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Interactive comment on "Diurnal variation of upper tropospheric humidity and its relations to convective activities over tropical Africa" *by* E. S. Chung et al.

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We would like to thank the referee for detailed comments on the paper.

1) Link between CAC and UTH

When the cirrus cloud cover reaches a maximum, the mean UTH, on cloud free pixels, is computed on a restricted number of pixels. These pixels are in the average closer of the cloud systems than when the cloud cover is smaller. This effect is likely to produce larger UTH when the cloud systems are larger. Is this "geometrical effect" of importance for the conclusion drawn?

Unlike the infrared radiation, microwave can penetrate the non-precipitating clouds, and

thus water vapor information can be retrieved for both clear and cloudy areas. There are studies from microwave measurements showing the close relationship between the all-sky UTH and cirrus anvil cloud amount. Using the Microwave Limb Sounder (MLS) measurements, Su et al. (2006) showed that upper tropospheric water vapor and ice water content are positively correlated. Sohn et al. (2006) calculated the hypothetical clear-sky upper tropospheric water vapor amount using the International Satellite Cloud Climatology Project (ISCCP) cloud information and upper tropospheric water vapor from the Special Sensor for Microwave Temperature-2 Profiler (SSM/T-2) measurements. The latter study showed that the largest departures from the measured all-sky values are exhibited in convectively active regions such as the western Pacific warm pool region, indicating that UTH is higher over the larger cloud systems. Thus the close relationship between UTH and CAC amount is not an artifact, but it should be a real signal, suggesting that the conclusion drawn in this paper should not be invalid.

References

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Sohn, B. J., Schmetz, J., Stuhlmann, R., and Lee, J. Y.: Dry bias in satellite-derived clear-sky water vapor and its contribution to longwave cloud radiative forcing, J. Clim., 19, 5570-5580, 2006.

2) It would be of interest to precise the method which allows to separate "cloud free" from cloud contaminated areas.

The cloud-contaminated pixels are determined by adopting both Soden (1998) and Sohn and Schmetz (2004) approaches, which are based on the temperature thresholds. Pixels are classified as cloud free when the window channel brightness temperature is larger than 275 K (Sohn and Schmetz, 2004) and the brightness temperature difference between window channel and water vapor channel is larger than 25 K (So-

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den, 1998). These thresholds eliminate pixels contaminated by high or middle clouds.

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