Dear Editor, dear reviewers,

Thank you for the valuable comments, which have helped us to improve the quality of the paper. The detailed replies to your questions are given below point by point.

Best regards,

Linlu Mei on behalf of all authors

This manuscript introduces the XBAER method and analysis the AOT result for OLCI/Sentinel-3 using this method. Generally speaking, this manuscript will be a good one after some minor revisions.
Response: Thank you for the positive comments.

1. In the introduction part, there is too much description about the haze itself. Haze is not the main topic of this article, so I suggest the authors to reconsider the content for the haze.

Response: The third paragraph in submitted version, describing the important factors which create the severe haze episodes, has been deleted, in response to your criticism.

2. Check if all the abbreviations are descripted at the first time, such as “ENVISAT” in Line 142 and “ESA” in Line 145.

Response: All abbreviations have been thoroughly checked.

3. Only one month for the AOT validation is not enough. Besides, it is lack of large AOT values for validation (only one sample great than 1.2) from the Fig. 3.

Response: This study uses the first month of data released and the results are very promising. The comparison with the AOT data products from AERONET, MODIS and MISR show good agreement (e.g. Pearson correlation coefficient 0.82). The focus of this study is to describe the retrieval algorithm and the results to demonstrate the feasibility of using XBAER on invert the reflectances measured at the top of the atmosphere by the new sensor- OLCI on sentinel 3. As we mentioned in the paper, potential cloud contamination due to both the relatively large calibration uncertainty of OLCI (can reach 6%) compared to MERIS as well as the impact of SRF on O_2A channel need to be investigated with the new version of level 1 TOA reflectance dataset after (not yet) released. An additional validation paper and corresponding applications papers will be prepared after the new run with the new calibrated level 1 TOA dataset. In order to illustrate the monthly variability of XBAER-derived AOT, the following additional two figures which show monthly mean AOT of Jan., Feb. of 2017 are presented. We can see that XBAER-derived AOTs are quite similar to other operational AOT products (MODIS_DarkTarget_DeepBlue_Combined, MISR and MODIS_DeepBlue_Land) for the winter season of 2016 (Dec 2016 – Feb. 2017).

