Review of the manuscript amt-2013-123

Validation of FORMOSAT-3/COSMIC level 2 'atmPrf' global temperature data in the stratosphere

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The authors use data from the Formosat-3/COSMIC constellation to compare temperatures derived from GPS Radio Occultation with temperatures from other satellite measurements and different reanalyses.
The paper could become an interesting contribution the current literature but there are several open questions, which I would like to see answered before the manuscript can be recommended for final publication (see my general comments below). Page and line numbers refer to the document <http://www.atmos-meas-tech-discuss.net/6/6187/2013/amtd-6-6187-2013.pdf>

General comments:

(1) The paper deals with the validation of the "new "atmPrf" dataset" and the authors come to conclusions like "Earlier the COSMIC data was available only up to 40 km and was reliable only up to ~ 30 km. This new dataset extends further up to 60 km and is reliable up to ~ 50 km as the present validation study reveals." (page 6191, lines 10 - 12) - but there is a terrible lack of information about this data set.

What are the "new" and the "old" data?
If you used real-time data from CDAAC: Which data version(s) did you use?
Why are the new data so much better?
If this should be indeed the case it must be due to differences in the retrieval. Please describe these differences and provide a proper reference.
RO temperatures in the upper stratosphere are very sensitive to the high-altitude initialization scheme used. How is this done for the "new dataset"?
What are the "old" data you are referring to, and why have they only been reliable up to ~30 km (+ reference)?

(2) The comparisons with radiosondes are based on a minuscule ensemble of 34 profiles only, obtained at a single station in Taiwan. While being relevant for this particular station this study is totally insufficient for an assessment of global temperature data.

(3) The authors used reanalysis date from different centers, which have only been available at limited height levels. For long-term data-sets there might be good reasons to use reanalyses as reference, but for comparison over just a year it would have been a better idea to use analysis data with higher vertical resolution and an extended vertical domain – especially when focusing on the performance in the stratosphere an beyond. ERA-Interim data are available at 37 pressure levels up to 1 hPa, but ECMWF analyses for 2010/11 are available at 91 levels up to 0.01 hPa. Even worse – NCEP data have only been available up to 100 hPa, which is certainly not appropriate to study temperatures in the stratosphere.

Specific comments:

(1) I am not entirely sure about AMT rules, but most journals (e.g. all AGU journals) require authors to use "data" as a plural word ("data are" instead of "data is" – on several locations).

(2) Page 6188, line 8: “above the tropopause (> 100 hPa)”: The height of the tropopause varies considerably with latitude. 100 hPa is fine in the Tropics, but certainly not at mid and high latitudes.

(3) Page 6188, line 10: “during December 2010 to November 2011” --> from December …

(4) Page 6189, line 5, 6, and 7: “for e.g.”: “e.g.” means already “for example”, therefore you can discard “for”.

(5) Page 6191, line 2-4: “.. into six orbit planes at 800 km with a 30° separation for evenly distributed global coverage, which has been successfully achieved.” This not entirely true: The orbit raising of FM-3 has been stopped at ~710 km due to problems with the solar panels.

Furthermore, the main reason for the 30° separation was a good coverage in local time.

(6) Page 6191, line 25 – 26 and Fig. 1: “Number of observations is marginally higher …. very uniformly distributed ..”: In my interpretation a factor about two is not marginal.

Also the longitudinal distribution is surprisingly non-uniform (especially at southern mid to high latitudes), given the geometry of the COSMIC constellation. Do you have an explanation for this?

(7) Page 6193, line 17: “.. at 1.30 a.m. and 1.30 p.m. ..”: In Fig. 1 the maxima appear to be right at 2:00 a.m and 2:00 p.m..

(8) Page 6195: line 19: “.. -20° to 20° ..”: In Fig. 2 you show separate results for -20° to 0° and 0° to 20 °.

(9) Page 6195, line 21: “… medians and their standard deviations ..”: Was there a particular reason to use medians and not mean (like many outliers or so)?

(10) Page 6213, Fig, 6, caption: “Right” and “left” are reversed.

There are several minor issues (use of articles …), which can be solved in a later stage of the review process.
