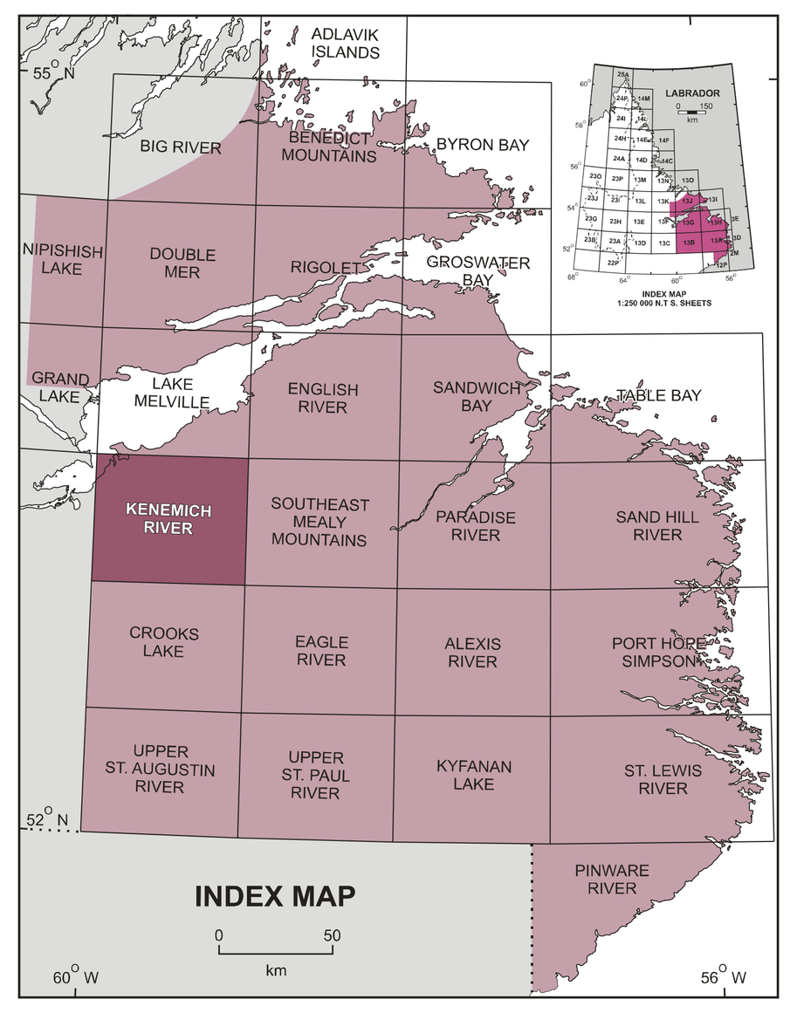
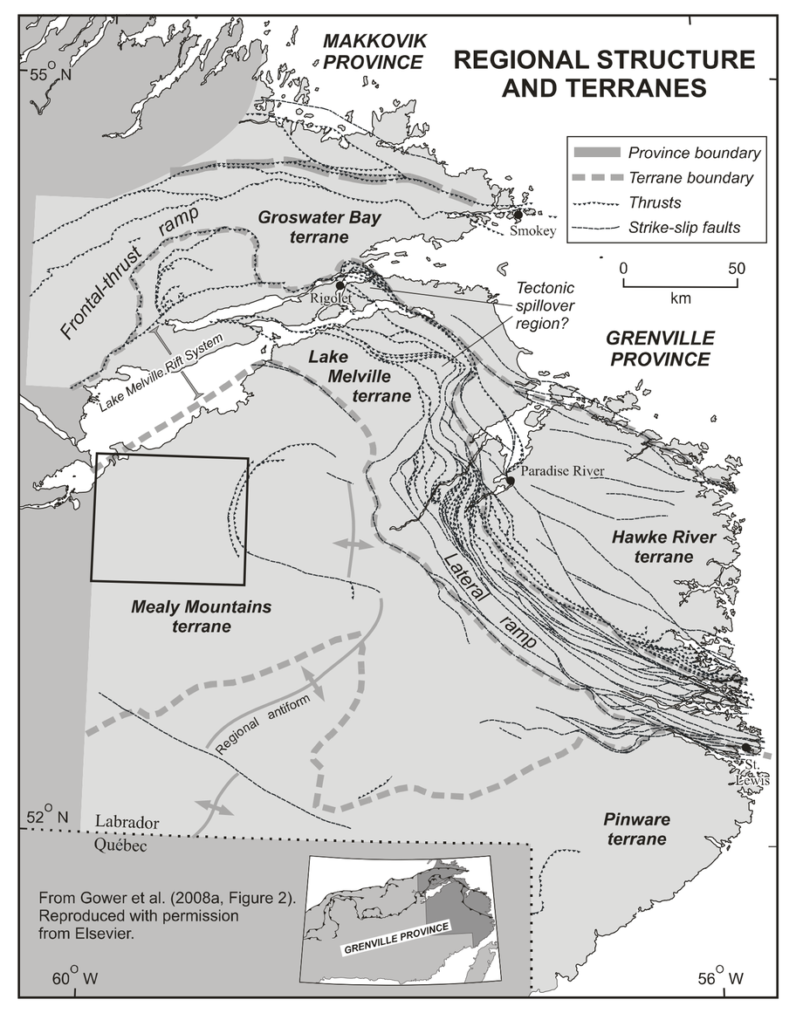
