

## ***Interactive comment on “How do changes in warm-phase microphysics affect deep convective clouds?” by Qian Chen et al.***

### **Anonymous Referee #2**

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This manuscript focuses on how changes to the warm-phase component of a convective cloud is modified by changes to aerosol amount. They simulate a convective cloud system from a field project over the Marshall Islands using WRF. The most interesting aspect of this work is the use of the what they call the VCOG or the combination of the surrounding air velocity and the effective terminal velocity of hydrometeors. This work is well written, easy to read and to follow, the results follow clearly from their analysis and the figures are well chosen and presented.

My recommendation to accept his work with minor revisions

Main comments: 1) It would also be beneficial to see a discussion about the applicability of this case to other convective systems. How generalizable are these results?

2) The discussion of Figure 2 states that they model CFAD captures the vertical struc-

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ture and magnitude of the observed CFAD reasonably well. I agree that the highest probabilities (dark red) do look similar between the observations and the model. However, what is the source of the strange peak in the modeled CFAD between 5-7 km that is not present in the observations?

3) For Figure 8, what is the source of the smooth nature of the clean curve in 8a and c vs. the more variable semipolluted and polluted curves?

Line by line comments: Line 164: "Aerosol effects on clouds' macroscale" is strange wording. Perhaps "Aerosol effects on macroscale cloud properties" would be a better section header.

Line 166-167: "vertical profiles of a cloud fraction" - I don't think you need the "a"

Line 167-168: What is a "Voxel"? I have never heard this term before.

Line 184: Voxel again... once it's introduced earlier this would be fine.

Line 296: VCOG - "COG" should be subscripted

Line 298: VCOG - "COG" should be subscripted

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Figure comments: General: Most of the figures appear to have bolded text for the axes and color bars, for some (specifically the color bar on Figure 3 b,d,f) is blurry due to this. The text in figure 7 is also very blurry.

Figure 4b) The insert is hard to see, perhaps switch the location of the legend and the zoomed in insert so that the insert can be made larger.

Figure 5a,b,c) including the ZTL as a dashed line on these figures would be helpful.