GEOLOGICAL SURVEY OF CANADA — COMMISSION GÉOLOGIQUE DU CANADA

DEPARTMENT OF ENERGY, MINES AND RESOURCES
MINISTÈRE DE L'ÉNERGIE, DES MINES ET DES RESSOURCES

THE NORTHERN INTERNIDES OF WOPMAY OROGEN

(SLOAN RIVER, HEPBURN LAKE AND PART OF COPPERMINE MAP-AREAS, N.W.T.)

Scale 1:250,000

Kilometres 6 0 6 12 18 Kilometres
Miles 4 0 4 8 Miles

Universal Transverse Mercator Projection

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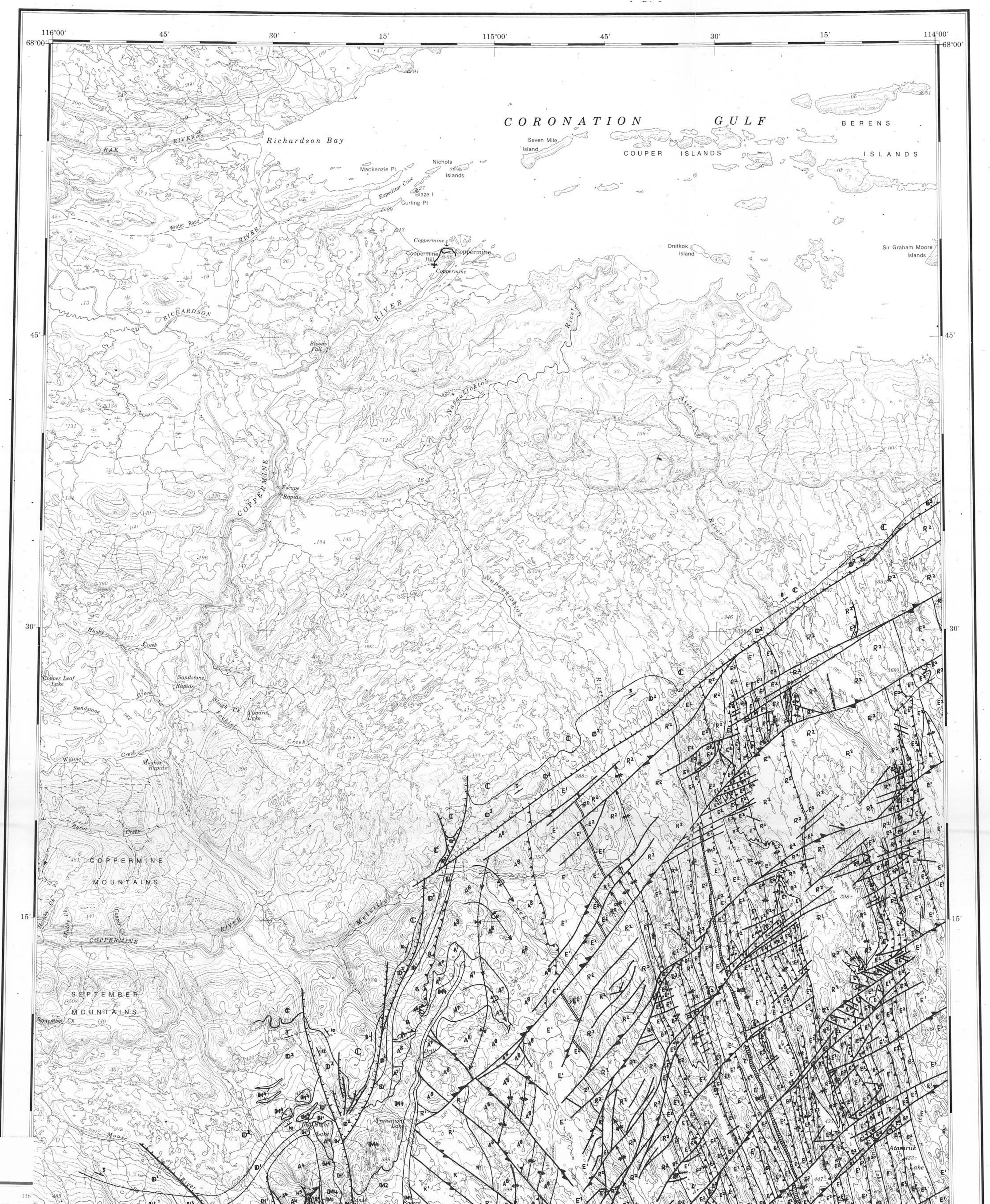


