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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Validation of aerosol and cloud layer structures from the space-borne lidar CALIOP using Seoul National University ground-based lidar" *by* S.-W. Kim et al.

S.-W. Kim et al.

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Dear Dr. Hoff,

We greatly appreciate for your helpful comments. We are fully aware that taking time to provide in-depth reviews is a sacrifice. Below we have reply to your comments and revised text and figures have been provided. We have made additional significant changes by including corrections for air molecular attenuation as well as calculations of aerosol extinction profiles from CALIOP and ground-based SNU lidar data. We have updated the figures and text to reflect these changes. We apologize to you that such significant changes were made. Again, we really appreciate your valuable comments

and suggestions and your interest in our paper. We hope we provide the appropriate answers, and if there are more questions, please let us know.

Best Regards,
Authors

I think the claim that this is the first "validation" of CALIPSO data is false.

The wording 8216;first8217; may be prolific of misunderstanding and is not important for the purpose of this paper. We have accepted your argument and have eliminated the wording **first** in the revised manuscript. We have just written that we present initial validation results of space-borne lidar CALIOP profiles-. Please see the reply to the anonymous referee 1.

My second concern is that the "validation" of attenuated beta is not the correct way to prove that CALIPSO is working well in the PBL since the dependence on extinction is implicit. Until CALIPSO extinction profile (not out yet) is validated against a ground based system with the ability to determine Sa properly, I can8217;t conclude that CALIPSO is yet validated.

The reviewer comment is right. We have implemented the results of apparent scattering ratio and aerosol extinction profiles in a revised manuscript.

Firstly, we applied an identical method both in CALIOP and ground-based SNU lidars to eliminate the effects of air molecules, because the laser emitted from space-borne CALIOP and ground-based SNU lidars explore different air molecular transmission.

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We have introduced it as new terminology apparent scattering ratio (Rapp). Apparent scattering ratio represent that the lidar return signal is only attenuated by atmospheric aerosol and cloud. And then, aerosol and cloud layer structures between CALIOP and ground-based lidar measurements have compared.

Secondly, we have implemented the results of aerosol extinction profile calculations both under cloud-free conditions and in cases of multiple aerosol layers underlying semi-transparent cirrus clouds, and the results have provided in the revised manuscript. Sunphotometer aerosol optical depth (AOD) data at SNU lidar site was used for lidar inversion in order to retrieve lidar ratio (extinction-to-backscattering ratio). We have added sections 2.4 and 4.4 and discussed the results regarding these changes.

Reviewer 18217;s comments that validating CALIPSO against the SNU system begs the question, "who validated the SNU system?" is a good one.

It8217;s good comment. We have added an entire history of the SNU lidar (e.g., calibration, validation etc.) and have provided several articles. Please see the reply to the reviewer1 comments.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 11207, 2007.