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Foreword/Context

The Geo-mapping for Energy and Minerals (GEM) program is laying the foundation for sustainable economic development in the North. The Program provides modern public geoscience that will set the stage for long-term decision making related to investment in responsible resource development. Geoscience knowledge produced by GEM supports evidence-based exploration for new energy and mineral resources and enables northern communities to make informed decisions about their land, economy and society. Building upon the success of its first five-years, GEM has been renewed until 2020 to continue producing new, publically available, regional-scale geoscience knowledge in Canada's North.

During the summer 2015, GEM program has successfully carried out 14 research activities that include geological, geochemical and geophysical surveying. These activities have been undertaken in collaboration with provincial and territorial governments, northerners and their institutions, academia and the private sector. GEM will continue to work with these key collaborators as the program advances.

Introduction

A surficial geochemical study was initiated by the Canada-Nunavut Geoscience Office (CNGO) in conjunction with the GEM Baffin Project in the Sylvia Grinnell Lake map area (parts of NTS 025N, 026C and 026F; Fig. 1). The fieldwork component of this study was carried out in two segments, the first during the middle two weeks in July and the latter during the middle two weeks in August 2015. Field activities were based out of Iqaluit, NU.

To date, there have been no public sector investigations using the mineralogy and chemistry data of indicator minerals derived from drainage sediments to facilitate bedrock mapping and evaluate mineral potential in Sylvia Grinnell Lake map area (Fig. 1).

The goal of the activity reported here is to use drainage geochemistry –specifically, to study the mineralogy and chemistry of recovered Indicator Minerals (IM) from Heavy Mineral Concentrate (HMC) samples, to facilitate bedrock and surficial as well as mineral potential mapping. This study aims to address the GEM Baffin Bedrock Mapping Project scientific question 3: *Is the Precambrian architecture of Baffin Island controlling the distribution of mineral resources and are unrecognized mineral systems present in NW Baffin Island?*

