"Improvements in AOD retrieval from geostationary measurements over Asia with aerosol optical properties derived from the DRAGON-Asia campaign" by M. Kim et al.

The manuscript presents significant improvements in AOD retrieval from geostationary measurements over East Asia by applying updated aerosol optical properties from the Distributed Regional Aerosol Gridded Observation Networks (DRAGON)-Asia campaign. This study is of interest to the reader community of Atmospheric Chemistry and Physics (ACP), but only accepted after considering the following comments.

General comments

1. Some sections in the manuscript just report the results found, but not explain what causes them. Therefore, the authors need to analyze more in detail the results with relevant references.
2. The most important scientific issue in this study is the updated aerosol optical properties form the DRAGON-Asia campaign that can improve the AOD retrieval in single visible channel algorithm. However, since in the case of SSA, it is only available under the specific condition (i.e. AOD at 440 nm is larger than 0.4), the LUT based on AERONET INV data could not work well in the single visible channel algorithm when the AOD is small. Therefore, further evaluations with AERONET sun-photometer observations are needed for the cases divided into small and large AOD (i.e. $AOD_{440nm} < 0.4$ and $AOD_{440nm} \geq 0.4$).
3. Occasionally, it is difficult to follow the logical flow of the text because of weak connection between sentence and sentence or between paragraph and paragraph. The authors need to clarify and rephrase difficult sentences for delivering more clearly what they want to show in this paper.

Specific comments

Pages 10774, lines 5 in Abstract: Please provide the exact period of DRAGON campaign.

Pages 10774, lines 9-11 in Abstract: Please clarify the sentence, i.e. explain clearly how much "4% difference in SSA" is and why the overestimation of SSA leads to an underestimation of AOD.

Pages 10774, lines 13-14 in Abstract: Since the authors mentioned that even a small difference in SSA can lead to a large difference in AOD, they need to provide the seasonal standard deviation for each seasonal SSA mean so that the readers can estimate how much the SSA varies at each season.

Pages 10774, lines 23 in Abstract: Please clarify what "original aerosol model" is.

Pages 10774, lines 24-25 in Abstract: I don't understand "while the change of the y-offset of -0.08 is significant." What does "significant" mean?

Pages 10774, lines 22-27 in Abstract: The last concluding sentence is derived from the previous sentences related with the regression slope, y-offset, and correlation coefficient. However, it is difficult to distinguish which values are representative for the "original" or the "new", and therefore hard to understand how the authors conclude "significant improved". Please rephrase the sentences.

Pages 10775, lines 7-8 in Introduction: The authors might want to change "The global aerosol distribution shows high spatial and temporal variability, and many studies ..." into "Since the global aerosol distribution shows high spatial and temporal variability, many studies ...".

Pages 10775, lines 9-15 in Introduction: Please select some of the most important or representative papers as reference and replace von Hoyningen-Huene et al. (2003) with von Hoyningen-Huene et al. (2011).

Pages 10775-10776, lines 26-2 in Introduction: Please provide the exact values (i.e. Pearson coefficient, regression slope, and the percentage of data within an expected error bound.) for supporting the sentence.

Pages 10777, lines 14 in Introduction: Please explain briefly "critical reflectance method".

Pages 10777, lines 20-22 in Introduction: Please clarify the difficult sentence.

Pages 10777, lines 22-23 in Introduction: Please explain why the BAOD correction is used in this study, but the critical reflectance method is not.

Pages 10778, lines 2 in 2.1 AERONET: Please present the kind, version, and level of AERONET data used in this study at the subsection title.

Pages 10778, lines 15 in 2.1 AERONET: Generally, the "trend" has the meaning of "temporal change or variation towards something new or different". It might be good to be changed into "behavior".

Pages 10778, lines 26-27 in 2.1 AERONET: Please enhance the sentence with relevant references and further discussions about the spatial AOD and ÅE over East Asia.

Pages 10779, lines 1 in 2.1 AERONET: Is there any special reason why the "daily" data are used. If yes, please mention it.

Pages 10779, lines 3 in 2.2 Meteorological imager: The authors might want to change the subsection title into "2.2 COMS meteorological imager".

Pages 10779 in 2.2 Meteorological imager: Since many readers might not know well about COMS, please provide more information about COMS calibration status, available products, and web address with relevant references.

Pages 10780 in 2.3 MODIS AOD: Please explain why the authors choose MODIS-AQUA AOD products to estimate BAOD over East Asia. Furthermore, the expected error of BAOD can be over ±100% when BAOD is smaller than 0.05. Since generally BAOD is very small value, the authors need to mention or discuss the possible error range in the BAOD correction.

Pages 10781, lines 5 in 3 Single channel algorithm: The authors might want to put a new subsection title, "3.1 Cloud masking", before the opening paragraph of threshold method for distinguishing cloud and aerosol pixel.

Pages 10781, lines 13-19 in 3 Single channel algorithm: Please briefly explain what each threshold value is targeting at.

Pages 10781, lines 20 in 3.1 Surface reflectance and BAOD: The authors might want to change the subsection number, "3.1" into "3.2".

Pages 10781, lines 24 in 3.1 Surface reflectance and BAOD: I cannot find Kim et al. (2015) in the reference list of the manuscript.

