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Contrasting crustal domains in the Committee Bay belt, Walker Lake–Arrowsmith River area, central Nunavut

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Abstract: Three crustal domains dominate the central Committee Bay belt. The central domain comprises northeast-striking, tightly folded amphibolite-facies supracrustal belts, cored by younger plutons, broadly folded into shallowly plunging structures. The supracrustal rocks include in approximate stratigraphic order: basalt, porphyritic felsic rocks, komatiite, psammite, iron-formation, quartzite, intermediate volcaniclastic rocks, and pelite interlayered with komatiite. To the southwest, potentially correlative basalt is interbedded with ca. 2.73 Ga felsic tuff, and 2.72 Ga tonalite cuts komatiite. Plutonic rocks include foliated biotite- and hornblende-tonalite, younger biotite- and K-feldspar-granodiorite, and late biotite monzogranite. The southeastern domain includes a large, northeast-striking, foliated, K-feldspar-magnetite granodiorite batholith, intrusive into the central domain, and affected by an east-striking, dextral shear zone cut by massive granite. The northern domain comprises low-pressure, upper amphibolite- to lower granulite-facies metasedimentary and plutonic rocks separated from the central domain by several, 1–2 km wide, shallowly dipping, high-strain zones with southward-directed extensional displacement.

Résumé : Trois domaines crustaux constituent l'essentiel de la partie centrale de la ceinture de Committee Bay. Le domaine central se compose de roches supracrustales du faciès des amphibolites déformées par des plis serrés. Ces roches sont organisées en bandes de direction nord-est qui ceinturent des plutons plus récents et dessinent des structures plissées à grande longueur d'onde aux axes faiblement inclinés. En ordre stratigraphique approximatif, les roches supracrustales comprennent des basaltes, des roches felsiques porphyriques, des komatiites, des psammites, des formations de fer, des quartzites, des roches volcanoclastiques intermédiaires et, enfin, des pélites interstratifiées de komatiites. Au sud-ouest, des tufs felsiques remontant à environ 2,73 Ga sont interstratifiés dans des basaltes qui sont potentiellement corrélatifs des précédents et une tonalite datée à 2,72 Ga recoupe des komatiites. Les roches plutoniques comprennent des tonalites à biotite et à hornblende montrant une foliation, des granodiorites à biotite et à feldspath potassique de formation plus récente ainsi que des monzogranites à biotite de stade tardif. Le domaine sud-est comprend un vaste batholite de direction nord-est formé de granodiorite à feldspath potassique et magnétite foliée; ce batholite a fait intrusion dans le domaine central et est recoupé par une zone de cisaillement dextre de direction est, elle-même recoupée par du granite massif. Le domaine nord comprend des roches sédimentaires et plutoniques métamorphisées dans des conditions de basse pression du faciès des amphibolites supérieur ou du faciès des granulites inférieur, lesquelles sont séparées des unités du domaine central par plusieurs zones d'intense déformation faiblement inclinées de 1 à 2 km de largeur qui ont été formées dans un régime d'extension avec déplacement dirigé vers le sud.

INTRODUCTION

The Committee Bay belt in central Nunavut (Fig. 1) is a 600 km long belt of northeast-striking, Archean supracrustal rocks and granitoid plutons in the northwestern Churchill Province. Supracrustal rocks of the Committee Bay belt belong to the Prince Albert Group and occupy the north-central part of a larger belt of Archean plutonic and similar supracrustal rocks that extend for about 2000 km from Lake Athabasca (Murmac Bay Group, Saskatchewan; Hartlaub et al. (2001)), northeastward through the Woodburn Lake area (Woodburn Lake group; Zaleski et al. (1999)), to Baffin Island (Mary River Group; Bethune and Scammell (1997); Fig. 1). Supracrustal rocks within this large terrane contain a number of proven and potential mineral resources. Gold deposits associated with iron-formation have been found both within the Woodburn Lake group (Meadowbank deposit, Fig. 1) and as scattered showings in the Committee Bay belt. Komatiite occurs within both the Woodburn Lake group and Prince Albert Group in the Committee Bay belt (Schau, 1982; Jefferson et al., 1993; Sandeman et al., 2001b), and these may be an important source of Ni and PGE mineralization (Eckstrand, 1975).

In order to further stimulate mineral exploration in this remote part of the Canadian Shield, a Targeted Geoscience Initiative was initiated in May 2000 that involves the Continental Geoscience Division, Canada-Nunavut Geoscience Office, and university partners. This three-year project involves helicopter-supported bedrock and surficial mapping, supporting geoscience studies, an aeromagnetic survey, and a separate program of drift prospecting across three 1:250 000 map areas (NTS 56 K, 56 J (north), 56-O (south), and 56 P). Sandeman et al. (2001b, c) completed bedrock mapping at 1:100 000 scale of the Laughland Lake area (NTS 56 K) in the southwest. During the summer of 2001, bedrock mapping to the northeast in the Walker Lake (56 J (north)) and Arrowsmith River map areas (56-O (south), Fig. 1, 2) was completed and initial results including lithological descriptions, stratigraphy, and tectonic significance are presented here. Companion papers on bedrock geology report on the

