Energy, Mines and Resources Canada
Énergie, Mines et Ressources Canada

Geological Survey of Canada
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DESCRIPTIVE NOTES

Introduction

This map is a geological compilation at 1:125,000 scale of the east-central early Proterozoic Wopmay orogen and adjacent Archean Slave province. It is published in two (east and west) sheets which cover parts of the Calder River (N.T.S. 86F), Redrock Lake (N.T.S. 86G) and Point Lake (N.T.S. 86H) map areas (Fig. 1). The geological compilation is based on the results of fieldwork carried out by the Geological Survey of Canada during the summers of 1981 to 1983 (areas 1, 4 and 5; Fig. 2), 1986 (areas 2 and 3; Fig. 2) and 1987 (area 3; Fig. 2). The field results are described by St-Onge et al. (1982, 1983, 1984) for area 1; King et al. (1987) for area 2; Hildebrand et al. (1987a), Hildebrand and Bowring (1988) for areas 3; Tirrul (1983) for area 4, and; Hoffman et al. (1983, 1984), Grotzinger and Hoffman (1983) for area 5.

Bedrock exposure in the western half of the map area is excellent except south of Scotstoun Lake and north of Acasta Lake, where bedrock outcrops are more scattered. In the eastern part of the map area, the exposure ranges from very good east of the Coppermine River and Rocknest Lake to sporadic south of the Hepburn Creek and north-east of Redrock Lake.

The geological data presented were gathered during ground-level traverses at a spacing of 2 - 3 km and augmented with detailed work in key areas. Stratigraphic, structural and intrusive relationships shown are primarily based on the mapped geology. Aeromagnetic maps (Geological Survey of Canada geophysical series maps 7874G, 7875G and 7876G) were used in conjunction with low- and high-level black and white airphotographs to interpret the bedrock geology in areas of extensive Quaternary cover and to interpolate between traverse lines. The position of metamorphic mineral isograds was determined in the field and verified with follow-up petrographic and microprobe work (St-Onge and King, 1987).

Wopmay orogen

Wopmay orogen is a ca. 1.9 Ga orogenic belt (Hoffman 1980; Hoffman and Bowring, 1984) located in the northwest corner of the Canadian Shield (Fig. 3). It is composed of three major tectono-stratigraphic elements. These elements, from east to west, are: (1) a marginal depositional prism (Coronation Supergroup, Figs. 3, 4) (Hoffman, 1980); (2) a continental volcano-plutonic arc (Great Bear arc, Figs. 3, 4) (Hoffman and McGlynn, 1977; Hildebrand and Bowring, 1984; Hildebrand et al., 1987b); and (3) amphibolite facies metasedimentary and (intermediate) metavolcanic rocks cut by a suite of calc-alkalic plutons (Hottah arc, Figs. 3, 4) (McGlynn, 1976; Hildebrand, 1981).

The Coronation Supergroup accumulated between 1900 Ma and 1885 Ma (Hoffman and Bowring, 1984) on the west margin of the Slave province (Fig. 3). Most of the supergroup was shortened, thickened, and transported eastward (Calderian allochthon; Fig. 5) onto autochthonous Archean basement and Proterozoic cover during the ca. 1885 Ma Calderian orogeny (Tirrul, 1983; King, 1986). Convergence between the 1914-1902 Ma Hottah arc (Hildebrand et al., 1987b) and the Slave province is interpreted to be responsible for the Calderian orogeny (Hoffman and Bowring, 1984). The 1876-1843 Ma Great Bear arc (Bowring, 1984) unconformably overlies both the Hottah arc and the west side of the deformed Coronation Supergroup.

The geological compilation map (east and west sheets) covers the central portion of the eastern tectono-stratigraphic element (Figs. 3, 4). The map area includes key portions of the following domains related to the Calderian orogeny (Fig. 4): (1) the eastern autochthon, (2) the Asiak thrust-fold belt (ATFB), and (3) the Hepburn metamorphic-plutonic internal zone (HMIZ). The compilation map provides the structural data base for the lower and intermediate structural levels illustrated in the composite, down plunge cross-section of Figure 5.

Archean basement

From Exmouth Lake (west sheet) to the eastern limit of the compilation map, autochthonous basement gneisses and volcanic rocks belonging to the Slave province (Figs 4, 5) are exposed. The Archean basement has been subdivided into three main map units: (1) a 3480 Ma (Bowring, 1984) biotite-hornblende quartzofeldspathic gneiss (**Sg**), (2) a mafic belt of dominantly massive and pillowed basalt flows (**Sb**), and (3) a massive to foliated biotite-hornblende monzogranite (**Sgr**). The mafic volcanic belt (**Sb**) is intruded by the biotite-hornblende monzogranite plutons (**Sgr**).

Along the western edge of the HMIZ, Archean basement outcrops in a series of basement-cored antiforms. The basement consists predominantly of **Sgr**, which locally displays a protomylonitic to mylonitic fabric (King, 1985).

A complex assemblage of biotite and/or hornblende quartzofeldspathic gneisses and amphibolites (**gn**) are exposed west of Exmouth and Robb Lakes (west sheet). These rocks are distinct from the surrounding high-grade Coronation Supergroup units, and are tentatively interpreted as Archean basement. However, geochronological work is required to confirm that this gneissic assemblage is Archean in age.

Coronation Supergroup

The Coronation Supergroup (**Gs - Cg**) contains three stratigraphically distinct sequences (Hoffman et al., 1988): (1) a western rift-facies assemblage (Akaitcho and Grant Groups; Fig. 4) (Easton, 1981; King, 1985); (2) a west-facing, shelf-rise sequence (Epworth Group; Fig. 4) (Hoffman, 1980; Grotzinger, 1986a); and (3) a synorogenic, eastward-younging, foredeep sequence (Recluse Group and Takiyuak Formation; Fig. 4) (Hoffman, 1987).

The Akaitcho and Grant Groups are composed of immature, subaqueous clastic sediments (**Gs, As, Ap, Aq**) and minor dolomite (**Ad**). The sediments are overlain by mafic volcanics (**Gb, Ab**), volcaniclastic sediments (**Am**), rhyolite (**Gr, Ar**) and felsic pyroclastic (**Af**) units. Both groups are intruded by gabbro sills and dykes (**Gg**; not distinguished in the Akaitcho Group). The volcanic and intrusive units of the rift-fill assemblage have ages that cluster at about 1900 Ma (Hoffman and Bowring, 1984).

