

## ***Interactive comment on “Technical Note: a combined SBUV and SAGE zonal-mean ozone data set” by C. A. McLinden et al.***

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### SPECIFIC COMMENTS

Abstract: I think that the most important piece of information missing from your abstract is that this is a vertically resolved database. Sure, many of your readers will know that SAGE and SBUV are vertically resolved, but for those that don't this is a vital piece of information. I think that the abstract should also include one sentence that describes why you did what you did. What was the motivation for this research?

– A mention of the vertically-resolved aspect was added to the abstract. The ultimate motivation, for used in deriving trends, was also added.

Page 12386, line 15: I definitely wouldn't call this the "post-Montreal Protocol era". The  
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Montreal Protocol remains very much in force and in fact may be even more necessary now than it ever has been. If the protocol were to be abolished tomorrow, I am quite sure that rampant use and emissions of CFCs would follow.

– A valid point. This has been adjusted to "... following the implementation of Montreal Protocol and subsequent amendments."

Page 12386, line 22: Well this is a bit of a value judgment and may be overstating the case. Perhaps replace 'is a daunting challenge' with 'is challenging'.

– Agreed. Changed to 'difficult challenge'.

Page 12387, line 2: The reader gets to this point in the paper and still hasn't been told that it is a vertically resolved database that is going to be presented. You need to make it clear up front that your database, and some of the others that you cite, are vertically resolved.

– This point has also been added in introduction (near line 2, page 12387 in the ACPD version).

Figure 1: I think that this figure would be much clearer if you just made it as a filled contour plot and not as a coloured line plot.

– A filled contour plot was created, and in our opinion seemed equally clear (or unclear), and so the original version was kept.

I think that the Introduction needs to say a little more about exactly why vertically resolved ozone databases are required. You should explain a little more how this database that you have constructed might be used.

– The motivation, for trend studies, was added.

Page 12388, line 21: I couldn't find Table 2 anywhere in the manuscript.

– This should have been 'Figure 2'. It has been changed.

Page 12389, line 5: I think that you mean 1981 and not 2001.

– Yes, changed to 1981.

Page 12389, line 8: I think you need to say more what this "high-tangent altitude reference" is or provide a citation where the reader can go for more information.

– A reference was added.

Page 12389, line 19: Noting of course that the native vertical resolution of the SAGE retrieval is nowhere near as good as 0.5 km.

– This was corrected to 1 km.

Page 12390, lines 11 to 14: This sentence doesn't make sense to me. What were the differences in layer 7?

– The difference refers to when sunsets and sunrises are averaged separately. This was clarified.

Page 12390, line 18: Why is it unlikely that this completely eliminates this source of bias? If the bias only happens when the beta angle drops below 60 degrees and if you exclude all data when the Beta angle drops below 60 degrees, surely that should completely eliminate that source of bias?

– What was meant was that there is nothing concrete about a 60 degree beta angle cut-off, this appears to be a semi-arbitrary choice, and so it is possible that occultations at, e.g., beta angles of 58-60 degrees may still possess a small bias. The text was changed to make this clearer.

Page 12390, line 26: You need to expand the SZA acronym, or, if you only use this once, it would aid the readability of the paper by just writing solar zenith angle.

– It was used only once, and so it was changed to 'solar zenith angle'.

Page 12391, line 15: Just to confirm: was this SR/SS bias correction applied to both

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the SAGE I and SAGE II data or just to the SAGE II data? Ah, OK I see now on page 12392 that it was applied only to the SAGE II data. I really like this SAGE SR/SS bias correction.

– No response necessary.

Page 12394, line 7: I don't know what you mean by "is found" in the sentence "A three-month running mean of this correction is found". Where did you find it?

– Corrected to "... is calculated."

Page 12395, lines 1 to 3: This sentence doesn't make sense to me. First, what does the "(?)" denote? Secondly, why should an interruption in the SAGE II data record in 2000 introduce a gap in the SAGE-corrected SBUV data? In that case there should be a gap between 1981 and 1984?

– The '?' was left over from pre-submission and has been removed. And you are correct: the SAGE gap does not introduce a gap in the SAGE-corrected SBUV. The text has been changed.

Page 12395, line 20: You should say here why you had to use QBO basis functions at two different levels in the atmosphere.

– Done. Two were used to account for the phase difference in the QBO at difference altitudes.

Page 12395, line 22: Only an annual harmonic term? No semi-annual or 4 month terms? It seems that that's unlikely to capture the strong seasonality in the EESC and QBO fit coefficients, especially for EESC at high latitudes - we know that the response of ozone to EESC doesn't just vary sinusoidally through the year. In that regard, it would be instructive to see your Figure 11 but evaluated in March and October, and how well that compares to other studies.

– A semi-annual harmonic term was in fact used (just not mentioned in the text – now

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corrected), but not a 4-month term.

– It was not a goal of this study to estimate ozone trends. We demonstrated the annual trend estimate in order to compare it with published results for the two other data sets. Although additional terms may reduce variance of the residuals and uncertainties of the annual trend estimates, they would not change the annual term because of the orthogonality of harmonic functions.

Figure 11: The label at the top of panel a is confusing. I think this should be changed to "SAGE-corrected SBUV". In Figure 11 why do you only show results between 60N and 60S when from Figure 9 it is clear that you have data well poleward of those latitudes?

– This was changed as suggested. Results are shown only to 60 N/S as this is the limit of the SAGEI+II and SBUV(/2) trend plots from the 2006 WMO assessment. The reason these were limited to 60 N/S is that SAGE misses entire seasons in the polar regions (see Figure 3).

Page 12396, line 2: I don't think it would excessively lengthen your paper by replacing NH with Northern Hemisphere and it would certainly improve the readability of the manuscript.

– Agreed. NH is no longer used.

#### GRAMMAR AND TYPOGRAPHICAL ERRORS

– All listed errors have been corrected.

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