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Canada

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2018

Permanent link: https://doi.org/10.4095/312408

This publication is available for free download through GEOSCAN (http://geoscan.nrcan.gc.ca/).

Recommended citation
Skipton, D.R., Saumur, B.M., and St-Onge, M.R., 2018. Regional bedrock mapping of northern Baffin Island (Steensby Inlet and Barnes Ice Cap areas), Nunavut: GEM-2 Baffin Project, report of activities 2018; Geological Survey of Canada, Open File 8484, 16 p. https://doi.org/10.4095/312408

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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 2018 field season, research scientists from the GEM program successfully carried out 18 research activities, 17 of which will produce an activity report and 14 of which included fieldwork. Each activity included geological surveying, and most activities included geochemical and/or geophysical surveying. These activities have been undertaken in collaboration with provincial and/or 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

This is a progress report on the fieldwork, map compilation and geoscience research undertaken in the GEM-2 North Baffin bedrock mapping activity during late 2016 to 2018, as part of the GEM-2 Baffin Project (Fig. 1).

Geological maps inform industry, government, and community stakeholders of potential economic resources. During the past two decades, the Precambrian and Phanerozoic bedrock geology has been mapped in extensive areas of Nunavut. Updated regional bedrock map coverage for Baffin Island south of latitude 70°N was completed in 2016 (St-Onge et al., 2016). The activity described herein represents the first steps towards an updated geological framework of Baffin Island north of 70°N, with the goal of producing maps at a scale and resolution commensurate with those produced for the southern portion of the island.

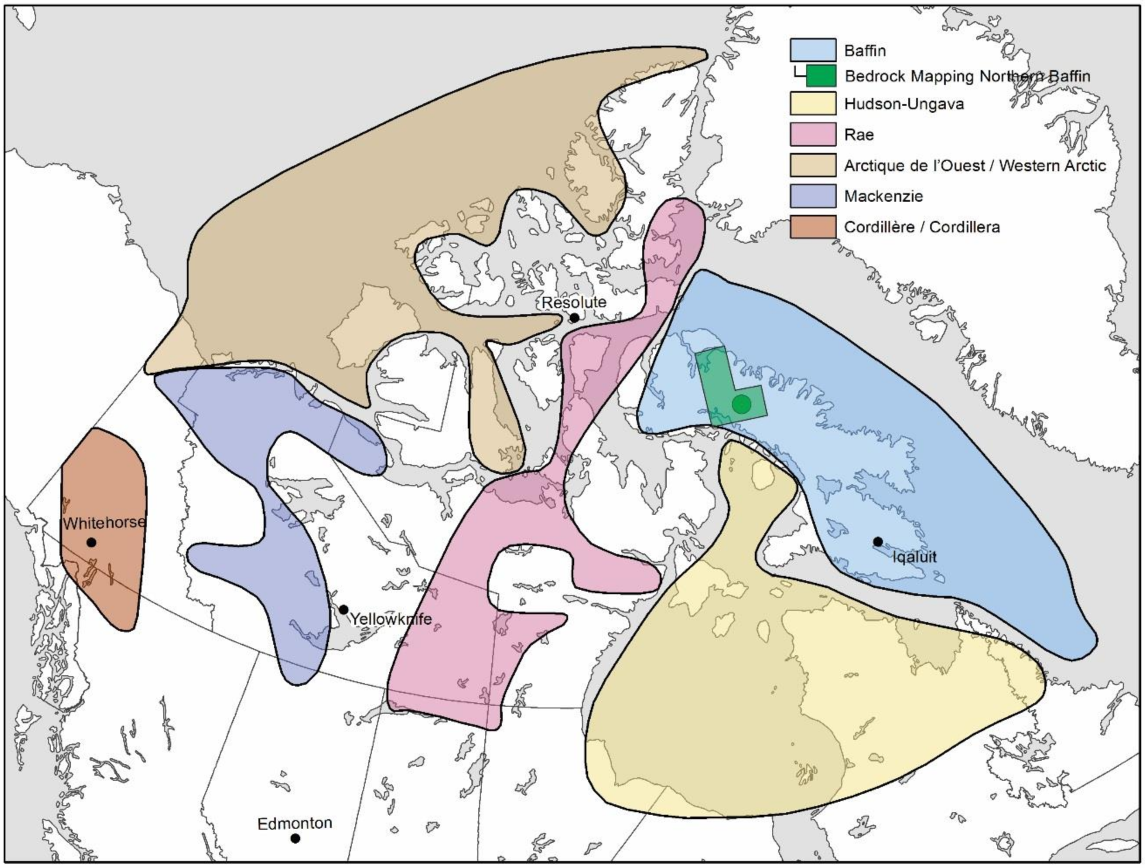

Figure 1: Approximate locations of 2018 GEM-2 projects. The location of the North Baffin Bedrock Mapping Activity is indicated in green, as part of the Baffin project. The green circle indicates the position of the 2018 Isortoq River field camp.

Improved geological maps will help determine the potential for diamonds, base metals and carving stone in northern Baffin Island. In 2017, fieldwork was conducted in NTS sheets 37G and 38B, including the area around Pond Inlet and part of Sirmilik National Park (Fig. 2). The second and final phase of bedrock mapping for the GEM-2 North Baffin project was completed in the summer of 2018 in the area bordering Steensby Inlet and the Barnes Ice Cap (NTS sheet 37F and parts of sheets 37E and 37G; Fig. 2), and included the world-class Mary River iron mine operated by Baffinland Iron Mines Corporation.

Results of 2017 fieldwork and research are presented in previous reports (Skipton et al., 2017; Saumur et al., 2017; Bros and Johnston, 2017). Three new bedrock geology maps stemming from the 2017 mapping campaign were published in 2018, and are publically available online (Saumur et al., 2018a, b; Skipton et al., 2018). Twelve rock samples representing the main map units have been dated using the U/Pb Sensitive High Resolution Ion Microprobe (SHRIMP) method, and research studies are ongoing into the tectono-metamorphic evolution of the area and implications for economic mineralization. The new maps and preliminary research results were presented to geoscientists and community stakeholders at the Nunavut Mining Symposium in April 2018 (Saumur et al., 2018c; Bros et al., 2018).

