

Comment on amt-2022-212

Anonymous Referee #2

Referee comment on "Harmonized retrieval of middle atmospheric ozone from two microwave radiometers in Switzerland" by Eric Sauvageat et al., Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2022-212-RC2>, 2022

Two similar microwave ozone instruments that have been measuring from nearby sites in Switzerland for decades, but the data has been processed with different retrieval codes. The authors do a nice job of harmonizing these datasets. The content is appropriate for publication in AMT. Below are a number of suggestions which I hope may improve the manuscript.

Throughout this study there is a disturbing emphasis on "reducing discrepancies" or "improving the agreement" between instruments. No scientific study should ever have this goal. The goal is to harmonize various stages of the data processing so that these stages do not, by themselves, introduce differences.

The most obvious information missing in this manuscript is any comparison of the tropospheric opacities at each site. While the sites are physically close in stratospheric terms, and the altitudes are similar, the tropospheric conditions at the two sites may be very different, yet there is no information presented on this topic. Even if the tropospheric opacities are quite similar, a small figure making this point would be nice.

Line 40 – "close to each other". Please give a physical distance somewhere in this paragraph.

Line 69 and 70 – This sentence sounds rather odd. It sounds like you're measuring the atmosphere with a measurement that is insensitive to the atmosphere. I assume the word troposphere belongs somewhere in here.

Line 99 – "no way to confirm the amplitude of the effect of the bias"

Line 115 – "Due to their high sensitivity, the operation of microwave radiometers requires continuous calibration". I don't understand this statement. Continuous calibration is required because the receivers are not perfectly stable, not because they are highly sensitive.

Line 134 – I assume what the authors are trying to say here is that they "provide good quality spectra for 87% and 89% of measurements", but I'm not quite sure if that is what is meant. Please rephrase.

Line 186 – "a modulation"

Paragraph starting at 195 – Have the fitted baselines been removed in the spectra shown in the following figures?

Figures 3 and 4 seem to be almost identical. While I realize that the authors are trying to make this point, there is no need for a two 4-panel figures to make this point. It would be nice to see the errors and resolutions of both instruments on the same plot (perhaps one with symbols and the other with a lines).

Perhaps I've missed it, but why is there a large spectroscopy error at the top in Figure 5

but not in Figure 6?

The authors show high and low tropospheric opacity cases, but they do not mention the opacities of these cases, nor do they give any indication of how representative each case is. I assume that the difference in AVKs between high and low opacity cases is larger than that between the two instruments in the low opacity case. I don't think that there is any need to show the AVKs for both instruments in the low opacity case since the exact AVK is probably much more opacity-dependent than instrument-dependent.

Figure 12 would be much more helpful if it were deseasonalized. Or perhaps just shrink the y-axes ranges a bit to make it easier to distinguish the lines.

Are the comparisons in Figure 13 with both the daytime and nighttime MLS overpasses?

Are the differences the same for both? Why are there more profiles in the unconvolved case than then convolved case?

Given that the error in Tprofile is the dominant error in Figures A1 and A2, some explanation about this would be of interest. I assume it has something to do with the calculation of opacity?