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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Characterizing the 2015 Indonesia Fire Event Using Modified MODIS Aerosol Retrievals" *by* Yingxi R. Shi et al.

Anonymous Referee #2

Received and published: 17 September 2018

Dear Authors,

Thank you for a well-written manuscript on your interesting and carefully performed study. The limitations of operational satellite retrievals for extreme events are well-known but had never been exactingly quantified.

I have a few questions seeking clarity, and several minor corrections, but I think with minor revisions this study can be published. Thank you for your hard work.

Comments below are organized roughly by significance:

Q: Would you say that your research results represent a lower bound on the low bias associated with the operational DT retrieval?

Q: The MODIS Dark Target retrieval makes some assumptions about the impact of aerosol scattering and absorption at longer wavelengths. For AE=1.8, AOD550 of 5.0 corresponds to an AOD2.1um of 0.45, which is quite substantial. I think you should discuss the ramifications of high AOD values on the assumptions of the MODIS DT retrieval, especially the reflectance ratios of longer wavelengths.

P5L29 and many other places. I don't like the term "failure metrics," because nothing is actually being measured. My preference would be to refer to this as the "cloud optical properties product MYD06 Collection 6 diagnostic quality flags," which is long but eliminated ambiguity. "Failure metrics" should be replaced with "diagnostic flags" or "quality flags" throughout the manuscript.

P11L26: "an aerosol model might.. better capture the variability of smoke optical properties" What kinds of improvement would you expect to see with more data? What kinds of conditions are undersampled with the existing dataset? Do you have suspicions about how your current results may be biased?

P14L23: "multiple types of smoke optical properties" Are you suggesting there may be multiple modes of smoke particle optical properties? Or are you only saying that the smoke particle optical properties are highly variable?

Figure 9. I recommend modifying the legend (and others) to read "C6 DT AOD" to assist future readers.

Page 2 line 26: "This new regional aerosol climatology" Is this referring to the updated empirical optical properties derived from AERONET? This should be clarified.

P4L13 "information about the aerosol optical properties"

P6L25 "Holben 2006 recommends a threshold of AOD>0.4 at 0.44 um for quality assurance of the AERONET inversion products; we followed the procedures of Holben, but used a higher more strict AOD threshold of AOD>0.4 at 0.675 um."

P11L15: "with 7 pixels in the last bin"

P15L4: This last sentence can be phrased better, I think. If I understand, you are trying to say that the research retrieval has more than double the number of AOD>1, and with those additional retrievals included, the bulk error statistics still show a large improvement.

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