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Comment

## ***Interactive comment on “CALIPSO observations of transatlantic dust: vertical stratification and effect of clouds” by W. Yang et al.***

### **Anonymous Referee #1**

Received and published: 29 June 2012

This paper using CALIPSO nighttime measurements to study how the dust aerosol properties change across the Atlantic Ocean. This paper provides some insights about how dust below and within the Saharan Aerosol Layer change across the Atlantic Ocean. However the reviewer believe the method used to study the effects of cloud on dust need to be refined. The authors need to elaborate on how they define the distance to clouds. Was it defined separately for dust layer below and above 2 km separately? Aerosols and clouds need to be in the same layer to study the effects of clouds on aerosol (or vice versa). Furthermore, CALIPSO only provide information along its pencil beam, therefore no information about cloud distribution is available on either side of the pencil beam. I recommend combine CALIPSO with imager for a more complete view of cloud field, which will provide a more truthful calculation of the distance from cloud. Given the 3-D nature of clouds, generalize the results derived

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from the CALIPSO beam might be misleading. This could be another reason for the unexpected increase of depolarization ratio near clouds shown in Figure 7.

Specific comments:

Figure 1. Percentage contribution of dust AOD to total AOD in Figure 1b would be more helpful for reader to see the contribution of dust to overall aerosol loading.

Figure 2b. The backscatter was the largest for region W, but why the dust AOD in W region didn't seem to be larger than AOD in M and E regions? As the dust transport across the Atlantic Ocean, the backscatter and color ratio increase. Authors explain this is due to the fading of the SAL during the westward transport. But the reviewer would argue the sedimentation speed of large particles is greater than that of small particle. Therefore the fraction of small particles would increase as the dust plume transports across the Atlantic Ocean, which would result in decreasing of color ratio. Authors need to further examine the causes of the westward increases of backscatter and color ratio.

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Interactive comment on Atmos. Chem. Phys. Discuss., 12, 12051, 2012.

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