**Atmospheric
Chemistry
and Physics
Discussions**

Interactive comment on "Comparison of satellite limb-sounding humidity climatologies of the uppermost tropical troposphere" *by* M. Ekström et al.

M. Ekström et al.

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The referee recommends this paper to be published under the condition that it revised especially with regards to grammatical errors. Some specific comments are also given, highlighting details that should be explained further. The proposed grammatical/typographical corrections together with a general review of the language will be included in the revision of the paper.

We will here respond to the specific comments;

1. RHi is chosen as unit for the comparison since relative humidity has close to constant or at least linear vertical gradient in the troposphere. The absolute amount of water vapour have steep vertical gradient and an integrated layer value will be weighted

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toward the lower bound of the vertical resolution and will be difficult to interpret. Both Odin-SMR and Aura-MLS include temperature uncertainties in their error estimates.

2. Information on the Odin-SMR UTH retrievals are presented in a previous paper, referred to as Ekström et al., 2007. That paper gives a more thorough description of the retrieval and the error characterisation than would fit in this paper. However, as the referee points out there is some fundamental information that easily could be inserted in the revised paper. The averageing kernels have not been considered in the linear interpolation of Aura-MLS, or for any of the other satellite data. Odin-SMR does not give vertical profiles, instead the result can be seen as two independent layers. We have assumed that as the vertical resolution of the different satellite instruments are quite similar linear interpolation is sufficient for this comparison.

3. The portions of observations at 205 hPa that show <20 %RHi is 0.26 for UARS-MLS, 0.23 for Aura-MLS and 0.19 for Odin-SMR. The main differences at dry conditions are the really low humidities that are seen by UARS-MLS and Aura-MLS and also the shape of the Odin-SMR PDF. The shape of the Odin-SMR PDF at low humidities show spikes at those humidities that are used in the forward simulations during the retrieval. These spikes result from the nonlinear behaviour of brightness temperature as a function of humidity at dry conditions.

4. The result in Figure 13 is Odin-SMR specific. The expected effect on Aura-MLS averages in a similar investigation should be less since Aura-MLS is less sensitive to scattering by ice cloud particles than Odin-SMR.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 12617, 2007.

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