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Interactive Comment

Interactive comment on "Evidence of mineral dust altering cloud microphysics and precipitation" *by* Q.-L. Min et al.

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MODIS data from 0912 UTC and TRMM data from 0911 UTC on 8 March 2004 for the tropical Atlantic off the west coast of Africa is analyzed (Fig. 1) to address the impact of mineral dust on cloud microphysics and precipitation. In this particular example, the precipitation intensity within the storm is stronger south of 0.5 deg S as compared to N of that line. There is no information on whether this represents a systematic or a chance correlation between the spatial distributions of precipitation intensity and AOD. The authors generalize from an insufficient amount of evidence.

Key problems with this analysis include:

Only one storm is examined: Hundreds of satellite data samples of storms would likely be needed to obtain a robust sample distribution that includes different stages of evo-

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lution and variability among cells forming in a similar environment.

Only one time period is examined. This single time period does not allow for examination of the evolution of the storms (early, mature, decaying stages) or their motion through the spatially varying dusty portion of the AOD field during storm lifecycle.

No information is provided on the direction of inflow air into the storms. Particularly for the precipitation regions near the boundary between the dust and dust-free sectors, the storm inflow air could be originating from either the dust or dust-free sectors or from regions where the aerosols have been scavenged by preceding rainfall.

Internally inconsistent definition of dust and dust-free sectors. 1st paragraph of Section 2, "...and segregate data from 4 deg N to 0.5 deg S as the dust sector and from 1 deg S to 4 deg S as the dust-free sector." Based on Figure 3, DS2, DS3 and DS4 and DF1 are largely within the sector between 0.5 deg S and 1 deg S that is between the author defined dust and dust-free sectors. Additionally, based on Figure 1c, during the time period in question, AOD varied roughly linearly between 3 deg S and 3 deg N, complicating the definition of distinct dust and dust-free zones.

The authors have a fundamental misunderstanding. Stratiform regions form as result of the evolution of convective regions (Leary and Houze 1979) over periods of 10's of minutes to hours. The precipitation rates and updraft intensities within the convective region and stratiform region of an MCS vary over time during an individual storm. A single instantaneous snapshot can be unrepresentative of the storm lifecycle intensities of the convective and stratiform regions.

The number of subregions is very small. 14 subareas are examined: 9 with dust and 5 dust free within a 6 deg latitude by 8 deg longitude region (Fig. 3). The influence of outliers on such small sample sizes can be large.

Only 68% of the total number of convective and stratiform pixels in Figure 3 are used in the subarea analysis.

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Sample sizes for each subregion are very small. Numerical samples sizes for the subareas were not provided by the authors. Based on downloaded TRMM 2A25 data, the study region in Figure 3 encompasses 528 convective pixels and 2133 stratiform pixels. Each PR pixel is 5 km x 5 km. Of these 486 convective pixels (92% of total) and 1313 stratiform pixels (62% of total) were used in the subarea analysis (Figures 3bcd and 4). One wonders if the results would have changed in those figures if the box definitions had been different. The exact latitude/longitude limits were not provided by the authors. We estimate sample sizes based on boxes shown in Figure 3 and the assumption that stratiform is defined as 100 $<=$ PR raintype $<$ 200 and convective is defined as 200$<=$ PR raintype $<$ 300. Estimated PR pixel sample sizes for convective (C) and stratiform (S) regions are as follows:

DS1: C=41, S=196;

DS2: C=29, S=141;

DS3: C=22, S=143;

DS4: C=22, S=29;

DS5: C=47, S=137;

DS6: C=24, S=32;

DS7: C=52, S=55;

DS8: C=32, S=20;

DS9: C=42, S=57;

DF1: C=24, S=98;

DF2: C=57, S=219;

DF3: C=29, S=55;

DF4: C=37, S=56;

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DF5: C=28, S=75;

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