"GOCI Yonsei Aerosol Retrieval (YAER) algorithm and validation during DRAGON-NE Asia 2012 campaign" by M. Choi et al.

The manuscript presents significant improvements in GOCI Yonsei Aerosol Retrieval (YAER) over ocean and land and validation results with AERONET inversion data during the DRAGON-NE Asia 2012 campaign. The methods appear appropriate and the paper is well written. Therefore, this study is of interest to the reader community of Atmospheric Measurement Techniques (AMT), but only accepted after considering the following comments.

General comments

Some sections in the manuscript just show the threshold and retrieval methods, but not explain why and how they are designed. Therefore, the authors need to explain more details with relevant references for who want to apply these methods to the aerosol retrieval.

Specific comments

Pages 9565 in Affiliations: Please check the Affiliation 6, "… (NIER), Inchon, …". It might be changed into "Incheon".

Pages 9566 in Abstract: The authors might want to highlight with few sentences why it is important to study about aerosol optical properties over East Asia, especially in spring time.

Pages 9566, lines 7-8 in Abstract: Please provide the exact period of DRAGON-NE Asia 2012 campaign at the beginning part, instead of the mention, "… from March to May 2012." at lines 23 in Abstract. What does "DRAGON-NE" stand for?

Pages 9567, lines 16 in 1 Introduction: Please check the uncertainty of AERONET AOD observation, "… 0.01 …". It is known as "±0.01".

Pages 9568, line 1 in 1 Introduction: Please check the uncertainties of MODIS AOD retrievals, "… as 0.03+5% over ocean and 0.05+15% over land …". Are they ±0.03±5% over ocean and ±0.05±15% over land?

Pages 9568, lines 11 in 1 Introduction: Please also check the uncertainty of GOES retrieval, "… as 0.13 …".

Pages 9568, lines 16-20 in 1 Introduction: Please discuss more in detail about other sensors' and GOCI calibration method/accuracy, spatial/temporal/spectral resolutions, platform orbit, swath, number of bands, local equatorial crossing time, launch date, AOD retrieval accuracy, and so on. It would be great to list them in an additional table.

Pages 9570, lines 7-10 in 2.1 Cloud masking and quality assurance: Please explain how to determine the threshold values for the cloud masking tests. Are they based on frequency test or from some relevant publications?

Pages 9570, lines 20-21 in 2.1 Cloud masking and quality assurance: Please explain the physical meaning of negative AOD value.

Pages 9571, lines 16-18 in 2.2 Surface reflectance over land and ocean: Please explain how to determine the threshold values, the darkest 1% for cloud shadow and 3% for surface reflectance. Are they derived empirically from the frequency test of RCR at 412 nm, or cited from other publication?

Pages 9571, lines 26-27 in 2.2 Surface reflectance over land and ocean: Please explain how to set the threshold value, 0.3 for applying land algorithm, and provide some relevant publications.

Pages 9571, lines 29 in 2.2 Surface reflectance over land and ocean: The authors might want to show the full name with the shortened form, i.e. "… metres above sea level (m.a.s.l.) …".

Pages 9572, lines 1-2 in 2.2 Surface reflectance over land and ocean: Please explain why the nodal points are irregularly divided like "1, 3, 5, 7, 9, and 20 m s^{-1}". Does the ocean surface reflectance vary drastically in low wind speed range and slightly with high wind speed range? This could be clear with a simple figure or a publication showing the relationship between surface reflectance and wind speed.

Pages 9573, lines 20-21 in 2.3 Turbid water detection: Could you explain why the cloud-covered pixels are different between Fig. 4 (a) and (b), and between Fig. 4 (c) and (d)?

Pages 9573, lines 22 in 2.3 Turbid water detection: I cannot find "true color image" in Fig. 4.

Pages 9574, lines 17-19 in 2.4 Aerosol models: Please explain why the authors used all available AERONET data to build up the LUTs of the aerosol models during the period up to February 2011 in all seasons even though the GOCI YAER algorithm was applied to retrieve the aerosol optical properties only for springtime. If the LUTs are based on the AERONET data in the spring, the retrieval accuracy can be improved?

