Reply to reviewer #1:

Review of "Characterizing the 2015 Indonesia Fire Event Using Modified MODIS Aerosol Retrievals" by Shi et al. Based on the Indonesian fire and smoke event in 2015, the paper identified the problems in the MODIS DT aerosol algorithm, and proposed solutions to further improve the global DT algorithm. The paper is well written with sufficient technical information and the improvements to the algorithm is evidently clear. I have conducted similar investigation to the VIIRS aerosol products and algorithm, and found very similar results with the VIIRS aerosol algorithm that is based on MODIS heritage DT algorithm. I think the paper outlined a very important issue with the current operational satellite aerosol algorithm, and the proposed improvements are really important for the satellite aerosol remote sensing community. I found the paper suitable for ACP and I recommend its publication in current format. I only have a few minor comments and suggestions for consideration:

We thank the referee for your nice words.

1. *Page 3 Line 25, Equation 1: Better have bracket to avoid any potential confusions*

   Done.

2. *Page 4 Section 2.2: DB algorithm is introduced here. It will be nice to briefly mention how this study will make use of the DB algorithm for comparison. For example, similar to the last paragraph in Section 2.3.*

   Done. We added "In this study we used DB in a case study to illustrate that both aerosol products (DT and DB) from MODIS have problems retrieving a complete image of AOD when optically thick smoke exists."

3. *Page 20 Table 1: highlight less absorbing in the 'Regional Smoke' model name, maybe 'Regional Less Absorbing Smoke Model'?*

   Done. We changed "Regional Smoke" to "Regional Less-Absorbing".

4. *Figure 2 is very interesting. DB product also missed quite some retrievals in comparison to DT product. Is it attributable to their different cloud screening? From the RGB image, it looks like to me that DT is sort of underscreening clouds but DB is overscreening. Very intriguing. It seems AI which uses UV channels has a better coverage when aerosols are above clouds. I wonder what OMI AOD will look like for the same scene.*

   We agree that the differences in DB and DT retrieval coverage are at least partially due to different cloud masking. However, we don't know the DB algorithm well enough to say that the cloud mask is the only source of differences. We checked the cloud filtering in this image and do not believe that DT is underscreening clouds over this region. To answer your question, we plot OMI AOD (right). Note that OMI AI retrieves over clouds but OMI AOD requires cloud free scenes in its 13x24 km footprint.

5. *Figure 2(e) and (f): it will be nice to put 'NDVI' title on the figure same as you did for (a) to (d)*
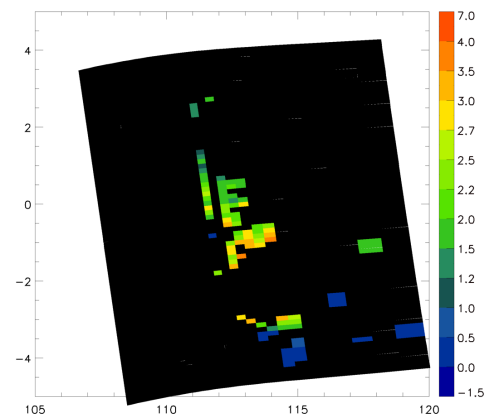
Done. We put NDVI title on the figure.

6. *Figure 2: do we have similar Figure 2(g) that shows where in-land water test failed?*

   Figure 2e shows where in-land water test failed, which are colors cooler than yellow. In another word, colors in green, blue, purple, black and light aqua are areas that failed the test. We added "In Fig. 2e only regions colored white and red passed the NDVI threshold" in Page 7 line 15.

7. *Figure 8 needs legends in addition to your caption descriptions*

   Done. We added legends.

8. *Figure 9: Are there any bin that blue bars are actually taller than red bars? If yes, you may consider using transparency*

   No, there is no blue bars actually taller than red bars.

9. *Figure 10: Why this Figure cannot use the same colorbar as the conventional rainbow colorbar in Figure 2 (c)?*

   We used this due to author's personal preference.

10. *It will be nice to show how many missing retrievals are due to cloud overscreening and how many are due to in-land water overscreening, in a Table or in a chart.*

    I understand what the referee is looking for. However, most of the retrievals at the center of the plume were screened out due to both cloud masks and in-land water mask. In our case study, 976 missing retrievals are due to cloud screen, 878 missing retrievals are due to inland water mask. The total number of increases is 1004 (the union of two masks), most of which are screened out by both masks.