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Report of 2017 activities for the geology and economic potential of the Tehery-Wager area, Nunavut: GEM-2 Rae Project

N. Wodicka[1], H.M. Steenkamp[2], T.D. Peterson[1], I. McMartin[1], S.J.A. Day[1], and V.L. Tschirhart[1]

[1] Geological Survey of Canada, 601 Booth Street, Ottawa, Ontario
[2] Canada-Nunavut Geoscience Office, 1106 Ikaluktuutiak Drive, Iqaluit, Nunavut

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Foreword

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 responsible land-use and 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 2017 field season, research scientists from the GEM program successfully carried out 27 research activities, 26 of which will produce an activity report and 12 of which included fieldwork. Each activity included geological, geochemical, and/or 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 partners as the program advances.

Project Summary

The Tehery-Wager activity, conducted as part of the second phase of Natural Resources Canada's Geo-mapping for Energy and Minerals (GEM-2) Rae project (Fig. 1), is a collaborative effort between the Geological Survey of Canada (GSC) and the Canada-Nunavut Geoscience Office (CNGO), with participants from Canadian universities. The study area comprises all or parts of eight National Topographic System (NTS) map areas between Chesterfield Inlet and Wager Bay in Nunavut (NTS 46D, 46E, 56A, 56B, 56C, 56F, 56G, and 56H) (Fig. 2). The main objective of the work is to increase the level of geological knowledge in this poorly known and under-explored region of the Canadian Shield through targeted bedrock geology mapping, surficial geology studies, glacial and stream sediment sampling, ground-gravity transects, and other thematic studies. The gathered information is being used to better evaluate this frontier region's potential for a variety of commodities, including diamonds and other gemstones, base and precious metals, industrial minerals, carving stone, and aggregate, and to assist all stakeholders, including northerners, in making future land-use decisions. This report provides an update on map compilation and laboratory activities conducted following the 2015 and 2016 field seasons in the Tehery-Wager area.

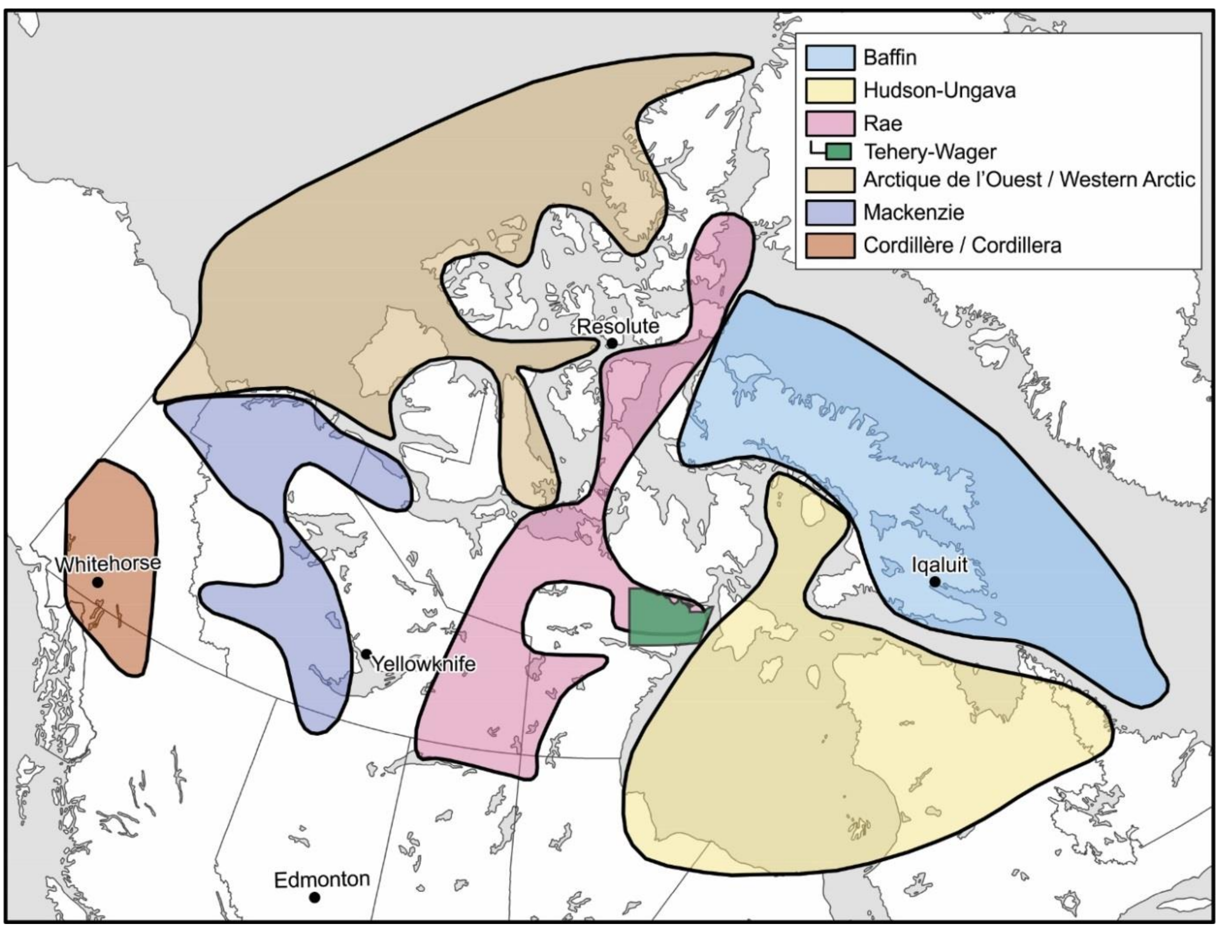

Figure 1. *Overview map of all GEM-2 projects in northern Canada. The area covered by the Tehery-Wager activity within the Rae project area is shown by the green polygon.*

