GLACIOVOLCANISM IN THE GARIBALDI VOLCANIC BELT

Overview: Glaciovolcanism is the interaction of volcanism with ice in all of its forms, including any melt water that is created by volcanic heating [1-3]. Glaciovolcanic edifices have distinctive morphologies and deposits indicative of ice enclosure or contact [3-6]. These edifices are of great significance to climatological science as they establish the paleo-presence of ice and can be used to constrain the thickness and age of ancient ice sheets. Such data represent a vital element to paleoclimate reconstruction [3,7-11].

Throughout the Neogene-Quaternary, the Garibaldi Volcanic Belt (GVB) of Southwest British Columbia (Canadian Cascade Arc) experienced extensive continental-arc volcanism coupled with a complex history of encroaching and retreating cordilleran ice [12,13]. The resulting deposit morphologies (a series of calc-alkaline stratovolcanoes and smaller, isolated basaltic vents and flows) are highly unique when compared to those in Iceland, Antarctica and Northern BC [3,5,6,14,15]. As such, the Garibaldi Volcanic Belt offers an exceptional opportunity to; i) document new examples of glaciovolcanic interactions, ii) increase our understanding of the role that glaciers play in influencing volcanic activity [5,7,9], and iii) provide invaluable information towards mapping the distribution, thickness and the advance/retreat of the Fraser and earlier cordilleran ice sheets.

This project involves a thematic study examining five virtually unstudied deposits distributed throughout the GVB. The sites include: i) the Monmouth Creek volcanic complex, near Squamish [2,16], ii) a subglacial volcanic cone at Mt. Meager [17-20], iii) a pillow lava succession recently exposed at the foot of Lillooet Glacier, iv) pyroclastic deposits preserved on Mt. Garibaldi [12], and v) "The Table" in Garibaldi Provincial Park [2,21].

The project will focus on field mapping combined with laboratory analysis to establish the volcanic stratigraphy and delineate the individual deposit morphologies. This will provide a basis for: i) deciding if the volcanism coincided with glaciation, ii) estimating the minimum thickness of Cordilleran ice at the time of eruption[22], iii) gaining insight into the processes involved during a glaciovolcanic interaction [3,8,23], and iv) determining the age of volcanism (Ar/Ar radiometric dating).

This study will contribute to a wider map of cordilleran ice thickness through time for SW B.C., and will speak to the waxing and waning of the cordilleran ice sheet over the last 2 Ma [13]. Ultimately, these data represent an important land-based complement to conventional paleoclimatology studies (i.e. marine cores).

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