Submitted Abstract

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First Author First Name Last Name	 Eole (1,2) Valence
Submitting Author First Name Last Name	 Eole Valence
Correspondence	eole.valence.1@ens.etsmtl.ca
Co-Authors **>> E-Mails will be not listed**	Mckenzie, Jeffrey (2); Charonnat, Bastien (1); Baraer, Michel (1)
Organisations	1: Ecole de Technologie Superieure, Canada 2: McGill University
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Abstract

Due to climate change, the mountain cryosphere is rapidly evolving. The most perceptible changes outside of the polar regions occur in mountainous areas, which host a significant amount of the cryosphere. In alpine area, the retreat of the cryosphere is even more pronounced as atmospheric warming increases with the altitude. Thus, change in the cryosphere affect the hydrology of these areas.

Our research focuses on the hydrological behaviour of the Grizzly Creek, a subarctic catchment in the Kluane Mountains, and in particular understanding the behaviour of seasonal snow distribution. The catchment is in the south-west of the Yukon at an elevation of around 1500 m.a.s.l. and is composed by diverse cryospheric elements, including bare glaciers, debris-covered glaciers, rock glaciers, permafrost, and seasonal snow cover. However, this system has no significant surface water discharge, indicating potential groundwater flow out of the catchment. Thus, identify and quantify the hydrological pathways and fluxes in this type of watershed is crucial to face climate changes in arctic and subarctic mountainous regions. To quantify the amount of groundwater flow, identify it sources is necessary. Thus, the distribution of snow cover is of great interest in such catchment.

We present a multi-method approach to maps the seasonal snow cover repartition, including satellite imagery, ground-based lidar measurements, snow depth and snow water equivalent monitoring, UAV-based photogrammetry, and time-lapse imagery. In-situ monitoring is used to classify snow amount for several points used as references. The satellite imagery permits to transpose the in-situ observation over the entire catchment.

The results of the research provide an improved understanding of snow distribution in northern mountain catchment, with implications for improving hydrologic models and forecasting.