Preliminary results from detailed geological mapping of the Powell block, Rouyn-Noranda area, Quebec

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Introduction

The Powell block (PB), named by De Rosen-Spence in 1976, is located in the Rouyn-Noranda gold and base-metal mining camp, where it extends from the Beauchastel fault to the north, to the Horne Creek fault (HCF) to the south, forming a wedge-shaped fault block approximately 18 km long by 2–10 km wide (Figure 1). The PB hosts the Au-rich Quemont VMS deposit (14 Mt at 5.5 g/t Au, 331 g/t Ag 1.32%Cu, and 2.44% Zn) and separates the Horne deposit, a world class Au-rich VMS deposit (54 Mt at 6.1 g/ Au, 13 g/t Ag, and 2.2% Cu), from less Au-rich VMS deposits (≤ 1 g/t Au) north of the Beauchastel fault. Syn-tectonic gold-quartz veins (Powell, Sillidor, New Marlon, Anglo-Rouyn) and gold poor, Cu-rich sulfide veins (Powell, B, D and F zones) are also present in the Powell Block (Figure 1).

Project Goals

This project aims to establish the timing, and relative roles of Au enrichment in Au-rich VMS deposits such as the Horne and Quemont deposits, and the relative roles of syngenetic and epigenetic processes in their metallogeny, through three thematic studies:

1) Characterize the Cu-stringer mineralization and associated spotted alteration found along an inferred synvolcanic fault within the PB. This may represent the deep plumbing system of a VMS deposit yet to be discovered and may provide insights into the formation of Au-rich VMS deposits in the Noranda camp.
2) Characterize the orogenic Au-mineralization along the HCF and map the carbonate alteration in its vicinity using recent drill core intersections and exposed rocks in the vicinity of the fault.
3) Map the distribution of carbonate alteration in mafic dikes associated with the Horne deposit to determine if and how this alteration relates to gold enrichment.

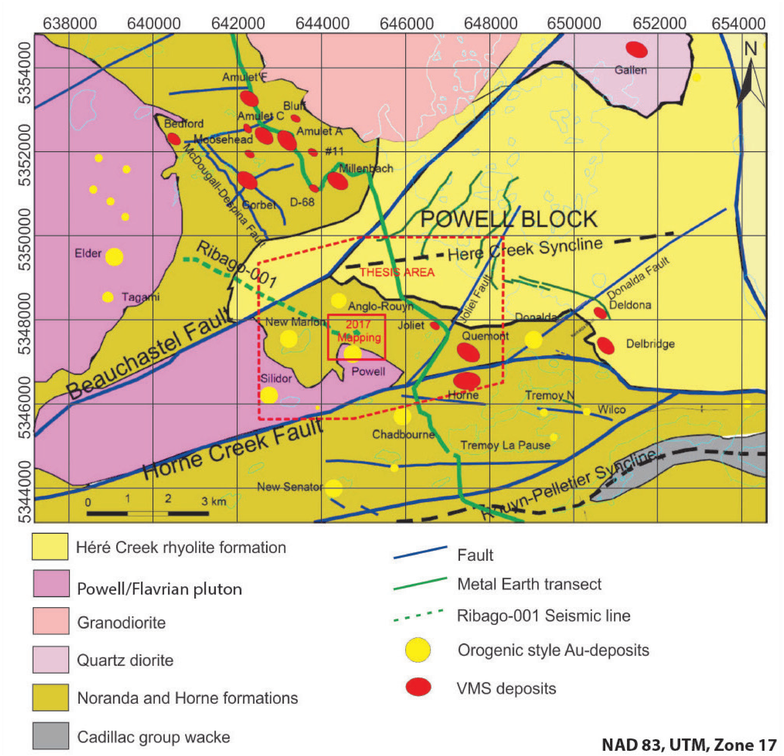

Figure 1: Regional geological map of Rouyn-Noranda, Quebec, showing the area mapped in 2017, and future extended mapping area. Yellow and red circles show the distribution of orogenic and VMS style mineralization, respectively, scaled to reflect deposit size. The Metal Earth Rouyn-Noranda Transect is shown in green, and the private sector Ribago-001 seismic transect is shown by a green dashed line.

