

## ***Interactive comment on “Introducing the 4.4 km Spatial Resolution MISR Aerosol Product” by Michael J. Garay et al.***

### **Anonymous Referee #2**

Received and published: 28 October 2019

Dear Authors,

Thank you for this exceptionally well-written and well-constructed manuscript documenting your updates to the MISR products. My recommendations for changes are almost entirely minor, but should be considered to improve the clarity and completeness of the final paper.

Good luck with the revisions, and thanks for your hard work on this project!

Page 35 line 9 : “. . . nonspherical fraction artifacts are further enhanced, which could be due to the generally lower AODs than in V22 and thus more frequent misclassification between dust/cirrus particles.” The atmospheric AODs have not become lower: the retrieved AODs are lower in V23 because of improved correction of certain artifacts.

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Why would an erroneously high AOD retrieval lead to a less erroneous retrieval of higher-order properties?

Page 32 line 10: “DW AOD retrievals in V23 are considerably smaller than in V22, thereby negatively impacting MISR’s ability to differentiate between aerosol types and their AEs.” I believe there is an error in this logic. Retrieved AOD over water was higher in V22 due to uncorrected stray light and possibly also underlight; these factors would be expected to manifest in (erroneously) higher retrieved AODs and (erroneously) more variable AEs. I believe this same logical error (lower retrieved AODs => lower S/N for higher-order properties) is repeated elsewhere in the manuscript, on page 33 line 9.

Page 19 Line 26: “. . .only the red and NIR bands are used in the MISR dark water retrievals if the AOD is less than 0.50” This does not seem to be mentioned at all in Section 4.2.1, and seems pretty important! You should modify section 4.2.1 to more completely describe how the data from different bands are used differently.

Page 16 line 24: “The width of the combined distribution is proportional. . .” The term “proportional” implies scaling. What is the actual calculation used?

Figures 13-14 If you use AOD weighting on the size mode fractions, this means that you are presenting an effective bulk modal fraction  $dMODE/dAOD$ , rather than e.g. a daily mean modal fraction such as would be used in a first-order climatology. You might consider adding a sentence describing this consequence of your weighting scheme for interpretation of your figures.

Page 19 line 12: “the minimum reflectance between model and observation constrains the wind speed in nearly all cases.” This was not clear to me: what model? Is this a finding from Fox et al. (2007)?

Page 27 Line 19: “. . .setting the upper limit on the ratio to 16. The same constraint does not apply to retrievals over land.” I think you mean that the success criteria for DW implies that any successful V23 retrieval within a 17.6km footprint implies a suc-

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successful V22 retrieval for that footprint, while V23 land can have one or more successful 4.4km retrievals in a footprint with zero valid V22 retrievals. This could be more clearly explained.

Page 34 line 9: "...it is recommended to use SSA when AOD is above about 0.15. . ." Figures 9-13 are weighted by AOD, do they include retrieved properties for all AOD values or only for retrieved AOD above a threshold?

Page 44 Line 12: "There is, however, a substantial decrease. . ." This can be explained more clearly.

Page 12, line 9 and elsewhere (e.g. page 14, line 29): The NetCDF/HDF terminology for hierarchical levels used to separate different sets of data and metadata is "group." I think it's more appropriate to use this term rather than "subdirectory." <https://support.hdfgroup.org/HDF5/doc/Glossary.html>

Page 24 Line 7: should be "northern hemisphere winter"

Page 24 Line 23: "AOD peaks and valleys" => "AOD gradients" avoid using topography as metaphor

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Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2019-340, 2019.

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