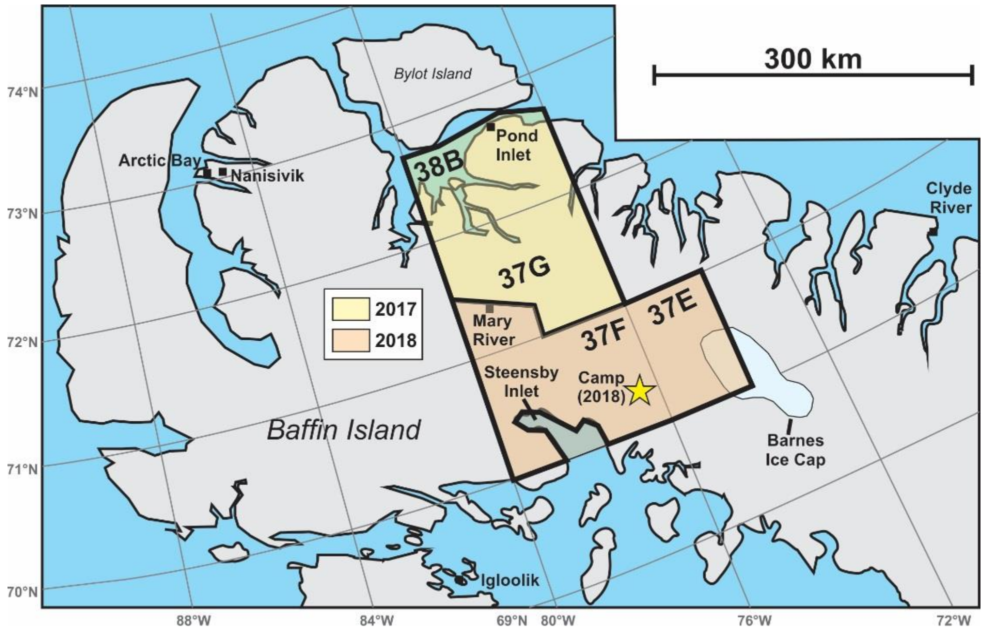

Figure 2: Location of GEM-2 North Baffin activity on northern Baffin Island, showing the areas mapped in 2017 (yellow) and 2018 (beige).

Introduction

Archean granite-greenstone belts of northern Baffin Island host the high-grade, large-tonnage Mary River iron deposit (Figs. 2, 3). However, the greenstone belts and associated granitic plutons and basement gneisses remain poorly understood. Unresolved questions include the spatial distribution, stratigraphy, tectono-metamorphic evolution and age of the granite-greenstone belts, as well as how they may correlate with iron-, nickel- and gold-bearing greenstone belts on Melville Peninsula to the west and the Lauge Koch Kyst area of Greenland to the east (e.g., Skulski et al., 2003; Berman et al., 2010; St-Onge et al., 2009; Corrigan et al., 2013; Sanborn-Barrie et al., 2014). As diamonds are more prospective in areas of ancient, thick continental crust, the extent of ancient basement versus younger plutons is also of economic importance, but had not yet been established on northern Baffin Island due to the paucity of geochronological data. These unknowns represent a major knowledge gap in the geology of Baffin Island, with important implications for our understanding of the geological evolution of Canada's Arctic and the area's economic potential.

