

## ***Interactive comment on “Cirrus clouds in convective outflow during the HIBISCUS campaign” by F. Fierli et al.***

### **Anonymous Referee #5**

Received and published: 4 June 2007

#### 1 GENERAL COMMENTS

This paper is an attempt to identify convection as a formation mechanism of tropical cirrus observed by balloon-borne lidar. It also attempts to correlate differences in microphysics with the features of convective processing of different airmasses. The authors use measurements from Balloon-borne lidar to show that the cirrus cloud is composed of different layers. By using a mesoscale model they are able to show that the cirrus is formed by a deep convective system.

The aims of the paper are appropriate to current ACP literature and the observations are quite interesting. Personally I do not like the use of the trajectory simulations in the paper as I feel they are not needed. The air was clearly from deep convection and

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we know that the trajectory model is not of sufficient resolution for deep convection. The mesoscale model simulations alone are in my opinion good enough to support the conclusion that the air was formed by deep convective uplift.

However, there are clearly problems with the microphysical parameterisations within mesoscale models at the temperatures relevant for this study and some discussion of the limitations would be useful in the paper in my opinion. I don't agree that your results are good enough to warrant the statement that the RH is well produced in the mesoscale model. For this statement you would have to present a more statistical analysis of the RH in both measurements and model. For instance if you could compare the observed distribution of RH in both the observations and the model then this would be a more robust analysis to base your conclusion on.

It wasn't clear how the RH was observed and some details of this in the paper would be useful to the reader.

Aside from the science, there are many typos and some missing cross reference that should be fixed (see Technical Comments).

## 2 SPECIFIC COMMENTS

¶ Page 7, 6th line up. "Values of  $D$  above zero implies that emitted light scatters over aspherical particles". But  $D$  must always be greater or equal to zero. Do you mean values not equal to zero?

¶ I am not sure of how the instrument for measuring RH works can you provide a brief description please.

¶ Section 3, Line 10. Can you give more details of the omega equation?

¶ The comparison of RH is perhaps a little crude since you only compared regions that had  $RH_i > 130\%$  how does the distribution compare with the data? I think you need to discuss more the caveats with this comparison.

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⌋ Top of page 10. You mention that you use both the WMO and the Marti and Mauersberger formula for saturation vapour pressure, but which one do you use? Or do you use both for comparison?

⌋ Page 11. Can you explain what is meant by hybrid coordinates please?

⌋ Page 12. Can you explain what is meant by RTTOV8.5 please?

### 3 TECHNICAL CORRECTIONS

⌋ Figure 1 didn't reproduce very well on my screen. I think the problem was that the plots were too small.

⌋ Section 1, line 7. "if it is included the impact of the tropopause level tropical cirrus". This sentence does not make sense, please reword.

⌋ Line 9. "on several parameters AS", should be "such as".

⌋ Page 3 line 16. "particles size distribution" should be "particle size distribution".

⌋ Page 4, line 4." The task" there are a number of typos in this sentence please correct.

⌋ Page 4, 7th line up. "active convective regions and" Ditto.

⌋ Page 5, 2nd line. "Continental South America region" insert "The".

⌋ "by positive precipitation" insert "a".

⌋ Line 5. "from Amazon basin" insert "the".

⌋ Line 11. "in nighttime" should be "in the night-time".

⌋ Second line up. No reference here instead you have a question mark. Please correct.

⌋ Page 8, line 10. Ondulation?

⌋ Line 11. wavelenght? Change to wavelength.

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- ⌋ Line 12. Define D average.
- ⌋ Line 18. Hypothize? Change to Hypothesize.
- ⌋ Line 21. “Modelling approach ofĚ” Insert “The”.
- ⌋ Line 23. “not representativesĚ” remove the “s” at the end.
- ⌋ Line 24. “Sassen and Benson (2001) shown” should be “Sassen and Benson (2001) showed”
- ⌋ Page 9, line 2. “the uncertainty” should be “uncertainties”.
- ⌋ Section 3, line 2. “so lagrangian trajectories has been” should be “so Lagrangian trajectories have been”
- ⌋ Line 4. “Typologies”?
- ⌋ Line 5. “Back-trajectories clusters” change to “Back-trajectory clusters”.
- ⌋ Line 8 “ leads to an” should be “leads to a”
- ⌋ Line 14. “Left panel of” insert “The”.
- ⌋ Last line. “height and small” should be “height and a small”.
- ⌋ Page 10. There are various typos on this page.
- ⌋ Page 10, 10th line up. “Undoubtely”? spelling. Also, this is not good scientific language: there might be some doubt.
- ⌋ Page 11. Numerous typos. Need to insert plural words and “the”.
- ⌋ Page 13, top. Model description needs better language.
- ⌋ Page 13, line 11. Missing figure cross reference.
- ⌋ Page 14, line 3. “south of 20” please put “south of 20 degS”

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¶ Line 12, “the region where RHi exceeds 130% are overlaid as cross to RH in  $\check{E}$ ”, this sentence needs rewording.

¶ 7th line up. “It should also ..” insert “be”.

¶ Page 15, 1st line. “at the same location 24 February MODIS image show the $\check{E}$ ” Bad grammar.

¶ Page 15, 8th line. “Higher cirrus layer $\check{E}$ ” grammar again.

¶ Last line. “both seems” should be “both seem”.

¶ Page 16. “tropical cirrus in the tropics”, unnecessary use of “in the tropics”.

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Interactive comment on Atmos. Chem. Phys. Discuss., 7, 6737, 2007.

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