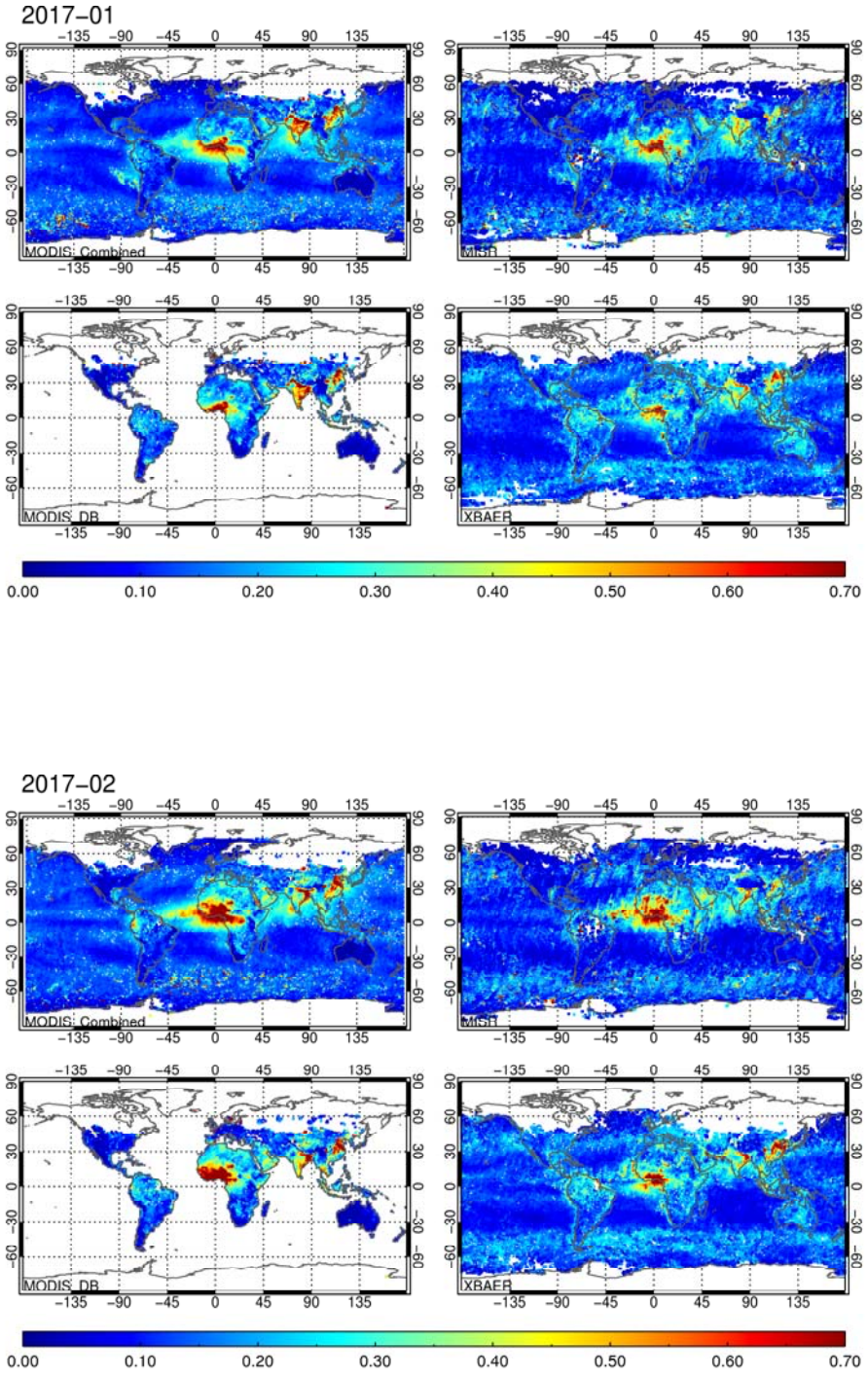

Fig. 1 Monthly mean AOT of (a) MODIS_DarkTarget_DeepBlue_Combined (upper left) (b) MISR (upper right) (c) MODIS_DeepBlue_Land (lower left) (d) XBAER (lower right) for Jan. and Feb. 2017.

4. Line 311: It is better to descript in details which surface and aerosol types is contains in the validation work.

Response: The collocations of Fig.3 (in the paper) contain various surface and aerosol types, which ensure a wide representativeness of the validation. Fig 2 below shows global distribution of collocated AERONET observations with OLCI and corresponding surface types for December 2016. According to Fig.2, the validation of Fig 3 (in the paper) represents all major surface types worldwide. Fig. 3 show the aerosol types used in XBAER retrieval, according to the AERONET sites distributions in Fig.2, we can see that the validation figure also contains all proposed aerosol types, they are weakly absorbing, moderately absorbing, strongly absorbing and dust. Some more details have been included in the revised paper.