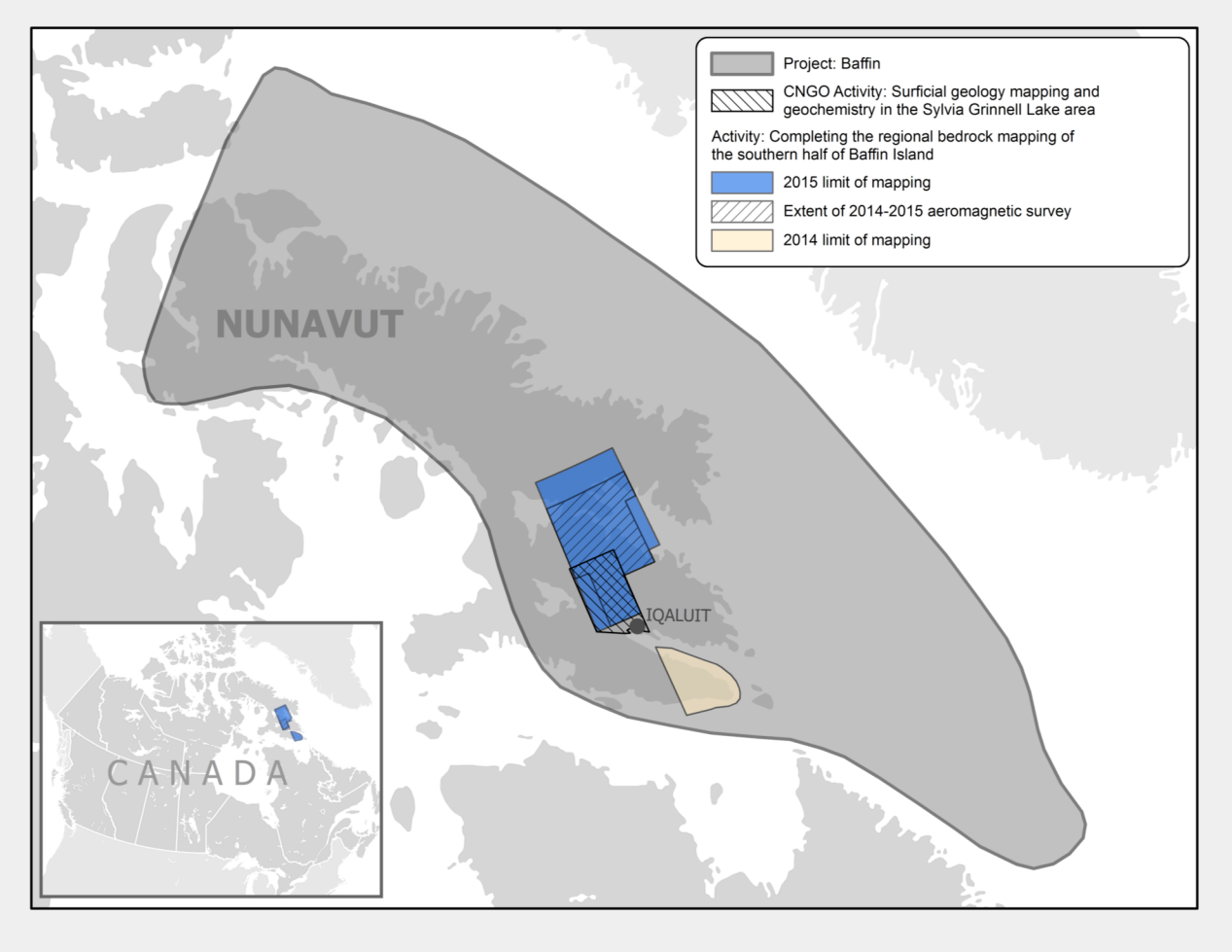

Figure 1: Location of the GEM2 Baffin Project. Drainage geochemical study location indicated with top left to bottom right diagonal hatching pattern

Methodology

Stream sediment and water samples were collected using the GSC's former National Geochemical Reconnaissance (NGR) programme's standard set of sample collection and analytical techniques, in order to ensure consistent and reliable results regardless of the area, date of the survey or the analytical laboratory used (Friske and Hornbrook, 1991). Figure 2 illustrates the field equipment used and samples collected at a typical bulk stream sediment and water site.

Stream sediment and water samples were collected at 76 sites, predominantly from the uplands north of Iqaluit (parts of NTS 025N, 026A and 026F). Bulk stream sediment samples were wet sieved on site to obtain ~15 kg of < 2mm sized material from relatively high-energy, gravel rich sites. These samples will be processed for their heavy mineral content. Silt sediment samples consisting of representative fine-grained material were gathered from relatively lower energy environments within the active streambed. After being dried to completion (<40ºC), the silt samples will be sieved to obtain the <177µm fraction for chemical analyses. Water samples were collected from the main flowing channel, filtered (0.45µm) in situ and will undergo chemical analyses. Site-specific field observations were recorded at each location.

Chemical analyses of stream silt sediments and stream waters will yield data for 90 and 67 variables respectively. The heavy mineral concentrates will be visually examined and gold grains and platinum

group metal (PGM) grains counted, as well as indicator minerals such as kimberlite indicator minerals (KIM) and Magmatic or Metamorphosed Massive Sulphide Indicator Mineral (MMSIMs®).

Field duplicate samples, laboratory sample splits and certified reference material samples are inserted into the sample populations prior to submission for chemical analyses for the purpose of monitoring, evaluating and ensuring data quality.

Figure 2: *Field gear used and samples collected at a typical bulk stream sediment and water site.*
1. two 60 ml water samples (filtered on site with 0.45 µm filter)
2. YSI Professional Plus multi-parameter water meter
3. silt-size stream sediment sample (~ 2kg wet)
4. #10 mesh (2mm) sieve
5. pan
6. steel shovel
7. bulk stream sediment (12+kg of ≤2mm sediment)
8. bucket lined with pre-labeled sample bag (not yet stretched tightly about the bucket opening)
9. iPad used for navigation and recording site-specific field observations

Results

At the time of publication, all samples collected during the 2015 field season have been submitted for sample processing and subsequent mineralogical and geochemical analyses. Preliminary analytical and mineralogical data are not expected until late in 2015, with a complete dataset not expected until early to mid 2016. A subsequent publication will contain site-specific field observations, chemical analyses of stream sediment and water samples, and HMC indicator-mineral data for stream sites visited.

Conclusions

The 2015 field component of this study was successfully undertaken. Once the mineralogical and analytical data are complete, then data compilation, interrogation and interpretation will proceed.

Acknowledgments

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