Table of Formations

MIDDLE PROTEROZOIC

COPPERMINE RIVER GROUP (C)

- C — COPPER CREEK: basalt flows; minor intercalated sandstone
- MACKENZIE DYKES: diabase, gabbro (north-northwest trending dykes)

MUSKOX INTRUSION (M^1 - M^4)

- M^4 — gabbro, granophyric gabbro, granophyre, xenolithic granophyre; minor pyroxenite (websterite)
- M^3 — pyroxenite (websterite), orthopyroxenite, clinopyroxenite; minor gabbro, peridotite
- M^2 — serpentinized dunite, peridotite, feldspathic peridotite; minor pyroxenite
- M^1 — bronzite gabbro, picrite, feldspathic peridotite (feeder dyke and border zone)

DISMAL LAKES GROUP (D^1 - D^2)

- D^2 — dolomite, in part stromatolitic; minor red mudstone at base
- D^1 — pure quartz sandstone; minor black shale, conglomerate
- W^1 — WESTERN CHANNEL SHEETS: diabase, gabbro (gently dipping sheets)
- diabase, gabbro (northeast trending dykes)
- CLEAVER DYKES: diabase, gabbro (west-northwest trending dykes)

HORNBY BAY GROUP (H^1 - H^3)

- H^3 — LADY NYE: quartz sandstone; minor quartz-pebble conglomerate
- H^2 — FAULT RIVER: reddish feldspathic sandstone, siltstone, polymictic conglomerate
- H^1 — BIGBEAR: feldspathic sandstone, quartz sandstone; minor polymictic conglomerate

EARLY PROTEROZOIC

GREAT BEAR INTRUSIVE SUITES (G^1 - G^4)

- G^4 — hornblende diorite, quartz diorite; minor pegmatitic granite
- G^3 — coarse grained biotite syenogranite, monzogranite
- G^2 — hornblende-biotite granodiorite, monzogranite
- G^1 — hornblende-biotite quartz monzodiorite, quartz monzonite

McTAVISH SUPERGROUP (M^1 - M^0)

- M^0 — biotite gabbro (altered) (correlation with McTavish Supergroup uncertain)
- M^9 — plagioclase-quartz porphyry near Great Bear Lake, plagioclase-hornblende porphyry near McLaren Lake, K-feldspar-plagioclase-quartz porphyry near Augustus Lake (various ages)
- M^8 — PERRAULT: dacite-rhyodacite ignimbrite, feldspathic-lithic sandstone, polymictic conglomerate, silty mudstone, basalt
- M^7 — DUMAS: silty mudstone, megacrystic "golf-ball" rhyolite porphyry, basalt; minor conglomerate, sandstone
- M^6 — JACIAR: dacite-rhyolite ignimbrite and lava flows, polymictic conglomerate, feldspathic-lithic sandstone, silty mudstone; minor basalt
- M^5 — McLAREN: andesite-dacite-rhyodacite ignimbrite and lava flows
- M^4 — SLOAN: rhyodacite-rhyolite ignimbrite; minor rhyolite lava flows (M^4r); feldspathic-lithic sandstone, conglomerate
- M^3 — DOMEX: dacite-rhyodacite ignimbrite, sills of dacite-rhyodacite porphyry; includes some dacite ignimbrite units stratigraphically within M^4
- M^2 — CAMERON BAY, FENIAK: feldspathic-lithic sandstone, polymictic conglomerate, dacite-rhyodacite-rhyolite ignimbrite, andesite-dacite-rhyolite lava flows, silty mudstone; minor dolomite
- M^1 — PORT RADIUM, ECHO BAY: andesite and basaltic andesite lava flows, reworked andesitic sandstone, andesite porphyry; basal mudstone with silicified tuff, minor rhyolite(?) lava flows

HEPBURN INTRUSIVE SUITE (H^1 - H^9)

