI campaign

G. Pinardi (1), C. Adams (2), S. Beirle (3), A. Cede (4), U. Friess (5), M. Gil (6), H. Irie (7), E. Peters (8), A. Piters (9), O. Puentedura (6), A. Richter (8), R. Shaigan (3), E. Spinei (10), K. Strong (2), H. Takashima (7), T. Wagner (3), F. Wittrock (8), S. Yilmaz (5), and M. Van Roozendael (1)

(1) Belgian Institute for Space Aeronomy (BIRA-IASB), Brussels, Belgium (gaia.pinardi@aeronomie.be), (2) Department of Physics, University of Toronto, Ontario, Canada, (3) Max Planck Institute for Chemistry, Mainz, Germany, (4) LuftBlick, Tyrol, Austria, and NASA/Goddard Space Flight Center, USA, (5) Institute of Environmental Physics, University of Heidelberg, Germany, (6) INTA, Madrid, Spain, (7) Research Institute for Global Change, JAMSTEC, Yokohama, Japan, (8) Institute of Environmental Physics, University of Bremen, Germany, (9) KNMI, De Bilt, The Netherlands, (10) Laboratory for Atmospheric Research, Washington State University, Pullman WA, USA

We present the results of a formaldehyde slant column intercomparison performed during the Cabauw Intercomparison Campaign of Nitrogen Dioxide measuring Instruments (CINDI) which took place in Cabauw (52°N, 5°E), The Netherlands, during summer 2009. Results from nine MAX-DOAS instruments (from BIRA-IASB, INTA, Bremen, Heidelberg, JAMSTEC, NASA, WSU, Toronto and Mainz research groups) are compared after application of common DOAS settings. To reduce instrumental and atmospheric noises, the slant columns are averaged over intervals of 30-minutes, and subsequently compared to a reference dataset. The intercomparison shows a good agreement, with differences from the reference dataset generally within 15% for off-axis elevations.

In a second part of the study, sensitivity tests are performed to investigate the systematic uncertainties in the HCHO slant columns retrieval. Input parameters such as the molecular absorption cross-sections, corrections terms for the Ring effect, the polynomial closure terms and the width of the fitting interval are tested. In general, HCHO slant columns were found to be moderately sensitive to changes in the retrieval settings. However larger differences exceeding 15-20% were found to be related to uncertainties on the Ring effect corrections as well as to the O4 absorption cross-sections. The contribution from random uncertainties (ranging between 5 and 30% of the total error) was found to be highly dependent on the performance of individual measuring systems.