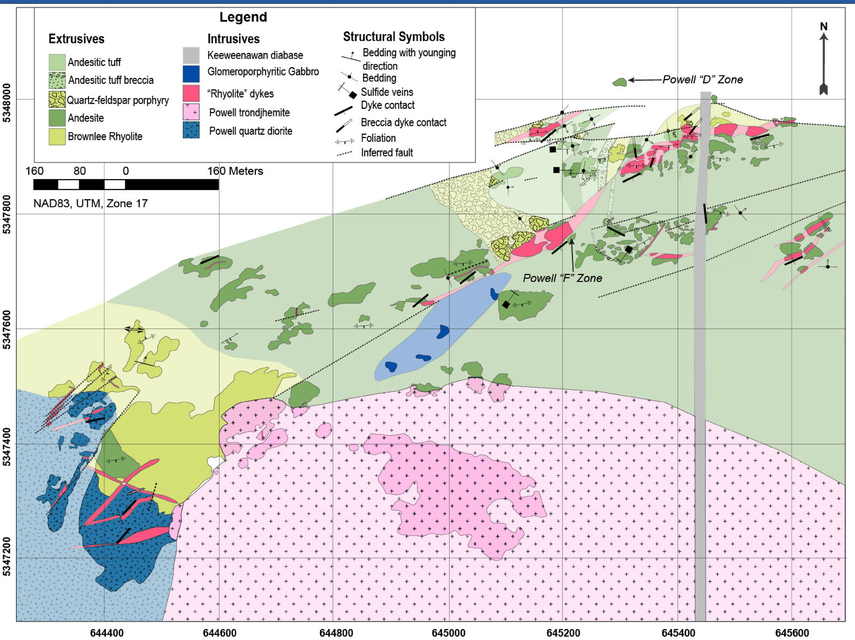

Figure 2: Preliminary map from the 2017 field season, Rouyn-Noranda, Quebec. Inferred faults digitized from Morris, 1957.