Introduction

Rationale & Background

The Tehery-Wager area (Figs. 1, 2), one of the least known and under-explored regions of Nunavut, was selected as part of the GEM-2 Rae project to increase our understanding of the geology and mineral potential of this frontier region. The work initiated in 2015 follows up on the reconnaissance field studies, data mining, and geochemical and geophysical surveys (Coyle and Kiss, 2012a, b; Day et al., 2013; Harris et al., 2013a-e; McMartin et al., 2013; Wodicka et al., in prep.) conducted under the Geo-mapping Frontiers project of the GEM-1 program. Results from these studies highlighted the potential for base- and precious-metal mineralization in the Lorillard supracrustal belt and identified prospective areas with potential ultramafic/mafic or kimberlite sources outside the known kimberlite field that was discovered by Peregrine Diamonds Ltd. (Fig. 3). Distinct Archean and Paleoproterozoic plutonic suites, as well as supracrustal packages of uncertain age and parentage, were also identified during the course of this reconnaissance work.

Goals & Objectives

The GEM-2 field activities carried out by the GSC and CNGO in the Tehery-Wager area were completed in the summers of 2015 and 2016. They included targeted bedrock mapping (Lawley et al., 2015; Steenkamp et al., 2015, 2016; Wodicka et al., 2015, 2016), targeted surficial mapping and glacial-/stream-sediment sampling (Byatt et al., 2015, 2016; McMartin et al., 2015a, 2015b, 2016a, 2016b, 2016c; Randour et al., 2016a, 2016b, 2017a, 2017b; Randour and McMartin, 2017), and ground gravity transects (Tschirhart et al., 2016). Coupled with laboratory analyses, the main objectives of our mapping were to: 1) document the nature and extent of Archean and Paleoproterozoic granitoid rocks across the study area and evaluate the nature of their contacts with adjacent supracrustal rocks; 2) improve our understanding of the map distribution and parentage of supracrustal rocks and constrain their depositional setting; 3) document the nature, extent, and style of deformation along major fault structures to evaluate their potential for focussing mineralization; 4) document the degree and extent of metamorphism to elucidate the potential for contrasting metamorphic histories across the map area and between neighbouring regions; 5) provide a glacial and post-glacial history framework required for interpreting the nature and transport history of surficial sediments; 6) document the provenance of surficial sediments; and 7) increase our knowledge of the economic mineral, gemstone, and carving stone potential of the Tehery-Wager area.

Scientific questions to be addressed

The main scientific questions being addressed by the Tehery-Wager activity, and pertaining to the GEM-2 Rae project as a whole, are:

1) What is the tectonic architecture and history of the Rae craton, and how do they influence the distribution of mineral resources?

2) What is the nature, distribution, and significance of 2.6 Ga igneous events in the Rae Province?

3) What is the nature of glacial transport in proximity and distal to the Keewatin Ice Divide?

4) What is the age of the weathered terrain under the ice divide and what is its potential for preservation of an older, relict landscape under a cold-based glacial regime?

5) What is the limit and chronology of the post-glacial marine inundation and what is its influence on surficial sediment composition?

6) How can we improve on current remote predictive mapping (RPM) methods of surficial materials to enhance surficial geology mapping and field methods?

The present report summarizes progress on key components of the Tehery-Wager activity, namely map compilation, geochemical, isotopic, and geochronological studies of the bedrock, shallow crustal structure though gravity and magnetic modelling, and surficial geology studies. The results from these studies will be used to reconstruct the tectonic and glacial history of the region, and to provide answers to the scientific questions posed above.

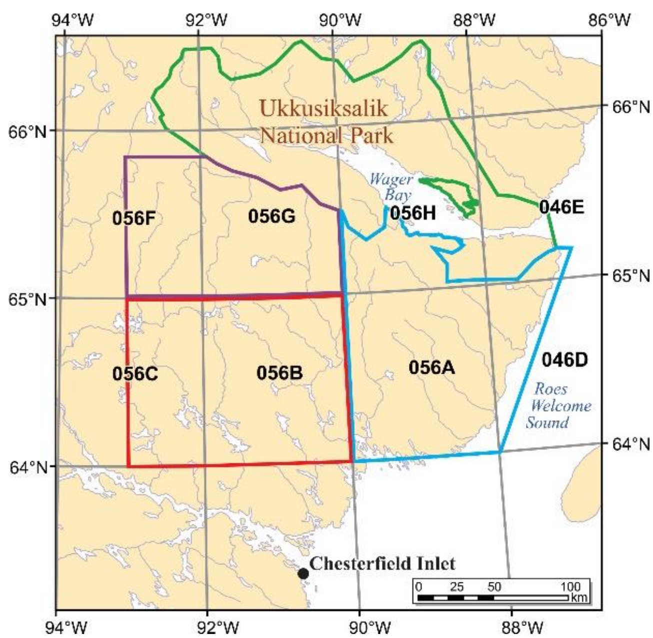

Figure 2. Overview of the GEM-2 Tehery-Wager area. The limits of the three 1:250 000 scale regional bedrock maps are outlined in blue, red, and purple.

