RELATIONSHIP BETWEEN SNOW GRAIN MORPHOLOGY AND IN-SITU CALIBRATED NEAR INFRARED PHOTOGRAPHS

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Abstract.

Seasonal and permanent snow covers a significant portion of our planet, and its impact on climate is significant. Through specific thermophysical prope es, snow controls radiative and turbulent fluxes between the ground and the atmosphere, but many aspects of the energy balance are poorly understood due to lingering uncertainties regarding snow properties, such as grain size in particular. Rapid and accurate measurement method has yet to be developed given the reality of field and laboratory logistical constraints, and the sensitivity of snow to such manipulation away from its natural environment.

In this paper, we describe and discuss the practical implementation in the field of two methods for characterizing snow grain morphology parameters fo itional' snow photography and instantaneous near infrared (NIR) reflectance photogra of snow walls. A total of 54 snowpits were analyzed during our International Polar Year field campaign across a 1200 km South-to-North transect over Eastern Canada. Two IR systems wer d throughout the study. The first system consisted of a Nikon AS-F DX with 18-70 mm zoom lens which was converted to an infrared camera at 830 nm (λ_2=1050 nm) (NIR filter placed in front of the Charge-Coupled Device/CCD). The second system was a Canon 400D with 18-55mm zoom lens. The cameras were modified for IR photography where additional IR filters at 850 nm (λ_2=1050 nm) and 1000 nm (λ_2=1050 nm) were placed successively onto the lens. We ompared the measurements with the theoretical model of Kokhanovsky and Zege (2004). ow that infrared reflectance can quickly and accurately provide snow grain optical diameter information, which can be applied to various studies such as passive microwave radiative tr fer models. The relationship between measured snow grain geometrical diameters from 'tradit al' photography and optical diameters derived from IR photos is discussed, considering the problem of different shape factors.

Keywords: Snow grain, optical diameter, SSA, infrared reflectance, model, *in-situ* measurements.