MDRU Mineral Deposit Research Unit

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

Geoscience BC

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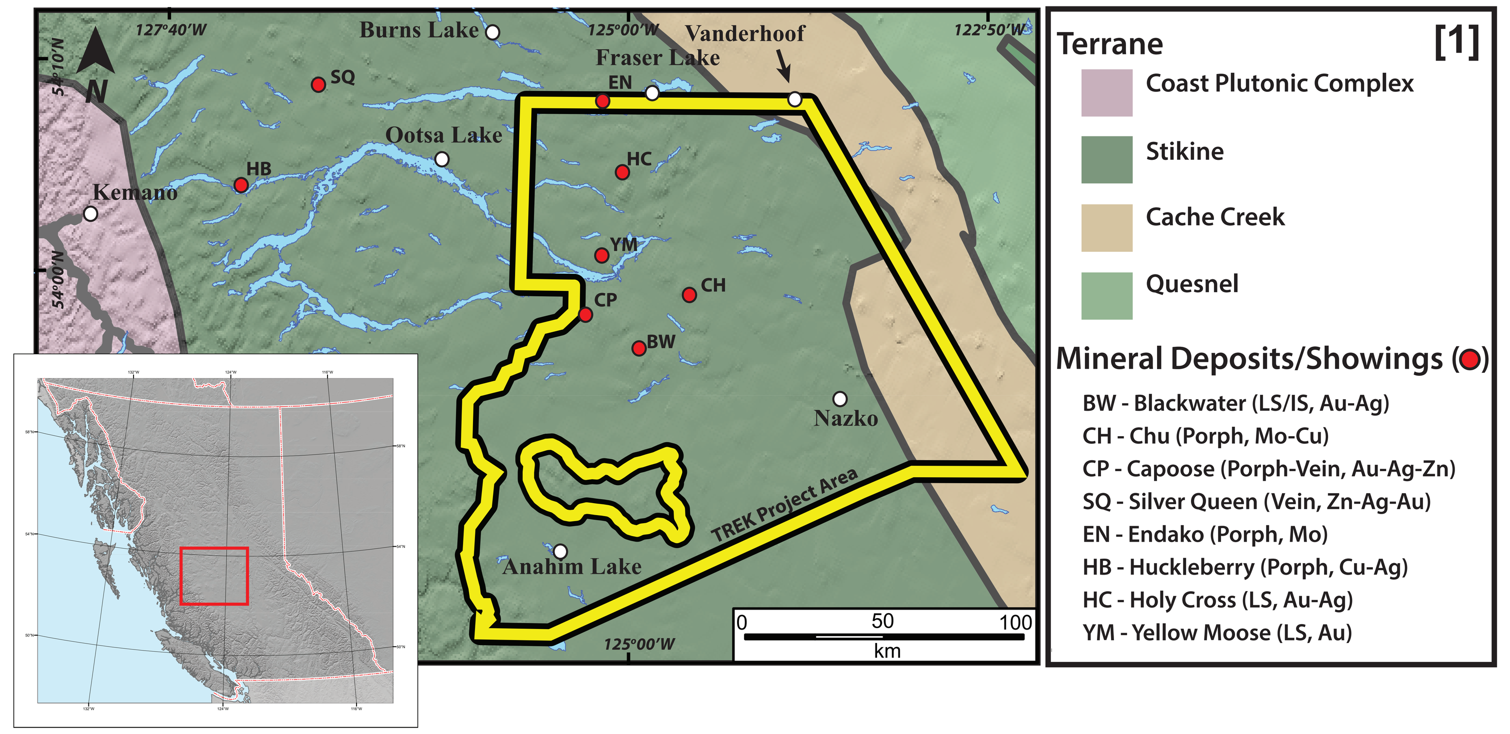
1. Introduction & Regional Geology



