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Atmospheric Chemistry and Physics Discussions

Interactive comment on "XBAER derived aerosol optical thickness from OLCI/Sentinel-3 observation" *by* Linlu Mei et al.

Anonymous Referee #3

Received and published: 11 September 2017

General comments:

This paper presents an expansion of XBAER (eXtensible Bremen Aerosol Retrieval) algorithm, which was developed based on previous MERIS (Medium Resolution Imaging Spectrometer), to a new OLCI (Ocean Land Color Instrument) sensor onboard sentinel-3. This contains the details of algorithm and results during December 2016 with specific heavy haze case analysis in Beijing and North China plain region. The scope is well-addressed and the contents are well-organized, thus I recommend it for publication after the responses for some points listed hereafter.

Specific comments:

1) The XBAER algorithm is based on previous works in Mei et al. (2016a; 2016b),

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which were applied to MERIS measurement. The authors described the brief explanation of XBAER algorithm in section 3, but some information should be clarified. As the reviewer's understanding, the TOA reflectance, not radiance, is used for the variability test of cloud masking algorithm (line 214) according to the Mei et al. (2016a). And please clarify what is different between cloud height and cloud altitude in line 214. In line 220, please clarify the scale of "space-time" dependent: is the seasonal time scale or day-to-day time scale?

2) Please clarify which channels are used for cloud masking, surface determination, and aerosol inversions as in Mei et al. (2016a). Are the selected channels of OLCI identical with that of MERIS for aerosol retrieval using XBAER although there are additional channels in OLCI?

3) In section 4.1 description of aerosol scenarios, the radius and variance of fine and coarse mode are presented but the fine-mode fraction and refractive indices (or SSA) are not presented. Please clarify whole aerosol microphysical properties for better understanding. Also, which aerosol model is assumed in retrieved OLCI AOT in December over Beijing and NCP region?

4) In line 319-320, the OLCI AOT shows higher R (0.82) compared to the MERIS (0.78), but the MERIS results are in 2009 July according to Mei et al. (2016a). The validation period is different. The period of MERIS and OLCI are not overlapped unfortunately as the authors mentioned in introduction. Then, please compare the accuracy of AOT from OLCI and MERIS for December if possible.

5) Please notify the spatial resolution of the figure 4. Also, the fire product is hard to identify thus larger symbol is required. And, the reviewer checked the MODIS AOT data in figure 4, and it seems to the "AOD_550_Dark_Target_Deep_Blue_Combined_Mean_Mean" product, not Dark-Target-only AOT. Then the MODIS product should be referred as like "Dark-Target (DT) and Deep-Blue (DB) combined product".

6) In line 350, please clarify the “first term”. In this paper, a SAVI or NDPI equation is substituted by referred previous studies without detailed explanation. Also, the reason for the DT like over dark surface and DB like over bright surface is insufficient to understand.

7) In section 4.3, please clarify the ground-based measurements: is the one-site data or averaged value of several site within interested domain? Is the UTC or local time in x-axis of figure 5?

Technical correction:

In table 1, please notify the meaning of red colored values in the title of figure.

Line 72: please correct “inlustrate” to “illustrate”

Line 99: please correct “therir” to “their”

Line 121: I think “low wind speeds” is better than just “low winds”

Line 457: please write full name of “SSR”, which is not mentioned before.

Also, please check the no space between words (e.g. (Alpha)(f) in line 421) in whole paper.

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