Bedrock map compilation

Bedrock map compilation for the Tehery-Wager area is currently underway using the Geological Survey of Canada Bedrock Data Model (Brouillette et al., 2015). All geoscience data acquired during the 2015 and 2016 field seasons, including field observations, measurements, photographs, and samples recorded into hand-held computers, were transferred into the GSC Bedrock Data Model. The geodatabase also includes 1) legacy products stemming from previous mapping programs, 2) aeromagnetic and Bouguer gravity survey results, 3) satellite (Landsat and RapidEye) and drone imagery for the entire or selected areas, 4) RPM results, 5) an airphoto mosaic, and 6) new geoscience data acquired during a two-week field season in 2017 by the CNGO (see Therriault et al., in press, for details). The combined data will be used to create three new 1:250 000 scale bedrock geological maps for the Tehery-Wager area as outlined in Fig. 2, with an anticipated release in spring of 2018.

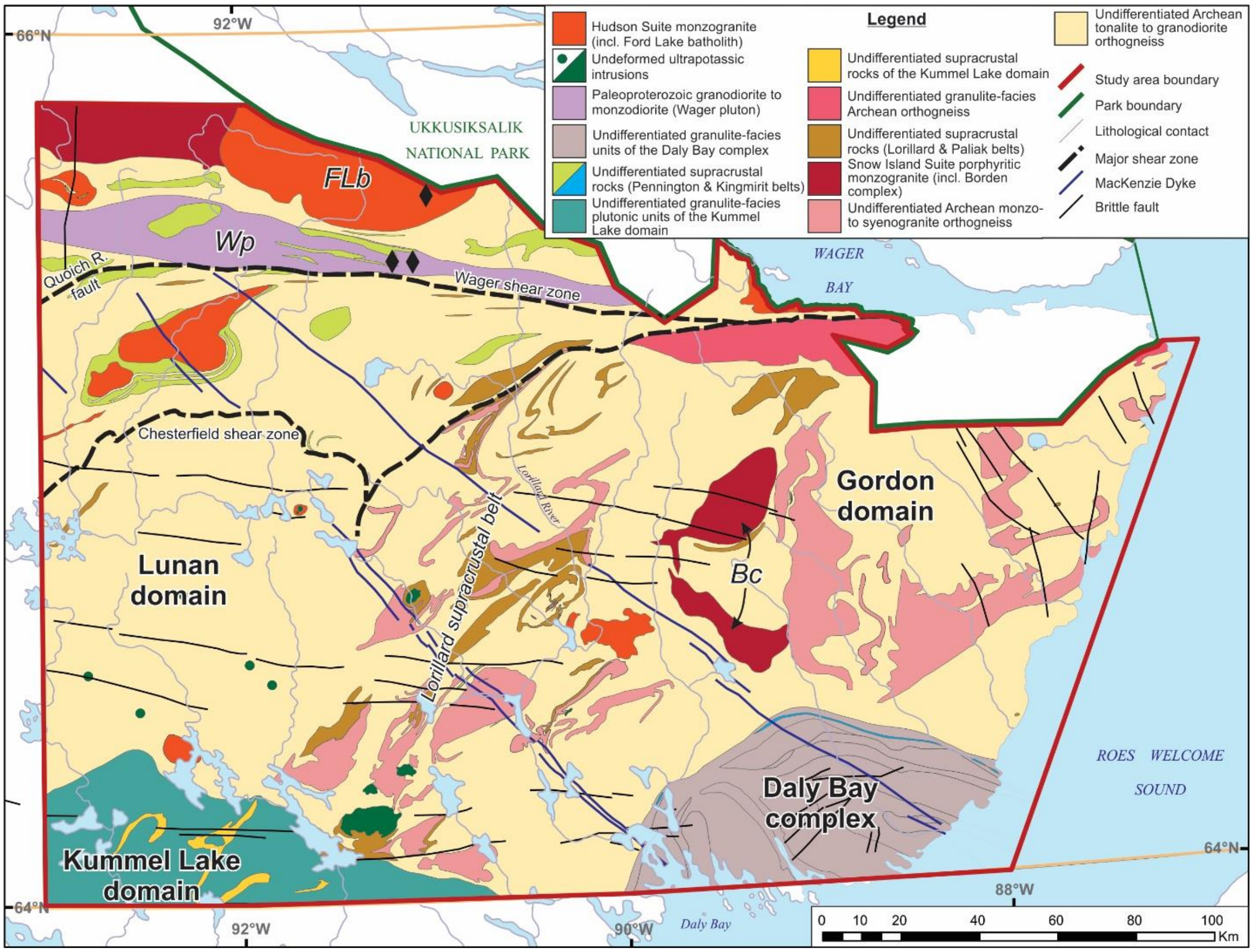

Figure 3. *Simplified geological map of the Tehery-Wager area (modified from Steenkamp et al., 2015 and Wodicka et al., 2016). Black diamonds indicate the location of known kimberlite bodies from Peregrine Diamonds Ltd. BC = Borden complex; FLb = Ford Lake batholith; Wp = Wager pluton.*

