

## ***Interactive comment on “Interannual Variability and Trends of Combustion Aerosol and Dust in Major Continental Outflows Revealed by MODIS Retrievals and CAM5 Simulations During 2003–2017” by Hongbin Yu et al.***

**Anonymous Referee #2**

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General comments:

In the paper, “Interannual Variability and Trends of Combustion Aerosol and Dust in Major Continental Outflows Revealed by MODIS Retrievals and CAM5 Simulations During 2003–2017”, the authors analyze both satellite-based and model-based datasets of various aerosol types in continental outflow regions over a fifteen-year period. A great deal of research has been completed and the narrative is generally well-written. I find no significant issues with this study; however, I believe it can be improved in a few areas. Several technical errors were found, and while I outline many of them in my review, the

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paper should be given a thorough round of proofreading edits. Overall, I recommend a minor revision for this manuscript. The authors should address the specific comments and technical corrections discussed below.

Specific comments:

1. Page 4, Line 12: Are you using the most recent MODIS data available (i.e., Collection 6.1)?
2. Page 5, Line 155: Why is SOA not included in the tagging?
3. Page 5, Lines 162–163: It does not look like an increase to me. Please double check.
4. Page 7, Lines 220–222: What is the uncertainty associated with this?
5. Page 8, Line 231: Do you have sources/citations for the claim that the derived dust AOD is likely overestimated?
6. Page 8, Line 244: In addition to AERONET, you can also compare against Maritime Aerosol Network (MAN) observations (since here much of the discussion is focused on over ocean)?
7. Page 8, Line 249: Please make sure this is mentioned somewhere later in the paper.
8. Page 8, Line 255: Be clearer here with your definition of fractional AOD. Also, in Figures 5 (b) and (d), I would not show AOD fraction this way, as it can be confusing. For example, dust always appears to be at 100%. I suggest editing these plots.
9. Page 10, Lines 301–304: Include the values of each trend.
10. Figure 1: I thought SOA was not included in the tagging? Also, is the y-axis supposed to be in percentages? Please add the correct units.
11. Figure 2: Shouldn't the units here for the y axes be just Tg?
12. Figure 6: Add the trend lines and trends for each plot.

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13. Figure 8: Why no CAM5 for 2016-2017? Is the MODIS trend only up to 2015, or does it include 2016-2017? It is of concern if the trends are computed for different time periods. This same comment can be applied to some of the later figures as well (see below).

14. Figures 9, 10, and 11: same concerns/questions/comments as Figure 8.

15. Figure 11: How come no climatological seasonal cycle plots are shown, as in Figs. 8-10?

16. Figure 12: Are you comparing trends from different time periods?

Technical corrections:

1. Page 4, Line 120: "sea-spay" should be "sea-spray".

2. Page 9, Line 268: The "0.025" here should be "0.015", correct?

3. Page 11, Line 340: I would switch "well captures" to "captures well".

4. Page 11, Line 343: "the peak occurs" . . . the peak what? Be specific.

5. Page 11, Line 343: Remove "the" before "MODIS" and "CAM5".

6. Page 11, Line 345: Add "the" before "NAT", "MED", and "NAT and MED regions".

7. Page 11, Line 356: "season" should be "seasons".

8. Page 12, Line 369: Remove "the" before "CALIOP".

9. Page 12, Line 370: Remove "the" before "SeaWiFS".

10. Page 13, Line 405: Remove "the" before "CALIOP".

11. Page 13, Lines 406-407: Define PM2.5, SO2, and CO.

12. Page 13, Line 407: "decline" should be "declining".

13. Page 13, Line 408: "decline" should be "declining".

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14. Page 13, Line 409: I would reword this sentence by changing "How" to "The manner in which".

15. Page 13, Line 410: Why is "Figure 10" in bold print?

16. Page 13, Line 417: "possibly" should be "possible".

17. Page 13, Line 422: Remove "the" before "MODIS".

18. Page 13, Line 426: Define ATSR.

19. Page 14, Line 459: Remove "the" before "northern".

20. Page 14, Line 460: Remove "the" before "northern".

21. Page 15, Line 461: Remove "the" before "southern".

22. Page 15, Line 462: Remove "the" before "northern".

23. Page 15, Line 468: In this context, I think "driving up" should be "drove up", although I suggest finding another phrase.

24. Page 15, Line 490: Add "the" before "literature".

25. Page 16, Line 496: Remove "the" before "CALIOP".

26. Page 16, Line 500: Add "of" after "factor".

27. Page 16, Line 506: Collection 6.1, correct?

28. Page 16, Line 507: Replace "the" after "over" with "a".

29. Page 17, Line 528: Remove "only".

30. Page 18, Line 566: Add commas after "Asia" and "China".

31. Page 18, Line 570: Add "the" after "of".

32. Page 18, Line 585: Replace "the" after "such" with "a".

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33. Page 26, Table 3 caption: Add “an” before “asterisk”.
34. Page 26, Table 4 caption: In the first line, “trend” should be “trends”. Add a comma before “respectively”. Also, add “an” before “asterisk”.
35. Page 27, Figure 1: (a) Add a label to the color bar. (b) Add latitudes and longitudes to the map.
36. Page 28, Figure 2: Add labels (a)-(c) to the plots and the figure caption.
37. Page 29, Figure 3: I suggest using (a)-(c) for labels. Please also edit the caption accordingly. Also, add the difference between the marine cases to the caption.
38. Page 30, Figure 4: Add labels (a)-(h) to the plots and the figure caption.
39. Page 32, Figure 6: Add labels (a)-(d) to the plots and the figure caption.
40. Page 34, Figure 8: Add labels (a)-(f) to the plots and the figure caption. Also, add labels to the y axes of the middle plots. Add “by” after “simulated” in the last line of the figure caption.
41. Page 35, Figure 9: Add labels (a)-(f) to the plots and the figure caption. Also, add labels to the y axes of the middle plots.
42. Page 36, Figure 10: Add labels (a)-(f) to the plots and the figure caption. Also, add labels to the y axes of the middle plots.
43. Page 37, Figure 11: Add labels (a)-(f) to the plots and the figure caption. Also, add labels to y axes of the plots on the left-hand-side of the figure.
44. Page 38, Figure 12: Label the x and y axes for each plot. Also, add labels (a)-(f) to the plots and the figure caption. In the figure caption, remove “and” before “the tropical Indian Ocean”.

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