

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

### **Anonymous Referee #2**

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This manuscript presents the comparisons of the UTH climatology as observed by four different limb-viewing instruments. The results are interesting to a wide community, considering the important role of UTH in regulating atmospheric dynamics, as well as the difficulties to measure UTH accurately. The method used in these comparisons is solid, shedding some lights on the consistencies of the UTH observations from some important instruments with different spatial and temporal coverage, (although it can not replace the direct comparisons of the co-located observations in the evaluation of different UTH observations). I recommend the publication of this paper, if its revision takes into account the comments below. In particular, many sentences in this manuscript are written in a rather informal or even grammatically incorrect way, and a careful check of

the language (by the authors or by editor) is suggested.

Specific comments:

1. There is a need to explain why the authors choose to compare RH<sub>i</sub> instead of the specific humidity (or volume mixing ratio) observed by the instruments, considering the sensitivity of the saturation pressures to the chosen temperatures. 2. More information on the Odin-SMR UTH retrievals is welcome (Section 2). Many readers like me are not familiar with Odin-SMR instruments, and may be curious about where the temperature profiles come from, and what the typical average kernel of the retrievals looks like. In particular, have the vertical distribution of actual Odin-SMR soundings levels, and the corresponding average kernels been taken into account in the linear interpolation of Aura-MLS data into Odin-SMR sounding levels ?

3. I'd like to know the portions of the observations at 205 hPa with RH<sub>i</sub> smaller than 20%, and the reasons for the discrepancies between different instruments in the dry condition (Fig.3). Also, I wonder why UARS-MLS shows more observations at the region 70%-90% RH<sub>i</sub> than other instruments.

4. Figure 13 is interesting. But is this result only specific for Odin-SMR UTH ? A similar plot for Aura-MLS is meaningful. ( I think cloud flags in Aura-MLS ozone or other products could be used to filter out the observations).

Technical comments:

Abstract

-p12618 L 4: UARS-MLS; Odin-SMR; Aura-MLS; acronyms

-p12618 L 10: 'were found to be in very good agreement?', and are also ?': the 'very good' statement seems too strong. Also, 'were found ?, and were also?', or, 'are found ?, and are also?' sounds better for me.

-p12618 L18-21: the statement is too strong for me. There is an issue with the under

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detect of cloud by microwave soundings.

## 1 Introduction:

-p12619 L4: IR; acronym

-p12619 L25: this sentence is questionable, as there are limb-viewing visible/IR instruments (like MIPAS), also Nadir instruments are not deemed to have low vertical resolution.

-p12620 L4 : acronyms: LRIR LIMS

-p12620 L8: acronyms: LMS; UARS

## 2 Data

-p12621 L12: 'The method together with ? , are' should be ' The method together with ? is '.

-p12621 L16: 'Spectra' means 'Spectra of the band 501 GHz and 544 GHz'

-p12621 L23-24: The sentences should be rewritten. I am not sure what 'they correspond to' means. If 'They' means 'the systematic calibration uncertainty', the better wording should be 'it corresponds'; If it means 'all systematic uncertainties', 'altogether with' becomes a problem. I am also not sure whether it is right to mention '<a> random calibration uncertainty' in the first sentence, and '<The> systematic uncertainty' in the following one.

-p12622 L2: I prefer 'reduced' to 'decreased'.

-p12622 L23-23: 'is considered to be' should be 'are considered to be', if the authors are talking about the measurements by UARS-MLS not UARS-MLS itself.

-p12623. L20: 'measurements, this was' ? 'measurements. This was'

-p12624 section 2.3.1, how many days of MLS v2.2 data are available ?

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-p12624 L14, 'is less than' ? are less than

-p12627 L10 'measurement' ? 'measurements'; 'were based' ? 'was based'

### 3 Result and Discuss

-p 12628 L7: HIRS; acronym

-p12628 L11: 'the otherhand' -> 'the other hand'

- p12628 L11: 'different time' mean 'different solar time' ?

-p12629 L26: I prefer 'in four groups:' to 'in four groups,'

-p12628 L24-28: how many Odin-SMR, UARS-MLS, EOS-MLS observations are available in a typical season ?

-p12629 L6: 'randomly resample' ? 'randomly re-sampling'

-p12629 L13: 'in the comparison between?' means 'in the comparisons of MIAPS with ??'

-p12629 L24: 'ice super-saturated' is odd for me.

-p12619 L26: what is the 'extra averaging'

-p12630 L6: discussion on the 'artifacts from the transfer function' is needed.

-p12631 L2: 'This way measurements ?.' Is not clear for me.

-p12632 L20: 'is therefore' ? 'are therefore'

-p12633 L6: some instances needed for 'the seasonal variations'

-p12633 L11: 'more closer to saturation' than 205 hPa ?

-p12633 L12: 'regions, latitudes higher?' -> 'regions with latitudes higher?'

-p12633 L13-17: how frequent (or the percentage ) the intrusions of stratospheric air

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could be ?

-p12633 L10-25: Not clear for me. What the definition of 'precisions of the UTH' is here; how many observations are available in each grid box.

-p12633 L22: 'which result in' ? which results in'

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

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