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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Updated ozone absorption cross section will reduce air quality compliance" *by* E. D. Sofen et al.

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We thank the reviewer for their thoughtful comments on our manuscript. We have included their comments below and our responses are highlighted in bold.

Summary: This relatively short paper discusses the significance of a recent reevaluation of the ozone absorption cross section for existing ozone data collected within North American and European networks. The authors correct existing data based on the revised cross section and point out locations that exceed the relevant air quality standard with this correction in place. Overall, this paper is well written and the topic is suitable for publication in this journal. However, I recommend that the authors address the following comments before the paper is accepted for final publication in ACP.

1) Please comment on similarities/differences between Viallion et al. (2015) and Mauersberger et al. (1987), another ozone cross section reference that is commonly used. Mauersberger, K., D. Hanson, J. Barnes, and J. Morton (1987), Ozone vapor pressure and absorption cross-section measurements: Introduction of an ozone standard, J. Geophys. Res., 92(D7),8480–8482, doi:10.1029/JD092iD07p08480.

We thank the reviewer for this comment. As the reviewer notes, the Hearn cross section is 11.476×10^{-18} cm^2 molecule^{-1}, the Viallon cross section is 11.27×10^{-18} and the Mauersberger et al. 1987 cross section is 11.31×10^{-18}, much closer to the Viallon value. We have added a Figure (1) illustrating the mean and standard deviation of each of the available cross sections from the literature with the Hearn and Viallon cross sections highlighted that illustrate how both of these cross sections sit at the edges of the range of measured cross sections.

We added the following paragraph describing the figure:

"Figure 1 illustrates all available ozone absorption cross sections at 253.65 nm and their uncertainties based on a compilation by Orphal et al. [2002]. The absorption cross sections measured by Hearn [1961] (maroon) and Viallon et al. [2015] (grey) are highlighted with thick lines. Most cross sections are lower than that reported by Hearn [1961]. The Viallon et al. [2015] cross section is the lowest of all of the reported values."

2) Please comment on whether other ozone instruments, including those built by Teledyne and 2B Technologies, use the Mauersberger et al. (1987) or Hearn (1961) values. These new analyzers are replacing the Thermo 49i's in the US. It would be most helpful to include a table that included all commercial ozone analyzers and the cross section employed.

Teledyne (T400) does not specify their internal absorption cross section in any of their publicly available documentation and when contacted did not respond. 2B in their manual (http://www.twobtech.com/docs/manuals/model_202_revB.pdf)

specifies 11.5×10^{-18}, suggesting that they are using the Hearn cross section (11.497). Furthermore, 2B's instruments are calibrated using a Thermo Electron 49i Primary Standard ozone calibrator tied to NIST (hence, the Hearn cross section).

3) Please comment on the uncertainty of the Hearn (1961) measurement, and whether this is greater than the difference between the Viallion and Mauersberger values.

As shown in the new figure that we have added, nearly all of the cross sections have overlapping uncertainties.

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 19537, 2015.

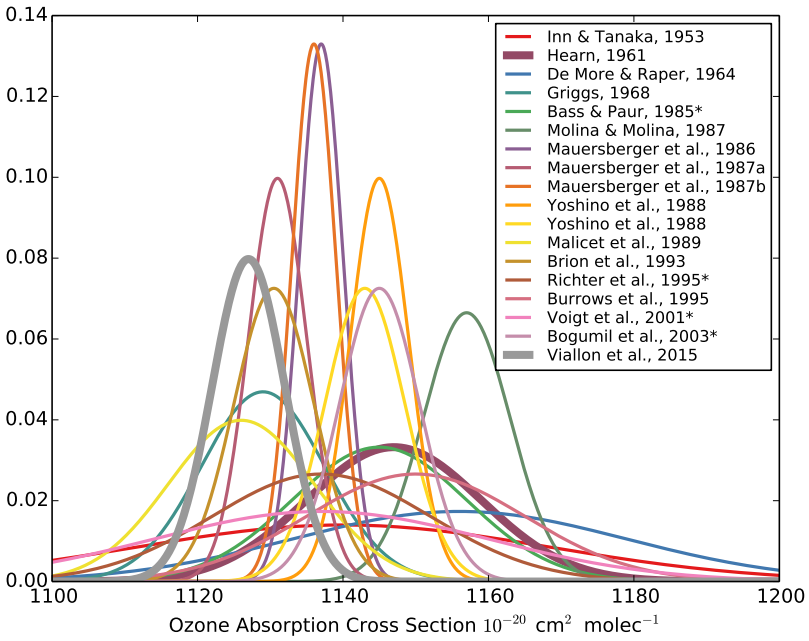

Fig. 1. Compilation of ozone absorption cross sections and their uncertainty based on Orphan et al., [2002]. Absorption cross sections marked with a (*) are relative measurements scaled based a calibration.