- H^9 — biotite gabbro, biotite bronzite gabbro, pegmatitic granite; minor anorthosite, pyroxenite, peridotite
- H^8 — hornblende-biotite diorite, pegmatitic granite; minor hornblendite
- H^7 — alaskite (fine-grained leucocratic granite-granodiorite)
- H^6 — hornblende-biotite quartz diorite; minor pegmatitic granite
- H^5 — coarse grained biotite syenogranite
- H^4 — biotite-hornblende tonalite; minor megacrystic (K-feldspar) granodiorite
- H^3 — biotite granodiorite (includes some tonalite with scattered pockets of syenogranite)
- H^2 — garnet-rich megacrystic (K-feldspar) granite, granodiorite; minor tonalite
- H^1 — biotite granite, megacrystic (K-feldspar) granite

OKRARK SILLS (O^1 - O^2)

- O^2 — K-feldspar-plagioclase-quartz porphyry sills and laccoliths; minor undifferentiated Akaitcho Group meta-sediments
- O^1 — plagioclase-phyric rhyolite porphyry

CORONATION SUPERGROUP (A^1 - R^2)

RECLUSE GROUP (R^1 - R^2)

- R^2 — feldspathic-lithic greywacke (ASIAK), semi-pelite, thin graphitic pelite (FONTANO) at base; meta-gabbro sills
- R^1 — laminated graphitic pelite (FONTANO); minor greywacke (ASIAK), semi-pelite; meta-gabbro sills

EPWORTH GROUP (E^1 - E^2)

- E^2 — ROCKNEST: cherty stromatolitic dolomite, reddish argillaceous dolomite; meta-gabbro sills
- E^1 — ODJICK: semi-pelite, quartzite; minor conglomerate, argillaceous dolomite, graphitic pelite; meta-gabbro sills

AKAITCHO GROUP (A^1 - A^8)

Cloos Nappe (A^7 - A^8)

- A^8 — STANBRIDGE: cherty arenaceous dolomite; stromatolitic shallow water facies in south, deepwater allodapic breccia and black pelite facies in north. VAILLANT: massive, pillowed and fragmental meta-basalt; meta-gabbro; minor arkose, pelite, dolomite, ironstone, rhyolite
- A^7 — DRILL: arkosic grit, black pelite, mafic tuff, quartz-pebble conglomerate with outsize dolomite clasts, meta-gabbro

Marceau Nappe (A^4 - A^6)

- A^6 — olive pelite, impure mafic tuff, meta-basalt, meta-gabbro sills, Okrark rhyolite porphyry sills; minor carbonate, feldspathic-lithic sandstone, conglomerate
- A^5 — massive, pillowed and fragmental meta-basalt; meta-gabbro; minor rhyolite
- A^4 — rhyolite, arkose, meta-gabbro sills

Okrark Nappe (A^2 - A^3)

- A^3 — BELLEAU: pillowed and massive meta-basalt, meta-gabbro; minor rhyolite, chert, pelite
- A^2 — ZEPHYR: arkosic turbidites, semi-pelite; minor meta-basalt, meta-gabbro, mafic tuff

High-grade thrust blocks (A^1)

- A^1 — migmatite derived from Akaitcho Group arkose, semi-pelite, mafic tuff, meta-basalt, meta-gabbro, marble, and from minor Okrark Sills

ARCHEAN

Basement in Cloos Nappe (B^1)

- B^1 — BADLANDS GRANITE: altered tourmaline-bearing, hornblende-biotite monzogranite; abundant syenogranite pegmatite

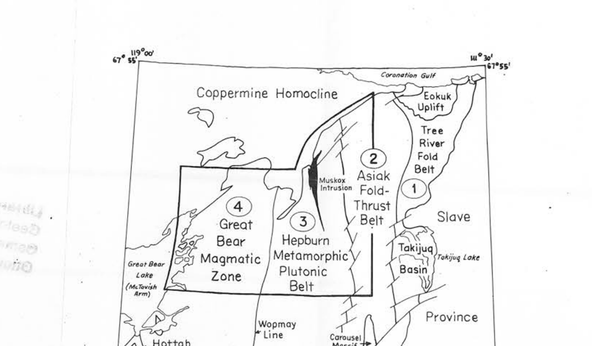
LEGEND

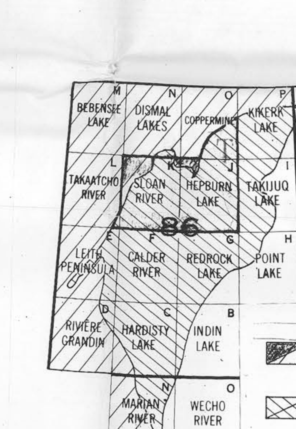
Planar structures:
- primary bedding (upright, inverted)
- eutaxitic structure in ignimbrite
- tectonic foliation
- geologic contact (sharp, gradational)