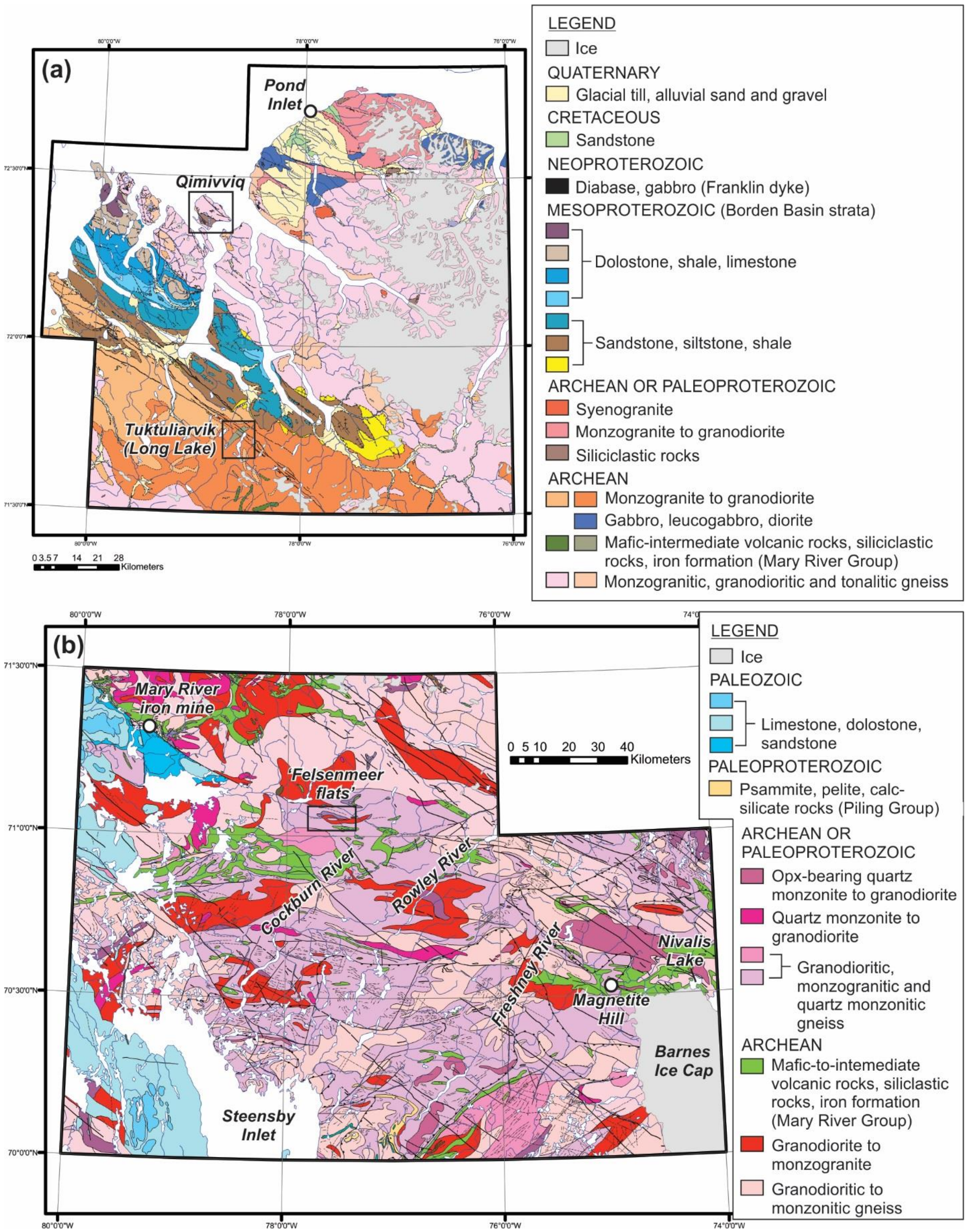
(a)
Pond Inlet
Qimivviq
Tuktuliarvik (Long Lake)
0 3.5 7 14 21 28
Kilometers
LEGEND
Ice
QUATERNARY
Glacial till, alluvial sand and gravel
CRETACEOUS
Sandstone
NEOPROTEROZOIC
Diabase, gabbro (Franklin dyke)
MESOPROTEROZOIC (Borden Basin strata)
Dolostone, shale, limestone
Sandstone, siltstone, shale
ARCHEAN OR PALEOPROTEROZOIC
Syenogranite
Monzogranite to granodiorite
Siliciclastic rocks
ARCHEAN
Monzogranite to granodiorite
Gabbro, leucogabbro, diorite
Mafic-intermediate volcanic rocks, siliciclastic rocks, iron formation (Mary River Group)
Monzogranitic, granodioritic and tonalitic gneiss
(b)
80°0'0"W
78°0'0"W
76°0'0"W
71°30'0"N
71°0'0"N
70°30'0"N
70°0'0"N
74°0'0"W
Mary River iron mine
'Felsenmeer flats'
Cockburn River
Rowley River
Freshney River
Nivalis Lake
Magnetite Hill
Barnes Ice Cap
Steensby Inlet
0 5 10 20 30 40
Kilometers
LEGEND
Ice
PALEOZOIC
Limestone, dolostone, sandstone
PALEOPROTEROZOIC
Psammite, pelite, calc-silicate rocks (Piling Group)
ARCHEAN OR PALEOPROTEROZOIC
Opx-bearing quartz monzonite to granodiorite
Quartz monzonite to granodiorite
Granodioritic, monzogranitic and quartz monzonitic gneiss
ARCHEAN
Mafic-to-intemediate volcanic rocks, siliclastic rocks, iron formation (Mary River Group)
Granodiorite to monzogranite
Granodioritic to monzonitic gneiss

Figure 3 (previous page): (a) Simplified compilation of the three new 1:100 000-scale bedrock geology maps stemming from the GEM-2 North Baffin 2017 fieldwork in the Pond Inlet area (after Saumur et al., 2018a, b; Skipton et al., 2018); (b) Generalized geology of the Steensby Inlet – Barnes Ice Cap area, from the compilation map of de Kemp and Scott (1998), based on 1: 500 000-scale geological mapping conducted in the 1960s (Jackson and Davidson, 1975; Jackson and Morgan, 1978; Jackson et al., 1978; Davidson et al., 1979). This area was mapped at 1: 100 000-scale in 2018 during the second phase of the GEM-2 North Baffin activity.

The GEM-2 North Baffin activity (Figs. 1, 2) consists of targeted and regional-scale (1: 100 000) bedrock mapping of Precambrian rocks in four NTS sheets (38B, 37G, 37F and 37E). This area was previously mapped at 1: 250 000-scale by the Geological Survey of Canada during the 1960s (Jackson, 1969, 2000; Jackson and Davidson, 1975; Jackson and Morgan, 1978; Jackson et al., 1978; Davidson et al., 1979; regional compilation in de Kemp and Scott, 1998). An aeromagnetic survey of the area was conducted by Natural Resources Canada in the 1970s (Natural Resources Canada, 2017). Targeted mapping of Archean greenstone belts on northern Baffin Island was completed by the Canada-Nunavut Geoscience Office (Young et al., 2004; Johns and Young, 2006), and the Geological Survey of Canada (Bethune and Scammell, 2003a, b). In 2017, the Canada-Nunavut Geoscience Office and Qikiqtani Inuit Association completed detailed mapping of ultramafic rocks hosting the Koonark carving stone deposit, located 5 km east of the Mary River iron mine (Steenkamp et al., 2017). Additionally, Baffinland Iron Mines Corporation released Government of Nunavut Mineral Assessment Reports containing detailed geological and geophysical maps of the Mary River iron deposits (Iannelli et al., 2010; 2013a, b, c). For a more complete summary of previous work conducted in the GEM-2 North Baffin activity area, the reader is referred to Skipton et al. (2017).

The GEM-2 North Baffin activity aims to integrate new 1: 100 000-scale mapping with legacy field data and aeromagnetic geophysical surveys to produce up-to-date, accurate bedrock geology maps. These maps will be supported by new geochronological and geochemical data, resulting in a robust regional geological framework that will provide the regional context for research studies into the tectonic history and economic potential of northern Baffin Island.

2018 Fieldwork Logistics and GIS Database Compilation

Logistical preparations for 2018 fieldwork involved close collaboration with the Polar Continental Shelf Program (PCSP). Following a successful application and screening process, the required licences were secured for conducting fieldwork in Nunavut (Nunavut Planning Commission, Nunavut Impact Review Board, Qitiktani Inuit Association, Nunavut Research Institute, Nunavut Water Board, Indigenous and Northern Affairs Canada). In-person community engagement consultations were held in Pond Inlet in late January 2018, and in Clyde River and Igloolik in May 2018, and support for the project was obtained from local stakeholders (e.g., Hamlet Offices, Hunter's and Trapper's Organizations).