Lithogeochemistry

Sample suites collected during the 2015 (n=78) and 2016 (n=77) field activities were analyzed for major and selected trace elements at Actlabs (2017; packages 4LITHORES, 4F-fluorine, and 4F-FeO titration). These data have been collated with those obtained during the Geo-mapping Frontiers project conducted in 2012 (n=69; Wodicka et al., in prep.) and complemented by additional data collected in 2015 and 2016 by H. Steenkamp as part of her PhD thesis. The geochemical component of this doctoral study is primarily focussed on differentiating Archean and Paleoproterozoic mafic volcanic rocks in prominent supracrustal belts within the map area.

The present lithogeochemical study focussed on intrusive felsic through mafic suites, from the oldest Archean basement to youngest Paleoproterozoic rocks. The complete 2015-2016 GSC database and preliminary interpretations will be published in an upcoming GSC Open File report (Peterson et al., in prep). Lithogeochemistry was used for the following purposes: 1) to assist in identifying map units and their extent across the study area; 2) to complement information on U-Pb geochronological samples; 3) to identify igneous events attributable to specific tectonic regimes and make regional correlations; and 4) to capture anomalies in elements of economic or environmental importance. The five principal results from this study are (Figs. 4, 5):

- The Tehery-Wager area is dominated by tonalite-trondhjemite-granodiorite (TTG) gneissic rocks (e.g., TTG1 in Fig. 4), mainly ca. 2.7 Ga in age, some of which have Eu/Eu*>>1 with depleted compatible elements (latter not illustrated in Fig. 4).
- The common chemical composition of the pan-Rae 2.6 Ga Snow Island Suite (SIS) granite is well represented in the Tehery-Wager dataset (Type 1 granite, Fig. 4). By contrast, the prominent Borden complex (Fig. 3), and more isolated outcrops elsewhere in the map area, contain granite of two other types (2 and 3, Fig. 4). A sample from the migmatitic core of the Borden complex contains molybdenite grains at least 5 mm wide.
- The Paleoproterozoic granitic rocks of the Hudson suite (PHg; Fig. 4) extend the previously observed regional enrichment in K and rare earth elements (REE) (Peterson et al., 2002) northward from the Chesterfield Inlet area, relative to other PHg samples in the western Churchill Province. Additionally, the Tehery-Wager area contains the three oldest dated PHg samples of the Rae craton, suggesting it may have occupied a unique position in the thickening and uplift history of the region during the Trans-Hudson Orogen. The exceptional REE enrichment has consequences for Sm-Nd isotopic compositions as highlighted in the next section.
- Mafic rocks in the study area are well separated in Pearce's (2008) Th/Yb vs Nb/Yb diagram (Fig. 5). Gabbroic to dioritic rocks of the Snow Island Suite plot within the continental arc field, in agreement with data from elsewhere in the Rae craton (Peterson, unpub. compilation; Peterson et al., 2015; Acosta-Góngora et al., 2017). A small GSC dataset for mafic rocks from the Lorillard supracrustal belt plots directly over mafic volcanic rocks of the MacQuoid supracrustal belt (Sandeman et al., 2006) located south of Chesterfield Inlet within the Chesterfield block. The array is consistent with a slightly crustally contaminated, transitional N-MORB – E-MORB geochemical signature, suggesting these rocks were sourced from a near-continent back arc.
- Our mapping has expanded the known extent of the Paleoproterozoic, high K-Mg Dubawnt minette dyke swarm and related rocks (Peterson et al., 2002) to the north, possibly terminating at the Wager shear zone (Fig. 3). The study area contains rare, coarse-grained ultrapotassic intrusions consistent with an unusually deep crustal level of exposure, and intrusions in the western part of the map area have transitional characteristics to basalt, consistent with the termination of an enriched mantle source of the potassic melts. The high-K mafic rocks (minette and shonkinite) plot very near average crust (Fig. 5), consistent with metasomatism of their mantle source region by crustally-derived incompatible elements.

