General comments

In this study satellite derived fields of PM2.5 are presented. These fields have been obtained based on GOCI observations of AOD and in-situ ground-based PM2.5 measurements. In addition, these two parameters have been linked to each other according to relationships obtained based on model simulations, where emissions inventory for China and surrounding East Asia regions have been used. I think this is a very good approach in an attempt to monitor PM2.5 from space over the present very relevant and interesting regions. However, there are two important questions or major comments that are in dispute and must be settled before this study can be accepted for publication in ACP.

Major comments

1. Second paragraph of Section 3.2 and corresponding Figure 4. It is clear that a seasonal variation in ground level PM2.5 appears for the eastern China region, and then I do not understand why annual averages of PM2.5 are presented in Figure 4. I suggest to subdivide the comparison between GOCI-derived and ground measured PM2.5 with respect to season. I suggest also to present statistic of relative RMSE when comparing satellite and ground-based PM2.5.

2. The language is on the whole confusing and need to be improved. The language is clearer in some few chapters and less clear in the remaining ones. Some suggestions are presented in "Specific comments" below. However, the full text needs an English proof-check.

Minor comments

1. Page 5, Lines 10-13. Clarify if you mean comparison to polar satellites and with the respect to the current investigation area (GOCI). Note that polar satellites have several and many overpasses each day over a particularly area at high and very high latitudes, respectively. The temporal resolution is indeed higher for the present platform, but then with respect to the time period $9:00 - 16:00$ and depended on what it is compared to. How is the factor 8 estimated?

2. Section 2.2. AERONET level 2 is to prefer, are these data not available for 2013?

3. Considering the statistical equations $(1-3)$ on page 10. If not presenting results of relative RMSE it is no reason to present results based on eq. 1. The same for eq. 2 if the skewness of the deviation is not discussed in the manuscript. For example, instead of presenting RMSE of 0.079 (however, keep this value in the figure) at line 7 on page 11 I suggest to present the relative RMSE when you discuss the results. What is meant by a "forecast value" at line 9 on page 10? I suppose you do not deal with predictions in this work.

4. Page 11, Lines 2 -3: Clarify if the 10.3% is obtained for this special case or for all data of 2013 investigated in the study?

5. Page 11, Lines 14-16: Then it seems that there is not so important with the higher temporal resolution (minor comment 1 above) associated with the GOCI retrievals for the present investigation area and period, or thus the results have some other implications?

6. Pages 12-13 and paragraph beginning with "Figure 4 compares…" Based on the results in Figure 2, left bottom, I suppose several relationships between AOT and PM2.5 have been obtained with respect to season with the GEOS-chem model? If this is not mentioned clearly in the manuscript you have to do that. As it is written here and presented in the figure, I suppose the correlation coefficient of 0.81 is obtained based on the fitted linear curve with slope 1.01. You should then instead present the squared correlation coefficient (coefficient of determination), since R^2 is the ratio of the explained variation to the total variation with respect to the fitted curve and this is more relevant to present. Similar for MODIS derived $PM_{2.5}$.

7. Page 14, sentence beginning on line 16: I guess, based on the results in Figure 2 (left top and left bottom figures), that the seasonal variation in mixing height is the main factor explaining the variations in PM2.5 shown in Figure 6?

Specific comments

Page 2, line 6: You have to write out AERONET here, since the abstract is separated from the main text in the manuscript. In the same way you do not need to define PM2.5 and AOD once again in Section 4, since this section is not separated from the previous sections where you already have written out the names of these two parameters.
Page 3, line 7: Write out units after 500.
Line 8: "Thus, it is….."
Line 9: Suggestion "remote sensing has a high potential to monitor $PM_{2.5}$."
Line 12: Suggestion "have long been recognized to relate to ground level $PM_{2.5}$…."
Lines 14-15: Suggestion "….surface $PM_{2.5}$ to estimate surface………"
Lines 17-18: I think "significant" does not suit here. Suggestion "…and found relatively good correlation (R^2=0.64) ……….."
Line 22: "…..demonstrated using data from the Multiangle………."
Page 4, lines 6-7: "…to produce a 15-year (1998-2012) global trend in ground-level $PM_{2.5}$."
Line 18: "speciation" ?
Line 19: "of the current"
Page 5, line 8: Change to "6 km^2"
Lines 14-18: Suggestion "A challenge using GOCI to detect aerosols in the atmosphere is the absence of mid-infrared…..to detect clouds, which means that significant errors are probably induced here in the estimates of AOD. The operational product screen clouds based on spatial……at each pixel (6 km^2) in combination with a meteorological………at a resolution of 4 km^2 aboard…….. "
Line 19: "However, as will be shown here cloud………."

Lines 21-22: The filter methods include 1) setting a minimum number of 15 valid AOT values per grid cell of 30 km^2, 2) using a local variance check to eliminate grid cells where the coefficient....... of AOD is larger than 0.5 within a grid cell, and 3)……"

Page 6, Line 5: "ground-based"

Lines 8-9, "Here we use AERONET level 1.5 cloud screened data (Smirnov et al., 2000) from 4 stations within the GOCI domain: Beijing………..and EPA-NCU."

Lines 11-12: "Criteria for selecting the AERONET station is 1) a PM$_{2.5}$ ground-based station has to be located within 10 km and 2) a complete time series of PM$_{2.5}$ for the period of study has to be available.

Lines 14-19: "However, due to interrupted time series of PM$_{2.5}$ at both these stations we combine the AERONET AOD from the Beijing and Beijing-CAMS stations and PM$_{2.5}$ from the corresponding two *in-situ* ground-based sites. We similarly combine the Taipei_CWB and EPANCU ground-based stations and name it with "northern Taiwan" site. "