A comprehensive digital GIS environment was built in collaboration with NRCan technical staff to enable the use of the Bedrock Data Model (Brouillette et al., 2015) for completing fieldwork and map compilation. The Bedrock Data Model enables geological mapping data to be collected digitally in the field, and compiled into a comprehensive GIS database, thereby streamlining post-fieldwork map compilation and interpretation. This model allowed publication of three new bedrock geology maps from the 2017 mapping area within 9 months of completing fieldwork (Saumur et al., 2018a, b; Skipton et al., 2018).

Heading into the 2018 field season, the GIS database included legacy products stemming from previous work on northern Baffin Island (e.g., maps, field stations, aeromagnetic surveys, geochronological data), topographic data (e.g., toporama, digital elevation model), satellite imagery (landsat) and an airphoto mosaic. The database was used to strategically plan helicopter-supported mapping traverses and targeted site visits.

Summary of 2018 Fieldwork

Fieldwork was conducted during July and August, 2018, and involved four weeks of helicopter-supported bedrock mapping of NTS map sheet 37F, the eastern half of sheet 37E, and southern parts of sheet 37G (Fig. 2). Mapping was completed by a team of 6-8 geologists, and involved daily ~10 km-long traverses conducted on foot in teams of two, as well as targeted site visits and sampling campaigns. The field team was based out of a remote camp centrally located on the Isortoq River (Fig. 2), which included a GIS specialist, camp cook and first aid attendant, helicopter pilot, and camp managers / wildlife monitors from Igloolik and Clyde River. Fieldwork logistics were staged out of Pond Inlet due to the community's proximity to the field area and use during the 2017 field season.

In addition to enhancing the geological knowledge-base of the region, the new field work will enable compilation and publication of five new 1:100 000-scale bedrock geology maps of northern Baffin Island. Release of these maps in publically available online format is planned for May 2019.

For details of geological findings stemming from the 2018 fieldwork, the reader is referred to Saumur et al. (2018d); selected highlights are discussed below.

Archean orthogneiss basement and felsic plutons

The 2018 field area is underlain by gneisses and plutons of dominantly felsic composition. The gneissic rocks consist of deformed tonalite, quartz diorite, granodiorite and/or monzogranite, and commonly include layers or enclaves of diorite and gabbro oriented parallel to gneissosity (Fig. 4a). The gneisses likely represent the basement to overlying supracrustal sequences.

Non-gneissic, homogeneous granodiorite to monzogranite intrusions are extensive, are massive to moderately foliated, lack compositional banding, and locally contain K-feldspar megacrysts (Fig. 4b, c). The granodiorite to monzogranite plutons commonly display cross-cutting relationships with gneissic and mafic-to-intermediate units. Numerous occurrences of blocks and panels of supracrustal rocks within the granodiorite-monzogranite plutons were also observed. The gneiss and granodiorite to monzogranite plutons typically contain biotite and magnetite (± hornblende), although distinct assemblages including garnet and orthopyroxene occur in parts of NTS sheet 37F (Fig. 4c).

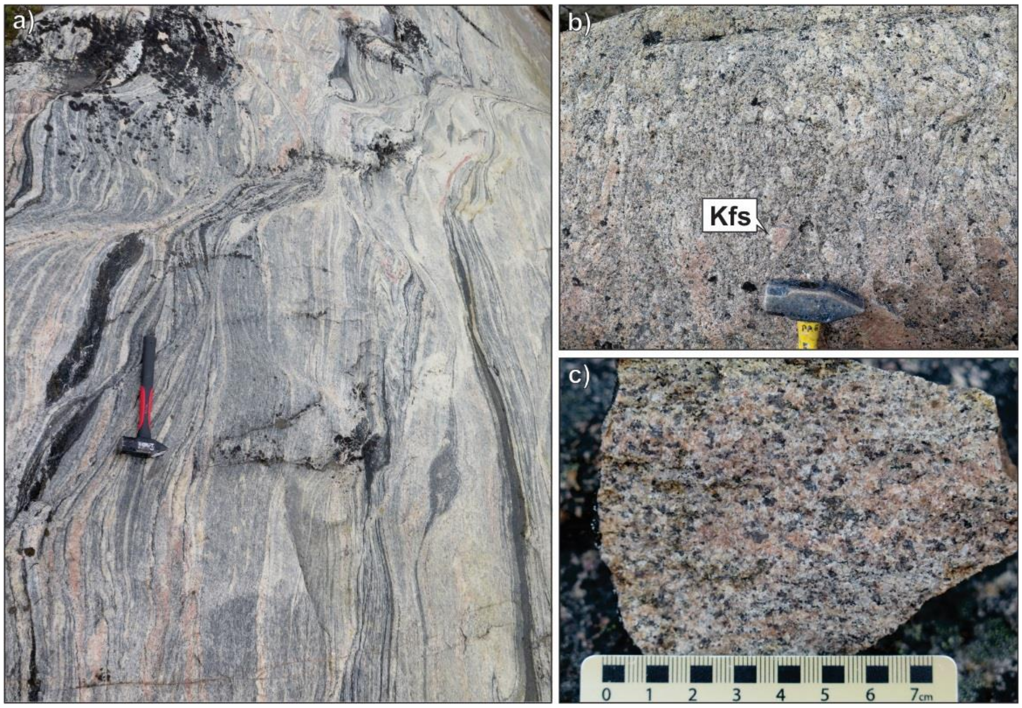

Figure 4: Field photographs of felsic gneiss and felsic plutonic rocks. (a) Gneiss of dominantly biotite-bearing monzogranite containing bands of syenogranite and bands/enclaves of biotite–hornblende–magnetite quartz diorite; (b) Foliated biotite–magnetite granodiorite containing K-feldspar megacrysts; (c) Weakly foliated-to-massive biotite–garnet–orthopyroxene monzogranite.