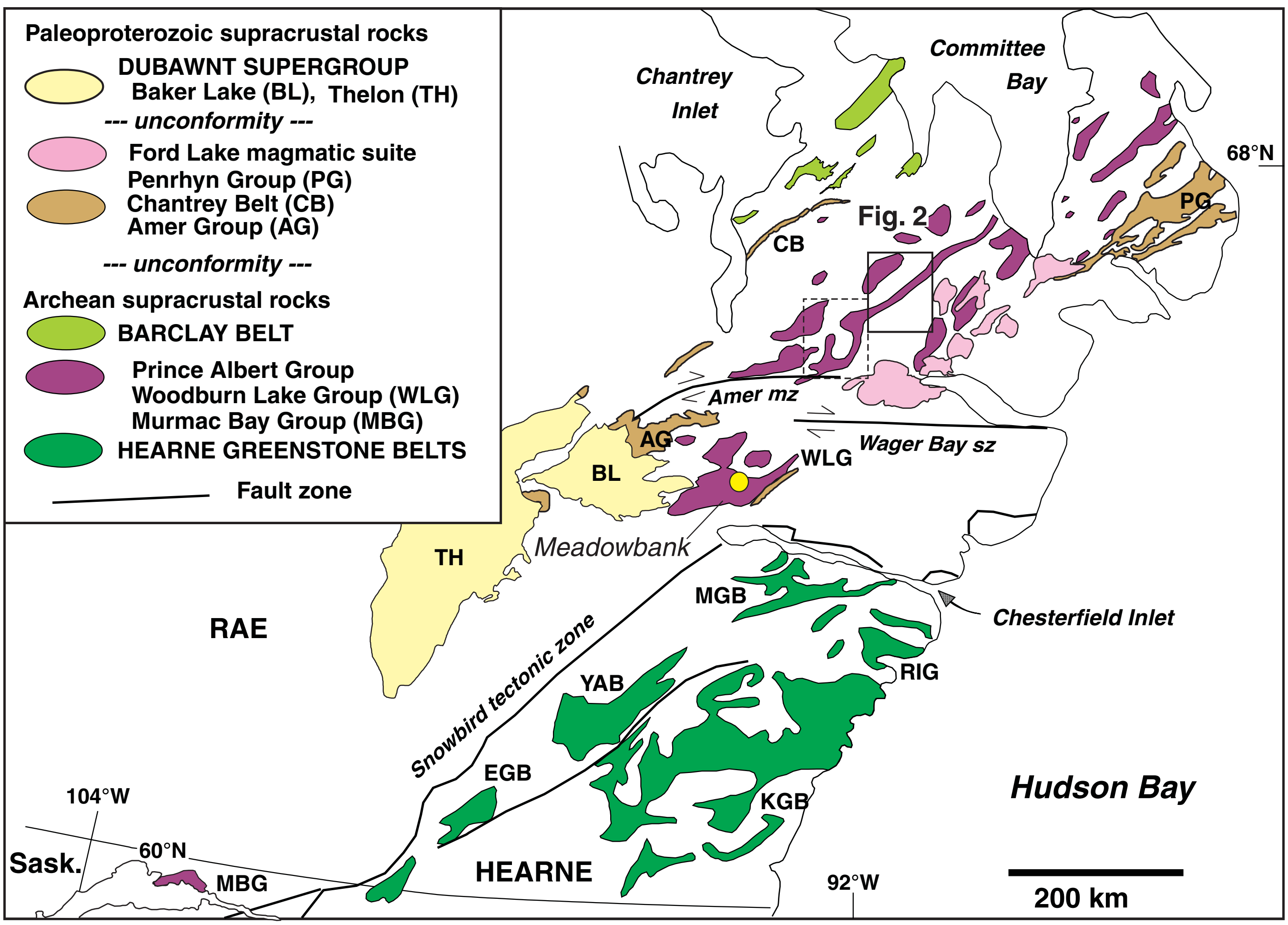

Figure 1. Regional geology of the northwestern Churchill Province. Box outlines show NTS 56 K in lower left, and NTS 56 J (north) and 56-O (south) in upper right (Fig. 2). Greenstone belts of the Hearne domain include: EGB, Ennadai greenstone belt; YAB, Yathkyed greenstone belt; KGB, Kaminak greenstone belt; RIG, Rankin Inlet greenstone belt; MGB, MacQuoid greenstone belt.

structural geology and metamorphic petrology (Sanborn-Barrie et al., 2002), physical volcanology of komatiite (MacHattie, 2002), and structural geology of the Walker Lake shear zone (Johnstone et al., 2002).

REGIONAL GEOLOGICAL SETTING

The northwestern Churchill Province records a complex history of Archean to Paleoproterozoic magmatism and deformation (Hoffman, 1988). The nucleus of the Churchill Province comprises two Archean crustal blocks separated by the Archean to Paleoproterozoic Snowbird tectonic zone. The Hearne domain includes the largely juvenile northwest Hearne subdomain, and the juvenile central Hearne subdomain to the southeast (Sandeman et al., 2001a). In contrast, the Rae domain in the northwest, which hosts the Committee Bay belt, includes Archean supracrustal rocks that have widespread continental affinities as reflected in local evidence for deposition on older basement (3.05 Ga, Hartlaub et al. (2001); 2.87 Ga, Zaleski et al. (2001)), presence of older Meso- to Paleoarchean detrital zircon in quartzite samples (Ashton, 1988; Davis and Zaleski, 1998; Hartlaub et al., 2001), and widespread occurrence of compositionally mature quartzite.

Archean supracrustal rocks in the eastern Rae domain are characterized by similar lithological associations including the presence of komatiite (and related ultramafic sills), iron-formation, and quartzite. In the south, the Murmac Bay Group, loosely bracketed between 3.05 Ga and 2.64 Ga, includes basal conglomerate, quartzite, mafic volcanic rocks (and related mafic and ultramafic sills), overlain by clastic sedimentary rocks (Hartlaub et al., 2001). The Woodburn Lake group in the central Rae domain includes komatiite, basalt, and 2.74–2.71 Ga felsic volcanic rocks, overlain by 2.63 Ga quartzite, banded iron-formation, and wacke (Zaleski et al., 2001). Komatiite, and rare basalt and rhyolite are associated with quartzite, metawacke, and iron-formation in the Prince Albert Group in the Committee Bay belt (Schau, 1982; Frisch, 1982; Sandeman et al., 2001b). A Prince Albert Group rhyolite on Melville Peninsula has a zircon multigrain U/Pb age of 2.88 Ga, and even older supracrustal rocks are cut by 2.92 Ga granitic gneiss (Frisch, 1982). The Mary River Group on Baffin Island includes 2.73–2.72 Ga mafic and felsic volcanic rocks (Bethune and Scammell, 1997), and possible ultramafic flows (Jackson, 2000), separated by an angular unconformity from overlying volcaniclastic and sedimentary rocks. Volcanism and sedimentation in the Rae domain were followed by major pulses of granitoid plutonic activity between 2.64 Ga and 2.58 Ga and later, in the interval 1.85–1.83 Ga (LeCheminant et al., 1987; LeCheminant and Roddick, 1991).