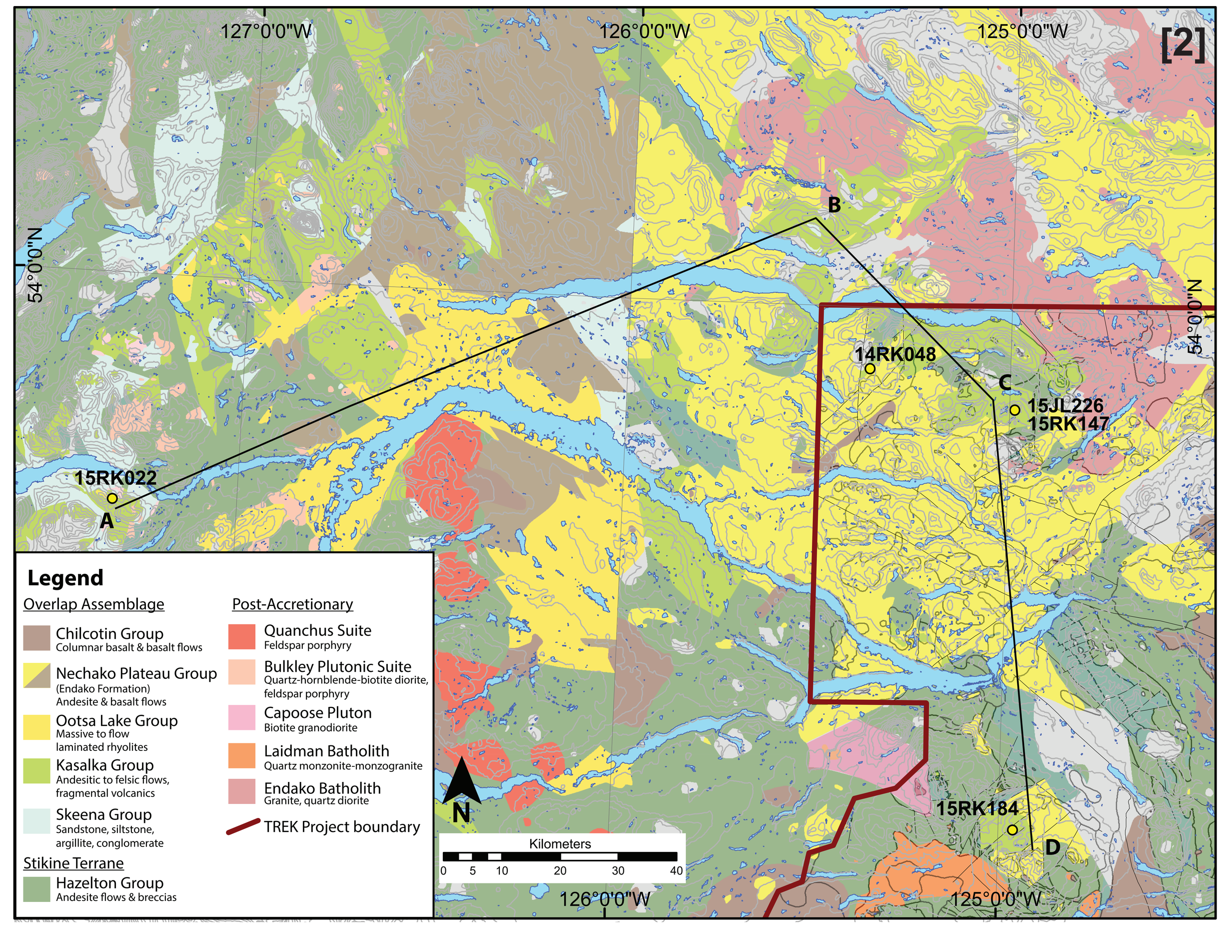
Development of the Blackwater deposit has generated interest in the volcanic host rocks, which belong to the Late Cretaceous Kasalka Group [1]. Characterization of the Kasalka Group in this study is focused on 3 main objectives:

