Reviewer1:

I appreciate the thorough revision of the first version of the manuscript responding to all comments from our reviewers side. I request only a small technicall correction before a publication of the manuscript:

L 185: You refer to Eq. (16) here, but the manuscript contains only 15 equations. You probably mean Eq. (15)

Answer: Corrected. See Line 185 in diff.pdf.

We appreciate the Reviewer 1 very much for the constructive comment.

Reviewer2:

Thanks much for the efforts made to address my comments.

However, I have two remaining issues related to my previous comments 1) and 4).

1) Figure 1 nicely illustrates the features of the seven additional profiles. However, I find puzzling the values in Table 3. It is strange to me that Coef_EC83 gives -1.6K bias at 51.26GHz but -9.5K at 52.28GHz. Why 52.28GHz would react more than 51.26GHz to humid environment? I would not expect that. Any thoughts on why this is happening?

Answer: According to Table 3, -9.5K occur at channel 10 (53.86 GHz). We present the Jacobian calculated by ARMS-gb for channels 8-11 of HATPRO.

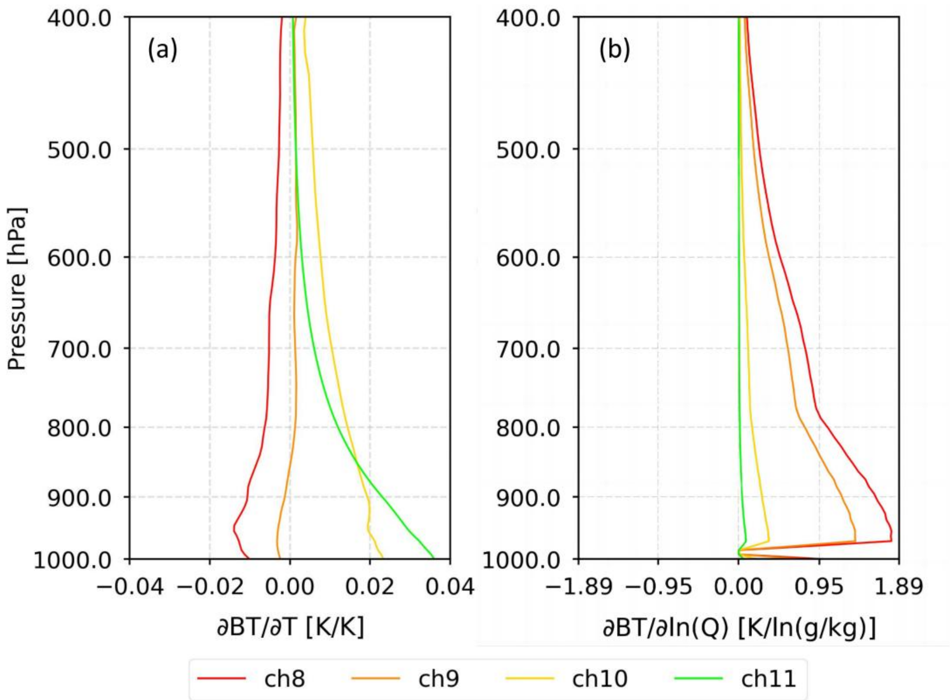

Figure 1. (a): Temperature Jacobian analysis for channels 8, 9, 10 and 11 of HATPRO. (b): Same as (a) but for water vapor Jacobian. RT simulations are performed under the 6th profile in the 101L UMBC 48-profile dataset. Observed zenith angle is set to 0° .

From Fig.1, we can see the following:

- Channel 8 (51.26 GHz) and 9 (52.28 GHz): Temperature has a negative impact on Brightness Temperatures (BTs) while water vapor has a positive impact. Simulated biases related to water vapor transmittance regression may be mitigated by fixed gases transmittance regression.

- Channel 10 (53.86 GHz): Both temperature and water vapor have a positive impact on BTs. Simulated biases related to water vapor transmittance regression cannot be mitigated by fixed gases transmittance regression.
- Channel 11 (54.94 GHz): Temperature has a positive impact on BTs while water vapor has little influence. Compared to channels 8-10, simulated biases in channel 11 are more primarily linked to fixed gases transmittance regression.

Accordingly, we attribute the -9.5 K bias in channel 10 to the strong interaction of temperature and water vapor. The sentence 'Large biases for Coef_EC83 in channel 10 may be caused by a strong interaction between water vapor and fixed gases transmittance' is added. See Lines 200-201 in diff.pdf.

4) Thanks for reporting comparison between observations and radiosonde-based simulations (Figures 5 and 7). Indeed, the two figures show quite different situations. While Figure 5 show very good agreement between the Airda-HTG4 and radiosondes, Figure 7 clearly shows substantial biases at lower values and large scatter at higher values between YKW3 and radiosonde, either processed with ARMS-gb or RTTOV-gb. This may indicate unstable calibration, and I don't think one can draw solid conclusions from this comparison. I think the authors should add a comment on these lines when discussing Figure 7.

Answer: Following sentences are added "We would like to highlight that the calibration quality of YKW3 at Tanggu is not as sufficient as that of Airda-HTG4 at Karamay. Significant biases and considerable scatter are observed between YKW3 measurements and RT simulations based on radiosonde data. Improving the calibration quality remains a key challenge for the quantitative application of GMR observations.". See Lines 332-335 in diff.pdf.

We appreciate the Reviewer 2 very much for constructive comments.