

## SAGLEK BLOCK, LABRADOR: IMPLICATIONS FOR THE ASSEMBLY OF THE NORTH ATLANTIC CRATON

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### ABSTRACT

*The Saglek and Hopedale blocks in Labrador form part of the Nain Province within the western North Atlantic Craton and preserve a complex, multi-stage record of Archean crustal formation, high-grade metamorphism, and Paleoproterozoic reworking. Field observations captured in National Topographic System (NTS) map areas 14F/04, 03, 14C/12, 11, 05 and 06, show that the Saglek Block is dominated by tonalitic–trondhjemitic–granodioritic (TTG) gneiss containing enclaves of amphibolite and supracrustal rocks, crosscut by Mesoarchean (Saglek dykes) to Paleoproterozoic mafic dykes, late granitic and pegmatitic sheets. These units were subsequently intruded by the Mesoproterozoic Nain Plutonic Suite. Structural relationships reveal five Archean deformation events. The earliest ( $D_{m-2}$ ,  $\geq 3.6$ – $3.3$  Ga) is locally preserved as gneissosity and tightly attenuated recumbent to isoclinal folds in Eoarchean TTG gneiss and Nulliak supracrustal enclaves. A younger Paleoarchean foliation ( $D_{m-1}$ ) developed in the Upernavik supracrustals prior to 2.9 Ga and is axial planar to early recumbent folds that variably transpose older Eoarchean layering. The main Neoarchean event ( $D_m$ ; 2.8–2.7 Ga) was accompanied by pervasive transposition, high-temperature ductile flow, and partial melting. The early Paleoarchean fabrics were progressively transposed into  $S_m$  during  $D_m$ , which is the regional Neoarchean gneiss-forming event. Late Neoarchean transcurrent high-grade reactivation ( $D_{m+1}$ , 2.6–2.5 Ga) formed narrow mylonitic to ultramylonitic shear zones that truncate  $S_m$  and record predominantly sinistral, locally dextral, kinematics.  $D_{m+1}$  also produced upright north- to north–northwest-trending folds that refold 2.7 Ga structures, generating map-scale type-2 interference patterns. A final Paleoproterozoic overprint ( $D_{m+2}$ ) produced gentle, open upright warps of the  $S_m$  fabric. The composite structural grain is north–northeast trending, whereas subordinate east- to east-southeast–trending shear zones coincide with prominent magnetic lineaments. These east–west-oriented shear systems are interpreted as manifestations of the principal tectonic boundary between the Saglek and Hopedale blocks and align with deep-crustal magnetic lineaments, consistent with a long-lived lithospheric discontinuity repeatedly reactivated from the Paleoarchean to Paleoproterozoic. Together, these lithological and structural relationships document a reactivated, polyphase Archean deformation history and provide new constraints on the geometry and tectonic significance of the southern margin of the Saglek Block within the Nain Province.*

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### INTRODUCTION

Northern Labrador is geologically complex and lies at the junction of three tectonic provinces (Figure 1): the Nain, Southeastern Churchill (SECP) and Makkovik. The Hopedale and Saglek blocks together form the Nain Province, which is the Labrador segment of the North Atlantic Craton (NAC) extending through Greenland to northwestern Scotland (Bridgwater *et al.*, 1973). The Labrador segment of the NAC comprises two Archean crustal blocks: a) the 3.9–2.5 Ga Saglek Block (Schjøtte *et al.*, 1989a, b) and b) the 3.3–2.5 Ga Hopedale Block (*see review in Hinchey et al.*, 2024). These two blocks exhibit

distinct Paleo- and Neoarchean tectonomagmatic histories (*see review in Connelly and Ryan*, 1999). The boundary between the Hopedale and Saglek blocks is inferred to occur along a poorly defined, north-northeast-trending high-strain zone, largely occluded by the intrusion of the Mesoproterozoic Nain Plutonic Suite, and was interpreted to have been active as late as *ca.* 2.56 Ga (Connelly and Ryan, 1996). However, recent work in the Hopedale Block indicates that the collision occurred earlier, between 2.73 and 2.70 Ga (Hinchey *et al.*, 2024).

The NAC is separated from the central Archean–Paleoproterozoic domains of the SECP by the Torngat

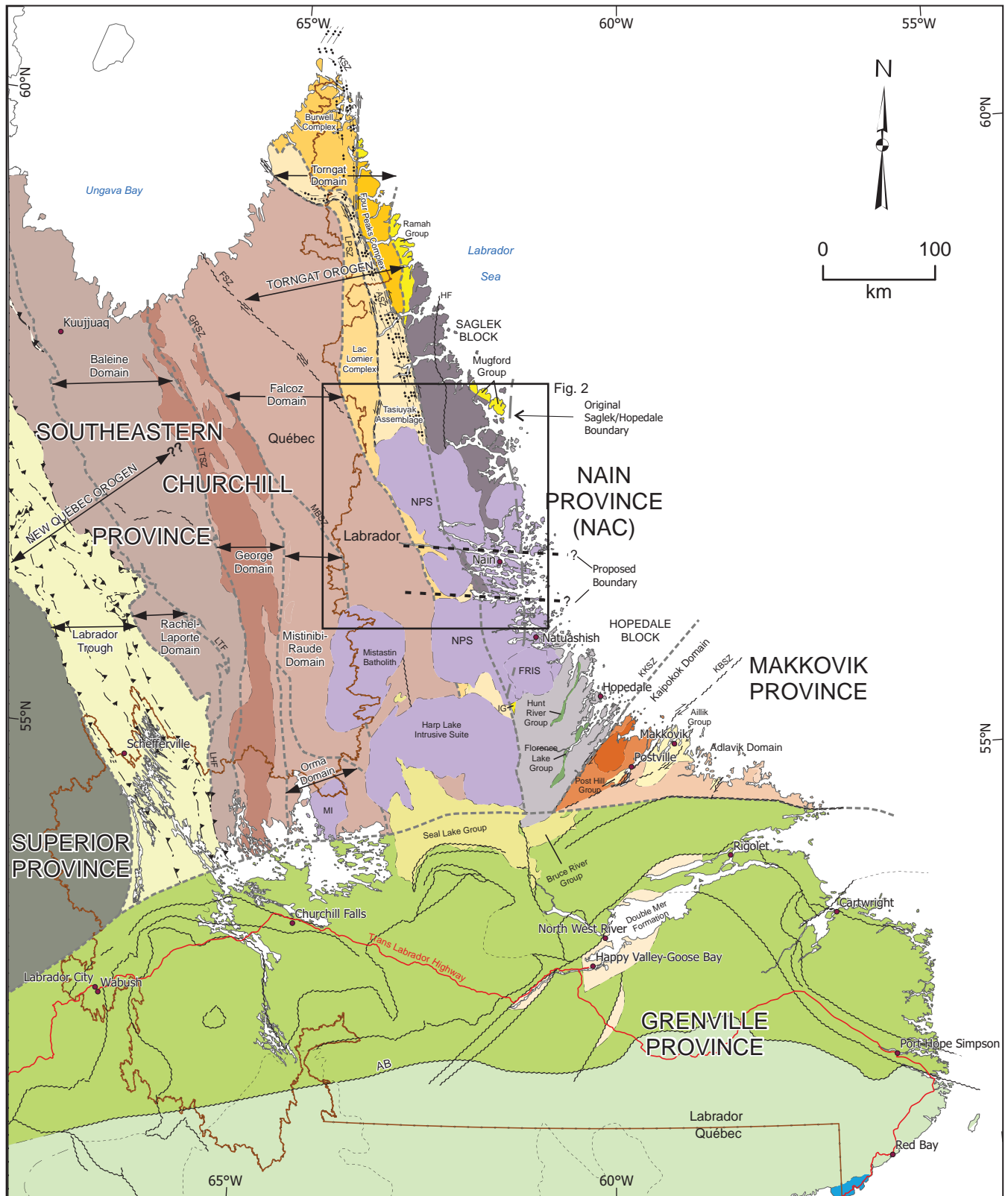
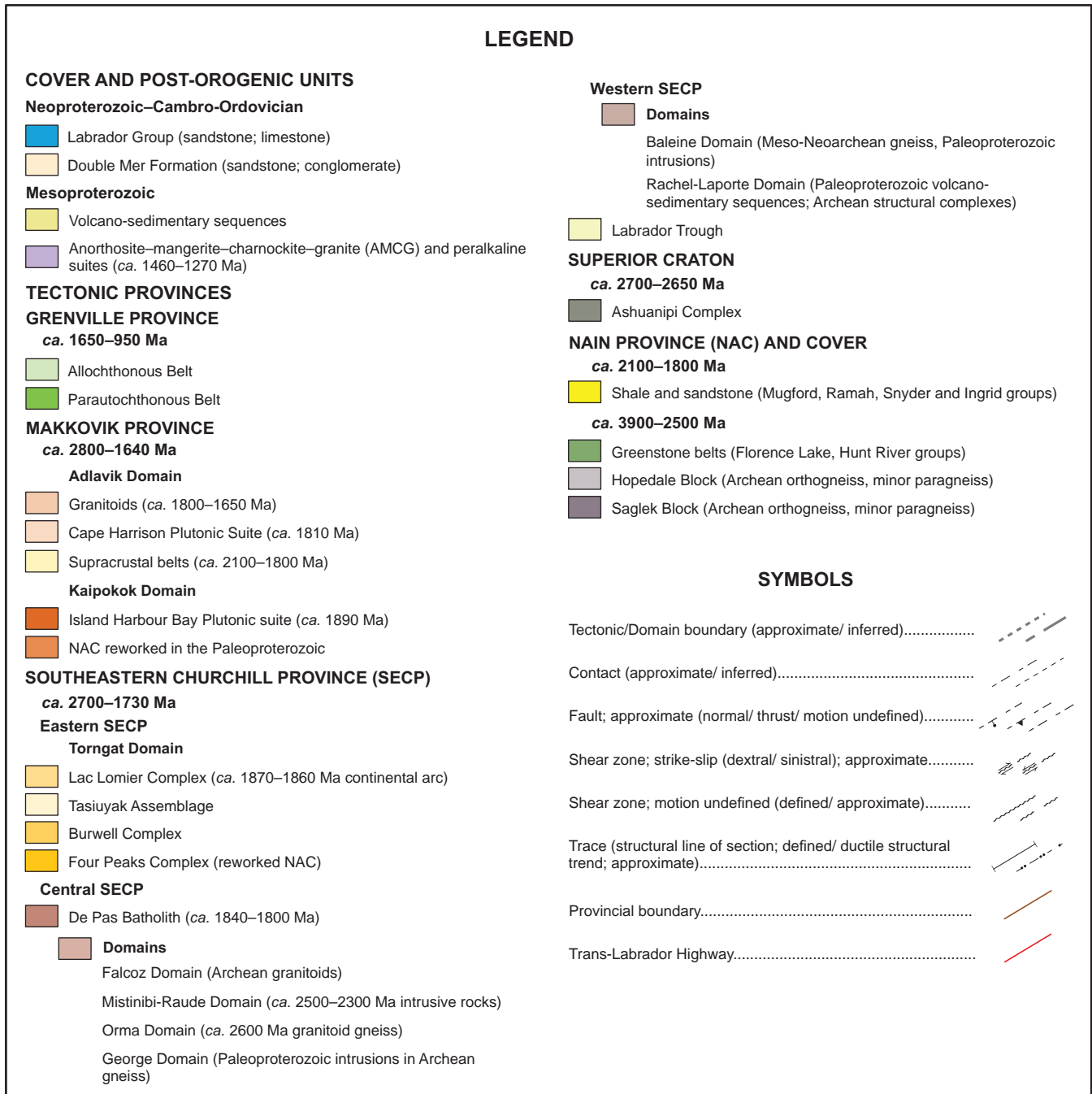


Figure 1. Caption and Legend on following page.



**Figure 1.** Simplified geological map of eastern Québec and Labrador (modified after Hinchey et al., this volume). ASZ–Abloviak Shear Zone, AB–Allochthon Boundary, FRIS–Flowers River Igneous Suite, FSZ–Falcoz Shear Zone, GRSZ–George River Shear Zone, HF–Handy Fault, IG–Ingrid Group, KSZ–Kormaktovik Shear Zone, KKSZ–Kanairiktok Shear Zone, KBSZ–Kaipokok Bay Shear Zone, LHF–Lac Herodier Fault, LPSZ–Lac Pilliamet Shear Zone, LTSZ–Lac Tudor Shear Zone, LTF–Lac Turcotte Fault, MBSZ–Moonbase Shear Zone, MI–Michikamau Intrusion, NPS–Nain Plutonic Suite. The location of Figure 2 is outlined.

