Geophysical Research Abstracts
Vol. 18, EGU2016-15507, 2016
EGU General Assembly 2016

On the relevance of grain shape for microwave and microstructure modeling of snow

Henning Löwe and Quirine Krol
WSL Institute for Snow and Avalanche Research, SLF, Davos Dorf, Switzerland (loewe@slf.ch)

The exponential correlation length of snow is crucial for various microstructure-based parametrizations of physical properties and particularly used in the context of microwave scattering. Though used for a long time, the abstract notion of exponential correlation length still lacks alternative interpretations. This hinders i) to measure it by techniques other than micro-computed tomography and ii) to predict its time evolution from prognostic equations in snowpack models. To contribute in this direction, we analyze snow microstructures by starting from a common statistical relation between the exponential correlation length and the specific surface area (SSA) as fundamental size metric. We show that the estimate of the correlation length can be significantly improved by including a curvature parameter as an objective shape metric. In a second step we analyzed chord-length distributions and show that the second moment can be accurately related to density, SSA and the curvature-based shape parameter. This empirical finding is supported by a theoretical reasoning suggested by small angle scattering methods. As a conclusion of the analysis, we discuss i) the possibility of estimating the exponential correlation length from a careful analysis of optical measurements of snow and ii) the potential of replacing sphericity in current snowpack models by the curvature-based shape parameter.