GEOLOGY OF THE COMMITTEE BAY BELT

The geology of the Committee Bay belt has been reviewed by Sandeman et al. (2001b, c) who reported on the results of bedrock mapping of the Laughland Lake area (NTS 56 K), summarized below (Fig. 1). Sandeman et al. (2001b) described northeast-trending belts of the Prince Albert Group, flanked to the north and west by paragneiss and associated peraluminous and metaluminous granitoid rocks, and to the south and east by metaluminous granitoid rocks. The Prince Albert Group in this area comprises dominant semipelite and psammite, iron-formation, and quartzite with less abundant komatiite and rare basaltic and intermediate to felsic volcanic rocks (Sandeman et al., 2001b). The central part of NTS 56 K is occupied by the large, central biotite-hornblende tonalite that cuts supracrustal rocks and has yielded a zircon U/Pb age of 2718 ± 2 Ma (H. Sandeman and T. Skulski, unpub. data, 2001).

The Committee Bay belt in the Laughland Lake area, exhibits northeast-striking fabrics of variable dip and shallowly plunging lineations (Sandeman et al., 2001c). These planar and linear structural fabric elements are rotated into an east-west orientation near the Paleoproterozoic Amer mylonite zone in the south, and Walker Lake shear zone in the north (Sandeman et al. (2001c); Fig. 1). Greenschist- to lower amphibolite-facies regional metamorphic mineral assemblages define the northeasterly trending fabric, and are overgrown by post-tectonic metamorphic minerals of similar grade. Three phases of deformation are documented in the Laughland Lake area (Sandeman et al., 2001c) and include rare D_1 isoclinal folds of bedding and development of a pervasive bedding parallel foliation (S_1). The second phase of deformation reflects northwest-southeast directed shortening and resulted in moderately northeast-plunging, tight F_2 folds, with an S_2 transposition foliation and widespread L_2 extension lineation. Late, upright, broad warping of earlier D_1 and D_2 structures about a north-striking axial plane occurred during D_3 deformation (Sandeman et al., 2001c).

The three broad crustal domains described in NTS 56 K continue northeastward into the present study area and include a central, northeast-striking granite-greenstone domain, northern metasedimentary-plutonic domain, and southeastern plutonic domain (Fig. 2). Regional aeromagnetic data (800 m line spacing, Geological Survey of Canada) and newly acquired, unpublished higher resolution data (400 m line spacing) were used extensively to interpret the geology of this area, delineate the three crustal domains, and highlight their significance along the length of the Committee Bay belt. The central domain is up to 68 km wide and its northern boundary is defined by a northeast- to east-striking high-strain zone (Sanborn-Barrie et al. (2002); Fig. 2). In the southeast, the central domain is cut by younger granitoid plutonic rocks of the southeastern domain, whereas in the south the two domains are separated by the Walker Lake shear zone (Fig. 2). The three crustal domains are described in relative chronological order below.

CENTRAL DOMAIN

The central domain comprises four narrow supracrustal belts intruded by lenticular plutonic bodies of intermediate to felsic composition. From north to south these include the metavolcanic-dominated northern Hayes River and central Hayes

