

Multi-Method Approach to Inventorying Rock Glaciers and Features of Interest in Banff and Jasper National Parks, Alberta, Canada

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ABSTRACT

Rock glaciers are perennially frozen masses of ice and unconsolidated material that creep downslope resultant from internal, cyclic freeze-thaw mechanisms and weight due to gravity. These features are often tongue-shaped, lobate landforms, with lateral and frontal margins, that often contain longitudinal or transverse flow features within their surface consisting of poorly sorted, angular rock debris. Although rock glaciers are abundant geomorphological features in the alpine periglacial environments of the Rocky Mountains, their spatial distribution and characteristics are largely unknown. As rock glaciers contain frozen fresh water and can be potential geohazards, inventories are crucial in the assessment of the activity status and distribution of these landforms. This inventory will also provide an estimate on the potential cubic meters of water equivalent storage within the rock glaciers for cryospheric reserves as freshwater depletes. To date, over 800 intact (active/inactive) rock glaciers were successfully identified within the study areas, as well as over 204 features of interest requiring further validation of surface kinematics and morphometric quantification. Grid-based manual inventorying of these features was completed using high-resolution satellite imagery that is readily available through the ESRI World Imagery Base Layer, then subsequently verified manually with Google Earth Pro. This proved crucial and supports the idea of both multi-temporal and multi-method approaches to the inventorying of rock glaciers and features of interest within the alpine terrains of Canada to ensure high accuracy in inventorying and for long-term monitoring feasibility. This work represents the first component of our rock glacier monitoring network within Canada, as there currently are none to date.

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