Archean Mary River Group and iron mineralization

Previous reconnaissance-scale mapping (Jackson et al., 1978; Jackson and Morgan, 1978) identified extensive tracts of Mary River Group exposed in the northwestern and southeastern corners of NTS sheet 37F and north of the Barnes Ice Cap in sheet 37E, as well as numerous smaller (1-10 km-scale) Mary River Group exposures throughout both map sheets. Targeted mapping of these areas has shown that the Mary River Group is less extensive than previous maps might suggest, and that most of these areas are underlain by tonalitic to monzogranitic gneiss and/or monzogranite to granodiorite plutons. Nonetheless, several exposures of Mary River Group strata were mapped, including those hosting oxide-facies iron formations in the Magnetite Hill and Nivalis Lake areas, and along the Cockburn, Rowley and Freshney rivers (Fig. 3). The Mary River Group includes mafic-to-intermediate meta-volcanic rocks, psammite, pelite and iron formations (Fig. 5). Iron formations are typically oxide-facies, ~5-20 m thick, comprised of banded magnetite and quartz, and locally contain minor bornite ± chalcopyrite (Fig. 5a–c). Outcrop is relatively rare near the edges of the Barnes Ice Cap, where Mary River Group strata are exposed as isolated outcrops or as several outcrops across an area of ~1-2 km^2 that are surrounded by boulders and till. This results in a degree of uncertainty regarding the spatial extent of the Mary River Group and its contact relationships with the surrounding felsic plutonic and felsic-to-intermediate gneissic rocks. In areas with better outcrop exposure, such as near Rowley River, the Mary River Group strata typically form extensive (~1-4 km-thick) panels surrounded by felsic gneisses and plutonic rocks. These panels are oriented parallel to the regional structural grain, but are discontinuous along-strike. As noted in the 2017 mapping area, this relationship may be due to a combination of the Mary River Group having been intruded by monzogranite-to-granodiorite plutons and surviving as rafts, as well as subsequent deformation including boudinaging (Skipton et al., 2017). Studies of the tectono-metamorphic history of selected Mary River Group sequences are ongoing as part of the GEM-2 North Baffin activity, and are important for understanding the evolution and distribution of iron mineralization.

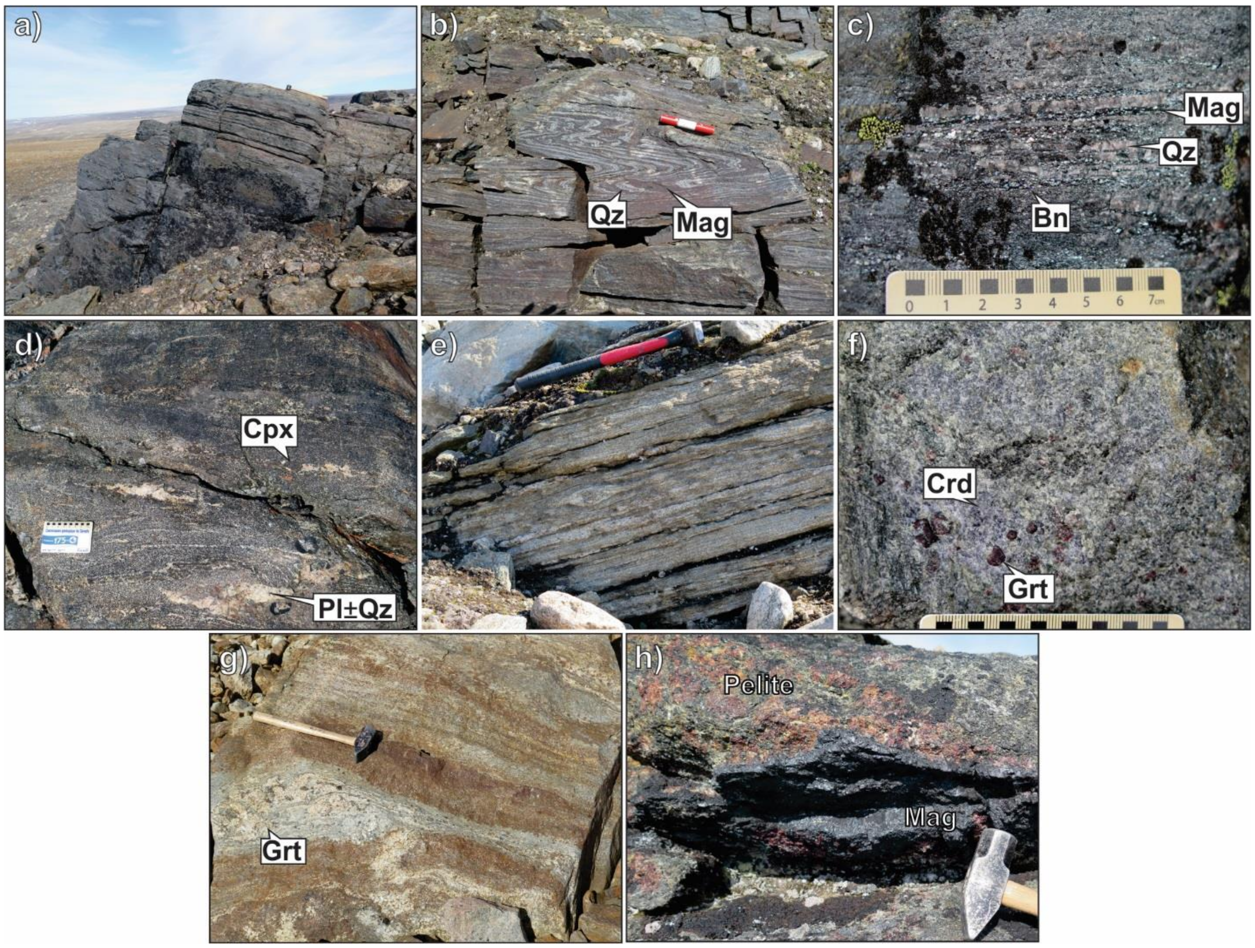

Figure 5: Field photographs of rock units in the Mary River Group. (a) A 5 m-thick interval of oxide-facies banded iron formation at Magnetite Hill; (b) Folded bands of magnetite and quartz in iron formation in the Nivalis Lake area (scale marker is 9 cm long); (c) Oxide-facies banded iron formation containing bornite in the Rowley River area; (d) Mafic meta-volcanic rock containing clinopyroxene, orthopyroxene, garnet, amphibole and magnetite, with pods of coarse-grained plagioclase feldspar (± quartz) in the Freshney River area; (e) Intermediate meta-volcanic rock containing clinopyroxene in the Nivalis Lake area; (f) Intermediate meta-volcanic rock containing garnet, cordierite and grunerite in the Rowley River

area; (g) Interbedded garnet–biotite psammite and garnet–biotite–sillimanite pelite at Magnetite Hill; (h) A magnetite band within garnet- and sillimanite-rich pelite at Magnetite Hill.

