Reivew of egusphere_2023-2264, Zawada et al. 2023

General: The hits keep coming, another new product from the OSIRIS team – middle atmosphere temperature profile, albeit over a limited altitude range ~30-60 km. The analysis method is fairly complete, but needs to supply more information about the character of the absolute calibration. The authors should consider an associated pressure profile to include with the temperature profile described here. The work is worth of publication after explaining more about the absolute calibration and minor edits are made.

Specifics:

Line 21: Must include Rusch et al. (1983), https://doi.org/10.1029/GL010i004p00261

Line 43: That will be interesting to see if the comparisons are any different given that MERRA2 assimilates Aura-MLS data.

Line 102: What profile? Be more specific

Line 132: Either "remains sensitive" or "retains sensitivity"

Line 139: How often does this (negative albedo) happen?

Line 156: When and where (lat/lon) were the simulations performed?

Line 164: Was that the only difference between versions of input radiance profiles?

Line 165: Is this the 1-sigma or 2-sigma uncertainty?

Line 166: This appears to be a very important aspect and more information is needed. What is the nature of the absolute calibration? How does it vary with time, wavelength, tangent point, latitude, etc.? How is radiometric calibration distinguished from pointing errors in deriving the absolute calibration?

For temporal trending of the radiometric calibration have you looked at the top 1% for the brightest scenes, which would probably be associated with deep convective clouds.

Line 198: "…decreasing exponentially with decreasing altitude."

Line 199: "decrease of error with decreasing altitude…"

Figure 4: What time period was used here, 1 month, 1 season, 1 year, 10 years?

Line 207: "…the temperature error…"

Line 213: Do you mean Appendix B?

Line 224: Ok, then how does the retrieved temperature vary with wavelength? Can the random component be reduced with multiple wavelengths?

Line 233: Any idea why this is the case? Does the retrieved number density profile behave the same way?

Line 244: How was this applied? shift entire profile by same amount for each radiance profile?

Errors in tangent height from tangent point to tangent point within a single profile will also impact the retrieved temperature since the scale height within a layer of the density profile will be wrong.

Line 249: The "precision" appears to be the absolute value of the mean difference in the left hand panel. Does that imply the precision in the original radiance profiles are 100 m or does this relationship scale with the size of the tangent point shift (is it a 1K precision for a 300 m shift)?

Section 5.1: Data from SABER might offer closer coincidences and minimize the effects of tides, since it has a precessing orbit and several times a year will sample at the OSIRIS measurement time.

Line 283: What version of MLS, UARS or Aura?

Line 288: At one point in time using the GPH was discouraged and instead using something like MERRA2 to relate altitude and pressure.

Since you retrieve a number density profile and assume a boundary condition, have you looked at a derived pressure profile to compare directly with MLS Temperature product?

Section 5.2: What time period was used for the comparisons?

Figure 10 caption: need to explain what “corr.” means. Maybe “corr. = application of estimated diurnal correction.

Line 319: I am not sure Fig. 10 supports the assertion of diurnal sampling being a significant factor for the MLS and OSIRIS comparisons. Specifically, the 'correction' increases the difference markedly for the tropics and somewhat for the Southern Hemisphere.

Line 326: Is there a sampling issue with OSIRIS favoring the summer hemisphere?

Line 328: What is the degree of correlation between the three sets?

Figure 13: What is the time period for this trend fit?

Line 341: What latitudes were used for the absolute calibration?