Comment on acp-2021-440

Anonymous Referee #2

Referee comment on "Investigation and amelioration of long-term instrumental drifts in water vapor and nitrous oxide measurements from the Aura Microwave Limb Sounder (MLS) and their implications for studies of variability and trends" by Nathaniel J. Livesey et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2021-440-RC2, 2021

Investigation and amelioration of long-term instrumental drifts in water vapor and nitrous oxide measurements from the Aura Microwave Limb Sounder (MLS) and their implications for studies of variability and trends

N. J. Livesey et al. et al.

The primary goals of this paper have been met and I see no reason to require modification before publication. The authors set out to demonstrate that certain MLS data products derived from observations made with the 190-GHz subsystem had statistically significant long term drifts. Results from comparisons with measurements and model derived results were presented in a systematic fashion that made this very clear. The authors then went on to identify a probable instrumental cause for most of the noticed drifts. The arguments here were clear and concise and informative. After corrections were applied to the processing algorithms, new data versions were produced and a similar set of rigorous comparisons were performed. These comparisons indicate improvements in data quality but did not fully correct for all previously detected “drifts”. In particular drifts with respect to the frost point measurements still remain. This does not detract from the results but does leave an open question. Finally the authors aim to give guidance to the scientific community, and this was done concisely at the end of the paper. I suggest no substantive changes to this paper before publication.

General Comments
Publish pretty much as is.

Very Minor Comments
1. It is mentioned in the abstract and the introduction that comparisons with other sensors have previously indicated drifts. Perhaps it would be good to mention SABER and the WVMS measurements earlier in the paper, before they are introduced in the respective sections.
2. The caption for Figure 14 could mention the results are for H2O.
3. I had a handful of even more minor comments but now they don’t seem worth mentioning. I may have noticed a missing comma, but it’s open for debate so I’ll leave it alone.
Summary

This paper is a very nice piece of work and the authors should be proud of how well these very important results were presented.