

Interactive comment on “Estimations of anthropogenic dust emissions at global scale from 2007 to 2010” by Siyu Chen et al.

Anonymous Referee #1

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This manuscript tries to calculate global dust emissions for anthropogenic components. However, the authors appear to only describe their method and results without any validation based on observation. In specific, their developed method for estimating anthropogenic dust emissions seems to depend largely on the CALIPSO data: e.g., equation (4) and (5). And yet, they are trying to validate their estimated emissions by comparison with the CALIPSO data (Figure 8, 9). The comparison with the CALIPSO's anthropogenic dust data should not work as validation of the estimated dust emissions because those emissions are basically derived from the CALIPSO data; consistency between their estimated dust emissions and CALIPSO like in Figure 9 is a matter of course. The authors should validate/describe their results using observational evidences which are independent on the CALIPSO data. At least, they should compare

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their results with other works previously published which are referenced in the text.

I also have a question on the methodology of emission estimate using the CALIPSO AOD (equation 5). The authors estimate anthropogenic dust emission based on “the anthropogenic dust column from CALIPSO”. This procedure should be more clearly described in the text. I presume that dust loading does not necessarily correspond to the location of dust emission, and I think that actual estimation of dust emissions requires consideration of transport processes of emitted dust in the air. How do you treat such effects of dust transport in your method?

As a total evaluation, I cannot recommend this work for publication in ACP. Due to volume of required modification (detailed validation, etc.) to the current manuscript, I would suggest major revisions or rejection in this instance.

(specific comments) L43 “the schemes reasonably reproduced”: to say this, you need more validation of your results using available observational data in addition to the CALIPSO data.

L120 “First, lacking of observation”: I think there should be a number of reports and studies on dust concentration/emissions from urban to regional scale”. Why don't you use such data in this study?

L263 “the anthropogenic dust column from CALIPSO”: How do you isolate indirect component from direct one in it?

The discussions on Figure 2.,3 in the “Results” section should be moved to the previous section, they are not the results.

Figure 8.: How about regional seasonality? Is it possible to compare the seasonal patterns in your estimated emissions and the anthropogenic dust column?

Figure 9: I don't understand the meaning of “Normalizations”: Please give clear definition of it. What do the figures like “0.36647” represent?

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