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Characterization of Fluids Related with Alkalic Porphyry Deposits in British Columbia, Canada

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Alkalic porphyries are Cu-Au high-grade deposits also known to host important PGE resources in localized metallogenic provinces such as those in British Columbia (BC) and eastern Australia. Alkalic deposits share some similarities with their calc-alkalic counterparts but also clear differences in terms of metal budget, timing with respect to subduction, vein composition, and alteration mineralogy.

This project aims to (1) identify the likely source of the mineralizing fluids and (2) characterize the physicochemical properties of fluids as a function of their distance to likely sources for some of the most alkalic porphyry deposits in British Columbia .

Mount Polley and Galore Creek are two large Late Triassic-Early Jurassic alkalic porphyries in BC, in which mineralization occurs as Cu-Au(-Ag) ore associated with hydrothermal-breccia bodies and coeval volcanic rocks. In the Mount Polley deposit, unaltered diopside phenocrysts in the alkalic volcanic units host crystallized melt inclusions consisting of sulfate, carbonate, silicate, and salt (?) phases. Apatite crystals within extensively altered and mineralized zones host aqueous fluid inclusions that are dominantly vapor-rich or liquid-rich. From preliminary observations in Galore Creek, fluid inclusion types similar to those at Mount Polley are expected, but hosted in diopside, anhydrite, and apatite crystals within the mineralized and altered regions of the deposit