Review of 2026-4358, Poncet et al, 'Validation of ATLID stratospheric aerosol retrievals using SAGE III/ISS and ground-based lidar observations'

General: Article is a systematic examination of the stratospheric aerosol retrievals from the EarthCARE ATLID against concurrent accurate reference standards for this difficult to observe region of the atmosphere. It is well written and figures were thoughtfully created. It is a very relevant topic with important conclusions regarding the current ATLID L1 and L2 products for the stratosphere. With clarification of a thread and a few minor corrections it should be accepted for publication.

Specific – Major:

1. Day/night performance: The thread related to comparison results when grouped by the solar time of the EarthCARE overpass is interesting, changes the tone as the paper evolves and has some unsupported intermediate conclusions.
2. Figure 2 caption says "…(a) daytime and (b) nighttime SAGE III/ISS occultations", but lines 189-191 state day/night definition is for EarthCARE overpass. This is confusing and seems to be two different situations or did I miss something in the discussion of the collocation method that ensured a certain type of occultation is paired with a certain type of ATLID observation. Furthermore, daytime/nighttime occultation is not a common definition and typically the label rise or set (from the viewpoint of the observer) is used. This shouldn't matter for the occultations since the geometry is the same for both types of events. A sunset is sunrise in reverse and the solar zenith angle at each tangent point is 90 degrees, by definition.
3. Line 203-204: What is the reference for this "well-known increase…during daytime occultations?"
4. Line 206: "confirming the improved SNR performance of nighttime occultations" Did you mean "nighttime" ATLID observations? Again, I don't know what nighttime solar occultations are and there has been no demonstration of this for SAGE III/ISS. SAGE II did exhibit differences between rise and set retrievals, but that was caused by the thermal sensitivity of that instrument and the rapidly changing thermal environment coming out of night into day for the rise events. It had nothing to do with the "solar background radiation on the detector."
5. Line 207, "well within the altitude-to-altitude variability of the median profiles": What median profiles? Are these the median extinction profiles or median difference extinction profile?
6. Line 209-211: The conclusion drawn is not supported by the evidence cited. It could still be true, but no evidence has been presented to rule-out ATLID having increased noise for 'daylight' observations. Since the day/night definition used in lines 189-191 do not guarantee that there is only one type of occultation in each category. To do that, an additional filter would have to be used. Or the overpasses could be divided in another way and use the occultation definition to divide using sunrise vs. sunset.
    a. To that end a colleague from the SAGE validation team analyzed aerosol profiles from OHP vs. SAGE III/ISS and found no appreciable difference in performance between sunrise and sunset events, with summary plots very similar to that posted on the mission Comparisons webpage that ignores the occultation type: https://sage.nasa.gov/sageiii-iss/browse_images/quicklook/SAGEWeb/Validation/AerosolLidar/Haute_Provence.png.
    b. For the stratosphere, the SAGE III/ISS solar occultation data can also be compared sunrise vs. sunset for those few times each year (~5) when the occultation latitude

overlaps between the two types. Within ~24hrs the same latitude band is sampled by each event. Zonal statistics for the SAGE III/ISS 384 nm aerosol (and other products) for the dates of this article show no appreciable difference between sunrise and sunset retrievals. A similar exercise (comparing daily zonal statistics) using ATLID data should be possible given it runs day and night.

7. Lines 402-407: The tone of this is different than when discussed in section 3.2. It stands to reason that the HSRL daytime performance is better than elastic lidar, but not immune from daylight noise. Whereas the occultation performance should be independent of sunrise vs. sunset since they are essentially the same measurement conditions, just reversed in time.
8. Completely agree with lines 375-377 that the comparison results include "the combined uncertainties of both instruments."

Specific – Minor:

1. Line 26: Consider adding fundamental HSRL ref.:
   Fiocco and DeWolf https://doi.org/10.1175/1520-0469(1968)025<0488:FSOLEF>2.0.CO;2
   and S. Shipley, D. Tracy, E. Eloranta, J. Trauger, J. Sroga, F. Roesler, and J. Weinman, "High spectral resolution lidar to measure optical scattering properties of atmospheric aerosols. 1: Theory and instrumentation," Appl. Opt. 22, 3716-3724 (1983).
2. Line 62: 'baseline BA and its successors BB and BC' What are these items?
3. Line 242: Which sAOD from SAGE was used? The stratospheric_aerosol_optical_depth parameter in the L2 product is occasionally invalid/missing because of an error in the way it is computed from the original aerosol extinction coefficient profile. Hopefully this will be fixed in the future. If you computed SAGE III/ISS sAOD directly from the aerosol profiles, then no worries. Otherwise, you might want to revisit that section of the analysis.
4. Line 373: Why use 384-521 nm for the Angstrom exponent instead of 384-449 nm? It might produce more stable results.
5. Figure 1b: What does the relative diff. plot look like when plotted as function of tropopause relative altitude? It is not clear where the tropopause is in this figure.