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Interactive comment on “CALIOP near-real-time backscatter products compared to EARLINET data” by T. Grigas et al.

J. Tackett

jason.l.tackett@nasa.gov

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Dear Editor and Grigas et al.,

I am submitting the following suggestions to help clarify the descriptions of the CALIOP data products which are used in this manuscript. It is my hope that they will help improve transparency of the methods employed. Please feel free to contact me for any questions about my comments below.

Best Regards,

Jason Tackett, Science Systems and Applications, Inc., CALIPSO Lidar Science Working Group at NASA Langley Research Center, Hampton, VA, USA

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Comments:

1. The CALIOP level 1.5 expedited product is derived from expedited level 1 and level 2 CALIOP data. It would help to emphasize that expedited products (a) use a simplified calibration scheme and (b) that the GMAO molecular model number densities used to derive molecular attenuated backscatter coefficients are slightly out of date (sometimes by as much as two days). These two effects degrade the science quality of the expedited data compared to the standard CALIOP products which have a more robust calibration scheme and use the most current GMAO molecular model. The following paper details these issues and their consequences on expedited level 1 and level 2 CALIOP data products (and ultimately, expedited level 1.5). It would be worth referencing this paper at a minimum since changes in CALIOP calibration could impact comparisons with EARLINET.

Vaughan, M., C. Trepte, D. Winker, M. Avery, J. Campbell, R. Hoff, S. Young, B. Getzewich, J. Tackett, and J. Kar, 2011: "Adapting CALIPSO Climate Measurements for Near Real Time Analyses and Forecasting", Proceedings of the 34th International Symposium on Remote Sensing of Environment, http://www-calipso.larc.nasa.gov/resources/pdfs/VaughanM_211104015final00251.pdf

2. Equation 3 and page 6047, lines 15-16: "...the molecular backscatter coefficient β_{mol} is provided as a Level 1.5 data product."

The level 1.5 product actually provides the molecular attenuated backscatter coefficient; i.e., the molecular backscatter coefficient multiplied by the two-way molecular transmittance (CALIPSO Quality Statements, 2011, pgs. 6-7). If the molecular attenuated backscatter coefficient is used rather than the molecular backscatter coefficient (as equation 3 expects), then the molecular extinction coefficient will be in error (equation 5). It follows then that the EARLINET total attenuated backscatter computations will also be in error. If this has already been taken into account, perhaps text could be added to clarify.

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3. Page 6044, lines 22-24: “This (Level 1.5) product is derived (Powell et al., 2013) by spatially averaging the Level 1 profiles and merging them with the Level 2 vertical feature mask product.”

A clearer way to describe the level 1.5 product would be something like: “Level 1.5 is derived by cloud-clearing level 1 attenuated backscatter profiles using the level 2 vertical feature masks, and then spatially averaging the cloud-cleared profiles.” In fact, the paper does not mention that level 1.5 is a cloud-cleared product. Adding this clarification would make this important point.

4. Page 6045, lines 20-22: “The (aerosol classification) algorithm detects eight main aerosol types: clean air, clean marine, polluted dust, dust, polluted continental, clean continental, smoke/burning biomass and mixed aerosols.”

The paragraph in which this statement appears describes the CALIOP level 2 aerosol subtyping algorithm which only classifies six aerosol types: clean marine, polluted dust, dust, polluted continental, clean continental and smoke. The aerosol subtyping algorithm does not detect clean air or identify mixed aerosol. However, the level 1.5 product does report feature types having the designation clear air and mixed aerosol to describe range bins absent of detected features (“clear air”, not “clean air”) or 20 km horizontal averages containing more than one of the six CALIOP aerosol types (mixed aerosol). I think this paragraph and the following paragraph which describes the level 1.5 product should be revised to make clear that six aerosol types are detected by the level 2 aerosol subtyping algorithm and the categories “clear air” and mixed aerosol are specific to how level 1.5 describes the features (or lack thereof) in each level 20 km x 60 meter (horizontal x vertical) range bin.

5. Page 6045, lines 25-26: “The Level 1.5 product is derived by spatially averaging 60 individual Level 1 lidar profiles and merging them with the Level 2 vertical feature mask product.”

Same as comment #3 above.

6. Figures 12 and 13: Labels are missing for the horizontal and vertical axes from all panels.

7. Figure 12 and 13 captions: Consistent with comment #4 above, “clean air” is not a detected aerosol type. A better description would be, “Eight level 1.5 feature types. . .” rather than “Eight aerosol types. . .”. For that matter, there are only six panels, so why does the caption say eight types?

8. It is important to mention that CALIOP version 3 data products are being used.

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 6041, 2015.

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