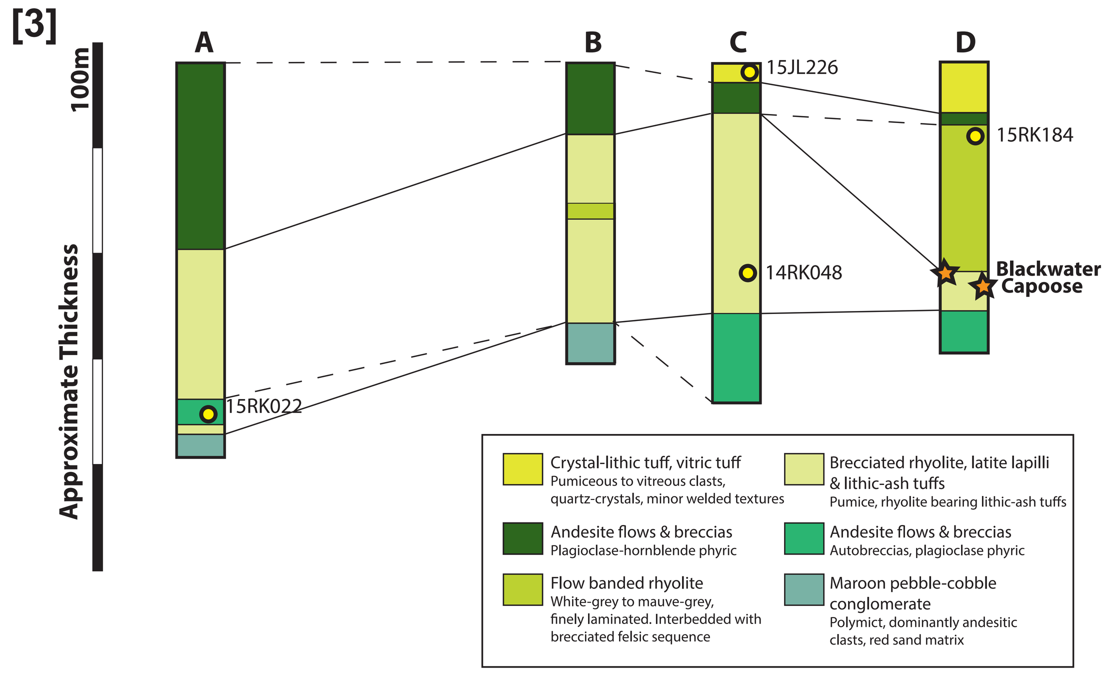
- Identification of lithogic units and regional stratigraphic correlations
- Distinguishing lithogeochemical signature
- Refining timing constraints

The Upper Cretaceous Kasalka Group and volcanic rocks of the Eocene Ootsa Lake Group are part of the overlap assemblage that extensively cover the Interior Plateau. Originally identified in the Tahtsa-Whitesail-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 stratigraphy. Lateral continuity is also truncated by late block faulting associated with Eocene extension & volcanism. Widespread cover in the form of younger volcanics and till hinders bedrock exposure in the area.

