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## ***Interactive comment on* “Evaluation of CALIOP 532 nm AOD over opaque water clouds” by Z. Liu et al.**

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Received and published: 16 September 2014

Dear authors, I read your paper with great interest. This work is of excellent quality, well written and worthy of publication.

I'd like to bring our recent publication to your attention:

Kacenelenbogen, M., J. Redemann, M. A. Vaughan, A. H. Omar, P. B. Russell, S. Burton, R. R. Rogers, R. A. Ferrare, and C. A. Hostetler (2014), An evaluation of CALIOP/CALIPSO's aerosol-above-cloud detection and retrieval capability over North America, *J. Geophys. Res. Atmos.*, 119, 230–244, doi:10.1002/2013JD020178.

Page 23586, Line 10, it reads “validation of aerosol above clouds is particularly difficult

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because independent, accurate measurements are almost non-existent”. Although I agree that there is a shortage of accurate global validation measurements of aerosol-above-cloud (AAC), we have assessed the CALIOP detection and retrieval capability over Northern America using co-located HSRL measurements and we think this is suitable for reference, at least in the introduction of your study. It could also be referred to when analyzing the different error sources in the CALIOP detection and retrieval of AAC as we have studied failure to detect the full extent of aerosol layers versus misclassification and/ or inaccurate lidar ratio.

Page 23589, Line 1 reads “. . . MODIS are limited to column AOD in clear skies, and the amount of the column aerosol present above the clouds in uncertain”. The authors could refer to the method of AAC AOD retrieval by [Jethvra et al., 2013] and mention the limitations of such AAC retrieval methods from passive remote sensing (compared to active remote sensing)

Jethva, H., O. Torres, L. A. Remer, and P. K. Bhartia (2013), A color ratio method for simultaneous retrieval of aerosol and cloud optical thickness of above-cloud absorbing aerosols from passive sensors: Application to MODIS measurements, IEEE Trans. Geosci. Remote Sens., 99, 1–9

Page 23595, Line 5, instead of Eq(4), it looks like it should be Eq(5)

Page 23595, Line 15, it would be beneficial to know the region over which the insitu measurements of water cloud size distributions were taken.

Page 23596, Line 16, is CALIOP used to determine the water cloud top temperatures or MODIS?

Page 23597, Line 10, Chand et al. [2008] selects OWC top heights below 3km instead of 2km. Any reason why the authors chose 2km?

Page 23597, line 18, delete “s” after s-1.

Finally, Dark and light green on Figure 5 are barely distinguishable on my screen. I

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would advise different colors.

Kind Regards, Meloë Kacenenbogen.

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Interactive comment on Atmos. Chem. Phys. Discuss., 14, 23583, 2014.

**ACPD**

14, C7102–C7104, 2014

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