Canadian Malartic Geological Footprint: Integration of Airborne Magnetic Surveys, Field Observations, Mineralogical and Geochemical data of Mafic Intrusive Rocks

S. Perrouty [1], R.L. Linnen [1], G.R. Olivo [2], C.M. Lesher [3], R. Wares [4]

[1] Earth Sciences, Western University, London, Ontario, sperrout@uwo.ca; [2] Geological Sciences and Geological Engineering, Queens University, Kingston, Ontario; [3] Earth Sciences, Laurentian University, Sudbury, Ontario; [4] Corporation Minière Osisko, Montréal, Québec

The Canadian Malartic gold mine is hosted mainly by metasedimentary rocks of the Pontiac Group, located on the south side of the Cadillac – Larder Lake fault system. On the north side, gold is also locally hosted in Piché Group mafic and ultramafic rocks. With a resource of over 14 Moz of gold (past production and current resources), this epigenetic world-class deposit should have a significant alteration halo, which is currently being investigated by the CMIC-NSERC Exploration Footprint project. Integration of multiple datasets (geological, mineralogical, geochemical, petrophysical, and geophysical) aims to characterize the footprint of the Malartic deposit and to identify exploration criteria that could be used in other areas of the Superior Province. Preliminary interpretation of new field data, including outcrop data, previous maps, and aeromagnetic surveys resulted in a revision of the MNRQ-SIGEOM map for the Pontiac metasediments in the Malartic area. The integrated data reveal the presence of multiple intrusions around Lac Fournière, which have distinct compositions, orientations, intensities of deformation, metamorphism, and alteration. In the Canadian Malartic mine area, highest gold grades (>1ppm) are associated with the nearby presence of intrusive rocks (monzodiorites) and major structures (the Sladen fault and the "Zone NW" fold hinge). Various generations of mafic dykes cross-cut the Pontiac meta-sediments and the monzodioritic rocks in the Malartic region. Some of them are cut by the felsic intrusions and they have been affected by multiple deformation and alteration events. Preliminary petrographic and geochemical investigations suggest that the mafic dykes, because of their more homogeneous (and mafic) composition than the Pontiac metasediments, may allow for a better discrimination of the various hydrothermal alteration events that affected the Malartic property. They appear to be a fundamental element in determining the relationships between mafic magmatism, deformation, hydrothermal alteration, and gold mineralization.
CMIC-NSERC Exploration Footprints Network Contribution 008.