In the western HMIZ, felsic and mafic protomylonites, mylonites and ultramylonites (**my**) form prominent north-south ridges. The protoliths to the sheared rocks may include high-grade Akaitcho Group units and/or Archean granites and gneisses.

The eastern Epworth Group (within the ATFB) is composed of storm-dominated, shelf-facies siliciclastics (**Eoq**) of the Odjick Formation and cyclic dolomite-argillite units (**Erl, Erm, Eru**) of the Rocknest Formation (Grotzinger, 1986a, b, c). The basal Odjick Formation is characterized by local accumulations of polymictic conglomerate (**Eoc**), massive or pillowed basalt intruded by gabbro sills (**Eom**) and argillaceous dolomite (**Eod**). The western Epworth Group (within the HMIZ) contains slope-rise facies pelite and semipelite (**Eop**) of the Odjick Formation.

The Recluse Group (flysch) contains (1) graphitic-sulfidic pelite and semipelite of the Fontano Formation (**Rf**), (2) feldspathic-lithic greywacke turbidites of the Asiak Formation (**Ra**), which are intertongued with (3) concretionary calcareous argillite of the Kikerk Formation (**Rk**) and (4) laminated calcareous argillite of the Cowles Formation (**Rc**). Overlying the Recluse Group is the Takiyuak Formation (**Ct**), a fluvial molasse composed of cross-bedded lithic-feldspathic arenites. Syndepositional gabbro sills (Morel Sills; **Cg**) are emplaced in the Epworth and Recluse Groups units (Hoffman, 1987).

Structure

The Coronation Supergroup was deformed by five temporally and geometrically distinct periods (D_1 to D_5) of compressional deformation (Tirrul, 1983; King, 1986; Hoffman et al., 1988). D_1 and D_2 are thin- and thick-skinned deformations, respectively, resulting from east-west shortening during the Calderian orogeny. D_3 is manifested by east-northeast-trending regional cross-folds. Oblique cross-sections of the Calderian belt are exposed on the flanks of the D_3 cross-folds in eastern Wopmay orogen, and have been used to construct the composite, down plunge-constrained cross-section shown in Figure 5 (see Tirrul, 1983 and King, 1986 for a discussion of down plunge sections). D_4 represents a period of dextral transpressive deformation (Hoffman, 1984) which is responsible for major northwest-trending folds in the Great Bear arc, but only locally affected the westernmost Coronation Supergroup. Finally, D_5 produced a system of conjugate transcurrent faults which postdate the Great Bear arc and affect all units of Wopmay orogen.

(a) Calderian structures (D_1 - D_2)

The initial thin-skinned deformation phase (D_1) of the Calderian orogeny produced a system of north-trending imbricate thrusts and folds of the Coronation Supergroup above a basal décollement (Fig. 5). The basal décollement is located 100 to 300 meters stratigraphically above the now exposed autochthonous Archean basement. The décollement has been mapped almost continuously for a distance of nearly 100 km transverse to the strike of the thrust-fold belt (King, 1986).

The style of Calderian D_1 deformation changes in response to increasing syn-deformation metamorphic grade both from east to west (foreland to hinterland) and with proximity to the Hepburn intrusive suite (see below for a discussion of the metamorphism). Foreland fold-and-thrust belt structures occur in the low grade siliciclastic and carbonate sediments of the Epworth and Recluse Groups east of 114° 30' W longitude (east sheet). Imbricate thrust systems root on the basal décollement and are primarily developed in the shelf facies Odjick and Rocknest Formations (Tirrul, 1983; King, 1986; Hoffman et al., 1988). Penetrative D_1 fabrics within thrust sheets are generally poorly developed east (lower grade) of the biotite isograd (east sheet). In contrast, polyphase folding, thrusting and foliation development characterize the higher grade areas to the west and are interpreted to result from progressive bulk shear deformation above the basal décollement (King, 1985). The structural domain northwest of Havant Lake (west sheet) records a component of dextral transpressive deformation in high P Akaitcho Group gneisses (King, 1986), and was juxtaposed against lower P eastern domains along possible west-dipping out-of-sequence thrust faults (Figure 5).

The thick-skinned (D_2) phase of the Calderian orogeny produced north-trending, upright folds of the Archean Slave basement, the autochthonous early Proterozoic cover and the overlying Calderian allochthon (Fig. 5). The amplitude of the first-order basement-cored folds increases from 3 km under the ATFB (east sheet) to 7 km under the HMIZ (west sheet). The north-south axes of the basement-cored folds and associated second-order folds of cover units are coaxial with earlier (D_1) Calderian folds. The only significant fault related to D_2 is a high-angle thrust which has about 3 km of slip. It is located on the east limb of the basement-cored fold south-east of Scotstoun Lake (west sheet).

(b) Post-Calderian structures (D_3 - D_5)

The post-Calderian, thick-skinned D_3 event produced east-northeast trending cross-folds of basement and cover with no associated thrust faults. First-order cross-folds are responsible for the regional-scale structural culminations and saddles of Wopmay orogen (King, 1986; Hoffman et al., 1988). The D_3 structures typically have limb dips of 10 to 15° (St-Onge, 1984a), but locally can be as much as 30° (King, 1986). Up to 30 km of structural relief is exposed on the flanks of the D_3 folds (King, 1986). The regional structure, resulting from the two episodes of thick-skinned folding (D_2, D_3), corresponds to a dome-and-basin fold interference pattern (King, 1986).

The effect of D_4 is only locally evident east of the Great Bear arc and is responsible for a set of northwest-trending folds found north of Bent Lake (west sheet). These folds are responsible for exposing the possible Archean basement unit **gn**.

The third post-Calderian deformation (D_5) produced a regional system of conjugate transcurrent faults (Fig. 4). D_5 involved east-west shortening and north-south extension in a dominantly pure-shear regime approximating horizontal plane strain (Tirrul, 1984). This was accomplished by block rotations about vertical axes. Relative to domains lacking transcurrent faults, Calderian structures are rotated clockwise in domains of northwest-trending sinistral faults and counter-clockwise in domains of northeast-trending dextral faults.

