

A Crustal-Scale Fold Nappe from the Trans-Hudson Orogen, Northern Baffin Island, Arctic Canada

Benoit M. Saumur ^{*1}, Stephen T. Johnston ², Diane R. Skipton ³, Marc R. St-Onge ⁴

¹Geotop & Département des sciences de la Terre et de l'atmosphère, Université du Québec à Montréal, 201 av. du Président-Kennedy, Montréal, QC, H2X 3Y7 | ²Department of Earth and Atmospheric Science, University of Alberta, Edmonton, AB, T6G 2E3 | ³Geological Survey, Department of Energy and Mines, Government of Newfoundland and Labrador, 50 Elizabeth Ave., St. John's, NL, A1B 4J6 | ⁴Geological Survey of Canada, Central Canada Division, 601 Booth St., Ottawa, ON, K1A 0E8

Abstract The recognition of crystalline basement nappes in deeply eroded orogens, which is critical to elucidating the tectonic and geodynamic histories of cratonic terranes, relies on the identification of key geometric and kinematic structural elements. These include (i) synformal anticlines and/or antiformal synclines along the nappe's overturned lower limb; (ii) parasitic folds with thinned long limbs elongated parallel to transport direction; and (iii) a stretching lineation that records the nappe transport direction and which is coeval with and perpendicular to a fold axis-parallel lineation. The structure, stratigraphy and geophysics of the Isortoq Fault Zone (IFZ) and nearby supracrustal Isortoq and Ege Bay belts (Rae craton, northern Baffin Island) suggest the occurrence of a regional synformal anticline interpreted as part of the lower limb of a Paleoproterozoic southeast-verging nappe. The northern northeast-striking, moderately southeast-dipping Isortoq belt is structurally thinned, metamorphosed to upper amphibolite to granulite facies, sheared (by the top-to-the-southeast IFZ) and overturned, with strata younging down-section to the northwest. In contrast, the southern east-northeast-striking, steeply southeast-dipping Ege Bay belt is structurally thickened, comparatively less metamorphosed and less deformed, and stratigraphically youngs to the southeast. The geometry and orientation of the belts mirror those of mesoscale parasitic S- and Z-folds exhibiting thinned elongated limbs and thickened short limbs. The IFZ and associated faults represent a brittle-ductile shear zone formed at the base of the nappe during propagation; offsets along these faults are responsible for the distribution of isograds. The Isortoq nappe occurs along strike (and may be genetically associated) with southwest-verging Rinkian nappes exposed >200 km to the northeast. South-verging fold nappes developed along the southern margin of the Rae craton contrast with north-verging, thin-skinned thrust sheets of the Foxe fold belt to the south, emphasizing the complex kinematics of the assembly of the Nuna supercontinent.

Executive Editor:
Graeme Eagles
Associate Editor:
Laura Federico
Technical Editor:
Mohamed Gouiza

Reviewers:
Jean-Baptiste
Koehl
Julien Perret

Submitted:
6 February 2026
Accepted:
1 September 2026
Published:
20 October 2026

1 Introduction

Fold nappes (hereafter just 'nappes') are recumbent folds characterized by shallowly dipping to sub-horizontal axial planes and inverted and commonly highly sheared and deformed lower limbs. Nappes are ubiquitous regional-scale structures within Phanerozoic convergent margin orogens (e.g., *McClay and Price, 1981*) and require large-scale horizontal displacements, as was recognized and documented in the Alps long before the advent of plate tectonics (*Bailey, 1930*, and references therein). While nappes and thrust sheets shorten and thicken the crust (e.g., *Dennis et al., 1981; Merle, 1998*, and references therein), nappes are more commonly associated with basement-involved, thick-skinned deformation whereas thrust sheets are more characteristic of thin-skinned deformation lacking

basement involvement (*Bauville and Schmalholz, 2015*). Nappes have also been documented in Proterozoic and Archean terranes (e.g., *de Wit, 1982; Friend and Nutman, 1991; Möller et al., 2015; Jannin et al., 2018*); however, their recognition in polydeformed and deeply eroded portions of orogens that have experienced a long-lived tectono-metamorphic history remains difficult. Basement-involved, crystalline nappes can lack features that commonly aid in nappe identification including way-up indicators, a recognizable stratigraphy, and the presence of age-constraining fossils. Their identification depends upon the preservation of structural elements that are considered characteristic of nappes (e.g., *Ramsay, 1981; Bastida et al., 2014; Figure 1*). These include (but are not limited to) (i) synformal anticlines and antiformal synclines on the nappe's overturned lower limb (*Figure 1A–B*); (ii) parasitic S- and Z-folds in the overturned lower limb characterized by thickened short

*✉ saumur.benoit@uqam.ca

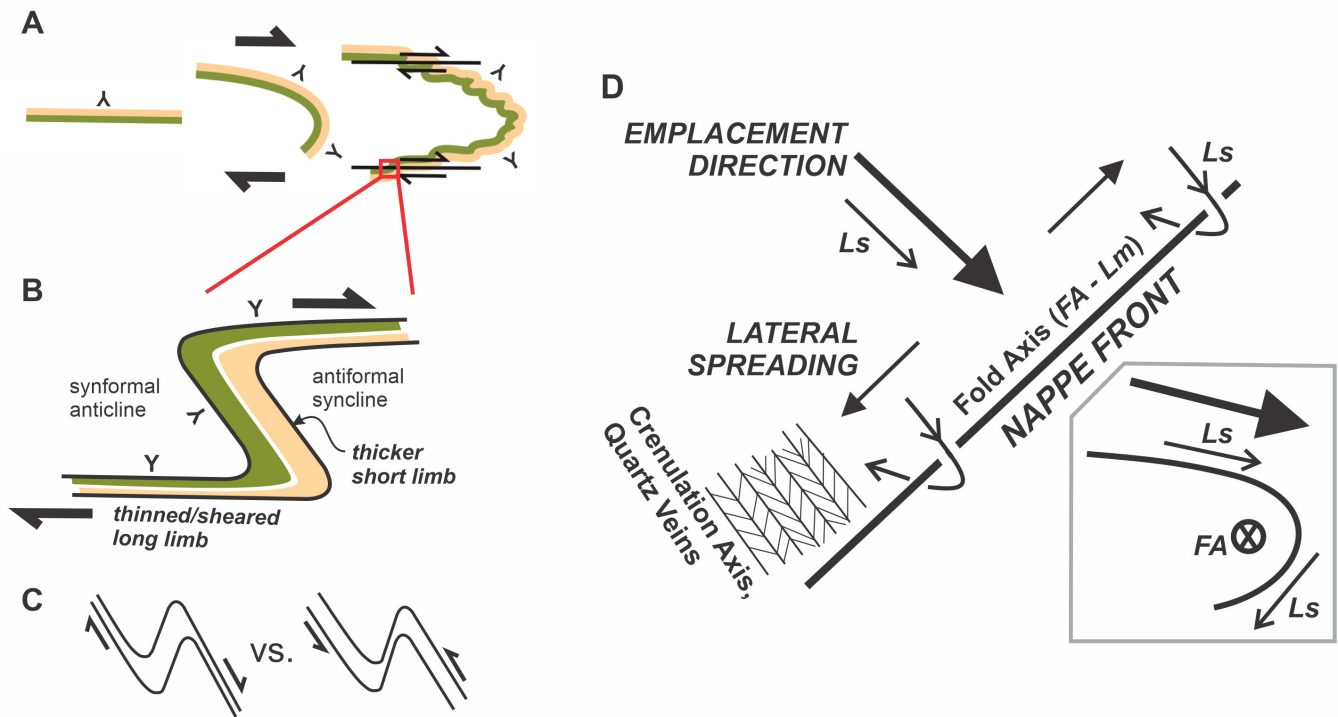


Figure 1 – Schematic development of a tectonic nappe and structural elements associated with its propagation. **A)** An upright stratigraphic sequence (green unit overlain by younger yellow unit; indicated by younging symbol) is entrained into a nappe, forming a sheared and overturned lower limb. **B)** Idealized parasitic folds developed on the overturned lower limb featuring a thinned (sheared) long limb and a thick, lower-strain, short limb. **C)** A comparison of the geometry of parasitic folds from basal nappe limbs vs. those from typical folds. S-folds within a hypothetical upright fold shown as example. Typical parasitic folds have thinned short limbs due to flexural rotation, whereas basal nappe folds have thinned long limbs parallel to basal shear zones. Moreover, for basal nappe folds, inferring vergence direction based solely on “S” (or “Z”) shape, without considering limb thickness, would yield an incorrect interpretation. **D)** Nappe viewed at a high angle to the direction of transport, with transport and lateral spreading directions shown with associated small-scale structural elements including a fold axis (FA) parallel mineral lineation (Lm) and a stretching lineation (Ls). Bottom right inset: view parallel to the nappe fold axis (FA). Stretching lineation (Ls) plunge will change as the lineations rotate and roll over during nappe propagation, and data may exhibit populations plunging in the direction opposite of vergence while remaining perpendicular to the fold axis.

limbs and thinned long limbs (as opposed to typical parasitic folds with thinned short limbs, Figure 1C); (iii) coeval lineations including an intersection/mineral lineation (Lm) parallel to the nappe fold axis (FA, Figure 1D) and oriented perpendicular to a stretching lineation (Ls, Figure 1D), or transverse lineation (e.g., Burg et al., 1987) parallel to the transport/emplacement direction of the nappe. Earlier stretching lineations (Ls) will be reoriented in the hinge zone as the nappe rolls over, producing an array of Ls orientations all perpendicular to the FA of the nappe (inset, Figure 1D). Finally, lateral spreading of a nappe, perpendicular to the direction of propagation (Figure 1D), will cause shortening along the edges of the nappe and generate associated features such as steeply inclined and shallowly plunging folds or crenulations, and/or shallowly dipping veins (Ratschbacher et al., 1989; Zhang et al., 2000; Davis and Maidens, 2003).

The identification of tectonic elements characteristic of nappes requires their recognition in the field and the collection of sufficient mesoscale structural data to provide rigorous 3D geometric and kinematic constraints. Regional geophysical surveys and associated enhancement techniques and filters (e.g., Beauchemin et al., 2019), as well as modern remote predictive

mapping by satellite imagery (e.g., He et al., 2015), provide first-order constraints on the distribution and geometry of crustal units and are key for targeting areas of interest for follow-up detailed fieldwork.

Despite a series of recent regional-scale bedrock mapping campaigns (Skipton et al., 2017; Saumur et al., 2018; Steenkamp et al., 2018; Lebeau et al., 2020; St-Onge et al., 2020), the geology of remote northern Baffin Island (Nunavut, Canada) remains relatively poorly understood due to a lack of targeted thematic studies. Nevertheless, the area is key for our understanding of the kinematics of the Paleoproterozoic Trans-Hudson Orogen (THO) and is critical for regional tectonic correlations between Canada and Greenland (Figure 2; St-Onge et al., 2009, 2020; Grocott et al., 2023; Johnston et al., 2024). In addition, apart from the world-class and currently producing Mary River Fe-ore deposit (Figure 2), greenstone belts of northern Baffin Island have untapped mineral potential (Harrison et al., 2022). Among the least understood regional bedrock structural elements of northern Baffin Island is the Isortoq Fault Zone (IFZ; Jackson, 2000; Jackson and Berman, 2000), a regional-scale structure that, despite being cryptic in the field, is characterized by a well-constrained linear aeromagnetic anomaly.

In this contribution, we report new structural observations stemming from geological mapping of the Grant-Suttie Bay area of northwestern Baffin Island (Figures 2, 3), and a reinterpretation of legacy structural data and regional geophysical surveys. We provide a new interpretation for the IFZ and the two greenstone belts of the Grant-Suttie Bay area, and argue that they form part of a regional-scale synformal anticline developed along the lower, overturned limb of a south-verging tectonic nappe. These findings have implications for the regional architecture and the tectonic framework of northern Baffin Island and the northeastern THO as a whole, and highlight the importance of horizontal displacements during Paleoproterozoic orogenesis.

2 Background

2.1 Regional Framework

The Paleoproterozoic (ca. 1915–1758 Ma) THO formed as a result of the convergence and collision of the upper-plate Churchill domain with the lower-plate Superior craton (e.g., *Hoffman, 1988; Lewry and Collerson, 1990; St-Onge et al., 2006; Weller et al., 2021*). The geometry and kinematics of the THO are relatively well defined in northern Quebec and Labrador in mainland Canada, in western Greenland, as well as in the Foxe fold belt and more southerly parts of Baffin Island (Figure 2). In comparison, the significance of THO structures north of the Foxe fold belt remains ambiguous. Reconnaissance-scale maps stemming from early mapping campaigns by the Geological Survey of Canada (e.g., *Jackson et al., 1978; Jackson and Morgan, 1978; Morgan, 1982*) provide the general geological framework of northern Baffin Island, and more recent 1:100,000-scale geological maps (*Skipton et al., 2017; Saumur et al., 2018; Skipton et al., 2020a,b*) provide additional geological constraints.

