NEW GEOLOGICAL MAPPING AND SETTING OF GOLD MINERALIZATION IN THE BRUNNE LAKE AREA, FLIN FLON BELT (PART OF NTS 63K11 AND 63K14)

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Introduction

An area spanning about 30 km between the eastern margin of the Flin Flon mining camp and the Elbow Lake region consists mostly of granitoid rocks, but also contains two significant supracrustal belts that have not been examined since the 1950's; one of these belts is referred to as the Brunne Lake belt. Forest fires during the summer of 2010 cleared the vegetation from the outcrop in this belt and thus provided better access and an opportunity to investigate the local geology. The supracrustal and intrusive rocks in the Brunne Lake area provide new information pertaining to the evolution and tectonic assembly of the central Flin Flon Belt. A better understanding of the local geology and its tectonic setting will also help improve the level of knowledge of the area's mineral potential. A 1:10 000 scale geological mapping program was conducted in the Brunne Lake area during the 2012 field season.

Project objectives

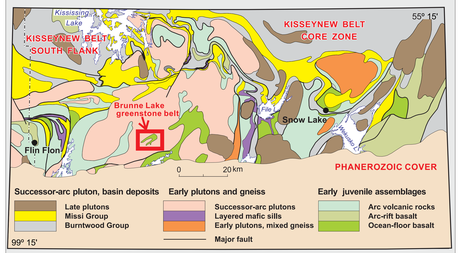
The geological investigation of the Brunne Lake greenstone belt aims to characterize the package of volcanic rocks, determine its possible tectonic setting, and identify, if possible, potential correlative units in the area. The stratigraphy of the supracrustal rocks will also be a focus of the study as this will help gaining a better knowledge of the geometry of the various geological units and refine our understanding of the deformational history of the belt. The various intrusive suites are also to be examined. In that purpose, geological mapping was carried on during the summer of 2012.

Further fieldwork will be conducted in the summer of 2013. The focus will be to refine the structural model for the greenstone belt with a particular emphasis on further delineating the major shear zones in the belt and deciphering their deformational history. Known showing and occurences will be systematically re-visited. In 2013, geological mapping of the greenstone belt immediately west of Brunne Lake will also be undertaken.