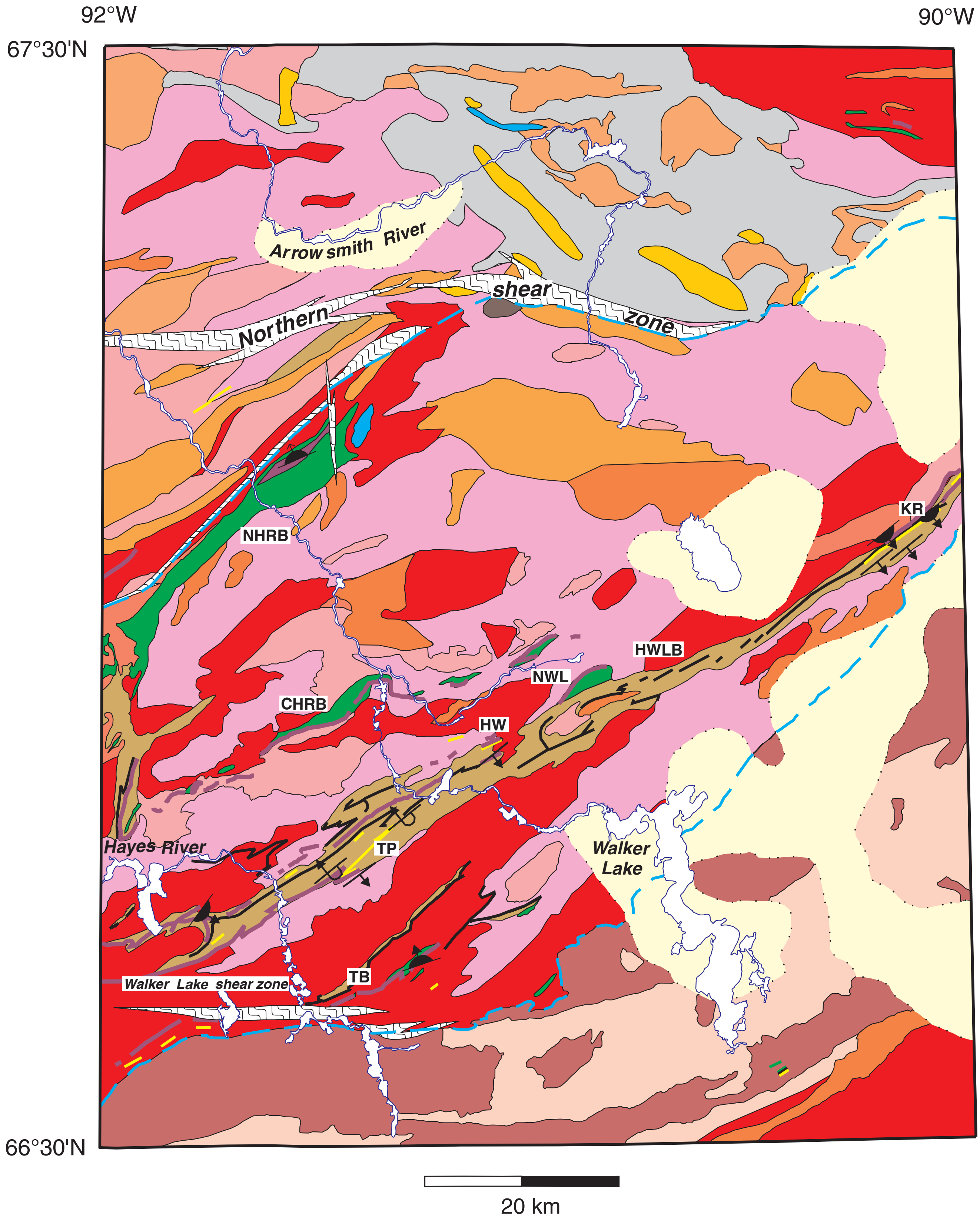

Figure 2. Simplified geological map of the Walker Lake and Arrowsmith River area, Nunavut NTS 56 J (north) and 56-O (south). Localities cited in text and Figure 3 include: the northern Hayes River belt (NHRB), central Hayes River belt (CHRB), Howling Wolf Lake belt (HWLB), Three Bluffs belt (TB), Kellett River (KR), north Walker Lake (NWL), Howling Wolf Lake (HW), and Twin Peaks (TP).

