

## ***Interactive comment on “Assessing the potential of passive microwave radiometers for continuous temperature profile retrieval using a three year data set from Payerne” by U. Löhnert and O. Maier***

**Anonymous Referee #1**

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The article 'Assessing the potential of passive microwave radiometers for continuous temperature profile retrieval using a three year data set from Payerne' by Löhnert and Maier describes a comparison of a long term data set of temperature profiles retrieved in the lower troposphere with collocated sonde data. The authors evaluate mainly the standard deviation and the bias with respect to changes in the retrieval strategy, i.e. updating parameters used in the retrieval algorithm or for special meteorological conditions.

General

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The contents of the article do not match the title and the abstract. In particular, the article deals with the comparison of the data set acquired by the HATPRO instrument with temperature profiles taken by sondes. In order to 'assess the potential' I would expect to see an estimation of the improvement of modern numerical weather forecast (NWP) when those data are used, especially in the light of the limitations (altitude resolution, altitude range) of the measurements taken with the aid of HATPRO. The authors state in the introduction and in the summary that the NWP would benefit from observation taking place every few minutes but this is not elaborated on. Calpini et.al. (2011) deal with wind measurements and not with temperature measurements. They explicitly state, that humidity and temperature measurements are not yet assimilated into the model because of their preliminary state.

I would therefore suggest to either append the article with a study to actually 'assess the potential' of the HATPRO measurements or to move the article to another journal which is specifically devoted to the description of data sets (e.g. AMT's sister journal Earth System Science Data, ESSD). In my view, the first would be very beneficial for designing observation strategies and to provide information on were to improve the instrumentation further. It would increase the scientific value of the manuscript considerably.

Please relate your findings to other publications dealing with the same or a similar topic, in particular Cimini et.al. (2006) and Crewell and Löhnert (2007).

Specific

It would be very helpful if a time series of temperatures at a particular altitude level would be presented. Examples of temperature profiles recorded by the HATPRO instrument and the sonde would help in assessing the statements too.

Please mention 'section 6' in the end of the introduction.

The authors pose, among others, the question of how good HATPRO performs during

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extreme conditions. I gather this question is dealt with in section 6.4. which is named 'significant weather'. I wonder if the passing of a front is the only extreme condition which affects the measurements of the HATPRO. What is about very low or very high temperatures? Are they reproduced as well?

page 7441 line 15pp

The authors cite a study by Löhnert and Crewell (2003) stating that the HATPRO(?) measurements contain profile information on the temperature throughout the atmosphere. Later, however, in page 7452 line 5 the authors state that 95 % of the information are from the lowermost 4 km. At first sight, this sounds contradictory. Please clarify.

The HATPRO section

Either omit details and cite a publication (I assume Rose et.al., 2005) or keep details but make sure they are correct and describe the instrument to a necessary degree.

Two examples:

page 7442 line 16-17

Polystyrene is transparent for millimeter waves, so what is the actual black body? My suggestion: only state that black body measurements are made and refer for any details to the relevant publication.

page 7442 line 19

This is not quite true and depends on the exact definition of the Brightness temperature used. Refer to Janssen (1993) for more details. Again, keep only the relevant statements and refer to the instrument publication (Rose et.al., 2005 ?) for anything else.

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section 6.2

How many observations are actually done during conditions which are not considered clear sky? How do measurements perform if the measurements are not during clear sky conditions but pass the quality checks? Is there a bias between measurements during clear sky and overcast conditions?

page 7542 line 2pp

Please provide an example for the AVK. The authors stated that 4 pieces of independent information can be retrieved from the HATPRO measurements. In the following and in the figures (e.g. fig 5) the impression is created, that the temperature profile is rather highly resolved in altitude.

page 7542 line 10pp

Have the radiosonde data been smoothed using the AVK matrices? What is the correlation between temperature obtained from HATPRO measurements at different altitude levels?

page 7455 line 12

Is non-crucial the proper expression? Do the authors mean 'insensitive' or 'little affected'?

Figure 5 to 8

What is actually shown in these figures? From the text I understand, shown are the bias, i.e. the difference of MWR and sonde temperatures and the standard deviation of those differences. If this is true the labels are wrong and should be corrected.

Figure 7

Labels and tickmarks are too small.

Janssen, Ed. (1993) Atmospheric remote sensing by microwave radiometry. John

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Interactive comment on Atmos. Meas. Tech. Discuss., 4, 7435, 2011.

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