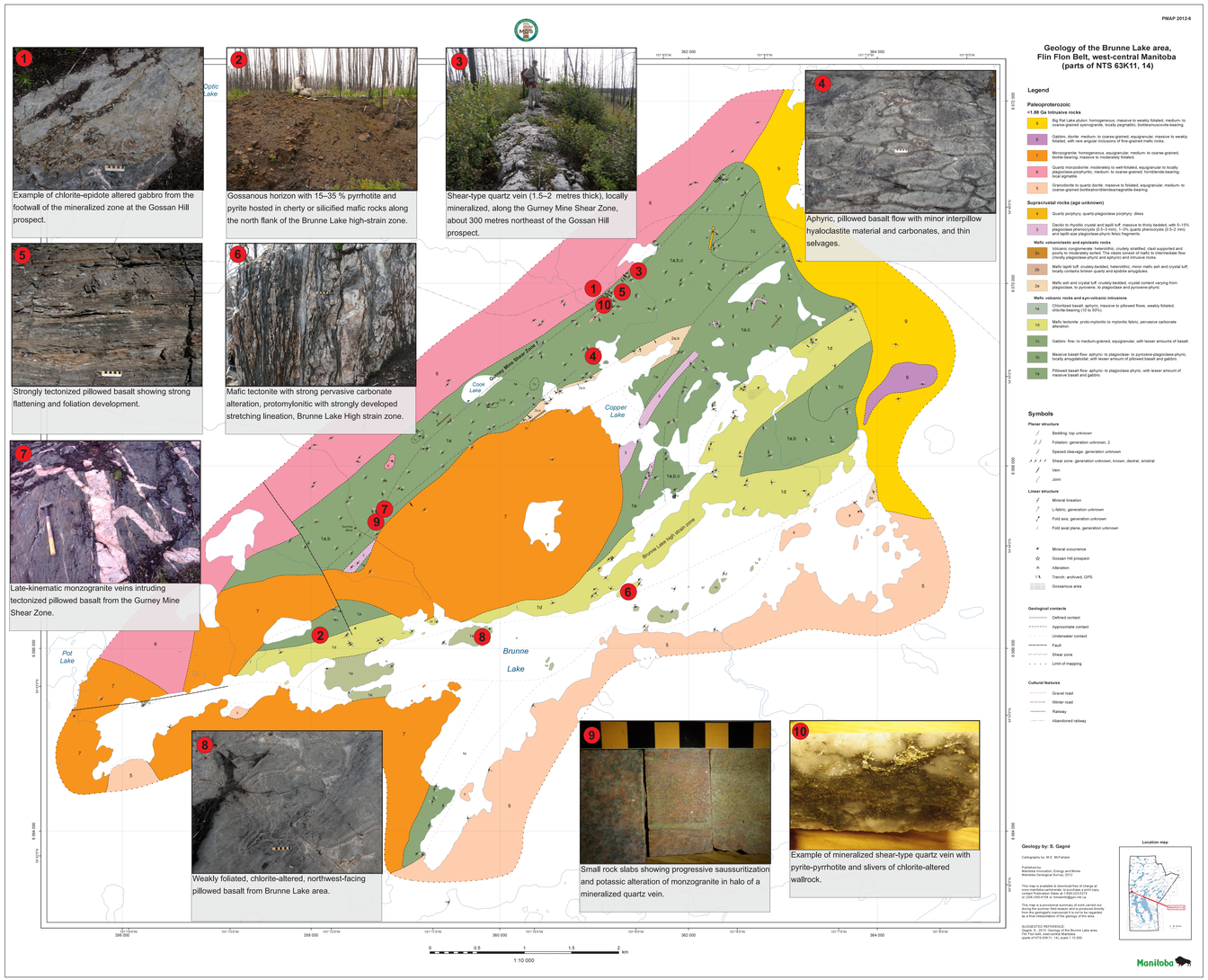
Concurrently to geological mapping, geochemical characterization of the different rock types is being done, over 35 whole-rock geochemical analyses have now been obtained from the Brunne Lake area, Sm/Nd analysis will also be obtained and samples were taken for U-Pb age determinations.

Ultimately, results from this study will add to our understanding of the tectonic evolution of the central Flin Flon Belt and its implication for the development of gold metallotects.

Project Location



Map showing the main geological subdivisions of the Flin Flon Belt. The project area is highlighted by the red box. The central Flin Flon Belt area consist of bimodal arc-related volcanic and volcaniclastic rocks, and ocean-floor volcanic rocks intruded by successor-arcs plutons of various compositions.



1 Example of chlorite-epidote altered gabbro from the footwall of the mineralized zone at the Gossan Hill prospect.

2 Gossanous horizon with 15–35 % pyrrhotite and pyrite hosted in cherty or silicified mafic rocks along the north flank of the Brunne Lake high-strain zone.

3 Shear-type quartz vein (1.5–2 metres thick), locally mineralized, along the Gurney Mine Shear Zone, about 300 metres northeast of the Gossan Hill prospect.

4 Aphyric, pillowed basalt flow with minor interpillow hyaloclastite material and carbonates, and thin selvages.

5 Strongly tectonized pillowed basalt showing strong flattening and foliation development.

6 Mafic tectonite with strong pervasive carbonate alteration, protomylonitic with strongly developed stretching lineation, Brunne Lake High strain zone.

7 Late-kinematic monzogranite veins intruding tectonized pillowed basalt from the Gurney Mine Shear Zone.

8 Weakly foliated, chlorite-altered, northwest-facing pillowed basalt from Brunne Lake area.

9 Small rock slabs showing progressive saussuritization and potassic alteration of monzogranite in halo of a mineralized quartz vein.