The Churchill domain consists of several reworked Archean–Paleoproterozoic crustal blocks, including the Archean Rae craton of northern Canada and Greenland (*St-Onge et al., 2006, 2009, 2020; Corrigan et al., 2009*). Cratonic rocks of northern Baffin Island include Meso- to Neoproterozoic (ca. 2901–2706 Ma) orthogneiss and plutons, which range in composition from dioritic to monzogranitic, and subordinate greenstone belts of the ca. 2863–2830 Ma Tuktuliavik Group and the ca. 2759–2718 Ma Mary River Group (*Bethune and Scammell, 1997, 2003a; Skipton et al., 2017, 2019; Saumur et al., 2018, 2025*). A number of orogens characterize the Rae craton including the 2.60–2.50 Ga MacQuoid orogen (*Peterson et al., 2024*), the 2.50–2.30 Ga Arrowsmith orogen (e.g., *Berman et al., 2013*), the 2.01–1.95 Ga Thelon-Inglefield orogen (e.g., *Berman et al., 2023*) and the THO. Far-field evidence for the Thelon-Inglefield orogen has been documented in northeastern Baffin Island, in the Qimivik area (QV in Figure 2; *Skipton et al., 2025*); otherwise metamorphic zircon and monazite isotopic data from the Rae craton of northern Baffin Island yield ages consistent with re-equilibration and/or crystallization during the Trans-Hudson orogeny (e.g., *Jackson and*

Berman, 2000; Bethune and Scammell, 2003b; Skipton et al., 2019; Saumur et al., 2025, 2026, and references therein). Unconformably overlying the Archean rocks of the Rae craton on Baffin Island are siliciclastic-carbonate strata and subordinate mafic-ultramafic volcanic rocks of the ca. <2.19 to >1.88 Ga Paleoproterozoic Piling Group (e.g., *Morgan et al., 1976; Henderson and Tippet, 1980; Scott et al., 2002; Partin et al., 2014; Saumur et al., 2025*). Piling Group strata were deposited along the southeastern margin of the Rae craton (e.g., *Rainbird et al., 2010; Wodicka et al., 2014*) and were subsequently imbricated and isoclinally folded and metamorphosed at upper greenschist to granulite facies conditions during development of the THO (*Gagné et al., 2009*). The Piling Group is best exposed in the north-verging Paleoproterozoic Foxe fold belt (Figure 2), where deformation was active between ca. 1.88–1.87 Ga (e.g., *St-Onge et al., 2009; Corrigan et al., 2009; Weller et al., 2021*).

The south-southeast-dipping, east-northeast-striking IFZ (Figures 2, 3) consists of a narrow, 10–100-metre-wide corridor of brittle-ductile fault rocks developed within Rae craton granitoids and orthogneisses (e.g., *Jackson, 2000; Bethune and Scammell, 2003b*) that is coincident with a sharp change in regional aeromagnetic response (Figure 4A; *Natural Resources Canada, 2013*); a pronounced magnetic low southeast of the IFZ contrasts with magnetic highs to the northwest. The northeastern extension of this aeromagnetic signature is more diffuse and difficult to pinpoint (Figure 4A). The zone is inferred by some to continue towards the northeastern coast of Baffin Island (see review by *St-Onge et al., 2020*). Regionally, the IFZ juxtaposes orthopyroxene(OPX)-bearing felsic plutonic rocks and granulite facies assemblages to the northwest (Dexterity granulite belt) against lower grade, upper-amphibolite-facies rocks to the southeast (*Jackson, 2000; Saumur et al., 2018*). However, the distribution of rocks that contain diagnostic granulite-facies assemblages northwest of the IFZ is patchy and discontinuous (*Skipton et al., 2020a,b*). South-directed structures (thrusts and folds) predominate in the hanging wall north of the IFZ, but appear to be truncated by the fault zone (*Jackson, 2000*). The IFZ was proposed to correspond to the northernmost extent of northwest-directed, ca. 1.85–1.82 Ga thrusts of the Foxe fold belt and its underlying basement (*Jackson, 2000; Jackson and Berman, 2000; Bethune and Scammell, 2003b*). Faults documented along the strike of the IFZ, such as the Caribou fault (Figure 3), were initially ductile and overprinted by brittle/cataclastic deformation. The Caribou and related faults are interpreted to reflect late normal-sense reactivation responsible for offsetting metamorphic isograds and explaining the sharp changes in metamorphic grade across the Grant-Suttie Bay area (*Bethune and Scammell, 2003b*).

A number of regional correlations have been made across Davis Strait and Baffin Bay to link structures and crustal blocks of Baffin Island with those exposed along the western coast of Greenland (Figure 2). The

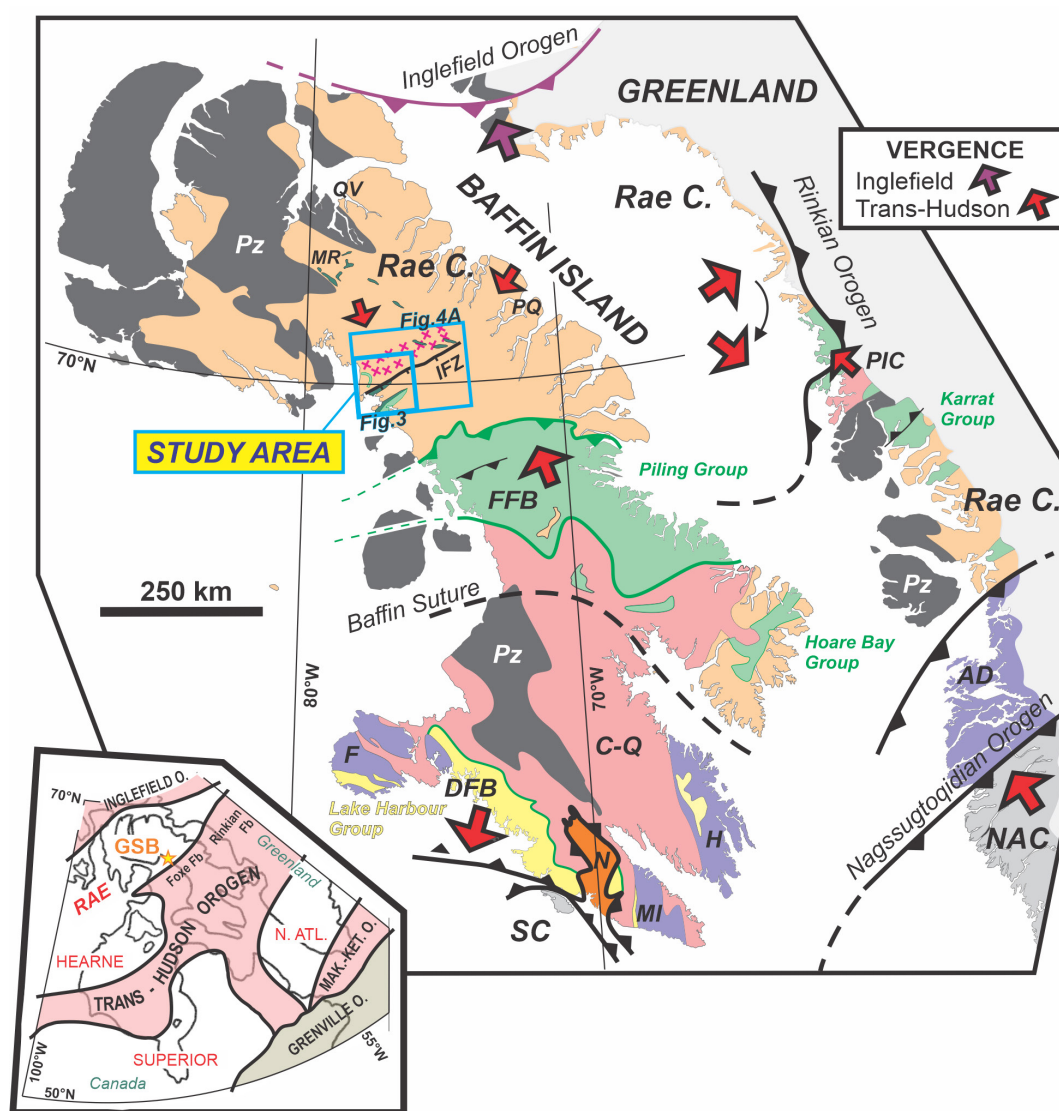


Figure 2 – General geology of Baffin Island, Canada, and the western coast of Greenland, showing relevant cratonic and structural elements (after *St-Onge et al.*, 2009; *Grocott et al.*, 2023; *Johnston et al.*, 2024). The position of Greenland has been restored to its pre-drift position (prior to the Late Cretaceous) with respect to Baffin Island; lines of latitude and longitude refer to the current position of Baffin Island. Vergence directions: purple arrow – Inglefield orogen; red arrows – Trans-Hudson orogen. In the Rinkian orogen, displacement vectors for the lower plate were first WSW-ENE, and rotated to NW-SE at ca. 1825 Ma (*Grocott et al.*, 2023), as highlighted by the curved black arrow. Geology: AD – Aasiaat domain; C-Q – Cumberland Batholith and Qikiqtarjuaq Plutonic Suite; DFB – Dorset fold belt; EQ – Ege Bay belt; F – Foxe domain; FFB – Foxe fold belt; H – Hall domain; IFZ – Isortoq Fault Zone; MI – Meta Incognita domain; N – Narsajuaq Arc; NAC – North Atlantic craton; PIC – Prøven Igneous Complex; SC – Superior craton; Pz – Paleozoic sedimentary rocks. Pink x symbols indicate the Dexterity granulite belt. Dark green units within the Rae craton in northern Baffin Island represent Archean greenstone belts (Mary River Group or Tuktuliargrup). Localities: MR – Mary River; PQ – Pilattuaq (Scott Island); QV – Qimivik. The lower left inset shows the general geodynamic framework of the Trans-Hudson Orogen and the Rae craton (after *Grocott et al.*, 2023). Study area identified as GSB (Grant-Suttie Bay). Mak-Ket.: Makkovik–Ketildian Orogen.

1.88 Ga Rinkian orogen of western Greenland (Figure 2; *Kalsbeek*, 1986; *Grocott and Pulvertaft*, 1990; *Grocott et al.*, 2023) has been interpreted as an extension of the THO east of Davis Strait and has been correlated with deformed rock units on Baffin Island (*Jackson and Berman*, 2000). Arc-like magmatism of the Prøven Igneous Complex (PIC), along with northwest-verging thrusts northwest of the PIC (Figure 2; *Dziggel et al.*, 2025), suggests that the Rinkian orogen developed within the upper plate of a convergent margin located to the northwest, and along which oceanic lithosphere subducted beneath the PIC towards the southeast. A

southeast-verging thrust belt developed southeast of the PIC inverts a passive margin sequence, and is interpreted as a retro-arc fold and thrust belt (*Grocott and McCaffrey*, 2017; *Guarnieri et al.*, 2023), consistent with southeast-directed, continentward-dipping subduction beneath the northwestern edge of the orogen (*Grocott et al.*, 2023). Continuity of structures and the presence of coeval magmatic sequences have been used to argue for correlation of the suture bounding the western edge of the Rinkian orogen with central Baffin Island (i.e., the Baffin-Rinkian suture of *Grocott et al.*, 2023; Figure 2).

2.2 Local Framework: Geology of the Grant-Suttie Bay Area

Two greenstone belts are documented in the vicinity of the IFZ: in the north the southeast-dipping Isortoq belt, and the more southerly, sub-vertical, east-northeast-striking Ege Bay belt (Figure 3). The Isortoq belt is located along the southeast-dipping IFZ, whereas the Ege Bay belt is located subparallel to and ~25 km to the southeast of the IFZ (*Jackson et al.*, 1978; *Morgan*, 1982). Both belts were the subject of thematic stratigraphic and tectono-metamorphic studies by *Bethune and Scammell* (1997, 2003a,b). More recent work—involving the authors of this manuscript—includes 1:100,000-scale mapping of the Isortoq belt north of latitude 70°N (*Saumur et al.*, 2018; *Skipton et al.*, 2020a,b) and focused studies on the Ege Bay belt (*Saumur et al.*, 2025; *Folkesson*, 2025). Due to logistical constraints, portions of the Isortoq belt south of 70°N could not be revisited by the authors; for these areas we rely on previous maps and structural datasets (*Bethune and Scammell*, 1997).

Both the Ege Bay and the Isortoq belts consist of a basal metavolcanic sequence with subordinate iron formation that is unconformably overlain by metaconglomerate, followed by a sequence of finer-grained siliciclastic rocks (e.g., metagraywacke, metasiltstone, quartzite; *Bethune and Scammell*, 1997). The lower sequence consists of Mesoarchean mafic to intermediate metavolcanic rocks and banded iron formation of the Tuktuliavik Group, unconformably overlain by Neoproterozoic dacitic tuff of the Mary River Group (*Saumur et al.*, 2025). The upper metasedimentary sequence, originally interpreted as part of the Mary River Group (*Morgan*, 1982; *Bethune and Scammell*, 1997, 2003a), is characterized by ca. 2.19 Ga detrital zircons obtained from quartzite near its stratigraphic base; this is interpreted as a maximum depositional age and the upper clastic sequence is thus reassigned to the Paleoproterozoic Piling Group (Figures 3, 5; *Scott et al.*, 2002; *St-Onge et al.*, 2009; *Partin et al.*, 2014; *Saumur et al.*, 2025). The similarity and analogous stratigraphic positioning of metasedimentary rocks of the Isortoq belt (*Bethune and Scammell*, 1997) are consistent with an interpretation of these rocks also being part of the Paleoproterozoic Piling Group (Figure 5).

