Till geochemistry of the West Iznogoudh Zn showing, Point Lake map sheet (86H), Nunavut

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Summary

Till geochemistry has been widely used as a mineral exploration method in glaciated terrain. Applying this exploration method in regions affected by multi-phase glacial ice flows requires a good understanding of dispersal processes involved with each ice flow trajectory. The West Iznogoudh (WIZ) showing occurs in a region of thin to moderate glacial cover with a wide array of ice flow trajectories.The landforms and surface materials of the Point Lake map sheet (86H) are the result of glaciation that flowed in a general westward direction from the Keewatin Sector of the Laurentide Ice Sheet. Recent fieldwork confirmed the earliest ice flow direction to be 220-230°, with a short-lived intermediate flow in the northwest direction (approximately 340°) and a strong, sustained flow to be in the 287° direction. Rock samples were collected from outcrop at the WIZ showing to define the source trace element geochemical signature. Preliminary petrographic analysis indicates pyrite, chalcopyrite and sphalerite as the dominant sulphide minerals present. Till samples were collected up-ice, overlying and down-ice from the West Iznogoudh showing to document the geochemical signature and distance down-ice of metal-rich debris from the showing. This information will also be used to determine the net effect of geochemical dispersal from all phases of Laurentide ice flow. This information can be then applied regionally to prospective areas. This research will be used to fulfill undergraduate thesis requirements at the University of Calgary for the senior author.

Introduction

The Izok Lake volcanogenic massive sulphide (VMS) deposit, located in Nunavut, is one of the largest undeveloped Zn-Cu-Pb VMS deposits in North America (Morrison, 2004). Approximately 6 km to the northwest of the Izok Lake deposit is another mineralogically different showing known as the West Iznogoudh showing which was discovered in the 1970s and about which little is known. A soil sampling survey was carried out in 1976 over the WIZ area, which identified a Zn, Pb, Cu, Ag anomaly. Geochemical analyses of these samples identified a felsic

volcanic rock with quartz eyes that contains approximately 7% sphalerite and 45-50% pyrite (Heslop, 1976).

The WIZ study area has been heavily impacted by the Laurentide Ice sheet, which sculpted the landscape and deposited glacial debris (boulders and till) of varying thickness throughout. Till samples collected in the area as part of the current study will be analyzed to determine the net glacial dispersal from the WIZ showing, and if possible, differentiate between the geochemical signature of the WIZ showing and Izok deposit to the east.

This project is being funded by the Geological Survey of Canada (GSC) as part of their Geo-mapping for Energy and Minerals (GEM) project, (2008-2013), (http://gsc.nrcan.gc.ca/gem/index_e.php) and in collaboration with Minerals and Metals Group (MMG), who own the property.

Sample Survey

A total of 40 till samples were collected in July of 2009 over a 10.5 km^2 area up-ice, overlying and down-ice from the West Iznogoudh showing. Twenty-four of the 40 till samples will be used for geochemical analysis while the remaining 16 will be used for pebble counts. An additional 5 samples were collected up-ice of the WIZ showing for pebble counts and these sample locations represent background provenance. The samples collected closest to the showing are spaced at intervals of approximately 50 m. This interval increased to approximately 100 m at sample sites further away from the showing. Pebble count sample sites were spread across the study area along 3 lines spaced approximately 750 m apart at approximately 1 km intervals.

Till samples were collected from fresh mudboils at a depth of approximately 0.20-0.25 m (Fig. 1). One sample, weighing approximately 2.5 kg, was collected at each site. Striation measurements and other ice flow indicators were photographed and recorded where available. Bedrock samples were collected at the WIZ showing for comparative analysis with the till samples.

Figure 1: A typical mudboil before (A) and after (B) sampling.

Quaternary Geology

Regionally, the area was affected by the Laurentide Ice Sheet, flowing from the Keewatin Ice Divide (Dyke and Prest, 1987). The landforms and surface materials are the result of Late Wisconsin ice that flowed in a general westward direction (Dredge et al., 1996) with parallel northwest trending eskers that formed during deglaciation. Till in the West Iznogoudh area usually occurs as a thin veneer (<1m) over bedrock. Thickness increases in depressions and

low-lying areas between bedrock outcrops. Till, observed in mudboils, is brown-grey with a silty sand to sandy silt matrix; modal clast sizes are small pebbles, subangular to subrounded in shape. Streamlined and sculpted landforms, striations and eskers occurring in the area show an extensive ice flow history with three known directions. These ice flow patterns were first observed by a surficial mapping survey carried out by the GSC (Dredge et al., 1996) and augmented by the authors in the field. The oldest recorded ice flow was to the southwest (220-230°), determined by striations found in the lee side of bedrock features formed from younger flows. Observations of striae, roche moutonée and whaleback forms suggest that a short-lived, intermediate flow occurred in the northwest direction (305-315°) followed by a strong, sustained, youngest event (280-290°), which likely represents maximum glacial erosion and entrainment of mineralized debris, as the macro landforms predominately reflect the west-northwest flow (Fig. 2).

