

## ***Interactive comment on* “Total ozone retrieval from GOME UV spectral data using the weighting function DOAS approach” by M. Coldewey-Egbers et al.**

**M. Coldewey-Egbers et al.**

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We thank Anonymous Referee 1 for his positive review and his comments.

Major point (1):

We will add the following discussion concerning the comparison with the GDP V3.0 algorithm and the new WFDOAS algorithm features to our manuscript.

The molecular ozone filling-in that is accounted for in the Ring spectra calculations has the largest contribution to improving total ozone results from WFDOAS compared to GDP V3.0. This leads to systematic differences of 2-3% between both methods (see Fig. 8). In selected cases, the albedo and effective altitude dependence of the

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Ring effect can lead to differences of up to 5% between WFDOAS and GDP V3.0, for instance, in the innertropical convergence zone near 28°S (high clouds) and above ice (south of 72°S). All other changes to the algorithm, for instance use of effective height and LER also improved the retrieval. This has been clarified in the Summary section. We also moved Figure 7 representing preliminary validation results into a new Section Comparison with Version 3 and ground data.

Major point (2):

We decided to keep the Himalaya case study in the manuscript, but we will replace Fig. 6. Latitude has been kept fixed at 28° N for the new comparison, so that ozone depends on effective height only. The correlation is 0.76. In addition, we included the decrease in total ozone with increasing height, as it is expected from a climatological ozone profile. We selected a profile from the TOMS V8 monthly mean climatology for June, 20°–30°N, with a total ozone amount of 275 DU. The expected decrease ( $\approx 2.5$  DU/km) and the observed agree very well.

Minor points:

a) See also major point (1). We will discuss our findings and results in the summary and in the abstract.

b) Introduction: 4918-14

We added: In Section 5 we discuss two case studies (tropics and mountains), that should demonstrate the proper working of the effective height concept (see Sect. 3.1), that we use for WFDOAS. As an example how well WFDOAS is working, a comparison with ground data from Hohenpeissenberg (Germany) is shown in Section 6, where also the differences of WFDOAS compared to the GDP V3.0 are analysed using one selected GOME orbit.

c) Weighting functions, SCD, and  $P_i$  are now explained in the parameter description of Eq. 1.

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d) 4920-8-10 Clarity has been improved. We added: The lower boundary in the actual retrieval is chosen according to ground height, cloud height, and cloud fraction (See Sect. 3.1).

e) We will keep Fig. 1 in the manuscript since it summarises the major aspect of the cloud correction to the total ozone retrieval.

f) 'Effective height' will be used instead of 'effective altitude'

g) It is not clear, to which issue the reviewer wants more explanations (BrO retrieval or residual?)

h) See major point (2)

i) Fig. 3: Axis labeling will be improved.

j) Fig. 7 title will be changed.

k) Fig. 6 will be replaced, see major point (2)

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Interactive comment on Atmos. Chem. Phys. Discuss., 4, 4915, 2004.

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