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Interactive comment on "Pole-to-pole validation of GOME WFDOAS total ozone with groundbased data" *by* M. Weber et al.

M. Weber et al.

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We thank the anonymous reviewer 1 for his comments and suggestions to improve the paper.

Major comments:
1) It was suggested by Reviewer 1 to include more years in the comparison, particularly, for northern hemispheric high latitudes. Also reviewer 3 asked why the intercomparison was limited to the period 1996 to 1999 except for Lauder and Hohenpeissenberg, although global measurements by GOME are available until 2003. The main reason was that at the time when the comparison was made as part of the GOTOCORD project, data after 1999 were not available due to a hard drive failure. Since both Lauder and Hohenpeissenberg comparison demonstrated that there are no systematic trends with

time, we have not extended the validation for low to mid-latitudes. Due to the more complicated nature of validating at polar latitudes, we have extended the validation with polar stations up to 2003. For this reason we have skipped Section 6 (Long-term validation) and integrated it into the new Section 5. Most material from Section 4 and 5 has been rearranged into three new Sections, i.e. Section 4 (Comparison with individual WOUDC stations), Section 5 (Validation at low to middle latitudes) and Section 6 (Validation in polar regions). Figs. 8 and 9 related to the validation in polar regions have been replaced by eight new figures that more clearly show the improvements of WFDOAS over GDP V3, despite remaining positive biases under twilight conditions (near the polar night period). Figure 10 (Hohenpeissenberg comparison up to 2003) has, therefore, moved to Section 5 (and is now Fig 8). The final sentences in the Introduction have been changed as follows: *The next section shows comparisons with individual WOUDC stations (Sect. 4) followed by Sect. 5 summarising the statistical analysis involving all stations selected from low to mid-latitudes. Most of the validation statistics at mid-latitudes and in tropics relies on ground-based data between 1996 and 1999, but for selected stations the validation has been extended up to 2003 (Lauder and Hohenpeissenberg) for demonstrating the long-term stability of the GOME data. In a separate section (Sect. 6) the validation results from comparison with polar station measurements in both hemispheres from 1996 to 2003 are presented.*

2) Questions were raised why different collocation radius of 160 and 300 km were used. From our experience from many validation exercises it was found that results are not strongly affected for collocation radii up to 500 km. Beyond 500 km, the more significant changes are in the RMS scatter of the differences. Since only the nearest collocation at a given day was selected, only few data are added from increasing the maximum allowable collocation radius. In the first paragraph of Section 4 the following was added: *A change of collocation radius to 300 km rather than 160 km as in the case of the triple comparison presented earlier does not alter the statistics significantly.* One should also keep in mind that the GOME footprint is for most part 320 km across track that alleviates the dependence on collocation radius for the first hundreds of km.

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Specific comments.

p. 6919, lines 12ff. explanation of large error bar in Fig. 4: We have added to the last paragraph in Sect. 4: *In fall 1997 the scatter in the differences to the Resolute Brewer data is quite large as expressed by the huge error bar in Fig. 4. This is due to some outliers and due to the fact that close to the polar night period only few data are contributing to the three month mean.*

p. 6919, lines 18ff. more information on profile shape climatology was requested: The following has been added: *This climatology accounts for seasonal variation and also contains typical ozone hole profiles.*

p. 6921, line 5. explain polar vortex: We have now described polar vortex edge as follows: It *delineates a cold region where the ozone hole resides*.

p. 6922, line 17ff. polar vortex edge and collocation radius: see earlier explanation regarding collocation radius choice. One has also to keep in mind that the GOME foot print is already 320 km across-track.

p. 6923. request for adding a figure with Hohenpeissenberg data similar to that of Lauder. The corresponding figure is in the Coldewey-Egbers et al. (2004) paper. We also mention now in the text that the GDP V3 comparison at Hohenpeissenberg (not shown) shows a similar seasonal variation in the differences with an amplitude of 1.4% (Lauder: 1.7%). Note that the Lauder figure and Section 6 (Longterm validation) has now moved to the end of Section 5.

All other specific comments have been agreed upon and changes were made as suggested.

Interactive comment on Atmos. Chem. Phys. Discuss., 4, 6909, 2004.