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Atmospheric Measurement Techniques Discussions

Interactive comment on "Uncertainty budgets of major ozone absorption cross-sections used in UV remote sensing applications" *by* Mark Weber et al.

Anonymous Referee #2

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This paper presents a review of the uncertainty budgets of three important ozone absorption cross-section datasets. This is a valuable exercise with a very practical application, since these uncertainties should be included in uncertainty estimates of ozone measurements made in the field by ground-based UV absorption monitors and by total ozone spectrophotometers, both ground and satellite-based. However, it will be much more valuable if it is widely used, and in that respect the paper would benefit greatly from some clear explanation, with examples, of the application of these results (which we are told are available on the authors' web site) to standard ozone monitoring and reporting. Some more detail in the description of what has been done in this paper would also help (perhaps in a supplement). The authors are reminded of the principle that a paper should describe the analysis in sufficient detail that the reader could reproduce it, if s/he so chose.

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Discussion paper

Detailed comments:

Section 2: The first paragraph, introducing the Beer-Lambert law, would seem to fit better in the Introduction.

Lines 55-59 and 60-64: Although the second of these paragraphs (line 60) begins with "Alternatively...", I do not understand how these two situations differ. It appears that both scale their measurements to other published ozone absorption cross-sections?

Lines 79-80: Why does concatenating spectra lead to additional uncertainties? Are those uncertainties not already accounted for in the bias uncertainties of the individual "slices"? (See also lines 156-158, below).

Lines 101-102: Why do you assume a rectangular distribution? In the absence of other information, would it not be more conservative to treat the reported value as a standard error, and assume a Gaussian distribution?

Line 128: "...extend the wavelength coverage (into the visible)..."? The wavelength ranges quoted differ by only 2 nm at the longer end.

Table 3: I have difficulty seeing how the individual uncertainties quoted add up to the totals at the bottom.

Lines 151-158: Some more detail here, please! From the lower panel of Figure 1, I gather that the relative uncertainties increase generally with an exp(lambdaˆ2) dependence on either side of a central wavelength in each "slice", but some other term is dominating at the longer wavelength end, and it is not at all obvious why the errors should take this form. The sentence "The latter were calculated according to law of propagation of uncertainty using standard deviation (variances) and mean values of I and I0 spectra which determine the optical density OD (see Eq. 3)." is no help in this regard.

Figures 2-4: These need better labels, and captions. Specifically, how are the uncertainties shown? There appears to be a shaded range in Figure 3, but I can't see

any in Figure 2, although Figure 5 suggests that the BP temperature uncertainties are much larger. I also suggest removing the sigma(T) equation from the figure, to avoid ambiguity with a0.

Lines 207-212: The uncertainties for the BP are an order of magnitude larger in Figure 5 than for the other cross-section datasets. This contrasts remarkably with Figure 2, but the authors do not remark on this apparent contradiction, nor explain it. Probably what is needed here is more description of the calculations, and possibly a few supplementary figures.

Figures 6 and 7: It would be nice to see a fourth panel superimposing the three others, in these two figures. It looks like the three cross-section datasets agree pretty well above 220K.

Summary: There is a lot more that could be said here. What is the practical effect of the community's use of these different ozone absorption cross-section datasets? The authors are presumably well-equipped to recalculate a few selected ozone measurements under different atmospheric conditions, and show how they differ both in mean and uncertainty, using the three cross-section datasets. This would make the paper more immediately interesting by demonstrating the practical importance of this work.

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