Folds:
- plunging anticline in bedding (upright, recumbent)
- " syncline in bedding (upright, recumbent)
- " antiform in tectonic foliation
- " synform in tectonic foliation

Faults:
- D5 normal fault (ticks on hanging wall)
- D4 thrust fault (barbs on hanging wall)
- D4 oblique thrust (barbs on hanging wall)
- D4 strike-slip fault (barbs give relative motion)
- ?D3 reverse fault (barbs on hanging wall)
- D1 thrust fault (barbs on hanging wall)

Metamorphic isograds (based on mineral assemblages in pelite):
- K-feldspar + sillimanite appear
- granitic melt-pods appear
- sillimanite appears
- andalusite appears
- staurolite appears
- biotite (microscopic) appears
- retrograde aureole around Muskox Intrusion

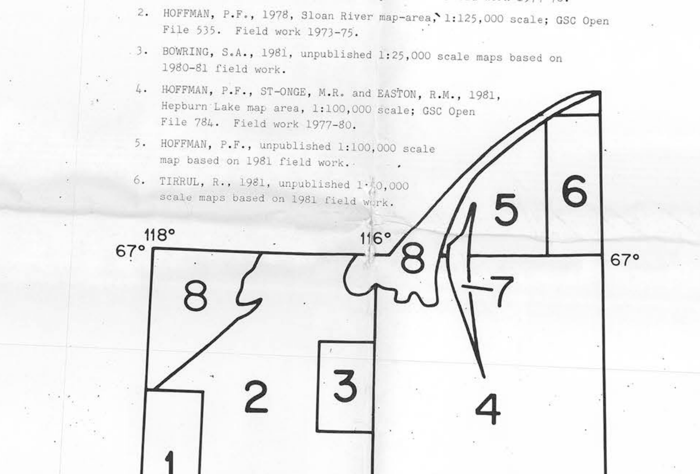




- younger rocks
- Wopmay Orogen
- older rocks (Slave Province)

SOURCES OF INFORMATION

1. HILDEBRAND, R.S., in press, Vance Peninsula and MacAlpine Channel map-areas, 1:50,000 scale; GSC Map 0000A. Field work 1977-78.
2. HOFFMAN, P.F., 1978, Sloan River map-area, 1:125,000 scale; GSC Open File 535. Field work 1973-75.
3. BOWRING, S.A., 1981, unpublished 1:25,000 scale maps based on 1980-81 field work.
4. HOFFMAN, P.F., ST-ONGE, M.R. and EASTON, R.M., 1981, Hepburn Lake map area, 1:100,000 scale; GSC Open File 784. Field work 1977-80.
5. HOFFMAN, P.F., unpublished 1:100,000 scale map based on 1981 field work.
6. TIRRUL, R., 1981, unpublished 1:50,000 scale maps based on 1981 field work.



7. SMITH, C.H., IRVINE, T.N. and FINDLAY, D.C., 1967, Muskox Intrusion, scale 1:63,360; GSC Maps 1213A and 1214A.
8. KERANS, C. and ROSS, G.M., 1980, Sloan River, Takaatcho River, Bebensee Lake and Dismal Lakes map area, scale 1:500,000; Department Indian Affairs and Northern Development, Open File 80 EM-1980-2, Yellowknife, N.W.T.
" BARAGAR, W.R.A. and DONALDSON, J.A., 1973, Coppermine and Dismal Lakes map area, scale 1:250,000; GSC Maps 1337A and 1338A.

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Scale: 1:250,000
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EXPLANATION

This map was compiled from results of more detailed mapping projects (1:25,000 to 1:125,000 scales) done between 1973 and 1981 in the Early Proterozoic Wopmay Orogen (Fig. 1), on the west side of the Archean Slave Province in the northwest of the Canadian Shield. The area is located about 400 km north of Yellowknife, capital of the Northwest Territories and principal logistical centre for this part of the western Arctic. The Coppermine River is mostly flat water within the map area and affords an excellent cross section of the orogen. The Coppermine River valley, most prominent topographic break in the glacially-scoured bedrock peneplain, was the site of a Quaternary proglacial lake and associated deltas, the deposits of which are being incised by the Recent river system (D.A. St-Onge, 1981). In the valley and a few other places where Quaternary deposits are present, the bedrock geology was interpreted with the assistance of 1:50,000 scale aeromagnetic maps published by the Geological Survey in 1981. Most of the geology was mapped by ground-level traverses at a spacing of 5 km or less, and interpolated between traverses by airphoto interpretation. The original sources of geological data (Fig. 2) should be consulted for structural data and lithological details not shown at this scale.