Domain, a high-grade lithotectonic domain that forms the easternmost subdivision of the SECP. The Torngat Domain records Archean crustal inheritance variably overprinted by intense Paleoproterozoic tectonometamorphic reworking between *ca.* 1.90 and 1.73 Ga and constitutes the principal collisional domain along the eastern SECP (Bertrand *et al.*, 1993; Corrigan *et al.*, 2018; Charette *et al.*, 2021; Godet *et al.*, 2021; Hinchey *et al.*, 2025, *this volume*). Deformation and metamorphism within the Torngat Domain are attributed to the Torngat Orogen, which developed during oblique collision between central SECP crustal domains and the NAC between *ca.* 1.90–1.80 Ga, followed by exhumation until *ca.* 1.73 Ga (Scott, 1998; Wardle *et al.*, 2002; Godet *et al.*, 2021). This event resulted in pronounced transpression, granulite-facies metamorphism, partial melting and localized mylonitization along the craton-facing margin. In Labrador, the Torngat Domain, comprising the Lac Lomier Complex and the Tasiuyak Assemblage in the study area, records deep crustal levels of this collisional system and preserves the most intense metamorphic and structural imprint of Paleoproterozoic convergence within the SECP.

To the south, the NAC is bound by the Makkovik Province, a Paleoproterozoic belt characterized by crustal reworking and terrane accretion (Hinchey *et al.*, 2020; Hinchey, 2021). The entire region was later intruded by voluminous Mesoproterozoic anorthosite–mangerite–charnockite–granite (AMCG) plutonism of the Nain Plutonic Suite, Mistastin Batholith, Harp Lake Intrusive Suite, along with peralkaline magmatism of the Flowers River Igneous Suite and Strange Lake igneous complex.

Within this framework, the Saglek Block represents the northernmost exposure of the Nain Province and records a long history of Archean magmatic, metamorphic and deformational events that provide critical insights into the early evolution of the NAC. This study forms part of a collaborative initiative between the Geological Survey of Canada (GEM–GeoNorth program), the Geological Survey of Newfoundland and Labrador, the Polish Academy of Sciences, and the Nunatsiavut Government. The project focuses on the poorly understood southern margin of the Saglek Block, where it bounds the Hopedale Block, a key region of uncertainty in Labrador’s Archean framework.

The study area encompasses parts of NTS (National Topographic System) map areas 14F/04, 03, 14C/12, 11, 05 and 06, extending from Ugjoktok Bay to the eastern portion of Mistastin Lake in north-central Labrador (Figure 2). One purpose of this research project is to evaluate the nature, geometry, and crustal significance of the contact between the Saglek and Hopedale blocks by integrating new litho-geochemical, isotopic, and geochronological data from key localities within the southeastern Saglek Block and adjacent

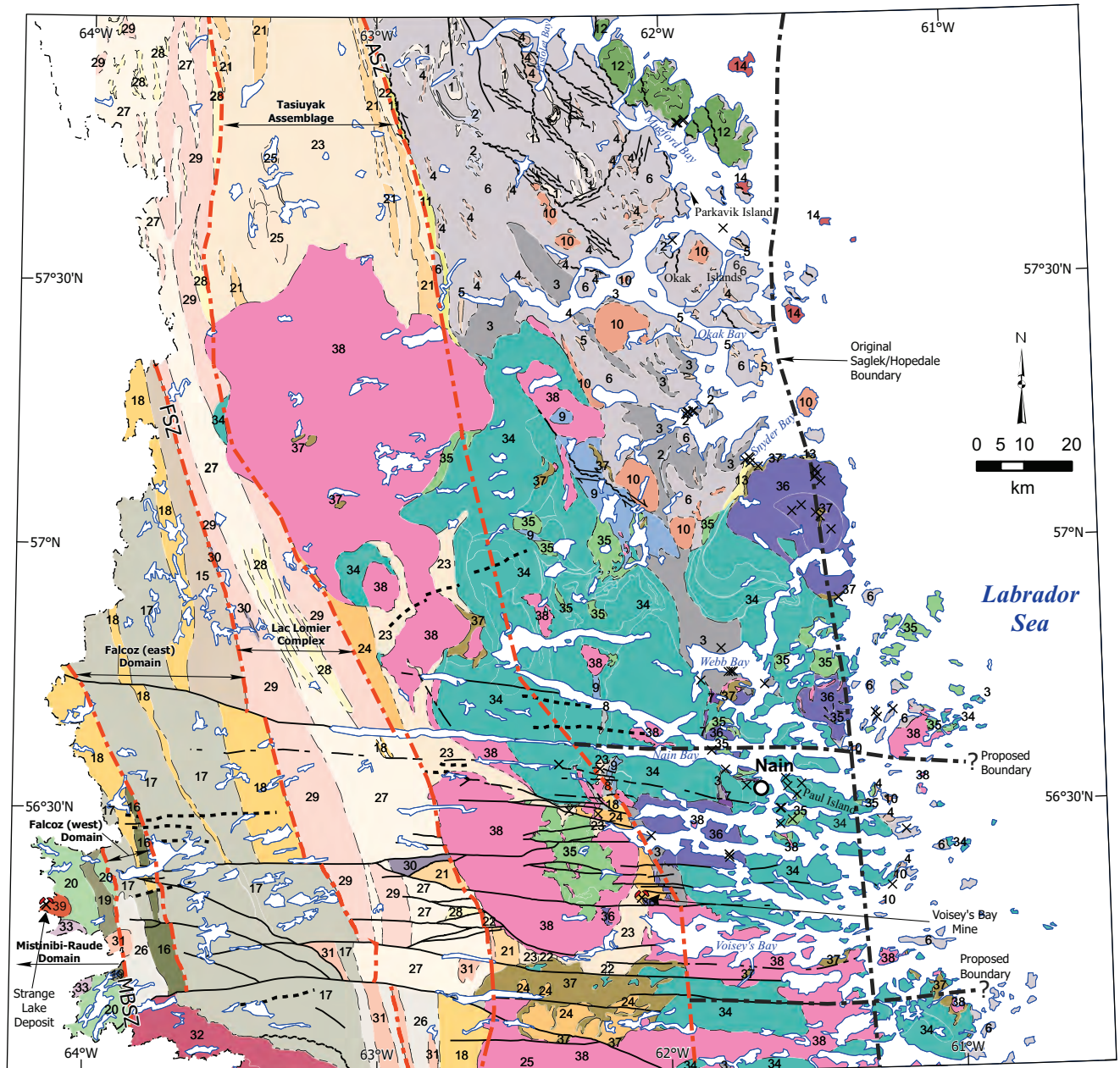
rocks of uncertain affinity around Nain. This first contribution summarizes preliminary observations and characteristics of the Saglek Block. Subsequent reports will cover the Nain Bay to Spracklin’s Island area. Supracrustal rocks deposited during or post Saglek–Hopedale assembly, and not restricted to either block (*i.e.*, 2.7–2.56 Ga), are not discussed here.

Preliminary field, structural and geophysical observations from this study indicate that the boundary between the Saglek and Hopedale blocks likely trends east–west (Figures 2 and 3), contrasting with earlier interpretations of a north–northeast orientation (Connelly and Ryan, 1996; Wasteneys *et al.*, 1996). This east–west structural grain corresponds with regional magnetic lineaments and lithologic contacts, suggesting a deeply rooted crustal boundary that influenced later Mesoproterozoic magmatism. The following section provides the geological framework of the Saglek Block, summarizing recent advances in its lithostratigraphy, magmatic evolution, and metamorphic history relevant to interpreting this boundary.

## SAGLEK BLOCK GEOLOGY

The Saglek Block forms the northern segment of the Nain Province and represents one of the most ancient continental nuclei within the NAC. Earlier work established that it is dominated by tonalitic–trondhjemitic–granodioritic (TTG) gneiss of the Eo- to Paleoproterozoic Uivak gneiss, intruded by Mesoproterozoic mafic Saglek dykes and variably affected by multiple high-grade metamorphic events (Bridgwater *et al.*, 1975). Subsequent isotopic and geochronological studies refined the ages of these components, showing Eoarchean protoliths (*ca.* 3.8–3.6 Ga) that were variably reworked during Neoproterozoic deformation and metamorphism until 2.56 Ga (Bridgwater *et al.*, 1975; Collerson and Bridgwater, 1979; Collerson *et al.*, 1982; Schiøtte *et al.*, 1989a, b). Structural mapping by Van Kranendonk and Helmstaedt (1990) extends this framework south of Hebron, showing that Eoarchean to Neoproterozoic units and structural fabrics continue at least to Pistolet Bay, where Upernivik supracrustal assemblages and Uivak basement gneisses are tightly interfolded and tectonically interleaved. However, south of Pistolet Bay, the continuity of these lithotectonic elements remains uncertain, as exposures are less well studied. Together, these investigations highlight both the antiquity of the northern Saglek Block and the need to better resolve the extent and architecture of Archean crust farther south along the Nain coastline.

Recent work has extended and enhanced our understanding of the Saglek Block. The block is dominated by Eoarchean to Paleoproterozoic TTG orthogneisses interleaved with supracrustal belts and intruded by younger granitoids



**SYMBOLS**

Contact, defined	——	Shear, strike-slip, dextral, approximate	↗↘	Tectonic boundary	— · — ·
Contact, approximate	- - -	Shear, strike-slip, sinistral, approximate	↖↗	Possible Saglek/Hopedale boundary	- · - ·
Contact, inferred	- · - ·	Shear, motion undefined, approximate	~~~~	Station	×
Fault, motion undefined, approximate	——	Thin lithology, dyke, approximate	- · - ·	Mine/Deposit	⚡
Fault, motion undefined, inferred	- - -			Provincial Border	- · - ·

**Figure 2.** Simplified compilation map of the Nain–Nutak map area. ASZ–Abloviak Shear Zone, FSZ–Falcoz Shear Zone, MBSZ–Moonbase Shear Zone.



Figure 2. Legend.

**Figure 3.** Aeromagnetic image of the southeastern Saglek Block highlighting east–west trending lineaments interpreted as shear zones of the Saglek–Hopedale boundary. A) First vertical derivative in colour with tectonic boundaries drawn; B) First vertical derivative in colour; C) First vertical derivative of the total magnetic intensity, hill-shaded image with 10° illumination, with tectonic boundaries drawn; and D) First vertical derivative of the total magnetic intensity, shown as a grey-scale, hill-shaded image with 10° illumination, with tectonic boundaries drawn. ASZ–Abloviak Shear Zone; KSZ–Kormaktovik Shear Zone, HF–Handy Fault.

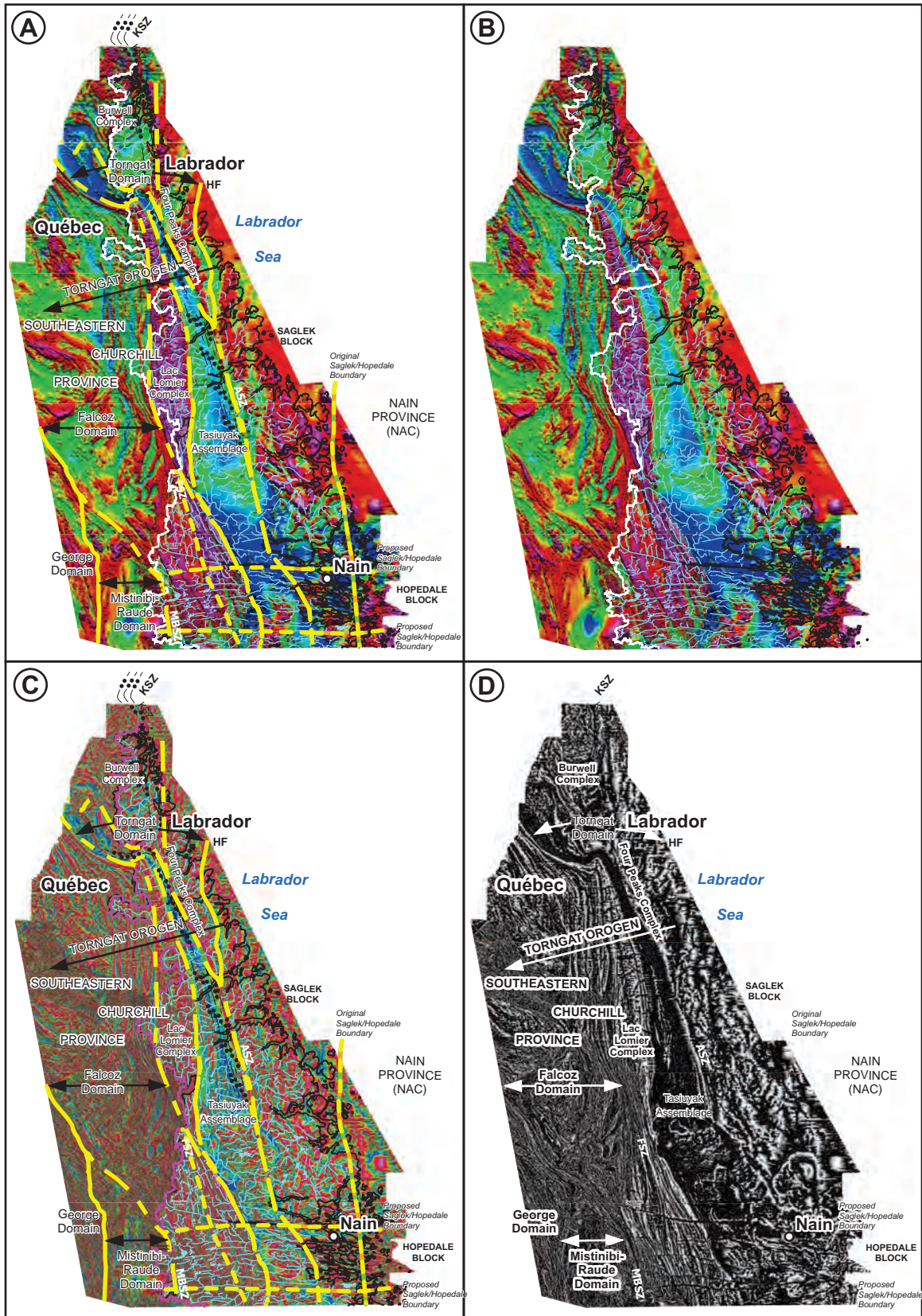


Figure 3. Caption on preceding page.