Rocks of the Ege Bay belt commonly retain primary sedimentary and volcanic features (graded bedding and pillow lavas, respectively) and are less metamorphosed (~greenschist to lower amphibolite facies) than those of the Isortoq belt (~upper amphibolite to granulite facies). Both belts are nonetheless polydeformed (*Bethune and Scammell*, 1997; *Folkesson*, 2025) as observed elsewhere on northern Baffin Island (*Young et al.*, 2004; *Bros and Johnston*, 2017; *Saumur et al.*, 2018).

3 Field Data and Observations

3.1 Isortoq Fault Zone

As indicated above, a sharp aeromagnetic boundary between rocks southeast and northwest of the IFZ is readily observed in regional surveys (Figure 4A). Rocks in the footwall of the IFZ correspond to magnetic, OPX-bearing felsic gneisses of the Dexterity granulite belt. These are structurally overlain to the south-southeast by non-OPX-bearing monzogranitic to granodioritic plutons. The plutons exhibit a variably developed, locally lineated, gneissic foliation that parallels the contact with the Dexterity granulite belt, although fabrics dip more gently southeast of the shear zone, defining an open, map-scale, northeast-plunging fold (Figure 4B).

Mapping across, along and on both sides of the IFZ reveals that shearing is discontinuous. Archean granitoid rocks cropping out along the IFZ (Figure 6A–D) are characterized by narrow (10-metre-wide), discrete high-strain shear zones that cut across and deform a pre-existing gneissic fabric (attributable to an earlier Archean or Paleoproterozoic deformation; for a summary, see *Young et al.*, 2004; *Skipton et al.*, 2017; *Saumur et al.*, 2018). The high-strain shear zones exhibit down-dip, top-to-the-south-southeast shear. Ductile planar fabrics (foliation, gneissosity) along the IFZ dip moderately southeast. Discrete, high-strain shear zones, observed along traverse IQ-A but not traverse IQ-B, deform the gneissosity and are characterized by a variably developed southeast-plunging stretching lineation defined primarily by elongate quartz-feldspar aggregates. S-C and S-C-C' fabrics (Figure 6A) are consistent with down-dip, top-to-the-south-southeast shearing parallel to the southeast-plunging stretching lineation. Highly strained quartz-feldspar-biotite schists are locally characterized by mm- to cm-scale, southeast-plunging crenulations (Figure 6D). Asymmetric folds (Figure 6B), with short, sub-vertical, thickened limbs separating elongate, shallowly southeast-dipping, thinned limbs, record clockwise rotation (viewed looking down-plunge to the northeast, Figure 6B inset). Consistent with the S-C and S-C-C' fabrics, asymmetric folds indicate top-to-the-south-southeast, normal-sense shearing with an apparent dextral component. Two main groups of lineations, which are orthogonal to each other, were identified in the IFZ along traverses IQ-A and IQ-B: (i) northeast-plunging fold axes and fold-axis parallel intersection lineations, and (ii) southeast-plunging stretching and crenulation lineations (Figure 4C).

3.2 Isortoq Belt

The character of the Isortoq belt appears to change in the vicinity of latitude 70°N (Figure 4A; *Saumur et al.*, 2018). To the north, it consists of dismembered and elongated 1–100-m-thick panels of amphibolitic rocks running parallel to the IFZ (Figures 3, 6C), whereas to the south it forms a proper continuous and spatially

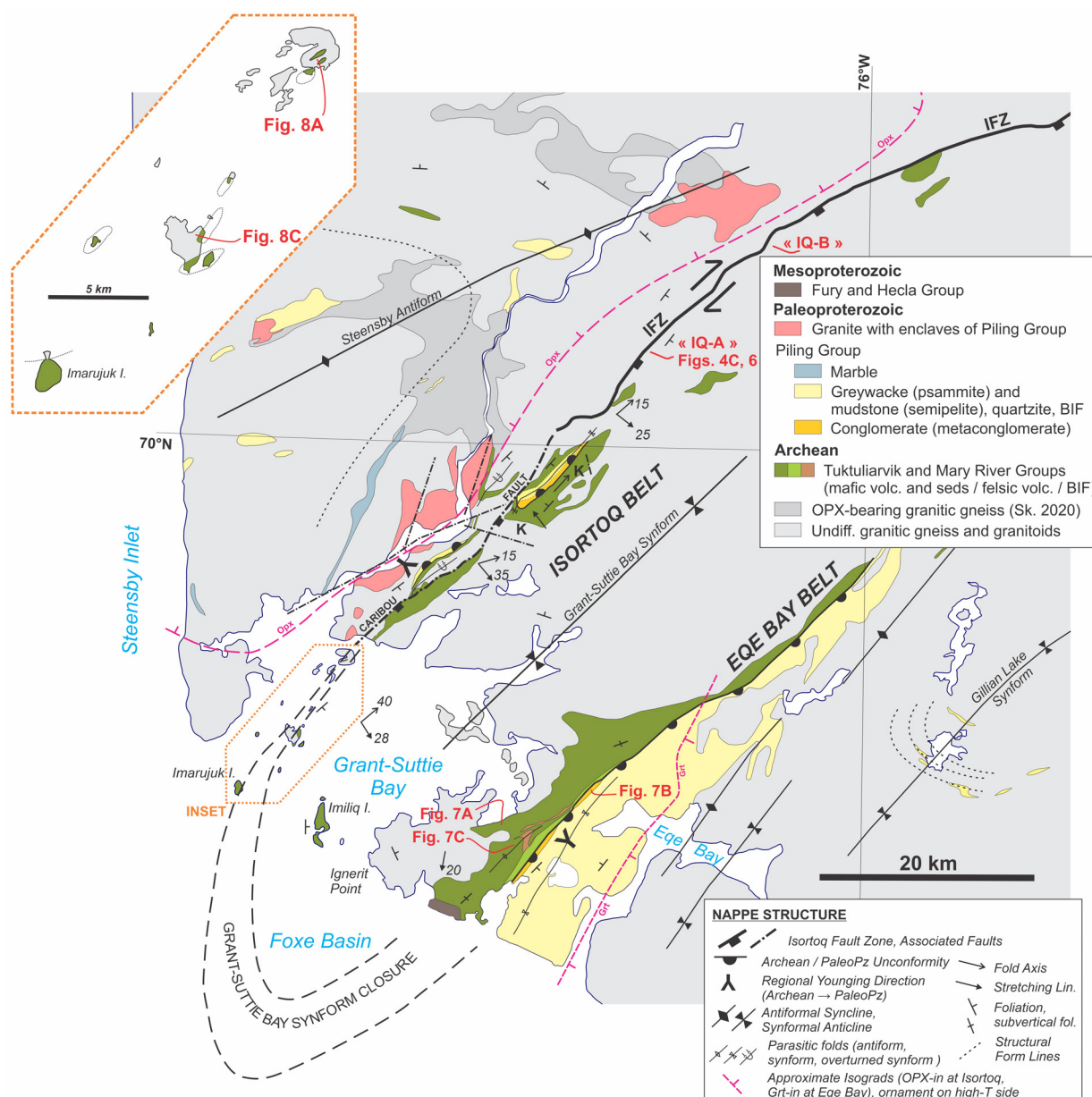


Figure 3 – Simplified geology map of the Grant-Suttie Bay area (location indicated in Figure 2), from this study and previous geological mapping (Jackson *et al.*, 1978; Jackson and Morgan, 1978; Bethune and Scammell, 1997; St-Onge *et al.*, 2005; Skipton *et al.*, 2020a,b; Saumur *et al.*, 2025; Folkesson, 2025). Red dashed lines identify the geometry of the unexposed fold proposed in this study. Approximate isograds are from Jackson *et al.* (1978), Jackson and Morgan (1978) and Bethune and Scammell (1997), whereas the distribution of OPX-bearing granitoids stems from mapping by Skipton *et al.* (2020a,b). Upper left inset: updated geology of the Grant-Suttie Islands. IFZ – Isortoq Fault Zone; IQ-A and IQ-B – traverses referred to in text. “K” – a specific locality discussed in the text.

extensive belt over a 5–10 km stretch (Figure 3; Bethune and Scammell, 1997).

The mapped unconformity between the lower Archean metavolcanic package and the Paleoproterozoic conglomerate and sedimentary rocks provides a means of determining regional facing direction. The Isortoq belt and surrounding units, which are largely subparallel to the IFZ and associated southeast-dipping faults (and of which the Caribou fault is the most significant), overall have a moderate southeastward dip (Figures 3, 4A), despite parasitic folding causing local variations in dip direction. The regional younging direction is to the northwest (Figure 3). Furthermore, panels of Piling Group and Paleoproterozoic granitic rocks containing

enclaves of Piling Group crop out within 10 km northwest of the Isortoq belt and dip homoclinally to the SE beneath the belt. Stratigraphic and map relationships therefore suggest that the Isortoq belt together with underlying rocks define a thick, downward-younging, southeast-dipping, overturned panel that is cut by more steeply southeast-dipping brittle (e.g., the Caribou fault) and brittle-ductile (e.g., the IFZ) faults and shear zones.

Structural data compiled by Bethune and Scammell (1997) for the Isortoq belt south of 70°N are shown in Figure 4D. Fold axes of the area are associated with coaxial mineral lineations defined by “medium- to high-grade metamorphic minerals” (Bethune and Scammell, 2003b, p. 1117). A

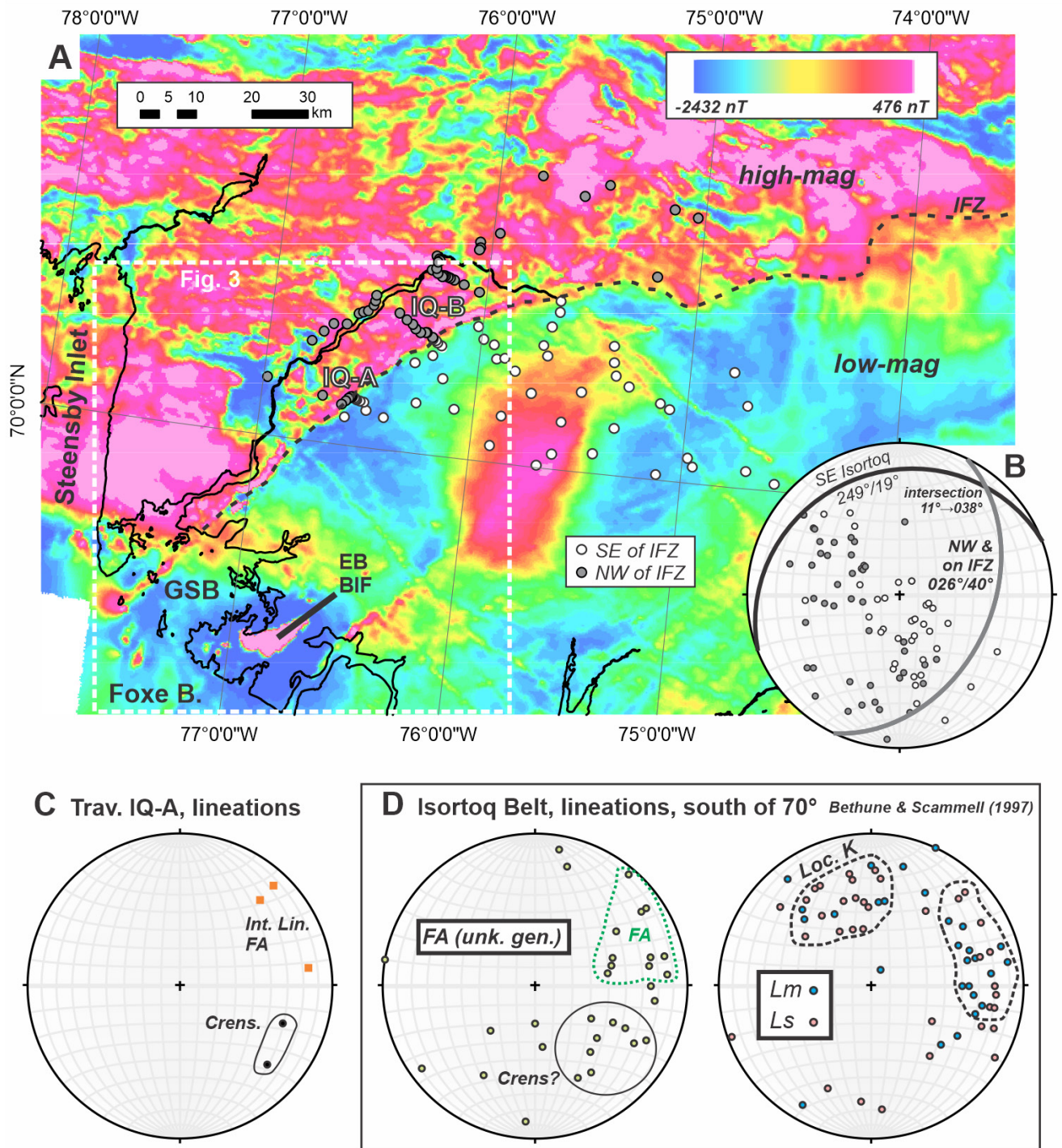


Figure 4 – A) Residual-total-field aeromagnetic data for northern Baffin Island (*Natural Resources Canada*, 2013; “Canada – 200 m – MAG”), and bedrock mapping stations along the IFZ. The aeromagnetic data were collected during 1973–1974 along flight lines spaced 805 m apart flown at an altitude of 305 m (*Miles and Oneschuk*, 2016). The highly magnetic reflective body at the bottom left corner is the Ege Bay Banded Iron Formation (EB BIF). GSB: Grant-Suttie Bay. Selected bedrock mapping stations near the IFZ (dotted line, location estimated from aeromagnetic data) are identified as grey (northwest of IFZ) and white (southeast of IFZ) circles; two mapping traverses discussed in the text are identified (IQ-A and IQ-B). **B)** Lower-hemisphere stereographic projection of poles to foliation measurements from stations northwest (44 data points) and southeast (37 data points) of the IFZ. Great circles associated with peak Kamb contours for each dataset are indicated. **C)** Lower-hemisphere stereographic projection, linear structures of the IFZ measured along the IQ-A area. Int. Lin: Intersection lineation; FA: Fold Axis; Crens.: Crenulation Axis. **D)** Legacy structural data from the Isortoq belt (south of 70°N) from *Bethune and Scammell* (1997). The left stereonet shows all fold axis data (FA) measured; however, the generation of folding (associated with IFZ or older) is unknown (unk. gen.). Orientations consistent with FA and crenulation orientations we measured are circled and highlighted. The right stereonet shows stretching lineation (Ls) and mineral lineation (Lm); orientations that are shallowly northeast plunging are consistent with FA measured north of latitude 70°N; north-northwest-plunging lineations, restricted to a specific fault-bounded locality (“loc. K”, Figure 3), are nearly perpendicular to FA orientations and may represent mineral lineations rotated during nappe propagation (Figure 1D inset; see text for discussion).

