



Interactive comment on “Simulation of the microwave emission of multi-layered snowpacks using the dense media radiative transfer theory: the DMRT-ML model” *by* G. Picard et al.

Anonymous Referee #2

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General comments

The authors introduce a numerical model to compute brightness temperatures of a large variety of snow pack configurations. The model is based on the DMRT/DISTORT method and is valid in the frequency range between 1-200 GHz and released as an open source package. The described model could be a very helpful and interesting contribution for the snow remote sensing community.

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Specific comments

- **p. 3656, eqn. 5-7:** It is not very clear how those equations are obtained, they should be properly referenced.
- **p. 36655, I20:** Is there an explanation for reducing the grain size from 1.75 mm to 0.83 mm? How are the grain sizes defined in the model, and in the original measurements? In general, you only briefly indicate the problems that are associated with the definition of snow grain sizes. Since brightness temperatures are very sensitive to grain size, this problem should be more thoroughly evaluated.
- **p. 3667:** The criterion for the validity of the Rayleigh approximation given by Ulaby (Microwave Remote Sensing) is $|2\pi a\sqrt{\epsilon}/\lambda| < 0.5$. This is much more strict than the criterion given here. Is it possible that the unrealistic values shown in Fig. 5 are a consequence of the resulting inaccuracy in the scattering efficiency?
- **p. 3669:** Please check the description of Fig. 8. It does not seem to be consistent with the plot you show.
- **p. 3671, 3672 and 3673:** You repeatedly cite Roy et al (2012), but the paper is not available yet. Please consider replacing or removing this reference.
- **p. 3671:** You compare measurements with results from your model. For such a comparison, it would be very helpful to have some information about the setup of your model.
- **Fig. 10/11:** Currently, it is not entirely clear what the authors want to show in those figures. Maybe it would be better to directly compare measurements and model results, even though the methods of deriving the field data are different?

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Technical corrections

- **p. 3650, I10:** direct measurements *are* only possible
- **p. 3651, I4:** no particular model ... systematically *reproduces*
- **p. 3653, I5:** the result is the brightness *temperature* emerging
- **p. 3653, I22:** Please check the citation (brackets).
- **p. 3655, I22:** a *means* to account for
- **p. 3657, I24:** between *individual* snow layers (?)
- **p. 3659, I17:** Please check the sentence structure.
- **p. 3664, I20:** Kirchhoff
- **p. 3666, I4:** Please check the sentence structure.
- **p. 3667, I6:** Please check the sentence structure/grammar.
- **p. 3667, I16:** *dashed* blue curve
- **p. 3668, I9:** the proximity of the *grains*
- **p. 3669, I5:** *using* a method *called* bridging (?)

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