Calderian plutonism: the Hepburn intrusive suite

The Hepburn intrusive suite (**Hg1-Hs**) is a compositionally diverse suite of plutons that intrudes the Akaitcho Group, the western Epworth Group and the western Recluse Group in the HMIZ (Figs. 4, 5). The plutons range in composition from gabbro to granite with peraluminous monzo- and syenogranites dominating volumetrically (Lalonde, 1986). A relative order of pluton emplacement has been established in the map area based on field cross-cutting relationships and relative degrees of penetrative deformation. The older intrusive phases of the Hepburn intrusive suite include a well-foliated biotite-hornblende monzogranite (**Hg1**) and a series of foliated biotite syenogranites (**Hg2**). The (**Hg2**) granites are intruded by foliated biotite tonalites (**Ht1**), which are in turn cross-cut by biotite monzogranites (**Hg3**) locally with foliated edges. All of the above plutons are cross-cut by biotite granodiorites (**Ht2**), which are typified by weakly foliated marginal zones showing poikilitic K-feldspar megacrysts. Hornblende-biotite quartz diorite, diorite and gabbro plutons (**Hq**) are found as a swarm of small (less than 3 km in diameter), massive to poorly foliated plutons emplaced in most of the other intrusive units. The exact timing relationships between **Ht2** and **Hq** plutons are equivocal, and in fact the **Hq** plutons may be older than the **Ht2** ones. Finally, the youngest plutons are a series of pyroxene-amphibole syenites and hornblende-biotite monzodiorites and quartz monzodiorites (**Hs**). These plutons are all titanite-bearing and massive.

Along the western edge of the deformed Coronation Supergroup, the timing of emplacement of biotite leuco-monzogranites (**Hl**) is more difficult to constrain because the plutons are spatially isolated from all other Hepburn intrusive suite units. However since the **Hl** plutons are massive, it is thought that they may be younger than the **Ht2** granodiorites.

U-Pb zircon dating of the Hepburn intrusive suite plutons has yielded ages that range from 1895 Ma to 1874 Ma, clustering at 1885 Ma (Bowring, 1984; Hoffman and Bowring, 1984). No Hepburn intrusive suite plutons have been mapped in the exposed Archean basement nor in autochthonous cover rocks beneath the basal décollement. In addition, the intrusive suite-related mineral isograds are inverted across the basal décollement and into the autochthon (see Calderian metamorphism section). In total, these observations suggest that the Hepburn intrusive suite is allochthonous with respect to the footwall of the basal décollement.

Calderian metamorphism

A major thermal culmination affects all units of the Coronation Supergroup in the HMIZ. The culmination corresponds to an increase in metamorphic grade, as documented in pelitic units, from muscovite-chlorite slates to garnet-sillimanite-cordierite-granitic melt gneisses. The last phase is inferred from the granitic pods present in metasediments, as discussed in St-Onge (1984b). The final form of the thermal culmination is outlined at the present erosion surface by suites of mineral isograds mapped in pelitic and semipelitic units (St-Onge, 1981, 1984a, b, 1987; St-Onge and King, 1987). The mineral isograds transect, and therefore postdate, the early Calderian (D_1) thrusts and folds of bedding. The isograd geometry with respect to the late Calderian (D_2) folds of basement and cover suggests that they are approximately coeval with the D_2 deformation (King, 1986; St-Onge and King, 1987).

The thermal culmination is elongate parallel to the structural grain of the orogen in map view (east and west sheets). In cross-section (St-Onge and King 1987) the metamorphic culmination has an asymmetric lobate form. The culmination is spatially related to plutons of the Hepburn intrusive suite at intermediate and high structural levels (Fig. 5). At low D_1 structural levels, beneath the main cluster of Hepburn intrusive suite plutons (west sheet), metamorphic grade increases with increasing distance away from the exposed basement-cover contact (i.e. going up structural section). The mineral isograds are therefore inverted or hot-side-up (St-Onge, 1981; St-Onge and King, 1987). The inverted isograds transect the D1 basal décollement and the autochthonous units of the Odjick Formation east of Exmouth Lake and Acasta Lake (west sheet).

Great Bear arc basal sequence: the Dumas Group

The western edge of the HMIZ is unconformably overlain by the supracrustal rocks of the Dumas Group (**Du**), part of the Great Bear arc basal sequence (Hildebrand and Bowring, 1988). Within the map area, the Dumas Group comprises low-grade interbedded mudstones and siltstones. Sandstone, dolomite and pebbly conglomerate are also present. In the northwest corner of the map area, Dumas Group sediments unconformably overlie HMIZ units within a north-south trending syncline (Hildebrand et al., 1987a).

Great Bear arc plutonism: the Bishop intrusive suite

The Bishop intrusive suite (**Bg - Bd**) is composed of numerous post-tectonic bodies intruding the Akaitcho and Grant Groups in the western part of the HMIZ north and south of Bishop Lake (west sheet). The Bishop suite is, much like the Hepburn intrusive suite, also composed of plutons that range in composition from gabbro (**Bd**) to granite (**Bg**). **Bd** and **Bg** plutons are (1) massive; (2) have sharp contacts with the surrounding country rocks and; (3) show occasional chilled margins. Unlike the Hepburn intrusive suite, Bishop intrusive suite plutons intrude known Archean basement (**Sgr** unit east of Wopmay Lake (west sheet)) and probable Archean basement (**gn** unit around Bishop Lake (west sheet)). The post-tectonic character, the location near the western edge of the HMIZ and a relatively young age (1855 Ma; Bowring, 1984) suggest that the Bishop suite is related to the Great Bear arc (Lalonde, 1986).

Post-orogenic units

Coronation Supergroup units and underlying Archean basement are intruded by the north-northwest trending Mackenzie Dykes. The dykes are unmetamorphosed and have been dated at 1200 Ma (A. Lecheminant, pers. com., 1988). South of the Calder River (west sheet), a large northeast trending, northwest dipping gabbro intrudes rocks of the Great Bear arc, Grant Group and the Archean basement. The gabbro is the eastern termination of a large, late Proterozoic sheet that extends from Hottah Lake in the southwest (Hildebrand et al., 1987a).

