

## ***Interactive comment on “SCIAMACHY Absorbing Aerosol Index – calibration issues and global results from 2002–2004” by M. de Graaf and P. Stammes***

**Anonymous Referee #2**

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This is an interesting paper that describes an aerosol index that is derived from Sciamachy radiance measurements. It shows that the operational product is not useful, and but that with some effort a product can be delivered that may be of use to the scientific community. Generally, I think that the paper could be strengthened by adding more physical interpretation of the results, particularly the comparison with TOMS.

- 1) Does the paper address relevant scientific questions within the scope of ACP? Yes
- 2) Does the paper present novel concepts, ideas, tools, or data? Yes

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- 3) Are substantial conclusions reached? Yes, but they need more precise formulation and clarification
- 4) Are the scientific methods and assumptions valid and clearly outlined? Yes
- 5) Are the results sufficient to support the interpretations and conclusions? Yes, but sometimes more interpretation of the results is necessary.
- 6) Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)? Yes.
- 7) Do the authors give proper credit to related work and clearly indicate their own new/original contribution? Yes
- 8) Does the title clearly reflect the contents of the paper? Yes
- 9) Does the abstract provide a concise and complete summary? Yes
- 10) Is the overall presentation well structured and clear? Yes
- 11) Is the language fluent and precise? Yes
- 12) Are mathematical formulae, symbols, abbreviations, and units correctly defined and used? Yes
- 13) Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated? No
- 14) Are the number and quality of references appropriate? Yes
- 15) Is the amount and quality of supplementary material appropriate? not applicable

Scientific Review - Page 3368, line 5. "design errors": I assume that not instrument design errors are meant here, but that it refers to errors in the algorithm design. This should be rephrased.

- Page 3370, lines 10-15. "The AAI separates .." The AAI is a physical quantity

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and does not separate things. The present text is unclear. My suggestion would be to replace these sentences by “The Absorbing Aerosol Index (AAI) is a measure for the spectral contrast between the reflectivity of the real atmosphere-surface system, that may be affected by the presence of UV absorbing aerosols, and that of a modeled atmosphere-surface system, that does not contain UV absorbing aerosols. The modeled atmosphere may contain scatterers (Rayleigh scattering molecules, non-absorbing aerosol and cloud particles, as well as absorbing gases, and is bounded below by a surface with wavelength independent reflectivity). The AAI is defined as the positive part of the residue, where the residue is defined as (Herman et al., 1997): ”

- Page 3372, line 23-24. with of the window is not given. I assume that the algorithm developers still remember what they use, and I cannot imagine that they are not willing to provide such information. Have you asked them for this?

- Page 3373, line 16. Normal mean? Do you mean arithmetic mean?

- Page 3379, line 12 “and greater daily global coverage”. I do not see why more data would change the average. It only reduces the statistical error on the average. Remove this.

- Page 3379, line 12. You state that in V8 TOMS the definition of the AAI has changed, and that this resulted in a more sensitive index. Is really more geophysical information in this V8 index compared to earlier versions? What is behind this? Can you explain more about this? Are the results presented in Fig. 6 from V8?

- Page 3379, lines 17 and further. You state that in 2002 Sciamachy performs badly. Does this hold for all Sciamachy products, or only for the AAI? Is a physical explanation present for the bad behavior and why it improves in 2004? Normally one would expect that the noise increases as the instrument ages, but here you find the opposite. This needs some clarification.

- Page 3380, line 1. “promising results”. This only holds for 2004 may be. But you fail

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to conclude that the operational AAI is useless, and that data before 2004 are also very different from TOMS.

- Page 3380. “fine tuning is necessary”. This is very vague. What do you mean with fine-tuning? What? How?

- Page 3380, line 26. reformulate as “The SC-AAI gives reasonable results after March 2004, ..”

- figure 6. Left axis seems to be off by a factor of 10 as it stands now. I would suggest to plot them on the same scale as TOMS; only the peak at 60 N in 2003 falls out of the scale then, but more convincingly demonstrates the correspondence in latitudinal behavior in 2004.

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Interactive comment on Atmos. Chem. Phys. Discuss., 5, 3367, 2005.

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