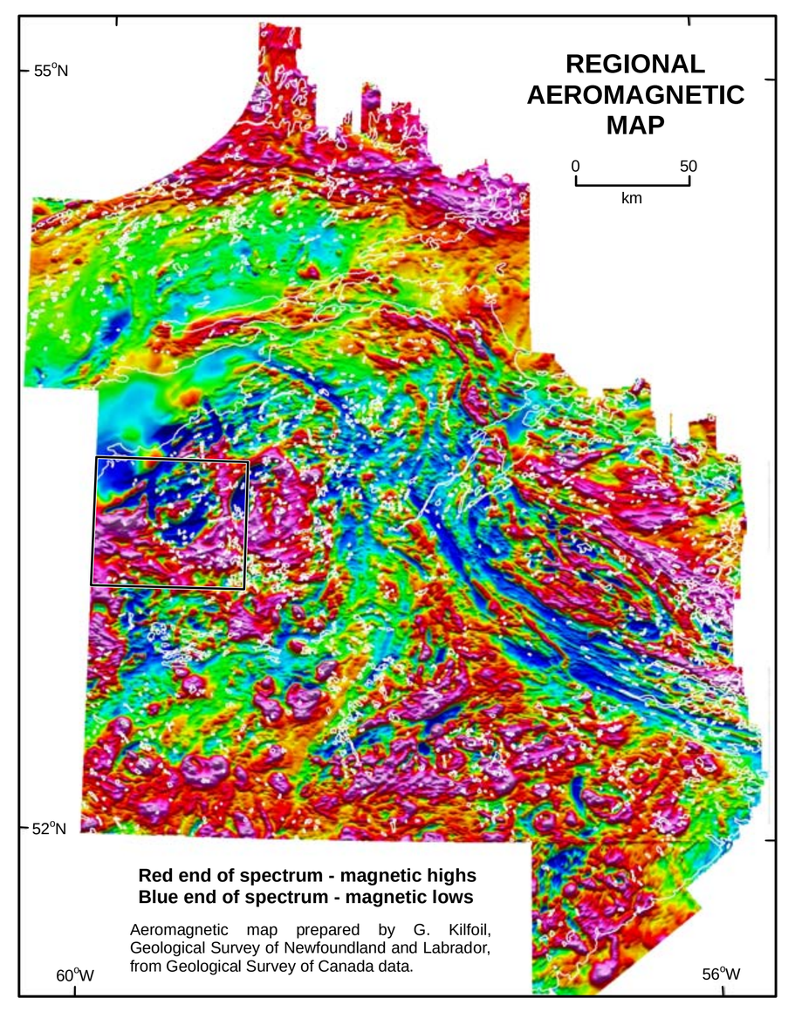
Newfoundland Labrador
NATURAL RESOURCES

