Submitted Abstract

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Abstract

The alpine cryosphere is retreating at a high rate under the ongoing changes in climate, leading to modifications in the hydrological behaviour of subarctic glacierized valleys. These catchments not only feature bare ice glaciers but also different cryospheric elements (debris-covered glaciers, rock glaciers, permafrost, buried ice…) that behave as one complex hydrological system. Thus, there is a need in characterizing poorly known cryo-hydrological processes and interactions. A glacierized catchment in Grizzly Creek's valley, located in St. Elias Mts (Yukon, Canada), groups every one of the cryospheric elements cited above. This configuration leads us to consider it as a favourable site for studying these elements, their hydrological role and interactions, and their evolution in a climate change context. A conceptual model of the hydrological system describes processes and interactions from the head to the outlet, but the over-representation of undersurface processes makes its conception complicated. Thus, some surface cryo-hydrological phenomena (aufeis formation, supra-rock glacier lakes, temporary outflows…) are analyzed and monitored to infer the internal structure of the system and the interactions between the different elements. Complementary methods (time-lapse imagery, hydro-meteorological and hydrochemical analysis, photogrammetry, GPR surveys…) are used to analyze the occurrence of these phenomena and their links with the rest of the system under climate change. Therefore, it allows us to draft a conceptualization of the system and to spot tipping points in cryosphere retreat that would affect its hydrological behaviour and its annual discharge. It is mandatory to point towards an assessment of the impact of cryospheric changes on future water resources of foreland regions.