Paleoproterozoic Piling Group

Sequences of pelite, psammite and calc-silicate located in the southern part of NTS sheet 37F had been previously mapped as part of the Paleoproterozoic Piling Group (Fig. 3; Jackson et al., 1978; Jackson, 2000). New mapping of these sequences has fine-tuned their spatial distribution, stratigraphy and composition. The strata form ~0.5-2 km thick packages of dominantly pelite and psammite, locally with calc-silicate (Fig. 6). The metasedimentary strata form discontinuous panels surrounded by monzogranite. Pelite contains garnet, biotite and sillimanite (Fig. 6b), and calc-silicate and marble contain phlogopite and diopside, indicating peak metamorphic conditions of at least upper-amphibolite grade. Surrounding monzogranite contains garnet and orthopyroxene. Geochronological and tectono-stratigraphic studies are planned to confirm whether these strata correlate with Paleoproterozoic Piling Group sequences that are extensively exposed on central Baffin Island.

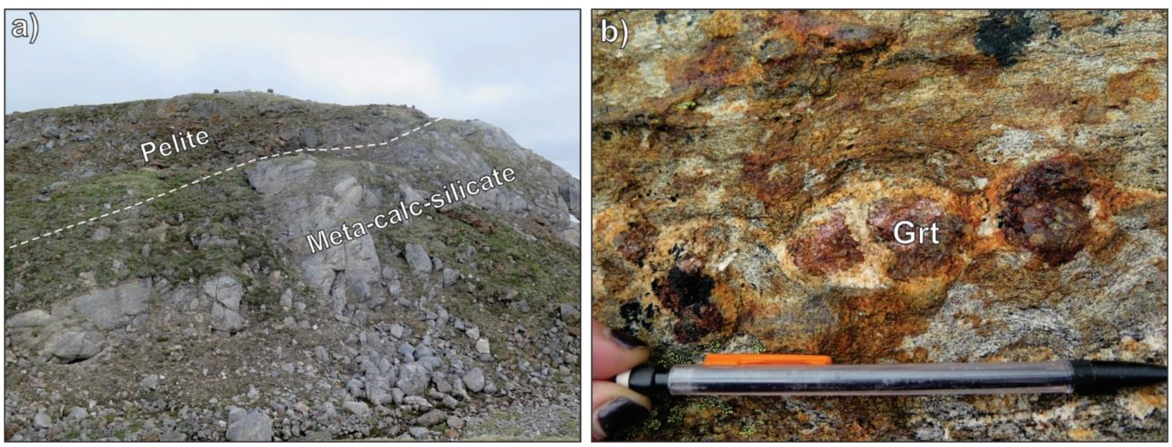

Figure 6: Field photographs of metasedimentary rocks assigned to the Paleoproterozoic Piling Group by previous studies. (a) 7m-thick interval of meta-calc-silicate containing diopside, phlogopite and titanite, overlain by biotite–sillimanite–garnet pelite; (b) Garnet porphyroblasts in biotite–sillimanite–garnet pelite.

Future Work

Compilation of five 1: 100 000-scale bedrock geology maps is underway, presenting the results of new bedrock mapping conducted in NTS sheet 37G in 2017 and 2018, and in NTS sheets 37F and the western half of 37E in 2018.

Several research studies based on 2017 fieldwork are ongoing, including an MSc thesis project (E. Bros, University of Alberta) focusing on the stratigraphy and structural history of the Mary River Group in the Tukuliarvik (Long Lake) area (Fig. 3). Furthermore, a new BSc thesis project (M. O'Brien, University of

Ottawa) will focus on the petrography, mineralogy and isotope geochemistry of felsic plutonic rocks of northern Baffin Island. Results of U/Pb zircon dating of 12 samples from the main rock units mapped in 2017 will be released in a GSC Current Research report, with an estimated publication date of May 2019. Pressure-temperature (P-T) studies and in situ U/Pb monazite dating are in progress to investigate the tectono-metamorphic evolution of a basement-cover thrust imbricate in the Qimivviq area, and of the Mary River Group in the Tuktuliarvik and Felsenmeer Flats areas (Fig. 3).

To construct a regional tectono-metamorphic framework, P-T and in situ U/Pb monazite studies are planned for key exposures of the Mary River Group in the 2018 fieldwork area (NTS sheets 37E & F). To determine igneous crystallization and depositional ages of the main rock units mapped in 2018, approximately 15 samples will be dated using U/Pb zircon geochronology. Additionally, structural data from the 2017 and 2018 map areas will be compiled and interpreted to form a regional 3D structural framework.

Acknowledgements

The authors thank the 2018 field mapping team for their dedication, enthusiasm and contributions to field work and interpreting the geology of northern Baffin Island: Erin Bros (MSc student, University of Alberta); Mylène O'Brien (BSc student, University of Ottawa); Geological Survey of Canada (GSC) postdoctoral research scientists Pedro Acosta-Gongora and Colter Kelly; Stephen Johnston (University of Alberta); Owen Weller (University of Cambridge); Annick Morin (GSC Québec). Annick Morin is thanked for her excellent GIS technical support and coordination of the Bedrock Data Model during fieldwork. Compilation of the GIS database was completed by GSC staff: Pierre Brouillette, Louis Robertson, Annick Morin and Guy Buller. The authors wish to thank Cesar Sevcik for providing the field team with delicious meals throughout the field season. Pilot Erik Polzin (Summit Helicopters) is gratefully acknowledged for his skillful and safe transportation of the mapping team. The authors also thank Paul Ivalu of Igloolik and Leeno Joe Apak of Clyde River for proficient camp management and wildlife monitoring.

