Lithological and Structural Setting of the Komatiite-Associated Cubric Ni-Cu-PGE Showing, Southern Manneville Fault Zone, Southern Abitibi Subprovince, Québec

D. Shirriff[1], C.M. Lesher[1], X. Zhou[1], B. Lafrance[1]

[1]Harquail School of Earth Sciences, Laurentian University, Sudbury, Ontario

The Abitibi greenstone belt contains abundant small-medium stratiform (Type I) komatiite-associated Ni-Cu-(PGE) deposits. The Marbridge deposit and Cubric Nickel Showing (CNS), hosted in the 2714 ± 2 Ma La Motte-Vassan Formation of the Malartic Group, are located ~25 km north of Malartic, QC. The La Motte-Vassan Formation predominantly consists of komatiites, basalts, and minor felsic volcanoclastic rocks which were later intruded by gabbroic and granitic dikes. This study is part of the Malartic transect mapping component of the Metal Earth project. The goal of this study is to examine the stratigraphic, structural, and geochemical setting of the mineralization in the CNS. Mineralization in the CNS occurs as semi-massive pyrite-pyrrhotite-pentlandite hosted in iron formation and the chilled margins of a large gabbro dyke. The mineralization at the CNS is interpreted to relate to that at the nearby Marbridge Ni-Cu mine. The Ni-rich, Cu-poor assemblage suggests a komatiitic rather than sedimentary-exhalative or gabbroic origin, and the interior of the dike is barren, suggesting a mobilized primary komatiitic origin rather than a primary gabbroic origin. Four episodes of deformation have been recognized at CNS and in nearby outcrops: D_1 pre-dates gabbro emplacement and is observed in metavolcanic xenoliths hosted in gabbro, is manifested as foliation that likely accompanied regional thrust faulting, and mobilized ductile sulfides from the komatiites into adjacent banded iron formation. D_2 post-dated emplacement of the gabbro and granite dikes, is manifested by isoclinal F_2 folds and principal S_2 cleavage, and sheared Fe-Ni-Cu sulfides into the chilled margin of the gabbro. D_3 and D_4 did not mobilize sulfides and are expressed as discrete and isolated S-C fabrics and crenulation cleavage throughout the CNS. Core logging and petrographic, textural, mineralogical, mineral chemical, and whole-rock geochemical studies are in progress to better constrain the structural history, timing of deformation with respect to metamorphism (i.e., as high-temperature MSS or lower-temperature pyrrhotite-pentlandite-chalcopyrite), metal fractionation during deformation, and – if possible – to place constraints on some of the mechanisms of magmatic ore genesis.