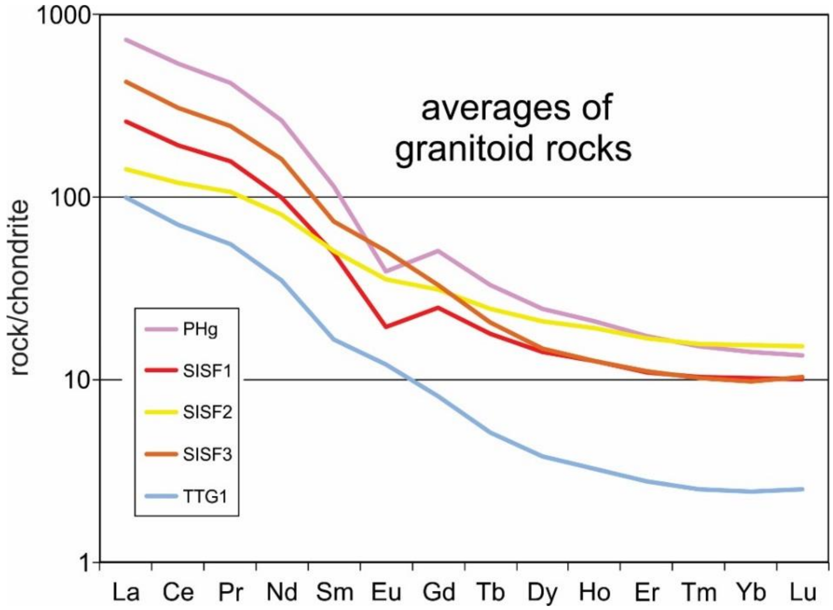

Figure 4. *Chondrite-normalized REE diagram showing the averages of the main granitoid rock types of the Tehery-Wager area. Type 2 and 3 SIS felsic rocks (SISF2 & SISF3) are mainly associated with the Borden complex and notably lack the Eu anomaly that is typical of Type 1 rocks (SISF1). SIS Type 1 rocks are distinguished from Hudson suite rocks (PHg) only by a lower overall REE content, a feature present throughout the Rae craton, possibly because these granite suites share a similar physical origin (remelting of older crust following lithosphere thickening).*

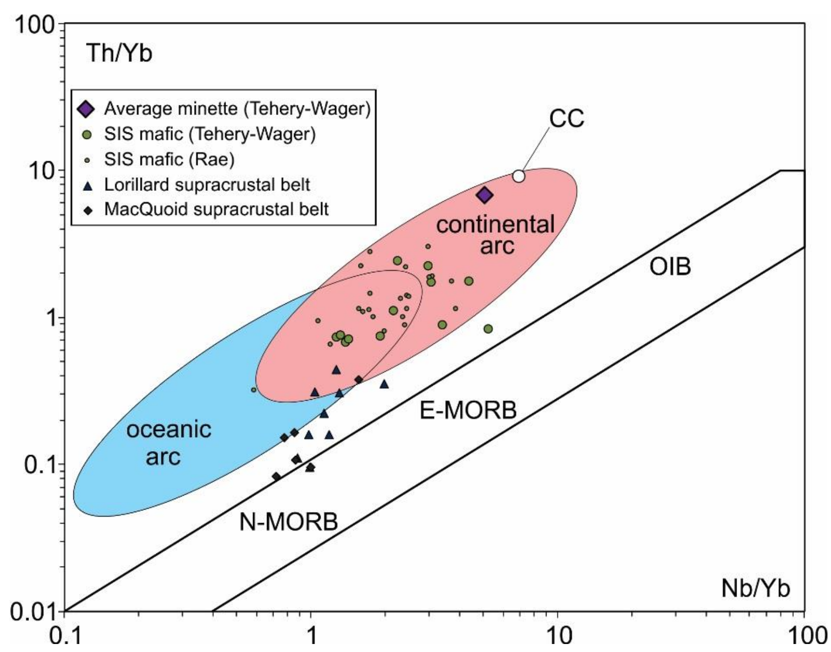

Figure 5. *Th/Yb vs Nb/Yb diagram for mafic rocks (individual analyses and average minette) from the Tehery-Wager area, with the N-MORB – OIB array and oceanic and continental arc fields after Pearce (2008). Data for mafic rocks from elsewhere in the Rae craton are shown for comparison. CC = average continental crust; N-MORB = normal mid-ocean-ridge basalt; E-MORB = enriched mid-ocean-ridge basalt; OIB = ocean-island basalt.*

Sm-Nd isotope geochemistry

Following the 2015 and 2016 field seasons, Sm-Nd isotopic data were acquired on 34 plutonic rocks, 2 volcanic rocks, 1 diabase dyke, and 1 pelitic rock. The analyses were carried out at the Crustal Geochronology Laboratory, Department of Earth and Atmospheric Sciences, University of Alberta. Together with pre-existing Sm-Nd data (van Breemen et al., 2007; Wodicka et al., in prep.), the new results permit the identification of two isotopically distinct crustal domains south of the Chesterfield shear zone, herein named the Gordon domain to the east and the Lunan domain to the west (Fig. 3). Archean tonalitic to monzogranitic gneiss and plutonic rocks within the Gordon and Lunan domains yield Nd model ages (DePaolo, 1981) of 3.29–2.93 Ga and 2.72–2.97 Ga, respectively, and can be correlated with the Mesoarchean Repulse Bay and Neoarchean Committee Bay blocks of the Rae craton (e.g. Pehrsson et al., 2013; Spratt et al., 2014; Wodicka et al., 2017). The boundary between the two domains appears to coincide with the complexly folded Lorillard supracrustal belt (Fig. 3) and a transition zone containing both evolved (3.09–2.90 Ga) and juvenile (2.89–2.75 Ga) rocks. We believe that the two crustal domains extend north of the Chesterfield shear zone, but the boundary between them cannot be clearly delineated at the present time owing to large-scale transposition associated with the Paleoproterozoic Wager shear zone and limited Sm-Nd data. Additionally, the potential correlation of the Lorillard supracrustal belt with volcanic rocks of the MacQuoid supracrustal belt (see previous section) suggests that the boundary between the Lunan and Gordon domains may extend into the Chesterfield block to the south.

