

Interactive comment on “SCIAMACHY Level1 data: Calibration concept and in-flight calibration” by G. Lichtenberg et al.

Anonymous Referee #2

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General comments

The paper by Lichtenberg et al. discusses the calibration of SCIAMACHY raw data to spectra that can be applied for retrieval of atmospheric trace gas abundances by spectroscopy. It is part of the SCIAMACHY special issue in ACP and a necessary element of this. It is well written, and combined with references about the instrument and its mission may serve as a very useful article for a comprehensive overview on SCIAMACHY and the usage of its data. In that respect I encourage the authors to make sure that all important issues in the calibration steps are discussed in the required detail and all references to important work in this field are given. Since the intention of the authors is that the paper serves “as a future reference for detailed issues into

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specific calibration issues” they should spend some time to make sure that this goal can really be achieved. I have three major revisions:

- 1) An important aspect in this context is the readability of the text. Of course, the matter of the article is technical but in my opinion there are a few cases, where some introducing and explaining sentences could be very helpful. Also, the compromise between giving detailed information and citing references is in some cases not optimal.
- 2) Another very important point is to draw the circle to the applications of the calibrated spectra. In two cases the method DOAS is mentioned, but only as this abbreviation and without a reference. Throughout the text it should be said what is the consequence of each calibration step regarding the applications in spectroscopy. Examples should be given, like for which retrievals is the considered calibration especially important.
- 3) My strongest suggestion is to improve the abstract (and the introduction). The ACP guideline for referees contains the question: “Does the abstract provide a concise and complete summary?” Unfortunately this question has to be answered with NO. This is mainly due to the fact that it is too short, while the introduction could easily be reduced (see specific comments to abstract and introduction). Also sentences of the conclusions would well fit in the abstract (while they are also more realistic). One important point for the retrieval side is the imperfect correction for polarisation features in the SCIAMACHY spectra. It should be said in the abstract that this article discusses this problem.

Specific comments

Title : I am not sure whether most readers know what is meant with “in-flight calibration”. Later on (Line 16) the authors talk about necessary adjustments to the ground calibration which is more easy understood.

Abstract :

In general I think the abstract should be extended and describe the main focus of the

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paper more properly. Also, say that the purpose of the calibration is to obtain spectra that can be applied for retrieval of atmospheric trace gases. I would also suggest to shortly describe the purpose and mission of SCIAMACHY. Don't start with "This paper discusses" For example, start the abstract with sentence 2 and make the first sentence the third. L2: It should be explained what is meant with "remaining open issues" in some detail already in the abstract since these are, in my opinion, the most important concerns of this paper !

L5: "performance is excellent" - concerning the points that are discussed in the paper, I don't think that "excellent" is really the appropriate word. I would suggest something like : " While the overall performance is -, there are certain issues (-) that afford - . These points will be discussed -"

L 6/7: "The only exception is " should be changed to "Exceptions are " (see conclusions)

Introduction:

L 13: Optical layout, observation modes and on-ground calibration are summarized. But the main focus and purpose of the paper is the discussion of the calibration shortcomings and the in-flight calibration. This should be made clear. However this should already be done in the abstract.

L 22: SCIAMACHY also measures constituents of the mesosphere.

L 16: This sentence would well fit in the abstract.

L17: This sentence is almost identically already in the abstract.

L 25: "The Q Fraction of the polarisation " For many readers this rather technical term appears quite abrupt. If possible, add a short explanation in brackets. Also, the sentence in p8927, L2 could be placed before.

P8927, L10 ff : Maybe add a figure, which shows the calibration steps from level 0 to

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1b and 1c as a scheme ?

P8928, L10-12 and 15: Finally, the reader gets to know what the paper is about. This should be said already in the abstract !

Section 2, The Instrument:

It may be advantageous to structure this section into subsections.

P8928, L23: I don't agree. SCIAMACHY is observing the Earth's atmosphere (by measuring direct and scattered sunlight and moonlight) not the Earth (this is done by instruments like DORIS or MERIS), and for sure not the moon and the Sun.

P8929, L17: The description of the lunar occultation mode is missing here.

Section 3, Calibration concept:

P8932, L18: This sentence is more confusing than explaining. Is an electronic signal not a physical quantity ? And what quantities are the output of the conversion ? Later on (P8933, L3) it is said, the signal measured on the detector is inverted to intensities as function of wavelength. I suggest to place this explanation as introducing sentence at the start of this chapter and to skip L18.

Section 4, Detector corrections:

The detector corrections for UV/VIS discussed in section 4.1 (memory effect, dark signal, pixel to pixel gain) should be printed bold or structured as subsections

No specific comments for sections 5-9, but consider general comments !

Section 10, Conclusions:

Very nice summary !

Technical corrections

P8927, L24 : one space too much before point.

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P8952, L14: “correction” is missing after “polarisation”

P8962, L15 ff: there is a point too much after every double point in the following

Figures:

Fig.6 is not very good to read and to understand

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