Atmospheric Measurement Techniques Discussions

Interactive comment on "Evaluation of BAER surface model for aerosol optical thickness retrieval over land surface" *by* Y. S. Chiang et al.

Y. S. Chiang et al.

aschiang@csrsr.ncu.edu.tw

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I really appreciate the comments from all the referees, as there are still many things to be modified for this manuscript to be of scientific use for others. Here I organize comments from all the referees and address on several of these comments.

1.This manuscript mainly references own previous works on BAER, rather than giving a complete overview of many other ways satellite aerosol retrievals dealing with surface reflectance. This is limited in scope and also makes this research unlikely to be scientific use to other. The manuscript should make general statements about surface modeling for AOT retrieval with more extensive application (ex: for different sensors and geographic regions).

2.BAER surface model is mainly based on an experiment conducted in Lindenburg, Germany in 1998. The concern is that the aerosol properties in Germany should be very different from those in Taiwan. The surface type and its complexity are also quite different for these two regions. Therefore, the application may introduce additional sources of error in the analysis. The simulation (of surface reflectance) in this study should be based on conditions with broader temporal and spatial coverage to evaluate the global applicability of BAER surface model.

3.In Fig.2, most of points are for moderate or high AOT, which is exactly where aerosol microphysical model errors play a big role in the accuracy of AOT retrieval. Meanwhile, the small sample size would be insufficient to address the problem faced by BAER surface model. This figure should be complemented by more validation results covering different geographic regions and temporal periods.

4.The concept of using MOD09 surface reflectance for evaluating BAER surface model needs to take into account the geometric effect and bandwidth/spatial resolution difference between the two sensors. The manuscript also needs to address on the accuracy of MODIS surface reflectance based on recent scientific work. Meanwhile, BRDF is another crucial concern.

5.The effect of error propagation (from surface reflectance to AOT retrieval) should be addressed in the study to make the study more useful to others.

6.The notation is clumsy and needs to be modified.

7.For fig. 8 and 9, a nonlinear fitting can better elucidate the cross relation. Explanation is also needed.

8.Referees have given specific comments on approaching the paper in different ways. All these suggestions are very constructive and useful for my future research, and I really appreciate these suggestions, indeed.

9.Finally, I apologize for the poor grammar and unclear writing in this manuscript, and

really appreciate for the patient from the referee to look through this manuscript and give constructive suggestions.

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