

Interactive comment on “Using the OMI Aerosol Index and Absorption Aerosol Optical Depth to evaluate the NASA MERRA Aerosol Reanalysis” by V. Buchard et al.

Anonymous Referee #1

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General comments

In this interesting paper, the authors present the validation of their aerosol data assimilation result with OMI aerosol products and other independent aerosol observations. The instrument OMI was launched with the aim of measuring the ozone layer, so that its aerosol products have been treated as secondary products. It is also partly due to the physical difficulty in interpreting the OMI aerosol products. The authors attempted the novel and challenging validation in this paper. Their attempt should be appreciated whether or not the attempt became completely successful. Actually, their attempt was successful in Saharan dust validation and unsuccessful in smoke and sulfate valida-

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tion. The overall presentation of this paper is well structured and mostly clear except for the classification of figures between “in the main body” and “in the supplement”. The manuscript is worth being published in ACP after some minor revisions.

Specific comments

1) page 32188 line 1: The monthly mean distribution is shown in Fig. 1, but the time (month and year) is not specified in either the main body or the figure caption. Even if it is an example, the time should be indicated.

2) page 32189 lines 20-24: No wonder the simulated AOD has a very good correlation with the assimilated observations MODIS NNR. It is meaningless to compare “the correlation with assimilated observations” and “the correlation with independent observations”. The really-required scores are “simulation with data assimilation versus simulation without data assimilation”, “analysis versus forecast”, or “analysis versus independent observations”.

3) page 32192 lines 5-7: The refractive index at 354 nm is modified here but the imaginary part value is not specified in the text. The value should be indicated to show the test-retest reliability of this experiment.

4) page 32193 lines 22-24: The same as comment #2.

5) page 32194 lines 23-25: This presentation is very confusing. The authors are ignoring marine layer aerosols but it is not described in the main body text. Without the description, “the maximum attenuated backscatter coefficient” seems to appear in the marine layer.

6) page 32197 lines 3-9 and page 32201 line 16: Torres (2011) indicated that OMI AOD is good when AAE is between 2.5 and 3.0. However, what the authors showed here is that MERRAero AI is good compared to OMI AI when all of the OC SSA is modified to always yield its AAE between 2.5-4.0. Therefore, this sensitivity test showed only that the default optical property of OC was not appropriate, didn't it? Plus, Fig. 13 indicates

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that the model bias is resolved (= the scatter distribution is just parallel-shifted) but the broad scattering remains unchanged. Is this an improvement?

7) page 32200 lines 14-15: The authors say that the MERRAero AI is reasonable. Yes, it is good in Saharan dust region. But, it is bad in smoke and sulfate regions. Please describe them honestly.

8) page 32200 line 26: I believe that the phrase “particularly over dust sources” is not well discussed in the paper.

9) page 32201 lines 11 and 20: Not only SSA but also AI is largely scattered.

10) Figs. 1, 2, 3: In these figures, the color of lands is green, blue, or red completely. But oceans are not colored mostly. This means that all of the land areas are covered with observation data and oceans are mostly full with no-data. Is the contrast of OMI data so strong?

11) Figs. 6 and 11: The expression of longitude is “plus and minus” in these figures. It is confusing because they are mentioned with “W and E” in the main text and the other figures. The expression should be unified.

12) Supplement: I have no idea what is the authors’ criterion to distinguish supplement figures from main body figures. Of course, this manuscript contains a lot of figures in the main body (I believe the number of figures can be reduced somewhat...), but Supplement should be only additional or serviceable information.

Technical corrections

1) page 32194 line 26: The longitude 15-25W is right? It isn’t 15-25E?

2) page 32200 line 14: “. . . in the process fine tune the aerosol optical properties. . .” is an error in grammar? I’m not sure because I’m not a native speaker. But I think “tunes” is grammatically correct.

3): The authors are using two terms “South Africa” and “southern Africa”. If they are

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intended as the same meaning, the expression should be unified.

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 32177, 2014.

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