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Geoscientific Instrumentation Methods and Data Systems Discussions

Interactive comment on "Arctic Snow Microstructure Experiment for the development of snow emission modelling" *by* W. Maslanka et al.

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Thank you for the thorough and complete review of the paper. We will now answer your comments and suggestions in the presented order. A modified version of the paper will be submitted at the end of the review period. More quantitative micro-structure measurements (SMP and micro CT measurements) will be included, in order to present all available data collected during the ASMEx campaign. A more detailed analysis and discussion into the RMSE and bias values has been included.

Comments.

The paper needs a mode in depth discussion about radiative transfer simulations and comparison with observations: 1) to better present model performances. . .

The discussion section has been improved, discussing the potential reasons for the bias, especially on the HUT reflective plate simulations. The predominant reason for the large bias at 36.5 GHz in the single layer HUT model comes from a flaw in modelling the reflective plate. This flaw has been elaborated on, along with the inclusion of a thin (thickness $\sim$ 5cm) homogeneous slab.

2) To give more statistics: some scatter-plots (Tb versus Sim) can be very useful in addition to bias/rms and correlation coeffs.

A new figure has been included; a scatter-plot showing observed brightness temperature plotted against simulated brightness temperature by both single layer HUT model and MEMLS. The correlation coefficient of the single layer HUT and MEMLS simulations are also displayed.

3) Authors could also try to add figures to plot time series of Tbs (obs,sim) at a given frequency together with some selected snow properties

Due to the nature of the experiment, time series plots of the data are not possible. Each of the 14 snow slabs are a separate slab extracted at different times/days, and each individual measurement (for example, 18.7 GHz on the reflective base) took no more than 30 seconds.

A dedicated discussion about the frequency dependence of RT models may be necessary.

Extra information has been added in the introduction, regarding the use of different frequencies in passive microwave remote sensing of snow. The frequency limitations of the two models has also been included in Section 2; discussing the frequency limitations of the scattering models.

Regarding higher frequencies, do you have any plans to study their potential in the near future?

The higher frequencies were not included in the analysis of the model simulations,

as only 6 out of the 14 slabs used the two higher frequency radiometers, due to unforeseen problems when conducting the experiment. Of those 6 slabs, only 2 were homogeneous, meaning that any RMSE and bias calculations at either of the two frequencies would not be representative of the RMSE and bias at these frequencies. The observed brightness temperature data at these two frequencies, however, has been included to allow the completed data set to be included.

Interactive comment on Geosci. Instrum. Method. Data Syst. Discuss., 5, 495, 2015.