Lesage G, Byrne K, Lee RG, Hart CJR, 2017, District-scale porphyry-related hydrothermal alteration and the quantitative use of feldspar-staining: the case of Highland Valley Copper, British Columbia, Abstract, Roundup, Vancouver, BC

The Highland Valley Copper district (HVC), near Kamloops, British Columbia, contains four mineralized porphyry Cu ± Mo centers hosted in the Late Triassic Guichon Creek batholith. Porphyry copper systems form when large quantities of magmatic fluids are exsolved from a magma chamber and react with the country rock, causing hydrothermal alteration that may include changes in feldspar species modal percentages. The spatial distribution of district-scale hydrothermal alteration at HVC is strongly controlled by structural permeability. The main alteration assemblages observed include: (1) potassic alteration (K-feldspar±biotite) striking dominantly NNE and approximately E, (2) sodic-calcic alteration (albite-chlorite-epidote±actinolite±diopside±garnet) striking dominantly NNE and WNW, (3) coarse-grained white mica alteration striking dominantly NE and NW, and (4) white mica-chlorite-prehnite alteration striking dominantly NNE. Quantitative image analysis of feldspar stained rock slabs using the ImageJ software is a cheap and effective technique to assess the nature and intensity of hydrothermal alteration. Vein-controlled K-feldspar alteration can be identified by analyzing the shape and size of particle fit ellipses in the slab and detecting samples containing anomalously large and elongate ellipses corresponding to interconnected grains in veins. Because sodic-calcic alteration destroys K-feldspar, it can be identified by a ratio of K-feldspar to plagioclase, and a K-feldspar particle count per area decreasing by up to three and two orders of magnitude respectively. Quantifying feldspar alteration can significantly improve the mapping of alteration distribution and intensity by recognizing otherwise cryptic features not consistently observed by geologists in the field.

NSERC-CMIC Mineral Exploration Footprints Project Contribution 113.