Quaternary

Till, outwash, glaciolacustrine silt, deltaic gravel and sandy alluvium comprise the surficial sediments that are found in the map area (D. A. St-Onge, 1984). Except for recent alluvium, the deposition of the sediments is related to the overriding of the area by two ice streams originating to the east, and to the subsequent downwasting of the ice mass (D. A. St-Onge, 1984, 1987). Areas of significant (> 2 m thick) Quaternary deposits are identified with the stippled pattern on the compilation map, and readers are referred to the surficial geology map for the greater Coppermine River area (D. A. St-Onge, 1988) for more information.

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LEGEND

Note: The prefix "meta" applies to all lithologies in units **gn** to **Du**.

QUATERNARY

Unconsolidated deposits, including Holocene alluvial sediments and Late Wisconsinan glacial, subglacial, and proglacial sediments

------unconformity------

LATE PROTEROZOIC

ga Gabbro (northeast trending, northwest dipping)

MIDDLE PROTEROZOIC

g Mackenzie Dykes: gabbro, (north-northwest trending dykes)

EARLY PROTEROZOIC (Gs - Bd)

BISHOP INTRUSIVE SUITE (Bg - Bd)

Bd Orthopyroxene-hornblende diorite, quartz diorite; minor gabbro; accessory biotite and actinolite; massive

Bg Biotite-hornblende monzogranite, syenogranite; minor granodiorite; K-feldspar megacrysts are common; generally massive, pink

McTAVISH SUPERGROUP (Du)

Du Dumas Group: siltstone, mudstone; thin bedded; minor sandstone, dolomite and pebbly conglomerate

------unconformity------

HEPBURN INTRUSIVE SUITE (Hg1 - Hs)

Hs Pyroxene-amphibole alkali feldspar syenite, hornblende-biotite monzonite, monzodiorite and quartz monzodiorite; titanite-bearing; massive

Hq Hornblende-biotite quartz diorite, diorite; minor monzogranite, tonalite, gabbro; often agmatic and poorly foliated (may be older than Ht2)

Hl Biotite leuco-monzogranite; massive, grey

Ht2 Biotite granodiorite; minor monzogranite, tonalite; often with marginal zone showing poikilitic K-feldspar megacrysts; weakly foliated, grey (may be younger than Hq)

Hg3 Biotite monzogranite, syenogranite; minor granodiorite; locally with large equant K-feldspar megacrysts, garnet and sillimanite; locally with foliated edges, grey

Ht1 Biotite tonalite, granodiorite; locally biotite monzogranite; well foliated, grey

Hg2 Biotite syenogranite, monzogranite; locally with large tabular K-feldspar megacrysts and garnet, commonly with metasedimentary xenoliths; foliated, grey

Hg1 Biotite-hornblende monzogranite; commonly with amphibolite xenoliths; well foliated, pink

CORONATION SUPERGROUP (Gs- Cg)

Cg Morel Sills: gabbro, granophyric gabbro; pigeonite-bearing

Ct Takiyuak Fm: lithic-feldspathic arenite; often cross-bedded; basal halokinetic breccia

------disconformity------

RECLUSE GROUP (Rf - Rc)

Rc Cowles Fm: calcareous argillite; well laminated; minor greywacke turbidites

Rk Kikerk Fm: calcareous concretionary argillite

Ra Asiak Fm: feldspathic-lithic greywacke turbidites, semipelite, thin graphitic pelite beds

Rf Fontano Fm: graphitic-sulfidic pelite, semipelite; well laminated

------disconformity------

EPWORTH GROUP (Eoc - Eru)

Rocknest Fm (Erl - Eru)

Eru Upper members (6 - 10): grey dolomite with unsilicified stromatolites, striped dark brown argillite and light orange dolomite beds, silicified stromatolite beds, reddish shale, intraclastic and oolitic dolomite, grey dolomite with silicified domal stromatolites

Erm Middle members (2 - 5): fine buff dololutites, pink chert, ooliths, thick grey intraclastic dolomite beds, shale: with large linked columnar stromatolites, conophyton stromatolites

Erl Lower member (1): intraclastic dolomite and shale cycles; with conophyton stromatolites, dark brown digitate rounded stromatolites

Odjick Fm (Eoc - Eop)

Eop Pelite, semipelite, thin quartzite beds; minor olistostromes

Eod Argillaceous dolomite; locally with unsilicified stromatolites; semipelite, pelite

Eom Basalt; massive and pillowed; pillow breccia, gabbro sills

Eoq Quartzite, argillaceous quartzite, semipelite

Eoc Conglomerate

------tectonic contact (?)------

AKAITCHO GROUP (As - Af)

Af Felsic volcaniclastic sediments, semipelite

Ar K-feldspar- or plagioclase-phyric rhyolite; flows and sills

Am Mafic volcaniclastic sediments, semipelite

Ab Basalt; pillowed and massive flows; mafic volcaniclastic sediments, gabbro

Ap Pelite, semipelite; minor gabbro, basalt

Ad Dolomite, semipelite

As Semipelite, pelite; minor gabbro, basalt

Aq Arkosic turbidites, feldspathic quartzites; minor basalt, gabbro

Ac Conglomerate

my Felsic and mafic protomylonite, mylonite, ultramylonite; protoliths may include high-grade Akaitcho Group units and/or Archean granites and gneisses; with sub-horizontal mineral lineation unless otherwise shown

------tectonic contact (?)------

GRANT GROUP (Gs - Gr)

Gr Rhyolite, felsic pyroclastics

Gb Basalt; pillowed and massive flows; gabbro, felsic pyroclastics

Gg Gabbro sills and dykes

Gs Semipelite, pelite

------unconformity------

ARCHEAN (Sg - Sgr)

Sgr Biotite monzogranite, syenogranite; accessory hornblende; amphibolite xenoliths; commonly foliated, local protomylonitic to mylonitic fabric

Sb Basalt; massive and pillowed flows; gabbro, intraflow silty and tuffaceous beds; minor dolomite

Sg Biotite-hornblende tonalitic to monzogranitic quartzofeldspathic gneiss

ARCHEAN? (gn)

gn Biotite or hornblende quartzofeldspathic gneisses, amphibolite; protoliths may include Akaitcho Group units and/or Archean granites and gneisses

