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Unravelling the Geochemistry and Tectonic Setting of the Eocene Summerland Volcanics, British Columbia, Canada

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Summary

Volcanic rocks from the Marron Formation in Summerland area of south-central British Columbia may represent the remnants of an Eocene-age caldera, providing an excellent analog for understanding arc-induced volcanic processes along the Western margin of North America at this time. This study involves detailed analysis of drill core, thin sections and geochemical data from 956 m of continuous core, intersecting the western side of the caldera (Fig. 1). Thirteen unique volcanic facies were identified, which were based on varying lithology, alteration and grain size. The deepest unit in the drill core is the Kitley Lake Member, which consists mainly of feldspathic trachyandesite lavas described by Church et al. (1990). These lavas are porphyritic, with relict clinopyroxene and feldspar phenocrysts, in a fine-grained feldspar and glass or clay-rich groundmass. Above the Kitley Lake Member is the Nimpit Lake Member, which is dominated by fine to coarse-grained volcaniclastics, polymictic breccias, and thick welded tuffs. The tuffs are highly altered to clays/fine-grained material, in both the clasts and groundmass. Trachyte and a hypabyssal intrusion exist above the volcaniclastic units, and beneath the welded tuffs.

The trachyandesites are characterized by low Mg-numbers (44-52), LREE and LILE enrichment, HREE and HFSE depletion, and Nb-Ta troughs. The geochemical signature of these volcanic and volcaniclastic rocks shows calc-alkaline affinities that are consistent with a classic arc-related tectonic setting; however, previous field work has shown that this region and the neighboring Penticton Volcanic Group were undergoing extension during the Eocene. Thus, the Summerland volcanics may be the product of decompression melting in an extensional regime, following arc-related fluid flux and metasomatism of the upper mantle.

References:

Church, B.N., Jessop, G.S.B., Bell, R., and Pettipas, A. 1990. Tertiary Outlier Studies: Recent Investigations in the Summerland Basin, South Okanagan Area, B.C. (82E/12). British Columbia Geological Survey, Geological Fieldwork 1990, Paper 1991-1. p163-170.

Figure:

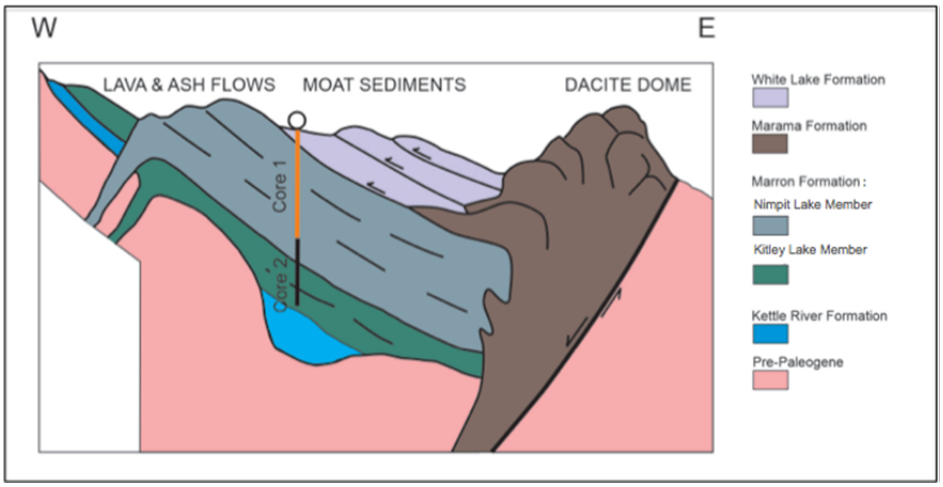

Figure1: Summerland core location, figure modified from Church et al. (1990).