

## ***Interactive comment on “Intercomparison of slant column measurements of NO<sub>2</sub> and O<sub>4</sub> by MAX-DOAS and zenith-sky UV and visible spectrometers” by H. K. Roscoe et al.***

**H. K. Roscoe et al.**

hkro@bas.ac.uk

Received and published: 14 October 2010

Response to Anonymous Referee 3.

Referee 3 is very generous.

Our responses to the comments following the referee's page selection follow each comment.

p. 3392, l. 6. The justification applies to ozone as well – why did you use 223 K cross-sections for ozone?

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Even at low solar zenith angle there is more stratospheric ozone in the path than tropospheric.

p.3392, l. 25. So were they able to correct for the elevation errors in previous data or did this mean you had to discard the early data measurements from some groups?

Some were able to correct by re-labelling for a 1° error because they in fact measured every 1°, some discarded a few days, but the coverage of the data used was as described in the paper.

p.3393, l. 25, you say that data from the whole campaign was used. What is the impact of elevation angle errors on the statistics?

Only data with correct or corrected elevations was used. We have now corrected the sentence to say so.

p. 3393, l.27 ‘non-zenith’ is superfluous here and makes the sentence confusing.

On the contrary “non-zenith” is rather important as the sentence does not apply to elevation angles of 90° (zenith).

p. 3397 last line. Stray light is always a problem, it just depends how much. This throwaway sentence needs to be argued more carefully. Are there references that could be used here?

We beg to differ - stray light is not a problem at all, at the longer wavelengths of NO<sub>2</sub> analysis used in twilight measurements of stratospheric NO<sub>2</sub>, with most modern spectrometers. If UV wavelengths of NO<sub>2</sub> absorption were used, then yes it might well be a problem, but UV wavelengths were not used for the twilight measurements of stratospheric NO<sub>2</sub> being described in the sentence.

p.3398. Why did Heidelberg not choose another reference spectrum? I can see there is an argument for accepting the data as is, but that point needs to be made explicitly otherwise it seems that the Heidelberg group couldn't be bothered re-analysing their

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data.

It is indeed important for NDACC protocols to accept data as is, except where it is seriously flawed for an obviously correctable reason, not the case for Heidelberg data. Furthermore, a polluted site such as this would not normally be used for stratospheric measurements, so it seemed unreasonable to demand that Heidelberg reanalysed with the variety of reference spectra necessary to address this point.

Figs 6 etc captions, point out that colours relate to elevation angles (not zenith angles)

We agree, and have now inserted "Colours refer to elevation angles shown top right" in the captions of Figures 6, 7, 8, 10, 11 and 13.

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Interactive comment on Atmos. Meas. Tech. Discuss., 3, 3383, 2010.