Wopmay Orogen consists of five tectonic zones (Fig. 3), of which the three central ones occur in this map area. Essentially, Zones 2 and 3 comprise the allochthonous shelf and slope-rise facies respectively of a collided continental-margin prism flanking the Slave Province, Zone 4 is a younger Andean-type magmatic arc, and all three zones have been affected by terminal collision to the west (Hoffman, 1980). The syn-tectonic Hepburn Intrusive Suite provides a minimum age of 1.90 Ga for the first collision, perhaps involving Hottah Terrane, and the succeeding (Great Bear) magmatic arc was active around 1.87 Ga, according to U/Pb zircon studies (Van Schmus and Bowring, 1980).

The continental-margin prism (Coronation Supergroup) accumulated in three tectono-depositional stages, corresponding to the Akaitcho, Epworth and Recluse groups. The Akaitcho Group, limited to Zone 3, is a complex assemblage many kilometres in thickness of submarine arkosic meta-sediments, tholeiitic meta-basalt and subordinate meta-rhyolite (Easton, 1981), capped in Cloos Nappe by stromatolitic dolomite reefs and fore-reef talus breccias. The Akaitcho Group accumulated in an active rift zone caused by east-west extension of the Archean granitic basement, now exposed in this map area only at the north end of Muskox Intrusion. The Epworth Group is a sedimentary prism of "passive-margin" type, the 2-km-thick shelf facies of which onlaps the Archean basement in Zone 2 (St-Onge et al., 1982) and correlative continental slope and rise facies overlie the top of the Akaitcho Group in Zone 3. The shelf break, defining the Zone 2-3 boundary, is marked by an abrupt facies change and westward pinchout of the Rocknest Formation (map unit E^2), a profusely stromatolitic peritidal dolomite, and a more gradational westward-deepening facies change in the underlying Odjick Formation, which consists of craton-derived clastics. The Recluse Group sharply overlies the Epworth Group and consists of many kilometres thickness of hemipelagic pelite and turbidites of non-volcanic feldspathic-lithic greywacke, deposited in an eastward migrating foredeep fed axially from the north such that more distal facies (map unit R^1) occur in Zone 3 and more proximal facies (map unit R^2) in Zone 2. The foredeep resulted from attempted westward subduction of the margin and consequent collisional foreshortening (D1) of the marginal prism. A swarm of gabbro sills (not shown at this scale), most numerous near the shelf break, intruded the Epworth and Recluse Group just prior to D1 deformation. The Okrark Sills (map units O^1 and O^2) and perhaps some of the mafic sill swarms (not shown) intruding the Akaitcho Group may be of the same age.

The D1 deformation involves east-west shortening, vertical thickening and eastward translation of the Coronation Supergroup relative to the Slave Province (Fig. 3). The very limited extent of basement involvement at the present level of erosion is noteworthy. In most areas, D1 deformation evolved from eastward-directed thrusting to tight upright folding with wavelengths mostly too small to be shown at this scale. In the Akaitcho Group, the thrusts are largely replaced by early eastward-facing recumbent folds which, like the thrusts, have been refolded. The compositionally diverse, in part peraluminous, granitoids of the Hepburn Intrusive Suite were emplaced in Zone 3 as D1 deformation waned, analogous in tectonic setting to the Neogene granitoids of the Himalayas. Isograds, related to prograde thermal metamorphism concentric with the early mesozonal intrusions of the suite (map units H^{1-3}), crosscut and must post-date the D1 thrusts in Zone 3, but are affected by the upright D1 folds, with which the dominant tectonic lineation in the metamorphic rocks is coaxial. The early intrusions and high-grade rocks peripheral to them possess a gently-dipping syn-plutonic foliation that is superimposed upon and also affected by upright D1 folds. Early D1 folds and associated steeply-dipping cleavage are recumbently refolded in the high-grade rocks about axial surfaces coplanar with the syn-plutonic foliation. Younger intrusions of the suite (map units H^{4-9}) are more epizonal in character, more discordant with the regional metamorphic isograds and less strongly foliated. The isograds dip inward beneath Hepburn Batholith, the cluster of plutons medial to Zone 3, indicating a funnel-shaped profile but dip outward east of the truncated batholith on the west margin of the zone (St-Onge, 1981). The D1 foreshortening of the marginal prism and consequent generation, mainly by crustal melting, of the Hepburn Intrusive Suite may have been caused by collision of the Hottah Terrane (Fig. 3) with the Slave Province margin.