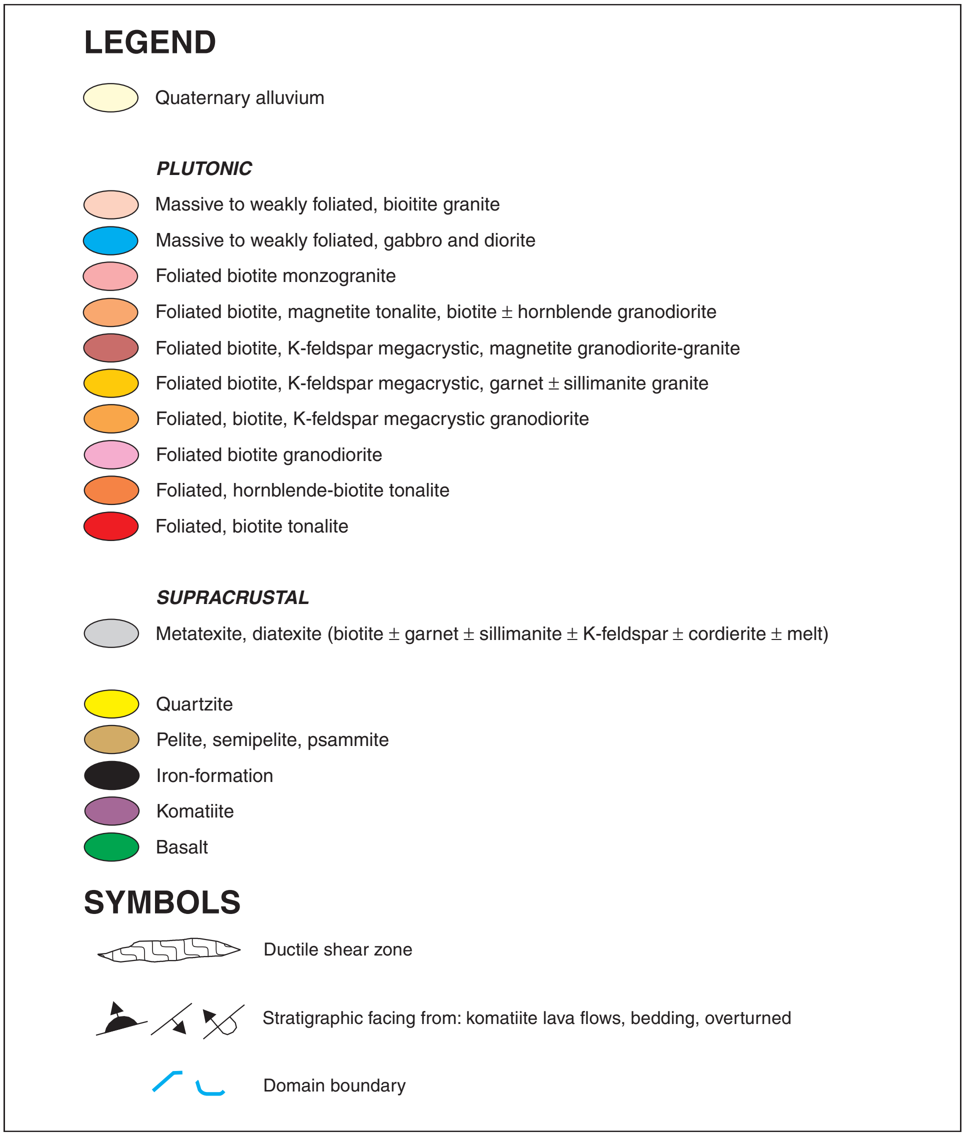

Figure 2. *Legend*

River belts, and the metasediment-dominated Howling Wolf Lake and Three Bluffs belts (Fig. 2). Field and aeromagnetic data reveal that the supracrustal belts and intervening lenticular plutons were folded into northeast-trending structures (Sanborn-Barrie et al. (2002); Fig. 2). Reconstructing the lateral and stratigraphic linkages between the diverse belts of supracrustal rocks was achieved by comparing measured sections through homoclinal sequences (Fig. 3), and tracing field occurrences and aeromagnetic traces of supracrustal screens. The aeromagnetic data were particularly useful in this regard, in so far as linear aeromagnetic highs can be attributed to iron-formation, ultramafic rocks, and metasedimentary screens in plutons. A more subdued aeromagnetic expression is characteristic of intact tracts of clastic metasedimentary and metavolcanic rocks in the supracrustal belts. Plutons in the central and southern parts of this domain contain abundant supracrustal remnants in the form of schlieren, screens, and enclaves of metasedimentary, amphibolitic, and ultramafic rocks.

Preservation of primary textures in the volcanic and sedimentary rocks (described below), is variable and generally poor due to extensive recrystallization accompanying penetrative deformation and low-pressure, mid-amphibolite-facies metamorphism (Sanborn-Barrie et al. 2002). Younging directions were measured at a number of locations on komatiite (size distribution and morphology of olivine spinifex-texture in komatiite; MacHattie (2002)), quartzite (crossbedding, graded bedding), and psammite (graded bedding). The supracrustal belts contain penetrative, moderately to shallowly dipping, northeast-striking fabrics and moderate to shallow northeast- and southwest-plunging mineral

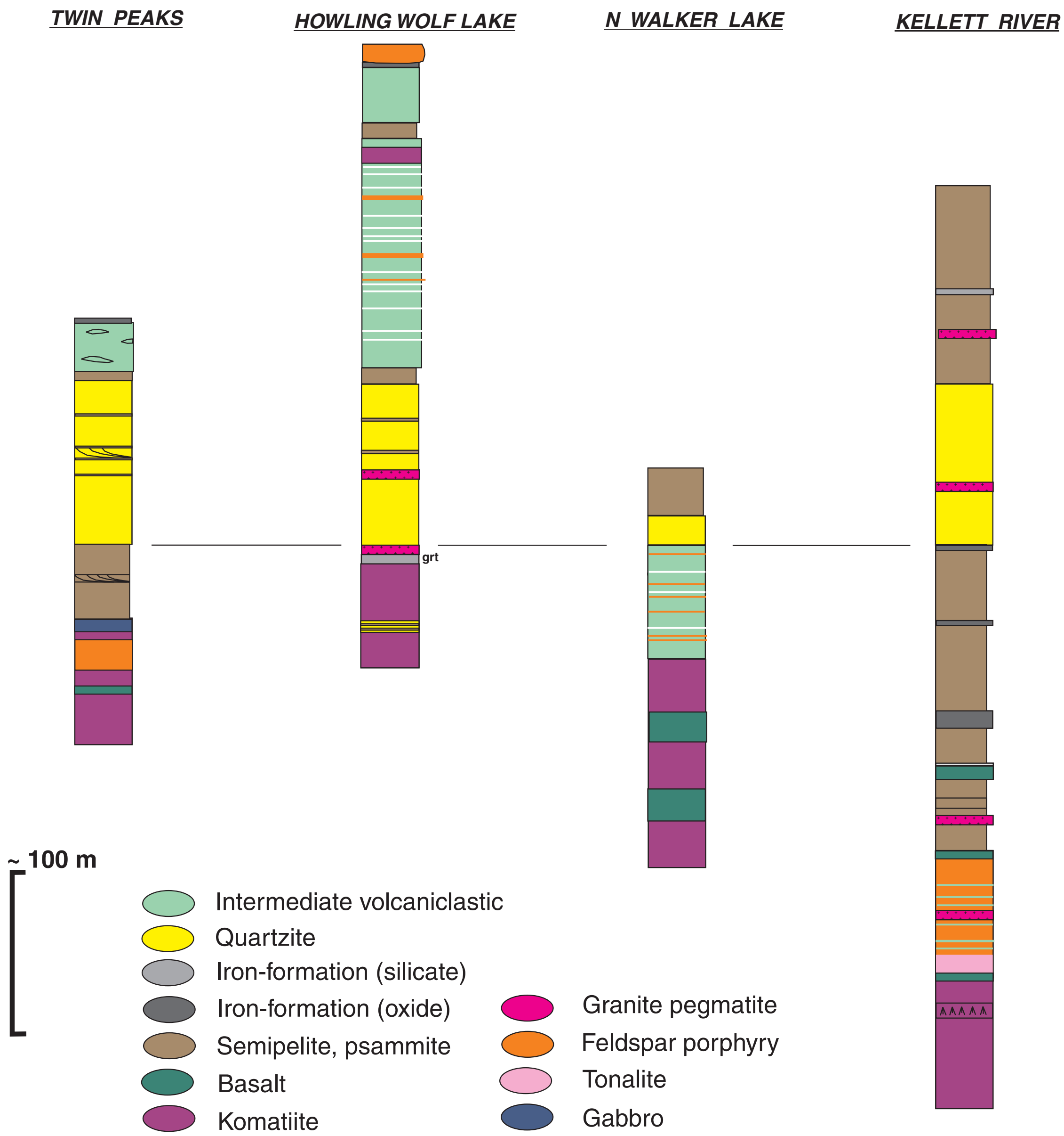

Figure 3. *Schematic stratigraphic columns from along the Howling Wolf Lake belt (see Fig. 2 for location of columns). Columns are hung on the base of the main quartzite marker unit.*

lineations attributed to a composite S_1+S_2 transposition fabric formed under low-pressure, lower to middle amphibolite-facies conditions (Sanborn-Barrie et al., 2002).

