

Interactive comment on “A critical assessment of high resolution aerosol optical depth (AOD) retrievals for fine particulate matter (PM) predictions” by A. Chudnovsky et al.

Anonymous Referee #2

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Review of “A critical assessment of high resolution aerosol optical depth (AOD) retrievals for fine particulate (PM) predictions” by A. Chudnovsky et al.

This article mainly compared the relationship between Particulate Matter-2.5 (PM_{2.5}) and two MODIS Aerosol Optical Depth (AOD) products with different spatial resolutions in different geographic regions, seasons and sites during 2002–2008 in New England, very logically. This paper is a successor of “Chudnovsky A. et al., (2013)” titled “Spatial scales of pollution from variable resolution satellite imaging”, some of the descriptions and conclusions are similar. The topic is suitable for ACP. To my point of view, this paper presented a nice and comprehensive analysis to “understand the full potential

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and limitations of the high resolution MAIAC AOD product for improving the accuracy in PM_{2.5} estimation”. However, some of the important explanations/discussions are not completed. I will not suggest the publication unless after the main revision.

(1) A more complete literature review about AOD-PM estimation is needed; I would suggest a similar table like Hoff and Christopher (2009), containing the recent (after 2007) progress about PM_{2.5} prediction; As to AOD retrieval, at least two more papers about MODIS Collection 6.0 should be included, “Remer et al., 2013” and “Levy et al., 2013”.

(2) Page 14587, Line 13, “These regions differ in topography and climate conditions” need to be clarified. The effects of all these different situations to AOD retrieval, especially to the conversion from AOD to PM_{2.5} should be explained. The authors gave very simple explanation when some abnormal cases occurred, but this is not enough in such a comprehensive analysis paper.

(3) For figure 2, if I understand right, the authors directly compared the single satellite pixel with 24-hour average PM_{2.5} concentration without considering the scale problem. With the same wind speed, it takes different time for aerosol/PM to cross a pixel with different spatial resolution. How to overcome this problem?

(4) Page 14588, Line 11, “but with room for improvement”, what does this sentence mean? Room for the improvement of AOD retrieval or PM prediction from AOD?

(5) Page 14588, Line 24, why negative slope occurs in region 2 (even the EPA sites location is near the road or lack of auxiliary information)? So that means the bias/intercept should be very large with a negative slope and this makes no sense for the regression.

(6) Page 14589, Line 4, “The improvement can be related to the finer resolution of MAIAC...”, this sentence should be clarified because the converting from AOD to PM_{2.5} is affected by many other factors as described by the authors and these factors may/may not also be affected by the scale/resolution. The authors should avoid

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the effects of other factors before coming to the conclusion.

(7)Page 14589, Line5, “and better performance over brighter urban areas”, any references or may be the author should provide some validation figures of MAIAC AOD for bright surface compared with MODIS product.

(8)Page 14592, Line 1. I got confused for Table 3 and Figure 9(b), both of them discussed about the situation when no match-ups between MYD04 and PM2.5, in Table 3, most correlation are less than 0.4, why the correlation in Figure 9 (b) is 0.51? Do Table 3 and Figure 9 (b) use different dataset?

(9)Page 14592, Line 17. I would suggest the authors presenting one more figure about the relationship between AOD/PM2.5 after using the thresholds to avoid the noise.

Specific points and suggestions: (1)Page14583, Line 15, Hoff and Christopher (2009) reviewed more than 30 papers, not all are about PM2.5, some of them are about PM10.

(2)Page 14583, Line 19, “et. al. 2010” should be “et al., 2010”

(3)Page 14583, Line 20, “et. al., 2007” should be “et al., 2007”

(4)Page 14590, Line 20, this sentence makes no sense because cloud screening of MODIS AOD are different from MYD35 cloud product.

(5)Page 14598, Line 20/24, should be arranged in alphabetical order.

(6)Some similar sentences repeated several times, please try to avoid the redundancies.

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