

Interactive comment on “CALIOP V4 Cloud Thermodynamic Phase Assignment and the Impact of Near-Nadir Viewing Angles” by Melody A. Avery et al.

Anonymous Referee #2

Received and published: 22 April 2020

General Summary: Depolarization ratio of CALIOP 532 nm signal is an additional variable that helps discriminate cloud thermodynamic phase. Passive radiometers are subject to “ambiguities” that CALIOP can alleviate. There is a $-15\text{ }^{\circ}\text{C}$ peak in HOI occurrence globally, and testing with different view angles results in a decrease in depolarization ratio by a factor of 5, and the mean backscatter decreases by 50% when view angle is changed from 0.3° to 3° . The CALIOP cloud phase algorithm for Version 4 does not “over-identify” HOI at 3° . V4 has increased detection of cloud layers, and total cloud volume increased 6-9% over V3 for “high-confidence” determinations and by 1-2% for all determinations.

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Review:

This paper is high-quality and pushes lidar remote sensing science forward significantly. It is written very well, and this reviewer has no major criticisms that need to be addressed prior to publication. However, there are a few minor corrections that should be addressed to ease in readability and clarity, and those are noted below.

Minor Comments:

Page 3

Line 33-34: It should be stated, at least briefly, how IIR observations complement the cloud phase determinations.

Page 4

Line 19: "HOI" has already been defined on Line 29 on Page 3.

Page 5

Lines 10-15: It would be helpful to the reader to discuss a range of expected differences between the molecular-only layer attenuated backscatter and the total layer attenuated backscatter, so that the assumption that $\delta\beta_{\text{m}} < \delta\beta_{\text{t}}$ is clear.

Page 6

Line 37: remove closing parenthesis after Mioche et al., 2010.

Page 12

Line 22: Replace ", however this has been corrected in V4.5 and" with ". However, this has been corrected in V4.5, and"

Line 23-24: Rewrite to "If the centroid temperature is > 0 °C the layer will be assigned as low-confidence water, and occurs only rarely in $< 0.1\%$ of layers detected at 5-80 km."

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Page 14 Line 15 (and throughout): Use consistent terminology. Either “viewing angle” or “view”. Some readers may confuse “view” for “field of view” taken out of context.

Page 20

Is the color scale for the CALIOP 532 nm backscatter curtain the standard one used in quicklooks (as in Figure 12a)? It appears that either the color scale is shifted or small values are being masked out, so please include a color bar or note about the values presented. There is no appearance of “total attenuation” underneath the clouds in Figure 11 as there is in Figure 12.

Page 25

Line 20: Fix the notation of “67deg N – 67deg S” to a symbolic representation of degrees (As in the caption for Figure 16).

Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2019-388, 2020.

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