(Ryan and Martineau, 2012; Sałacińska *et al.*, 2019; Whitehouse *et al.*, 2019; Wasilewski *et al.*, 2022; Keluskar *et al.*, 2024). The oldest rocks in the Saglek Block are the supracrustal belts referred to as the Nulliak assemblage (>3.8 Ga), which together preserve a record of early volcanic and sedimentary processes. The Nulliak assemblage forms rafts and more continuous belts (10 by 0.5 km) of mafic and ultramafic intrusive and extrusive rocks, magnetite iron formation, calcsilicate rock and pelitic gneiss that are preserved as enclaves or tectonic slivers within the oldest orthogneiss (Bridgwater *et al.*, 1975; Collerson and Bridgwater, 1979).

The oldest Archean orthogneiss in the Saglek Block is the Uivak gneiss, which was traditionally divided into two main types: a) the early grey, layered TTG Uivak I banded gneiss, and b) the iron-rich, augen, granodioritic to ferrodioritic Uivak II gneiss (Collerson and Bridgwater, 1979; Bridgwater and Schiøtte, 1991). Originally, they were described as a single lithological unit due to their shared structural relationships, but additional mapping and geochronological studies demonstrate they are separated by hundreds of millions of years and where discernible, xenoliths of banded, foliated Uivak I gneiss are enclosed within Uivak II augen gneiss, demonstrating that the former underwent ductile deformation prior to the emplacement of the latter (Bridgwater *et al.*, 1975; Bridgwater and Collerson, 1976). The Uivak I gneiss yields crystallization ages *ca.* 3.75–3.72 Ga (Kusiak *et al.*, 2018; Sałacińska *et al.*, 2018; Schiøtte *et al.*, 1989a, b; Wasilewski *et al.*, 2022), whereas Uivak II gneiss returned crystallization ages between *ca.* 3.63 and 3.22 Ga (Collerson, 1983; Sałacińska *et al.*, 2019). It has been suggested that the enclaves within the Uivak gneiss are derived from >3.9 Ga protoliths termed the Nanok and Iqualuk gneisses (Komiya *et al.*, 2015). This interpretation has been questioned (*see* Whitehouse *et al.*, 2019), suggesting that the earliest zircon grains may be xenocrystic and the most recent gneiss names have not been universally accepted (*see* Kusiak *et al.*, 2018; Sałacińska *et al.*, 2018; Wasilewski *et al.*, 2022).

The Saglek dykes were described as a suite of amphibolite-facies mafic intrusions containing plagioclase megacrysts and displaying discordant relationships with the host gneisses in low-strain domains (Bridgwater *et al.*, 1975). These features remain the principal criteria for distinguishing Saglek dykes from other mafic enclaves (Collerson and Bridgwater, 1979). In high-strain zones, porphyroclasts of potassium feldspar within Uivak II gneiss define the compositional layering, and distinguishing these rocks from plagiophyric Saglek dykes can be challenging (Bridgwater *et al.*, 1975; Ryan and Martineau, 2012). They are interpreted to predate *ca.* 3.3 Ga deformation and metamorphism locally discernible in the Uivak I gneisses (Krogh and Kamo, 2006).

Detailed mapping and geochronology on augen gneiss of Maidmonts Island yielded a crystallization age of *ca.* 3.33 Ga for Uivak II gneiss (Sałacińska *et al.*, 2019), leading the authors to propose the term Maidmonts gneiss for rocks of this age, reserving Uivak gneiss for Eoarchean protoliths. Wasilewski *et al.* (2021) introduced the name Illuilik gneiss for similar rocks based solely on geochronology; however, these lithologies correspond to the original description of Uivak II augen gneiss and are therefore considered equivalent to Maidmonts augen gneiss, which has nomenclatural precedence (Keluskar *et al.*, 2024).

The Maidmonts augen gneiss forms a key component of the Saglek Block, where it locally intrudes or is interlayered with older TTG Uivak I gneiss. The Maidmonts augen gneiss is an iron-rich, augen-textured granitic gneiss (Collerson *et al.*, 1982). It is less extensive than the Uivak I gneiss and occurs mainly along coastal regions between White Point and Nulliak Island (Ryan and Martineau, 2012). The augen gneiss displays a well-developed foliation and lineation, with flattened and stretched feldspar porphyroclasts forming augen banding within high-strain zones (Collerson and Bridgwater, 1979). These rocks are cut by younger granitoids and crosscutting shear zones that define the structural grain of the region.

The younger, Paleoproterozoic supracrustal sequence is termed the Upernavik assemblage and comprises interlayered amphibolite, quartz–biotite paragneiss, semipelite, calc-silicate gneiss and minor marble. It is interleaved with both Uivak I and Maidmonts gneisses (Bridgwater *et al.*, 1975). The absence of Saglek dykes in the Upernavik sequence was initially used to distinguish it from the Nulliak assemblage (Bridgwater *et al.*, 1975); however, later mapping has shown that Saglek dykes are not ubiquitous at outcrop scale, rendering this criterion unreliable (Ryan and Martineau, 2012). The Upernavik assemblage is now more consistently identified by its sediment-dominated lithologies and lack of iron formation (Sałacińska *et al.*, 2019). Detrital zircon spectra and isotopic compositions indicate that the Upernavik assemblage was derived from reworked Uivak-type crust, deposited in possibly three periods: 1) after *ca.* 3.3 Ga and metamorphosed at *ca.* 2.8–2.7 Ga (Connelly and Ryan, 1996; Kusiak *et al.*, 2018), 2) after 2.8 Ga and 3) before 2.7 Ga (Bridgwater and Schiøtte, 1991). Despite their age difference, the mafic metavolcanic rocks of both the Upernavik and Nulliak assemblages are geochemically indistinguishable, implying comparable mantle sources and magmatic processes throughout Eoarchean crustal evolution (Wasilewski *et al.*, 2019).

The Lister gneiss represents a younger, *ca.* 3.25 Ga tonalitic granitoid (Schiøtte *et al.*, 1989a). It is a felsic orthogneiss metamorphosed under amphibolite-facies con-

ditions, petrologically similar to the Uivak I gneiss but distinct in age and isotopic composition (Schjøtte *et al.*, 1989a, b; Schjøtte and Bridgwater, 1990). No intrusive contact between the Uivak and Lister gneisses has been identified, and geochronological data indicate that they record distinct magmatic episodes more than 300 million years apart, implying independent crustal evolution prior to their later tectonic juxtaposition (Schjøtte *et al.*, 1989a, b; Wasteneys *et al.*, 1996; Sałacińska *et al.*, 2019). South of Hebron Fjord, on Parkavik Island (Figure 2), a granitoid of similar age (*ca.* 3.25 Ga) is intruded by a younger, *ca.* 3.0 Ga leucocratic granite sheet (Schjøtte and Bridgwater, 1990). This later pulse of magmatism suggests renewed crustal reworking and high-temperature metamorphism (Schjøtte *et al.*, 1989b; Wasteneys *et al.*, 1996). Together, these granitoid complexes document a prolonged cycle of magmatic differentiation and partial melting between *ca.* 3.9 and 3.2 Ga, comparable in age and evolution to the Itsaq Gneiss Complex of southwest Greenland (Nutman *et al.*, 2014; Vezinet *et al.*, 2019).

The Saglek Block preserves multiple episodes of high-temperature metamorphism and deformation that profoundly modified the pre-existing Archean crust. Uivak I granitoids underwent early metamorphism and migmatization prior to emplacement of Maidmonts augen gneiss (Collerson, 1983; Collerson and Bridgwater, 1979), with metamorphic ages of *ca.* 3.63–3.57 Ga (Sałacińska *et al.*, 2018). This event predates a *ca.* 3.56 Ga magmatic phase associated with monzonite emplacement in Tigigakyuk Inlet (Sałacińska *et al.*, 2018). Later, widespread granulite- to upper-amphibolite-facies metamorphism occurred at *ca.* 2.7 Ga, producing the pervasive gneissosity observed in all Eoarchean to Paleoarchean units (Dunkley *et al.*, 2019). A subsequent event at *ca.* 2.55 Ga, variably interpreted as a separate or prolonged phase of the 2.7 Ga episode, was accompanied by the intrusion of post-tectonic granites (Baadsgaard *et al.*, 1979; Collerson, 1983; Kusiak *et al.*, 2018; Dunkley *et al.*, 2019; Wendt and Collerson, 1999). These events resulted in widespread migmatization, partial melting, and isotopic resetting, and while granulite- or retrograded granulite facies metamorphism is widespread, original prograde, possibly 3.4 Ga amphibolite facies metamorphism is preserved east of the Handy Fault (Schjøtte *et al.*, 1989b; Bridgwater *et al.*, 1975; Keluskar *et al.*, 2024). Major lithological units can be correlated on both sides of the Handy Fault and thus are interpreted to represent different structural levels of the same crustal components (Bridgwater *et al.*, 1975).

## METHODS

A three-week field sampling program was completed in the summer of 2025. Work focused on collecting representative samples for litho-geochemistry, isotopic analysis and

U–Pb and Lu–Hf geochronology from key lithological units within the southern Saglek Block. Sampling targeted TTG gneisses, amphibolite and granitic intrusions, along with selected supracrustal enclaves and late dykes located near the inferred Saglek–Hopedale contact.

All samples are currently being prepared for thin sectioning and geochemical analysis. Thin sections are being produced for petrographic examination under transmitted and reflected light to document mineral assemblages, metamorphic textures and deformation microstructures. Sub-samples are being processed for whole-rock major- and trace-element analysis (XRF and ICP-MS), Sm–Nd isotopic work, Lu–Hf garnet dating, and zircon separation for future U–Pb geochronology and cathodoluminescence (CL) imaging. Analytical work will be carried out in collaboration with external laboratories, and results will be integrated with existing regional geochronological and geophysical datasets (Baadsgaard *et al.*, 1979; Collerson, 1983; Wendt and Collerson, 1999; Kusiak *et al.*, 2018; Dunkley *et al.*, 2019) to refine the crustal evolution model for the southern Saglek Block and its contact with the Hopedale Block.

## FIELD OBSERVATION

### LITHOLOGICAL UNITS

#### TTG Gneiss

Tonalitic–trondhjemitic–granodioritic gneiss is the dominant Archean lithology throughout the southern Saglek Block (Figure 2). Outcrops are medium to coarse grained, grey to pink-grey, and well foliated, displaying characteristic banded to migmatitic textures (Plate 1A). The tonalitic protolith is defined by alternating quartzo-feldspathic and biotite-rich layers, locally containing hornblende ± orthopyroxene-bearing domains and minor garnet. Mafic gneiss and amphibolite occur as centimetre- to decimetre-scale enclaves and discontinuous layers within the felsic gneiss. Minor leucocratic segregations and crosscutting felsic veins (quartz + plagioclase ± K-feldspar) are common, reflecting partial melting under high-grade conditions. Straight granodiorite gneiss contains older disaggregated mafic dykes (possibly Saglek dykes). These rocks may be equivalent to the Uivak I gneiss.

Crosscutting relationships record multiple intrusive and deformational episodes (Plate 1B). Early TTG gneisses are cut by diffuse granodioritic and granitic veins parallel to foliation and by later crosscutting sheets of granite. The gneisses exhibit strong planar fabrics that generally strike north–northeast and dip steeply, consistent with the regional structural grain. Early isoclinal folds are commonly transposed within the gneissosity (Plate 1A), and local extensional shear bands (3–4-cm wide) and narrow mylonitic zones

with biotite–hornblende foliation and quartz ribboning mark localized strain partitioning. Accessory minerals include titanite, magnetite, zircon and apatite. Zircon and monazite ages from equivalent rocks in the Saglek Bay region constrain the timing of high-grade metamorphism and foliation development in the orthogneiss to 2.8–2.7 Ga, with subse-

quent thermal re-equilibration and minor granitic magmatism at 2.6–2.5 Ga (Kusiak *et al.*, 2018; Dunkley *et al.*, 2019). These relationships indicate that the gneisses represent reworked Archean TTG crust formed during early crustal assembly and later modified during granulite-facies metamorphism and anatexis.

