

Interactive comment on “Hydration of the lower stratosphere by ice crystal geysers over land convective systems” by S. Khaykin et al.

Anonymous Referee #4

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This paper presents very interesting observational results suggesting the possible impact of deep convective overshooting on water vapor amounts around the tropopause during the monsoon season over West Africa. Observational setups, such as the combination of various instruments and the location and season for the scientific thrust on water vapor problems in the tropical tropopause region, are well focused and designed. I believe that observational results presented here are very informative and valuable to the atmospheric science community and should be open to public in such a manuscript, though personally I am not fully satisfied with their explanation to the impact of deep convective overshooting in relation to the hydration mechanism.

One major comment is a lack of the large scale view of meteorological fields in which their observations were placed, as their descriptions are rather limited to local spatial

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scale. Also they need to show the time sequence of their observations which is possibly affected by the large scale wave perturbation such as due to equatorial Kelvin waves. I suggest that the authors might include appropriate figures for these aspects when we see the balloon flight results.

Anyway I appreciate the value of this manuscript, particularly from the view point of the unique observational results, and I believe that it is acceptable for publication to ACPD after minor revision.

The followings are minor comments:

General comment 1: Their flights were conducted during night time, and I just wonder if there exists some diurnal variation in terms of their discussion on convective activity and related phenomena.

General comment 2: There are several names of the observation locations (Niamey, Ouagadougou and so on) in the manuscript. I feel the latitude-longitude information is preferable to present.

Abstract: It is somewhat similar to “Concluding remarks” section. The way of writing may be improved.

Page 15467, line 14: I am and the readers may be unfamiliar to the Harmattan wind. The brief description and reference would be preferable.

Experimental setup: The descending speed of balloons around the tropopause would be informative to write down somewhere in this section, though we can estimate it around page 15469 and line 26- 28.

Page 15468, line 18- : The BKS sonde is one of the core instruments for this observation, and I would like to know much more details. Compared with the FLUSH-B, the description on the BKS sonde is too short.

Figure 1: The order of figures is not in the date sequence (One for August 7 is put in

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the bottom).

Page 15470, line 14- : Comparison of the tropopause height and temperature with those over Darwin is not fair. They should give much more general arguments about the tropopause properties.

Page 15472, line 20- : Appropriate reference should be quoted here for the vertical velocity.

Page 15472, line 21- : It is difficult for me to read how different the satellite profiles are. Detailed description would be required.

Page 15473, line 6- : It is difficult for me to read “the amplitude of hydration”. Detailed description would be required.

Figure 4: Symbols to indicate the times since overshoot are overlapped and rather difficult to distinguish. For example, a use of open circles would be better.

Page 15474, line 21- : To estimate the vertical velocity, it was mentioned that they used the rule of thumb (Vonnegut and Moore, 1958), but it would be preferable to describe a brief idea of this method.

Figure 6: It is rather difficult to read this figure. Further refinement would be necessary.

Page 15476, line 15- : For the use of ozonesonde data which were probably taken during the ascent, is there any difficulty to compare with other parameters taken during the descent?

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 15463, 2008.

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