

Interactive comment on “Characterization of downwelling radiance measured from the ground-based microwave radiometer using the theoretical reference data”

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GENERAL COMMENTS

The authors present a study to assess the calibration accuracy of microwave radiometers in order to gain a better understanding of the instrument characterization. Additionally it is intended to prepare operational applications for a network of 9 microwave radiometers installed by the Korea Meteorological Administration.

Therefore various comparisons are made between theoretical calculations of brightness temperatures (T_b) and measured radiances at the Changwon Weather Station. Temperature and humidity profiles which are needed for radiative transfer model calculations were derived from radiosonde observations and two different NWP models (ECMWF and KLAPS). After two steps of screening the samples a significant bias remains for channels at lower frequencies of the oxygen absorption band. By means of frequency adjustments the difference between measured and simulated T_b could be considerably reduced. That is the most interesting outcome of the manuscript. Furthermore it is noteworthy that data sets of three years have been taken into account for the analysis. That would be worth to be published.

Unfortunately, the manuscript contains several errors and uncertainties. Before I can recommend the paper for publication I would suggest the authors to consider the following comments:

SPECIFIC COMMENTS

1) Generally I think the authors should rework some figures and tables thoroughly. For example:

Fig.1: If a bias is plotted, the authors should let the reader know, which differences are calculated. In the subfigures is noted ‘sonde&KLAPS’ and ‘sonde&ECMWF’. Does it mean ‘sonde minus model’? Probably not, as in the captions is mentioned “the bias of the temperature profiles of the NWP data compared to the radiosonde data”. Does it mean ‘model minus radiosonde’? But finally, in the text is formulated (Page 4353, line 22) that Fig.1 shows a comparison between available radiosonde and NWP data’. That would mean ‘sonde minus model’ after all.

Fig.4: Maybe the authors had in mind to plot different ranges of Y-axis as noted in the captions. Unfortunately they didn’t. It should be done as nothing can be recognized from the last three subfigures

Tables: I miss units for several columns.

Table 1: Typo – negative variability (SD)

Table 2: What is the basis for the number of samples for KLAPS data (37230)? Three years of hourly data result in about 26300.

Table 3: Captions and column headings don't agree.

Table 2 and 3: In both tables 'Bias, Variability and R' for the data set referred to as 'Original' are listed and have identical values. Why then the numbers of cases differ (4384 and 3972)?

Table 4: Typo – frequencies

2) Section 2.2.2 and 3.1:

A total of 117 radiosonde data are used to compare at first radiosondes with two model data sets (local model KLAPS and ECMWF) and secondly, simulated brightness temperatures. The numbers of samples taken into account for the analysis of the two models differ (117 and 67, respectively) and therefore different data sets are compared. This is ignored by the authors and not discussed. Not any information is given whether model forecast values or data of the numerical analysis were used. I assume that the two data sets are composed differently due to the different temporal resolution. Possibly, deviations between the models result from their variable pre-treatment.

The question arises whether KLAPS data are available for the subset of 67 cases used for the ECMWF comparisons? If so, add bias/SD calculations as well as Tb computations on the basis of this 'really comparable' data set.

Further, how many cloudless cases are contained in both data sets? Clarifications are needed.

3) In the paper is shown that a screening of data is necessary to perform frequency adjustments and that clouds have the largest impact on the simulated Tb. It is entirely reasonable to show it as presented in Fig.3. But is it also appropriate to compare simulated and measured Tb without consideration of the cloud conditions (Table 2)?

In Section 2.3 (p.4354) is stated that Tb simulations are done with the clear sky assumption. According to the authors (Table 3) about 40% of all data points are sorted out due to cloudiness. It means that the assumption is not valid for 40% of the Tb simulations which are widely discussed in Section 3. The conclusion that for an accurate assessment cloudless data points are needed (page 4348, line 2) is trivial as it was the general assumption for the Tb calculations.

From my point of view assessments of model differences as discussed in Section 3.2 and offered in Table 3 should focus more on screened data then on data which are mostly incorrect by definition.

MINOR COMMENTS

Probably due to different contributions by the co-authors the paper appears inhomogeneous. It concerns both the language and the text flow.

For example, measured Tb is used three times before Tb^R is introduced for it (Page 4351, line 24). In the following Tb^R (5x), measured Tb (9x), measured Tb^R (3x) and radiometer Tb (2x) are listed alternately. Please, try to homogenize the text.