Review on “Climate intercomparison of GPS radio occultation, RS90/92 radiosondes and GRUAN over 2002 to 2013”” by Ladstädter et al.

The authors intercompared atmospheric temperature and humidity values of conventional GTS RS90/92, GRUAN-processed RS92 and GPSRO data in a scientifically detailed and strict way. To my knowledge, their results are reliable. This work again indicates that GPSRO can play a critical role in upper air climate monitoring and in assessing the quality of data from other measuring systems. But, this paper has many minor issues, mainly on the presentation aspect, that need to be corrected/modified before it can be published in the journal.

The following lists the issues or recommendations.

a. Section 2.1 Suggest to add a discussion of WEGC GPSRO dry temperature intercomparison with other products to gain confidence of the RO climate quality.
b. Page 11745, around Line 11. Can you discuss more about the solar activity related error? What is the impact of this error on RO dry temperature on diurnal scale or at different phase of solar activity cycle?
c. Figures 7-9. I believe the statistics shown in those figures are reliable (I got very similar results, by the way). I know GRUAN data points are much denser than GTS vertically. But, do we also expect to see the vertical discontinuities shown in the RS92-minus-GRUAN plots? Why do not those strange discontinuities show up in the GRUAN-minus-RO or GTS-minus-RO plots? I recommend these confusions to be clarified in the paper.
d. Page 11740, Line 16. “The optimal estimation is applied up to an altitude of 16 km, with a half-sine-weighted transition to physical to dry parameters between 14 and 16km for temperature and pressure”. Does this weight apply to everywhere globally? Doe this mean that the physical temperature is the same as the dry temperature above 16 km everywhere? If not (most probably not as discussed in Section 3.6), then the above cited sentence needs to be modified to reflect that.
e. The authors used “radiosonde-minus-dry T” vs “radiosonde-minus-physical T” to compare RO dry vs physical T as displayed by Fig.11. Unfortunately, it is very hard to see the differences (described in the text in Section 3.6) from the figure. I recommend the authors to draw the plots of “RO physical T-minus-RO dry T” for this discussion to replace the existing Figure 11.
f. Page 11753 Line 10. I would not say “excellent” basic agreement of the products intercompared. The upper tropospheric and low stratospheric temperature difference of ~0.2 K noticed in this study is not a trivial number given that the upper air temperature change discovered by many publications is around 0.2 K/decade.

Questions and other comments:

1. Page 11738 Line 2. You may explain a bit about the “structural uncertainty”. What does it mean?
2. Page 11739 Line 6. Change “several” to “some”. You listed 10 articles.
3. Page 11740 Line 22. Suggest to indicate the percentage of profiles that are quality “bad” and not used in the study.
4. Page 11741 Lines 4-9. 0.2 K and 0.3 K errors are inconsistent. Need to clarify this.
5. Page 11742 Line 26. What about mandatory level data? Are they included in the GTS raobs?
6. Page 11743 Section 2.3. Suggest to expand a bit about the way to do the collocation. Do you use lat/lon and time at raob launch site and at RO occultation point to compute the collocation mismatch?
7. Figure 3. Three vertical pressure labels on the y-axis of this figure are too few and it is hard to pin down where certain pressure values discussed in Section 3.1 are. Suggest to use the y-axis of any figures of 6-11 for this figure.
8. Figures 4-5. I am confused by the symbols. What is the difference between “RS9092vsCHAMPOPSv56” and “RS92vsCHAMPOPSv56” for example? If the former is the combination of RS90 and 92, then I suggest to delete all those combination symbols in the plots since RS90 and 92 are separately included in the plots already. If not, I think these symbols need to be explained in figure legend.
9. Page 11745, Line 6 and some other places as well. Change “between GPSRO and RS” should be “between RS and GPSRO”.
10. Page 11746, Line 13. What does ECMWF “IFS” stands for?
11. Page 11750 Line 13. Add parenthesis before “See” and after “2014)”.