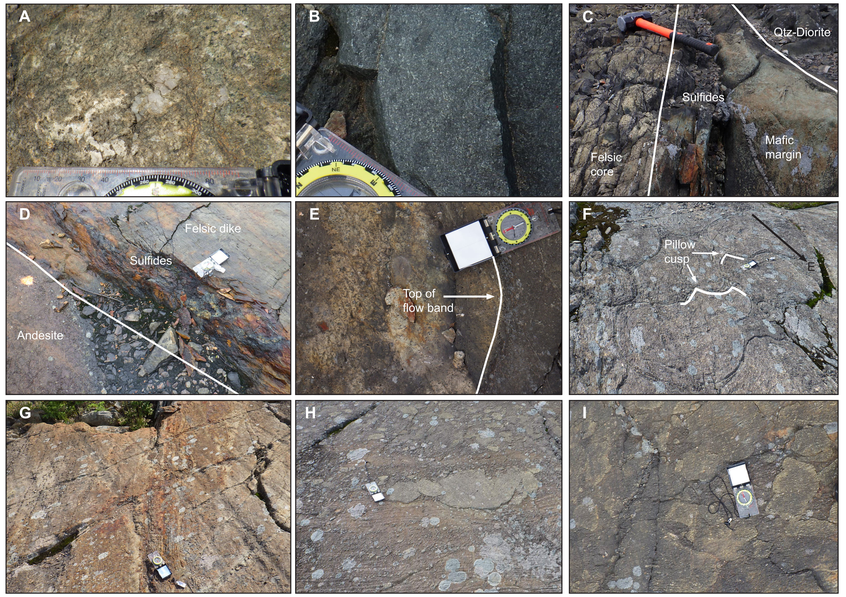

Figure 3: Field photographs of A) Powell Tonalite, with miarolitic cavities. B) Quartz diorite with euhedral plagioclase laths. C) Composite dike with felsic core and mafic margin. Sulphide minerals are present along the mafic margin. D) Felsic feeder dike, with Cu-veining along contact margin between the dike and host andesite. E) Brown-Lee rhyolite with hyaloclastite defining the margin of the rhyolite lobe. F) Pillows with well defined cusps indicating top to the east. G) Graded bedding in mafic tuff. H) Andesitic tuff breccia, with angular quartz-feldspar porphyry blocks within the bedded mafic tuff. I) Proximal quartz-feldspar porphyry flow, showing angular, closely packed, jig-saw fit clasts. Compass (10 cm) for scale.

Local Geology

The Powell Pluton consists of trondjhemite (2700.1 ±1.0 Ma; McNicoll et al., 2014), tonalite, and diorite. Its upper intrusive contact with overlying older volcanic rocks of the Blake River Group dips at about 60° to the northeast. The volcanic rocks include the lowermost Brown Lee rhyolite formation and the overlying Powell formation. Hypabyssal "rhyolite dikes", strike northeast and cut across NW-striking and NE-dipping (60° - 70°) strata (Figure 2). They are feeder dikes to the Héré Creek rhyolite, which overlies the Powell formation (Figure 1). These early dikes host Au-poor, Cu-rich vein mineralization along their margins (eg. Powell F-Zone; Figure 2). Volcanic strata is offset along a lineament represented by one of the felsic dikes, suggesting that it was emplaced along a synvolcanic fault.

Figure 4: Field photographs of A) Massive andesitic volcanic rock overprinted by sulfide stringers with spotted alteration haloes. B) Close-up of alteration spots, showing dark coloured cores with light coloured rims. C) Close-up of alteration spots, showing flattening parallel to foliation.

Alteration

Alteration spots surrounding sulfide stringer veins (Figure 4a,b and c) are similar to the dalmatianite alteration observed at the Amulet deposit (Figure 1). Dalmatianite consists of cordierite, anthophyllite, and cummingtonite, and results from contact metamorphism of the chlorite-sericite alteration envelope surrounding VMS deposits (Fitchett, 2012). The alteration spots in the Powell block consist of clusters of very fine-grained sericite and quartz within a chlorite matrix (Figure 5). Element maps taken with the SEM indicate zonation within the spot, characterized by a Si-rich core, grading outwards into a K-rich rim and higher Mg and Fe within the matrix (Figure 5). They either represent retrogressed metamorphic porphyroblasts or altered varioles. Further work on the SEM will be done to establish the nature of these alteration spots.

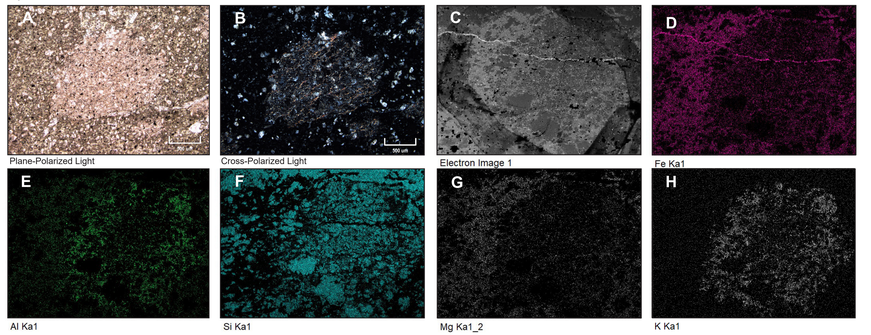

Figure 5: Alteration spot taken from the location in Figure 4. A) Photomicrograph in plane polarized light. B) Photomicrograph in cross-polarized light. C) Back Scattered Electron Image. D) Chemical distribution map of Fe. E) Chemical distribution map of Al. F) Chemical distribution map of Si. G) Chemical distribution map of Mg. H) Chemical distribution map of K.

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