

Interactive comment on “Validation of merged MSU4 and AMSU9 temperature climate records with a new 2002–2012 vertically resolved temperature record” by A. A. Penckwitt et al.

Anonymous Referee #1

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General comments

The authors present a new temperature database by merging monthly mean time series of different limb sounding measurements and validate different versions of merged MSU4 and AMSU9 temperature data with the new dataset with respect to the identification of statistically significant break-points in the MSU4/AMSU9 data.

The paper is well structured and written with clear analysis methods, results and conclusions. However there are some general questions that need clarification before publication. My recommendation is to publish the paper with consideration of the following

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points (minor revision).

1. The main question concerns the motivation for and usefulness of the merged six satellite-based dataset. The idea of an unique temperature dataset in the upper troposphere and lower stratosphere (UTLS) region is very interesting, but each dataset has different characteristics which make it difficult to merge the data, even if the statistical model the authors describe in Section 3 is comprehensible and the focus is not the investigation of absolute differences between the iVRT and MSU4/AMSU9 data. I think the authors should give more motivation for the merging of the different datasets which is completely missing in the current version (introduction and also later in the text).

Would it not be more useful to perform the analysis with the MIPAS and combined CHAMP/GRACE/TSX data separately? A similar result as shown in Fig. 7 should be possible for the MIPAS (2002 to 2010) and radio occultation (2001 to 2012) data. This would make the results regarding the detected break-points in the merged MSU4/AMSU9 dataset more significant. In addition to that one could compare also absolute values.

2. Another points is the choice of the datasets. Why the GFZ dataset and not the CHAMP, GRACE, TSX, and COSMIC data from UCAR with has a much broader database. The amount of ACE-FTS and SMR data are very small compared to the other data. Why not SABER data (since 2002) above 20 km?

3. The radio occultation temperature data are dry temperatures. This causes a negative temperature bias between the dry and real temperatures in regions where atmospheric water vapor cannot be neglect. The lowest level the authors use is 300 hPa. In the extra-tropics the dry air assumption should be justified at and above 300 hPa, but could be violated in the tropical upper troposphere. Did the authors consider this when merging with the other data (MIPAS)?

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