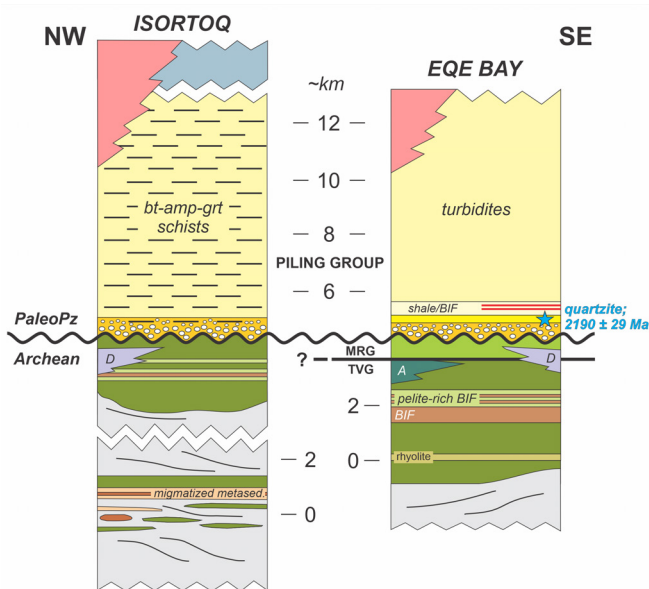


Figure 5 – Updated stratigraphic relationships between the Isortoq belt (modified from *Bethune and Scammell, 1997*) and the Ege Bay belt (modified from *Saumur et al., 2025; Folkesson, 2025*). Colours as in legend shown in Figure 3. Additional minor units are identified in the figure. D: diorite, A: anorthosite, MRG: Mary River Group, TVG: Tuktuliavik Group. The stratigraphic position of the quartzite dated using U-Pb detrital zircon, which yielded a maximum depositional age of 2160 ± 29 Ma (*Saumur et al., 2025*), is indicated with a star.

cluster of east-northeast-plunging fold axes, as well as a group of east-northeast-plunging stretching and mineral lineations, are consistent with our structural observations along the IFZ north of 70°N (Figure 4C). A second, southeast-plunging cluster of fold axes has orientations consistent with crenulations that we observed (Figures 4C, 6D). The population of stretching and mineral lineations that plunge north-northwest appears to be restricted to a specific partially fault-bounded zone within the Isortoq belt where a parasitic synform and northwest-dipping planar fabrics occur (Figure 3, Locality “K”). Overall, the belt is characterized by a consistently east-northeast-plunging lineation representing the regional fold axis, and a subordinate perpendicular (crenulation) lineation that generally plunges to the southeast (Figure 4). Protomylonitic granites along the Caribou fault contain stretching lineations that also plunge southeast (*Bethune and Scammell, 2003b*, see their figure 7).

3.3 Ege Bay Belt

The Ege Bay belt is a coherent, ~ 50 -km-long, continuous belt exhibiting much lower degrees of strain and grade of metamorphism (Figures 3, 7A–D). Bedding and tectonic fabrics within the lower, volcanic portion of the Ege Bay belt are generally northeast-striking and subvertical (Figure 7D), whereas planar fabrics within the upper metasedimentary portion are subvertical to steeply southeast-dipping near the unconformity, and otherwise generally dip towards the northwest (Figure 3; *Bethune and Scammell, 1997*). Despite internal parasitic

folds causing localized variations in younging direction, an overall southeast-younging direction, opposite that of the Isortoq belt, is determined from pillow-lava tops (Figure 7A) and stratigraphic relationships at the contacts between the Mesoarchean Tuktuliavik Group and the Neoarchean Mary River Group, as well as between the Mary River Group and the stratigraphically younger Piling Group (*Bethune and Scammell, 1997; Saumur et al., 2025*).

Within the metavolcanic portion, a continuous stratigraphic unit of banded iron formation defines a broad, 100-metre-scale, parasitic Z-fold (Figure 3, see “Figure 7C” locality), near which orthogonal linear tectonic fabrics, similar to those of the Isortoq belt, are observed (Figure 7C). Bedding and planar tectonic fabrics are locally folded about shallowly northeast-plunging asymmetric folds (Figure 7B). These folds are characterized by vertical to steeply south-dipping long limbs, and sub-horizontal to south-dipping short limbs, yielding an asymmetric Z-geometry when viewed down-plunge.

3.4 Grant-Suttie Bay Islands and Ignerit Point

Regional gravity data (*Natural Resources Canada, 2013*) define an arcuate anomaly offshore of the western ends of the Isortoq and Ege Bay belts which may indicate the presence of a regional fold closure in Grant-Suttie Bay (Figure 8D). Consistent with observations along the IFZ, mafic rocks in Grant-Suttie Bay form discrete, northeast-striking, 100-metre- to kilometre-scale panels (Figure 3 inset) within strongly foliated to gneissic, locally migmatitic, granodioritic to tonalitic rocks. Two perpendicular lineations characterize the gneiss (Figure 8A): a shallowly north-northeast-plunging mineral lineation, defined by dark amphibole, consistent with the regional fold axis, and a southeast-plunging stretching lineation (Figure 8B). Locally, a southeast-plunging crenulation lineation parallels the stretching lineation and is spatially associated with steeply southwest-dipping to near-vertical quartz veins oriented perpendicular to the north-northeast-plunging mineral lineation. On one unnamed island, 50-m-scale panels of amphibolite define megascopic S-folds (viewed down-plunge to the northeast, Figure 8C). The position of this island with respect to the arcuate gravity high (Figure 8D) is consistent with these S-folds representing parasitic structures to a synformal fold closure within Grant-Suttie Bay.

Greenstones on Imiliq Island (mapped as Mary River Group by *Bethune and Scammell, 1997*) dip towards the east-northeast. Granitic rocks of Ignerit Point similarly show shallowly east-northeast-dipping planar fabrics (Figure 3), which is consistent with the expected orientation in the hinge of a northeast-plunging synform. Granitic rocks also show a weakly southeast-plunging stretching lineation (Figure 8B) defined by biotite and/or slightly stretched quartz. This orientation is similar to

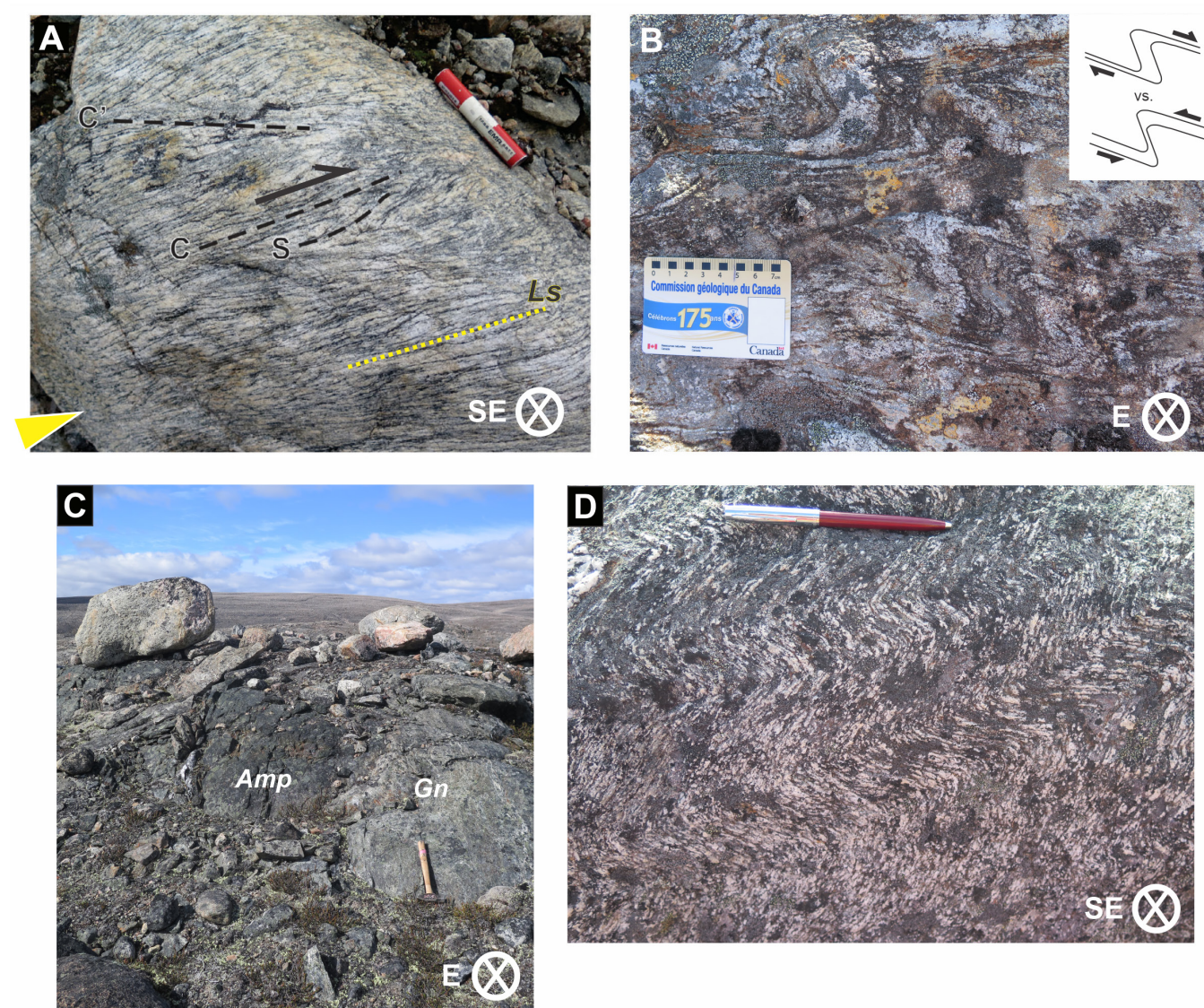


Figure 6 – Field photographs from the northern portion of the Isortoq fault zone. **A)** S-C-C' fabrics. Photo facing southeast, observed on moderately dipping irregular rock face. Note that the fabric is weaker and lineation occurs as dots on the face on the bottom left corner of the image (see yellow arrow), representing the YZ plane of the strain ellipse). The S-C-C' fabric therefore occurs along the shear plane. **B)** Decimetre-scale folds consistent with normal-sense, top-to-the-south-southeast shearing (corresponding to thinned long limbs, top image in inset, versus thinned short limb, lower image of inset; cf. Figure 1B). Photo facing east. **C)** Stretched metre-scale panel of dark grey amphibolite (Amp) of the Isortoq belt (Mary River or Tuktuliarvik Group) in contact with light grey tonalitic gneiss (Gn), hammer for scale. Photograph facing east. **D)** Crenulated quartz-plagioclase-biotite schist, crenulations plunge SE.

that of other stretching lineations measured along the IFZ and in the Isortoq belt (Figure 4C–D).