Pages 9574, lines 19-20 in 2.4 Aerosol models: Please briefly explain why the AERONET sites having individual data more than "10 times" were selected.

Pages 9574, lines 22-24 in 2.4 Aerosol models: It should be mentioned that the temporal and spatial variations of the direct emissions, secondary production, and meteorological transport could also influence the AOPs' change [Yoon et al. (2011, 2012, 2014) and references therein]. Additionally, the authors might want to change "… as AOD increases …" into "… as AOD varies …".

Pages 9575, lines 12-25 in 2.5 LUT calculation and inversion procedure:

a. Please explain more in detail about "libRadtran" with few more sentences, e.g. how to get the model, what are the characteristics, and so on.

b. Since the surface reflectance is lower and aerosol reflectance is higher at shorter wavelength in visible spectrum than at longer, generally the AOD retrieval accuracy is higher at the shorter wavelengths (e.g. 412, 443, 490, and 555 nm) than the longer wavelengths (660, 680, 745, and 865 nm for GOCI channel). The authors also mentioned this point at lines 13-15 on 9571 pages. Therefore, it is difficult to understand why the authors chose only four channels (443, 555, 660, and 680 nm) used to retrieve AOD over land except the GOCI shorter wavelengths (i.e. 412 and 490 nm).

c. As the authors mentioned before in the manuscript, I agree that "at 412 nm, the variability of surface reflectance is lower and atmospheric signals such as Rayleigh scattering or aerosol reflectance are higher than at longer wavelengths". Then the retrieval accuracy of AOD at 412 nm should be the best among the other spectral GOCI AODs. However, the authors use the retrieved AOD at 550 nm as the reference value for the comparison between observed and calculated AODs, instead of the AOD at 412 nm. Please explain why.

d. The best 3 aerosol types for the final products seems to be determined using the AEs of aerosol models. Please provide the exact AE values of each aerosol model on Table 2 for the readers, or add an additional table if AE varies with AOD change for each aerosol model.

e. It is somehow difficult to understand the inversion procedure. Please improve the inversion part of the flowchart in Figure 1 or add a new figure showing more details.

f. Please explain how to get the "stddev weighted average" with an equation.

Pages 9577, lines 2 in 3 Case studies of GOCI YAER products during the DRAGON-NE Asia 2012 campaign: The authors need to discuss briefly about dominant aerosol types around East China Sea in Figures 6 and 7.

Pages 9578, lines 25 in 4.2 Inter-comparison condition between MODIS and GOCI: What does "GOCI FOR" stand for?

Pages 9579, lines 25-27 in 4.3 Validation of AOD: Please explain why the AOD points lower than 0.4 are immediately below EE. Is it attributed to the LUT built up with AERONET SSA data only available when AOD is larger than 0.4?

Pages 9581-9583 in 4.4 Validation of Angstrom exponent, fine-mode fraction, and single scattering albedo: If possible, please add some validation results from other publications, and compare them with your results.

Pages 9584, lines 13-14 in 5 Error analysis of GOCI YAER AOD: Please explain why "GOCI AOD is underestimated at scattering angles near 115° and 140° and overestimated at 145° and above 160°".

Additional references used in this review

Yoon, J., von Hoyningen-Huene, W., Vountas, M., and Burrows, J. P.: Analysis of linear long-term trend of aerosol optical thickness derived from SeaWiFS using BAER over Europe and South China, Atmos. Chem. Phys., 11, 12149-12167, doi:10.5194/acp- 11-12149-2011, 2011.

Yoon, J., von Hoyningen-Huene, W., Kokhanovsky, A. A., Vountas, M., and Burrows, J. P.: Trend analysis of aerosol optical thickness and Ångström exponent derived from the global AERONET spectral observations, Atmos. Meas. Tech., 5, 1271-1299, doi:10.5194/amt-5-1271-2012, 2012.

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.