

## ***Interactive comment on “Error sources in the retrieval of aerosol information over bright surfaces from satellite measurements in the oxygen A-band” by Swadhin Nanda et al.***

### **Anonymous Referee #1**

Received and published: 2 October 2017

Review comments on manuscript “Error sources in the retrieval of aerosol information over bright surfaces from satellite measurements in the oxygen A-band”

Author(s): Swadhin Nanda et al.

MS No.: amt-2017-323

MS Type: Research article

General comments:

This paper presents a comprehensive analysis on the potential error sources in aerosol height and optical thickness retrieval over different surface brightness. By breaking

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down the top of atmosphere reflectance into contribution from surface ( $R_s$ ) and from the atmospheric column ( $R_p$ ), the authors are able to analyze the mechanisms behind the potential retrieval bias/errors. The manuscript is organized and presented very well. It provides the community a detailed documentation on the problems facing aerosol property retrieval with oxygen A-band observations. I definitely recommend publication of the paper. I have several minor comments for the authors to consider.

One general suggestion I have is to add some discussions on TOA reflectance sensitivity to layer height for optically thin aerosols. The manuscript uses thick aerosol layers ( $\tau = 1.0$ ) for this purpose (Figure 3 left panel). Since most aerosol layers are optically thin, a similar figure with aerosol optical thickness of 0.2 maybe more telling. I'm thinking a thinner layer would make the problem even harder.

Specific comments:

- 1) P8, Line 31: Figure 2 does show  $R_s$  is more significant than  $R_p$ , but that's for albedo = 0.4, not for a dark surface. Maybe just remove "(Figure 2, blue line)".
- 2) Figure 6: what would be the physical reasons for the retrieval algorithm getting a positively biased optical thickness over brighter surfaces?
- 3) P11, Line 15: "larger over land than the over the ocean" may be "larger over land than over ocean".

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Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2017-323, 2017.

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