University of Victoria | Graduate Studies

Notice of the Final Oral Examination
for the Degree of Master of Science

of

ANSLEY CHARBONNEAU

BSc (University of Victoria, 2012)

"Rock Glacier Activity and Distribution in the Southeastern British Columbia Coast Mountains"

Department of Geography

Thursday, April 23, 2015
10:00 A.M.
David Turpin Building
Room B215

Supervisory Committee:
Dr. Dan Smith, Department of Geography, University of Victoria (Supervisor)
Dr. Hugh French, Department of Geography, UVic (Member)

External Examiner:
Dr. Maren Geertsema, BC Ministry of Forests

Chair of Oral Examination:
Dr. Sarah Macoun, School of Exercise, Science, Physical and Health Education, UVic

Dr. David Capson, Dean, Faculty of Graduate Studies

Abstract

Rock glaciers are common features in high alpine settings of the southeastern British Columbia Coast Mountains. The spatial distribution and characteristics of these periglacial features have not previously been documented. The goal of this research was to determine the distribution and activity of these rock glaciers in order to characterize their periglacial response to climatic variability.

A high-resolution aerial inventory documented the presence of 187 rock glaciers between Lat. 50° 10’ - 52° 08’ N. These rock glaciers occur at sites located between 1900 m and 2400 m above sea level, where rain shadow effects and continental air masses result in persistent dry cold conditions. Intact rock glaciers were the most prevalent form and accounted for almost 90% of the rock glaciers included in the inventory. Glacier-derived features outnumbered talus-derived features by a ratio of 4:1 and only 22 relict rock glaciers were identified.

Rock glaciers in this region occupy predominately northwest- to northeast-facing slopes, with talus-derived rock glaciers largely restricted to north-facing slopes. All rock glaciers were found at locations above presumed Younger Dryas terminal moraines, suggesting that they began to form after 9390 BP. Rock glacier activity during the Late Holocene was characterized using lichenometric methods to establish the relative surface age of three talus-derived features at Perkins Peak. Sustained periods of cool-wet climates activated pulses of rock glacier surface instability and movement, while a shift to warmer, drier conditions resulted in the loss of internal ice and increased surface stability. Varying degrees of present-day activity highlight a local topoclimatic control on talus-derived rock glacier behaviour. A dendrogeomorphological investigation at nearby Hellraving rock glacier indicated that it has been steadily advancing into surrounding forest since the beginning of the late Little Ice Age. Its continued advance in the face of warming temperatures suggests the internal thermodynamics of this rock glacier may be out of equilibrium with the contemporary climate. This research is the first to document and characterize rock glaciers in the Coast Mountains and challenges previous understandings of permafrost distribution in the southwestern Canadian Cordillera.