New U-Pb age constraints and lithogeochemical classification for Late Cretaceous volcanics in the TREK project area, central British Columbia

R.S. Kim1, J.J. Angen1, C.J.R. Hart1
1Mineral Deposit Research Unit (MDRU), The University of British Columbia

1. Introduction & Regional Geology

Development of the Blackwater deposit has generated interest in the volcanic host rocks, which belong to the Late Cretaceous Kasalka Group [1]. Characterization of the Kasalka Group in this study is focused on 3 main objectives:

- Identification of lithogeochemical signature
- Identification of lithic units and regional stratigraphic correlations
- Refining timing constraints

The Upper Cretaceous Kasalka Group and volcanic rocks of the Eocene Ootsa Lake Group are part of the overthrust assemblage that extensively cover the Interior Platform. Originally identified in the Tahltan-Herschel-Kasalka Ranges, the Kasalka Group is documented to extend eastward into the Interior Plateau region.

The Kasalka Group identified in the northern TREK area bears strong resemblance to the Jurassic Hazelton and Eocene Ootsa Lake Group volcanic rocks in the field. All three are made up of both competent and fragmental intermediate to felsic volcanic rocks. The Kasalka Group represents a number of volcanic centres, resulting in a heterogeneous sequence of rocks. Lateral continuity is also truncated by late-phase faulting associated with Eocene extension & volcanism. Widespread cover in the form of younger volcanics and till hindered bedrock exposure in the area.

2. Northwestern TREK Geology

Stratigraphic schematics from regional mapping indicate a transition from andesite-dominated units to increasingly felsic members to the east and south [2, 3]. Moving upwards in stratigraphy, the increase in felsic trends is also dominant felsic members to the east and south [2, 3]. Moving upwards in stratigraphy, the increase in felsic trends is also dominant.

3. Lithogeochemistry

Felsic Kasalka samples are distinctly metaluminous to peraluminous [6] compared to Otsa Lake samples (metaluminous to weakly peraluminous). Hazelton samples are metaluminous. High-alumina felsic units are reported as andesite-bearing felsic dikes at Capoose (Andrew, 1986) and rhyolites at the Kasalka type section (MacIntrye, 1977).

Normalised SiO2 against Zr/Ti shows the intermediate Kasalka samples have a trachyandesite to rhyolite trend, suggesting early and intermediate fractionation processes [7].

Samples are subdivided into intermediate and felsic groups [4]. Hazelton rocks rock to be largely in the sub-alkaline field (dominantly basaltic, andesitic basalts). Kasalka & Otsa Lake Group rocks show more felsic trends toward intermediate to evolved alkalic species [5].

4. U-Pb Dates

Samples are presented in a concordia plot for each sample: one showing a concordia plot for each sample, the second with a weighted average for each suite.

Concordia plots and weighted averages for several U-Pb zircon samples [8]. Sample 13RK-022 is a plagioclase-hornblende porphyritic andesite, providing the oldest Kasalka age in the suite of 82.3 Ma. Sample 13RK-184 is the southeastern suite, from low-latitude rhyolites that outcrop just north of the Blackwater camp. Rhyolite age of 74.6 Ma. The Kasalka Lake area, an andesite-dacite tuff (140K-048) provides an age of 73.6 Ma, in the same locality a white crystal-lithic tuff (15S-226) results in the youngest age of 66.1 Ma, interpreted to be part of the uppermost felsic sequence for the Kasalka Group.

5. Summary & Conclusions

The Kasalka Group is a cal-alkaline to alkali Late Cretaceous volcanic package in BC’s Interior Plateau region. It includes a trachyandesite-dominated intermediate and a high-silica rhyolite-dominated component. A two-stage fractionation process is suggested: initial fractionation interpreted to occur at the base of thickened lithosphere where hornblende was a fractionating phase, forming trachyandesites with flat REE profiles. The high-silica rhyolites are interpreted to reflect significant upper crustal fractionation where plagioclase and feldspar are stable, leading to its anomalous and peraluminous compositions [Guadalu & Ghiorso, 2013].

New igneous zircon ages provide updated age brackets of 68-63Ma across the study area. This range in ages may reflect long lived, localized and sporadic magmatic activity.

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