

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

S. Khaykin et al.

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The authors thank the reviewer for his constructive remarks.

We understand, that the large scale view of the meteorological fields could be useful, however, to our opinion, including that into the paper would make it too long and undermine its point. Indeed, as noted by the Referee #3, the point of the paper is rather simple - to present water vapour in situ observations, that are highly suggestive of hydration by convective overshooting. A reference (Mathon et al. 2002) has been added providing global information on convective systems in the Sahel region. A detailed description of the meteorology during the campaign will be included in a SCOUT-AMMA overview paper in preparation by F.Cairo et al. Regarding the possible effect of equatorial Kelvin waves, they are commonly associated with local cooling of the cold point tropopause, leading to dehydration (e.g. [Holton and Gettelman, 2001]). We do not

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see how such waves could enhance the water content in the lowermost stratosphere.

General comment 1. The convective activity above continents is indeed modulated by the diurnal cycle with a maximum development around 16 local time. This is mentioned in the introduction.

General comment 2. The latitude-longitude information of the measurement locations has been added.

Abstract. The writing has been improved

Page 15467, line 14 As a matter of fact, Harmattan wind is widely known and its description is given in most of the encyclopedias. Reference to Mathon et al., 2002 has been added.

Experimental setup. Information on descent speed around tropopause added.

Page 15468, line 18. The description of backscatter sonde has been enhancedimproved.

Figure 1. The date sequence of the plots has been fixed.

Page 15470, line 14 The comparison of tropopause properties at different locations has been removed.

Page 15472, line 20 Reference for vertical velocity estimates added.

Page 15472, line 21 Discussion on the differences between in situ and remote water vapour measurements improved.

Page 15473, line 6 The term "amplitude of hydration" has been removed.

Figure 4 has been fixed.

Page 15474, line 21 Brief description of the Rule of thumb added.

Figure 6. The storm shown in the radar image at 16:51 UT was found not compatible

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with an overshoot upwind the sonde. The full series of radar images has been examined carefully together with the wind speed and direction measured by the sonde. Though there were many storms in the area in the afternoon and the evening, a far better option was found shown in the cloud top image at 20:31 UT replacing the previous one. The event is described in the text as well as in the figure caption.

Page 15476, line 15. The 50-60 s response time of the ECC sensor does not allow for reliable measurements during descent; therefore we used the ascent ozone profile. The sharp peak in water vapor at 16.2 km was observed during both ascent and descent, indicating that the observed features had some temporal and spatial extent. The time difference between ascent and descent measurements at 16.2 km is about 40 minutes and the distance is less than 30 km.

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