

## ***Interactive comment on “Intercomparison of CALIOP and MODIS aerosol optical depth retrievals” by C. Kittaka et al.***

**C. Kittaka et al.**

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1. The reviewer suggests some of the observed AOD bias could be due to comparison of 532  $\mu\text{m}$  AOD from CALIOP with 550 AOD from MODIS.

The range of aerosol Angstrom exponents retrieved by MODIS is typically between 0.5 and 1. The corresponding ratio of 532 nm AOD to 550 nm AOD is 1.017 to 1.034. Even if the Angstrom exponent were as large as 2, the ratio would still be only 1.069. Although this should be taken into consideration, these differences are small compared to the differences seen in the comparisons and so this correction was not applied to the data. A comment on this has been added to the paper.

2. Consider using AOD and aerosol models from collocated MODIS retrievals as constraints on the CALIOP retrieval.

Either the MODIS AOD or the MODIS aerosol model would serve as a sufficient constraint. Constraining the CALIOP extinction retrieval with the MODIS AOD has been explored (Burton, et al., JGR, 2009) and this provides an interesting diagnostic. The MODIS aerosol models were examined early on for use in CALIOP retrievals. The MODIS models do not seem to represent the ratio of aerosol extinction to 180-degree backscatter (the 'lidar ratio') very realistically. The lidar ratio tends to be very sensitive to particle absorption, particle size, and (for coarse mode aerosol) particle shape and is not necessarily well-correlated with aerosol scattering at the angles sensed by MODIS. Therefore this approach has not been pursued.

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