



Measuring the specific surface area of snow by near infrared photography

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Measuring a snowprofile by hand, including different layers and various features, is time consuming and laborious. At the same time the traditional snowprofile has some drawbacks: the features (e.g. hand hardness, grain size, snow type) are measured at discrete locations, the description is one-dimensional, and the result depends on the observer's experience. From these considerations resulted the request for a cheap and simple method, producing "objective" measurements.

Digital photography in the near infrared spectrum (near-infrared photography NIP) fulfils these requirements. It measures the specific surface area (SSA). The required wavelength spectrum can be captured with a commercial digital camera; our CCD has maximum sensitivity at 890 nm.

SSA, here measured per ice volume and therefore independent of snow density, is an important parameter for microstructural description of snow. Information about the SSA is also fundamental for all chemical processes concerning snow (e.g. the impact of the snow cover on atmospheric chemistry), as it governs the rate of exchange. Recently SSA has been used to parametrize thermal conductivity and metamorphic processes.

The NIP method was tested by photographing snow pit walls with different types of snow. The results were compared with stereological estimations of the SSA, obtained from samples of the same snow profiles. The comparison showed a direct correlation between reflectance and SSA. This correlation has been stated in literature previously, but was never verified for field measurements.

This method creates a tool with various fields of application. For example:

- Determination of texture or spatial variability on the profile scale (0.1 - 2 m²);

- Fundamental parameter for snow chemical studies;
- Initialization and verification of snow cover models;
- Building a link between micro scale analysis of snow and research on the profile scale.