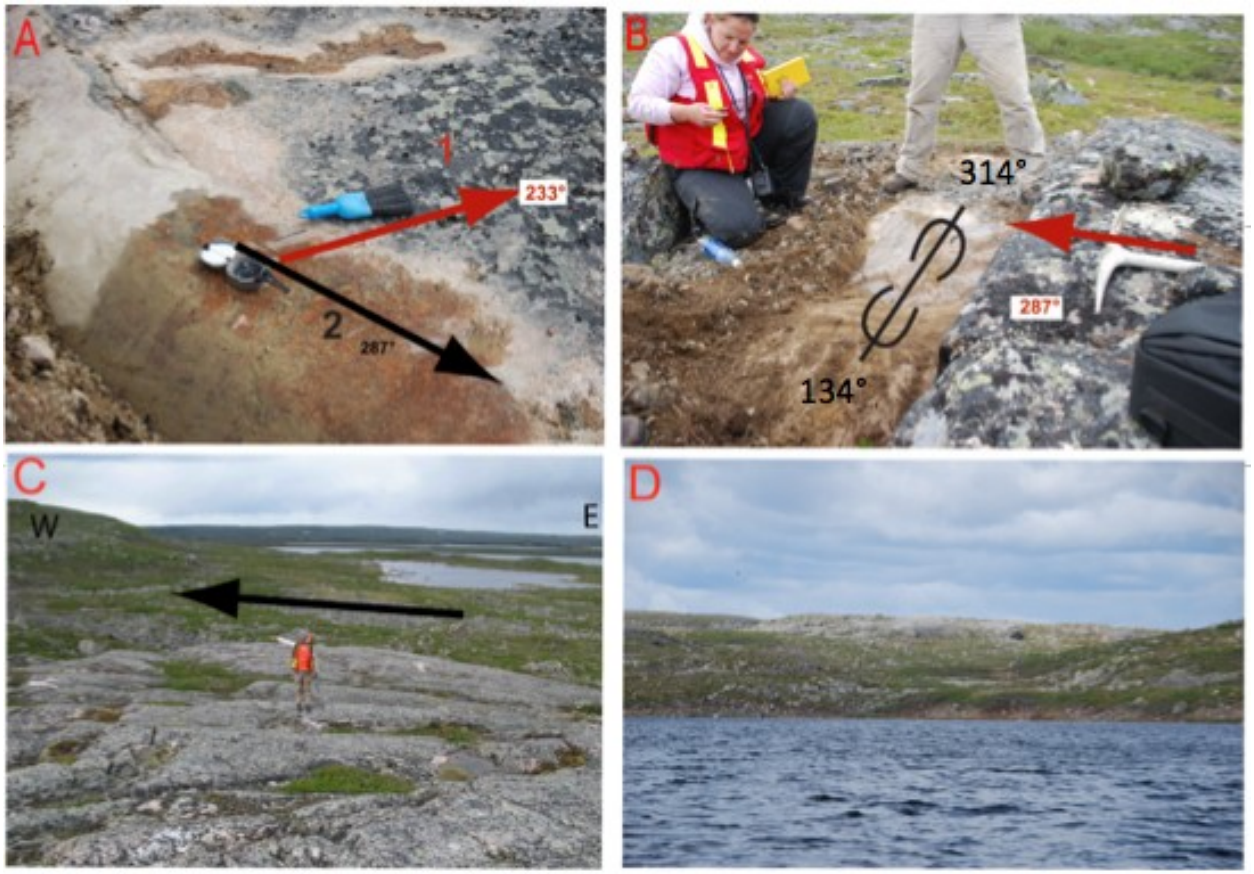

Figure 2: Striation sites depicting three directions of ice flow. A) striations showing oldest (red arrow) towards 233° and youngest (black arrow) towards 287°; B) striations oriented 314°/134° in lee side trough protected from the younger ice flow (ice pick) towards 287°; C) whalebacks and roche moutonees on west side of Iznogoudh Lake trending approximately 285°; D) typical study area terrain showing outcrop and felsenmeer terrain in the area.

Pending Results

The samples collected in this survey were submitted to the GSC Sedimentology Lab, Ottawa for sample preparation, grain size analysis and Munsell Colour determination. The 0.063 mm till fraction was then submitted to Acme Analytical Laboratories, Vancouver for geochemical analysis by aqua regia digestion/ICP-MS and total digestion by borate fusion/ICP-MS. Overburden Management Ltd., sieved the pebble fraction of each till sample to isolate the 0.5-

2.5 cm fraction for lithological sorting and counting. Results of the till geochemical analyses and pebble lithological studies are pending, and will be available by May 2010.

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