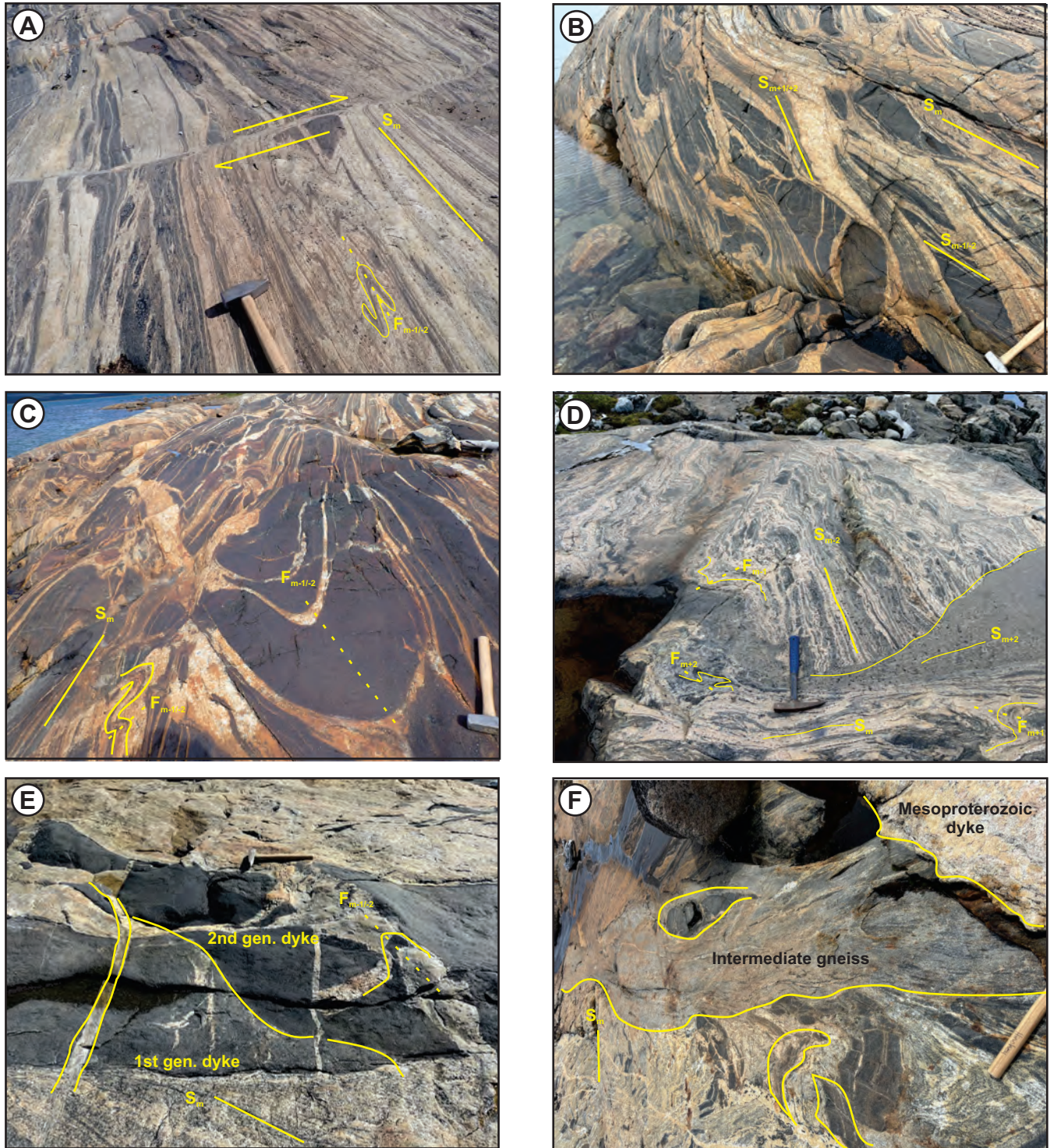


Plate 1. Caption on following page.

### Amphibolite and Mafic Gneiss

Mafic gneiss and amphibolite occur as discontinuous layers, boudins, and enclaves within the TTG gneiss and form a volumetrically minor but regionally significant component of the Archean basement (Plate 1B). The rocks are fine to medium grained, dark greenish-grey to black, and display a strongly developed foliation and stretching lineation parallel to the regional gneissosity. They are composed primarily of hornblende + plagioclase ± biotite ± garnet ± clinopyroxene ± magnetite, with local quartz and feldspar-rich segregations. Textures range from granoblastic to weakly nematoblastic, and in places, hornblende-rich bands and garnetiferous laminae define compositional layering. Coarser grained domains locally preserve relic subophitic or cumulate textures; however, most exposures are fully recrystallized.

Leucocratic segregations and thin felsic veins of quartz and feldspar ± K-feldspar occur both parallel to and cross-cutting foliation, representing zones of partial melting and anatectic segregation during high-grade deformation (Plate 1C). Retrograde alteration to chlorite, epidote and actinolite is locally developed along fractures and shear zones. The mineral assemblages are consistent with upper-amphibolite- to granulite-facies metamorphism, followed by limited hydration.

Regionally, these rocks correspond to the mafic components of the Uivak I orthogneiss and Nulliak amphibolites, both of which were metamorphosed during the Neoproterozoic (2.8–2.7 Ga) high-temperature event and subsequently re-equilibrated during younger 2.6–2.5 Ga thermal overprinting (Kusiak *et al.*, 2018; Dunkley *et al.*, 2019). Mafic layers and injected leucosome veins within the granulite-facies gneiss commonly show isoclinal intrafolial folding ( $D_m$ ) and transposition into the regional foliation ( $S_m/S_{m+1}$ ), consistent with progressive ductile deformation during crustal thickening and lateral flow. Their structural and metamorphic characteristics match those described by Komiya *et al.* (2015) and Sałacińska *et al.* (2018) in the Saglek–Hebron area,

where mafic–ultramafic enclaves within TTG gneiss represent relict accretionary and volcanic sequences incorporated into the Eoarchean crust. These mafic rocks thus record a complex polyphase history of magmatic accretion, granulite-facies metamorphism, and ductile transposition, forming part of the deep-crustal architecture of the southern Saglek Block.

### Supracrustal Enclaves

Supracrustal enclaves occur sporadically interleaved with the TTG gneiss and consist of finely banded, locally garnet-bearing, quartz–biotite semipelitic gneiss, amphibolite, quartzite and minor iron formation (Plate 1D). No units of conclusive Nulliak assemblage were observed, although early mafic metasupracrustal enclaves in Uivak gneiss were observed at one locality. Most of the enclaves are <100-m in width and preserve relic bedding and compositional layering, characterized by millimetre- to centimetre-scale alternations of quartz-rich and biotite-rich laminae. Amphibolitic layers are locally interbedded with calc-silicate pods, thin marble bands, and rare pelitic layers containing garnet, sillimanite, cordierite, spinel and corundum, consistent with descriptions of high-grade metasedimentary Upernavik inclusions within the Archean gneisses of the Nain area (Ryan, 2015). Although thoroughly recrystallized, relic mineral assemblages and rhythmic banding indicate derivation from a mixed metasedimentary to metavolcanic protolith, typical of Upernavik I supracrustal rocks of the northern Saglek Block (Bridgwater *et al.*, 1975; Bridgwater and Collerson, 1976).

The enclaves are typically tight to isoclinally folded, boudinaged and transposed within the gneissic host, reflecting strong ductile strain under upper amphibolite- to granulite-facies conditions. Local migmatization and partial melting along enclave margins are common, producing leucosome–melanosome segregations and diffuse contacts with the surrounding TTG gneiss. These relationships indicate that the supracrustal rocks were incorporated early into the evolving Archean gneiss complex and subsequently reworked during

**Plate 1.** A) Field photograph showing banded, straight TTG gneiss ( $S_m$ ) with isoclinal folding and diffuse leucocratic segregations. The outcrop is cut by discrete east–west-oriented shear zones; B) Straight granodiorite gneiss contains older disaggregated mafic dykes (possible Saglek dykes); C) Mafic layers within the granulite-facies gneiss with isoclinal intrafolial folding ( $D_m$ ) and transposition into the regional foliation ( $S_m/S_{m+1}$ ); D) Semipelitic gneiss, <2.7 Ga displaying isoclinal  $F_{m+1}$  folds refolded by  $F_{m+2}$ , crosscut by a fine-grained, weakly foliated intermediate dyke ( $S_{m+2}$ ); E) Strongly foliated granodiorite gneiss, intruded by two generations of mafic dykes that are both folded and boudinaged. All phases are intruded by fine-grained dykes that intrude each other, cut the foliation, are deformed and boudinaged, and do not have chilled margins; F) Polydeformed orthogneiss with older boudinaged mafic dykes intruded by fine-grained weakly foliated intermediate composition dykes. The intermediate gneiss contains small pods of amphibolite and all phases are intruded by Mesoproterozoic granite dykes with chill margins.

multiple late Meso–Neoproterozoic high-grade deformation events associated with the assembly of the NAC.

### **Younger TTG Gneiss (in Part Maidmonts Gneiss)**

The younger orthogneisses observed form a major component of the Saglek Block and consist of 3.6–3.3 Ga TTG orthogneisses that intrude and partially rework the older Uivak I gneiss complex and are interpreted as equivalents to the Maidmonts augen gneiss (Plate 1E). These plutonic bodies are typically moderately to strongly foliated, with well-developed gneissic banding, quartz ribbons and granoblastic polygonal textures produced during successive high-grade metamorphic events. Mineralogically, they are dominated by quartz + plagioclase ± K-feldspar ± hornblende ± biotite, with local preservation of relict igneous features such as weak porphyritic textures. Maidmonts gneisses are sheets and plutons that truncate fabrics in the older Uivak I gneisses but are themselves overprinted by later Neoproterozoic deformation, including regional gneissic foliation and tight to isoclinal folding.

### **Granitic and Pegmatitic Phases**

Leucocratic granitic and pegmatitic intrusions occur as veins, sills and irregular segregations cutting the tonalitic to granodioritic gneiss. These rocks are coarse to very-coarse grained, pink to white and generally massive to weakly foliated. They consist predominantly of quartz, K-feldspar and plagioclase, with variable biotite, muscovite and garnet, local accessory tourmaline, apatite and rare orthopyroxene. Pegmatitic phases commonly form along foliation-parallel zones and shear planes, whereas irregular pods and sheets cut across the gneissosity. In several localities, fine-grained aplitic margins accompany the pegmatitic cores, suggesting late-stage crystallization from fractionated melts.

These felsic segregations are interpreted as partial-melt derivatives of the surrounding tonalitic gneiss and metasedimentary rocks formed during peak Neoproterozoic metamorphism, consistent with the late leucogranitic and enderbite phases (Aggl-type) described by Ryan (2015) in the Nain area. The presence of thicker, more homogeneous granitic sheets suggests that some bodies may represent late- to post-tectonic intrusions associated with waning high-grade metamorphism or early 2.6–2.5 Ga granitic magmatism (Kusiak *et al.*, 2018; Dunkley *et al.*, 2019).

### **Mafic to Felsic Dykes**

The gneiss complex is transected by a diverse suite of mafic to felsic dykes ranging from medium-grained metadiabase, fine-grained, dark-grey diabase and gabbro to

pale-grey quartz–feldspar porphyry and granitic aplite (Plate 1F). Felsic dykes are quartz- and feldspar-phyric, locally displaying weakly aligned phenocrysts and narrow recrystallized zones along foliation planes, suggesting syn- to post-deformational emplacement of several generations. Contemporaneous, *ca.* 2.55 Ga intrusion of some felsic and metadiabase dykes is noted locally, such that discrete north-northeast trending granite dykes and foliated hornblende ± clinopyroxene ± garnet metadiabases mutually crosscut each other (Connelly and Ryan, 1996). Younger, straight-sided, fine-grained east–west trending mafic dykes are typically unfoliated to weakly foliated, weakly metamorphosed and have chilled margins against the gneiss, and in places retain subophitic textures. Comparable dyke assemblages in the Nain region include gabbro-noritic and dioritic “granulite” dykes and Kaiktusuak-type granitic sheets (Ryan and Martineau, 2012). By analogy, the dykes in the southern Saglek Block likely represent Paleoproterozoic intrusive phases, emplaced after the development of the Neoproterozoic gneissic foliation but locally reactivated during late transcurrent shearing (Connelly and Ryan, 1996; Dunkley *et al.*, 2019). These intrusions record the early stages of crustal reactivation preceding the widespread Mesoproterozoic Nain Plutonic Suite magmatism.

