

## ***Interactive comment on “Revised temperature dependent ozone absorption cross section spectra (Bogumil et al.) measured with the sciamachy satellite spectrometer” by W. Chehade et al.***

### **Anonymous Referee #1**

Received and published: 30 May 2013

The authors presented the revised SCIAMACHY FM ozone cross sections with a focus on the Huggins bands. The revised data generally agree with other published data to within 3% and show significant improvement over the original Bogumil et al. data. They further showed that the use of revised data reduces the retrieved total ozone abundance using the WFDOAS method by 3–4% and makes it more consistent with retrievals using GOME data. This paper is suitable for publication on AMT. It is generally well organized. But the paper does not provide enough detail about how improvements were made over the initial analysis of the SCIAMACHY FM data. And some of the dis-

C1131

cussions require clarification. In addition, the paper needs to be checked for English including grammatical and typographical errors. Overall, I would recommend it to be published on ATM after the following comments were addressed.

#### Specific comments

1. In the first sentence of the abstract, changing “Ozone absorption cross section spectra and other trace gases” to “Absorption cross section spectra for ozone and other trace gases”?
2. In abstract, remove “from the original measurements” as it is repetitive to “from original raw data”
3. In abstract, change “agrees” to “agree” and “preserves” to “preserve” as the data is plural
4. In abstract, it is confusing about “correct” in the “preserves the correct”, do you mean the correct temperature dependence from the original SCIAMACHY FM data or other published literature data?
5. In abstract, the last sentence is confusing as you are comparing “SCIAMACHY’s total ozone using revised ...” with “ozone amounts retrieved routinely from SCIAMACHY”. I suggest adding “, which uses Bogumil et al data but adjusted with a scaling factor of 5.3% and a wavelength shift of 0.08 nm”
6. The abstract should summarize the main improvements in reanalyzing the SCIAMACHY FM cross sections.
7. Page 2450, Line 21, change “solar fluxes” to “solar radiances”
8. Page 2450, Line 24, change “observation modes” to “observations”
9. Page 2451, Line 1, change “In addition to” to “In addition, ”
10. Page 2451, Line 6, change “destroys” to “destroy” as it is parallel to “cause”

C1132

11. Page 2451, Lines 9-13, change “vertical profile” to ‘vertical profiles”, add “the” before ‘Montreal protocol”, add “whether” before “ozone recovery”. The last sentence seems to be not very relevant and could be removed as it mentions “minor constituents”.
12. Page 2451, Lines 21, change “The consistency” to “However, the consistency”
13. Page 2451, Line 23, add “and” before “among”, or add “including ozone absorption cross section after “relevant parameters” and remove “, among . . . section”
14. Page 2451, Lines 26-28 , change “conducted in 1998-2000 using SCIAMACHY’s spectrometer” to “conducted using the SCIAMACHY instrument in 1998-2000 before launch”, remove the sentence “The measurements . . . in orbit”, and change “The so-called” to ‘This so-called” as it has not been mentioned before.
15. Page 2452, lines 13-15, many factors could cause the GOME/SCIAMACHY differences. I don’t think that it can tell the approaches for measuring ozone cross sections are different”. You need to add more details to illustrate this point.
16. Both “cross-section” and “cross section” are used in the text, change “cross-section” to “cross section”
17. Page 2453, Line 6, change “presents” to “presented”
18. Page 2453, Line 5, change “was carried out” to “were carried out” corresponding to “ a set of . . . measurements”
19. In the first paragraph of section 2.2, please provide more detail about the scaling: is the scaling wavelength dependent? Or does the scaling at each temperature suggest that the temperature dependence comes from the reference Bass and Paur data? Since the Bass and Paur only covers up to ~340 nm. So how is the scaling done at longer wavelengths?
20. Page 2455, Line 5, add “especially around local absorption minima” after “rapidly”

C1133

21. In Figure 5 caption, remove “(DOAS region)”. It says that Bogumil et al. (2003) data are smaller, but the differences wrt to Bogumil et al. data are mostly negative. Or do you mean the amplitudes of the structures. Please make it clear.
22. Page 2455, Line 11, change “in the DOAS spectral window of the revised data in the 315-340 nm region” to “ of the revised data in the DOAS spectral window”
23. Page 2455, Line 21, change “for the ozone profiles . . .” to “for retrieving ozone profiles . . .”
24. Page 2455, Line 1 and Line 22 as well as in the conclusion, what do you mean “correct” here as we don’t know what is the correct/true temperature dependence? Do you mean “same as that in the original data”? If so, it is better to change “correct temperature dependence” to “the temperature dependence in the original data” or “consistent temperature dependence”. But from Figure 6, one can see clear differences in the temperature dependence between original and revised data, for example around 570, 587 nm 602 nm, so there are significant differences between original and revised data in the Chappuis bands.
25. Since the article discussed about revised SCIAMACHY FM ozone cross sections, I was expecting to see the description of the procedure differences in deriving the revised and original data. It was not shown until the end of section 2. I think that it is better to move the section to before section 2.1 as a separate paragraph and more detail about the differences/improvement should be provided. You may start to talk about potential problems in the previous procedures and then mention the improvement with more detail in the subsections.
26. Page 2456, Line 15, change “changes” to “change”
27. Page 2457, section 3.2, are the  $a_0$  consistent among different datasets? Maybe it is good to compare  $a_0$  as well in Figure 7.
28. In Figure 8, the legend “228 nm” should be “328 nm”. Is the inset showing the

C1134

differences between original and parameterized cross sections? Please make it clear. You may change the caption to “Comparison of measured (solid and open circles) and parameterized (lines) absorption . . .”

29. Page 2458, Line 4, do you mean the inset of Figure 8 rather than Figure 7?

30. Page 2458, Lines 11-12, change to “DOAS type of fit”, change “that can be” to “and they can be”

31. In Table 4, do you mean “SCIAMACHY FM version 3.0” in the last column? Maybe you should use Bogumil to be consistent with Tables 1-3.

32. Figures 9, 10 captions are confusing for the right panels. Is the red line the revised SCIAMACHY FM data and the black line the revised SCIAMACHY FM data adjusted with wavelength shifts and scaling? If so, then the Bass-Paur or Bogumil data are not shown directly. Please make it clear.

33. Page 2459, Line 5, remove “between”

34. In pages 2458 and 2459, you may add “like” in between “Bass-Paur” and “temperature parameterization” to avoid some misunderstanding of using exact Bass-Paur parameterization.

35. Change “radiation transfer” to “radiative transfer” at a few places.

36. Page 2459, line 17, add “cross section” at the end as “ozone absorption” also depends on ozone concentration.

37. Page 2459, line 23, change to “expect at high latitudes and high solar zenith angles where . . .”

38. Page 2460, line 2, do you mean GOME FM cross section is used both GOME and SCIAMACHY retrievals? Please clarify it.

39. In Figure 13 caption, add “but” before “for the”

C1135

40. Page 2460, line 6, do you mean GOME data or SCIAMACHY total ozone retrieved with GOME FM data. Please clarify it.

41. Last sentence in the conclusion, I suggest adding “, which use Bogumil data but with a scaling of 5.3% and a shift of 0.08 nm applied to match the GOME WFDOAS total ozone retrieval.” to avoid misunderstanding that the change is very small.

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Interactive comment on Atmos. Meas. Tech. Discuss., 6, 2449, 2013.

C1136