

Answer to Referee #1

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”?

Done

2. In abstract, remove “from the original measurements” as it is repetitive to “from original raw data”

Done

3. In abstract, change “agrees” to “agree” and “preserves” to “preserve” as the data is plural

Done

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?

The temperature dependence of the revised data agrees with that of the published data, (this will be clarified in the text).

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”

Done

6. The abstract should summarize the main improvements in reanalyzing the SCIAMACHY FM cross sections.

Done

7. Page 2450, Line 21, change “solar fluxes” to “solar radiances”

Done

8. Page 2450, Line 24, change “observation modes” to “observations”

Done

9. Page 2451, Line 1, change “In addition to” to “In addition, ”

Done

10. Page 2451, Line 6, change “destroys” to “destroy” as it is parallel to “cause”

Done

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”.

Done

12. Page 2451, Lines 21, change “The consistency” to “However, the consistency”

Done

13. Page 2451, Line 23, add “and” before “among”, or add “including ozone absorption cross section after “relevant parameters” and remove “, among ... section”

Done

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 socalled” to ‘This so-called” as it has not been mentioned before.

Done

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.

The WFDOAS total ozone setup for SCIAMACHY is nearly identical to that described in Coldewey-Egbers et al. (2005) for GOME. Bracher et al. (2005) reported a relative differences to within 1% between SCIAMACHY WFDOAS using convolved GOME FM absorption cross section data (Burrows et al., 1999a) and collocated GOME WFDOAS data, direct comparison between the SCIAMACHY FM with respect to GOME FM show differential scaling of 5% (Weber et al., 2011). This indicates that the approaches used to determine the absolute absorption cross sections were not consistent for the two instruments.

16. Both "cross-section" and "cross section" are used in the text, change "cross-section" to "cross section"

Done

17. Page 2453, Line 6, change "presents" to "presented"

Done

18. Page 2453, Line 5, change "was carried out" to "were carried out" corresponding to " a set of ... measurements"

Done

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?

The optical density (OD) spectra of each measurement (at each temperature) are concatenated together to form a full OD spectrum covering the whole wavelength range. The full OD spectrum is then scaled to Bass-Paur data (at each temperature) over the wavelength range 312 - 335 nm, the scaling factor is the average over the wavelength window. The temperature dependence of SCIAMACHY FM data comes from the reference Bass and Paur data

20. Page 2455, Line 5, add “especially around local absorption minima” after “rapidly”

Done

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.

The amplitudes of the absorption structures at the absorption minima are smaller, (this will be clarified in the text).

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”

Done

23. Page 2455, Line 21, change “for the ozone profiles ...” to “for retrieving ozone profiles ...”

Done

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.

The correct temperature dependence as the published literature data (e.g. Bass-Paur, BMD, GOME FM and Burkholder and Talukdar)

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.

Done

26. Page 2456, Line 15, change “changes” to “change”

Done

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.

a_0 comparisons will be included

28. In Figure 8, the legend “228 nm” should be “328 nm”. Is the inset showing the 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 ...”

Done

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

Figure 8

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

Done

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 Tabela 1-3.

Done

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.

The comparisons with Bass-Paur and Bougmil data will be displayed clearly.

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

Done

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.

Done

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

Done

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

Done

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

Done

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

GOME FM cross section is used in SCIAMACHY and GOME WFDOAS retrieval (Bracher et al., 2005)

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

Done

40. Page 2460, line 6, do you mean GOME data or SCIAMACHY total

ozone retrieved with GOME FM data. Please clarify it.

The SCIAMACHY total ozone amounts (using SCIAMACHY FM ozone cross-sections (Bogumil et al., 2003) differentially scaled by 5.3% and shifted by 0.008 nm) are within 0.5% to SCIAMACHY total ozone retrieved using GOME FM data (Weber et al., 2011), (this will be clarified in the text).

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.

Done