Nd model ages from Paleoproterozoic Hudson suite intrusions (2.73–2.51 Ga) are distinctly younger than those of most other granitoid rocks (>2.72 Ga from mainly Snow Island Suite and pre-2.6 Ga TTG gneissic rocks) within the map area. This feature, which is less prominent elsewhere in the western Churchill Province, can be attributed to remelting of crustal sources with strong LREE enrichment of new melts. By contrast, the ultrapotassic rocks, contemporaneous with the Hudson suite, yield distinctly older Nd model ages of 3.03–2.81 Ga, clearly indicating a different source region in metasomatized mantle (e.g., Peterson et al., 2002). Full Sm-Nd results and preliminary interpretations will be made available in an upcoming GSC Open File report (Peterson et al., in prep.).

U-Pb geochronology

To date, Sensitive High Resolution Ion Microprobe (SHRIMP) U-Pb zircon analyses, conducted at the J.C. Roddick Ion Microprobe Laboratory, GSC, Ottawa, were acquired on 17 plutonic rocks, 1 volcanic rock, and 9 metasedimentary rocks collected in 2015 and 2016. Geochronological investigations focussed on establishing the age of major plutonic units and supracrustal belts across the map area. The main highlights from this geochronological work include the following:

- An age of 2.70 Ga from an intermediate rock with andesitic geochemistry provides the first direct U-Pb geochronological constraint on the timing of volcanism in the Lorillard supracrustal belt (Wodicka et al., 2017). The new result will facilitate comparison with similarly aged supracrustal belts elsewhere in the Rae craton, including the <2.74–2.66 Ga MacQuoid supracrustal belt (Davis et al., 2006).

- Two quartzite samples from the Lorillard supracrustal belt exhibit significant detrital zircon peaks of ca. 2.695–2.685 Ga, potentially indicating a maximum depositional age for the siliciclastic rocks. The samples also contain relatively abundant Paleo- to Mesoarchean detritus and lesser Eoarchean detrital zircon, which may have been derived from the Gordon domain (or Repulse Bay block).
- New U-Pb crystallization ages from Archean granitoid rocks and leucogabbro within the Gordon and Lunan domains, the Lorillard supracrustal belt, and north of the Chesterfield shear zone, fall mostly between 2.70 and 2.68 Ga. One main exception is a 2.86 Ga granodiorite gneiss from the Gordon domain, in the immediate footwall to the Daly Bay complex (Fig. 3).
- Granulite-facies granodiorite and leucogabbro of the Kummel Lake domain yield preliminary crystallization age results of 2.71–2.70 Ga, similar to U-Pb age data from the Uvauk complex south of the map area (Mills et al., 2007).
- A weakly deformed and mylonitic monzogranite from the interior and highly strained margin of the southern body of the Borden complex (Fig. 3), respectively, yield crystallization ages of 2.60 Ga confirming that this complex belongs to the Snow Island Suite (Steenkamp et al., 2015; Wodicka et al., 2015).
- Basal quartzite units from the Pennington supracrustal belt west of Wager Bay and from a narrow fault-bounded panel structurally beneath the Daly Bay complex, herein named the Kingmirit supracrustal belt (Fig. 3), contain ≥2.74–2.72 Ga detrital zircon, similar in age to the local Archean basement. In contrast, younger detrital age peaks of 2.60–2.59, 2.31, and 1.99–1.98 Ga in an overlying semipelite from the Kingmirit belt establish a Paleoproterozoic depositional age for these supracrustal rocks and point to some distal source(s) for the detritus. The new results confirm previous correlation of these rocks with cover sequences elsewhere in the Rae craton, in particular the Ketyet River group, based on lithological and previously limited detrital zircon age similarities (e.g., Ferderber, 2013; Garrison, 2016; Panagapko et al., 2003; Steenkamp et al., 2016; Wodicka et al., 2016).
- A crystallization age of 1.83 Ga for the Wager pluton, a weakly foliated to massive monzogranite to monzodiorite intrusive in the Wager shear zone (Fig. 3; Steenkamp et al., 2016; Wodicka et al., 2016), indicates that a major component of deformation along this shear zone occurred prior to ca. 1.83 Ga.
- Two new crystallization ages of 1.84 and 1.82 Ga for a monzogranite sill within the Lorillard belt and a coarse-grained K-feldspar porphyritic monzogranite from the southern part of the Ford Lake batholith (Fig. 3), respectively, confirm correlation of these rocks with the Hudson plutonic suite (Steenkamp et al., 2015, 2016; Wodicka et al., 2015, 2016).

