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Pole-to-pole validation of GOME WFDOAS total ozone with groundbased data

M. Weber, L. N. Lamsal, M. Coldewey-Egbers, K. Bramstedt, and J. P. Burrows
Institute of Environmental Physics, University of Bremen, Bremen, Germany

Abstract. This paper summarises the validation of GOME total ozone retrieved using the Weighting Function Differential Optical Absorption Spectroscopy (WFDOAS) algorithm Version 1.0. This algorithm has been described in detail in a companion paper by Coldewey-Egbers et al. (2005). Compared to the operational GDP (GOME Data Processor) V3, several improvements to the total ozone retrieval have been introduced that account for the varying ozone dependent contribution to rotational Raman scattering, includes a new cloud scheme, and uses the GOME measured effective albedo in the retrieval. In this paper the WFDOAS results have been compared with selected ground-based measurements from the WOUDC (World Ozone and UV Radiation Data Centre) that collects total ozone measurements from a global network of stations covering all seasons. From the global validation excellent agreement between WFDOAS and ground data was observed. The agreement lies within ±1%, and very little seasonal variations in the differences are found. In the polar regions and at high solar zenith angles, however, a positive bias varying between 5 and 8% is found near the polar night period. As a function of solar zenith angle as well as of the retrieved total ozone, the WFDOAS differences to ground polar data, however, show a much weaker dependence as compared to the operational GOME Data Processor Version 3 of GOME that represents a significant improvement. Very few stations carry out simultaneous measurements by Brewer and Dobson spectrometers over an extended period (three years or more). Simultaneous Brewer and Dobson measurements from Hradec Kralove, Czech Republic (50.2N, 15.8E) and Hohenpeissenberg, Germany (47.8N, 11.0E) covering the period 1996-1999 have been compared with our GOME results. Agreement with Brewers are generally better than with the simultaneous Dobson measurements and this may be explained by the neglect of stratospheric (ozone) temperature correction in the standard ozone retrieval from the ground.

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