The authors are thankful to PCSP for handling fieldwork logistics, and to the Tununiq Sauniq Co-Op for their assistance with logistics in Pond Inlet. Kenn Borek Air Ltd. are thanked for providing Twin Otter flights supporting Isortoq Camp. Groceries for fieldwork were provided by the Tununiq Sauniq Co-Op and the Northern Store in Pond Inlet. Accommodation and meals in Pond Inlet before and after fieldwork were provided by the Sauniq Hotel and Black Point Lodge. Additional support from the following organizations is gratefully acknowledged: the Hamlet of Pond Inlet; the Hunters and Trappers Organizations of Pond Inlet, Igloolik and Clyde River; Baffinland Iron Mines Corporation; and the Qikiqtani Inuit Association.

The authors are grateful for support from the GEM Coordination Office at the GSC, in particular from Project Manager Natalie Shea, Community Engagement Officer Kate Clark and Financial Officer Marlene Francis, and for administrative support from Melanie MacKay. Pedro Acosta-Gongora is thanked for his helpful critical review of this article.

References

Berman, R.G., Sanborn-Barrie, M., Rayner, N., Carson, C; Sandeman, H.A. and Skulski, T., 2010. Petrological and in situ SHRIMP geochronological constraints on the tectonometamorphic evolution of the Committee Bay belt, Rae Province, Nunavut. Precambrian Research 181 (1-4), 1–20, https://doi.org/10.1016/j.precamres.2010.05.009

Bethune, K.M. and Scammell, R.J., 2003a. Geology, geochronology, and geochemistry of Archean rocks in the Eqe Bay area, north-central Baffin Island, Canada: constraints on the depositional and tectonic history of the Mary River Group of northeastern Rae Province. Canadian Journal of Earth Sciences 40, 1137–1167.

Bethune, K.M. and Scammell, R.J., 2003b. Distinguishing between Archean and Paleoproterozoic tectonism, and evolution of the Isortoq fault zone, Eqe Bay area, north-central Baffin Island, Canada. Canadian Journal of Earth Sciences 40, 1111–1135.

Bros, E.R. and Johnston, S.T., 2017. Field observations of the Mary River Group south of Tay Sound, northern Baffin Island, Nunavut: stratigraphy and structure of supracrustal sequences and surrounding plutonic units; *in* Summary of Activities 2017, Canada-Nunavut Geoscience Office, 69–80.

Bros, E.R., Skipton, D.R., Saumur, B.M. and Johnston, S., 2018. Observations of the Mary River Group in the western Tuktuliarvik region, northern Baffin Island, Nunavut: stratigraphy and structure of an Archean supracrustal sequence. Nunavut Mining Symposium, Iqaluit, NU (April 2018).

Brouillette,P., Girard, E. and Huot-Vézina, G., 2015. Generic Data Model Design and tools for geoscience mapping projects implemented in ArcGIS. Proceedings of the 17th annual conference of the International Association for Mathematical Geoscience (IAMG), Freiberg, Germany, September 5-13, 2015. Extended abstract.

Corrigan, D., Nadeau, L., Brouillette, P., Wodicka, N., Houlé, M.G., Tremblay, T., Machado, G. and Keating, P., 2013. Overview of the GEM Multiple Metals - Melville Peninsula project, central Melville Peninsula, Nunavut. Geological Survey of Canada, Current Research (Online) no. 2013-19; 21 p., https://doi.org/10.4095/292862

Davidson, A., Jackson, G.D. and Morgan, W.C., 1979. Geology, Icebound Lake, District of Franklin; Geological Survey of Canada, Map 1451A, coloured, with expanded legend, scale 1:250 000.

de Kemp, E.A. and Scott, D.J., 1998. Geoscience compilation of the Northern Baffin Island and Northern Melville Peninsula, Northwest Territories. Geological Survey of Canada, Open File D3636.

Iannelli, T., Samiei, A. and Robatian, M., 2010. Baffinland – Mary River Project, Diamond Drilling, Rock Sampling, Prospecting, Geological Mapping and Ground Magnetic Surveying. Unpublished INAC Assessment Report #85600, http://nunavut-geoscience-s3-browser.ca-central-1.elasticbeanstalk.com/?directory=Exploration_Reports/085/0856/085600/

Iannelli, T., Robatian, M., Breckon, S., Campbell, H., Dao, P. and MacLeod, M., 2013a. Baffinland – Assessment Report: Rock Sampling, Prospecting, Geological Mapping and Geophysical Surveying. Unpublished INAC Assessment Report #85816. http://nunavut-geoscience-s3-browser.ca-central-1.elasticbeanstalk.com/?directory=Exploration_Reports/085/0858/085816/

Iannelli, T., Robatian, M., Breckon, S., Campbell, H., Dao, P. and MacLeod, M., 2013b. Baffinland – Assessment Report: Rock Sampling, Prospecting, Geological Mapping, and Geophysical Surveying. Unpublished INAC Assessment Report #85823. http://nunavut-geoscience-s3-browser.ca-central-1.elasticbeanstalk.com/?directory=Exploration_Reports/085/0858/085823/

Iannelli, T., Robatian, M. Breckon, S. and Iannelli, E., 2013c. Baffinland – Mary River Project Assessment Report: Rock Sampling, Prospecting, Geological Mapping and Geophysical Surveying. Unpublished INAC Assessment Report #85842. http://nunavut-geoscience-s3-browser.ca-central-1.elasticbeanstalk.com/?directory=Exploration_Reports/085/0858/085842/

Jackson, G.D., 1969. Reconnaissance of the North - Central Baffin Island; *in* Blackadar R. (ed): Report of Activities Part A, April To October 1968. Geological Survey of Canada Paper no. 69-1A, 171-176.

Jackson, G.D., 2000. Geology of the Clyde-Cockburn Land map area, north-central Baffin Island, Nunavut. Geological Survey of Canada, Memoir 440, 316 pp.

