

***Interactive comment on* “The fine-scale structure of the trade wind cumuli over Barbados – an introduction to the CARRIBA project” by H. Siebert et al.**

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ACP Manuscript Review

Title: The fine-scale structure of the trade wind cumuli over Barbados – an introduction to the CARRIBA project

Authors: H. Siebert et al.

Reviewer: Patrick Chuang, UC Santa Cruz

General Comments

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This manuscript is an introduction and overview of the CARRIBA project, which centers on airborne measurements in a trade wind cumulus region off Barbados during two month-long deployments. The overall goals of the project involve the interactions among aerosol, clouds, turbulence and radiation, and this paper is mainly organized along these four themes. Like any field program overview paper, it's difficult to balance describing interesting results, often of a preliminary nature, with the need to document the basic meteorological and other characteristics during the project time period. In my opinion, the primary purpose of the paper is the latter, with just enough of the former mixed into it to make the paper seem worthy of scientific publication.

My main over-arching comment is that I would like to actually see less science and more documentation. The science that is contained in here is certainly interesting, but because it covers select topics throughout all four themes, each scientific point is either rather modest in scope or just the start of something quite interesting. I don't think any of the scientific analyses and conclusions contained in here will be the reason future papers reference this one. So I would instead prefer to see the paper be more complete. For example, Table 2 in Lu et al., JGR Atmos, 2008 "Aerosol-cloud relationships in continental shallow cumulus" has proven to be very helpful for many subsequent studies. Is there any chance that the authors would consider shifting some of their focus onto this type of synopsis? I can imagine one table for each theme (with maybe another one for basic meteorology), covering the basic properties of interest for each flight, for example. This will help other scientists not directly involved with the project to quickly understand each flight, but also help jog the memory of scientists directly involved as their memories fade a few years down the line. I will note that the ACP manuscript review guidelines, under Scientific Significance, asks "Does the manuscript represent a substantial contribution to scientific progress within the scope of Atmospheric Chemistry and Physics (substantial new concepts, ideas, methods, or **data**)?". In my mind, this manuscript should focus mainly on data and leave most of the science for later. That said, I think the authors should consider these remarks but edit the paper to achieve a balance of documentation and science that they are comfortable

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with.

Specific Comments

I'm attaching a marked-up PDF file of the submitted manuscript with portions highlighted throughout. Those without any comments are basically typos/grammatical mistakes. There are some with some substantial comments as well, which I'll reproduce here:

p. (286)23, line 11: is this sigma with all data put into one pile? it seems to me that one might be just as (or more) interested in a typical sigma for each day. otherwise the sigma might just represent the differences in the means between days.

23, 22-23: given the location of deebles pt and the prevailing wind it doesn't seem possible that the land can explain a drier atmosphere. could it just be bias in the ACTOS sampling?

24, 4-5: you might consider removing discussion of the ACTOS profiles. I'm very surprised that you have more faith in ECMWF reanalysis profiles than those directly measured by ACTOS, though.

25, 25: need supersaturation. make sure you clarify this throughout the manuscript, since the instrument description is that it measures ccn at "different supersaturations".

28, 1: it sure doesn't look obvious to me. if you really want to make this point, please show a scatter plot so we can more clearly see the quality of the correlation.

29, 6: this seems rather low to me, i'm guessing by a factor of 2 or more. given the aerosol concentrations you find, what is the updraft velocity this would correspond to for a rising adiabatic parcel?

31, 4-5: I think you're probably correct, but I don't think the data really shows this. Panel A in Fig 11 shows bursts of particles when clouds are absent and present. And clouds occur without the presence of particle bursts. Just because the inset suggests

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some relationship, I don't think that the data can rule out that clouds and particle bursts are randomly distributed without any causal relationship at all.

31, 21: really? to my eye, there is a fairly substantial fraction of points where the difference appears quite a bit larger than this. if you really want to make this comparison, it seems that a scatter plot is a more appropriate presentation of the data.

Please also note the supplement to this comment:

<http://www.atmos-chem-phys-discuss.net/12/C11195/2012/acpd-12-C11195-2012-supplement.pdf>

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 28609, 2012.

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