

Interactive comment on “Temperature dependent ozone absorption cross section spectra measured with the GOME-2 FM3 spectrometer and first application in satellite retrievals” by W. Chehade et al.

Anonymous Referee #1

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This paper presented the GOME-2 FM cross sections, including laboratory set up and measurement procedure, derivations of absolute cross sections, comparison with other cross section data in the literature with a focus on comparison in the total ozone fitting window ($\sim 327\text{--}335$ nm), and total ozone retrieval comparison with those using other datasets. It shows that the GOME-2 FM cross sections and the temperature dependence are generally in good agreement with other datasets to be well within 3%, and the retrieved total ozone is within 1% with those routinely from GOME-2 using GOME

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FM cross section and with 2-3% using BDM and Bass and Paur data. This paper is suitable for publication on AMT. It is generally well written and organized. But some of the results need more discussion (e.g., results from Figs. 7 and 8) and some of the discussions are not clear and needs to be clarified (see specific comments below). I recommend it to be published after addressing the following comments:

Specific comments

1. In abstract, add “-2” after “Experiment”
2. P7985, L2 and P7986, L16, Change “solar flux” to “solar radiance” since the spectral flux has unit of photons/cm²/s/nm, while spectral radiance has unit of photons/cm²/s/nm.
3. P7985, L10, Metop-B was launched on Sept. 17, 2012. Please rephrase this sentence.
4. P7985, L18, change “a long term data-sets” to “long-term data sets”
5. P7985, L21, it is not necessary that using FM cross section leads to smaller fitting residuals. For example, in Liu et al. (2007), using BMD cross sections gives the smallest fitting residuals. So suggesting changing “reduces” to “might reduce”
6. Figure 1 caption, change “cross section” to “cross sectionS” or “cross section spectra”
7. P7991, L2, change “must be also” to “must also be”
8. P7993, L2, change “and and” to “and”
9. P7993, L17, change “less good” to “worse”
10. P7993, L23 and in Table 3, it says “Hartley band” but include “245-340 nm”, i.e., including both Hartley and Huggins bands
11. P7995, L7-8, change “the lower cross section spectral resolution spectrum” to “the

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lower spectral resolution cross section spectrum”

12. Figure 5 title, it says “FWHM=0.00”, should not it be the “GOME-2 FWHM”? Suggest adding “nm” for the shift in the title and adding unit in the y-axis

13. Table 6 is not referred in the text.

14. P7995, L9, label this equation as equation (3) and the next one as equation (4)

15. P7995, last paragraph, according to the fitting equation and Table 6, scaling factor is around 1, but in the text, 1%, 2-3% (rather than 0.988, 1.026) is used, which is difficult to follow. It is better to be consistent.

16. P7996, L7, please explain in more detail about how to convolve GOME FM with GOME-2 slit function as GOME FM cross section is already at GOME spectral resolution (which is similar to GOME-2 spectral resolution)”. Do you de-convolve GOME FM with GOME slit functions first and then convolve the de-convolved GOME FM with GOME-2 slit function?

17. Since the measured GOME-2 FM cross sections are relative cross sections, and need to be scaled by BMD and Bass and Paur data as discussed in section 2.4, why are there still some large differences of 2-3% between GOME-2 FM and BMD and Bass and Paur data according to section 4.3? Please clarify this.

18. In Figs. 7 and 8, please clearly define the relative difference (which minus which one). Any idea about why the difference is higher at higher latitudes? Between Fig. 7 and Fig. 8, in Fig. 7, most of the differences are positive, but in Fig. 8, a lot of the differences between 50S-50N are negative. What causes the differences between Fig. 7 and Fig. 8?

References

Liu, X., K. Chance, C. E. Sioris, and T. P. Kurosu (2007), Impact of using different ozone cross sections on ozone profile retrievals from Global Ozone Monitoring Experiment

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(GOME) ultraviolet measurements, *Atmos. Chem. Phys.*, 7, 3571-3578.

Interactive comment on *Atmos. Meas. Tech. Discuss.*, 5, 7983, 2012.

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