Northern Hayes River and central Hayes River belts

Basalt- and komatiite-bearing volcanic successions dominate the northern and central Hayes River belts in the northern part of the central domain. Northward younging is indicated in a spinifex zone of a komatiite flow in the northern Hayes River belt. The stratigraphy of this narrow (up to 5 km wide) belt comprises amphibolite-facies, massive to pillow basalt overlain by komatiite, sulphidic pelitic sedimentary rocks, and a thin upper basalt unit. The pillow basalts (Fig. 4) have slightly flattened pillows up to 1 m wide, with 5 mm thick, dark green selvages, and sparsely vesicular pillow interiors. The komatiite sequence includes flows varying in width from 50 cm to 1 m and displays distinctive colour banding with brown cumulate zones and dark green spinifex zones. Spinifex layers have bladed crystal morphology (up to 10 cm in length) reflecting olivine pseudomorphs. Sulphidic pelite (pyrite and pyrrhotite) conformably overlies komatiite in the northern Hayes River belt and is interlayered with komatiite flows in the central Hayes River belt. The mafic volcanic sequence is cut by likely subvolcanic, fine- to medium-grained gabbro sills up to 100 m wide, very fine-grained quartz diorite dykes, and felsic porphyritic (quartz and plagioclase) sills from 50 cm to 20 m wide. Potentially

Figure 4. *Flattened pillow basalt, northern Hayes River belt.*

correlative pillow basalts in the north-central Laughland Lake area are interbedded with a quartz-phyric lapilli tuff that has a preliminary U/Pb age of 2.73 Ga (H. Sandeman and T. Skulski, unpub. data, 2001).

Howling Wolf Lake belt

The Howling Wolf Lake belt is a sediment-dominated supracrustal belt that is up to 7 km wide and extends across the width of the map area (Fig. 2). Younging indicators are found at the Kellett River and Howling Wolf Lake sections and from a Z-folded sequence at the Twin Peaks locality (Fig. 2, 3). A lower sequence, up to 100 m thick, comprises numerous komatiite flows that vary in thickness from 2 m to 7 m. Individual flows comprise 2–6 m thick, orange-brown-weathering, medium- to coarse-grained cumulate zones overlain by recessively weathering, green, less than 1 m thick, spinifex zones that are commonly tectonized, but have rare bladed olivine spinifex at Kellett River and in the southwest part of the belt (Fig. 2, 3). Mafic volcanic rocks are locally (e.g. North Walker Lake; Fig. 3) interbedded with the lower komatiite unit and include green-black-weathering, massive, medium-grained flows up to 10 m thick. Rare pillow basalt occurs at Howling Wolf Lake, and thin (<1 m wide) beds of fine-grained, mafic volcaniclastic rocks occur discontinuously along the belt. A thin (approximately 1 m thick) white- to buff-weathering, sericitic quartzite occurs between komatiite flows at the base of the Howling Wolf Lake section.

In the Kellett River and Twin Peaks sections, komatiite is overlain by extensive (up to 150 m thick), poorly bedded to ungraded, rusty-weathering, medium-bedded metawacke, with fine to medium grain size. These are interbedded with finely bedded semipelite with local trough-type crossbedding (2 cm foresets; Twin Peaks; Fig. 5). Thin, 2–5 m thick, massive basalt flows are interbedded with the metasedimentary rocks in the Kellett River section and contain metamorphic hornblende, garnet, and clinopyroxene.

Within the metawacke-semipelite unit is a 10–15 m thick, thinly to thickly laminated, oxide-facies banded iron-formation with white-weathering, recrystallized chert (e.g. Kellett River section, Fig. 3). Silicate-facies iron-formation occurs at similar stratigraphic levels (below main quartzite) and occurs as a 2–3 m thick, dark green-black, garnet-grunerite±quartz ironstone (e.g. Howling Wolf Lake section). Disseminated pyrite and pyrrhotite occur within both oxide-facies and silicate-facies iron-formation. Gold mineralization is reported in assessment reports of the Committee Bay Joint Venture (Williamson and Faragher, 1995) at the Three Bluffs occurrence (Fig. 2), where it is associated with iron-formation. The mineralized oxide-facies iron-formation is interbedded with pelitic rocks and contains abundant pyrrhotite±pyrite and chalcopyrite. New field data and high-resolution aeromagnetic data arising from this study have been used to define bedrock and subsurface iron-formation (Fig. 2). Pending results of ongoing drift prospecting and lithogeochemical assay samples, some of these localities may warrant mineral exploration follow-up.

Figure 5. *Lower semipelite-psammite unit, Kellett River section, Howling Wolf Lake belt.*

Overlying the lower metawacke and semipelite unit is a prominent main quartzite unit that is up to 85 m thick. This ridge-forming unit is white weathering, with 5–20 cm thick beds which are locally (e.g. Howling Wolf Lake section) graded from grit to coarse sand, contain fuchsite, and at Twin Peaks contain 50 cm, trough-type crossbedding (Fig. 6). The quartzite unit appears to thin along strike to less than a few metres and may have been deposited originally as a lensoidal (2–4 km wide) sedimentary unit. Quartzite is overlain by lenticular, up to 180 m thick, white- to buff-weathering dacite tuff and lapilli tuff. This unit is locally feldspar porphyritic (<10%, up to 1 cm laths), and in the Howling Wolf Lake section has well defined, millimetre- to centimetre-scale textural

Figure 6. *Trough-type crossbedding in quartzite, Twin Peaks section, Howling Wolf Lake belt.*

and compositional layering representing original bedding. In the Howling Wolf Lake section the dacite volcaniclastic unit is overlain by a 20 m thick sequence of tectonized komatiite with characteristic brown-green layering of flows that are 2–3 m thick. These are in turn overlain by rusty-weathering, semipelite and psammite that are thickly bedded and only locally graded from medium to fine sand. This upper unit is up to 100 m thick in the Kellett River section and contains rare, less than 1 m thick, silicate-facies iron-formation. The absence of intercalated basalt flows in the upper semipelite-psammite is one of the few criteria for distinguishing the clastic metasedimentary units above and below the main quartzite.

