

Dear Associate Editor,

We thank you for your useful comments and for efforts you have been spending for editing our manuscript. We have produced a minor revision of the paper that includes your comments. Below we answer your concerns and make the necessary corrections to the paper.

Page 2, line 12: “Stratospheric aerosols that mainly originate from volcanic sources are from sulfur dioxide and carbonyl sulfide” I think something is missing here?

Reply: We rewritten the sentence as

“Stratospheric aerosols that mainly originate from volcanic sources are described as liquid droplets composed of a mixture of the sulfuric acid (H_2SO_4) and water (H_2O)”

Page 3, line 9: “it’s” -> “its”

Reply: Fixed.

Page 4, line 23: “Other time periods known to have low aerosol loading (e.g. 1989- 1990) show lower values of AE in the SAGE II dataset.” It’s not entirely clear what this statement refers to. Looking at Fig. 1 and 30 km, the AE in 1989/1990 shows a maximum.

Reply: We have added the words “between 20 and 25 km” to the sentence for clarity.

*Page 5, line 12: “The SAGE III/ISS which developed by”
“which was developed” or just “developed” ?*

Reply: Fixed.

Page 7, line 10: “SAGE III/SS”

Reply: Fixed.

*Page 8, line 18: “While the SAGE III/ISS algorithm does not make any assumptions”
This is certainly correct, but perhaps it would better to write “does not require any assumptions” ?*

Reply: We have replaced “make” by “require” as suggested.

Page 8, line 21: “uncertainties in LP measurements” -> “uncertainties in LP radiance measurements”?

Reply: We have added “radiance” after ‘LP’.

Page 15, line 12: “profilers” -> “profiles”

Reply: Fixed.

Page 15, line 20: “The results shown that the LP retrievals”

Reply: Fixed.

List of references: There are many inconsistencies in the list of references (spaces between initials etc.), please check the AMT style guide and adjust the references accordingly.

Reply: Done.

Caption Fig. 5: “angels” -> “angles”

Reply: Fixed.

Fig. 7: I think something is wrong here. Looking at panels a) and b), the differences below 19 km or so are larger for LP than for SAGE, right? But in panel c) the anomaly is larger for SAGE. This appears inconsistent. Please correct me, if I’m wrong.

Please also mention how the extinction anomaly is defined exactly. What is the reference profile?

Reply: You are correct. We have fixed this issue by changing the color of the two lines in panel c). We also updated the caption of Fig. 7c to clarify our definition:

“c) extinction anomaly (defined as deviation from the before case)”

Fig. 8: Is it possible, that the two lines are mixed up? The behavior of the lines is inconsistent with intuition and also with Fig. 9.

Larger particles - associated with lower AE - will have a more pronounced forward scattering peak, i.e. $PF(AE=1.8) - PF(AE=2.08)$ should be positive for a scattering angle of zero. However, this not the case in Figure 8. Similarly, $PF(AE=2.3) - PF(AE=2.08)$ should be negative for a scattering angle of zero.

In addition, the signs of the curves in Fig. 8 appear to be inconsistent with the differences between the curves in Fig. 9. In Figure 8 $PF(AE=2.3)$ is smaller than $PF(AE=2.08)$ for scattering angles between 60 and 90 deg, which would imply larger aerosol extinction for the $AE=2.3$ case (to produce the same limb radiance). However, this is not the case in Fig. 9.

These issues would disappear, if the two lines in Fig. 8 are mixed up or if the differences are actually determined the other way around (i.e., $B - A$ instead of $A - B$). Perhaps I’m missing something?

Please also specify, what value is used as a reference value to determine the relative differences in Figure 8.

Reply: Thank you for catching this. This was due to a label typo in Fig. 8. We have updated the labels in Fig. 8 – now these issues disappear. As indicated in the figure caption and labels, the reference value, i.e. the baseline value, is 2.08.

Caption Fig. 14, line 1: “675 nm (left)”

The panel says “508 nm” Same caption, line 5: “508 nm and 675 nm” ? Which wavelength is shown?

Reply: We updated the caption Fig. 14 to indicate that 508 nm, 745 nm and 868nm are shown. Thank you.