The full analytical results and preliminary interpretations on the timing of magmatism and sedimentary deposition will be presented in an upcoming GSC Open File report. The timing of metamorphism across the Tehery-Wager area, investigated through *in situ* U-Pb monazite and Lu-Hf garnet dating, forms part of an ongoing doctoral research project by H. Steenkamp.

Shallow crustal structure

Modelling and interpretation of the geophysical data was undertaken to estimate the geometry of shallow crustal structures in the region. This was done using the 400 m line-spaced magnetic data, regional gravity data (12–15 km spaced stations), and two targeted gravity transects (200 m spaced stations) conducted in 2016 (Tschirhart et al., 2016). Over 200 density and magnetic susceptibility measurements, and structural information from bedrock mapping, were used as constraints in the modelling. The main highlights from the geophysical modelling include:

- Granodiorite and monzogranite from the Archean basement can be differentiated on the basis of magnetic susceptibility and density, with the former being less magnetic and denser. The most pronounced positive anomalies on the magnetic map correspond to iron formation (688 x 10^{-3} SI) in the supracrustal belts. A comparison of surface density information over the Kummel Lake domain and Daly Bay complex (Fig. 3) shows denser rocks at surface over the Daly Bay complex. Preliminary unconstrained 3D inversions of the regional gravity data (Fig. 6) support this interpretation, and model a dense body dipping north below the domain boundary, in comparison to the Daly Bay complex, which is modelled as a dense inward dipping body emplaced by northward directed thrusting (Gordon and Lawton, 1995).
- A notable north-south trending lineament is visible on the upward continued magnetic field map and regional gravity data (Fig. 6), co-located with the boundary separating the Gordon and Lunan domains discussed above, and reflects the deep geophysical expression of the structure.
- Joint forward modelling of the magnetic and residual gravity data model the pronounced magnetic anomaly north of the Wager shear zone (i.e., the Wager pluton; Fig. 3) as a near surface dense body that has a long wavelength component visible in the regional gravity data (Fig. 6). South of the shear zone, the supracrustal belts are modelled as thin packages of folded rocks. The Chesterfield shear zone coincides with a 1.5 mGal gravity low and requires a low density body below surface. Two preliminary unconstrained 3D inversions of the magnetic data show evidence for major south-dipping structures south of the Chesterfield shear zone.
- Keating correlation coefficient solutions released for the 2012 aeromagnetic survey (Coyle and Kiss, 2012a, 2012b) identify circular magnetic anomalies correlative to the magnetic anomaly produced by a synthetic kimberlite body (Tschirhart, 2016).

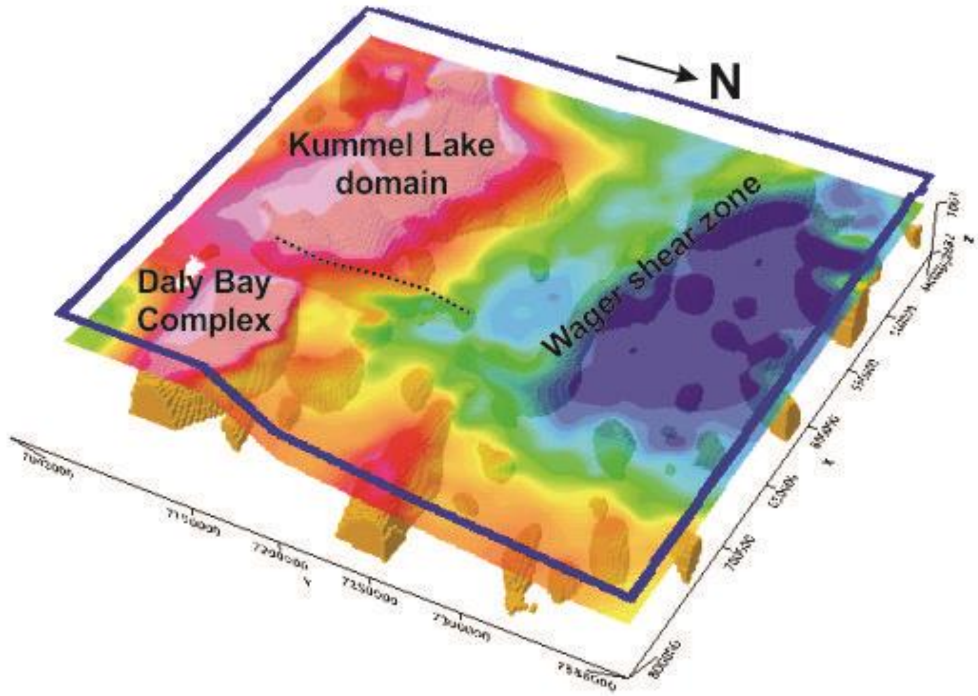

Figure 6. *Transparent regional Bouguer gravity data overlying 0.008 g/cm^3 density contrast isosurface. Dashed line overlies gravity lineament separating the Gordon and Lunan domains.*

Surficial geology and geochemistry

Continuing surficial geology studies include thematic research on the nature of the terrain and glacial transport characteristics near the Keewatin Ice Divide and implications for mineral exploration, stream sediment provenance, and two MSc theses in areas of complex glacial and post-glacial histories.

