



## Minimal and Optimal Structural Measures to Characterize Snow for Remote Sensing at Different Wavelength

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The microstructure of snow is in nature under constant transformation. The most important processes are, from the surface to the bottom of the snowpack, deposition, erosion and re-deposition, settling and metamorphism. The timescale of large changes varies between minutes to days; and spatial scale varies from millimeters to decimeters. Such a highly variable material is difficult to measure in all of its physical properties in all details, which most affect to a certain extent its electromagnetic properties. The question arises then in which detail the layering and physical properties of the snowpack must be measured. This depends on the one hand on the models that are planned to be used, on the other hand on the available instruments.

A minimal snow measurement will include an average density (equivalent to a snow water equivalent and snow depth). An optimal snow measurement has to be carefully designed. Several modern instruments (micro-CT, SnowMicroPen, IceCube, NIR-photography, snow casting) enable us today to measure snow properties with unprecedented spatial and temporal resolution. We will present a few scenarios with an optimal setup and compare to currently measured datasets.