Characterization of alteration systems associated with subvolcanic intrusions and VMS mineralization in the Duprat-Montbray formation, lower Blake River Group, Rouyn-Noranda, Quebec

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This study is part of the Metal Earth research initiative that aims to identify and understand the controls responsible for the differential metal endowment of Archean greenstone belts in order to improve targeting of endowed terranes during mineral exploration. Utilizing the world class Noranda volcanogenic massive sulphide (VMS) camp, this study aims to reconstruct the volcanic, intrusive and hydrothermal history of the Duprat-Montbray formation (DMF), a less metal endowed volcanic stratigraphy of the 2702 Ma successions which are host to the gold-rich Horne and Quemont VMS deposits. The DMF stratigraphy is characterized by alternating andesitic pillowed and massive flows and rhyolitic massive-coherent and volcaniclastic units that form part of the 2704-2695 Ma Blake River group (BRG). The DMF is host to the Fabie and Magusi VMS deposits with a past production of 1.3 Mt at an average grade of 1.99% Cu, 4.12% Zn, 42.8 g/t Ag and 1.27 g/t Au. Both deposits are in close proximity to the 2701 Ma subvolcanic Fabie pluton, a quartz-feldspar porphyry, that is in sharp-irregular contact with the volcanic rocks and brecciated along the contact with later diorite intrusive phases. Preliminary research is focused on defining the volcanic stratigraphy and its spatial-temporal relationship with the Fabie intrusion through detailed field mapping and petrographic analysis of volcanic and intrusive units, and U-Pb zircon geochronology to constrain the lower age of the DMF. Once the stratigraphy has been established, research will focus on defining the VMS alteration system and its relationship to the Fabie intrusion and the VMS deposits. This will include mineralogical and geochemical characterization of the alteration. The alteration will be mapped using whole rock geochemistry and $\delta^{18}O$-isotopic data collected from samples within a ~10 km by 5 km grid, taken systematically across the intrusion, volcanic host rocks, and VMS deposits. The alteration map will constrain the magnitude of fluid-rock interaction between the Fabie intrusion and both VMS deposits, and will be used to create a geological model for the formation of the Fabie and Magusi deposits. Results of this research will enable a comparison to more prolific VMS mineralized stratigraphy in the Noranda camp.