SYMBOLS

Planar and linear structures:

- D_2 schistosity (inclined)
- D_2 crenulation lineation (plunging)
- D_1 schistosity (inclined)
- D_1 compositional foliation (inclined)
- D_1 mineral lineation (plunging)
- Bedding, tops known (inclined, overturned)
- Bedding, tops unknown (inclined)
- Pillow elongation, tops known (inclined)
- mylonitic foliation (inclined); protomylonite, mylonite, ultramylonite
- Archean basement compositional foliation (inclined)
- Geological boundary (defined; approximate in areas with pattern indicating significant Quaternary cover)

Folds (defined; approximate in areas with pattern indicating significant Quaternary cover):

- D_4 synform of tectonic foliation (upright; northwest-trending)
- D_4 antiform of tectonic foliation (upright; northwest-trending)
- D_3 synform of tectonic foliation (upright; east-northeast-trending)
- D_3 antiform of tectonic foliation (upright; east-northeast-trending)
- D_2 synform of tectonic foliation (upright to overturned; north-trending; arrow indicates plunge direction)
- D_2 antiform of tectonic foliation (upright to overturned; north-trending; arrow indicates plunge direction)
- D_1 syncline of bedding (upright; north-trending; arrow indicates plunge direction)
- D_1 anticline of bedding (upright; north-trending; arrow indicates plunge direction)
- D_1 minor fold of bedding or tectonic foliation (overturned to recumbent; with consistent east-verging asymmetry)

Faults (defined; approximate in areas with pattern indicating significant Quaternary cover):

- D_5 oblique-slip fault; arrows indicate relative motion where known
- D_5 normal fault: ornaments on hangingwall
- D_2 steep reverse fault; ornaments on hangingwall
- D_1 thrust fault; ornaments on hangingwall

Isograds based on mineral assemblages in pelites (defined; approximate in areas with pattern indicating significant Quaternary cover):

- K-feldspar + sillimanite
- Granitic pods
- Sillimanite + muscovite ± kyanite
- Andalusite + muscovite ± kyanite
- Staurolite + muscovite
- Biotite + muscovite

Geology by:

J.P. Grotzinger	1981 - 1983
P.F. Hoffman	1981 - 1983
J.E. King	1981 - 1983
A.E. Lalonde	1981 - 1983
M.R. St-Onge	1981 - 1983
R. Tirrul	1981 - 1983
S.A. Bowring	1986 - 1987
R.S. Hildebrand	1986 - 1987

Geological compilation and notes by: M.R. St-Onge, J.E. King and A.E. Lalonde, 1988.

Geological cartography by: M.R. St-Onge and L.T. Adamitz, 1988.

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1988: Geology, east-central Wopmay orogen, District of Mackenzie, Northwest Territories; Geological Survey of Canada, Open File 1923, 3 sheets, scale 1:125,000

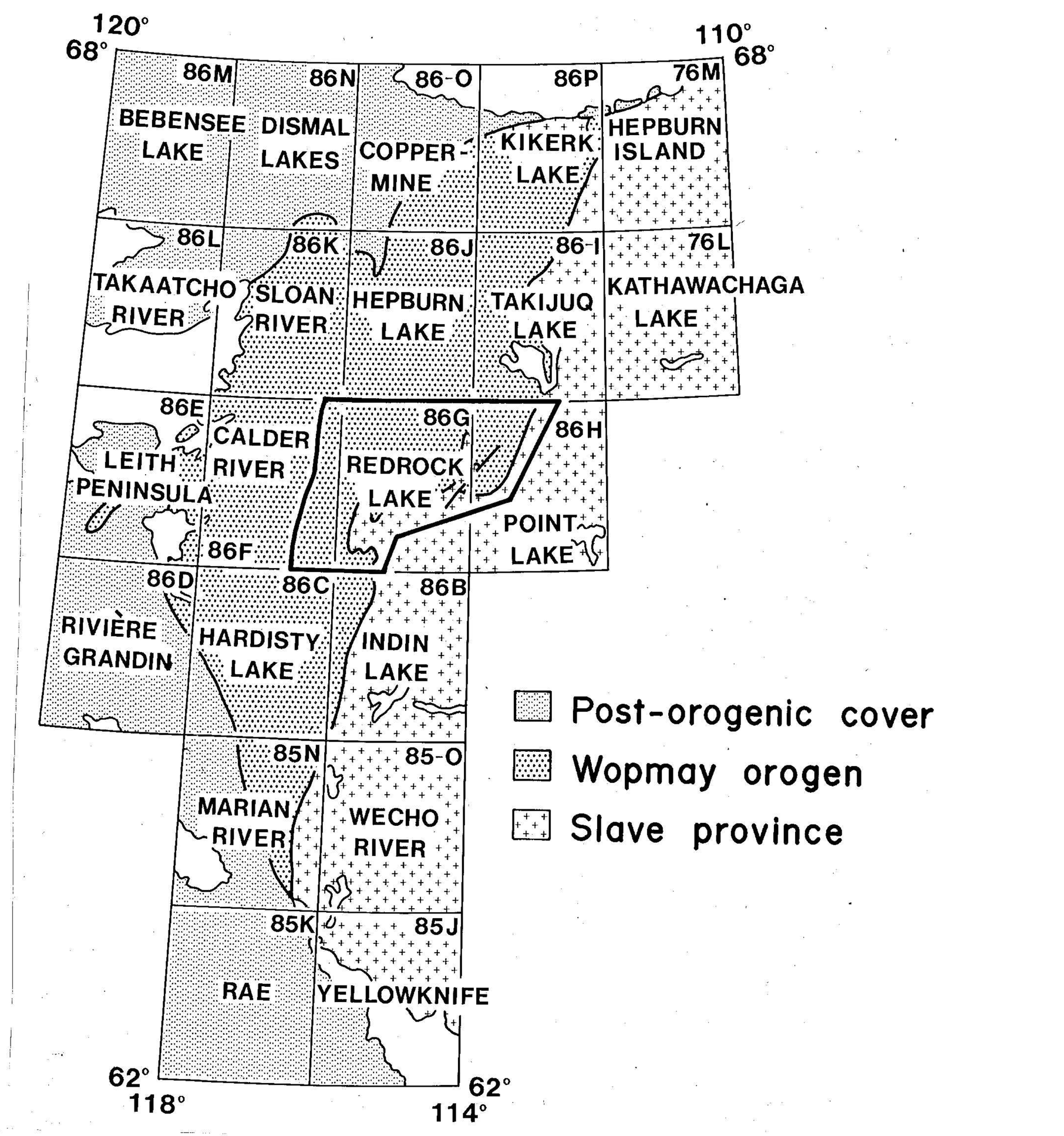


Figure 1. Location of the compilation map (outlined with heavy line) in the N.T.S system of map sheets for the northwest corner of the Canadian shield.