## **STRUCTURAL GEOLOGY**

The southern Saglek Block preserves a long-lived Archean deformation history that began prior to 3.6 Ga and continued episodically until *ca.* 2.5 Ga. The dominant gneissic fabric is the composite product of multiple generations of high-temperature ductile strain imposed on Eo- to Neoproterozoic gneisses and granitoids, as well as the Nulliak–Upernavik supracrustal packages. A steep, penetrative  $S_m$  gneissosity is developed throughout the region, defined by quartz–feldspar ribbons, biotite–hornblende ± orthopyroxene fabrics, leucosome segregations and compositional banding. This fabric transposes earlier layering and records superposition of several generations of folding, from earlier recumbent structures in the Nulliak and Uivak I domains to later recumbent to upright folding involving Upernavik supracrustal rocks and 2.7 Ga granitoids. A shallow to moderately plunging stretching lineation ( $L_m$ ) reflects combined flattening and high-temperature lateral flow. The deformation sequence below focuses on regionally traceable structures and map-scale fabrics that overprint all Archean lithologies. Only a short summary of the earliest locally preserved structures is provided.

### **EOARCHEAN DEFORMATION ( $D_{m-2}$ ; $\geq 3.6$ Ga)**

The earliest structures are preserved only locally in lower strain domains within Uivak I gneiss and Nulliak

supracrustal enclaves. These include variably transposed banding, axial planar foliation and recumbent isoclinal mesoscale folds with shallow axial surfaces and attenuated limbs, interpreted to represent early folding and thrusting during granulite-facies metamorphism (Bridgwater *et al.*, 1975). These structures form the oldest recognizable layering-parallel fabric ( $S_0/S_1$ ), now largely incorporated into younger gneissic foliations. Panels of less strained Uivak I gneiss in Webb Bay, Challenger Cove and west Snyder Bay preserve these folds at the micro scale (Plate 2A, B).

#### DEVELOPMENT OF FOLIATION IN THE UPERNAVIK 1 SUPRACRUSTAL ROCKS ( $D_{m-1}$ ; >2.9 Ga)

A well-developed foliation in Upernavik metasedimentary and metavolcanic assemblages ( $S_2$ ) formed prior to *ca.* 2.9 Ga and is axial planar to tight to isoclinal recumbent folds of primary layering (Schjøtte *et al.*, 1992). These folds also deform the margins and internal layering of adjacent orthogneisses, demonstrating that significant pre-2.9 Ga deformation affected both supracrustal and orthogneiss units. In many areas,  $S_{m-1}$  is now completely transposed into the dominant Neoproterozoic gneissosity, but it can be distinguished near Torr Bay and St. John's Harbour (Plate 2C, D).

#### REGIONAL NEOARCHEAN DEFORMATION ( $D_m$ ; 2.8–2.7 Ga)

The principal deformation phase ( $D_m$ ) produced the dominant steep gneissic foliation ( $S_m$ ) and associated isoclinal to recumbent folds observed throughout the southern Saglek Block. It is herein combined into a single  $D_m$  event, as the scattered nature of dating and observation does not allow consistent differentiation, although distinct *ca.* 2.8 and 2.7 Ga zircon metamorphic rim formation is known. The  $D_m$  event coincided with widespread high-grade metamorphism and partial melting, resulting in: a) strong transposition of earlier Meso–Paleoproterozoic fabrics; b) development of a regional L–S fabric defined by quartz–feldspar ribbons and biotite–hornblende  $\pm$  orthopyroxene alignment; and c) formation of migmatitic leucosomes, granite dykes and melt-enhanced shear fabrics (Plate 2). Crustal- to -mesoscale structures associated with this stage include shallow shear zones and thrusts, recumbent to tight inclined fold trains in Upernavik supracrustal rocks, and straight gneissic zones up to 100s of metres across, due to strong heterogeneous strain.  $D_m$  is interpreted to reflect crustal thickening and lateral flow during Neoproterozoic reworking and is associated with a second major upper-amphibolite to granulite-facies metamorphic event.

#### LATE NEOARCHEAN TRANSCURRENT SHEARING AND UPRIGHT FOLDING ( $D_{m+1}$ ; 2.6–2.5 Ga)

A younger high-temperature deformational phase produced: narrow mylonitic to ultramylonitic shear zones with well-developed C–S fabrics; predominantly sinistral shear indicators, locally overprinted by dextral components; upright, open to tight north-northwest–north south-trending folds, which refold the 2.7 Ga recumbent structures; and produced type-2 fold interference patterns and straightened belts at all scales (Plate 2E, F). Distinctive fine-grained *ca.* 2.5 Ga biotite granites and biotite–garnet granodiorites occur axial planar to these folds, and both crosscut and are deformed by the shear zones. This event corresponds to the deformation of *ca.* 2.55 Ga granites previously noted by Connelly and Ryan (1996) and represents continued high-temperature transcurrent reactivation of the Archean crust.

#### PALEOPROTEROZOIC REACTIVATION ( $D_{m+2}$ )

Torngat Orogen-related deformation and metamorphism occur discontinuously throughout the study area. As noted by Ryan (2015), the Paleoproterozoic dykes display a westward-increasing metamorphic field gradient from greenschist facies along the Kiglapait Mountains to granulite facies adjacent to the Ramah Group and Tasiuyak Assemblage. Discrete structures include east-verging ductile thrusts such as the Handy fault and Pannitok structure; ductile and brittle-ductile, east–west and southeast trending transcurrent faults; and detachments such as that preserving the Mugford Group in its hangingwall. Several regional domains of rotated, northwest-trending  $D_{m+1}$  folds occur in areas of intensive  $D_{m+2}$  faulting as at Pistolet Bay, Okak and Mugford Inlet. At the outcrop scale, related weakly developed, open upright minor folds and local crenulation cleavage locally warping the Archean gneissosity.  $D_{m+2}$  reactivation is interpreted as far-field deformation associated with early stages of the Torngat Orogen. Enigmatic east–west trending brittle faults on the south margin of Saglek block at and south of Webb Bay may reflect Paleoproterozoic reactivation, Mesoproterozoic reworking, or both.

## DISCUSSION

The lithological assemblages of the southeastern Saglek Block are dominated by high-grade TTG gneiss, with mafic gneiss, amphibolite, and supracrustal enclaves, cut by leucogranitic segregations and Paleoproterozoic dykes. Collectively, these rocks record granulite-facies deformation and partial melting at 2.8–2.7 Ga, followed by thermal and

magmatic reworking at 2.6–2.5 Ga, and later Paleoproterozoic intrusive overprinting. Their structural and metamorphic features are consistent with the deep-crustal reworking and crustal assembly of the Nain Province, marking the evolution of the Saglek Block within the western NAC.

The southern Saglek Block records at least four major Archean deformation phases, beginning with early Eoarchean recumbent folding, continuing through <2.9 Ga formation of foliation in Upernavik supracrustals, and culminating in regional 2.8–2.7 Ga gneiss formation followed by 2.6–2.5 Ga transcurrent reactivation. This prolonged his-

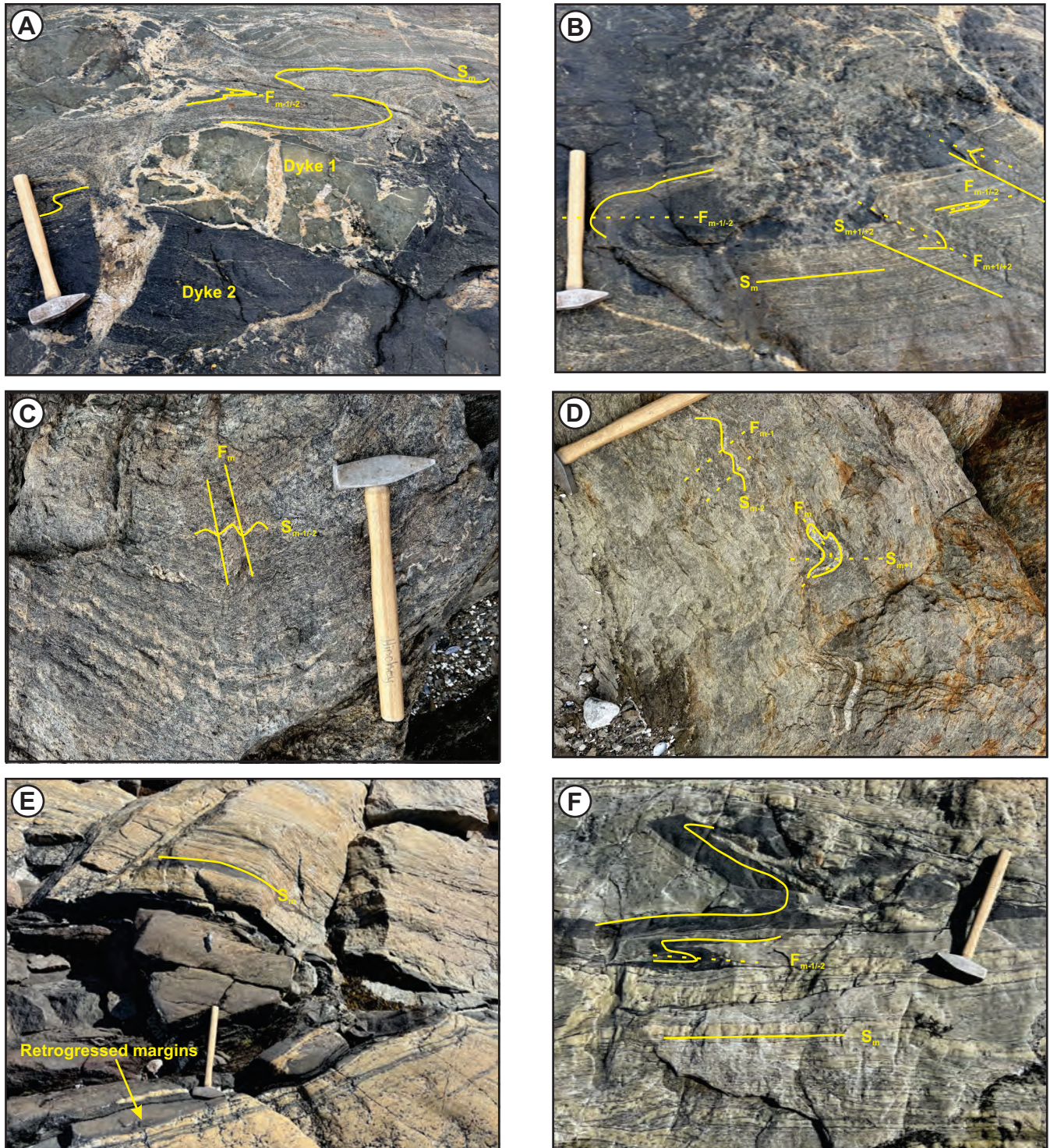


Plate 2. Caption on following page.

tory reflects repeated cycles of crustal thickening, high-temperature flow, and late transcurrent modification, defining the composite structural architecture of the southeastern Saglek Block.

Field and structural relationships demonstrate that the southeastern Saglek Block preserves a polycyclic Archean crustal history. The earliest Eoarchean gneissosity ( $D_{m-2}$ ), preserved locally within TTG gneiss and Nulliak supracrustal enclaves, records deformation older than 3.3 Ga and predates the emplacement of early granitoids (Keluskar *et al.*, 2024). These structures were progressively reworked during the main Neoproterozoic  $D_m$  event (2.8–2.7 Ga), which produced the regionally pervasive steep gneissic foliation ( $S_m$ ) and its associated stretching lineation ( $L_m$ ) under granulite-facies conditions. This event marks a period of crustal thickening, transposition of earlier Paleoproterozoic fabrics, and widespread partial melting within the Nain Province.

A compilation of >2.5 Ga U–Pb zircon and monazite ages combined with Lu–Hf garnet and U–Pb allanite ages from the Saglek region (Figure 4 and Appendix A) further supports this polyphase history. Eoarchean to Paleoproterozoic igneous and metamorphic ages between 3.75 and 3.55 Ga correspond to the earliest  $D_{m-2}$  gneissosity preserved in TTG gneiss and Nulliak enclaves. A younger suite of 2.95–2.85 Ga ages in Upernavik supracrustal rocks is consistent with development of the  $D_{m-1}$  foliation prior to *ca.* 2.9 Ga. The dominant  $D_m$  gneiss-forming event is corroborated by abundant zircon ages between 2.78 and 2.70 Ga, reflecting widespread Neoproterozoic high-grade reworking. Late Neoproterozoic transcurrent shearing ( $D_{m+2}$ ) is accompanied by igneous activity and metamorphism clustering around 2.55–2.50 Ga, whereas sparse 2.40–2.20 Ga data record the limited Paleoproterozoic overprint ( $D_{m+2}$ ); note ages <2.5 Ga are not plotted on Figure 4. These age populations collectively match the structural evolution inferred from field relationships.

