Geophysical Research Abstracts
Vol. 16, EGU2014-15784, 2014
EGU General Assembly 2014

Tomography-based parameter estimation for sticky hard spheres as microstructure model for microwave modeling of snow

Henning Löwe (1) and Ghislain Picard (2)

(1) WSL Institute for Snow and Avalanche Research, SLF, Davos Dorf, Switzerland (loewe@slf.ch), (2) LGGE CNRS/UJF, Grenoble, France (ghislain.picard@ujf-grenoble.fr)

Within dense media radiative transfer (DMRT) simulations for microwave modeling of snow, the microstructure is often modeled as a discrete sphere assembly, e.g. sticky hard spheres (SHS). An objective mapping of this simplified microstructural model onto the bicontinuous structure of real snow is however missing. This ambiguity in the structural representation actually hinders a compelling comparison of DMRT with other models, such as the microwave emission model of layered snowpacks (MEMLS) which is formulated in terms of the two-point correlation function for continuous microstructures. To connect the different approaches, we have derived an analytical expression for the two-point correlation function for monodisperse SHS in the Percus–Yevick approximation. The analytical form of the two-point correlation function allows both, the evaluation of the scattering coefficient for SHS in the improved Born approximation for MEMLS, and an objective retrieval of the SHS parameters (sphere diameter and stickiness) from micro-computed tomography for DMRT. The parameter estimation is demonstrated for a comprehensive set of 167 different snow samples by providing stickiness values and comparing estimated sphere diameters to the specific surface area.