A subsequent deformation (D2), mainly developed in the Tree River Foldbelt (Fig. 3) of Zone 1, may be responsible for a broad east-west trending structural arch west of Coppermine River at the latitude of Marceau Lake (66°25'N) which, east of the river, trends northeast toward the basement promontory north of Takijuq Lake (Fig. 3). This transverse arch is documented by the variation along strike in exposed stratigraphic level in Zone 2, the plunge of D1 folds and lineations, the westward deflection of D1 thrust traces in Zone 3, the narrowing of Hepburn Batholith exposing the stem of the plutonic funnel, and the changes in sequence of the "K-feldspar + sillimanite" and "granitic melt-pods" isograds that imply an increase in metamorphic pressure of at least 1 kb across the arch (M.R. St-Onge, in prep.). The origin of D2 deformation is uncertain but its age must be very close to that of the north-northwest directed thrust nappes affecting the Great Slave Supergroup in Athapuscow Aulacogen (Hoffman et al., 1977; Hoffman, 1981), which are probably related to a collision in the Churchill Province.

The Great Bear Magmatic Zone developed after the first collision (D1), probably after D2, and consists of folded calc-alkaline volcanic rocks and subordinate continental sediments, little metamorphosed, intruded by epizonal granitoids of which some are comagmatic with, and some younger than, the volcanics (Hoffman and McGlynn, 1977; Hildebrand, 1981). The McTavish Supergroup consists of many overlapping sequences, each several kilometres in thickness, of which only the LaBine, Jaciar, Dumas and Perrault groups have been mapped in detail. The volcanics are dominantly dacite-rhyodacite-rhyolite ignimbrites and related intrusive porphyries, remnants of andesitic stratovolcanoes, and subordinate rhyolite flow-domes and high-Al_2O_3, low-TiO_2 flood basalts. Toward the margins of the magmatic zone, the volcanics are intercalated with sediments derived mainly from volcanic and plutonic rocks within the zone. Although the Dumas Group (map unit M^7) is near the top of the overall stratigraphic sequence, which appears to get younger from west to east, it unconformably onlaps granitoids of the Hepburn Intrusive Suite along much of the Zone 3-4 boundary. This important unconformity is well exposed at Latitude 66°19'N, just south of the Sloan River crossing. The supergroup is strongly folded about northwest-southeast trending axes which, even with the effect of younger (D4) rotations removed, are oblique to the regional north-south trend of the zone and suggest a deformation (D3) by dextral transpression parallel to the zone. The north-south faults near the western limit of Zone 3, tentatively interpreted as high-angle reverse faults, may also be related to D3 deformation but their timing is not well established.

The extensive epizonal plutonic rocks of the Great Bear Magmatic Zone are divided into four suites on the basis of lithology and local age relationships. The G^1 suite comprises laccoliths that characteristically have lower quartz contents than succeeding intrusions and have strong alteration haloes. The G^1 and G^2 suites are at least partly synvolcanic, and they are affected by the D3 folds. The G^2 granitoids are distinct lithologically from rocks of similar composition in the Hepburn Intrusive Suite by the dominance of hornblende over biotite. The G^3 and G^4 suites post-date the D3 folding, and have no preserved volcanic equivalents. The G^3 syenogranites are lithologically similar to the H^7 granite of the Hepburn Intrusive Suite and are identified in the southwest corner of Zone 3 on the basis of low-grade Dumas Group xenoliths. A swarm of north-northeast trending rhyolite porphyry dykes converges on the south tip of the G^3 granite at Spence Lake, cutting the G^2 but not the G^3 plutons. Anomalous ductile strain, probably related to D4 deformation, is prevalent in the southeast corner of Zone 4 and affects even the G^4 diorites. The McTavish Supergroup and the two oldest plutonic suites are interpreted as products of an Andean-type magmatic arc related to eastward subduction of oceanic lithosphere west of the Hottah Terrane following its collision with the Slave Province. The cessation of calc-alkaline magmatism, onset of D3 transpression, and perhaps consequently the generation of anatectic G^3 granites might have been caused by ridge subduction and resulting change in relative plate motion prior to terminal collision.

