

## ***Interactive comment on “Intercomparison of CALIOP and MODIS aerosol optical depth retrievals” by C. Kittaka et al.***

**C. Kittaka et al.**

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Scientific and Technical Comments:

Title - Changed the title to be more specific. While I don't agree with the reviewer that “MODIS” implies “MODIS-Terra”, a key point of this work is that we are using measurements from MODIS-Aqua because they are time- and space-matched with CALIOP measurements. So the title has been changed to make this clear and to indicate the focus is on intercomparing AOD data rather than the AOD retrieval algorithms.

P 3320 L 21 – I understand that, technically, ‘aerosol’ refers to a two-component system of fine particles and the gas in which they are suspended. Use of the term ‘aerosols’

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to refer just to the aerosol particles is nearly universal in the atmospheric sciences community, however, and I follow the conventional usage here.

P 3320 L 24 – changed ‘hemispheric’ to ‘global’

P 3321 L 3 – agree, spelled out the acronym

P 3221 L 9 – The comment on ‘high vertical resolution’ is only intended to point out that, whatever they are designed to measure, a distinguishing characteristic of lidar instruments is that they can typically provide much higher vertical resolution than non-lidar remote sensing techniques. Also added a mention of retrievals beneath optically thin clouds.

P 3221 L 13 – agree with reviewer comment, revised the statement to be more accurate

P 3221 L 15 – clarified the meaning of the orbit time

P 3221 L 19 – revised the wording to try to be clearer on the difficulties of validating aerosol profiles. While a good attempt has been made to place Aeronet instruments so as to characterize all the important aerosol source and transport regions, coverage from lidar instruments is much poorer. For example, there are currently only 2 lidars operating in South America and none in Africa or Australia.

P 3322 L 1 – Added references on the data product versions..

P 3322 L 16 – The Kaufmann reference on line 14 provides the basis for the statement on line 16

P 3322 L 18 – agree with reviewer comment. MODIS validation is not perfect, but much better than for previous satellite aerosol sensors.

P 3322 L 27 – clarified the statement

P 3323 L 6 – reviewer is correct, IR radiances are emitted, as well as scattered. Corrected text.

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P 3323 L 7 – changed ‘swath’ to ‘viewing swath’

P 3323 L 11 – resolved the discrepancy

P 3324 L 26 – clarified ‘retrievals’

P 3324 L 27 – changed ‘extinction’ to ‘extinction coefficients’

P 3325 L 3 – don’t understand reviewer comment

P 3325 L 8 – revised text to clarify

P 3325 L 12 – text revised to make clear this comment is intended to apply to CALIOP

P 3325 L 16 – the same extinction retrieval algorithm used for aerosol is applied to optically thin clouds. This allows CALIOP to retrieve aerosol extinction below these clouds.

P 3325 L 22 – text revised to clarify

P 3326 L 1 – This paragraph was intended to point out that the spatial coverage where retrievals are performed is very different for the two instruments. ‘Sampling’ was replaced by ‘spatial sampling’.

P 3327 L 4 – The orbit planes of CALIPSO and MODIS are inclined with respect to each other. CALIPSO flies to the east of Aqua to move the CALIOP footprint out of the sunglint region as seen by MODIS. ‘Daytime’ was specified as that is when there is sunglint. The text was modified to try to make this point more clearly.

P 3327 L 13 – revised text to clarify the meaning

P 3327 L 14 – revised text to clarify

P 3328 L 5 – revised text to clarify the meaning

P 3330 L15 –The statement in the text suggests biases may be larger when sample sizes are small. Determination of the effect of sample size on MODIS-CALIOP AOD

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biases would require a more sophisticated understanding of the underlying reasons for AOD differences than we currently have. This is an interesting point for future research.

P 3330 L19 – revised the statement to be more qualified

Conclusions – The last part of the paper has been expanded to draw more detailed conclusions from the comparisons presented.

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Interactive comment on Atmos. Meas. Tech. Discuss., 3, 3319, 2010.

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