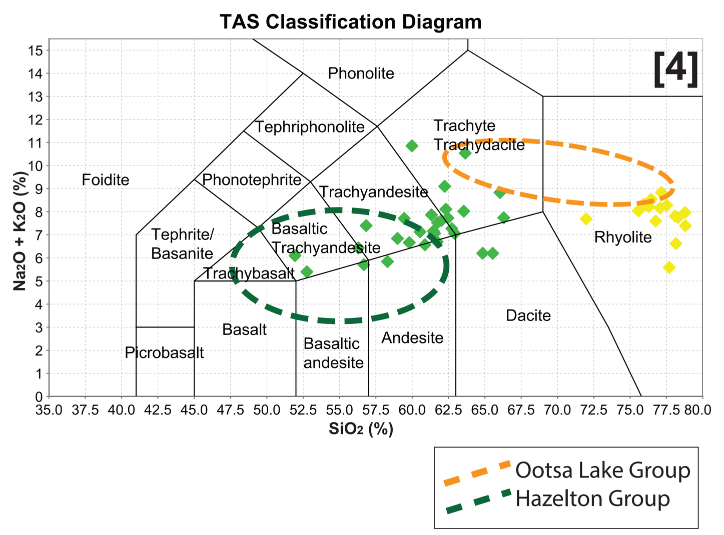
2. Northwestern TREK Geology

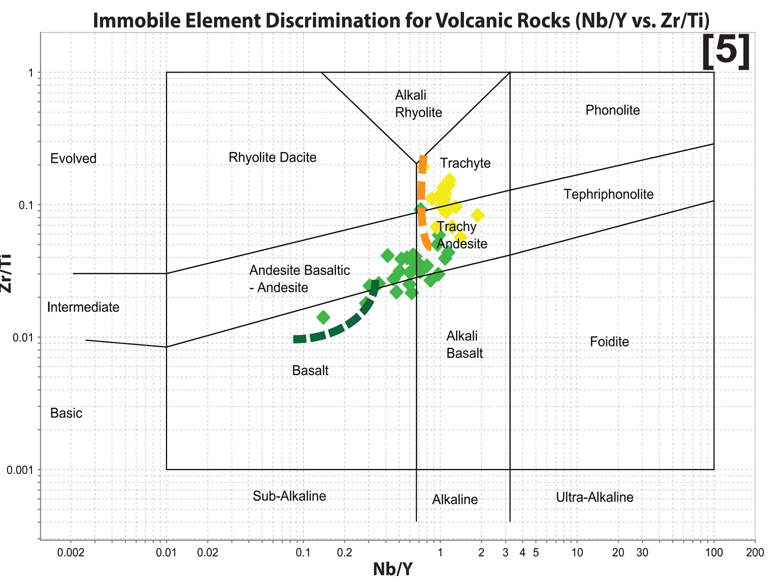




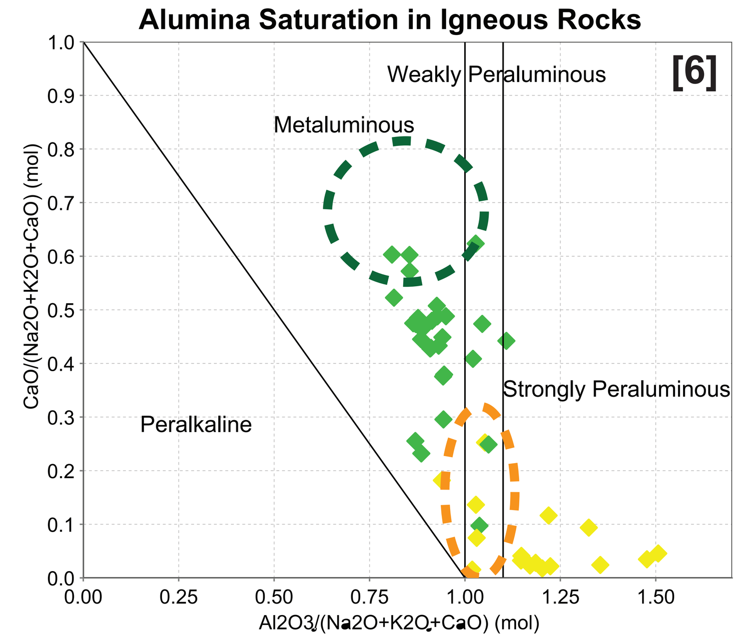
Stratigraphic schematics from regional mapping indicate a transition from andesite-dominated units to increasingly felsic members to the east and south [2, 3]. Moving upwards in stratigraphy, the increase in felsic trends is also dominant especially when preserved in regional graben structures.

