

## **Adakites of the Garibaldi Volcanic Complex, British Columbia: petrological and geochemical constraints on their origin**

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The Garibaldi Volcanic Complex (GVC) is located in southwestern British Columbia, Canada. It comprises two volcanic fields: the Garibaldi Lake Volcanic Field (GLVF) in the north and the Mount Garibaldi Volcanic Field (MGVF) in the south. Petrographical and geochemical studies on volcanic rocks collected from the GVC have determined that this suite of samples exhibit adakitic characteristics; intermediate rocks range from andesite to dacite that are represented mainly by lava flows and domes, with minor pyroclastic material. The lavas from all the investigated volcanoes exhibit evidence of magma mixing, which include sieve textured crystals, dehydration reaction textures, differently sized phenocryst populations, xenocrysts and xenoliths. The geochemistry of the GVC magmas exhibit several adakitic indicators, including: high Sr/Y ( $> 40$ ),  $Mg^\#$  ( $\sim 51$ ),  $Al_2O_3$  ( $> 15$  wt. %), low  $K_2O/Na_2O$  ( $\sim 0.3$ ), low Yb ( $< 1.9$  ppm) and fractionated rare earth element (REE) compositions ( $La/Yb_{(N)} \sim 10$ ). The adakitic character of these rocks has not been identified in previous studies. Adakites were first described as the product of subducted slab melts within the garnet stability field [1]. The subdivision of low and high silica adakite (LSA / HSA) reflects differing source regions; HSA are viewed as primary slab melts with an assimilated mantle wedge peridotite component whereas LSA are mantle wedge partial melts that have been previously modified by slab-derived magmas [2]. Basalts in adakite suites are often enriched in high field strength elements (HFSE) and are classified as niobium enriched basalts [NEB; 3]. NEB are argued to originate from mantle wedge peridotite that has been previously metasomatized by slab partial melts, the same source as LSA. Mixing models and previously published  $^{87}Sr/^{86}Sr$  isotopic data [4] illustrate that the GVC adakites are likely the result of partial melting of subducted ocean crust, followed by interaction with mantle peridotite. Similar mixing models for the GVC basalts suggest that they originate from slab melt altered peridotite and by extension, support the slab melt model for genesis of the GVC adakites.

[1] Defant and Drummond (1990) *Nature* **367**, 662-665. [2] Martin *et al* (2005) *Lithos* **79**, 1-24. [3] Sajona *et al* (1996) *J Pet* **37**, 693-726. [4] Green (1990) *Geosci Can* **17**, 171-174.