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

### **Anonymous Referee #3**

Received and published: 29 June 2015

#### General Comments:

This paper presents a newly developed nighttime aerosol optical depth (AOD) algorithm using the VIIRS Day/night Bands, improved from previous work presented in Johnson et al., 2013. This work is very important and significant for aerosol research community. Reviewer #1 and #2 have already pointed out some important major and minor comments. I agree that the sensitivity studies and VIIRS AOD retrieval can be improved by extending data availability and study period, and the authors also recognized that limitation in the manuscript. This paper is scientifically significant and well written, and I recommend its publication at AMT.

Minor comment:

C1731

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Although the authors recognized that the  $r_s(r)$  term (the product of the surface reflectance and the reflectance from the aerosol layer) could be significant for high AOD atmospheric condition, assumed it to be negligible in this manuscript. If I understand correctly, the authors also assumed the retrieved total optical depth over cloud free skies are AOD without subtracting the Rayleigh optical depth from the total optical depth. Even though the Rayleigh optical depth at VIIRS DNB wavelength ( $\sim 0.7 \mu\text{m}$ ) is small, in low AOD atmospheric condition, Rayleigh optical depth can be comparable to the retrieved AOD and this could lead to overestimation of retrieved AOD. However, these two assumptions do not add up to become a combined bias, since one bias occurs in high AOD and the other in low AOD condition.

It would be helpful if the authors include the retrieved AOD bias due to these two assumptions in low, moderate and high AOD atmospheric condition.

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Interactive comment on Atmos. Meas. Tech. Discuss., 8, 5147, 2015.

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