

Interactive comment on “Analysis of Global Three-Dimensional Aerosol Structure with Spectral Radiance Matching” by Dong Liu et al.

Dong Liu et al.

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We thank the reviewer for the time spent to evaluate our work and we thank him/her for the very useful and detailed comments.

We made following changes in the revision according to reviewer's comment.

For the issues throughout paper reviewer pointed out:

- We have been consistent to use a space between a value and the unit.
- We are not using LaTeX, but we have replaced all ‘–’ in the context, and been consistent to use ‘-’.
- We have put commas after Equations before ‘where’.

C1

–We have fixed the format of using abbreviation or not abbreviated form of ‘Figure’ and ‘Table’ in context.

–We have fixed the format of using abbreviation or not abbreviated form of ‘Figure’ and ‘Table’ in context.

–We have added period after the table number in table captions.

–We thank author's recommendation, but we think both ‘long’ and ‘lon’ are commonly used for abbreviation of longitude.

–The citation in the context is done through Cite While You Write™. We thank the reviewer for pointing it out and have added space in between cited works.

–We have made sure that only ‘Table X.’ is bold in the title.

–We have added to the data part that all CALIPSO products used in the work are from Version 4.20, and MODIS products used in the work are from MODIS Collection 6

Specific Comment

–Page 1, Line 28: The cite uses [] when it should use ().

The brackets have been changed.

–Page 2, Line 5: The reference used here is rather old and is cloud specific. What about Levy et al. (2013).

The suggested reference has been added.

–Page 4, Line 5: The MODIS radiances are also provided at 250 m (bands 1–2) and 500 m bands (1–7) and I am pretty sure these are used for the official aerosol product.

We thank reviewer for the comment. MODIS visible bands are provided with better resolutions, however, 1 km resolution is used to be consistent with infrared bands.

–Page 4, Line 6: Again the references here could be better and more up-to-date. Con-

C2

sider using Levy et al. (2013) and Platnick et al. (2017).

The suggested references have been added.

–Page 4, Line 26: The operators and brackets should not be italicized.

The operators and brackets have been changed.

–Page 4, Eq 1: Use italics (math mode) for variables $F(i,j;m) \rightarrow F(i,j;m)$.

The equation has been changed.

–Page 4, Eq 1: In the summation notation the lower variable is an index. The upper variable should be the upper value of the index. In this case both are the same variable.

We have changed the upper value of the index to 4.

–Page 4, Line 30: $K = 4$? Related to previous comment.

Same as the last question, we have changed the upper value of the index to 4.

–Page 4, Line 31: I think I understand why these bands are chosen but maybe have a bit of explanation.

We thank the review for the comment. We have added following explanation to the context:

“The bands are chosen for their widely accepted usage in retrieving cloud properties, including cloud cover, cloud top properties (CTP/CTT/CTH), and cloud phase (Ackerman et al. 1998, Baum et al. 2012, Baum et al. 2000) and aerosol properties (Sayer et al. 2014, Levy et al. 2013, Remer et al. 2013).”

–Page 5, Eq 2: Use italics (math mode) for variables $D(i,j;m) \rightarrow D(i,j;m)$.

The equation has been changed.

–Page 5, Line 9: The asterisk in $(m \hat{L}, 0)$ is weird.

C3

We thank the reviewer for the comment. The asterisk is used to specify that from all potential donors, the most suitable match is chosen to be the donor for the specific recipient. We add lines to clarify this in the context.

–Page 5, Line 12: ‘of construction’ \rightarrow ‘of the construction’.

The line has been changed accordingly.

Page 6, Eq 5: Inconsistent use of italics. MR should not be italicized (use MR) and N should be italicized. Note other usages of MR below.

The equation has been changed, as well as the usage in the following context.

–Page 6, Line 30: ‘km AGL’ \rightarrow ‘km above AGL’.

Since the AGL stands for above ground level, we think no change is needed here.

–Page 7, Line 15: ‘donors meets’ \rightarrow ‘donors that meet’.

The line has been changed accordingly.

–Page 7, Line 18: ‘air column’ \rightarrow ‘air columns’.

The line has been changed accordingly.

–Page 7, Line 19: ‘air column’ \rightarrow ‘air columns’.

The line has been changed accordingly.

–Page 7, Line 29: ‘This is resulted’ \rightarrow ‘This results’.

The line has been changed accordingly.

–Page 7, Line 29: ‘of TBM’ \rightarrow ‘of the TBM’.

The line has been changed accordingly.

–Page 7, Line 32: ‘by total’ \rightarrow ‘by the total’.

C4

The line has been changed accordingly.

–Page 7, Line 33: ‘in reconstructed’ → ‘in the reconstructed’.

The line has been changed accordingly.

–Page 8, Line 1: ‘in reconstructed’ → ‘in the reconstructed’.