A generalized stratigraphy of the belt is reconstructed from stratigraphic sections and comprises lower komatiite, overlain by semipelite and psammite interbedded with thin basalt flows, iron-formation, a main quartzite unit, in turn overlain by intermediate volcaniclastic rocks, and an upper pelite-psammite unit. The thickness and lateral continuity of sedimentary and volcanic units is highly variable; however, the thickest and most prominent quartzite unit lies stratigraphically above the main komatiite unit in all of the sections (Fig. 3). Komatiite and basalt are common lithologies of the upper northern Hayes River–central Hayes River belts and the lower Howling Wolf Lake belt (e.g. North Walker Lake section; Fig. 3). Proposed correlation between komatiite and basalt in the Howling Wolf Lake and Hayes River belts will be tested through lithogeochemistry and geochronology on intercalated and crosscutting felsic units.

Plutonic rocks in the central domain

Lithological contacts and internal structure of intermediate to felsic plutons were interpreted in part using recently acquired, high-resolution aeromagnetic data. Magnetite-bearing tonalite and granodiorite have higher magnetic susceptibility and are easily distinguished in their aeromagnetic signature from magnetite-poor varieties of tonalite, granodiorite, and granite. Intermediate to felsic plutonic rocks in the central domain include in relative chronological order: biotite tonalite, hornblende-biotite quartz diorite and tonalite, biotite granodiorite and biotite-K-feldspar megacrystic granodiorite, monzogranite, and syn- to post-tectonic pink syenogranite. These major plutonic phases are described below.

Biotite±epidote±magnetite tonalite, the oldest plutonic unit in the map area, is a foliated, typically fine- to medium-grained, recrystallized ('sugary' texture) rock that forms voluminous, lenticular, northeast-trending plutons that cut and engulf supracrustal belts, and dominate the southern half of the central domain (Fig. 2). Hornblende-biotite quartz diorite and tonalite are foliated, medium-grained rocks that form small, lenticular plutons that crosscut biotite tonalite south of the Howling Wolf Lake belt. Medium- to coarse-grained, foliated, equigranular biotite (±magnetite±allanite) granodiorite is a voluminous plutonic phase that dominates the northern half of the central domain (Fig. 2). Biotite granodiorite units are charged with metasedimentary screens and xenoliths south of the central Hayes River belt. K-feldspar megacrystic granodiorite is locally transitional with biotite granodiorite and forms large, lenticular sheets in the northern half of the central domain and within the Northern shear zone. These granodiorite units can contain up to 50% K-feldspar megacrysts, 1–5 cm in length, that are flattened, recrystallized, and define a mineral lineation close to and within the Northern shear zone. Coarse-grained biotite monzogranite occurs as centimetre-, to decimetre-scale, thick sheets throughout the central domain, and as larger plutons within the Northern shear zone. The monzogranite bodies have a weak to moderate foliation and are locally folded into kilometre-wide sheets south of the Howling Wolf Lake belt (cf. Sanborn et al. (2002); Fig. 2).

NORTHERN DOMAIN

The northern crustal domain is dominated by upper amphibolite- to lower granulite-facies metasedimentary rocks and metaluminous and peraluminous granitoid plutons. The high-grade metasedimentary rocks include metatexite and heterogeneous and homogeneous diatexite cut by lenticular bodies of peraluminous granite. Aluminosilicate minerals and garnet are not present in all of the paragneiss units, likely reflecting a spectrum of protolith bulk compositions ranging from psammite to semipelite to pelite. Within the northern domain are rare, clastic metasedimentary protoliths that include wacke with relict bedding. The northeastern corner of the map area contains tonalite with thin screens of relatively intact, upper amphibolite-facies supracrustal rocks including metabasalt, iron-formation, and komatiite. These rocks are locally separated from the high-grade metasedimentary domain by a high-strain zone that awaits further detailed study.

Metatexite and diatexite are rust-coloured, muscovite-free, quartz-biotite±garnet±sillimanite±K-feldspar±cordierite±melt rocks that have either migmatitic texture and reflect in situ partial melting, or more commonly contain granitic dykes and pods of likely proximal derivation.

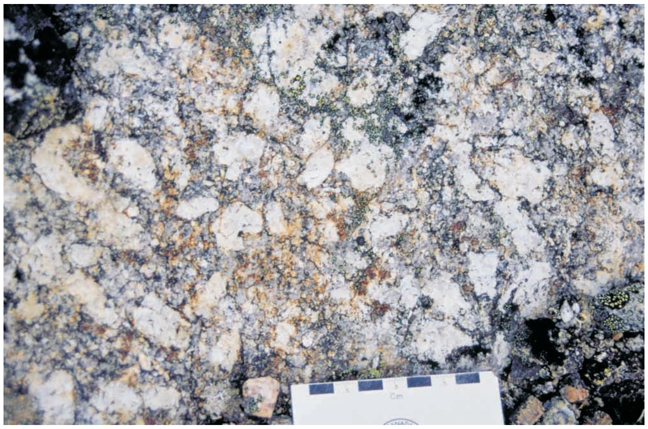

Figure 7. K-feldspar, garnet, biotite peraluminous granite, northern domain.

