

Interactive comment on “Intercomparison of ground-based ozone and NO₂ measurements during the MANTRA 2004 campaign” by A. Fraser et al.

Anonymous Referee #2

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This paper describes the results of an intercomparison exercise of ground-based ozone and NO₂ measurements during the MANTRA 2004 campaign. Ozone and NO₂ differential slant column densities and vertical column densities measured by four zenith-sky UV-vis instruments are discussed and compared with a focus on their agreement with NDACC standards for instruments certification. Ozone measurements are also compared to observational data from a Brewer spectrophotometer, three FTS instruments, and ozonesondes. Despite the fact that almost no real atmospheric science results have been discussed in it, I think this technical paper can be useful for the NDACC UV-vis and FTIR communities. Therefore, it can be published in ACP after addressing the following comments:

Page 3, Section 3.1, end of paragraph #1: It is said that the NO₂ DSCDs calculated using WinDOAS for MAESTRO and SPS are unreliable. Could you give possible explanation(s) on this and include them in the paper? Is it related to WinDOAS or to the MAESTRO and SPS observations? If it is a WinDOAS-related problem, contacting M. Van Roozendael and C. Fayt could certainly help, as suggested by Referee H. K. Roscoe.

Page 3, Section 3.1, paragraph #2: One single NO₂ profile is used to calculate NO₂ AMFs. So the variation of the NO₂ concentration along the different light paths is not taken into account in the AMF calculation. At SZA around 90°, this can have a significant impact on the NO₂ AMF and therefore on the NO₂ VCD. I think you should include this source of error in the estimation of the error on NO₂ VCDs given at paragraph 3 in Section 3.1.

Page 4, last paragraph of Section 3.1: Mention here that total columns of SO₂ are also retrieved using Brewer observations is a bit confusing because the Brewer SO₂ columns are not shown and discussed in the paper. I would mention only in the instrumental section (Section 2) that the Brewer also measures SO₂.

Page 5, Section 4.2, paragraph #1: SPS O₃ DSCDs display large scatter especially at SZA higher than 90deg. Could you comment on this in the paper. Also at the end of the same paragraph, it is said that both SPS and MAESTRO datasets are not always in agreement at small SZAs. From Fig 1a, it is also the case at high SZAs (higher than 90deg). Again, could you comment on this.

Page 5, Section 4.2, paragraph #2: Due to large errors at small SZAs in the UT-GBS data, only SZAs in the 85-91deg range are used in the regression analysis. Is it permitted by the NDACC to reduce the SZA range for Type 1 analysis? If not, could this comparison still be labelled 'NDACC'?

Page 5, Section 4.2, paragraph #3: The residual of the type 1 analysis for ozone are large and variable. Except for the UT-GBS, this may be due to shifts in the calibration

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of the spectra (due to temperature change). It is mentioned that this effect is not accounted for in the WinDOAS analysis. Why ? According to my knowledge, this effect can be accounted for in WinDOAS.

Page 8, paragraph #2: The SPS VCDs are in average 15 DU lower than those from the other instruments. For some days (e.g., 236 or 253), the difference reaches about 35 DU. Do you have possible explanation(s) for that ?

Page 8, Section 5.2: Both instruments show a general decrease in NO₂ during the campaign period. It would be useful to mention in the paper the percentage of decrease in NO₂ during the campaign for both morning and afternoon and for both instruments. According to Fig. 8, it seems that for the morning, the decrease seen by the SAOZ is smaller than with the UT-GBS.

Page 9, Conclusions: The fact that the O₃ and NO₂ DSCDs and VCDs from UT-GBS only partially meet the types 1 and 2 NDACC standards can be, according to the authors, related to a problem with the detector and an error in the data acquisition. Since these problems have been solved, do you have first indications (e.g., from comparisons of Eureka campaign data sets) that the UT-GBS instrument will now meet NDACC standards ? If not, a 'non-optimal' use of WinDOAS should be considered and again, contacting M. Van Roozendaal and C. Fayt would help.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 10205, 2007.

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