Applying the Snow Characterization with Light and Temperature (SCLT) Method to better Understand the Evolution of a Winter Snowpack

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ABSTRACT

Snow cover duration and depth are critical metrics that are widely used for assessing global energy balance, ground thermal regimes, ecological modelling, and predicting cultural and infrastructure hazards in response to climate change. In Nunatsiavut, Nitassinan, and NunatuKavut (Labrador, Canada), expanding spatial and temporal snow depth measurement is imperative to understanding the future impacts of a changing climate. However, like many northern regions, logistics and the benefits of having a number of stations dispersed across diverse terrains limits the suitability of automated snow sensors such as SR50s. Low-cost methods for characterizing winter snow accumulation and ablation are sorely needed but commonly used methods including time-lapse imagery and iButton (temperature) snow stakes struggle with issues including weather conditions obscuring image acquisitions and the density-dependency of temperatures recorded in the snowpack. Recently, Tutton and Way (2021) proposed a new low-cost technique for monitoring snow thickness at remote field sites termed the Snow Characterization with Light and Temperature (SCLT) method. This approach uses vertically arranged light and temperature loggers and was initially deployed in 2019 at six remote field sites for evaluation. In subsequent years, additional SCLT stakes have been deployed across different ecotypes in Labrador and compared against time-lapse imagery. Here we report on follow up analysis investigating the utility of the SCLT method for characterizing snow depth including a discussion of suitable snow cover thresholds. These results will be used to better understand changes to snow in remote regions of Labrador and may facilitate cost-effective measurement of key snow variables in remote northern environments.

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