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Atmospheric Measurement Techniques Discussions

Interactive comment on "Preliminary investigations toward nighttime aerosol optical depth retrievals from the VIIRS day/night band" *by* R. S. Johnson et al.

Anonymous Referee #2

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Overall Comments:

This is a good paper, introducing ideas for retrieving AOD from the VIIR day/night band. The algorithm is presented as preliminary, and a more detailed analysis of the uncertainties is discussed but not performed here. This seems ok to me, but I suggest that the authors might do at least a little more digging into the performance criteria (e.g., #11 below).

Specific Notes:

1. P590, line 23. "... there are no other available, reliable..." In the next sentence you mention CALIPSO, and although the lidar ratio is uncertain in many circumstances, I

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think dismissing AOD derived from the instrument as 'unreliable' is overstated. I do understand that there might be very little coincident data, and as such, you decided not to make use of it for the purposes of this demonstration-of-concept paper. 2. P592, line 21. ". . . nighttime physical properties. . ." It seems you really mean "nighttime AOD." 3. P592, line 23. Might be: ". . . via obscuration and horizontal diffusion of scattered artificial. . ." It is not only horizontal diffusion, which fuzzes out the bright surface and lunar sources; backscattering and absorption of the surface-emitted light also reduce the contrast as observed from space. 4. P593, line 6. ". . . diffuse transmittance. . ." (typo – it is usually called the diffuse transmittance) 5. P593, last line. You might mention the spectral band-pass of the VIIRS channel used. I see you mention the oxygen A-band as requiring a possible correction, but depending on the band-pass, you might also need to consider ozone, etc. in the atmospheric optical depth. 6. P594, lines 18-19. It is not clear how Ia is derived. I guess the implication here is that Ia is derived on a low-AOD night, but you would still need to somehow take account of whatever AOD was there at that time. I now see you get to this on P596, lines 23-25. How many such days did you use to estimate Ia in each case, and how repeatable a value did you obtain? 7. P594, lines 15-17. What do you assume about the aerosol properties to derive the diffuse reflectance, and what uncertainty is introduced by estimating k this way? 8. P595, lines 1-4. How big an uncertainty does assuming r_s * r_bar is negligible introduce? 9. P595, lines 18-20. Were the background pixels chosen as the darkest pixels in the surroundings, or was some other criterion used? 10. P597, lines 9-14. I guess you are assuming that the primary factor determining the relationship in figure 3a is viewing zenith, and that the linearity of the plot is your justification. If this is the case, perhaps it would be worth mentioning. 11. P597, end. You might also plot the final, estimated I_a vs. exp (-tau/mu), and compare the value of I_a extrapolated to zero with the value estimated from the moonless night. I see now that you mention something like this later in the paper, but it does not seem to be a lot of extra work, and could be helpful in revealing a number of aspects of the technique's uncertainty, which is one of the main focuses of the paper. 12. P599, line 20. Unlike

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the standard MODIS and VIIRS daytime retrievals, which rely on aerosol scattering, this is basically an aerosol absorption technique, so the increased light unaccounted for at the detector produces an underestimation in retrieved AOD. This might be worth mentioning explicitly, for those less familiar with retrieval methods. 13. P601, line 3. Typo. "... VIIRS DNB is presented." 14. P601, line 21. "... applied to nighttime thin cloud optical depth..." Two notes here: I'd expect this to work only with thin cloud, and rather than properties in general, this seems it would just be optical depth.

Interactive comment on Atmos. Meas. Tech. Discuss., 6, 587, 2013.