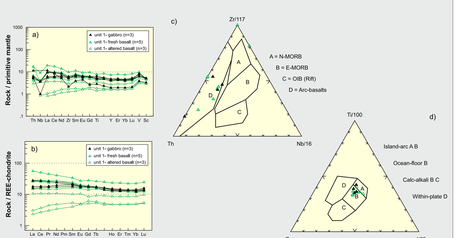
10 Example of mineralized shear-type quartz vein with pyrite-pyrrhotite and slivers of chlorite-altered wallrock.

Structural Geology

The main foliation observed in the supracrustal rocks is the flattening plane in which lies the stretching lineation. On the northwestern flank of the supracrustal belt, the main foliation is subvertical and consistently strikes 040°. The stretching lineation typically plunges moderately (50–65°) to the northeast but it steepens progressively as it gets closer to the high-strain zones, till eventually it is downdip within the shear zone. Two major high-strain zones affect the supracrustal rocks. The Gurney Mine Shear Zone, a narrow (50–100 m) high-strain zone striking 040°, characterized by ductile fabric and dextral-shear sense, trends along the northern margin of the supracrustal package from the eastern end of Copper Lake to the Gurney mine. The Brunne Lake high strain zone straddles across Brunne Lake for 100–600 m, widening from west to east, where it splays out. The latter shear zone is characterized by a ductile, mylonitic fabric and a pervasive carbonate impregnation of the rocks.

Geochemistry

All fresh samples of the Brunne Lake basalt (unit 1) display common geochemical characteristics. The trace-element geochemical signature of the basalt is very similar to that of McDougalls Point basalt from the southwestern area of Elbow Lake (Stern et al., 1995; Babechuk and Kamber, 2011; Syme and Whalen, in press). This signature exhibits both back-arc and ocean-floor geochemical characteristics (e.g., lower TiO_2 and higher Th/Nb ratios) and was interpreted by Stern et al. (1995) as reflecting magma generation in a back-arc spreading environment



Stern, R. A., Syme, E. C. and Lucas, S. B. 1995. Geochemistry of 1.9 Ga MORB- and OIB-like basalts from the Amisk collage, Flin Flon Belt, Canada; evidence for an intra-oceanic origin, Geochimica et Cosmochimica Acta, v. 59, no. 15, p. 3131–3154. **Babechuk, M. G. and Kamber, B. S. 2011**. An estimate of 1.9 Ga mantle depletion using the high-field-strength elements and Nd-Pb isotopes of ocean floor basalts, Flin Flon Belt, Canada; Precambrian Research, v. 189, no. 1–2, p. 114–139.**Syme, E. C. and Whalen, J. B. in press**; Geology of the Elbow Lake area, central Flin Flon Belt (part of NTS 63K10SW); Manitoba Geological Survey, Geoscientific Report 2012-1.

Gold mineralization

The Brunne Lake area is host to a former gold producer, the Gurney mine, and several gold showings. Several gossans observed in the Brunne Lake area generally show a strong spatial association with major or subsidiary shear zones and display a strong subvertical fabric. Fine-grained disseminated pyrrhotite (5–25%) is the main sulphide mineral identified in the gossans. Locally, trace amounts of chalcopyrite, galena and pyrite were observed. The gossans were generally associated with a pervasive silica-replacement–type alteration. Examples of both massive and composite quartz-carbonate shear-type veins were observed in the shear zones. The wallrocks vary from gossanous to weakly or intensely silicified or epidote-chlorite altered rock. The relationship between the gold mineralization and the various alteration types has not been resolved and will be the focus of future studies. The monzogranite (unit 7) that forms the core of the supracrustal package is also locally mineralized. Near the Gurney mine, the monzogranite shows sets of narrow quartz veins (0.5–5 m) associated with silicification, saussuritization and potassic alteration of the wallrocks, locally with 1–5% pyrrhotite.