- A total of 73 till samples collected in 2015 and 2016 to evaluate mineral potential and characterize regional transport across the Keewatin Ice Divide were analyzed for matrix texture, colour, carbon content, indicator minerals (IM), pebble count, as well as geochemistry of the <0.063 mm fraction. All field observations (196 stations) and till composition datasets were compiled in separate spreadsheet and shape files, and will be released in an upcoming GSC Open File report together with preliminary interpretations (McMartin and Randour, in prep.). Results so far indicate distinct but partially overlapping dispersal trains from various sources (McMartin et al., 2016c): 1) palimpsest SSE to SE dispersal of high Cr-pyrope and minor forsteritic olivine grains from Peregrine Diamonds Ltd.'s kimberlite field (Fig. 3), 2) fan-shaped long-range (80 km+) SE dispersal train of forsteritic olivine from unknown kimberlite or various olivine-rich mantle rocks, and 3) relatively short (< 30 km) SE chromite dispersal train from slivers of mafic/ultramafic intrusions within the Lorillard supracrustal belt (Fig. 3). Six hundred potential IM grains from selected 2015 and 2016 till and bedrock samples were mounted for electron microprobe analyses to clarify the extent and nature of the bedrock sources and determine mineral potential.

- A total of 114 stream sites were sampled in 2015 and 2016 (see Fig. 4 of McMartin et al., 2016b) for water, silt, and bulk sediment (to obtain the heavy mineral fraction) with the main goal of utilizing stream sediment chemistry and IM to gain knowledge regarding the sediment provenance and mineral potential of the study area. Sample processing and chemical analyses on all media are complete and are being compiled for a future publication. Picked IM grains from selected heavy mineral concentrate (HMC) samples are currently being prepared and will be analyzed to obtain their chemistry. Once completed, these mineral chemistry data will be compiled and published in a timely manner. An integrated interpretation of the entire silt, water, and bulk sediment/HMC/IM dataset (including data collected in 2012 as part of the GEM-1 Tehery–Cape Dobbs project) will also be published.
- Seven bedrock samples from 2015 and 2016 were selected for terrestrial cosmogenic nuclide exposure dating. These were collected in weathered and fresh upland terrain under the Keewatin Ice Divide to constrain the relative age of potentially preserved surfaces under a cold-based dome (McMartin et al., 2016b). The results will also help to assess relative erosion rates and determine the effects of potentially inherited signatures under ice divides unrelated to the last glacial events.
- As part of an MSc thesis on the extent and chronology of the post-glacial marine limit and effects on till composition, the southern half of the Douglas Harbour map area (NTS 56H-South) was compiled at 1:100 000 scale (Randour and McMartin, 2017). The post-glacial limit of marine inundation was mapped, characterized, and sampled for age dating within the study area (Randour et al., 2016b, 2017a). Geochemical and textural analyses were completed on till samples above and below the marine limit to document how till composition is affected by marine reworking and winnowing processes (Randour et al., 2017b).
- A surficial earth materials mapping MSc research project produced classification maps with over 20 surficial material classes for areas north and south of Wager Bay using a combination of satellite imagery, a digital elevation model, and derived slope data (Byatt et al., in prep.). The different classes were validated with georeferenced sites, which included visits where field observations were collected.

Conclusions & Future Work

The new results and preliminary interpretations of the multidisciplinary datasets summarized herein provide first-order constraints on: 1) the delineation of Archean crustal blocks, 2) the nature and age of major Archean and Paleoproterozoic plutonic suites, 3) the timing of deposition of major supracrustal belts and correlation of the latter with supracrustal belts elsewhere in the Rae craton, 4) the geometry of shallow crustal structures and the relationships between rock properties, geophysical maps, and geological units, 5) the nature, elevation, and age of the post-glacial marine limit, and 6) the improvement of surficial geological mapping using advanced RPM methods. Future work will include finalization of geochronological, and whole-rock and isotopic geochemical analyses of key lithological units collected during the 2015 to 2017 field seasons to answer any outstanding questions on the tectonic history of the Tehery-Wager area. The release of till composition datasets, final interpretation of 2015 and 2016 results, together with the integration of the stream-sediment survey results, will help to better characterize glacial transport and enhance mineral exploration methods in the Tehery-Wager area.

The tectonometamorphic history of the Tehery-Wager area continues to be investigated through a PhD thesis by integrating petrology, metamorphic pressure and temperature studies, and high-temperature geochronology (Steenkamp et al., 2017). A new MSc thesis under the auspices of the CNGO was initiated in the summer of 2017 with the main goal of unravelling the structural history of the Wager shear zone (Therriault et al., in press). Mapping protocols and classification of surficial materials using a combination of satellite imagery and field data were developed for the areas north and south of Wager Bay as part of an MSc thesis (J. Byatt) that was completed in May 2017. The post-glacial marine limit chronology and the study of the effects of marine processes on till composition as part of an MSc thesis (I. Randour) is well under way and should be completed by the end of 2017.

The results of the multidisciplinary GEM-2 Tehery-Wager activity will continue to be disseminated through publication of bedrock and surficial maps, GSC Open File reports, CNGO Summary of Activities articles, oral and poster presentations, and journal papers.

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