Abstract ID: 177

Title: LU-HF, PB-PB, SM-ND, AND RB-SR ISOTOPE GEOCHEMISTRY OF MESOZOIC PORPHYRY INTRUSIONS, QUESNEL TERRANE, SOUTHERN BRITISH COLUMBIA, CANADA

Student: Yes

Topic: Economic Geology

Medium: Poster Presentation

Author 1 (CONTACT AUTHOR)
Name: Katrin Breitsprecher
Org: University of British Columbia
Country: Canada

Author 2
Name: Dominique Weis
Org: University of British Columbia
Country: Canada

Author 3
Name: James Scoates
Org: University of British Columbia
Country: Canada

Author 4
Name: Robert Anderson
Org: Geological Survey of Canada
Country: Canada

Keywords: Quesnel terrane, arc, subduction, isotopes, geochemistry, porphyry, Cu-Au, Mesozoic, Canadian Cordillera

Abstract: Mesozoic igneous rocks in the Quesnel terrane, southern British Columbia, Canadian Cordillera are associated with world class Cu±Mo±Au porphyry mineral deposits and accretionary tectonism. Late Triassic to Middle Jurassic igneous rocks, including mineralized porphyries, represent one accretionary cycle and show an apparent temporal trend in mineralization style. Among our studied samples, the broad temporal mineralization trends are: 1) Cu-Au±Ag porphyry mineralization in latest Triassic alkalic intrusions; 2) Cu±Au±Mo porphyry mineralization in Early Jurassic calc-alkaline intrusions; and 3) low-F Mo-type porphyry mineralization in Middle Jurassic and younger intrusions. Temporal variability in composition of arc-derived magmas due to changes in source (mantle, slab component, crustal component) are to be expected due to changes in slab state and resulting lithosphere-asthenosphere interplay over the course of an arc system's life-cycle: 1) nascent convergence; 2) steady-state subduction; and 3) accretion to post-collision. Preliminary high-precision results of Lu-Hf, Pb-Pb, Sm-Nd, and Rb-Sr isotopic analyses for samples from the most southerly Quesnellian intrusions confirm the arc origin, and further indicate a distinct increase in radiogenic source components with time, i.e. towards younger suites. Initial 207Pb/204Pb relative to 206Pb/204Pb reveal tightly linear trends within each suite, with a significant increase in a radiogenic component between the Late Triassic and Early Jurassic (201-193 Ma). Initial

176Hf/177Hf relative to 143Nd/144Nd indicates a mantle origin for the Late Triassic mineralized monzodiorite suite and corroborates the time-progressive increase in radiogenic component for the younger units, as do trace-element indicators such as La/Yb and Nb/La. The radiogenic component may derive from either subducted sediment or assimilation of Precambrian crust. Gold, which is most abundant in the oldest samples, is likely to derive from melting of subducted oceanic sediment, although assimilation of a previously Au-enriched crustal source cannot be ruled out at this time. Isotopic analysis of additional samples from the Kamloops area, Thuya batholith, and Takomkane batholith will be used to further constrain the origin of the Quesnel arc and hence of its associated mineralization.