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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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We appreciate the referee's comments and understand that some parts of the paper would benefit from being more clarified. The title and initial description in the section on seasonal mean value comparison will be changed so that the purpose of it becomes clearer. The referee's comments also points at the general difficulty of indicating relative errors of relative units. This will be addressed and reformulated so that it is understood by the readers. The typographical errors pointed out by the referee will be corrected in the revised paper.

The focus of the paper is the comparison of the different UTH data set, which alone is interesting to a wide community as pointed out by referee #2. The statistical anal-

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ysis and details on the data sets are therefore provided to make the comparison as solid as possible. Several of the data sets (MOZAIC, UARS-MLS and Aura-MLS) have already been used for geophysical interpretations, e.g. the geographical distribution of humidity. In that sense this paper does not add new geophysical information but instead confirm the results of previous studies.

For the specific comments:

- p. 12621, line 24: For detailed information on the Odin-SMR instrument and retrieval characteristics we refer in the paper to Ekström et al., 2007. But to clarify, the exact origin of the random calibration uncertainty is not yet determined. The effect is an brightness temperature variation with standard deviation of 2-4 K, depending on frequency band. There is a connection to the paragraph on p. 12632 about observed super-saturation, as mentioned further down on line 21 on p. 12632.

- p. 12621, line 26: Other systematic errors refer here to uncertainties in temperature and spectroscopy, see Ekström et al., 2007. This sentence will be more specific in the revised paper.

- p. 12622, line 6: The description of why the dataset of the upper level is sparser than for the lower is incomplete. It is not a matter of local resolution due to longer integration time, insteads it is a technical issue that most observations are performed with shorter integration time. Consequently there are less observations available with sufficient integration time.

- p. 12626, line 9: The nominal vertical resolution of MIPAS is 4 km. In the presens of clouds, the vertical resolution for altitudes from the cloud top and down then become greater than 20 km. Possibly due to the smoothing constraint that is applied to to the profiles, this degraded vertical resolution can also stretch upwards in profile to nearest gridpoints. The vertical resolution has therefore been considered together with the visibility flag to find cloud influenced measurements.

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- p. 12633, line 15: The humidity in the upper troposphere determine how deep the Odin-SMR observation reach. The retrieval of UTH is therefore based on the temperature-altitude relation in the UT. The stronger that relation is (i.e. higher lapse-rate) the more accurate the retrieval becomes. This means that closer to the tropopause the measurement will be more uncertain, and therefore we only measure in tropospheric air. The other microwave limb-sounders operate at lower frequencies where the upper troposphere is optically thin, and their retrieval method is not dependent on the temperature lapse-rate.

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