Dear Reviewer,

thank you for your positive feedback. Your comments are pasted below, followed by our replies in blue.

Kind Regards
Henning Löwe, Ghislain Picard

Anonymous Referee #2
Received and published: 29 May 2015

The manuscript presents the linkage between two well-known microwave snow emission model, MEMLS and DMRT-ML, by expressing the two-point correlation functions for sticky hard spheres. The study also provides an objective retrieval method for sticky hard sphere parameters from tomography images.
The manuscript improves the understanding of microwave snow emission modeling. The retrieval of sticky hard sphere parameter from tomography images also opens up research opportunities for the improvement of emission models and a better understanding of microwave snow emission.

Hence, I recommend publication in The Cryosphere following some minor revisions as outlined in the following report.

1. Eq.10 : is define only in Sect 4.

This comment was incomplete. I guess it is related to Ctilde? Eq. 10 is generally valid, and not only for the particular SHS form given in Eq. 25. The general definition of the tilde follows directly after Eq. 10.

2. Eq. 12 : is nt defined

This comment was incomplete. I guess it is related to Omega_s. The definition of Omega_s will be added to the text.

3. Eq.30 : β is not defined

Will be added.

4. At the end section 4.5, Fig. 8 is presented, but no specific comments are given. Some further comments on Fig. 8 should be given.

We agree. The main observation are apparent differences depending on snow type, which are discussed only later. A comment on the figure will be added here.

5. End of section 4.7. “Small difference. . .” I would say it is more like an offset. What can possibly cause that offset?

Exactly, this offset in the log-log plot is equivalent to an overall prefactor. As shown in the plot (legend), the prefactor is well determined by r_s, as derived in Eq 29. So the origin of the “offset” are the slight differences in the static permittivity of the two models as explained in Sec. 3. This will be mentioned more explicitly in Sec 4.7.

6. I would recommend including some more symbols definition in figure labels. Also in Fig.3, the values of d = 1,τ = 1,Φ2 = 0.15 could be include in the label.

We agree. Values will be given.

In Fig. 9, the blue circles should be defined.

This is a scatter plot, so the circles are automatically defined by the labels on the x/y axis.

7. Fig. 5 : The dashed line should be define.

We agree. Definition will be given.

8. Could be interesting to add R2 for the fits.

This is interfering with a comment from the other reviewer and we decided to replace the RMSE plot with an R2 plot.

9. I would be very interesting if the author develop more on the polydisperse SHS.
It seems to me that it could be another improvement in the model. The author could discuss on the feasibility of such an approach and on the possible effects on the results.

The polydisperse case is presently touched briefly in the discussion (end of Sec 5.2 and beginning of Sec. 5.3). We agree that this might give an improvement of the model, given that a closed form expression for the (Fourier transform) of the correlation function could be derived. We are not aware of such a development. An outlook on these issues will be included in Sec 5.