

***Interactive comment on “Validation of 525 nm and 1020 nm aerosol extinction profiles derived from ACE imager data: comparisons with GOMOS, SAGE II, SAGE III, POAM III, and OSIRIS” by F. Vanhellemont et al.***

**Anonymous Referee #1**

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Review of

Validation of 525 nm and 1020 nm aerosol extinction profiles derived from ACE imager data: comparisons with GOMOS, SAGE II, SAGE III, POAM III, and OSIRIS

by F. Vanhellemont et al.

General comments:

The paper is generally well written and easy to follow. Although there are still major

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issues with the quality of the data product, I believe the paper - viewed as an intermediate status report for these ACE aerosol profiles - has sufficient content to be published as part of the special ACP issue on ACE. I ask the authors, however, to consider the general and specific comments below. I have three more general comments:

1) I think the use of "validation" in the title and several sections of the paper is somewhat inappropriate. A "validation paper" usually serves the purpose of demonstrating that the new data product agrees to with the combined error bars with independent collocated measurements. Once this is established the data product may be used for scientific purposes. But with the obvious problems with the aerosol ACE extinction profiles (low bias and negative values for the VIS channel and also fairly large differences for the NIR channel) we cannot really conclude that the data product is in a good shape. Therefore, I wouldn't consider (and neither would you, probably) this product validated. I suggest replacing "validation" by, e.g., "comparison", particularly in the title, and perhaps speak of "preliminary" ACE aerosol extinction profiles.

2) Nothing is said about the quality of the aerosol extinction profiles derived from the SAGE, POAM, GOMOS and OSIRIS instruments. It would be good to list the known accuracies and problems of the aerosol data products derived from these instruments, particularly since you describe the retrieval algorithms in some detail.

3) The vertical resolution of the ACE aerosol profiles is not mentioned. It should be explicitly stated in the paper. Except for SAGE II and POAM III the vertical resolution of the other instrument isn't mentioned either. It should be discussed whether differences in vertical resolution between the different instruments affect the comparisons (I don't think so), and whether these differences need to be considered in any way (convolution with averaging kernels) when comparing the profiles.

Specific comments:

1) Page 12350, line 13: ".. while the profiles are systematically too high at 1020 nm." I don't think this conclusion is justified, looking at the comparison with SAGE II and

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POAM III. Here, the ACE extinction values are larger than the coincident measurements over fairly large altitude ranges.

2) Page 12353, line 5: "... edge of the main solar disk the contribution is about 5 - 8 %." Later, on page 12364 (lines 24 - 26) you find, that these values are also more or less valid for the pixels used for the retrievals, which are near the centre of the sun. Your results therefore indicate that the 5 - 8 % are not only valid for the edge, but also for the centre of the solar disk, don't they? Perhaps this is worth mentioning.

3) Page 12353, line 19: You mention the relative accuracy of the tangent height registration. What is the absolute accuracy?

4) Page 12357, line 17: "For the NIR channel, GOMOS.. ". I thought there were no NIR comparisons with GOMOS?

5) Pages 12372/12373, Figs. 4 and 5: To me these figures are not consistent. Fig. 4 SH NIR shows that the ACE extinction values below 20 km are systematically lower than the SAGE II values. This is not the case in the corresponding panel in Fig. 5. The same applies to the NH NIR plots. The VIS plots seem to be more consistent. Is it possible, that the wrong plots are shown?

6) Pages 12374/12375, Figs. 6 and 7: Fig. 7 SH NIR shows a "singularity" at about 21 km altitude. There are no indications for unusual behaviour in the corresponding panel of Fig. 6. Please clarify.

7) Page 12362, line 2: Is it really true that global coverage is obtained in a few days. Global coverage typically means that all locations were covered by the instrument FOV/swath. Given OSIRIS' horizontal (across track) FOV of only 40 km, I doubt that all spots on Earth are really covered within a few days.

8) Page 12362, lines 27 - 29: In this case the aerosol extinction profiles at 1020 nm are not measured, but extrapolated from the spectral range used for the OSIRIS aerosol retrievals. This involves the assumption of an aerosol particle size distribution. What is

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the error introduced into the aerosol extinction values at 1020 nm due to this indirect technique. I think this issue should be addressed in the paper.

9) Page 12363, line 27: "..(with the notable exception for POAM III below 16 km in the SH)..". The same is true (according to Fig. 4) for the SAGE II comparisons in both hemispheres below about 17 km. This is again related to the inconsistency between Figs. 4 and 5.

Typos etc.

1) Page 12350, line 3: "larg" should read "large"

2) Page 12359, line 1: "extinctions" should be "extinction" ?

3) Page 12361, line 21: The second "I" in "OSIRIS" stands for "Imager", not "Imaging", I believe

4) Page 12363, line 19: "o r" should be "or"

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