Geophysical Research Abstracts
Vol. 19, EGU2017-18295, 2017
EGU General Assembly 2017

The ASMEx snow slab experiment: snow microwave radiative transfer (SMRT) model evaluation

Melody Sandells (1), Henning Löwe (2), Ghislain Picard (3), Marie Dumont (4), Richard Essery (5), Nicolas Floury (6), Anna Kontu (7), Juha Lemmetyinen (8), William Maslanka (9), Christian Mätzler (10), Samuel Morin (4), and Andreas Wiesmann (10)

(1) CORES Science and Engineering Limited, Burnopfield, United Kingdom, (2) WSL Institute for Snow and Avalanche Research SLF, Davos, Switzerland, (3) LGGE, Université Grenoble Alpes, Grenoble, France, (4) CNRM-GAME, Grenoble, France, (5) University of Edinburgh, Edinburgh, UK, (6) European Space Agency, Noordwijk, The Netherlands, (7) Finnish Meteorological Institute, Sodankylä, Finland, (8) Finnish Meteorological Institute, Helsinki, Finland, (9) University of Reading, Reading, UK, (10) Gamma Remote Sensing AG, Bern, Switzerland

A major uncertainty in snow microwave modelling to date has been the treatment of the snow microstructure. Although observations of microstructural parameters such as the optical grain diameter, specific surface area and correlation length have improved drastically over the last few years, scale factors have been used to derive the parameters needed in microwave emission models from these observations. Previous work has shown that a major difference between electromagnetic models of scattering coefficients is due to the specific snow microstructure models used.

The snow microwave radiative transfer model (SMRT) is a new model developed to advance understanding of the role of microstructure and isolate different assumptions in existing microwave models that collectively hinder interpretation of model intercomparison studies. SMRT is implemented in Python and is modular, thus allows switching between different representations in its various components.

Here, the role of microstructure is examined with the Improved Born Approximation electromagnetic model. The model is evaluated against scattering and absorption coefficients derived from radiometer measurements of snow slabs taken as part of the Arctic Snow Microstructure Experiment (ASMEx), which took place in Sodankylä, Finland over two seasons. Microtomography observations of slab samples were used to determine parameters for five microstructure models: spherical, exponential, sticky hard sphere, Teubner-Strey and Gaussian random field. SMRT brightness temperature simulations are also compared with radiometric observations of the snow slabs over a reflector plate and an absorber substrate. Agreement between simulations and observations is generally good except for slabs that are highly anisotropic.