3. Lithogeochemistry



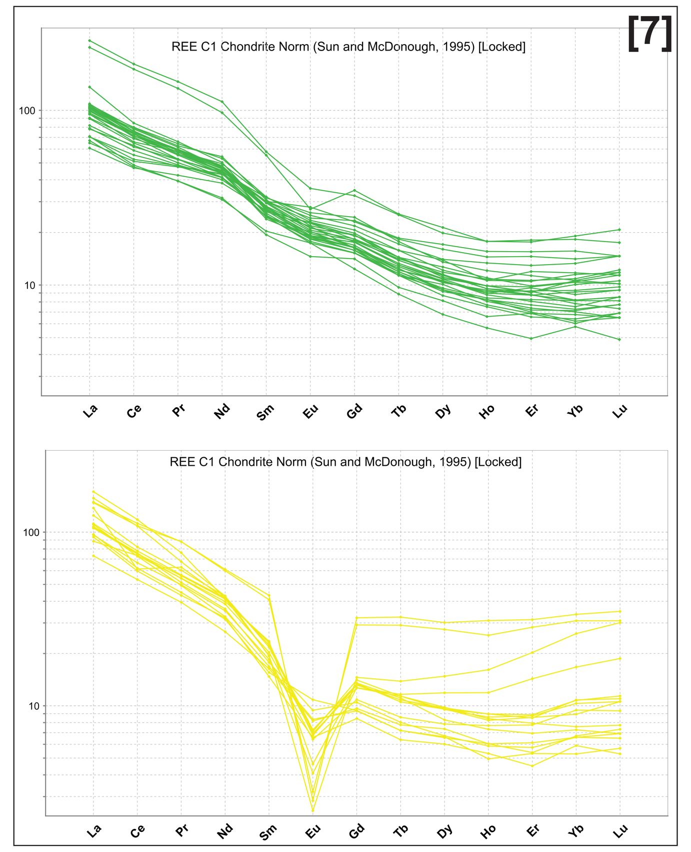


Samples are subdivided into intermediate and felsic groups [4]. Hazelton Group rocks lie largely in the sub-alkaline field (dominantly basalts, andesitic basalts); Kasalka & Ootsa Lake Group rocks show more felsic trends toward intermediate to evolved alkaline species [5].

