Lee RG, King JJ, Vallée MA, Lesage G, Hart CJR, Byrne K, Ryan J, Alfaro M, D'Angelo M, Hollings P, Mir R, Gleeson SA, Enkin RJ, Morris WA, 2018, Development of an integrated 3D model and distal expression of the Highland Valley Copper system, south-central British Columbia, Abstract, Roundup, Vancouver, BC

Understanding the distal features of economic deposits is essential for the exploration of new and potentially buried targets. Subtle expressions of hydrothermal fluid alteration and identification of the fluid pathways is imperative for defining vectors towards mineralization. Extensive geological and geophysical studies were conducted at the Teck Resources Limited owned and operated Highland Valley Copper mine which is hosted in the late Triassic Guichon Creek Batholith (GCB). Pre- and syn-GCB magmas were emplaced over at least eleven million years with the main facies of the batholith forming between approximately 211 and 207 Ma. This long period of magmatic activity increased the fertility of the region through magmatic crystallization, mixing, and oxidation, which culminated with the formation of the HVC porphyry Cu-(Mo) deposits. Hot, hydrous fluids released during the formation of mineralization produced high temperature alteration mineral assemblage of quartz-potassium feldspar-biotite-sulfide-mica adjacent to the deposits and assemblages of albite-white mica-epidote-calcite-tourmaline-prehnite distal from the main ore centres. Extensive field mapping was conducted over a 40x30 km area with over 1000 samples of both fresh and altered rock types in the region collected for petrologic and analytic evaluation. Airborne magnetic and radiometric surveys, as well as ground and airborne gravity surveys, were reprocessed and used to develop a new 3D model of the batholith and porphyry centres. The model was constrained using the lithochemical and petrophysical properties of all the samples collected for the study and in addition were used to generate new inversion models. The 3D model defines new lithological, structural, and alteration features associated with the HVC system that provides an example for how large scale fertile plutons and associated mineralized ore bodies are formed through time.

NSERC-CMIC Mineral Exploration Footprints Project Contribution 166.