

Atmos. Meas. Tech. Discuss., referee comment RC3  
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## **Comment on amt-2022-204**

Anonymous Referee #3

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Referee comment on "Assessing the consistency of satellite-derived upper tropospheric humidity measurements" by Lei Shi et al., Atmos. Meas. Tech. Discuss.,  
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Reviewer's comments on "Assessing the consistency of satellite derived upper tropospheric humidity measurements" by Shi et al.

General comments:

This article describes an assessment of four UTH datasets: one using IR measurements and the other three using microwave (MW) measurements. The main purpose is to evaluate the consistency among these UTH datasets. Focus is placed on the tropics. Comparisons show that the four datasets are consistent in tropical-mean, interannual variability. For spatial patterns, they show broad consistency in ENSO-related action centers (e.g., Nino 4 region). Spatially, the IR-based UTH shows smaller variability than the MW-based UTH. The authors also re-examined a previous finding that was based on IR data (Shi et al. 2018), namely, upper tropospheric moistening during the El Nino events where convection is concentrated, but overall upper tropospheric drying when averaged over the whole tropics. They found that this conclusion is supported by the other three MW datasets. Finally, they analyzed the long-term changes as depicted in the four datasets by focusing on consistency among them.

Overall, I believe results from this assessment study should be useful to researchers in climate community who wish to use these datasets for diagnostic studies or model evaluations. It will contribute to the literature. As such, the paper is publishable. This kind of technical analysis fits the scope of AMT. Therefore, I'd recommend the paper be published after minor revisions.

Specific comments:

L223-224: While UTH anomalies in the IR measurements are weaker than those in the MW in the Hovmoller diagram, the tropical-averaged UTH anomalies in the IR seem to be larger than those in the MW, as seen in Fig. 1(b). I see deeper dips in the IR data during the 1997-1998, and 2015-2016 ENSO events.

L224 – 225: "Differences in the definition and computation of UTH, the sensitivity of different sounder, and clear-sky process may all contribute to the different strengths of derived anomalies". More details should be given to each of these causes as to how they affect the magnitude of the anomalies. This is a technical paper. The readers will likely care about such details.

L300: Since Nino 4 region has been mentioned and used for comparison in quite a few places, it makes sense to mark it up on the maps using rectangles.

L315 Conclusion: for a technical paper, I'd recommend the main findings be organized in bullet points to facilitate reading.