Taylor CE, Ross M, Perrouty S, Lypaczewski P, Rivard B, Clark JR, Linnen RL, Taves R, 2017, Detecting increasingly larger exploration footprints of a world-class stockwork-disseminated Au deposit: integration of hyperspectral imaging and petrography of glacial clasts in surficial sediments , Abstract, CIM-GAC-MAC, Vancouver, BC

There is a growing need for exploration approaches designed to vector towards high-tonnage, near surface, low-grade gold deposits, particularly in glaciated terrains. The challenges include potentially indiscernible geophysical signatures undercover and limitations of detecting fine-grained indicator minerals in glacial sediments. This research aimed to develop a new approach to exploration in glaciated terrains. It involved hyperspectral imaging analyses integrated with detailed petrographic and mineralogical investigation on larger clasts from glacial sediments down-ice of the footprint of the Canadian Malartic stockwork-disseminated Au deposit. Hyperspectral imaging has been previously demonstrated to be a powerful tool to outline gold-related hydrothermal alteration in micas and to define a footprint that extends significantly beyond the gold mineralization itself. In this study, 2-4 mm and 4-8 mm clasts from 57 till samples were analysed using hyperspectral imaging. The results revealed the presence of both phengitic white mica (2205-2215 nm) and Mg-rich biotite (2241-2252 nm), similar to the hydrothermal alteration of the Canadian Malartic bedrock footprint. Forty-two pebbles that contain both mica footprint indicators were selected to perform further petrographic and mineralogical analyses to confirm potential bedrock sources. Among those pebbles, 38 have similar textural and mineralogical features to the Canadian Malartic deposit and its footprint. The dispersion of the 4-8 mm altered clasts in glacial sediments is approximately 70 sq km, and that for the 2-4 mm fraction is approximately 50 sq km. Therefore, the glacial processes during the last glaciation have produced an extensive secondary detrital surficial footprint down-ice of the Canadian Malartic deposit that is significantly more extensive than the identified hydrothermal alteration bedrock footprint (~13 sq km). This study is the first application of hyperspectral imaging analysis to glacial clasts, a straightforward, low-cost, and rapid technique for mineral exploration.

NSERC-CMIC Mineral Exploration Footprints Project Contribution 172.