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Interactive comment on "A Dark Target research aerosol algorithm for MODIS observations over eastern China: Increasing coverage while maintaining accuracy at high aerosol loading" *by* Yingxi R. Shi et al.

Yingxi R. Shi et al.

yingxi.shi@nasa.gov

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We thank Dr. Si's comment and are happy that our work is inspiring to the community. Here are our answers to your questions:

A1: We agree that both scenarios (high and low aerosol loading) should be evaluated. The main goal of our study is to increase the data coverage over eastern China. We expect that in achieving this goal, we may need to accept an overall degradation of accuracy. When the data coverage increases, the change of the data accuracy strongly

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depends on the quality of the retrievals at high aerosol loading, which why the higher AOD ranges becomes the focus of the paper. Thus, it is important to re-assess our aerosol model assumption and to evaluate the uncertainties. To better illustrate the data performances against AERONET, we regenerated the Figure 9 and changed the y-axis range in Figure 10. The new figures include all ranges of AOD including the low AOD cases. The figure shows that when AOD < 0.5, even there is about a 30% increase in the number of retrievals, although there is indeed an overall decrease in accuracy, as expected. We do note that the overall bias in research AOD does not change much compared with the operational AOD. Please read our responses to Reviewers #1 and #2 for a more complete explanation of the study's goals and successes.

A2: In our Table 1 we provide equations of how imaginary part of the refractive index is calculated. The imaginary part of the refractive index related to absorption and are all as functions of AOD. The non-absorbing and regional model the sign in front of the term that includes AOD is positive, indicating that with increasing of AOD, the imaginary part is increasing. This sign is opposite in moderate absorbing model. Note that the change of absorption in terms of AOD is not linear as we seen in Figure 6, however, to avoid over fitting, we use linear relations which will have a better match at high AOD end. This choice was made because the assumption of absorption has much larger influence on retrieval uncertainty when AOD is large.

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