Jackson, G.D. and Berman, R.G., 2000. Precambrian metamorphic and tectonic evolution of northern Baffin Island, Nunavut, Canada. Canadian Mineralogist 38 (2), 399-421.

Jackson, G.D. and Davidson, A., 1975. Geology, Pond Inlet and Nova Zembla Island, District of Franklin. Geological Survey of Canada, Map 1396A, coloured, with expanded legend, scale 1:250 000; *in* Jackson, G.D., Davidson, A. and Morgan, W.C. (eds) Geology of the Pond Inlet map-area, Baffin Island, District of Franklin (38A, 38B, part of 48A). Geological Survey of Canada, Paper no. 74-25.

Jackson, G.D., Morgan, W.C. and Davidson, A., 1978. Geology, Steensby Inlet, District of Franklin. Geological Survey of Canada, Map 1450A, coloured, with expanded legend, scale 1:250 000.

Jackson, G.D. and Morgan, W.C., 1978. Geology, Conn Lake, District of Franklin. Geological Survey of Canada, Map 1458A, coloured, with expanded legend, scale 1:250 000.

Johns, S.M. and Young, M.D., 2006. Bedrock geology and economic potential of the Archean Mary River group, northern Baffin Island, Nunavut. Geological Survey of Canada Current Research 2006-C5, 13 p.

Natural Resources Canada, 2017. Geoscience Data Repository for Geophysical Data; Natural Resources Canada, URL http://gdr.agg.nrcan.gc.ca/gdrdap/dap/search-eng.php [October, 2017].

Sanborn-Barrie, M., Davis, W.J., Berman, R.G., Rayner, N., Skulski, T. and Sandeman, H., 2014. Neoarchean continental crust formation and Paleoproterozoic deformation of the central Rae craton, Committee Bay belt, Nunavut. Canadian Journal of Earth Sciences 51 (6), 635–667, https://doi.org/10.1139/cjes-2014-0010

Saumur, B.M., Skipton, D.R. and St-Onge, M.R., 2017. Report of activities 2017, GEM-2 Baffin Project: regional bedrock mapping of northern Baffin Island (Pond Inlet and Mary River areas), Nunavut. Geological Survey of Canada Open File 8304, 14 p.

Saumur, B.M., Skipton, D.R., St-Onge, M.R., Wodicka, N., Bros, E.R., and Weller, O.M., 2018a. Bedrock geology, Mumiksaa-Milne Inlet, Nunavut, parts of NTS 38-B and 48-A. Geological Survey of Canada, Canadian Geoscience Map 348, scale 1:100 000, 1 sheet.

Saumur, B.M., Skipton, D.R., St-Onge, M.R., Wodicka, N., Bros, E.R., and Weller, O.M., 2018b. Bedrock geology, Kanajuqtuuq (Paquet Bay), Nunavut, NTS 37-G north. Geological Survey of Canada, Canadian Geoscience Map 349, scale 1:100 000, 1 sheet.

Saumur, B.M., Skipton, D.R. and St-Onge, M.R., 2018c. The bedrock geology of the Pond Inlet – Mary River area: Upgrading the geological knowledgebase of northern Baffin Island. Nunavut Mining Symposium, Iqaluit, NU (April 2018).

Saumur, B.M., Skipton, D.R., St-Onge, M.R., Bros, E.R., Acosta-Góngora, P., Kelly, C.J., Morin, A., O'Brien, M.E., Johnston, S.T. and Weller, O.M., 2018d. Precambrian geology of Steensby Inlet and West Barnes Ice Cap (NTS 37F and 37E), Baffin Island, Nunavut; *in* Summary of Activities 2018, Canada-Nunavut Geoscience Office (in press).

Skipton, D.R., Saumur, B.M., St-Onge, M.R., Wodicka, N., Bros, E.R., Morin, A., Brouillette, P., Weller, O.M. and Johnston, S.T. 2017: Precambrian bedrock geology of the Pond Inlet–Mary River area, northern Baffin Island, Nunavut; *in* Summary of Activities 2017, Canada-Nunavut Geoscience Office, 49–68.

Skipton, D.R., Saumur, B.M., St-Onge, M.R., Wodicka, N., Bros, E.R., Currie, L.D., Haggart, J.W. and Weller, O.M., 2018. Bedrock geology, Pond Inlet, Nunavut, part of NTS 38-B. Geological Survey of Canada, Canadian Geoscience Map 347, scale 1:100 000, 1 sheet.

Skulski, T., Sandeman, H., Sanborn-Barrie, M., MacHattie, T., Young, M., Carson, C., Berman, R., Brown, J., Rayner, N., Panagapko, D., Byrne, D. and Deyell, C., 2003. Bedrock geology of the Ellice Hills map area and new constraints on the regional geology of the Committee Bay area, Nunavut. Geological Survey of Canada, Current Research (Online) no. 2003-C22, 11 p., https://doi.org/10.4095/214204

St-Onge, M.R., Van Gool, J.A.M., Garde, A.A. and Scott, D.J., 2009. Correlation of Archaean and Palaeoproterozoic units between northeastern Canada and western Greenland: constraining the pre-collisional upper plate accretionary history of the Trans-Hudson orogen; *in* Cawood, P.A. and Kroner, A. (eds) Earth Accretionary Systems in Space and Time. Geological Society, London, Special Publications 318, 193-235, https://doi.org/10.1144/SP318.7.

St-Onge, M.R., Weller, O.M. and Rayner, N.M., 2016. 2016 report of activities for completing the regional bedrock mapping of the southern half of Baffin Island: GEM 2 Baffin Project. Geological Survey of Canada, Open File 8118, 11 p.

Steenkamp, H.M., Elgin, R.A. and Therriault, I., 2017. Geological mapping and resource evaluation of the Koonark carving stone deposit, northern Baffin Island, Nunavut; *in* Summary of Activities 2017, Canada-Nunavut Geoscience Office, 139–150.

Young, M.D., Sandeman, H., Berniolles, F. and Gertzbein, P.M., 2004. A preliminary stratigraphic and structural geology framework of the Archean Mary River Group, northern Baffin Island, Nunavut. Geological Survey of Canada, Current Research 2004-C1, 14 p.