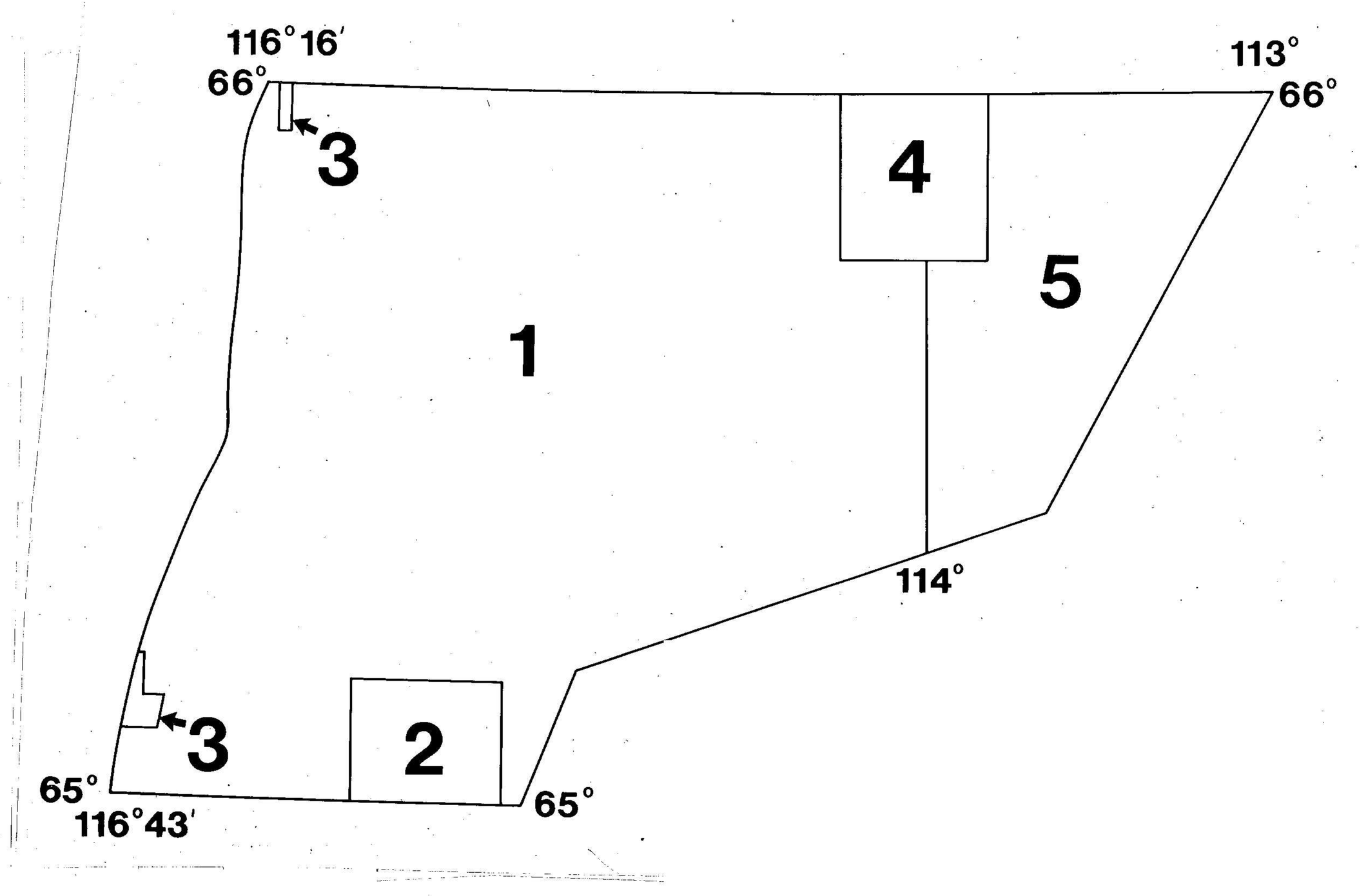


Figure 2. Sources of information:
1. ST-ONGE, M.R., KING, J.E., and LALONDE, A.E., 1983, unpublished 1:50,000 scale compilation maps based on 1981-1983 field work.
2- KING, J.E., BARRETT, P.D., and RELF, C.D.,1986, unpublished 1:50,000 scale compilation map based on 1986 field work.
3- HILDEBRAND, R.S. and BOWRING, S.A.,1987, unpublished 1:100,000 scale compilation map based on 1986-1987 field work.
4- TIRRUL, R., 1983, Structure cross-sections across Asiak foreland thrust and fold belt, Wopmay orogen, District of Mackenzie; Geological Survey of Canada Paper 83 - 1B, p. 199-260.
5- HOFFMAN, P.F., TIRRUL, R., and GROTZINGER, J.P., 1983, unpublished 1:250,000 compilation map based on 1981-1983 field work.