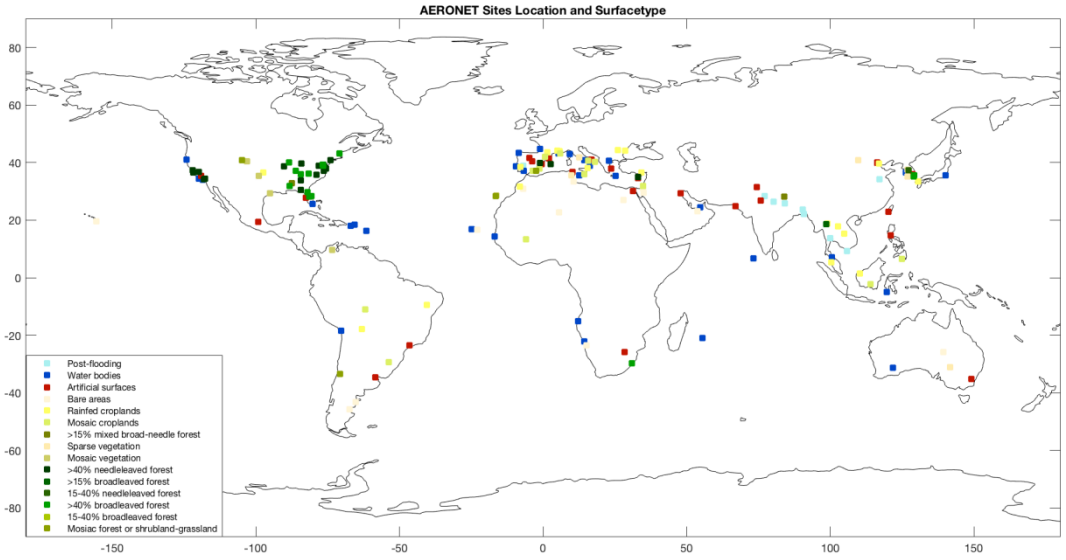

Fig 2. Global distribution of collocated AERONET observations with OLCI and corresponding surface types for December 2016

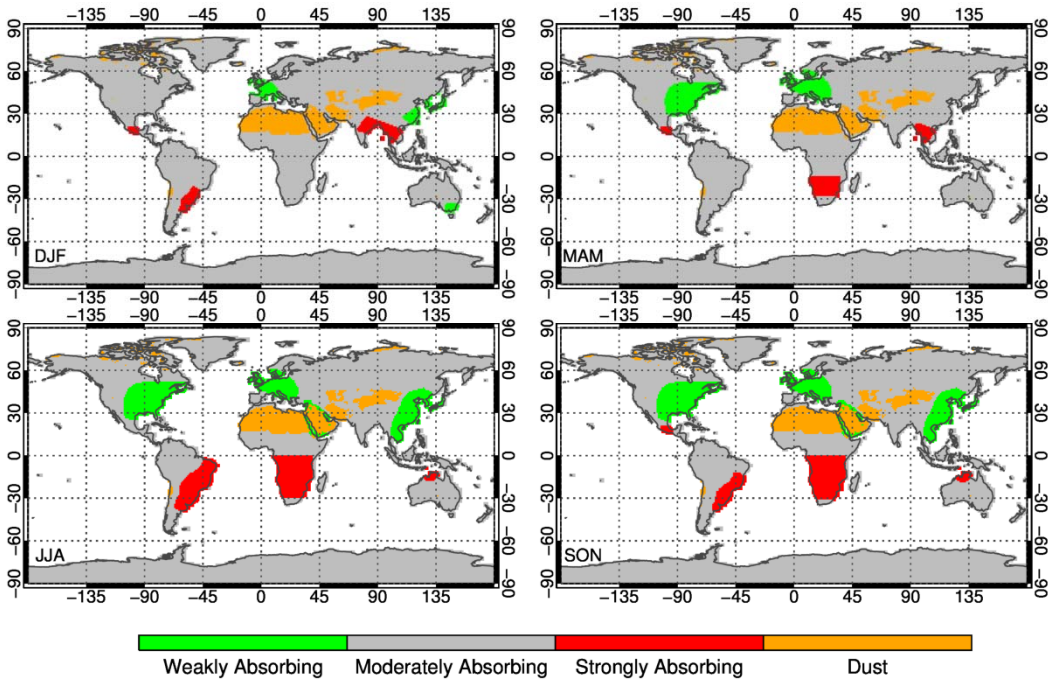

Fig.3 Aerosol types over land used in the XBAER algorithm designated at 1°×1° grid for different seasons.

The four sub-figures represent four seasons. Upper row: left – December, January and February (DJF), right-March, April and May (MAM). Lower row: left-June, July and August (JJA), right- September, October and November (SON).

5. Fig.4: Not quite clear to see the fire points in the MODIS fire product.

Response: Fig. 4 has been updated.