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Interactive comment on "Statistical Analysis of Ice Microphysical Properties in Tropical Mesoscale Convective Systems Derived from Cloud Radar and In-Situ Microphysical Observations" *by* Emmanuel Fontaine et al.

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I have given this submission an excellent in Scientific significance and quality because of the richness and breadth of the data set and the potential value for expanding the existing database of cloud microphysical measurements. I am rating the presentation as fair because it is my opinion that the graphical presentations and associated descriptions are unnecessarily cluttered with excessive information on each figure as well as too much discussion dedicated to each figure rather than a more concise summary that highlights the salient points.

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Discussion paper

The attached annotated manuscript details the majority of my concerns, questions, recommendations and strong requests for additional information as well as additional analysis and stratification of the data.

There are a number of what I consider to be major omissions in the analysis that either need to be included, or a convincing argument made as to why they can be omitted.

1) In the introduction and conclusions the authors emphasize the importance of dynamics on the cloud properties, then there is a very brief analysis of vertical velocity but after that section, no further effort is made to link microphysical properties to vertical velocity. In addition, given that updrafts are usually associated with hydrometeor growth and downdrafts with cloud decay, lumping all the results together regardless of vertical velocity direction will mask possibly important trends. The analysis has to include stratification by updraft and downdraft.

2) The discussion in several places talks about the importance of crystal shape, simulations using oblate spheroids, aggregation and the various mass-diameter relationships that depend on particle habit; however, even though in all four projects the 2D-S is used, an OAP with 10 um resolution, there are no images shown or used in this analysis. This is a large omission of the most valuable piece of information that is available in this data set and would address a number of the questions that are raised hypothetically.

Please also note the supplement to this comment:
https://www.atmos-chem-phys-discuss.net/acp-2019-502/acp-2019-502-RC1-supplement.pdf

Interactive comment on Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2019-502, 2019.