NiviLux

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PRODUCT SHEET

SnowImager

The **SnowImager** is a field measurement instrument that uses near-infrared (NIR) imaging to determine physical snow parameters. It enables fast, accurate, and standardized retrieval of two-dimensional specific surface area (SSA) images and a vertically resolved density profile with millimetre-scale resolution.



SnowImager, foldable unit



Measurement against the snowpack

HOW IT WORKS

Data acquisition

The SnowImager uses NIR illumination and cameras inside a light-tight housing to capture a reflectance image of the snowpack by placing the device directly against it. For density retrieval, an additional image is acquired using a cover plate with vertical slits. The device stores all images and metadata for post-processing.

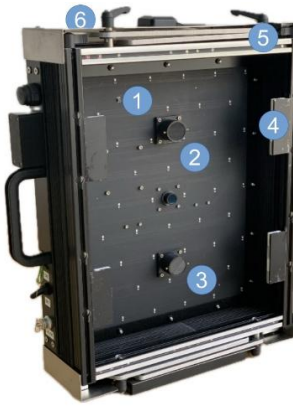
Foldable unit (displayed)
Unfolded: 440 × 500 × 330 mm
Folded: 440 × 500 × 110 mm
Weight: ~6.7 kg

Non-foldable unit
440 × 470 × 330 mm
Weight: ~5.0 kg

Key features

- Standardized 2-D SSA maps
- Vertical SSA and density profiles
- Millimetre-scale resolution
- Clear layer boundaries
- Detection of thin ice crusts
- Field-tested in extreme conditions
- Fast setup and simple operation
- Software for post-processing

Components



1. NIR Illumination
2. Upper Camera
3. Lower Camera
4. Reflectance Targets
5. Target Folding Handle
6. Unfolding Handle

HOW IT WORKS

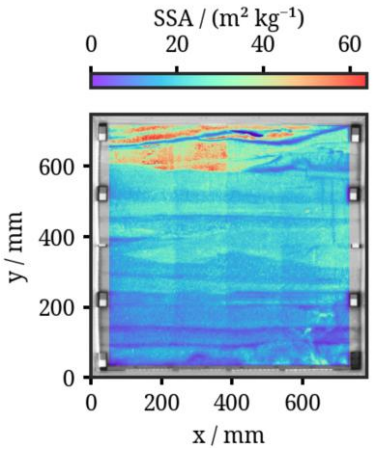
Data processing

With the provided software, NIR reflectance images are evaluated based on reflectance variations within the snowpack, which are directly linked to the snow microstructure, to derive a two-dimensional SSA image and a corresponding vertical SSA profile by horizontal averaging at each depth.

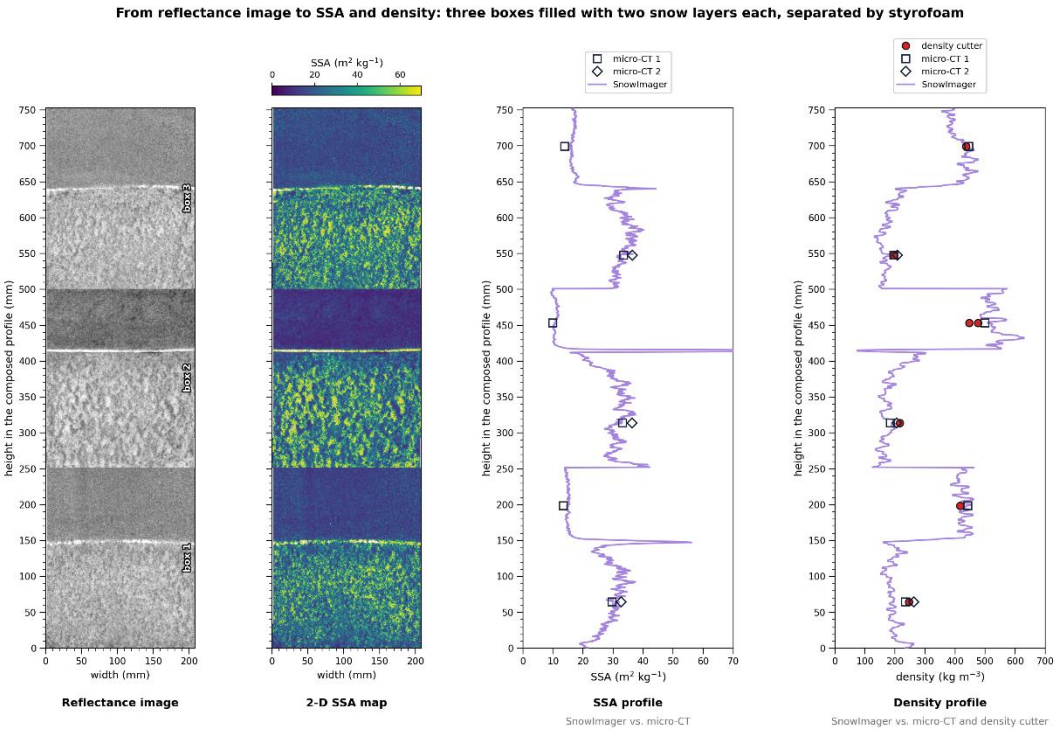
For density retrieval, the method exploits the penetration of near-infrared light into the snowpack: in high-density snow, light penetrates only shallowly and remains confined, whereas in low-density snow, light penetrates deeper and spreads more laterally. Based on the known SSA and the resulting reflectance patterns, snow density is derived as a continuous vertical profile representing variations in ice volume fraction over depth.

OUTPUT

Data products



- High-resolution SSA imaging reveals detailed snow stratigraphy
- Thin ice crusts and subtle layer transitions are clearly resolved
- Vertically averaged SSA and density profiles
- Good agreement between SnowImager, µCT, and IceCube / Density Cutter reference measurements
- The standardized workflow ensures reproducible and comparable measurements across different field sites



For purchase options, field deployments, or collaborative projects, please contact: info@nivilux.ch

DEVELOPED AND SUPPORTED BY

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Innovation project supported by

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