Reviewer 1:

Comments: The manuscript named "Investigation of CATS aerosol products and application toward global diurnal variation of aerosols" by Lee et al. presents an inter-comparison of the measurements of aerosol optical depth and mean profiles between CATS and other remote sensing sensors (AERONET, MODIS, and CALIOP) for a period of Feb. 2015 -Oct. 2017. This paper also discusses the aerosol diurnal variation patterns changing with different seasons and geographic regions. This manuscript presents an original data analysis of some significant instruments. The discussion and conclusions are sound and clear. Therefore, I recommend for publish after addressing some minor concerns.

Response: We thank the reviewer for his/her suggestions, comments and encouragement.

Comments: Specific comments: Section 2, can you briefly describe the AOD measurement uncertainty of these instrument?

Response: This is a great question. Most validation and uncertainties analysis efforts of satellite AOD retrievals are focus on visible channels. To our knowledge, uncertainties in AOD retrieval at 1064 nm, both from passive and active sensors, are less studied. Just as suggested from the comments from Mark Vaughan and Stuart Young (Short comment for this paper), this paper might be among the first to go deep into AOD retrievals at 1064 nm channel. We were not able to find papers to address uncertainties in AOD retrievals at 1064 nm, although there are papers that do show comparisons between CALIOP and AERONET AOD at 1064 nm (Omar et al., 2013).

Omar, A. H., D. M. Winker, J. L. Tackett, D. M. Giles, J. Kar, Z. Liu, M. A. Vaughan, K. A. Powell, andC. R. Trepte (2013), CALIOP and AERONET aerosol optical depth comparisons: One size fits none,J. Geophys. Res.Atmos.,118, 4748–4766, doi:10.1002/jgrd.50330.

We have added the following discussion in the text: "Note that most evaluation efforts for passive- and active-based AOD retrievals are focused on the visible spectrum and the performance of AOD retrievals at the 1064 nm channel is less explored. "

Comments: P6, L134, it may be better to replace "increasing" with "degrading".

Response: Done

Comments: P8, L163, can you describe what constant value of that Angstrom exponent is used here without letting readers to look for that in Shi et al. paper?

Response: We apologize for the confusion. The Angstrom exponent values are computed using instantaneous retrievals. We have revised the text to avoid confusion.

"Here we assume the angstrom exponent value, computed using instantaneous AOD retrievals at the 860 and 1240 nm, remains the same for the 860 to 1064 nm wavelength range, similar to what has been suggested by Shi et al., (2011; 2013). "

Comments: P12,L266-268, "A clear diurnal variation is found, with the peak mean AOD of 0.08 found around local noon and smaller AOD values of 0.06 found for both sunrise and sunset times." In Figure 4, look to me the AOD peak is located around 9AM local time, "before" the noon. Also, is this diurnal variation consistent with your expectation?

Response: Thanks for the suggestion. We have revise the sentence to "with the mean AOD values of 0.07-0.08 found between late morning and early afternoon and smaller AOD values of 0.06 found for both sunrise and sunset times"

Comments: Can you pro-vide an explanation on why the AOD measured by CATS less than all other instruments suggested by Figure 1, 2, and 3?

Response: We assume that the reviewer is referring to the slope of the regressions in Figures 1-3. Slopes in linear regressions can often be biased by outliers. In Figure 6, which are spatial plots of AODs from CALIOP and CATS, differences are less noticeable for the DJFMAM season. For the JJASON season, CATS AODs are lower at certain regions (Middle East, India, and North Africa) and higher over other regions (South Africa). The cause of those discrepancies, however, is unclear to us. To really explore the issue, it deserves a paper of its own. Thus, we leave this topic to a future paper.