

***Interactive comment on* “Detection of dust aerosol by combining CALIPSO active lidar and passive IIR measurements” by B. Chen et al.**

Anonymous Referee #2

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General comments: It is a good idea to combine CALIOP and IIR and the A-train satellites to identify the dense dust aerosol since it has a significant different IR properties comparing with clouds. The detail method and the algorithm with error analysis are presented. This new method can improve the classification made only by the CALIOP CAD method especially over the dust source region. This manuscript is well constructed and the equations are well stated. I recommend the acceptance of this manuscript after the revision is made.

Specific comments:

1. Page 3427 line 16 : “...launched early in 2006 ...” Actually CALIPSO and CloudSat was launched by the same vehicle.

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2. Page 3428 line 12 : "...for one CALIOP pulse are below 0.6 km" I prefer "profile" instead of "pulse".

3. Page 3429 line 2 : "Such wind speeds are sufficient to produce and support dust storms." Could you please give a reference here?

4. Page 3429 line 8 "...feature mask (FMK) derived ..." In the figure 2c, in the plot you use "VMF". The caption you use "VFM". Do these three have the same meaning?

5. Page 3431 line 19 : "... is the layer-integrated 1064 to 532-nm volume color ratio" Is this a "layer mean attenuated color ratio"?

6. Page 3431 line 22 : "...the layer-integrated perpendicular-to-parallel 532-nm attenuated backscatter at depolarization ratio." What does this mean?

7. Page 3432 line 9 : "Figure 5 shows a flowchart of the CLIM method " Is this only for "single-layer"? if so, please make it clear and also in the fig.5.

8. Page 3435 line 11 : "The highest dust aerosol altitude was 6 and 8 km for the V2-CAD and CLIM method, respectively. The CLIM method, however, showed more dust and greater backscatter between altitudes of 1.8 to 6 km. I see the high occurrence in (a) and (b) is from 2km to 4 km. it doesn't show any information about backscatter coefficient of dust aerosol. In this fig, you have selected the profile which elevation is below 3km. will this bias your statistics? Same criteria also used in fig 10 and fig 11.

9. In fig 9 (b), what happened that there are very high occurrence from 3 to 6 km (the values are almost 1, red color) ?

10. Page 3436 line 9 : typo "1064/532- μm ". It should be nanometer. Please find others.

11. Page 3435 line 25 : "Figure 11 presents the vertical profiles of regionally averaged dust lidar parameters ..." How many profiles are used for averaging? Since the attenuation in each height for different profile is different, is this meaningful to average attenuated backscatter profile? I prefer average the extinction profiles.

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12. In fig 11b, Is this depolarization ratio the “volume” or “particle”? Please make it clear.

13. Since you use the daytime CALIOP data, is the signal-to-noise ratio sufficient for your data analysis?

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 3423, 2010.

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