Pages 10781, lines 24-25 in 3.1 Surface reflectance and BAOD: "An underestimation of BAOD results in an overestimation of retrieved AOD" is wrong and contradictory to the explanation at Pages 10777, lines 17-20. Please correct it.

Pages 10782, lines 6-8 in 3.1 Surface reflectance and BAOD: I don't understand why authors mention the BAOD median values over land and ocean. Please explain what you want to show with the median values.

Pages 10782, lines 17 in 3.2 Aerosol model: The authors might want to change the subsection number, "3.2" into "3.3".

Pages 10783, lines 11-12 in 3.2 Aerosol model: AERONET INV data provide four spectral SSAs at 440, 675, 870, and 1020 nm. I guess that authors choose the SSA at "675 nm" because it is the closest wavelength to the COMS MI central wavelength. Please explain why.

Pages 10783, lines 12-15 in 3.2 Aerosol model: Please provide the seasonal standard deviation (±1σ) with each seasonal SSA mean.

Pages 10783, lines 20-21 in 3.2 Aerosol model: Since SSA is only available under the specific condition (i.e. AOD at 440 nm is larger than 0.4), it is difficult to understand how to calculate the SSA mean for an AOD bin of 0.15. The authors need to explain more about how to derive the mean value for each bin, and also to add the bin size, range, and number of data fall into each bin.

Pages 10784, lines 13-22 in 3.2 Aerosol model: Please enhance the sentences by citing relevant references.

Pages 10785, lines 7 in 3.3 Sensitivity to assumed aerosol optical properties: The authors might want to change the subsection number, "3.3" into "3.4".

Pages 10785, lines 10-15 in 3.3 Sensitivity to assumed aerosol optical properties: Please explain why the authors perform the sensitivity test with "assumed conditions", i.e. a ±4% variation in SSA relative to the reference condition, the surface reflectance of 0.05 and 0.10, and the scattering angle from135.7° to 173.2°.

Pages 10786, lines 6-9 in 3.3 Sensitivity to assumed aerosol optical properties: Please put "+" in front of a positive error in the manuscript.

Pages 10787, lines 5-7 in 4.1 Comparison with MODIS AOD: The authors might want to cite Yoon et al. (2014) with mentioning another advantage that the AOD derived from geostationary satellites can minimize the uncertainty caused by the different/limited sampling of polar-orbiting-satellite in the trend estimate.

Pages 10787, lines 17-19 in 4.1 Comparison with MODIS AOD: I don't understand the meaning of "… 03:00 UTC 55" and "… 05:00 UTC 15".

Pages 10789, lines 1-4 in 4.2 Comparison with AERONET: DRAGON-Asia: Please clarify and rephrase difficult sentences, and explain more in detail why the comparison results (i.e. slope, correlation coefficient, and percentage of the comparison dataset distributed within ±30% on the basis of the one-to-one correspondence) in Fig.8 (d) are worse than the results in Fig.8 (c).

Pages 10790, lines 7-14 in 4.2 Comparison with AERONET: This part just reports the results found in the manuscript, but not explain what causes them. Please analyze more in detail the results with relevant references.

Pages 10790, lines 15-27 in 4.2 Comparison with AERONET: The authors need to categorize the AERONET sites as e.g. improved and worsened results compared to the original, and explain more in detail the leading causes of the results with relevant references.

Pages 10792, lines 29 in 5 Summary: I cannot find Choi et al. (2015) in the reference list of the manuscript.

Pages 10793, lines 1-2 in 5 Summary: The authors need to explain briefly why.

Pages 10799 in Table 1: It is difficult to distinguish the italic font. Please mention again the period for DRAGON2012.

Pages 10800 in Table 2: It is difficult to distinguish the italic font. Please add the bin size, range, and number of data fall into each bin, and provide the seasonal mean with 1 standard deviation.

Pages 10801 in Table 3: Please add the bin size, range, and number of data fall into each bin, and provide the seasonal mean with 1 standard deviation.

Pages 10802 in Table 4: Please add a new column of "relative difference between DRAGON AOD and MI AOD".

Pages 10803 in Table 5: Please add a new column of "relative difference between DRAGON AOD and MI AOD".

Pages 10808 in Figure 5: It is difficult to distinguish the colors for different AODs. Please change it.

Pages 10812 in Figure 9: Please put the labels, (a) and (b) on the figures.

Additional references used in this review

von Hoyningen-Huene, W., Yoon, J., Vountas, M., Istomina, L. G., Rohen, G., Dinter, T., Kokhanovsky, A. A., and Burrows, J. P.: Retrieval of spectral aerosol optical thickness over land using ocean color sensors MERIS and SeaWiFS, Atmos. Meas. Tech., 4, 151-171, doi:10.5194/amt-4-151-2011, 2011.

Yoon, J., Burrows, J. P., Vountas, M., von Hoyningen-Huene, W., Chang, D. Y., Richter, A., and Hilboll, A.: Changes in atmospheric aerosol loading retrieved from space-based measurements during the past decade, Atmos. Chem. Phys., 14, 6881-6902, doi:10.5194/acp-14-6881-2014, 2014.