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Atmospheric Chemistry and Physics Discussions

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.

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Referee #3 The authors present an evaluation of model and satellite observations of mineral dust/combustion aerosols over a fifteen -year period. They discuss the strengths/weaknesses of the MODIS products and various versions of the CAM simulations. In this manuscript further highlight the need to consistently use MODIS data to avoid errors, and the MODIS/Terra data are not to be used for AOD trends. Further, the conclusions regarding dust model simulations needing significant improvement are encouraging.

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Discussion paper

Overall, the manuscript is a challenging read due to the flamboyant reference of statistics. It is understood that the authors are putting the current evaluation in context of previous work, but it significantly impacts the readability of the manuscript. Other than the manuscript's readability, my comments on the paper are minor and I believe it should be published after minor revisions.

We thank the reviewer for comments. We will strive to streamline the text to better the flow of paper.

– Page 6, line 202: Can the authors clarify whether these differences are statistically significant or not?

These differences are based on an analysis of a large amount of data points and are substantially larger than standard errors. The bottom line here is that we should use platform-specific numbers to attain the self-consistent use of the data.

– After reading the manuscript I could not conclude which (MODIS or CAM5) is more reliable. Page 12, lines 393-398 and section 3.3.3 left me somewhat confused. Can the authors clarify which is a "better" product according to their research?

Each product has its own strength and weakness, which depends on region. In our analysis, we have been trying to discuss major uncertainties associated with individual product and assess which product is better based on the discussion and independent data if available. For example, MODIS-detected dust decreasing trend in Northwestern Pacific Ocean (NWP) is consistent with independent measurements over Asian dust source regions and Japan (AD-Net lidars). But CAM5 model doesn't capture this trend and we believe that the model needs improvement of Asian dust. Another example is the Southeast Asia (SEA) outflow region. CAM5 POM emission and combustion AOD were significantly smaller than 2014, which is contradict with well-documented intense wildfires in 2015. We thus believe that the model's fire emissions are likely underestimated. Unfortunately, it is not always possible to judge which product is more reliable due to lack of independent data sets to collaborate the MODIS or CAM5 results.

– Page 17, line 561: I am confused regarding the use of "monotonous" here. Please consider changing.

“monotonous” is removed.

– Page 18: line 583: "...processes, such the broad..." should be "...processes, such a broad..."?

Fixed

– Figure 6 caption: Capitalize first word in sentence.

Fixed.

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