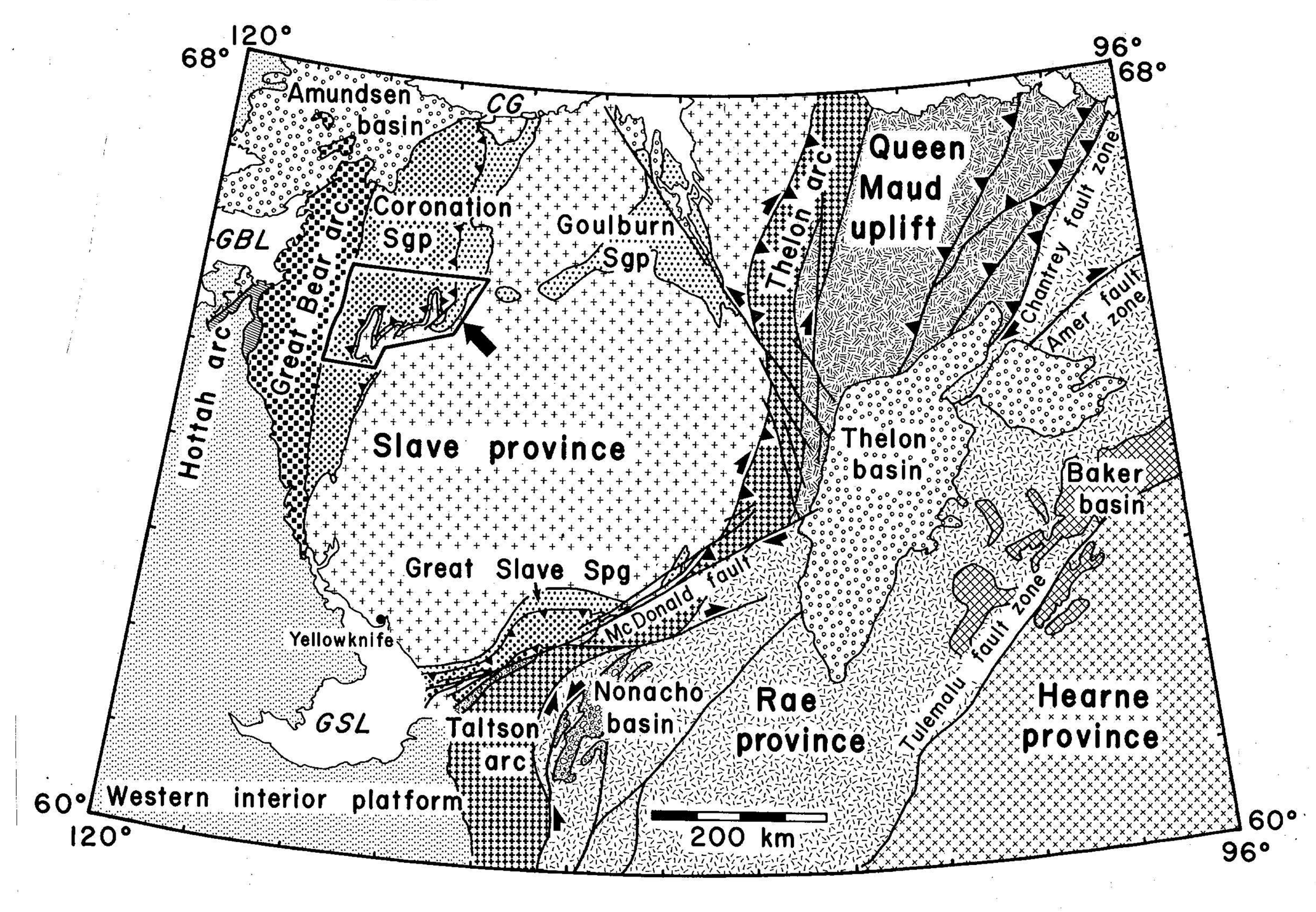


Figure 3. Tectonic elements of the northwestern Canadian shield (after Hoffman, 1988), showing location of map area (outlined with heavy line and arrow). Major thrust faults are identified by lines with teeth on hangingwall. Relative offsets on transcurrent faults are shown with half-arrow pairs.

