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Interactive comment on “Estimating ground-level PM_{2.5} in Eastern China using aerosol optical depth determined from the GOCI Satellite Instrument” by J. Xu et al.

Anonymous Referee #3

Received and published: 24 September 2015

The manuscript presented a first attempt to derive surface PM_{2.5} concentrations using the aerosol optical depth (AOS) measurements from the Korean Geostationary Ocean Color Imager (GOCI) instrument. A chemical transport model (GEOS-Chem) was evaluated and then used to provided the PM_{2.5} over AOD ratios over the eastern China. The methodology of this study has been well established in previous studies by the authors, and its application to a geostationary satellite instrument provides support for future satellite missions. I recommend publish on ACP after the following comments are well addressed.

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Specific Comments:

ACPD

15, C7162–C7164, 2015

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1) Page 17254, Introduction:

Suggest have one paragraph describing why using the Korean Geostationary Ocean Color Imager (GOCCI) to quantity surface PM2.5 concentrations in the eastern China. As the authors mentioned, this approach has been applied to a number of satellite instruments: MODIS, MISR, and SeaWiFS. What are the advantages to use the GOCCI instrument?

2) Page 17256, Section 2.1:

In the manuscript, the authors emphasized the importance of cloud filters at a number of places. How sensitive are the conclusions to the three cloud filters? For example, the first filter set a minimum number of 15 retrievals per 30km x 30km grid, how would the results change if using the number of 10 retrievals?

4) Page 17258, Line 5:

It appears that Heald et al. (2012) has tested a few ways to correct the HNO₃ overestimates over the United States. Can you describe which ones you have implemented in your study? And does the HNO₃ overestimation also apply over the eastern China?

5) Page 17262, Line 1-4:

It would be helpful to explain the comparisons with GEOS-Chem and MODIS-derived PM2.5 concentrations. Are these your results or from previous studies?

6) Page 17262, Section 3.3:

This section discussed the chemical speciation of satellite-derived PM2.5. I suggest add a few more sentences describing how you derived the chemical composition of satellite-derived PM2.5 and a new figure showing their spatial distribution (like the panel of Figure 3). These would help to support the discussion here.

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7) Page 17263, Section 3.3:

Is there any difference between Organic Matter (OC) and Organic Carbon (OC)?
Please clarify.

8) Page 17265, Line 9-14:

Please tell us how you estimated the health impact. By summing up the population over areas with PM_{2.5} concentration above 35 ug m⁻³? From Figure 3, it did not seem to me that all regions of eastern China exceed 35 ug m⁻³ (with the color scale goes to zero).

9) Page 17275, Table 1:

Please clarify whether the concentrations of different chemical speciation are population-weighted or area-weighted.

Technical Comments:

1) Page 17253, Line 2:

East China or the eastern China? Please be consistent. The term East China represents a specific geographic domain.

2) Page 17254, Line 27:

Please define the domain of the eastern China in the study, the domain of Figure 3 or by longitude and latitude?

3) Page 17256, Line 7:

Please define mathematically the coefficient of variation, probably in Section 2.5.

4) Page 17260, Line 19:

Suggest change the forecast value to the model simulated value:

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