Late Neoproterozoic transcurrent reactivation ( $D_{m+1}$ , 2.6–2.5 Ga) overprinted  $S_m$  along narrow mylonitic to ultramy-

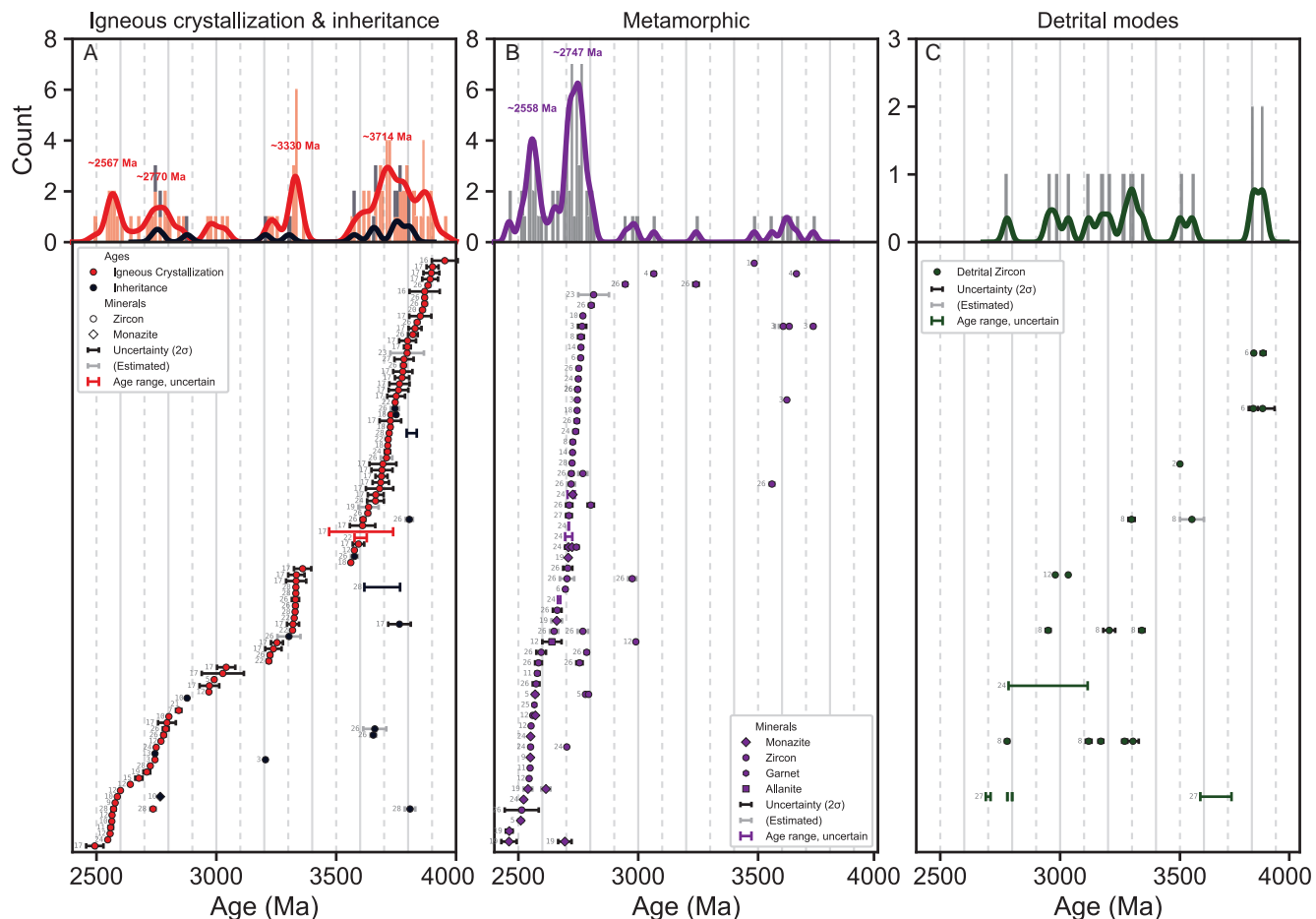
lonitic shear zones. These structures record predominantly sinistral, locally dextral, shear and correspond spatially to east–west trending magnetic lineaments. Their continuity, kinematics and high-temperature character suggest that they represent a long-lived crustal-scale discontinuity separating distinct domains. Importantly, the absence of widespread retrogression of granulite orthogneisses or pervasive Paleoproterozoic tectonometamorphism, except in younger, post  $D_{m+2}$ , fertile Paleoproterozoic mafic dykes, indicates that the southeastern Saglek Block largely retains its Archean structural architecture.

Recognition of east–west-trending high-strain zones contrasts with earlier interpretations of a dominantly north–northeast-trending Saglek–Hopedale margin (Connelly and Ryan, 1996). The field relationships presented here indicate localized deflection and reactivation of older fabrics during late Archean transpression and early Paleoproterozoic deformation. Taken together, these features imply that this region exposes a deep-crustal section of the late-Archean Nain Province, structurally reworked but not fundamentally reorganized during the Paleoproterozoic.

## STRUCTURAL ARCHITECTURE OF THE SAGLEK–HOPEDALE BOUNDARY

The boundary between the Saglek and Hopedale blocks has traditionally been inferred as a north–northeast-trending structure (Connelly and Ryan, 1996; Wasteneys *et al.*, 1996). However, the mapped east–west-oriented high-strain zones, their alignment with regional magnetic anomalies, and their correspondence to major lithological breaks such as the contrasting Webb and Voisey’s Bay gneisses (Figure 2, Rayner, 2022; Ryan, 1996) collectively suggest that the principal structural boundary is east–west, not north–northeast. Supporting evidence extends beyond the shear zones themselves, and includes: a) east–west magnetic lineaments coincide directly with the mapped shear zones, indicating a deep-seated lithospheric discontinuity (Figure 3); b) contrasting crustal ages and compositions north and south of this trend including 3.8–3.3 Ga tonalitic–trondhjemitic crust

**Plate 2.** *Field photographs. A, B) Highly strained orthogneiss showing an older gneissic foliation overprinted by intense ductile deformation. Mafic dykes are boudinaged and folded into tight S-folds, with amphibolite layers showing retrogression. A mylonitic shear zone crosscuts the foliation, and two generations of leucosome are present: an early folded stromatic phase and a later discordant phase. Outcrop dated at  $2711 \pm 12$  Ma (Rayner, 2022); C, D) Paragneiss (Uppernavik assemblage) with interlayered pelitic–psammitic gneiss and 2–10-cm mafic horizons, including mafic pods. Units are ductily sheared, recrystallized, partially melted, and contain folded stromatic leucosome and retrogressed granulite-facies assemblages. Structures include tight folding with crenulation ( $S_{m+1}$ ), type-2 interference, and a south-raking ( $\sim 30^\circ$ ) lineation; E, F) Paul Island. Grey banded orthogneiss cut by foliated pegmatitic granite dykes. The gneiss hosts cm–m-scale amphibolite boudins with retrogressed rims and interfolial S-folds, all truncated by a later mylonitic shear zone. Two generations of leucosome are present: an early folded stromatic phase and a younger crosscutting melt. A sample of tonalitic orthogneiss yielded a U–Pb TIMS age of  $3043 \pm 12$  Ma (Rayner, 2022).*



**Figure 4.** Three-panel summary of U–Pb geochronology for the Saglek Block, integrating igneous crystallization, inherited components, metamorphic recrystallization, and detrital ages. A) Igneous crystallization and inheritance ages include abundant Eoarchean and Paleoproterozoic xenocrystic populations (3.75–3.55 Ga) and Neoproterozoic igneous zircon peaks (2.78–2.70 Ga) corresponding to the main  $D_m$  gneiss-forming event; B) Metamorphic ages record high-grade events at 3.75–3.60 Ga ( $D_{m-2}$ ), 2.95–2.85 Ga ( $D_{m-1}$ ) and 2.55–2.50 Ga ( $D_{m+1}$ ); C) Detrital zircon ages reflect maximum depositional ages for supracrustal units and include both Eoarchean and Paleoproterozoic components. KDE curves, histograms and individual ages with analytical uncertainties highlight the major Archean tectonothermal events preserved in the Saglek Block. Detailed compilation is in Appendix A. Corresponding references are in Appendix B. The figure and Appendix A are matched to full citations in Appendix B.

north of the boundary and 3.2–2.8 Ga granitoids and gneisses to the south, and importantly, west of the original inferred Saglek–Hopedale boundary; c) young 2.7–2.5 Ga supracrustal and granitic suites preserved on both blocks with partitioning of Neoproterozoic fabrics:  $S_m$  is continuous across the region and both blocks but shows geometrical modulation near the east–west shear system, consistent with Neoproterozoic transcurrent overprinting; and d) reactivation during the Paleoproterozoic, including pluton and dyke emplacement and localized retrogression, adjacent and about these east–west zones. Together, these observations support the interpretation that the boundary between the Saglek and Hopedale blocks represents a long-lived Mesoproterozoic crustal break, later reactivated during the

Neoproterozoic and Paleoproterozoic. Such a structure was also recognized to the west in the Southeastern Churchill Province and the Superior Craton (Godet and Lafrance, 2025). This new interpretation is consistent with an accretionary model in which ancient TTG crust of the Saglek Block was juxtaposed against younger Paleoproterozoic terranes of the Hopedale Block during early assembly of the Labrador segment of the NAC.

#### EVIDENCE FOR REACTIVATION AND OVERPRINTING

High-temperature ductile deformation in the boundary region – recorded by quartz–feldspar augen, ribbon quartz,

and migmatitic segregation – indicates activity during Neoproterozoic transpression. Paleo to Mesoproterozoic reactivation is recorded by localized mylonitic zones, minor retrogression of granulite-facies assemblages, and the emplacement of mafic to felsic dykes associated with the Nain Plutonic Suite. These features collectively demonstrate that the east–west structural corridor acted as a long-lived anisotropic weakness repeatedly reactivated during multiple tectonothermal cycles. Both sinistral and dextral shear indicators occur within the same structural corridors. Repetition of high-temperature fabrics, visible on regional aeromagnetic surveys, followed by localized retrogression supports a model of episodic reactivation of an inherited Archean crustal-scale discontinuity (Figure 3).

## CONCLUSIONS

The northern Saglek and southern Hopedale blocks in Labrador form part of the Nain Province within the western NAC and preserve a long-lived record of Archean crustal formation, high-grade metamorphism, and Paleoproterozoic reworking. Field observations from NTS map areas 14F/04, 03, 14C/12, 11, 05 and 06 show that the Saglek Block is dominated by TTG gneiss with enclaves of amphibolite and supracrustal rocks, intruded by late granitic and pegmatitic sheets and cut by Archean to Paleoproterozoic dykes. These units are later intruded by the Mesoproterozoic Nain Plutonic Suite.

Structural relationships record five Archean deformation events. An earliest Eoarchean phase ( $D_{m-2}$ ,  $\geq 3.6$ – $3.3$  Ga) is preserved locally as gneissosity and recumbent to isoclinal folds in TTG gneiss and Nulliak supracrustal rocks. A younger Paleoproterozoic foliation ( $D_{m-1}$ ,  $< 2.9$  Ga) is developed in Upernavik supracrustal rocks and partially transposed older fabrics. The main Neoproterozoic event ( $D_m$ ,  $2.8$ – $2.7$  Ga) produced the steep, north–northeast-striking gneissic foliation ( $S_m$ ), widespread transposition, and high-temperature ductile flow. Late Neoproterozoic transcurrent shearing ( $D_{m+1}$ ,  $2.6$ – $2.5$  Ga) generated mylonitic zones and upright north–north–northwest folds that refold  $2.7$  Ga structures. A final Paleoproterozoic phase ( $D_{m+2}$ ) produced gentle upright open folding.

The dominant structural grain trends north-northeast, whereas subordinate east–east–southeast striking shear zones align with prominent magnetic lineaments. These east–west systems are interpreted as the principal tectonic boundary between the Saglek and Hopedale blocks, representing a long-lived lithospheric discontinuity repeatedly reactivated from the Paleoproterozoic to Paleoproterozoic. Collectively, these relationships define a polyphase deformation history and refine the geometry of the southern margin of the Saglek Block within the Nain Province.