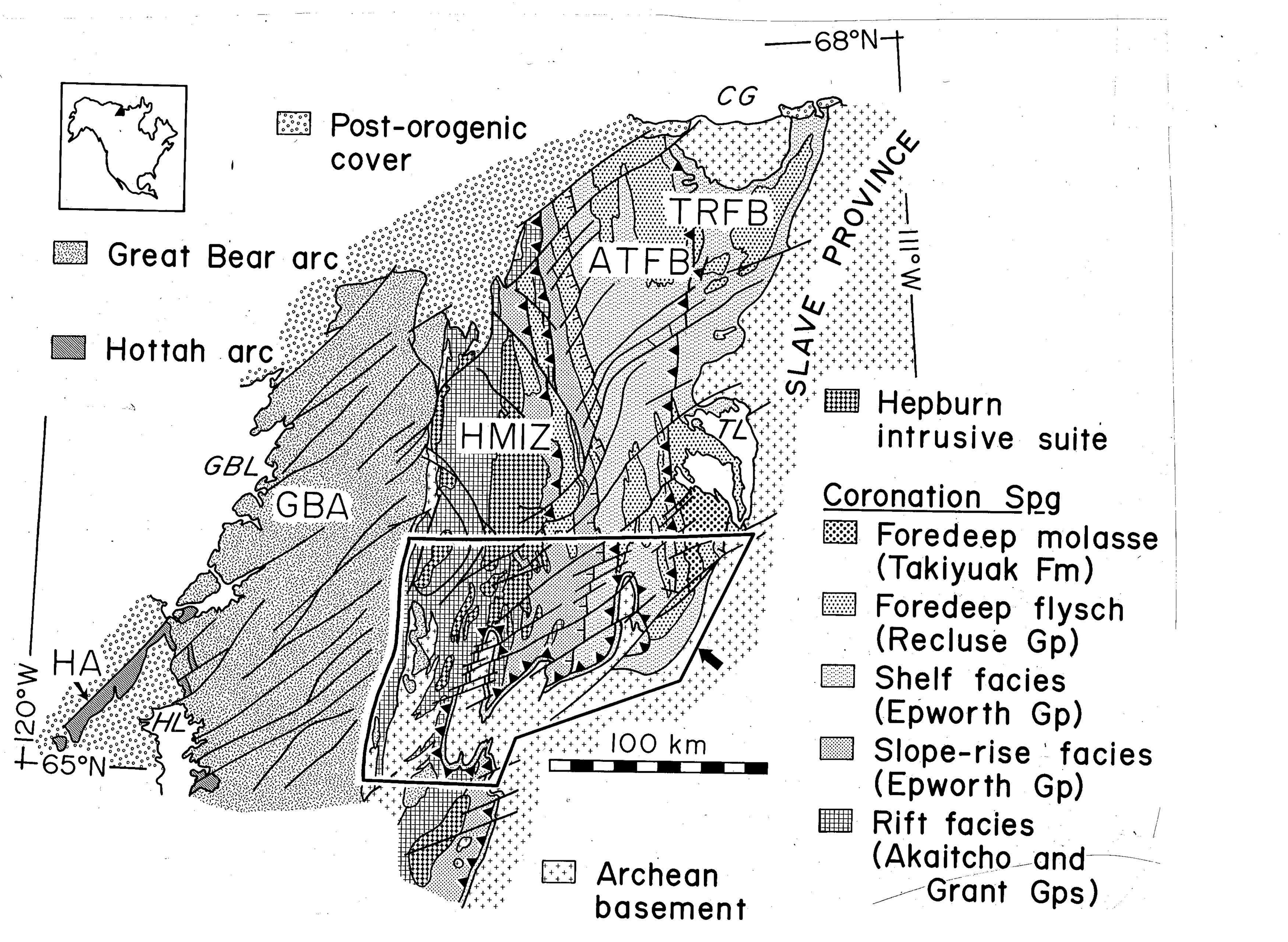


Figure 4. Simplified geologic map of northern Wopmay orogen (modified from Hoffman et al., 1988) showing location of map area (outlined with heavy line and arrow). Major (D_1) thrust faults are identified by lines with teeth on hangingwall. D_5 transcurrent faults are shown with heavy lines oriented northeast or northwest: TRFB, Tree River fold belt; ATFB, Asiak thrust-fold belt; HMIZ, Hepburn metamorphic-plutonic internal zone; GBA, Great Bear arc; HA, Hottah arc. Water bodies: Coronation Gulf (*CG*), Great Bear Lake (*GBL*), Hottah Lake (*HL*) and Takijuq Lake (*TL*).

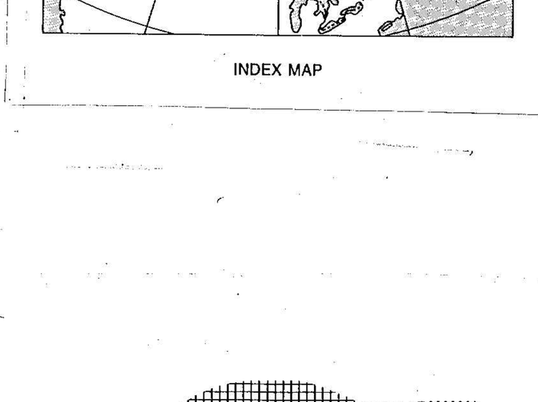
SHEET 3

GEOLOGY

EAST-CENTRAL WOPMAY OROGEN

DISTRICT OF MACKENZIE

NORTHWEST TERRITORIES



INDEX MAP

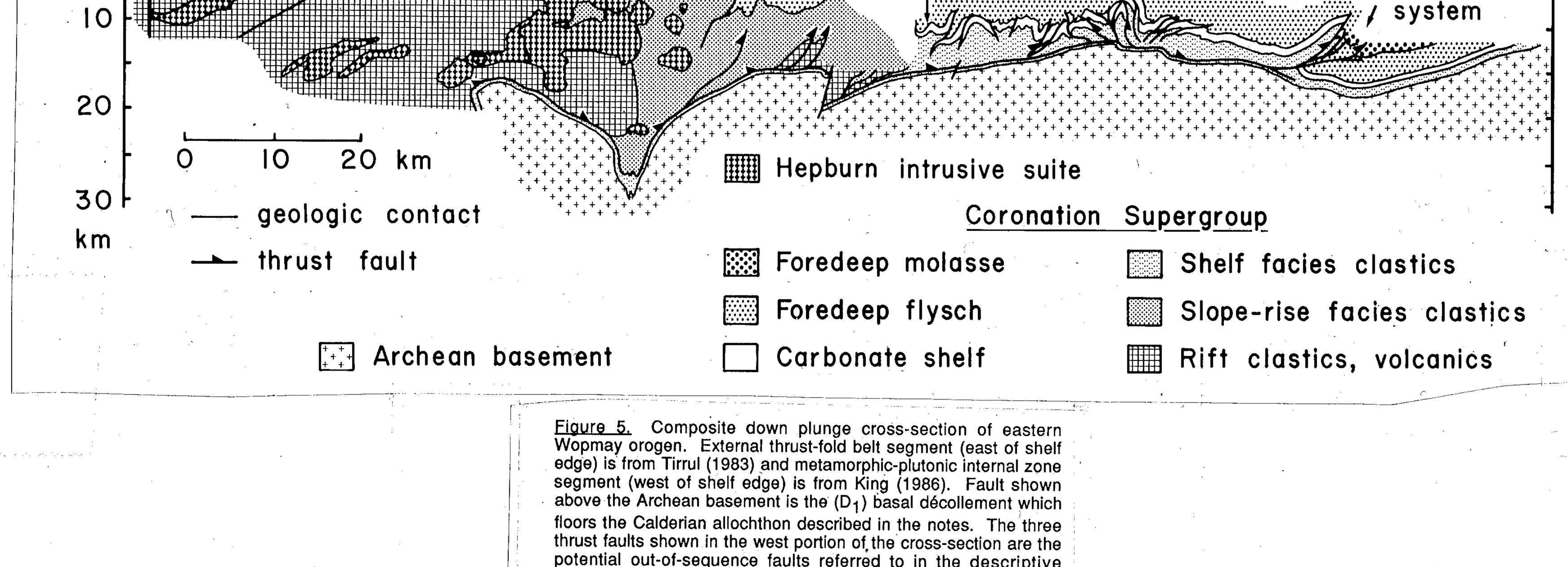


Figure 5. Composite down plunge cross-section of eastern Wopmay orogen. External thrust-fold belt segment (east of shelf edge) is from Tirrul (1983) and metamorphic-plutonic internal zone segment (west of shelf edge) is from King (1986). Fault shown above the Archean basement is the (D_1) basal décollement which floors the Calderian allochthon described in the notes. The three thrust faults shown in the west portion of the cross-section are the potential out-of-sequence faults referred to in the descriptive notes. Patterns for rock units are identical to those of Figure 4.

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