

Dear Editor, dear reviewer,

Many thanks for the valuable comments, which help to improve the quality of this paper. The detailed replies are addressed below point by point.

As below, I would like to clarify some of the points raised by the reviewers. We hope that the reviewers and the editors will be satisfied with our responses to the 'comments' and the revisions for the original manuscript.

Best regards,

Yahui Che on behalf of all authors

2019-5-15

Response to reviewer 2:

Interactive comment on “Investigations into the Development of a Satellite-Based Aerosol Climate Data Record using ATSR-2, AATSR and AVHRR data” by Yahui Che et al.

Anonymous Referee #2

Received and published: 28 February 2019

Review of “Investigations into the Development of a Satellite-Based Aerosol Climate Data Record using ATSR-2, AATSR and AVHRR data” for Atmospheric Measurement Techniques. This paper try to discuss the feasibility of using AVHRR to continue the aerosol optical depth (AOD) record from AATSR ending in 2012 to SLSTR starting at 2016 over Beijing-Tianjing-Hebei region. The study is relevant and the potential product will benefit the aerosol community. However, there are some major issues that need to be addressed before it is suitable for publishing.

Re: Thank you for affirmation and suggestions. We have addressed these points in the revised manuscript.

1. The reason author chooses to use AVHRR is because not only can this data bridge the gap between AATSR and SLSTR but also it can extend the data record to 1983. This idea is presented in introduction, but there is only one plot Figure 8 shows the AVHRR data before 2000. All other analyses are focused 2000 to 2012. I think if we only consider this 2000-2012 period of time, there are a lot more aerosol products that can be used with much lower uncertainties. Thus, more analyses are needed to understand AVHRR through the entire data record or empirically correct AVHRR data to make it more suitable for a long term data record.

Re: As you suggest, AVHRR is not a good choice as there are some aerosol products with lower uncertainties like MODIS or MISR aerosol product. However, AVHRR is almost the only choice to look back to 1980s with expected accuracy. Correspondingly, we change the focus on making an extension (A)ATSR aerosol data record back to 1980s using AVHRR data. We will not talk about bridge of AATSR and SLSTR in this paper. Please refer to the introduction in new version of manuscript.

2. This is a paper about continue data from AATSR to SLSTR. But I didn't see a session in data talking about SLSTR.

Re: We change the primary purpose of this paper to extension (A)ATSR aerosol data record back to 1980s. Hence, we will not talk about SLSTR.

3. The author uses a very large portion of paper introducing aerosols and their facts. It is really not to the point of this article. Please make the introduction more concise.

Re: This is also mentioned by Dr. Andrew Sayer (referee 1). Please refer to the new version of manuscript in which the introduction is re-written.

4. To me it makes more sense to validate the radiance retrieved AOD against AERONET. Or maybe against MODIS to show the sampling bias. Then rely on radiance retrieved AOD to validate everything else consistently from 1983 to current.

Re: The validation of this “BEM (broadband extinction method) AOD” (the radiance retrieved AOD)

has already done by co-author Dr. Ling Sun in her paper of <https://doi.org/10.1016/j.atmosenv.2015.08.042>. The primary purpose of this paper has been switched to make an extension from 1987 to 1997 from ATSR. Hence, we adjust radiance AOD related time series from 1987 to 2012 as whole-time range (please refer to fig.6 and 8 in new version of manuscript). Here, we only validate AVHRR AOD with radiance retrieved AOD as the data volume for monthly ATSR AOD is too small which could lead to severe bias.

5. The title doesn't indicate the study region.

Re: The title has been revised as "Investigations into the Development of a Satellite-Based Aerosol Climate Data Record using ATSR-2, AATSR and AVHRR data over North-Eastern China from 1987 to 2012".

