Thanks to both reviewers for taking time to assess the paper and give some valueable feedback. Below are the original comments from the reviewers, with a response from the authors in green text and what has been changed in the article in response to the comment shown in red.

Comment: Figure 2: What are the orange lines and grey shades for? It would be helpful to provide the information in the caption. And, “(right)” in the caption is confusing. There is only one plot for the MIAWARA time series.

Added: The area between the two orange lines indicates where the measurements have a measurement response of above 0.6, meaning that most of the information comes from the atmospheric signal and not the a priori. The grey areas show where there were no measurements made of acceptable quality for more than five consecutive days.

Figure 8 is shown but not discussed.

Added: In figure \ref{fig:hist_difference_q}, the distribution of the differences between the unscaled AC-240 retrievals and the USRP retrievals, and the scaled AC-240 retrievals and the USRP retrievals, all at four pressure levels between 0.1 hPa and 1 hPa. The distribution of the differences of the corrected (scaled) and uncorrected (non-scaled) retrievals compared to those made with the USRP both exhibits roughly normal distributions. Whilst the standard deviation of differences are very similar for the two distributions at each pressure level, the scaled measurements have a median difference of closer to zero at every pressure level except \SI{1.1}{hPa}.

Figure 9: Why is the summer bias larger? Why is the bias below/above 1 hPa negative/positive? The reason should be discussed.

Response: The reason for the inverting bias cannot be known for sure; it could come from systematic errors in MLS measurements, MIAWARA measurements, or both. It is interesting that in the paper by Nedoluha et al. (2020), a similar pattern is found when comparing the WVMS to MLS and HALOE (seen in figure 8. [although this is WWMS - MLS whilst we show MLS - MIAWARA, so the sign of the bias is opposite.]). This work shows an overestimation of water vapour by the WWMS compared to MLS below 65km, and an underestimation over this height. The bias could therefore be a due to the difference in measurement technique (for example, common assumptions made in the retrieval of water vapour for ground-based radiometers compared to occultation/limb sounding), or biases in common components used in both radiometers, as could have been the case with the upgraded spectrometer in the MIAWARA.

With regards to the seasonal biases, this was also found to be the case with the SOMORA radiometer in Sauvageat et al. (2022). The seasonal bias is hypothesised as potentially due to a seasonal change in the instrumental baseline which had not been taken into account or increases in the optical depth (opacity) of the atmosphere in summer. Both points could be valid for the MIAWARA, but the most likely is the second point. In the calibration of measurements, a correction is made of the tropospheric attenuation of the measurements from a calculation of the tropospheric optical depth, which is in turn calculated from the tipping curve calibration of the cold sky view. An overestimation of the tropospherical optical depth could result in the over-correction of the tropospheric attenuation, which would lead to larger water vapour mixing ratios being retrieved from the measurement. As in summer, the optical depth of the troposphere around 22 GHz is larger than in the winter, any overestimation would have a bigger impact on the measurements in the summer months.

Added: A similar effect is seen in the ozone radiometer SOMORA \citep{sauvageat2022harmonized}, and has been hypothesised to come from a seasonal-dependent baseline, or due to changes in the optical depth of the troposphere in summer compared to winter. As the tropospheric optical depth is also used to correct for attenuation of middle atmosphere water vapour absorption line signal (see section \ref{section:calibration}), it is possible that errors in the calculation of the optical depth which increase in summer could result in the pattern seen in figure \ref{fig:MIA_MLS}.

Figure 10: Putting the profiles before the bias in Figure 9 seems better for the readers to understand the bias pattern. But again, why is the peak altitude in MIAWARA lower than the MLS?

Response: This is good point- that the altitude of the peak of the middle atmosphere water vapour pressure should be better understood. We hope with the new generation of ground-based radiometers, satellite instruments, and in-situ sensors that errors on each respective instrument will be better quantifiable. Due to the width of the averaging kernels at the upper heights, there is some contamination of the peak altitudes from areas with lower measurement response that seems to artificially reduce the MIAWARA water vapor peak altitude.

Change: order of figures changed as suggested

Line 128 and elsewhere: “H2O” should be “H2O”

Change: as suggested

Line 139 and elsewhere: “PPMv” or “PPMV” should be “ppmv”.

Change: as suggested

Line 194: There are two “that” in this sentence. The second one seems to be a grammar error.

Change: as suggested

Bibliography

Nedoluha, G., Maillard Barras, E., Haefele, A., Hocke, K., Kämpfer, N. and Boyd, I., 2020. Study of the dependence of long-term stratospheric ozone trends on local solar time. *Atmospheric Chemistry and Physics*, 20(12), pp.8453-8471

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