4 Discussion

4.1 Folds and Nappes

Table 1 summarizes our results and interpretations. Structural data, regional gravity surveys, stratigraphic constraints and the overall map pattern presented herein suggest that the overturned, southeast-dipping Isortoq belt is continuous with the steeply dipping Ege Bay belt, forming two limbs of a crustal-scale regional fold. A northeast-plunging fold hinge joins the two belts within Grant-Suttie Bay (Figure 8). Stratigraphic younging directions on the two limbs indicate that the fold is a synformal anticline characterized by a

moderately inclined axial surface that dips to the south-southeast. Viewed down-plunge, the Isortoq and Ege Bay limbs are characterized by S- and Z-folds, respectively (Figure 9A), consistent with the geometry of parasitic folds observed at Isortoq (Figure 6B) and Ege Bay (Figure 7B). Northwestern dips that predominate in the metasedimentary (Piling Group) portion of the Ege Bay belt reflect the antiformal inflection one would expect to the southeast of the Grant-Suttie Bay synform. Northwest of the Isortoq belt, the structural grain and the geometry of mapped units follow an arcuate bend that closes towards the northeast (“Steensby Antiform”, Figure 3), consistent with the geometry of aeromagnetic anomalies (Jackson, 2000; Johnston *et al.*, 2024). Southeast of the Ege Bay belt, folds with subparallel axial traces and similar geometries are

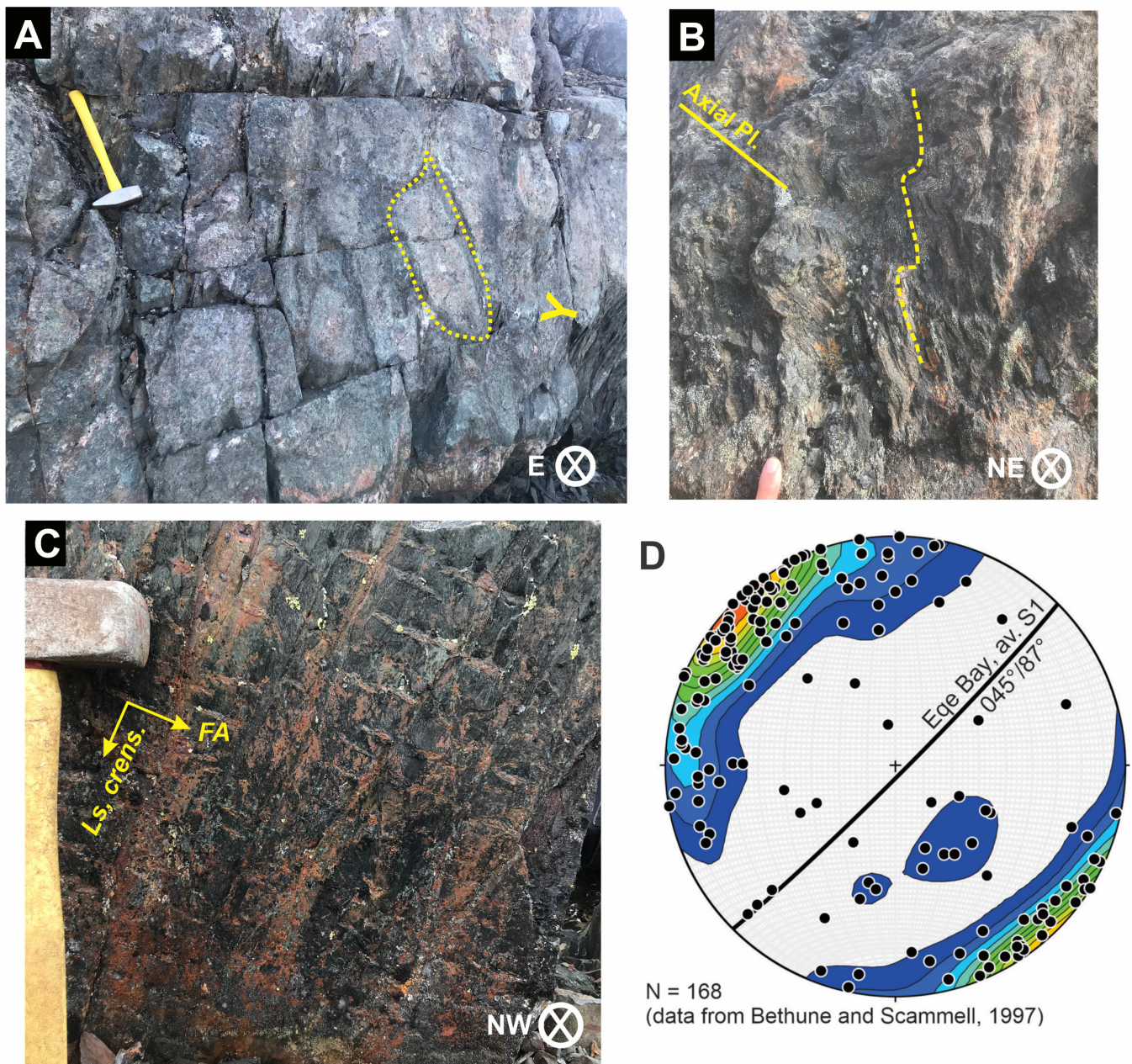


Figure 7 – Ege Bay belt, field photographs (locations provided in Figure 3) and structural data. **A)** An example of pillowed basalts observed on a sub-vertical rock face; S_0 is steeply dipping; keels point north, top interpreted towards the south (after Saumur *et al.*, 2025). **B)** Z-fold in metasedimentary rocks of the Ege Bay belt, with associated axial plane inclined towards the SE. **C)** Perpendicular fabrics on local S_1 plane: shallowly north-northeast-plunging lineation defined by boudin necks (regional fold axis) and steeply south-southeast-plunging crenulation lineation in pelitic iron formation. **D)** Lower-hemisphere stereographic projection of poles to S_1 foliation data from the Ege Bay belt by Bethune and Scammell (1997). Average foliation $045/87$ shown with a great circle. Kamb contours shown in increments of two standard deviations.

defined by panels of metasedimentary rocks (*St-Onge et al.*, 2005; “Gillian Lake Synform” on Figure 3), and are likely also part of the same train of folds.

Many of the structural elements identified in the Grant-Suttie Bay area are consistent with those expected in crustal-scale nappes (Figure 1; e.g., Bastida *et al.*, 2014) through progressive deformation and strain accumulation (e.g., Fossen *et al.*, 2019). Expected elements include perpendicular fold axes and stretching lineations, asymmetric parasitic folds with thickened short limbs, and crenulation hinge lines perpendicular to the regional fold axis. Given the occurrence of antiformal

synclines and synformal anticlines, we propose that the train of folds forms part of a map-scale nappe, and that the Isortoq, Grant-Suttie Bay and Ege Bay areas expose the lower, mostly overturned limb of a large, south-southeast-verging nappe (Figure 9A). Vergence to the south-southeast is consistent with the geometry of the belt-scale synformal anticline, the evidence of top-to-the-south-southeast shearing observed on the Isortoq limb, and the predominant south-southeast trend of well-developed stretching lineations observed throughout the structure. North-northwest-plunging stretching lineations perpendicular to the regional fold

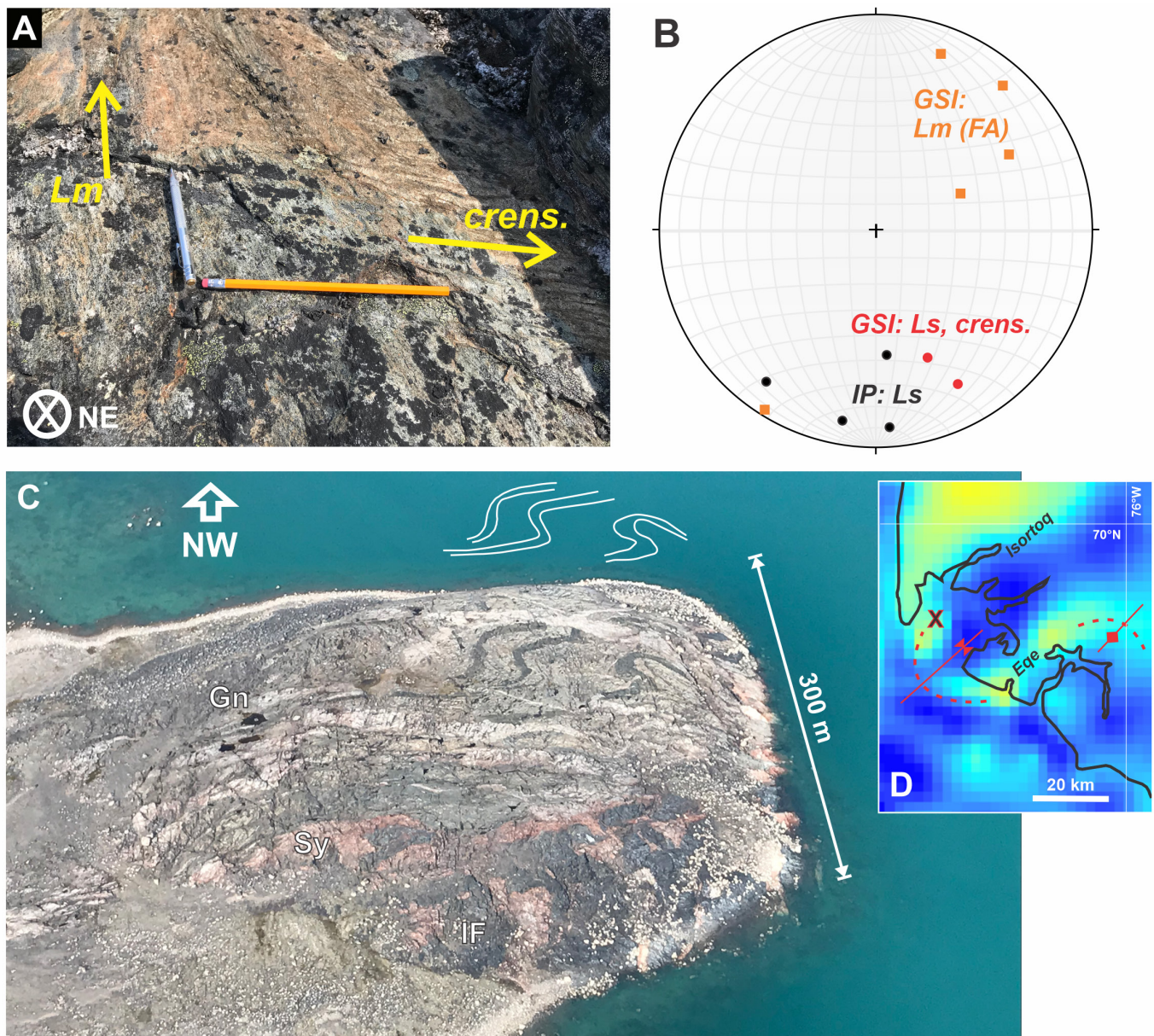


Figure 8 – Grant-Suttie Bay islands and Ignerit Point; field photographs and representative structural data (locations of photographs provided in Figure 3). **A**) Perpendicular fabrics within gneissic fabric in rocks along the IFZ; a southeast-plunging crenulation lineation (Crens., yellow pencil direction) overprints a faint northeast-plunging mineral lineation (Lm, defined by dark amphibole, parallel to the grey scribe pen). **B**) Lower-hemisphere stereographic projection; linear structural data of the Grant-Suttie Bay islands (GSI) and Ignerit Point (IP). Ls = Stretching Lineation; Lm = Mineral Lineation; FA = Fold Axis; Crens. = Crenulations. **C**) Aerial view of northeastern tip of the informally named ‘BIM’ island of central Grant-Suttie Bay showing mesoscopically S-folded panels of amphibolite. **D**) Bouguer gravity anomaly in the Ege Bay area (*Natural Resources Canada, 2013*; “Canada 2 km – GRAV – Gravity Anomalies”), showing an arcuate anomaly related to an unexposed fold hinge in Grant-Suttie Bay. The location of “BIM” Island (Figure 8C) is indicated with an X. S-folds found on that island are consistent with the proposed fold geometry.

axis (restricted to “locality K”; Figures 3, 4D) are interpreted as resulting from progressive limb rotation during the advance of the nappe (Figure 1D, bottom right inset).

4.2 Origin of the Isortoq Fault Zone

The Isortoq belt is notably thinned, dismembered (north of 70°N and on the islands of Grant-Suttie Bay), and sheared. This localized deformation has been attributed to the IFZ (*Bethune and Scammell, 2003b*), which is coincident with the Isortoq belt and associated panels

and extends farther northeast. The sharp aeromagnetic boundary (Figure 4A), interpreted as the continuation of the IFZ, is now also interpreted as the base of the nappe, consistent with the truncation of the Isortoq belt by the IFZ (Figure 3) and with foliation attitudes on either side of the IFZ indicating a mildly northeast-plunging fold (Figure 4B) similar to geometries inferred at Grant-Suttie Bay.

Although the IFZ exhibits brittle and ductile deformation, it is predominantly ductile north of 70°N, where S-C-C’ fabrics and asymmetric folds are consistent

Table 1 – Summary of results and interpretations. MRG: Mary River Group; TVG: Tuktuliavik Group.

