# Snow Specific Surface Area: Margins of Error and Best Methods for the IceCube by A2 Photonic Sensors

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## ABSTRACT

Snow specific surface area (SSA) is a minute physical property of snow that governs reflectance and plays an important role in microwave emission modeling and estimations of Earth's energy budget. While SSA is an important measurement, there are many challenges to acquiring *in situ* measurements. This project works with the IceCube, which measures snow SSA using an optical method in the field. The IceCube is highly desirable for its ability to make in field measurements, although there are some uncertainties about its margin of error. Some studies that have used the IceCube have noted a difference between IceCube SSA and micro-CT SSA up to 25% (Leppõnen *et al*., 2018) and even higher in some cases. This project will take SSA samples using both IceCube and micro-CT from a wide variety of snow packs. Results will be compared and analyzed with the goal of laying out potential sources of error, identifying trends in the SSA differences, giving a better margin of error for the IceCube, and prescribing the best methods for sampling with the IceCube. We hope that this will be useful to those who are not experts in microstructure but need accurate SSA measurements to validate modeling products, remote sensing data, as well as for other areas of study.

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