Figure 8. K-feldspar megacrystic, biotite, magnetite granodiorite, northern domain. Knife points to magnetite (3–4 mm) crystals.

The migmatite units contain lenticular, foliated leucosome of quartz-plagioclase±garnet±K-feldspar±cordierite enveloped in a melanosome comprising garnet-sillimanite-biotite. Peraluminous granitic plutons cut the metasedimentary rocks and are composed of rust to pale orange, blocky K-feldspar, biotite, garnet±sillimanite monzogranite (Fig. 7).

Crosscutting the paragneisses are K-feldspar megacrystic, biotite, magnetite granodiorite (Fig. 8), and biotite-magnetite tonalite. The plutons contain abundant metasedimentary screens and xenoliths, and share a common structural history with the high-grade metasedimentary rocks (Sanborn-Barrie et al., 2002). The northern domain contains plutonic phases that are common to the central domain and include biotite tonalite, biotite granodiorite, K-feldspar megacrystic granodiorite, and biotite monzogranite (Fig. 2).

In contrast to relatively straight transposition fabrics in the south, the northern domain displays variably oriented structures attributed to at least three deformational (D_1, D_2, D_3) events (Sanborn-Barrie et al., 2002). Several arcuate belts of 1–3 km wide, highly strained rocks, designated the Northern shear zone, separate the central and northern domains (Fig. 2; Sanborn-Barrie et al. (2002)). The northernmost strand is east striking and has shallow, south-dipping mylonitic fabrics. An adjacent northeast-striking, high-strain zone is a moderately shallow, southeast-dipping structure that shows top down-to-the-southeast, extensional movement (Sanborn-Barrie et al., 2002).

SOUTHEASTERN DOMAIN

The southeastern domain is dominated by foliated, K-feldspar megacrystic-biotite-magnetite granodiorite to granite, and later, massive to weakly foliated, biotite granite (Fig. 2). These northeast-trending batholiths of likely widely different age, intrude rocks of the central domain. The K-feldspar megacrystic-magnetite plutons in particular, contain abundant supracrustal screens of psammite, semipelite, and amphibolite. The southeastern corner of the map area contains biotite tonalite and hornblende-biotite tonalite that engulf supracrustal screens of komatiite, quartzite, iron-formation, amphibolite, and semipelite, comparable to rocks found in the central domain.

The foliated, K-feldspar megacrystic-biotite-magnetite granodiorite to granite suite comprises coarse-grained plutonic rocks with distinctive 2–3 mm magnetite and a corresponding, high aeromagnetic signature, accentuated by linear positive magnetic anomalies likely reflecting the presence of metamorphosed supracrustal screens. This batholith is a northeastward continuation of the Walker Lake intrusive complex of Sandeman et al. (2001b), and is cut by the Walker Lake shear zone in the southern part of the map area (Fig. 2). In contrast, the massive to weakly foliated, biotite granite suite is fine to medium grained and was emplaced as metre-scale, to decimetre-scale granite sills, dykes, and larger sheets. This younger suite has a subdued, mottled aeromagnetic signatures relative to the older K-feldspar megacrystic suite, and its emplacement appears to postdate dextral strike-slip displacement along the Walker Lake shear zone in the southern part of the map area.

SUMMARY AND CONCLUSIONS

The Committee Bay belt comprises three distinctive, regionally continuous crustal domains. The central domain includes northeast-trending belts of mid-amphibolite-facies supracrustal rocks intruded by diverse tonalite, granodiorite, and granite plutonic suites. Lower grade equivalents of these rocks are exposed to the southeast in the Laughland Lake area (Sandeman et al., 2001b). A direct result of the current study is a stratigraphic model of the Prince Albert Group that is the subject of an ongoing geochronological investigation. The supracrustal rocks in the northern Hayes River belt include early erupted, submarine mafic volcanic rocks overlain by olivine spinifex komatiite and fine-grained sulphidic pelite. The Howling Wolf Lake belt is a metasedimentary dominated supracrustal sequence with a lower komatiite unit overlain by semipelite, metawacke, mafic volcanic rocks, and iron-formation. The lower part of this stratigraphy marks a gradual transition from likely mantle-derived, mafic and ultramafic magmatism (cf. Fitzhenry, 1993), to clastic sedimentation and intermediate to felsic volcanism. Subsequent deposition of quartz-rich sands in a high-energy environment, reflected in local large-scale crossbedding, likely occurred in a fluvial setting marking a shoaling-upward transition in the stratigraphic sequence. Late-stage volcanism was characterized by felsic volcaniclastic deposition, periodic eruption of ultramafic magma, followed by late clastic sediment deposition.

Metasedimentary rocks in the northern domain appear to have been deposited in the absence of volcanic activity. Ongoing detrital zircon dating will test whether the protoliths of these metasedimentary rocks could have been deposited after the demise of volcanism and during the onset of deformation, as appears to be the case for similar large, clastic sedimentary basins formed adjacent to Archean granite-greenstone belts in the Superior Province (e.g. English River, Quetico and Pontiac subprovinces; Davis (1996)). Low-pressure, high-grade metamorphism and crustal anatexis as found in the northern domain, also characterizes late sedimentary subprovinces in the Superior Province (e.g. Corfu et al., 1995).

The southeastern domain comprises a voluminous suite of K-feldspar megacrystic and magnetite-bearing granodiorite and granite that intrudes the central domain, and can be traced at least 200 km along the southeastern margin of the Committee Bay belt. This magmatic suite is overprinted by northeast-striking D_2 fabrics (Sanborn-Barrie et al., 2002), and is cut by the Walker Lake shear zone. Voluminous sheets and plutons of massive to weakly foliate biotite granite intrude the K-feldspar megacrystic suite and appear to be late tectonic to post-tectonic.

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