The line has been changed accordingly.

–Page 8, Line 11: Use LaTeX \times instead of ‘x’.

The manuscript is not prepared in LaTeX. We apologize for the inconvenience.

–Page 8, Line 16: ‘In reality, this’ → ‘This’.

The line has been changed accordingly.

–Page 8, Line 29: Use LaTeX \times instead of ‘x’.

The manuscript is not prepared in LaTeX. We apologize for the inconvenience.

–Page 8, Line 30: ‘surrounding Bohai’ → ‘surrounding the Bohai’.

The line has been changed accordingly.

–Page 9, Line 13: ‘heating. Average’ → ‘heating. The average’.

The line has been changed accordingly.

–Page 9, Line 16: ‘C, average’ → ‘C, the average’.

The line has been changed accordingly.

–Page 9, Line 20: ‘AOD, especially’ → ‘AOD, with especially’.

The line has been changed accordingly.

–Page 9, Line 26: ‘with CALIPSO’ → ‘with the CALIPSO’.

The line has been changed accordingly.

C5

–Page 9, Line 27: ‘hour of’ → ‘hours of’.

The line has been changed accordingly.

–Page 9, Line 27: ‘using 10’ → ‘using the 10’.

The line has been changed accordingly.

–Page 9, Line 31: ‘have larger’ → ‘have a larger’.

The line has been changed accordingly.

–Page 10, Line 9: ‘to alter our’ → ‘to improve our’.

The line has been changed accordingly.

–Page 10, Line 10: ‘for study’ → ‘for the study’.

The line has been changed accordingly.

–Page 10, Line 12: ‘using SRM’ → ‘using the SRM’.

The line has been changed accordingly.

–Page 10, Line 16: ‘6.%’ → ‘6%’.

The line has been changed accordingly.

–Page 10, Line 18: ‘with sufficient’ → ‘with a sufficient’.

The line has been changed accordingly.

–Page 10, Line 25: ‘on SRM’ → ‘on the SRM’.

The line has been changed accordingly.

–Page 10, Line 25: ‘a power’ → ‘an important’.

The line has been changed accordingly.

–Page 10, Line 26: ‘well off’ → ‘not’. The line has been changed accordingly.

C6

–Page 16, Table 3: Identify the abbreviations in the headers.

Thank for the suggestion, we add to the footnote of the table that ‘No Sig’ stands for ‘no signal’ and ‘Surf’ stands for ‘surface and subsurface’ portions of the measured columns.

–Page 20, Figure 3: ‘with 30km’ → ‘with a 30km’.

The line has been changed accordingly.

–Page 20, Figure 3: σ should be in italicized.

Ackerman, S. A., K. I. Strabala, W. P. Menzel, R. A. Frey, C. C. Moeller & L. E. Gumley (1998) Discriminating clear sky from clouds with MODIS. *Journal of Geophysical Research-Atmospheres*, 103, 32141-32157.

Baum, B. A., W. P. Menzel, R. A. Frey, D. C. Tobin, R. E. Holz, S. A. Ackerman, A. K. Heidinger & P. Yang (2012) MODIS Cloud-Top Property Refinements for Collection 6. *Journal of Applied Meteorology and Climatology*, 51, 1145-1163.

Baum, B. A., P. F. Soulen, K. I. Strabala, M. D. King, S. A. Ackerman, W. P. Menzel & P. Yang (2000) Remote sensing of cloud properties using MODIS airborne simulator imagery during SUCCESS 2. Cloud thermodynamic phase. *Journal of Geophysical Research-Atmospheres*, 105, 11781-11792.

Levy, R. C., S. Mattoo, L. A. Munchak, L. A. Remer, A. M. Sayer, F. Patadia & N. C. Hsu (2013) The Collection 6 MODIS aerosol products over land and ocean. *Atmospheric Measurement Techniques*, 6, 2989-3034.

Remer, L. A., S. Mattoo, R. C. Levy & L. A. Munchak (2013) MODIS 3 km aerosol product: algorithm and global perspective. *Atmospheric Measurement Techniques*, 6, 1829-1844.

Sayer, A. M., L. A. Munchak, N. C. Hsu, R. C. Levy, C. Bettenhausen & M. J. Jeong (2014) MODIS Collection 6 aerosol products: Comparison between Aqua’s e-Deep

C7

Blue, Dark Target, and "merged" data sets, and usage recommendations. *Journal of Geophysical Research-Atmospheres*, 119, 13965-13989.

Please also note the supplement to this comment:

<https://www.atmos-meas-tech-discuss.net/amt-2019-182/amt-2019-182-AC4-supplement.pdf>

Interactive comment on *Atmos. Meas. Tech. Discuss.*, doi:10.5194/amt-2019-182, 2019.