	GEOLOGY	STRATIGRAPHY	GEOPHYSICS	STRUCTURE	NAPPE-SPECIFIC STRUCTURE	INTERPRETATION
Isortoq Fault Zone (north of 70°N)	(+/- OPX) orthogneiss, granitoids, meso-scale panels of amphibolite (MRG)	–	Sharp aeromagnetic boundary between high-and low-mag rocks	Gneissosity in footwall (northwest) of IFZ generally dips moderately SE, in hanging wall gneissosity shallowly dips northwest; overall broadly defining synform	Asymmetric S-folds (thickened short limbs); NE-plunging fold axis; SE-plunging crenulations; S-C-C' fabrics	IFZ interpreted as basal shear zone of the nappe
Isortoq Belt (south of 70°N)	TVG and/or MRG, Piling Group, late granite with enclaves of Piling Group; (+/- OPX) orthogneiss and granitoids	Generally younging northwest (MRG Piling unconformity); panels of Piling to the north (east of Steensby Inlet)	Sharp aeromagnetic boundary between high-and low- mag rocks	Moderately SE-dipping panel; internal structure partly characterized by pre-nappe structural elements	Perpendicular linear structures; shallowly NE-plunging fold axis; Along-strike continuation of IFZ; Caribou Fault	Isortoq and Ege Bay belt represent one deformed belt within the nappe; Isortoq Belt represents nappe-scale stretched lower limb; Caribou Fault represents late-stage brittle nappe propagation
Ege Bay Belt	TVG, MRG, Piling Group	Generally younging SE (pillows; geochronologic constraints; mapped unconformity between MRG and Piling Group)	Highly magnetic TVG BIF dominates aeromagnetic signal; Arcuate gravity anomaly defines eastern portion of Gillian Lake synform	Volcanic portion is steeply dipping to sub-vertical; southeastern metasedimentary rocks dip progressively more shallowly towards the SE; internal structure partly characterized by pre-nappe structural elements	Perpendicular linear fabrics; steeply south-southwest plunging Ls; northeast plunging Z-folds (southeast-dipping axial planar fabric).	Isortoq and Ege Bay belt represent one deformed belt within the nappe; Ege Bay belt represents nappe-scale thickened short fold limb.
Grant Suttie Bay	Orthogneiss, panels of BIF (TVG or MRG)	–	Continuation of IFZ; Arcuate gravity anomaly defines Grant-Suttie Bay synform	Southeast dipping gneissosity; southwestward continuation of IFZ and Isortoq Belt	Perpendicular linear fabrics; south plunging Ls, northeast plunging fold axis, S-folds consistent with Grant-Suttie Bay synform	Core of synformal anticline at lower inverted limb of Isortoq nappe
Ignerit Point	Orthogneiss, granitoids	–	Arcuate gravity anomaly defines Grant-Suttie Bay synform	Lineated granitoids	S-plunging Ls; near core of Grant-Suttie Bay synform	Core of synformal anticline at lower inverted limb of Isortoq nappe

with dextral, top-to-the-south-southeast kinematics. As noted by *Jackson and Berman* (2000), the drag-folded geometry of the Steensby Antiform (Figure 3) is consistent with dextral kinematics along the IFZ. Given the similarity of units on either side of the IFZ, we agree with previous authors that the IFZ does not represent a major regional suture zone (*Jackson, 2000*). Furthermore, we did not observe evidence for north-verging, reverse-sense, ductile shearing consistent with the kinematics and style of the Foxe fold belt (e.g., *Henderson and Tippett, 1980*). Instead, the kinematic link between regional folds and the IFZ, as well as the near-identical geometry of the outcrop-scale asymmetric folds observed within the IFZ (Figure 6B) with the regional-scale geometry of the Grant-Suttie Bay fold (Figure 9A), suggests that the IFZ is genetically linked to the fold, and thus represents a basal nappe detachment structure. Normal-dextral kinematics documented along the IFZ are consistent with the south-southeast vergence of the nappe.

Within a nappe model for the Grant-Suttie Bay area, the IFZ characterizes the overturned limb of the nappe, and is genetically linked to nappe propagation

(Figures 1, 9A). We recognize the IFZ as a network of low-angle, normal-sense, brittle faults and brittle-ductile mylonitic shear zones formed during nappe propagation (Figure 9B). Thinning and dismemberment of the Isortoq belt occurred at the base of the nappe, along the IFZ. Anastomosing strands of the IFZ dip more steeply southeast than the Isortoq belt, and cut stratigraphically up-section through the overturned strata in the direction of transport (Figure 9B, C). These anastomosing strands would be subparallel to the axial plane of the Grant-Suttie Bay synform (Figures 7B, 9A); shearing along axial planar structures may have contributed to the kinematics of the fault zone. The geometry of the IFZ is analogous to that of faults and mylonite zones observed along the base of Phanerozoic nappes (e.g., *Echtler, 1990; Escher et al., 1993*). The Caribou fault, a normal-sense initially ductile fault overprinted by stages of normal-sense brittle/cataclastic deformation (*Bethune and Scammell, 2003b*), can be interpreted as a brittle-ductile strand of the IFZ that nicely exemplifies the characteristics described above. Brittle normal faulting in the IFZ represents the latest stages of nappe propagation, and later rotation or tilting (syn- or post-nappe emplacement) may have given the IFZ its

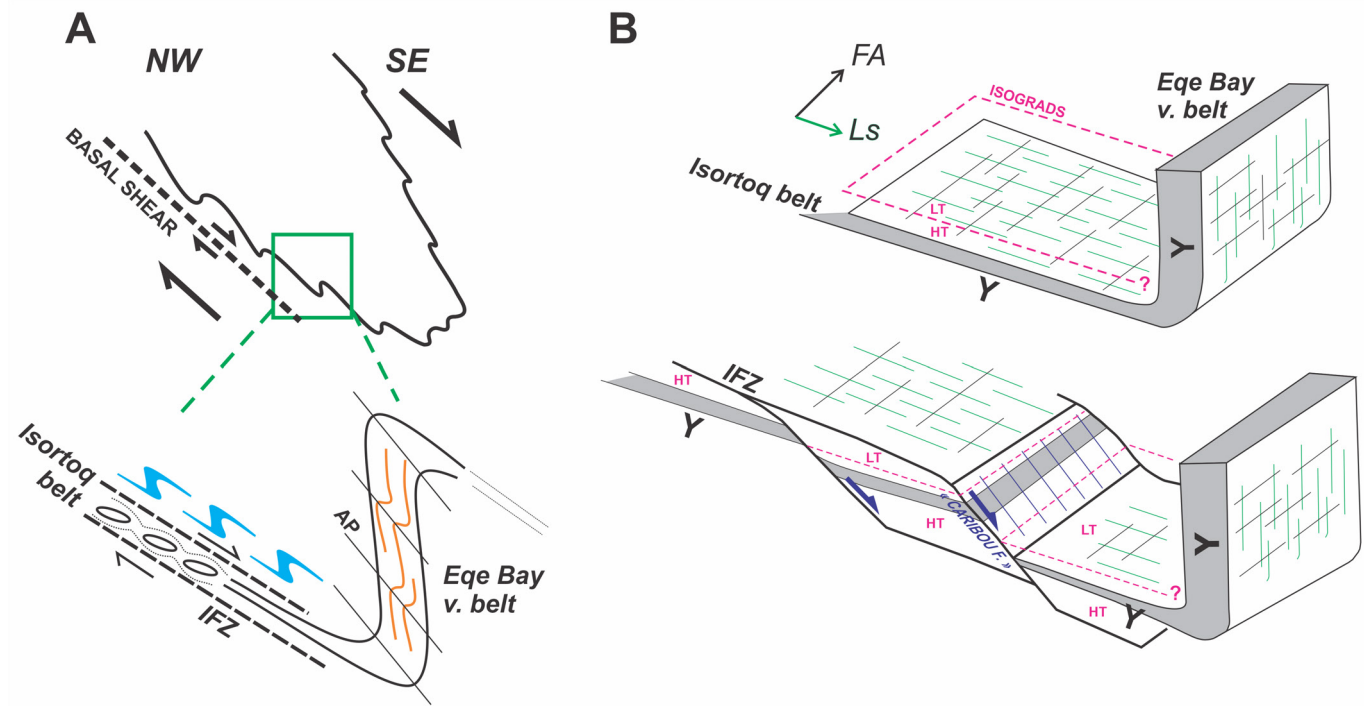


Figure 9 – Summary of geometries observed in the Grant-Suttie Bay area and Isortoq nappe model. **A)** Upper panel – Conceptual view of the Isortoq nappe, facing down-plunge, whereby the Isortoq and Ege Bay belts represent a portion of the overturned lower limb of a south-southeast-verging nappe. Lower panel – zoomed-in view of a portion of the nappe defined by the Isortoq belt and the metavolcanic (v.) portion of the Ege Bay belt, forming one continuous belt. Asymmetric S-folds (blue) and boudins are associated with the Isortoq limb (including the Grant-Suttie Bay islands) and Z-folds (orange) are associated with the Ege Bay limb. AP = Axial Plane. The Isortoq limb is partially sheared and dismembered due to its parallelism with basal shear zones (see Figure 1A). **B)** Oblique view of the Isortoq-Ege Bay fold, facing N, highlighting the presence of two lineations (Ls = stretching lineation; FA = fold axis, or mineral lineation). A general isotherm is indicated, with a high temperature (HT) and low temperature (LT) side. Isotherms can potentially be faulted (and folded) during nappe propagation. The lower panel demonstrates how the IFZ and associated faults (e.g., the Caribou fault) developed as a consequence of shearing at the base of the nappe during propagation, contributed to the dismemberment of the Isortoq belt, and juxtaposed high temperature (HT) footwalls against low temperature (LT) hanging walls.

current oblique dextral-normal apparent kinematics and steeper orientation.

Previous workers have noted a sharp change in metamorphic grade, from granulite to greenschist, across the Steensby Inlet to Grant-Suttie Bay area (Jackson, 2000; Jackson and Berman, 2000) and proposed that normal offsets along brittle structures linked to the IFZ, such as the Caribou fault, are responsible for the distribution of metamorphic grade (Bethune and Scammell, 2003b). Our model agrees with this and provides an origin for the IFZ and associated faults. As illustrated in Figure 9B, the base of a thick-skinned nappe can in some circumstances be hotter than its core (e.g., Girault et al., 2020), generating isograds subparallel to the nappe's lower limb. Furthermore, thinning and extension of the lower limb during nappe emplacement can give rise to an elevated geothermal gradient and condensed isotherms, facilitating ductile deformation and further promoting lower-limb thinning during syn-kinematic nappe emplacement (Herwegh and Pfiffner, 2005). Isotherms can subsequently be offset by later-developing basal brittle-ductile fault zones (Figure 9B) that enable late-stage nappe propagation.

4.3 Implications for the Trans-Hudson Orogen

The involvement of ca. <2.19 Ga Piling Group strata in the folding implies that the nappe is a syn- to post-Paleoproterozoic structure, and hence is likely a component of the THO (e.g., St-Onge et al., 2009). THO-aged tectonism is further supported by U-Pb metamorphic ages of ca. 1.85–1.82 Ga obtained in the Grant-Suttie Bay area (Bethune and Scammell, 2003b).

As highlighted in Figure 2, documented Paleoproterozoic vergence directions in northern Baffin Island and Greenland reflect the complexity of the assembly of the Nuna supercontinent in the Arctic (Harrison and St-Onge, 2023). The south-southeast vergence of the Isortoq nappe contrasts with the north to northwest vergence of the Foxe fold belt, another component of the THO (e.g., Jackson and Berman, 2000; St-Onge et al., 2009), and with the northwest vergence documented in the Committee Bay belt of the central Rae craton of mainland Nunavut (Sanborn-Barrie et al., 2014), located ~500 km southwest along strike of the Isortoq belt. Nevertheless, evidence for south vergence has been documented elsewhere in northern Baffin Island. South-verging structures detected north of the IFZ, originally interpreted to be older given their

truncation by the IFZ (*Jackson, 2000*), likely represent structures coeval with the Isortoq nappe, with the truncation simply a consequence of shearing and fault zone development at the nappe's base (Figure 9B). Southwest-verging nappes along the northeastern coast of Baffin Island (Figure 2; *Jackson and Berman, 2000*), such as the Pilattuaq Nappe ~260 km northeast of Grant-Suttie Bay (figure 5 of *Jackson and Berman, 2000*; previously known as Scott Island Nappe), are along-strike from the IFZ (Figure 2) and may be correlative structures.

In the Rinkian orogen, the subduction direction for the lower, oceanic plate was largely to the SE (Figure 2; *Grocott et al., 2023*). Given that the upper plate Rinkian fold belt was adjacent to Baffin Island prior to the Cretaceous opening of Baffin Bay and Davis Strait (e.g., *St-Onge et al., 2009*), it is possible that the 1.90 to 1.82 Ga, retro-arc, southeasterly verging folds and thrusts of the Rinkian fold belt could be related to those detected in the Rae craton of northern Baffin Island (Figure 2). A correlation between the Isortoq nappe and the southern Rinkian orogen would suggest that south-verging structures of the THO extend across much of the eastern Arctic. South vergence toward the lower-plate Superior craton characterizes the Cape Smith foreland fold and thrust belt, and explains the accretion of the Narsajuaq and Meta Incognita terranes (*St-Onge et al., 2009*; *Johnston et al., 2024*). Exceptions are the north-verging Foxe fold belt, and the Baffin suture for which geometry and vergence remain uncertain.

5 Conclusion

New fieldwork, combined with the reinterpretation of legacy maps and data, has allowed us to reassess the tectonic framework of portions of the Rae craton of northern Baffin Island. The Isortoq and Ege Bay belts are interpreted as the limbs of one continuous folded belt that connect offshore in a hinge zone within Grant-Suttie Bay, and which together define the Isortoq nappe. The predominance of synformal anticlines and antiformal synclines suggests that the area exposes the nappe's overturned lower limb (Figure 9). As such, we reinterpret the IFZ to represent a shear zone formed at the base of the Isortoq nappe during the latter's propagation. Shearing and offsets generated by the IFZ explain the dismemberment of the Isortoq belt as well as the distribution of metamorphic isograds. The Isortoq nappe is associated with the Paleoproterozoic Trans-Hudson Orogen, and potential regional correlations suggest that south-verging crystalline nappes within the Rae craton may have been of important spatial extent.