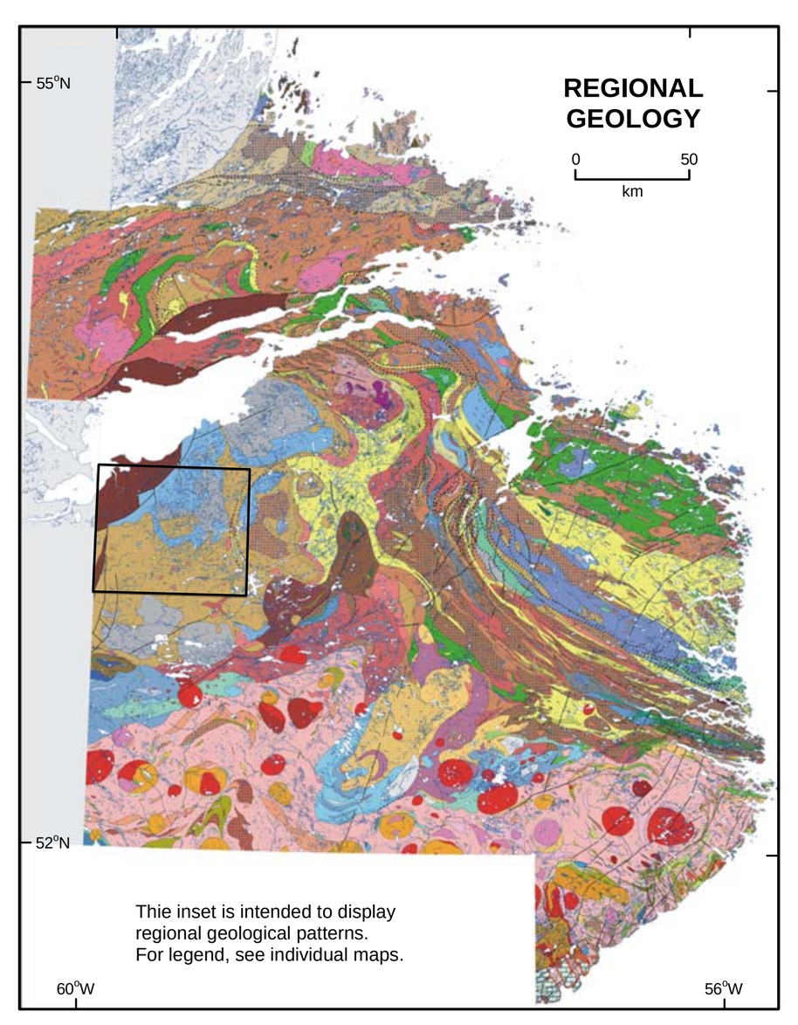
MAP 2010-13
OPEN FILE 013G/0056

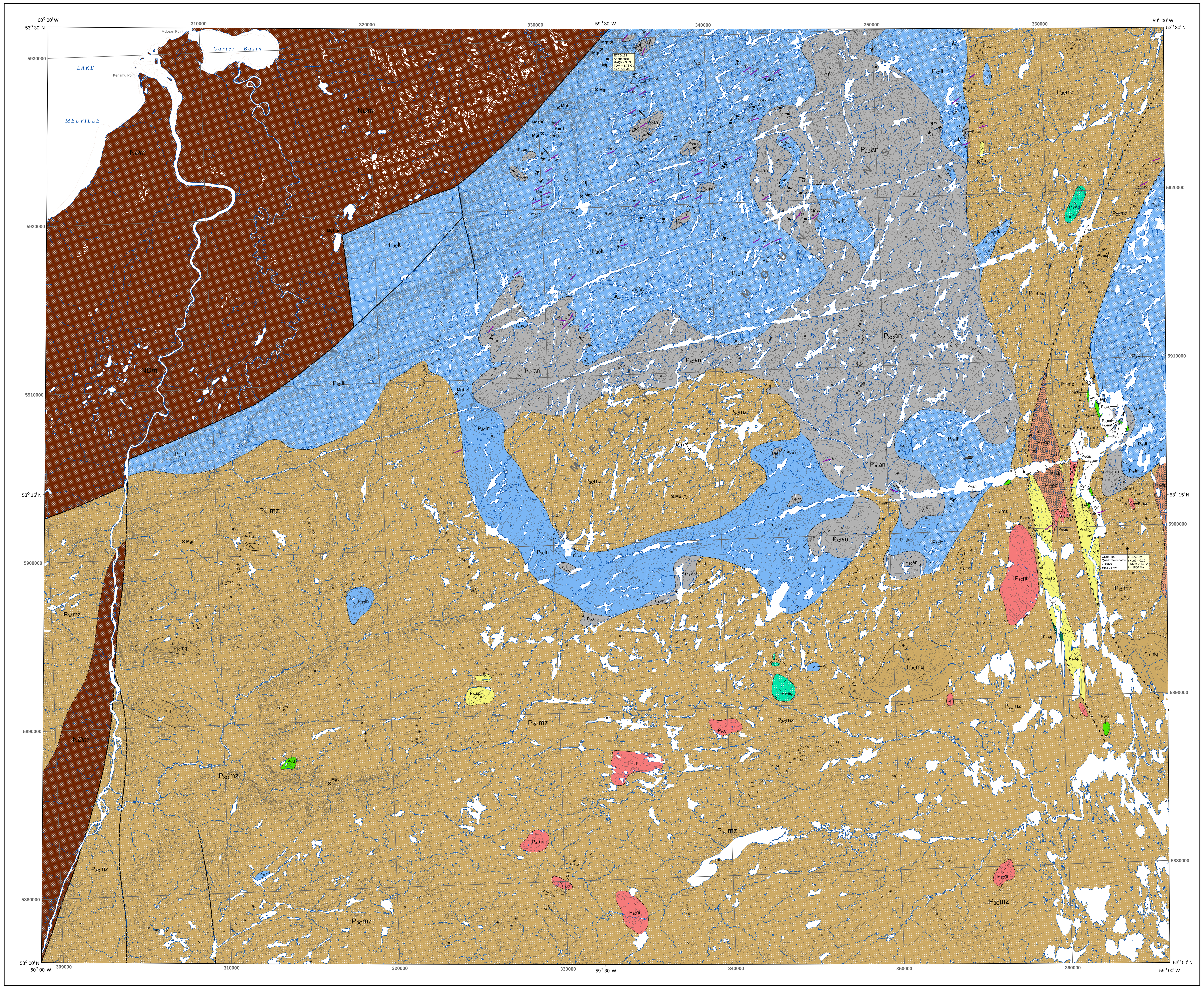
GEOLOGY OF THE KENEMICH RIVER AREA (NTS SHEETS 13G/03, 04, 05 & 06) SOUTHEASTERN LABRADOR











