

Interactive comment on “Evaluation of a Method for Converting SAGE Extinction Coefficients to Backscatter Coefficient for Intercomparison with LIDAR Observations” by Travis N. Knepp et al.

Travis N. Knepp et al.

travis.n.knepp@nasa.gov

Received and published: 29 May 2020

We thank the reviewer for reading this manuscript and providing feedback. Below are our responses to the reviewer's comments. Reviewer's comments are in black, our responses are in red.

The only major comment is that the backscatter wavelength from the three lidars is 355 nm. Lidar measurements at 532 nm may be even more numerous and have an advantage in signal to noise. The fundamental lidar quantity is the ratio (molecular

C1

+ aerosol)/molecular scatter. The aerosol scatter at 355 and 532 nm will be similar but the molecular scatter at 355 will be 5 times stronger than at 532 nm. So you are effectively looking at smaller changes in the ratio. It would be valuable to repeat the analysis for 532 nm backscatter

We agree that using backscatter coefficients at 532 nm would make an interesting follow-on study as suggested by both anonymous reviewers. Indeed, application of this technique to 532 nm lidar products will be the subject of a subsequent publication.

Interactive comment by Bingen: If I understand her correctly Bingen is saying this paper implies beta is not wavelength dependent, which it clearly is. Line 166 states that beta(Sage) is independent of wavelength combination. I take this to mean that different combinations of the SAGE wavelengths can be used in the analysis and the results are the same with error bars. This is a strong result of the paper and maybe it can be explained better.

Your understanding is correct. This is a major finding of the manuscript and has the entirety of section 3.1 dedicated to this. The wording at the end of §3.1 and in the conclusions was updated to more clearly communicate this.

In the second part of Bingen's comment she makes the point that a comparison of S should be made with this paper and previous papers. I would agree. Papers by Jaeger et al. (already referenced), Bingen (referenced in comment), and Altuna (below) are ones I know of.

Additional text and references have been added to discuss the lidar ratio agreement.

C2

charge coupled device (with) a resolution **Corrected**

Line 88: typo . . . **Backscatter Corrected**

Line 128: Why was this sigma range chosen? Is there a reference?

The range of sigmas was chosen to be representative of the reasonable range expected in the stratosphere. This is now explicitly stated in the text with references.

Line 141: You might add a note that although Ext/beta is defined as S, Ext and beta are normally at the same wavelength. In this paper you sometimes use this quantity with two different wavelengths.

Clarification was added to §3 and figure/table captions.

Figure 6, 7, & 8: The legend overwrites some of the data. Can this be fixed? **Corrected**