In terrains characterised by crystalline rocks and a lack of significant topographic (and hence structural) relief, geologists often do not have the benefit of large mesoscale, 3D exposures akin to those found in mountain ranges and fjordlands. Identification of nappes in low-relief, eroded terrains hinges on the recognition of key structural elements and patterns in structural data, from the outcrop to the regional scale. Several structural elements, considered characteristic of the basal structure

of nappes (Figure 1), are documented in the Grant-Suttie Bay area, including (1) asymmetric parasitic folds with thickened short limbs that verge in the opposite direction of nappe emplacement; (2) perpendicular coeval linear elements including a fold-axis-parallel intersection lineation, and a stretching lineation that records the transport direction of the nappe; (3) crenulations perpendicular to the regional fold axis; and (4) synformal anticlines and antiformal synclines. Given the paucity of thematic tectonic studies in shield areas of Canada's remote Arctic, especially in comparison to Greenland and Fennoscandia (*Johnston et al., 2024*), we suspect that other crustal-scale nappes remain to be identified, with the potential to improve regional correlations, paleogeographic reconstructions and the geodynamic framework of the Trans-Hudson Orogen.

Acknowledgements

This work includes observations stemming from the Natural Resources Canada (NRCan) Geomapping for Energy and Minerals program (GEM-2) North Baffin Bedrock Mapping Activity (2017–18). The Polar Continental Shelf Program and the Tuniniq Sauniq Co-Op (Pond Inlet) provided logistical support during the 2017–18 field mapping campaigns. BMS and STJ thank John Hey, Luke Howitt and Tom Iannelli (Baffinland Iron Mines) for their support and invitation to participate in the Ege Bay exploration programs of 2019 and 2021.

This is NRCan contribution number 20200406. Rob Berman (NRCan) provided an internal critical review of a previous version of this manuscript.

BMS and STJ are supported by Natural Sciences and Engineering Research Council of Canada Discovery Grants RGPIN-2021-03306 and RGPIN-2025-05311, respectively. Geotop (BMS) is funded by the Fonds de recherche du Québec (<https://doi.org/10.69777/377326>).

Author contributions

BMS and STJ conceived the study, co-wrote the manuscript, participated in all fieldwork between 2017 and 2021, led fieldwork in 2019 and 2021, collected field data and observations and interpreted results (including the reinterpretation of legacy data of *Bethune and Scammell, 1997*). All figures were designed by BMS. DRS participated in fieldwork in 2017–18, collected field data and participated in the original conceptualization of the study. BMS and DRS co-organized the 2017–18 field seasons with the Geological Survey of Canada. MRS conducted fieldwork in the Gillian Lake area south of Ege Bay (2006) and provided regional geological context. DRS and MRS provided edits to the manuscript.

Data availability

Data collected by the authors and utilized in this manuscript are in an online data depository (*Saumur, 2026*) and included here as supplemental data. The

full structural dataset stemming from the GEM-2 North Baffin Bedrock Mapping Activity (north of latitude 70°N) is openly available in *Skipton et al.* (2020a,b). Legacy structural data reinterpreted in this work are openly available in *Bethune and Scammell* (1997).

Competing interests

The authors declare no competing interests.

Peer review

This publication was peer-reviewed by Jean-Baptiste Koehl and Julien Perret. The full peer-review report can be found here: [Review Report](#).

Copyright notice

© His Majesty the King in Right of Canada and The Author(s) 2026. This article is distributed under the [Creative Commons Attribution 4.0 International License](#), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author(s) and source are credited, and any changes made are indicated.

References

- Bailey, E. B. (1930), The Nappe theory: A review, *Scottish Geographical Magazine*, 46(1), 21–26, <https://doi.org/10.1080/00369223008734697>.
- Bastida, F., J. Aller, F. J. Fernández, R. J. Lisle, N. C. Bobillo-Ares, and O. Menéndez (2014), Recumbent folds: Key structural elements in orogenic belts, *Earth-Science Reviews*, 135, 162–183, <https://doi.org/10.1016/j.earscirev.2014.05.002>.
- Bauville, A., and S. M. Schmalholz (2015), Transition from thin- to thick-skinned tectonics and consequences for nappe formation: Numerical simulations and applications to the Helvetic nappe system, Switzerland, *Tectonophysics*, 665, 101–117, <https://doi.org/10.1016/j.tecto.2015.09.030>.
- Beauchemin, M., V. Tschirhart, J. Harris, and M. Lamontagne (2019), A method for curvilinear structure mapping in normalized derivative magnetic maps, *Journal of Applied Geophysics*, 162, 72–79, <https://doi.org/10.1016/j.jappgeo.2018.10.002>.
- Berman, R. G., S. Pehrsson, W. J. Davis, J. J. Ryan, H. Qui, and K. E. Ashton (2013), The Arrowsmith orogeny: Geochronological and thermobarometric constraints on its extent and tectonic setting in the Rae craton, with implications for pre-Nuna supercontinent reconstruction, *Precambrian Research*, 232, 44–69, <https://doi.org/10.1016/j.precamres.2012.10.015>.
- Berman, R. G., J. A. Cutts, W. J. Davis, A. Camacho, M. Sanborn-Barrie, and M. A. Smit (2023), The tectonic evolution of Thelon tectonic zone, Canada: a new model based on petrological modeling linked with Lu–Hf garnet and U–Pb accessory mineral geochronology, *Canadian Journal of Earth Sciences*, 60(5), 550–582, <https://doi.org/10.1139/cjes-2022-0147>.
- Bethune, K. M., and R. J. Scammell (1997), Precambrian geology, Koch Island area (part of NTS 37C), District of Franklin, Northwest Territories, *Tech. rep.*, Geological Survey of Canada, <https://doi.org/10.4095/208509>.
- Bethune, K. M., and R. J. Scammell (2003a), Geology, geochronology, and geochemistry of Archean rocks in the Ege 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(8), 1137–1167, <https://doi.org/10.1139/e03-028>.
- Bethune, K. M., and R. J. Scammell (2003b), Distinguishing between Archean and Paleoproterozoic tectonism, and evolution of the Isortoq fault zone, Ege Bay area, north-central Baffin Island, Canada, *Canadian Journal of Earth Sciences*, 40(8), 1111–1135, <https://doi.org/10.1139/e03-040>.
- Bros, E., and S. Johnston (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*, pp. 69–80, Canada-Nunavut Geoscience Office, Canada.
- Burg, J.-P., P. Bale, J.-P. Brun, and J. Girardeau (1987), Stretching lineation and transport direction in the Ibero-Armorican arc during the siluro-devonian collision, *Geodinamica acta*, 1(1), 71–87, <https://doi.org/10.1080/09853111.1987.11105126>.
- Corrigan, D., S. Pehrsson, N. Wodicka, and E. de Kemp (2009), The Palaeoproterozoic Trans-Hudson Orogen: a prototype of modern accretionary processes, *Geological Society Special Publication*, 327(1), 457–479, <https://doi.org/10.1144/sp327.19>.
- Davis, B. K., and E. Maidens (2003), Archean orogen-parallel extension: evidence from the northern Eastern Goldfields Province, Yilgarn Craton, *Precambrian Research*, 127(1-3), 229–248, [https://doi.org/10.1016/s0301-9268\(03\)00189-x](https://doi.org/10.1016/s0301-9268(03)00189-x).
- de Wit, M. J. (1982), Gliding and overthrust nappe tectonics in the Barberton Greenstone Belt, *Journal of Structural Geology*, 4(2), 117–136, [https://doi.org/10.1016/0191-8141\(82\)90022-0](https://doi.org/10.1016/0191-8141(82)90022-0).
- Dennis, J. G., R. A. Price, J. K. Sales, R. Hatcher, A. W. Bally, W. J. Perry, H. P. Laubscher, R. E. Williams, D. Elliott, D. K. Norris, and D. W. Hutton (1981), What is a thrust? What is a nappe?, *Geological Society, London, Special Publications*, 9, 7–9.
- Dziggel, A., L. Bramm, T. F. Kokfelt, J. Grocott, and J. F. A. Diener (2025), Preservation of igneous and metamorphic charnockites in the Paleoproterozoic Prøven Igneous Complex, Rinkian Orogen, central West Greenland, *Precambrian Research*, 417(107634), 107,634, <https://doi.org/10.1016/j.precamres.2024.107634>.
- Echtler, H. (1990), Geometry and kinematics of recumbent folding and low-angle detachment in the Pardailhan nappe (Montagne Noire, Southern French Massif Central), *Tectonophysics*, 177(1-3), 109–123, [https://doi.org/10.1016/0040-1951\(90\)90276-e](https://doi.org/10.1016/0040-1951(90)90276-e).

- Escher, A., H. Masson, and A. Steck (1993), Nappe geometry in the western Swiss alps, *Journal of Structural Geology*, 15(3-5), 501–509, [https://doi.org/10.1016/0191-8141\(93\)90144-y](https://doi.org/10.1016/0191-8141(93)90144-y).
- Folkesson, C.-P. (2025), Turbidites paléoprotérozoïques de la Baie Ege, île de Baffin: contraintes stratigraphiques, structurales, et géochronologiques, Master's thesis, Université du Québec à Montréal (UQAM), Montréal.
- Fossen, H., G. C. G. Cavalcante, R. V. L. Pinheiro, and C. J. Archanjo (2019), Deformation – progressive or multiphase?, *Journal of Structural Geology*, 125, 82–99, <https://doi.org/10.1016/j.jsg.2018.05.006>.
- Friend, C. R. L., and A. P. Nutman (1991), Refolded nappes formed during late Archaean terrane assembly, Godthåbsfjord, southern West Greenland, *Journal of the Geological Society*, 148(3), 507–519, <https://doi.org/10.1144/gsjgs.148.3.0507>.
- Gagné, S., R. A. Jamieson, R. MacKay, N. Wodicka, and D. Corrigan (2009), Texture, composition, and age variations in monazite from the lower amphibolite to the granulite facies, longstaff bluff formation, Baffin island, Canada, *The Canadian Mineralogist*, 47(4), 847–869, <https://doi.org/10.3749/canmin.47.4.847>.
- Girault, J. B., N. Bellahsen, A. Boutoux, C. L. Rosenberg, U. Nanni, A. Verlaquet, and O. Beyssac (2020), The 3-D thermal structure of the helvetic nappes of the European alps: Implications for collisional processes, *Tectonics*, 39(3), e2018TC005334, <https://doi.org/10.1029/2018tc005334>.
- Grocott, J., and K. J. W. McCaffrey (2017), Basin evolution and destruction in an Early Proterozoic continental margin: the Rinkian fold-thrust belt of central West Greenland, *Journal of the Geological Society*, 174(3), 453–467, <https://doi.org/10.1144/jgs2016-109>.
- Grocott, J., and T. C. R. Pulvertaft (1990), The early Proterozoic Rinkian belt of central West Greenland, in *The Early Proterozoic Trans-Hudson Orogen of North America*, Geological Association of Canada, Special Paper, vol. 37, edited by J. F. Lewry and M. R. Stauffer, pp. 443–463, Geological Association of Canada.
- Grocott, J., K. Thrane, K. J. W. McCaffrey, P. R. Sleath, and A. Dziggel (2023), Andean-type, bivergent crustal shortening in the Rinkian orogen: New constraints on the tectonic evolution of Laurentia–West Greenland in the Paleoproterozoic, *Geosphere*, 19(5), 1231–1258, <https://doi.org/10.1130/ges02614.1>.
- Guarnieri, P., D. Rosa, K. Thrane, T. F. Kokfelt, E. V. Sørensen, M. Y. DeWolfe, and N. Baker (2023), Tectonics of the Paleoproterozoic Rinkian orogen, central West Greenland, *Geological Society of America Bulletin*, <https://doi.org/10.1130/b36930.1>.
- Harrison, C., and M. R. St-Onge (2023), Geological history and supercontinent cycles of the Arctic, *Geological Society of America Bulletin*, 135(1-2), 162–189, <https://doi.org/10.1130/b36398.1>.
- Harrison, J. C., B. M. Saumur, and D. R. Sipton (2022), Mineral and carving-stone resources of Baffin Island, Nunavut, in *Geological Synthesis of Baffin Island (Nunavut) and the Labrador–Baffin Seaway*, Geological Survey of Canada, Bulletin, vol. 608, edited by L. T. Dafoe and N. Bingham-Kosłowski, pp. 389–407, Geological Survey of Canada, Canada, <https://doi.org/10.4095/321858>.
- He, J., J. R. Harris, M. Sawada, and P. Behnia (2015), A comparison of classification algorithms using Landsat-7 and Landsat-8 data for mapping lithology in Canada's Arctic, *International Journal of Remote Sensing*, 36(8), 2252–2276, <https://doi.org/10.1080/01431161.2015.1035410>.
- Henderson, J. R., and C. R. Tippet (1980), Foxe Fold Belt in eastern Baffin Island, District of Franklin, *Tech. rep.*, Natural Resources Canada, <https://doi.org/10.4095/106195>.
- Herwegh, M., and O. A. Pfiffner (2005), Tectono-metamorphic evolution of a nappe stack: A case study of the Swiss Alps, *Tectonophysics*, 404(1-2), 55–76, <https://doi.org/10.1016/j.tecto.2005.05.002>.
- Hoffman, P. F. (1988), United plates of America, the birth of a craton: Early Proterozoic assembly and growth of Laurentia, *Annual Review of Earth and Planetary Sciences*, 16(1), 543–603, <https://doi.org/10.1146/annurev.ea.16.050188.002551>.
- Jackson, G. D. (2000), Geology of the Clyde-Cockburn Land map area, north-central Baffin Island, Nunavut, *Tech. rep.*, Natural Resources Canada, <https://doi.org/10.4095/211268>.
- Jackson, G. D., and R. G. Berman (2000), Precambrian metamorphic and tectonic evolution of northern Baffin island, Nunavut, Canada, *The Canadian Mineralogist*, 38(2), 399–421, <https://doi.org/10.2113/gscanmin.38.2.399>.
- Jackson, G. D., and W. C. Morgan (1978), Geology, Conn lake, district of Franklin, *Tech. rep.*, Natural Resources Canada, <https://doi.org/10.4095/109162>.
- Jackson, G. D., W. C. Morgan, and A. Davidson (1978), Geology, steensby inlet, district of Franklin, *Tech. rep.*, Natural Resources Canada, <https://doi.org/10.4095/109160>.
- Jannin, S., F. Gervais, A. Moukhsil, and L. E. Augland (2018), Late-Grenvillian channel flow in the central Grenville Province (Manicouagan Reservoir area): New constraints from a structural and geochronological study of the Allochthon Boundary Thrust, *Journal of Structural Geology*, 115, 132–151, <https://doi.org/10.1016/j.jsg.2018.07.019>.
- Johnston, S. T., R. Lahtinen, B. M. Saumur, and P. Guarnieri (2024), Reconstructing the Paleoproterozoic heart of Nuna, from Fennoscandia to northeastern Laurentia, *Geological Society Special Publication*, 542(1), 31–49, <https://doi.org/10.1144/sp542-2023-37>.
- Kalsbeek, F. (1986), The tectonic framework of the Precambrian shield of Greenland A review of new isotopic evidence, *Rapport Grønlands Geologiske Undersøgelse*, 128, 55–64, <https://doi.org/10.34194/rapggv.v128.7924>.
- Lebeau, L. E., M. Russer, I. Therriault, P. J. Bovingdon, F. Dufour, J. W. Greenman, and M. Patzke (2020),