The last significant compressional deformation (D4), presumably related to terminal collision west of the Hottah Terrane, is manifested by a remarkable system of transcurrent faults and arcuate east-convex thrusts that post-date the G^4 intrusions and pre-date the Cleaver Dykes and probably all of the Hornby Bay Group, basal sequence of the Coppermine Homocline (Fig. 3). The transcurrent faults form a conjugate system of northeast trending right-slip and northwest trending left-slip faults. The bulk strain is mainly east-west shortening and north-south extension, with a small clockwise rotation resulting from the predominance of right-slip over left-slip faults, perhaps an "edge effect" of the more rigid Slave Province. The deformation is achieved by counterclockwise rotation of dextral shear fractures and clockwise rotation of sinistral ones, in other words rotations away from the direction of maximum compression. The effect of these rotations on older structures is well illustrated on the map. The arcuate D4 thrusts may have evolved from major transcurrent faults that became linked by north-south zones of eastward-directed thrusting, a significant deviation from the prevailing horizontal plane strain. The D4 thrusts west of the Muskox Intrusion and on the Zone 3-4 boundary between Benoit and Perrault lakes may be localized at sinistral "steps" in a dextral fault system extending from the Tilchuse River to the northeast corner of the map area. The thrust zone north of Vaillant Lake in the southeast part of the map area bounds a "quiet" area, lacking transcurrent faults, to the west and an area of extreme fault rotations to the east. The bilobate thrust at Wentzel Lake in the southwest corner of Zone 3 juxtaposes mineral assemblages that differ by at least 3 kb in metamorphic pressure in the Redrock Lake map area (St-Onge et al., 1982). Post-orogenic extensional reactivation of the D4 thrusts accounts for the graben-like outliers of Hornby Bay Group sandstone that occur preferentially along the thrust traces. Regionally, the D4 deformation is probably coeval with major transcurrent motion on the sinistral Bathurst and dextral McDonald fault systems, which extend over 500 km into the craton east of the orogen.

The onlapping post-orogenic sediments of the Hornby Bay and Dismal Lakes groups are well described by Kerans et al. (1981). The three siliciclastic formations of the Hornby Bay Group were deposited by fluvial systems that flowed to the southeast (Bigbear), southwest (Fault River) and west (Lady Nye) successively. There are regoliths in the basement (Wopmay Orogen) rocks beneath all three systems but by far the deepest is associated with the Fault River Formation. Fossil karst breccias are developed in the Rocknest Formation dolomite beneath the basal surface of the Dismal Lakes Group. The Cleaver Dykes and Western Channel gabbro sheets both post-date D4 faulting, but only the sheets are observed cutting the Hornby Bay Group. One or both might be related to the Narakay Volcanic Complex (Ross, 1982) in the northwest part of Takaatcho River map area (Fig. 1), which occurs stratigraphically in the upper Hornby Bay Group. The Muskox Intrusion is a funnelform layered ultramafic-mafic intrusion exposed obliquely from roof to feeder dyke due to the regional tilt of the Coppermine Homocline (Irvine and Baragar, 1972). Its emplacement is dated stratigraphically by a karst horizon near the top of the Dismal Lakes Group (Kerans, in prep.). Scientific drilling and subsequent petrologic studies of this intrusion have led to significant new concepts concerning magmatic processes in igneous intrusions (Irvine, 1980).

Extrusion of the thick Coppermine River Group flood basalts was accompanied by extension normal to the Muskox Intrusion and Mackenzie Dykes. This deformation (D5) is manifested in rocks below the lavas by north-northwest trending normal faults and extensional reactivation of D4 thrusts. The age of faulting is bracketed as post-Muskox Intrusion and pre-Rae Group (Baragar and Donaldson, 1973). The northward 3-7° tilting of Coppermine Homocline (D6) occurred sometime after deposition of the Rae Group, which overlies the Coppermine River Group (Baragar and Donaldson, 1973).

The compiler wishes to acknowledge the exceptional dedication of all those whose mapping is represented here, and the free flow of data and ideas among us. These notes were prepared with the knowledge of a large number of unpublished high-precision U/Pb zircon ages covering most of the igneous suites in the orogen, obtained by Samuel A. Bowring and W.R. Van Schmus at University of Kansas, Lawrence. Any corrections or additions to the geology would be welcomed by the compiler.

