

Interactive comment on “Tropical deep convective life cycle: Cb-anvil cloud microphysics from high altitude aircraft observations” by W. Frey et al.

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This paper has a lot of unrealized potential to provide a valuable set of data to what is still a relatively sparse database of measurements in the TTL.

The manuscript starts off with a nice overview of what is known of clouds in the TTL and what measurements have been made, particularly in the Hector system. What is missing is a clear road map of what the current study will provide that has been missing and the abstract and summary also lack that explanation.

The supplementary material contains an annotated PDF with all my comments and questions. In general, however, I feel that a fairly major modification is needed to the text and associated analysis in order to clarify and provide more detail. There are
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many speculative statements made in the interpretation of the measurements with not enough discussion to support them. In particular I was very confused by the discussion that tries to link the lidar data with the in situ measurements and the CN measurements with the cloud probe and lidar measurements. Part of the problem is that there are large paragraphs containing the various speculations that need to be broken into distinct sections that provide more detail explaining how these speculations about cloud processes were arrived at. I have commented on all of these in the annotated file.

The other critical measurements that are under-analyzed are the images from the CIP. More detailed shape analysis is needed to back up all the discussions about ice crystal types. If nothing else, categorization by degree of asphericity to compare in the various cloud stages would provide a lot more clarity in the discussion.

It would help me a lot to follow the somewhat convoluted train of events if the authors provided a conceptual diagram of how they perceive the cloud system in the four stages, including the potential temperature levels so that I can better understand where the measurements are being taken and what are the cloud properties in each of these levels.

At the moment the discussion of the microphysical processes come across as too much "hand waving" and not enough concrete description that can support the hypothesized processes.

In its present form, the paper doesn't provide the necessary detail to merit its publication.

Please also note the supplement to this comment:
<http://www.atmos-chem-phys-discuss.net/14/C3247/2014/acpd-14-C3247-2014-supplement.pdf>