- Regional Precambrian bedrock mapping of the Jungersen River area, northwestern Baffin Island, Nunavut, in *Summary of Activities 2019*, pp. 11–26, Canada-Nunavut Geoscience Office, <https://doi.org/10.4095/321858>.
- Lewry, J. F., and K. D. Collerson (1990), The Trans-Hudson Orogen: extent, subdivisions and problems, in *The Early Proterozoic Trans-Hudson Orogen of North America, Geological Association of Canada, Special Paper*, vol. 37, edited by J. F. Lewry and M. R. Stauffer, pp. 1–14, Geological Association of Canada.
- McClay, K., and N. J. Price (Eds.) (1981), *Thrust and Nappe Tectonics, Special Publication*, vol. 9, Wiley-Blackwell, Chichester, England.
- Merle, O. (1998), *Emplacement mechanisms of nappes and thrust sheets*, Springer, Dordrecht, Netherlands.
- Miles, W., and D. Oneschuk (2016), Magnetic anomaly map, Canada, *Tech. rep.*, Geological Survey of Canada, <https://doi.org/10.4095/297337>.
- Morgan, W. C. (1982), Geology, Koch island, district of Franklin, *Tech. rep.*, Natural Resources Canada, <https://doi.org/10.4095/127056>.
- Morgan, W. C., A. V. Okulitch, and P. H. Thompson (1976), Stratigraphy, structure and metamorphism of the west half of the Foxe Fold Belt, Baffin Island, *Tech. rep.*, Natural Resources Canada, <https://doi.org/10.4095/104230>.
- Möller, C., J. Andersson, B. Dyck, and I. Antal Lundin (2015), Exhumation of an eclogite terrane as a hot migmatitic nappe, Sveconorwegian orogen, *Lithos*, 226, 147–168, <https://doi.org/10.1016/j.lithos.2014.12.013>.
- Natural Resources Canada (2013), Geophysical Data / Données géophysiques, <http://gdr.aggr.nrcan.gc.ca/gdrd/ap/dap/search-eng.php>, accessed: 2026-9-21.
- Partin, C. A., A. Bekker, D. Corrigan, S. Modeland, D. Francis, and D. W. Davis (2014), Sedimentological and geochemical basin analysis of the Paleoproterozoic Penrhyn and Piling groups of Arctic Canada, *Precambrian Research*, 251, 80–101, <https://doi.org/10.1016/j.precamres.2014.06.010>.
- Peterson, T. D., N. Wodicka, S. J. Pehrsson, P. Acosta-Gongora, V. Tschirhart, C. J. Jefferson, H. Steenkamp, E. Martel, J. Percival, and D. Corrigan (2024), The Rae Province at 2.6 Ga: a sanukitoid storm on the Canadian Shield, Nunavut, *Tech. rep.*, Natural Resources Canada, <https://doi.org/10.4095/332505>.
- Rainbird, R. H., W. J. Davis, S. J. Pehrsson, N. Wodicka, N. Rayner, and T. Skulski (2010), Early Paleoproterozoic supracrustal assemblages of the Rae domain, Nunavut, Canada: Intracratonic basin development during supercontinent break-up and assembly, *Precambrian Research*, 181(1-4), 167–186, <https://doi.org/10.1016/j.precamres.2010.06.005>.
- Ramsay, J. G. (1981), Tectonics of the Helvetic Nappes, *Geological Society Special Publication*, 9(1), 293–309, <https://doi.org/10.1144/gsl.sp.1981.009.01.26>.
- Ratschbacher, L., W. Frisch, F. Neubauer, S. M. Schmid, and J. Neugebauer (1989), Extension in compressional orogenic belts: The eastern Alps, *Geology*, 17(5), 404, [https://doi.org/10.1130/0091-7613\(1989\)017<0404:eicobt>2.3.co;2](https://doi.org/10.1130/0091-7613(1989)017<0404:eicobt>2.3.co;2).
- Sanborn-Barrie, M., W. J. Davis, R. G. Berman, N. Rayner, T. Skulski, and H. Sandeman (2014), Neoproterozoic 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. (2026), Supplemental data - Structural geology studies of northern Baffin Island, Borealis, <https://doi.org/10.5683/SP4/CLDWMV>.
- Saumur, B. M., D. R. Skipton, M. R. St-Onge, E. R. Bros, P. Acosta-Gongora, C. J. Kelly, A. Morin, M. E. O'Brien, S. T. Johnston, and O. M. Weller (2018), Precambrian geology of the surroundings of Steensby Inlet and western Barnes Ice Cap (parts of NTS 37E, 37F, 37G), Baffin Island, Nunavut, in *Summary of Activities 2018*, pp. 27–45, Canada-Nunavut Geoscience Office, Canada.
- Saumur, B. M., C.-P. Folkesson, D. R. Skipton, J. H. F. L. Davies, N. Wodicka, and S. T. Johnston (2025), Precambrian Greenstone belts of north Baffin Island, Canadian arctic: Geochronological constraints on magmatism and stratigraphy in the Rae craton, *Geochemistry, Geophysics, Geosystems: G(3)*, 26(10), e2025GC012,206, <https://doi.org/10.1029/2025gc012206>.
- Saumur, B. M., S. T. Johnston, B. Dyck, K. Larson, J. Hey, and M. Robatian (2026), Structural controls on the metallogeny and distribution of the Mary River Fe-deposits, Canada, in *Iron Ore and Open Pit Operators Conference Proceeding 2026*, Perth, Australia.
- Scott, D. J., M. R. St-Onge, and D. Corrigan (2002), Geology of the Paloproterozoic Piling Group and underlying Archean gneiss, central Baffin Island, Nunavut, *Tech. rep.*, Geological Survey of Canada, <https://doi.org/10.4095/213194>.
- Skipton, D., B. Saumur, M. St-Onge, N. Wodicka, E. Bros, A. Morin, P. Brouillette, O. Weller, and S. Johnston (2017), Precambrian bedrock geology of the Pond Inlet–Mary River area, northern Baffin Island, Nunavut, in *Summary of Activities 2017*, pp. 49–68, Canada-Nunavut Geoscience Office, Canada.
- Skipton, D., N. Wodicka, O. Weller, S. Jackson, M. St-Onge, B. Saumur, and D. Petts (2025), Polyphase metamorphism of the northern Rae craton (Baffin Island, arctic Canada) and trace element behaviour in monazite: Insights from phase equilibria modelling and geochronology, *Journal of Metamorphic Geology*, 43(3), 287–314, <https://doi.org/10.1111/jmg.12808>.
- Skipton, D. R., N. Wodicka, V. McNicoll, B. M. Saumur, M. R. St-Onge, and M. D. Young (2019), U-Pb zircon geochronology of Archean greenstone belts (Mary River Group) and surrounding Archean to Paleoproterozoic rocks, northern Baffin Island, Nunavut, *Tech. rep.*, Geological Survey of Canada, <https://doi.org/10.4095/314938>.
- Skipton, D. R., B. M. Saumur, M. R. St-Onge, E. R. Bros, P. Acosta-Góngora, C. J. Kelly, M. E. O'Brien, O. M. Weller, and S. T. Johnston (2020a), Bedrock geology, Barnes Ice Cap northwest, Baffin Island, Nunavut, NTS 37-E west, *Tech. rep.*, Natural Resources Canada, <https://doi.org/10.4095/314938>.

[//doi.org/10.4095/314657](https://doi.org/10.4095/314657).

- Skipton, D. R., B. M. Saumur, M. R. St-Onge, E. R. Bros, P. Acosta-Góngora, C. J. Kelly, M. E. O'Brien, O. M. Weller, and S. T. Johnston (2020b), Bedrock geology, Rowley River-Isortoq River, Baffin Island, Nunavut, NTS 37-F east, *Tech. rep.*, Natural Resources Canada, <https://doi.org/10.4095/315401>.
- St-Onge, M. R., D. J. Scott, D. Corrigan, and N. Wodicka (2005), Geology, Ikpiq Bay, Baffin island, Nunavut, *Tech. rep.*, Natural Resources Canada, <https://doi.org/10.4095/221054>.
- St-Onge, M. R., M. P. Searle, and N. Wodicka (2006), Trans-Hudson Orogen of North America and Himalaya-Karakoram-Tibetan Orogen of Asia: Structural and thermal characteristics of the lower and upper plates, *Tectonics*, 25(4), TC4006, <https://doi.org/10.1029/2005tc001907>.
- St-Onge, M. R., J. A. M. Van Gool, A. A. Garde, and D. J. Scott (2009), Correlation of Archean and Palaeoproterozoic units between northeastern Canada and western Greenland: constraining the pre-collisional upper plate accretionary history of the Trans-Hudson orogen, *Geological Society Special Publication*, 318(1), 193–235, <https://doi.org/10.1144/sp318.7>.
- St-Onge, M. R., D. J. Scott, N. Rayner, M. Sanborn-Barrie, D. R. Skipton, B. M. Saumur, N. Wodicka, and O. M. Weller (2020), Archean and Paleoproterozoic cratonic rocks of Baffin Island, in *Geological Synthesis of Baffin Island (Nunavut) and the Labrador-Baffin Seaway*, vol. 608, edited by L. T. Dafoe and N. Bingham-Koslowski, pp. 25–53, Geological Survey of Canada, Canada, <https://doi.org/10.4095/321824>.
- Steenkamp, H., P. Bovingdon, F. Dufour, C.-A. Génereux, J. Greenman, G. Halverson, A. Ielpi, M. Patzke, and D. Tinkham (2018), New regional mapping of Precambrian rocks north of Fury and Hecla Strait, northwestern Baffin Island, Nunavut, in *Summary of Activities 2018*, pp. 47–62, Canada-Nunavut Geoscience Office, Canada.
- Weller, O. M., C. M. Mottram, M. R. St-Onge, C. Möller, R. Strachan, T. Rivers, and A. Copley (2021), The metamorphic and magmatic record of collisional orogens, *Nature Reviews. Earth & Environment*, 2(11), 781–799, <https://doi.org/10.1038/s43017-021-00218-z>.
- Wodicka, N., M. R. St-Onge, D. Corrigan, D. J. Scott, and J. B. Whalen (2014), Did a proto-ocean basin form along the southeastern Rae cratonic margin? Evidence from U-Pb geochronology, geochemistry (Sm-Nd and whole-rock), and stratigraphy of the Paleoproterozoic Piling Group, northern Canada, *Geological Society of America Bulletin*, 126(11–12), 1625–1653, <https://doi.org/10.1130/b31028.1>.
- Young, M. D., H. Sandeman, F. Berniolles, and P. M. Gertzein (2004), A preliminary stratigraphic and structural geology framework for the Archean Mary River Group, northern Baffin Island, Nunavut, *Tech. rep.*, Geological Survey of Canada, <https://doi.org/10.4095/215376>.
- Zhang, J., L. Ding, D. Zhong, and Y. Zhou (2000), Orogen-parallel extension in Himalaya: Is it the indicator of collapse or the product in process of compressive uplift?, *Xezue tongbao [Chinese Science Bulletin]*, 45(2), 114–120, <https://doi.org/10.1007/bf02884653>.