REFERENCES

Baragar, W.R.A. and Donaldson, J.A.
1973: Coppermine and Dismal Lakes map areas; Geological Survey of Canada, Paper 71-39, 20 p. and Maps 1337A and 1338A.

Easton, R.M.
1981: Stratigraphy of the Akaitcho Group and the development of an early Proterozoic continental margin, Wopmay Orogen, Northwest Territories; in F.H.A. Campbell, ed., Proterozoic Basins of Canada; Geological Survey of Canada, Paper 81-10, p. 79-95.

Hildebrand, R.S.
1981: Early Proterozoic LaBine Group of Wopmay Orogen: remnant of a continental volcanic arc developed during oblique convergence; in F.H.A. Campbell, ed., ibid., p. 133-156.

Hoffman, P.F.
1980: Wopmay Orogen: a Wilson cycle of early Proterozoic age in the northwest of the Canadian Shield; in D.W. Strangway, The Continental Crust and Its Mineral Deposits; Geological Association of Canada, Special Paper 20, p. 523-552.
1981: Autopsy of Athapuscow Aulacogen: a failed arm affected by three collisions; in F.H.A. Campbell, ed., ibid., p. 97-102.

Hoffman, P.F. and McGlynn, J.C.
1977: Great Bear Batholith: a volcano-plutonic depression; in W.R.A. Baragar, L.C. Coleman and J.M. Hall, eds., Volcanic Regimes in Canada; Geological Association of Canada, Special Paper 16, p. 169-192.

Hoffman, P.F., Bell, I.R., Hildebrand, R.S. and Thorstad, L.
1977: Geology of Athapuscow Aulacogen, East Arm of Great Slave Lake, District of Mackenzie; in Report of Activities, Part A, Geological Survey of Canada, Paper 77-1A, p. 117-129.

Irvine, T.N.
1980: Magmatic infiltration metasomatism, double-diffusive fractional crystallization, and adcumulus growth in the Muskox Intrusion and other layered intrusions; in R.B. Hargraves, ed., Physics of Magmatic Processes; Princeton University Press, Princeton, New Jersey, p. 325-383.

Irvine, T.N. and Baragar, W.R.A.
1972: Muskox intrusion and Coppermine River lavas, Northwest Territories, Canada; XXIV International Geologic Congress (Montreal), Excursion A29, 70 p.

Kerans, Charles
Timing of emplacement of the Muskox Intrusion: constraints from the Hornby Bay-Dismal Lakes Group cover strata; Canadian Journal of Earth Sciences (in preparation).

Kerans, C., Ross, G.M., Donaldson, J.A. and Geldsetzer, H.J.
1981: Tectonism and depositional history of the Helikian Hornby Bay and Dismal Lakes Groups, District of Mackenzie; in F.H.A. Campbell, ed., ibid., p. 157-182.

Ross, G.M.
1982: The Narakay Volcanic Complex: mafic volcanism in the Helikian Hornby Bay Group of Deane Arm, Great Bear Lake: a preliminary report of depositional processes and tectonic significance; in Current Research, Part A, Geological Survey of Canada, Paper 82-1A, p. 329-340.

St-Onge, D.A.
1980: Glacial Lake Coppermine, north-central District of Mackenzie, Northwest Territories; Canadian Journal of Earth Sciences, v. 17, p. 1310-1315.

St-Onge, M.R.
1981: "Normal" and "inverted" metamorphic isograds and their relation to syntectonic Proterozoic batholiths in the Wopmay Orogen, Northwest Territories, Canada; Tectonophysics, v. 76, p. 295-316.
Geothermometry and geobarometry in pelitic rocks of the north-central Wopmay Orogen (early Proterozoic), Northwest Territories, Canada; Geological Society of America Bulletin (in preparation).

St-Onge, M.R., King, J.E. and Lalonde, A.E.
1982: Geology of the central Wopmay Orogen (early Proterozoic), Bear Province, District of Mackenzie: Redrock Lake and the eastern portion of Calder River map areas; in Current Research, Part A, Geological Survey of Canada, Paper 82-1A, p. 99-108.

Van Schmus, W.R. and Bowring, S.A.
1980: Chronology of igneous events in the Wopmay Orogen, Northwest Territories, Canada; in Abstracts with Programs, Geological Society of America, v. 12, p. 540.

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