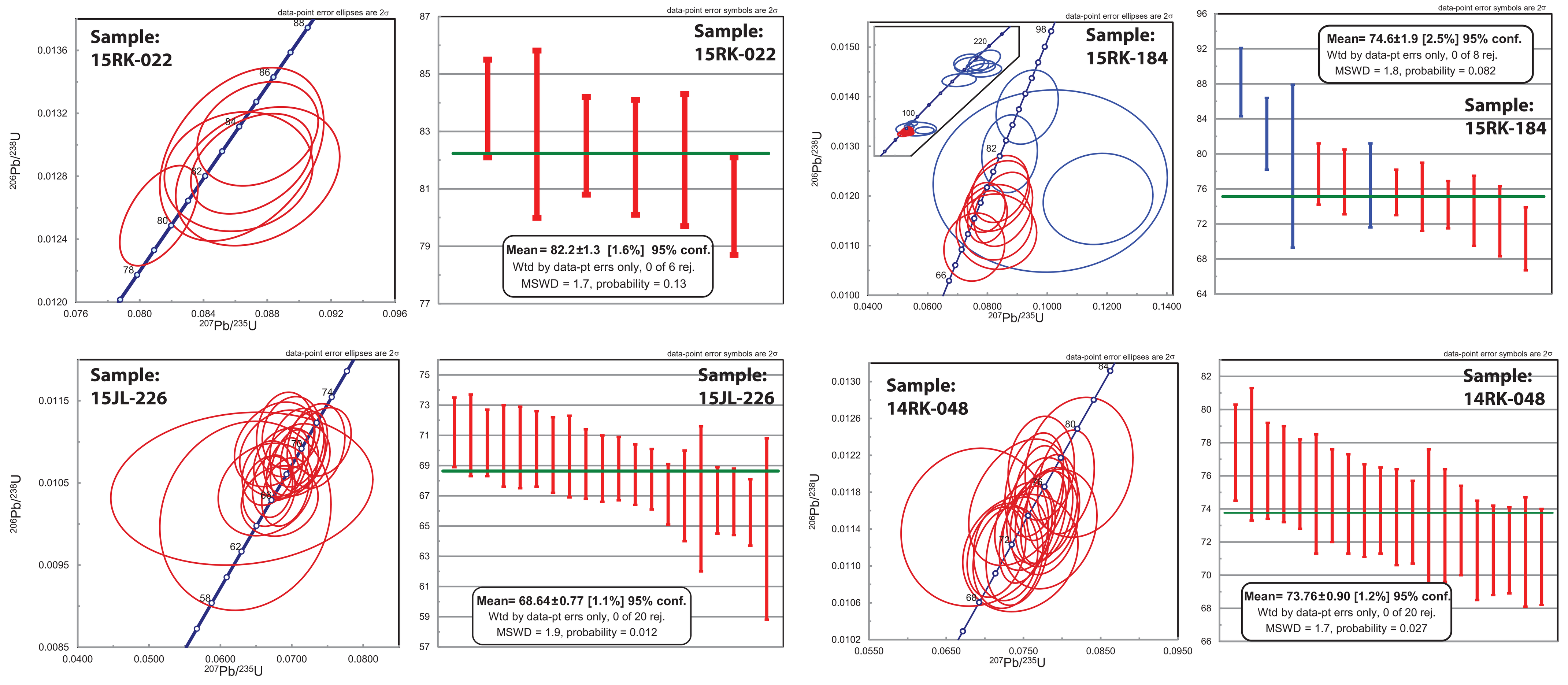


Felsic Kasalka samples are distinctly metaluminous to peraluminous [6] compared to Ootsa Lake samples (metaluminous to weakly peraluminous), Hazelton samples are metaluminous. High alumina felsic units are also reported at garnet-bearing rhyolite dykes at Capoose (Andrew, 1988) and rhyodacites at the Kasalka type section (MacIntyre, 1977).

Normalized C1 chondrite spider plots show the intermediate Kasalka samples have a listric trace, suggesting early hornblende fractionation [7] (Davidson et al., 2007; Richards, 2009). Comparatively, the felsic samples exhibit a strong negative Eu anomaly, suggesting plagioclase-stable fractionation in the upper crust.



4. U-Pb Dates



[8]. A selection of U-Pb age results on zircon obtained by LA-ICP-MS. Samples collected are from across the study area [2, 3]. Two graphs are shown for each sample: one showing a concordia plot for each sample, the second with a weighted average for each analysis.

Concordia plots and weighted averages for several U-Pb zircon samples [8]. Sample 15RK-022 is a plagioclase-hornblende porphyritic andesite, providing the oldest Kasalka age in the suite of 82.2 Ma. Sample 15RK-184 is the southernmost of the suite, from flow laminated rhyolite that outcrops just north of the Blackwater camp returns age of 74.6 Ma. In the Cabin Lake area, an andesite-dacite tuff (14RK-048) provides an age of 73.6 Ma; in the same locality a white crystal-lithic rhyolite tuff (15JL-226) results in the youngest age of 68.6 Ma, interpreted to be part of the uppermost felsic sequence for the Kasalka Group.

5. Summary & Conclusions

The Kasalka Group is a calc-alkaline to alkaline 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 listric REE profiles. The high-silica rhyolites are interpreted to reflect significant upper crustal fractionation where plagioclase and K-feldspar are stable, leading to Eu anomalies and peraluminous compositions (Gualda & Ghiorso, 2013).

New igneous zircon ages provide updated age brackets of **68-82Ma** across the study area. This range in ages may reflect long lived, localized and sporadic magmatic activity.

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