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## REFERENCES

- Baadsgaard, H., Collerson, K.D. and Bridgwater, D.  
1979: The Archean gneiss complex of northern Labrador. 1. Preliminary U–Th–Pb geochronology. *Canadian Journal of Earth Sciences*, Volume 16, pages 951–961. <https://doi.org/10.1139/e79-081>
- Bertrand, J.M., Roddick, J.C.C., Van Kranendonk, M.J. and Ermanovics, I.  
1993: U–Pb geochronology of deformation and metamorphism across a central transect of the early Proterozoic Torngat Orogen, North River map area, Labrador. *Canadian Journal of Earth Sciences*, Volume 30, pages 1470–1489. <https://doi.org/10.1139/e93-127>
- Bridgwater, D. and Collerson, K.D.  
1976: The major petrological and geochemical characters of the 3,600 m.y. Uivak gneisses from Labrador. *Contributions to Mineralogy and Petrology*, Volume 54, pages 43–59. <https://doi.org/10.1007/BF00370871>
- Bridgwater, D., Collerson, K.D., Hurst, R.W. and Jesseau, C.W.  
1975: Field characters of the early Precambrian rocks from Saglek, coast of Labrador. *In* Report of Activities, Part A, April to October 1974, Geological Survey of Canada, Paper 75-1A, pages 287–296.
- Bridgwater, D. and Schiøtte, L.  
1991: The Archaean gneiss complex of northern Labrador: A review of current results, ideas and prob-

- lems. Bulletin of the Geological Society of Denmark, Volume 39, pages 153-166. <https://doi.org/10.37570/bgds-1991-39-06>
- Bridgwater, D., Watson, J. and Windley, B.F.  
1973: The Archean Craton of the North Atlantic Region. Philosophical Transactions of the Royal Society of London. Series A, Mathematical and Physical Sciences, Volume 273, pages 493-512. Available from <http://www.jstor.org.qe2a-proxy.mun.ca/stable/74162> [accessed 2025/10/16/]
- Charette, B., Godet, A., Guilmette, C., Davis, D.W., Vervoort, J., Kendall, B., Lafrance, I., Bandyayera, D. and Yakymchuk, C.  
2021: Long-lived anatexis in the exhumed middle crust of the Torngat Orogen: Constraints from phase equilibria modeling and garnet, zircon, and monazite geochronology. *Lithos*, Volumes 388-389. <https://doi.org/10.1016/j.lithos.2021.106022>
- Collerson, K.D.  
1983: The Archean gneiss complex of northern Labrador. 2. Mineral ages, secondary isochrons, and diffusion of strontium during polymetamorphism of the Uivak gneisses. *Canadian Journal of Earth Sciences*, Volume 20, pages 707-718. <https://doi.org/10.1139/e83-064>
- Collerson, K.D. and Bridgwater, D.  
1979: Metamorphic development of early Archean tonalitic and trondhjemitic gneisses: Saglek area, Labrador. *In* *Trondhjemitic, Dacites and Related Rocks*. Edited by F. Barker. Elsevier Publishing, pages 205-273.
- Collerson, K.D., Kerr, A., Vocke, R.D. and Hanson, G.N.  
1982: Reworking of sialic crust as represented in late Archean-age gneisses, northern Labrador. *Geology*, Volume 10(4), pages 202-208. [https://doi.org/10.1130/0091-7613\(1982\)10<202:ROSCAR>2.0.CO;2](https://doi.org/10.1130/0091-7613(1982)10<202:ROSCAR>2.0.CO;2)
- Connelly, J.N. and Ryan, A.B.  
1999: Age and tectonic implications of Paleoproterozoic granitoid intrusions within the Nain Province near Nain, Labrador. *Canadian Journal of Earth Sciences*, Volume 36, pages 833-853. <https://doi.org/10.1139/e99-002>
- Corrigan, D., Wodicka, N., McFarlane, C., Lafrance, I., Van Rooyen, D., Bandyayera, D. and Bilodeau, C.  
2018: Lithotectonic framework of the Core Zone, Southeastern Churchill Province, Canada. *Geoscience Canada*, Volume 45, pages 1-24. <https://doi.org/10.12789/geocanj.2018.45.128>
- Dunkley, D.J., Kusiak, M.A., Wilde, S.A., Whitehouse, M.J., Sałacińska, A., Kielman, R. and Konecňý, P.  
2019: Two neoproterozoic tectonothermal events on the western edge of the North Atlantic Craton, as revealed by SIMS dating of the Saglek Block, Nain Province, Labrador. *Journal of the Geological Society*, Volume 177, pages 31-49. <https://doi.org/10.1144/jgs2018-153>
- Godet, A. and Lafrance, I.  
2025: Archean inheritance in Paleoproterozoic orogens: Example of the Southeastern Churchill Province, Trans-Hudson Orogen, Canada. *Earth-Science Reviews*, Volume 262. <https://doi.org/10.1016/j.earscirev.2025.105060>
- Godet, A., Guilmette, C., Labrousse, L., Smit, M.A., Cutts, J.A., Davis, D.W. and Vanier, M.A.  
2021: Lu–Hf garnet dating and the timing of collisions: Palaeoproterozoic accretionary tectonics revealed in the Southeastern Churchill Province, Trans-Hudson Orogen, Canada. *Journal of Metamorphic Geology*, Volume 39, pages 977-1007. <https://doi.org/10.1111/jmg.12599>
- Hinchey, A.M.  
2021: Lithogeochemical and Nd isotopic constraints on felsic magmatism in the Makkovik Orogen, Labrador, Canada: Implications for assembly of the supercontinent Nuna. *Lithos*, Volume 382-383, Article 105917. <https://doi.org/10.1016/j.lithos.2020.105917>
- Hinchey, A.M., Butler, J.P., Diekrup, D., Scorsolini, L.G., Adam, Z.V., Godet, A., van Nostrand, T., Sandeman, H.A.I., Mendoza Marin, D. and Yip, I.C.Y.  
*This volume*: Tectonic provinces of Labrador: A modern lithodemic and tectonic synthesis.
- Hinchey, A.M., Rayner, N. and Davis, W.J.  
2020: Episodic Paleoproterozoic crustal growth preserved in the Aillik Domain, Makkovik Province, Labrador. *Precambrian Research*, Volume 337, Article 105526. <https://doi.org/10.1016/j.precamres.2019.105526>
- Hinchey, A.M., Rayner, N., Diekrup, D., Sandeman, H.A.I. and Mendoza Marin, D.  
2024: New U–Pb Shrimp age constraints on the geodynamic evolution of the Hopedale Block, Labrador: Implications for the assembly of the North Atlantic Craton. *In* *Current Research*. Government of Newfoundland and Labrador, Department of Industry,

- Energy and Technology, Geological Survey, Report 24-1, pages 1-26.  
<https://doi.org/10.13140/RG.2.2.12333.50405>
- Hinchey, A.M., Rayner, N., Sandeman, H.A.I., Butler, J.P., Diekrup, D. and Mendoza Marin, D.  
 2025: Paleoproterozoic volcanism and rift basin evolution during Nuna assembly: Evidence from the Ingrid group, Labrador, Canada. *Precambrian Research*, Volume 427.  
<https://doi.org/10.1016/j.precamres.2025.107881>
- Hurst, R.W.  
 1974: The Early Archean of coastal Labrador. *In* The Nain Anorthosite Project, Labrador: Field Reports. Department of Geology, University of Massachusetts, Contribution No. 13, pages 29-32
- Keluskar, T., Kusiak, M.A., Dunkley, D.J., Wilde, S.A., Whitehouse, M.J., Yi, K. and Lee, S.  
 2024: The significance of Paleoproterozoic granitoids from the Saglek Block, Labrador, Canada. *Precambrian Research*, Volume 410.  
<https://doi.org/10.1016/j.precamres.2024.107504>
- Komiya, T., Yamamoto, S., Aoki, S., Sawaki, Y., Ishikawa, A., Tashiro, T., Koshida, K., Shimojo, M., Aoki, K. and Collerson, K.D.  
 2015: Geology of the Eoarchean, >3.95 Ga, Nulliak supracrustal rocks in the Saglek Block, northern Labrador, Canada: The oldest geological evidence for plate tectonics. *Tectonophysics*, Volume 662, pages 40-66. <https://doi.org/10.1016/j.tecto.2015.05.003>
- Kusiak, M.A., Dunkley, D.J., Whitehouse, M.J., Wilde, S.A., Sałacińska, A., Konečný, P., Szopa, K., Gawęda, A. and Chew, D.  
 2018: Peak to post-peak thermal history of the Saglek Block of Labrador: A multiphase and multi-instrumental approach to geochronology. *Chemical Geology*, Volume 484, pages 210-223.  
<https://doi.org/10.1016/j.chemgeo.2017.10.033>
- Nutman, A.P., Bennett, V.C., Friend, C.R.L., Hidaka, H., Yi, K., Lee, S.R. and Kamiichi, T.  
 2014: The Itsaq gneiss complex of Greenland: Episodic 3900 to 3660 Ma juvenile crust formation and recycling in the 3660 to 3600 Ma Isukasian orogeny. *American Journal of Science*, Volume 313.  
<https://doi.org/10.2475/09.2013.03>
- Rayner, N.M.  
 2022: Report on U–Pb geochronology from the 2017–2020 GEM-2 activity “Saglek Block, Labrador: Geological evolution and mineral potential”. Geological Survey of Canada, Open File 8901, 15 pages.
- Ryan, A.B.  
 1996: Commentary on the location of the Nain–Churchill boundary in the Nain area. *In* Current Research. Government of Newfoundland and Labrador, Department of Natural Resources, Geological Survey, Report 96-1, pages 109-129.
- 2015: Geological map of the Nain area (NTS 14C/12), a colourized and revised version of Map 2001-10. Government of Newfoundland and Labrador, Department of Natural Resources, Geological Survey, Open File 14C/12/0154.
- Ryan, A.B. and Martineau, Y.  
 2012: Revised and coloured edition of 1992 map showing the Geology of the Saglek Fiord–Hebron Fiord area, Labrador (NTS 14L/2, 3, 6, 7). Map 2012-15. Scale: 1:100 000. Government of Newfoundland and Labrador, Department of Natural Resources, Geological Survey, Open File 14L/0091.
- Sałacińska, A., Kusiak, M.A., Whitehouse, M.J., Dunkley, D.J., Wilde, S.A. and Kielman, R.  
 2018: Complexity of the early Archean Uivak Gneiss: Insights from Tigigakyuk Inlet, Saglek Block, Labrador, Canada and possible correlations with south West Greenland. *Precambrian Research*, Volume 315, pages 103-119.  
<https://doi.org/10.1016/j.precamres.2018.07.011>
- Sałacińska, A., Kusiak, M.A., Whitehouse, M.J., Dunkley, D.J., Wilde, S.A., Kielman, R. and Król, P.  
 2019: Gneiss-forming events in the Saglek Block, Labrador; a reappraisal of the Uivak gneiss. *International Journal of Earth Sciences*, Volume 108, pages 753-778.  
<https://doi.org/10.1007/s00531-019-01677-y>
- Schiøtte, L. and Bridgwater, D.  
 1990: Multi stage Late Archaean granulite facies metamorphism in northern Labrador, Canada. *In* *Granulites and Crustal Evolution*. Edited by D. Vielzeuf and P. Vidal. Springer Netherlands, Dordrecht. pages 157-169.
- Schiøtte, L., Compston, W. and Bridgwater, D.  
 1989a: U–Th–Pb ages of single zircons in Archaean supracrustals from Nain Province, Labrador, Canada. *Canadian Journal of Earth Sciences*, Volume 26, pages 2636-2644. <https://doi.org/10.1139/e89-224>

- 1989b: Ion probe U–Th–Pb zircon dating of polymetamorphic orthogneisses from northern Labrador, Canada. *Canadian Journal of Earth Sciences*, Volume 26, pages 1533-1556. <https://doi.org/10.1139/e89-131>
- Schiøtte, L., Nutman, A.P. and Bridgwater, D.  
1992: U–Pb ages of single zircons within "Upernavik" metasedimentary rocks and regional implications for the tectonic evolution of the Archaean Nain Province, Labrador. *Canadian Journal of Earth Sciences*, Volume 29, pages 260-276. <https://doi.org/10.1139/e92-024>
- Scott, D.J.  
1998: An overview of the U–Pb geochronology of the Paleoproterozoic Torngat Orogen, northeastern Canada. *Precambrian Research*, Volume 91, pages 91-107. [https://doi.org/10.1016/S0301-9268\(98\)00040-0](https://doi.org/10.1016/S0301-9268(98)00040-0)
- Van Kranendonk, M.J. and Helmstaedt, H.  
1990: Late Archean geologic history of the Nain Province, North River–Nutak map area, Labrador, and its tectonic significance. *Geoscience Canada*, Volume 17, pages 231-237.
- Vezinet, A., Thomassot, E., Pearson, D.G., Stern, R.A., Luo, Y. and Sarkar, C.  
2019: Extreme  $\delta^{18}\text{O}$  signatures in zircon from the Saglek Block (North Atlantic Craton) document reworking of mature supracrustal rocks as early as 3.5 Ga. *Geology*, Volume 47, pages 605-608. <https://doi.org/10.1130/G46086.1>
- Wardle, R.J., James, D.T., Scott, D.J. and Hall, J.  
2002: The southeastern Churchill Province: Synthesis of a Paleoproterozoic transpressional orogen. *Canadian Journal of Earth Sciences*, Volume 39, pages 639-663. <https://doi.org/10.1139/e02-004>
- Wasilewski, B., O'Neil, J. and Rizo, H.  
2019: Geochemistry and petrogenesis of the early Archean mafic crust from the Saglek–Hebron Complex (northern Labrador). *Precambrian Research*, Volume 328, pages 321-343. <https://doi.org/10.1016/j.precamres.2019.04.001>
- 2022: Archean crustal evolution of the Saglek–Hebron Complex, northern Labrador, revealed from coupled  $^{147-146}\text{Sm}$ – $^{143-142}\text{Nd}$  systematics. *Earth and Planetary Science Letters*, Volume 594. <https://doi.org/10.1016/j.epsl.2022.117735>
- Wasilewski, B., O'Neil, J., Rizo, H., Paquette, J.L. and Gannoun, A.M.  
2021: Over one billion years of Archean crust evolution revealed by zircon U–Pb and Hf isotopes from the Saglek–Hebron complex. *Precambrian Research*, Volume 359, Article 106092. <https://doi.org/10.1016/j.precamres.2021.106092>
- Wasteneys, H.A., Wardle, R.J. and Krogh, T.E.  
1996: Extrapolation of tectonic boundaries across the Labrador shelf: U–Pb geochronology of well samples. *Canadian Journal of Earth Sciences*, Volume 33, pages 1308-1324. <https://doi.org/10.1139/e96-099>
- Wendt, J. and Collerson, K.D.  
1999: Early Archæan U/Pb fractionation and timing of late Archæan high-grade metamorphism in the Saglek–Hebron segment of the North Atlantic Craton. *Precambrian Research*, Volume 93, pages 281-297. [https://doi.org/10.1016/S0301-9268\(98\)00093-X](https://doi.org/10.1016/S0301-9268(98)00093-X)
- Whitehouse, M.J., Dunkley, D.J., Kusiak, M.A. and Wilde, S.A.  
2019: On the true antiquity of Eoarchean chemofossils – assessing the claim for Earth's oldest biogenic graphite in the Saglek Block of Labrador. *Precambrian Research*, Volume 323, pages 70-81. <https://doi.org/10.1016/j.precamres.2019.01.001>

## APPENDIX B

Citations Figure 4.

