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Atmospheric Measurement Techniques Discussions



# *Interactive comment on* "Model Enforced Post-Process Correction of Satellite Aerosol Retrievals" *by* Antti Lipponen et al.

**Anonymous Referee #2**

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Lipponen et al. have tried to use a model enforced post-process correction of satellite retrievals, especially the post-process correction of approximation error in the retrieval. It seems helpful as it allows to use other ancillary dataset and efficiently reprocess the existing aerosol dataset without much change in raw retrievals. I found the method innovative and potential for broader applications. However, the model has some unexplained characteristic that needs to be addressed.

Specific comments:

1. I found the abstract too general with having description only on the description/uncertainty and processing of the dataset by the algorithm. It lacks how much the AOD/AE retrievals were improved against a standard algorithm and any other specific observation (like regional or temporal advantages/ performance).



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2. Abstract: modify line 1, as all satellite do not provide global data. Atmospheric characterization by aerosol does not mean anything.

3. Introduction: authors have used the word 'anthropogenic' too general, as it would be crude to decide the anthropogenic nature of aerosol based solely on high AE, as it could also be attributed by natural forest fire and other. Kindly revise the text.

4. Line 30: AE is not a typical satellite retrieval data as it is negative slope of AOD for a particular wavelength in log. Avoid writing AE as retrievals.

5. Section 3.1: what quality flag was considered to retrieve DT AOD to avoid cloud contamination and other errors in the AOD retrieval?

6. Line 195: Why authors have pointed that AE (and the AI) is not reliable over land?

7. As in Fig. 3, model-enforced correction model has achieved higher accuracy and lower bias compared to other. How the model-enforced processing are dependent on the selection of ancillary data? Is selection of different variable or a different group of variables have any possibility to change the outcome?

8. Line 215: I agree, due to poor mixing of aerosol models in DT over land there is no operational DT AE product. In Fig. 4, there is improvement in AE prediction by model-enforced correction but result is comparable to fully learned Random Forest based regression model. Why author have not tried FMF which is a quantitative value and provide better estimation of aerosol size? Selection of a different parameter would have leads to add the applicability of the result.

9. Clearly in Fig. 6, model-process data is well comparable to that of MODIS RF REGRESSOR for AOD<0.5 while at high AOD, machine learning based models have negative bias but the range of error values is clearly smaller. So, can we conclude from it that the post-processing of the AOD will not work well for the cases with extreme aod observation? How post-processing will improve aod estimation for a region with high AOD, like in China/ India?

Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2020-229, 2020.





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