Atmos. Meas. Tech. Discuss.,
doi:10.5194/amt-2017-429-RC2, 2018

Atmospheric Measurement Techniques Discussions

Interactive comment on "Impact of the Ozone Monitoring Instrument Row Anomaly on the Long-term Record of Aerosol Products" *by* Omar Torres et al.

Anonymous Referee #2

Received and published: 30 January 2018

The manuscript of amt-2017-429 by Torres et al. presents an interesting topic in satellite aerosol retrievals: the representation of the angular distribution of scattered light by aerosols and its consequences for satellite retrieval algorithms. The paper is well structured. The ideas are not new, but they are explored straightforward with appropriate data and theoretical (model) considerations. The results are convincing and relevant. The results are important for the further development of aerosol retrieval algorithms, which are under constant development and have to be adapted to increasingly more sophisticated instrumental capabilities. The aerosol products which are treated in this paper are in dire need of improvement, having been developed for instruments that were designed decades ago. Once state-of-the-art products, delivering daily global

aerosol characteristics, they now suffer from increasingly large inaccuraccies as the instruments' spatial resolution and measurement quality increase considerably. This paper presents an excellent example of the problems that are encountered when unadjusted algorithms are applied to a new, more sophisticated instrument like OMI with much more detail in the across-track direction than previous instruments like TOMS, GOME and SCIAMACHY. The problems addressed here will be even more pronounced in the successors of OMI, and the manuscript presents a clear direction for improvement.

The main problem of the paper is the lack of detail and thoroughness. As said above, the paper is well structured in the sense that the ideas are explored clearly, but the text is sometimes careless to the point of being sloppy, and the analysis lacks the detail that is necessary to check the results should this be desired.

The scientific significance warrants prompt publication of the manuscript, after a careful revision of the text. I will give an overview of the problems I encountered, but this is by no means a comprehensive list, and I encourage the authors to critically revise the manuscript and to provide more details about the analyses.

Specific problems:

The analysis was probably prompted by OMI's reduced viewing capabilities, known as the row anomaly. No unequivocal explanation for this problem is known, and the manuscript's title suggests an analysis of at least its consequences. However, a detailed analysis of the angular distribution of aerosol scattering is presented, but not the consequences of the row anomaly. These topics are clearly connected, but the row anomaly is not treated in the manuscript at all, therefore a more suitable title should be provided. A large part of the introduction is dedicated to the row anomaly, but this is not further treated, except for the statement that only data before 2007 is used because of this. In the conclusion section, at least a general discussion of the row anomaly's consequences in view of the angular distribution of aerosols scattering should be given.

In the introduction, section 3, and a few more times in the main text, the measurements of OMI are referred to as 'scanning'. Although this has no consequences for the results and conclusion of the analysis, I suggest that the authors, who are principle investigators in the OMI project, describe the instrument and its capabilities correctly and accurately.

The introduction lacks details. The reader is expected to know everything about the AOD and SSA retrieval in the OMAERUV algorithm. A reference is given, but I think a brief recap of the angular dependence on aerosol scattering and its consequences for the AOD and SSA is in order here. E.g. in the same way as the treatment of the UVAI product, which is more clear and detailed.

Also the difference between phase functions of spherical particles and spheroids are important to understand, in order to interpret the results.

Abstract:
thru -> through
scattering-angle-dependent -> scattering-angle dependent (multiple times, and inconsistently)

main text:
row-anomaly -> row anomaly (multiple times, and inconsistently)
two-days -> two days
worldwide-coverage -> world wide coverage
etc.

p3 slow -> slowed
p4 representative -> is representative
p4 separately -> separate
p6 Retrieval errors transition from overestimations to underestimations at about 155° scattering angle. -> Rephrase

AOD and AOT are both used, please be consistent.

The level of details of the plot is rather low, leaving questions that seem irrelevant but nag because it hampers a thorough check of the results: the monthly mean pictures seem at close inspection to consist of 4 points per month. Is it a running mean? Or a weekly mean? The analyis in Fig. 4 was done for 'A non-spherical polydispersion'. Which one? What fraction? Was it a specific set that improves the data so well as shown in Fig. 5, or is it robust?

Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2017-429, 2017.