- 1: Hurst, 1974
- 2: Baadsgaard *et al.*, 1979
- 3: Collerson *et al.*, 1985
- 4: Schiøtte *et al.*, 1989a
- 5: Schiøtte *et al.*, 1989b
- 6: Schiøtte *et al.*, 1990
- 7: Nutman and Collerson, 1991
- 8: Ryan, 1991
- 9: Schiøtte *et al.*, 1992
- 10: Connelly and Ryan, 1993
- 11: Scott, 1995
- 12: Connelly and Ryan, 1996
- 13: Wasteneys *et al.*, 1996
- 14: Ermanovics and van Kranendonk, 1997
- 15: Hamilton *et al.*, 1998
- 16: Connelly, 2001
- 17: Ryan *et al.*, 2003
- 18: Shimojo *et al.*, 2016
- 19: Komiya *et al.*, 2017
- 20: Sałacińska *et al.*, 2018
- 21: Kusiak *et al.*, 2018
- 22: Vezinet *et al.*, 2018
- 23: Ryan and James, 2018
- 24: Sałacińska *et al.*, 2019
- 25: Vezinet *et al.*, 2019
- 26: Dunkley *et al.*, 2020
- 27: Godet *et al.*, 2021
- 28: Wasilewski *et al.*, 2021
- 29: Rayner, 2022
- 30: Keluskar *et al.*, 2024

## REFERENCES

- Baadsgaard, H., Collerson, K.D. and Bridgwater, D.  
1979: The Archean gneiss complex of northern Labrador. 1. Preliminary U–Th–Pb geochronology. *Canadian Journal of Earth Sciences*, Volume 16, pages 951-961. <https://doi.org/10.1139/e79-081>
- Collerson, K.D., Williams, I.S. and Compston, W.  
1985: Archean crustal evolution of northern Labrador: Influences from ion microprobe studies of zircons in metasedimentary units. *In Geological Association of Canada–Mineralogical Association of Canada, Annual Meeting, Program with Abstracts, Volume 10, page A11.*
- Connelly, J.N.  
2001: Constraining the Timing of Metamorphism: U–Pb and Sm–Nd Ages from a Transect across the Northern Torngat Orogen, Labrador, Canada. *The Journal of Geology*, Volume 109(1), pages 57-77. <https://doi.org/10.1086/317965>
- Connelly, J.N. and Ryan, A.B.  
1993: U–Pb constraints on the thermotectonic history of the Nain area. *In Eastern Canadian Shield Onshore-Offshore Transect (ECSOOT): Report of Transect Meeting. Edited by R.J. Wardle and J. Hall. Lithoprobe Secretariat, University of British Columbia, Report No. 32, pages 233-233.*  
  
1996: Late Archean evolution of the Nain Province, Nain, Labrador: Imprint of a collision. *Canadian Journal of Earth Sciences*, Volume 33, pages 1325-1342. <https://doi.org/10.1139/e96-100>
- Dunkley, D.J., Kusiak, M.A., Wilde, S.A., Whitehouse, M.J., Sałacińska, A., Kielman, R. and Konečný, P.  
2020: Two Neoproterozoic tectonothermal events on the western edge of the North Atlantic Craton, as revealed by SIMS dating of the Saglek Block, Nain Province, Labrador. *Journal of the Geological Society*, Volume 177(1), pages 31-49. <https://doi.org/10.1144/jgs2018-153>
- Ermanovics, I. and Van Kranendonk, M.  
1997: Geology of the Archean Nain Province and Paleoproterozoic Torngat Orogen in a transect of the North River–Nutak map areas, Newfoundland (Labrador) and Québec. *Geological Survey of Canada, Bulletin No. 497.*
- Godet, A., Guilmette, C., Labrousse, L., Smit, M.A., Cutts, J.A., Davis, D.W. and Vanier, M.  
2021: Lu–Hf garnet dating and the timing of collisions: Palaeoproterozoic accretionary tectonics revealed in the Southeastern Churchill Province, Trans-Hudson Orogen, Canada. *Journal of Metamorphic Geology*, Volume 39(8), pages 977-1007. <https://doi.org/10.1111/jmg.12599>
- Hamilton, M.A., Ryan, A.B., Emslie, R.F. and Ermanovics, I.F.  
1998: Identification of Paleoproterozoic anorthositic and monzonitic rocks in the vicinity of the Mesoproterozoic Nain Plutonic Suite, Labrador: U–Pb evidence. *In Radiogenic Age and Isotopic Studies:*

- Current Research 1998. Geological Survey of Canada, Report 11, pages 23-40.
- Hurst, R.W.  
1974: The Early Archean of coastal Labrador. *In* The Nain Anorthosite Project, Labrador: Field Reports. Department of Geology, University of Massachusetts, Contribution No. 13, pages 29-32.
- Keluskar, T., Kusiak, M.A., Dunkley, D.J., Wilde, S.A., Whitehouse, M.J., Yi, K. and Lee, S.  
2024: The significance of Paleoproterozoic granitoids from the Saglek Block, Labrador, Canada. *Precambrian Research*, Volume 410.  
<https://doi.org/10.1016/j.precamres.2024.107504>
- Komiya, T., Yamamoto, S., Aoki, S., Koshida, K., Shimojo, M., Sawaki, Y., Aoki, K., Sakata, S., Yokoyama, T. D., Maki, K., Ishikawa, A., Hirata, T. and Collerson, K.D.  
2017: A prolonged granitoid formation in Saglek Block, Labrador: Zonal growth and crustal reworking of continental crust in the Eoarchean. *Geoscience Frontiers*, Volume 8(2), pages 355-385.  
<https://doi.org/10.1016/j.gsf.2016.06.013>
- Kusiak, M.A., Dunkley, D.J., Whitehouse, M.J., Wilde, S.A., Sałacińska, A., Konečný, P., Szopa, K., Gawęda, A. and Chew, D.  
2018: Peak to post-peak thermal history of the Saglek Block of Labrador: A multiphase and multi-instrumental approach to geochronology. *Chemical Geology*, Volume 484, pages 210-223.  
<https://doi.org/10.1016/j.chemgeo.2017.10.033>
- Nutman, A.P. and Collerson, K.D.  
1991: Very early Archean crustal-accretion complexes preserved in the North Atlantic craton. *Geology*, Volume 19(8), pages 791-794.  
[https://doi.org/10.1130/0091-7613\(1991\)019](https://doi.org/10.1130/0091-7613(1991)019)
- Rayner, N.M.  
2022: Report on U–Pb geochronology from the 2017-2020 GEM-2 activity “Saglek Block, Labrador: Geological evolution and mineral potential”. Geological Survey of Canada, Open File 8901, 15 pages.
- Ryan, A.B.  
1991: On recent geochronological studies in the Nain Province, Churchill Province and the Nain Plutonic Suite, north-central Labrador. *In* Current Research. Government of Newfoundland and Labrador, Department of Mines and Energy, Geological Survey Branch, Report 91-1, pages 231-255.
- Ryan, B. and James, D.  
2018: Geological map of the Tikkoatokak Bay area, NTS sheet 14D/09. Map 2018-03. Government of Newfoundland and Labrador, Department of Natural Resources, Geological Survey, Open File 014D/09/0339.
- Ryan, B., Lee, D. and Dunphy, D.  
2003: Geology of the Long Pond map sheet (NTS 14D/3). Government of Newfoundland and Labrador, Department of Mines and Energy, Geological Survey, Map 2003-07.
- Sałacińska, A., Kusiak, M.A., Whitehouse, M.J., Dunkley, D.J., Wilde, S.A. and Kielman, R.  
2018: Complexity of the early Archean Uivak Gneiss: Insights from Tigigakyuk Inlet, Saglek Block, Labrador, Canada and possible correlations with south West Greenland. *Precambrian Research*, Volume 315, pages 103-119.  
<https://doi.org/10.1016/j.precamres.2018.07.011>
- Sałacińska, A., Kusiak, M.A., Whitehouse, M.J., Dunkley, D.J., Wilde, S.A., Kielman, R. and Król, P.  
2019: Gneiss-forming events in the Saglek Block, Labrador; a reappraisal of the Uivak gneiss. *International Journal of Earth Sciences*, Volume 108, pages 753-778.  
<https://doi.org/10.1007/s00531-019-01677-y>
- Schiøtte, L., Compston, W. and Bridgwater, D.  
1989a: U–Th–Pb ages of single zircons in Archaean supracrustals from Nain Province, Labrador, Canada. *Canadian Journal of Earth Sciences*, Volume 26, pages 2636-2644. <https://doi.org/10.1139/e89-224>
- 1989b: Ion probe U–Th–Pb zircon dating of polymetamorphic orthogneisses from northern Labrador, Canada. *Canadian Journal of Earth Sciences*, Volume 26, pages 1533-1556. <https://doi.org/10.1139/e89-131>
- Schiøtte, L., Noble, S. and Bridgwater, D.  
1990: U–Pb mineral ages from northern Labrador: Possible evidence for interlayering of Early and Middle Archean tectonic slices. *Geoscience Canada*, Volume 17(4), pages 227-231.
- Schiøtte, L., Nutman, A.P. and Bridgwater, D.  
1992: U–Pb ages of single zircons within “Upernavik” metasedimentary rocks and regional implications for the tectonic evolution of the Archaean Nain Province, Labrador. *Canadian Journal of Earth Sciences*, Volume 29, pages 260-276. <https://doi.org/10.1139/e92-024>

- Scott, D.J.  
1995: U–Pb geochronology of the Nain craton on the eastern margin of the Torngat Orogen, Labrador. *Canadian Journal of Earth Sciences*, Volume 32(11), pages 1859-1869. <https://doi.org/10.1139/e95-143>
- Shimojo, M., Yamamoto, S., Sakata, S., Yokoyama, T.D., Maki, K., Sawaki, Y., Ishikawa, A., Aoki, K., Aoki, S., Koshida, K., Tashiro, T., Hirata, T., Collerson, K.D. and Komiya, T.  
2016: Occurrence and geochronology of the Eoarchean, ~3.9 Ga, Iqaluk Gneiss in the Saglek Block, northern Labrador, Canada: Evidence for the oldest supracrustal rocks in the world. *Precambrian Research*, Volume 278, pages 218-243.  
<https://doi.org/10.1016/j.precamres.2016.03.018>
- Vežinet, A., Pearson, D., Thomassot, E., Stern, R., Sarkar, C., Luo, Y. and Fisher, C.  
2018: Hydrothermally-altered mafic crust as source for early Earth TTG: Pb/Hf/O isotope and trace element evidence in zircon from TTG of the Eoarchean Saglek Block, N. Labrador. *Earth and Planetary Science Letters*, Volume 503, pages 95-107.  
<https://doi.org/10.1016/j.epsl.2018.09.015>
- Vežinet, A., Thomassot, E., Pearson, D.G., Stern, R.A., Luo, Y. and Sarkar, C.  
2019: Extreme  $\delta^{18}\text{O}$  signatures in zircon from the Saglek Block (North Atlantic Craton) document reworking of mature supracrustal rocks as early as 3.5 Ga. *Geology*, Volume 47, pages 605-608.  
<https://doi.org/10.1130/G46086.1>
- Wasilewski, B., O'Neil, J., Rizo, H., Paquette, J.L. and Gannoun, A.M.  
2021: Over one billion years of Archean crust evolution revealed by zircon U–Pb and Hf isotopes from the Saglek–Hebron complex. *Precambrian Research*, Volume 359, Article 106092.  
<https://doi.org/10.1016/j.precamres.2021.106092>
- Wasteneys, H.A., Wardle, R.J. and Krogh, T.E.  
1996: Extrapolation of tectonic boundaries across the Labrador shelf: U–Pb geochronology of well samples. *Canadian Journal of Earth Sciences*, Volume 33(9), pages 1308-1324. <https://doi.org/10.1139/e96-099>

