

## ***Interactive comment on “An improved method for retrieving nighttime aerosol optical thickness from the VIIRS Day/Night Band” by T. M. McHardy et al.***

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Retrieving nighttime AOT is one of most wanted satellite operational product to meet many needs from various user communities, not only limited to air quality, weather forecast, and climate sciences. Advancing the previous Johnson et al (2013) study, this paper presents more details of an innovative algorithm to retrieve global nighttime AOT using VIIRS Day/Night Band (DNB). At the frontline of the discipline, this work is scientifically significant. The results are both inspiring and encouraging to the research community that strives to provide more comprehensive satellite observations to form a complete diurnal cycle of global aerosol observations. The paper is well written with easy to follow structure, full technical details and sufficient discussions on retrieval

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uncertainties. Overall, the paper makes significant contribution to the research field and I recommend its publications at AMT.

Some minor comments are as follows:

1. Figure 5: the legend only matches the shape of the markers, but not differentiate colors of the markers
2. I am curious on the criteria used to select the four AERONET sites. The paper outlined that the aerosol types are different for the sites but that should not be all I think. Cape Verde might be too small a site for nighttime dust observations, and it appeared to be an outlier in the statistics. Did you ever consider using another dusty site over mainland instead?
3. I was hoping to see a regional AOT figure with a nighttime aerosol outbreak observed from either CALIPSO or HSRL over a mega city where artificial light source existed to retrieve nighttime AOT and compared to HSRL or CALIPSO retrievals at regional scale. Maybe this is out of scope for this paper, but how feasible it is based on your experience with many VIIRS DNB observations already?
4. Figure 7: what if we plot VIIRS-AERONET(or HSRL) AOT vs. Lunar Fraction? From the limited samples, I feel most of low L.F. samples were having lower VIIRS retrieval biases. But indeed the samples were too few to understand the L.F. impact better. It is intriguing to get sufficient more samples to make the arguments on L.F. impact more robust.

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