

Review of Ladstädter et al: An assessment of differences in lower stratospheric temperature records from (A)MSU, radiosondes, and GPS radio occultation, manuscript submitted to *Atmos. Meas. Tech. Discuss.*

General comment

The manuscript deals with differences in the trends of lower-stratospheric temperatures obtained from different observational records – MSU/AMSU, radiosondes, and GPS RO. Such differences in the trends result from *structural uncertainties*. Understanding and narrowing such uncertainties has a high priority in current climate research.

Specific comments

Section 2.1:

This section would benefit from just adding two or three sentences describing which RO data that actually are used as input to the analysis. In Section 3.1 it is mentioned that the RTTOV radiative transfer model is used to compute layer-averaged T_{LS} from RO data. But which RO data is used as input to this model? Is it just a simple vertical weighted-averaging of RO temperature profiles, or is it something more complex based on refractivity or bending angle profiles. If RO temperature profiles are used, is it dry temperatures or 1D-Var temperatures? I do not suggest to go into any detail, but it is important for the reader to know more precisely which RO data that is actually being used.

Line 4: is it really correct to refer to excess phase versus time as an “excess phase profile”?

Line 12: “distributed almost uniformly”: uniform with respect to what: over month, day, local time, or spatially over latitude and longitude?

Sections 3.2 and 4.1

As shown by Figure 5, the sampling errors are larger at high latitudes compared to low latitudes. This is also discussed in Section 4.1. A 2.5 degree longitudinal grid means that the collocated ECMWF profiles have a spatial resolution comparable to the RO observations at low and mid latitudes, but a higher spatial resolution than the observations at high latitudes. This is a simple consequence of extracting profiles from an equal-angle grid without doing any further spatial smoothing. It means that the high-latitude collocated ECMWF profiles include a larger variability than the low-latitude profiles, leading to a larger sampling error.

Now to my question: Is it obvious that this effect is negligible, or could it add to the latitudinal distribution shown in Figure 5? It’s just an idea - I do not require that you address this in the paper.

Conclusions

My conclusion is that the manuscript is a well written, very interesting piece of work that provides a substantial contribution to the science in this field. My recommendation to the Editor is to publish it after just a minor revision of Section 2.1, and perhaps a minor addition of Section 3.1.