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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Global statistics of liquid water content and effective number density of water clouds over ocean derived from combined CALIPSO and MODIS measurements" *by* Y. Hu et al.

Y. Hu et al.

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We have made as much changes as we can to clarify a few things Dr. Han's spotted for us.

One key question Dr. Han has is about our claim of the uncertainty of remote sensing methods caused by the unknown width of droplet size spectrum. We agree that the width is important for single scattering properties and it explains some biases that is related to the assumed width. To determine droplet number concentration, we would like to know the width. But unfortunately, we will not have enough signal from either MODIS or CALIPSO to know the width accurately. At the end of the paper, we have

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pointed out that the main error source of the number concentration in this study is the lack of knowledge in the width. A 0.1 effective variance uncertainty introduce number concentration uncertainty of 20%. That uncertainty drops to 10% when the effective variance uncertainty is 0.05.

The discussion in this paper intends to point out that multiple scattering in water clouds are relatively insensitive to the width. All the results in this paper are solely based on depolarization measurements, which contain very little single scattering information and thus the width can not be determined. We revised the manuscript to make this point more clear.

We added the sentence that Equation (1) is purely derived from Monte Carlo simulations with CALIPSO footprint size. Dr. Han is correct that it will improve the paper a lot if we can discuss more about the physics behind. The truth is, we are still trying to figure out the exact physics behind it. The first thing we did is to verify whether the modeled values are reasonable. And that is why we have to go through the pain of deconvolution of lidar transient response and derive the extinction coefficient for a sanity check.

The extinction coefficient directly derived from deconvolution and multiple scattering removal, as discussed in this paper, is not part of the official CALIPSO water cloud data product.

We cleared the text about the effective variance as Dr. Han suggested.

Dr. Han's comments helped us improving the paper a lot.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 4065, 2007.