

This paper presents a validation of the EarthCARE ATLID stratospheric aerosol extinction profiles and stratospheric aerosol optical depth by comparison against SAGE III/ISS solar occultation measurements and the ground based lidars at the Table Mountain Facility and the Observatoire de Haute-Provence. The paper is well organized and presents an important validation of the ATLID stratospheric aerosol retrievals. After edits for clarification and readability I recommend this paper for publication.

General comments

1. **Analysis in altitude above tropopause** – When analyzing vertical profiles from scattered latitudes it is sometimes clearer to present analysis in altitude above tropopause. This may make the features in your altitude plots more distinct and give the reader more confidence in your statements with respect to altitude. Such as the statements made in section 3.2, which discuss features at specific altitudes. With geometric altitude the altitude plots may be spreading out the near tropopause features. As well the latitude plot (Figure 5a) may be affected by this.
2. **Use of the L2 lidar ratio in the L1-derived extinction**– Problems with L2 extinction are well discussed, however the L2 lidar ratio is used in calculating the L1-derived extinction. Could the issues affecting the L2 retrieval be of any concern for the L1-derived values through the use of the L2 lidar ratio? What are the possible effects on the resulting error? A short discussion of this seems warranted.

Specific Comments

3. **Section 3.2: noise-floor interpretation** – The statements that the scatter at low extinction is “consistent with the additive retrieval noise floor” and that the relative differences approach zero above 25 km as both instruments approach their respective noise floors could use more explanation or supporting references. In particular, it is not obvious why approaching the noise floor should cause the relative difference between the instruments to approach zero. Some additional justification of this interpretation would be helpful.
4. **Figure 7 / treatment of missing L2 retrievals** – The text describes unsuccessful L2 retrievals as fill values, while Figure 7 appears to assign zero sAOD to cases where no stratospheric retrieval is returned. It would be helpful to clarify exactly how these cases are handled. Are fill values explicitly converted to zero during the sAOD calculation, or does the L2 product actually report zero extinction? It would also be useful to explain why Figure 7 contains 652 SAGE comparisons when the overall collocation dataset contains 895 profiles.

5. **Line 51: “season”.** “time” would be more appropriate I think, there is no real seasonal analysis.
6. **Dist in the Figure 3 extinction plots** – I like this detail added to the plot. Am I right in thinking this is the distance between the SAGE tangent point and ATLID’s footprint? If so, this should be stated somewhere. Since multiple ATLID profiles are averaged for each collocation, it would also be helpful to clarify exactly how this distance is defined.
7. **lines 67–68: “Successfully retrieves extinction”.** Seems to be too strong a statement, or perhaps just accidentally misleading, considering what is said about the performance later in the paper.
8. **Lines 382–384:** The statement that “the true physical lidar ratio is expected to be close to the 50 sr assumed value” should be supported by a reference, or the language softened. Kremser et al. (2016), cited earlier, reports typical stratospheric lidar ratios of approximately 45–50 sr at 532 nm. Since ATLID operates at 355 nm, please clarify whether there is evidence that 50 sr is similarly representative at this wavelength for the aerosol conditions considered here.