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This manuscript details a new method to retrieve AOD and pixel-level AOD uncertainty from the Multi-angle Imaging SpectroRadiometer. The manuscript is well-written, and it is likely that this new method will serve the MISR aerosol community well in the future. However, I can not support publication of this work without at least a cursory attempt at validation, which this paper is sorely missing.

Major Comment: Although I believe that this new method probably represents a substantial improvement for aerosol remote sensing from MISR, it is incumbent on the authors to prove this. The authors claim that not all sources of error are included, therefore no comparison of the AOD differences and pixel-level uncertainties (against MAN or AERONET, for instance) should be done. If this new method is going to be implemented in the next version of the MISR aerosol retrieval algorithm (and going to be published here), it should be validated first. A comparison of new algorithm results with old algorithm results does not replace real validation.

Re: We carefully considered including some form of external validation of the new approach (AODs and their pixel-level uncertainties) in this manuscript, but eventually decided the topic is challenging enough to deserve a separate study. Here we will try to briefly summarize our reasoning behind this decision. First, at the time of writing, only two months of V23 data were available, which did not provide enough comparison points against surface-based AERONET observations. At present, we have processed two years, 2014 and 2015, and obtained around 1300 collocations with AERONET. Note that we are constrained to Dark Water retrievals only, which limits the number of available AERONET locations. This number could be sufficient for AOD validation, but in our opinion it is still insufficient for a proper assessment of the reported pixel-level uncertainties. There is a range of topics that we would like to explore while assessing the MISR AOD uncertainty predictions:

- How do the spatial and temporal differences between MISR retrieval and AERONET observation influence agreement metrics?
- Is spatial variability in AOD uncertainty consistent with expectations?
- Is the AOD uncertainty dependent on specific retrieval parameters (e.g., viewing geometry, number of cameras used, ARCI parameter)?
- Is the AOD uncertainty affected by the proximity of clouds?
- How can we use information from other instruments (MODIS) to evaluate the AOD uncertainties?

These are just a few questions that we have already started investigating. In our view, a cursory evaluation within the scope of the present manuscript would not have been unsatisfactory.

Minor Comment:

The authors mention (5 times) that several of the thresholds from the current version of the MISR aerosol retrieval algorithm are arbitrary. Please refrain from so much hyperbole in the manuscript, as most empirical thresholds could be considered arbitrary (including your own ARCI threshold).

Re: We eliminated most occurrences of the phrase “arbitrary thresholds” from the manuscript and substituted it with “empirical thresholds”. The one remaining case is on page 12, line 14: “This approach allows for a consistent calculation of AOD and AOD uncertainty without the need for screening acceptable mixture solutions based on a complex interplay of multiple, and somewhat arbitrary, thresholds.”