LEGEND

DEVONIAN (?)

Dd — Sandwich Bay and Battle Harbour dykes

EARLY CAMBRIAN

CFo — Forteau Formation

CBr — Bradore Formation (subdivided into L'Anse-au-Clair, Crow Head and Blanc-Sablon members)

NEOPROTEROZOIC – EARLY CAMBRIAN

NCLc — Lighthouse Cove Formation

NCBa — Bateau Formation

NEOPROTEROZOIC

NDm — Double Mer Formation

NGi — Gilbert arkose

NSb — Sandwich Bay conglomerate

Nc — Clastic dykes

Nd — Long Range dykes

Nq — Quartz veins

LATE MESOPROTEROZOIC (M_3 1200 – 900 Ma)

LATE POST-GRENVILLIAN INTRUSIONS (M_{3D} ca. 975 – 955 Ma) e.g., Chateau Pond granite

M_{3D}gp — Massive to weakly foliated megacrystic/porphyritic granite to quartz monzonite

M_{3D}gr — Massive to weakly foliated granite to alkali-feldspar granite

M_{3D}ln — Massive to weakly foliated leucogabbro to leuconorite

M_{3D}mn — Massive to weakly foliated monzogabbro and monzonorite

M_{3D}mq — Massive to weakly foliated quartz monzonite; mantled feldspar textures

M_{3D}mz — Massive to weakly foliated monzonite to monzodiorite

M_{3D}yq — Massive to weakly foliated syenite, quartz syenite and alkali-feldspar quartz syenite

M_{3D}d — Unnamed mafic dykes

EARLY POST-GRENVILLIAN INTRUSIONS (M_{3C} ca. 985 – 975 Ma) e.g., Beaver Brook and Picton Pond plutons

M_{3C}gr — Weakly to moderately foliated granite to alkali-feldspar granite

M_{3C}ln — Weakly to moderately foliated leucogabbro to leuconorite

M_{3C}mn — Weakly to moderately foliated monzogabbro to monzonorite

M_{3C}mq — Weakly to moderately foliated monzonite to quartz monzonite

M_{3C}rg — Weakly to moderately foliated gabbro, norite and troctolite

M_{3C}yq — Weakly to moderately foliated syenite, quartz syenite and alkali-feldspar syenite

M_{3C}d — L'Anse-au-Diable, York Point, Gilbert Bay mafic dykes

SYN-GRENVILLIAN INTRUSIONS (M_{3B} ca. 1085 – 985 Ma)

M_{3B}gd — Moderately to strongly foliated granodiorite to quartz diorite

M_{3B}gp — Moderately to strongly foliated megacrystic/porphyritic granodiorite to quartz diorite

M_{3B}gr — Moderately to strongly foliated granite to alkali-feldspar granite

M_{3B}yn — Moderately to strongly foliated aegerine- or nepheline-bearing syenite

M_{3B}d — Unnamed mafic dykes (Makkovik Province and adjacent Grenville Province)

PRE-GRENVILLIAN INTRUSIONS (M_{3A} ca. 1200 – 1085 Ma) e.g., Gilbert Bay pluton

M_{3A}gr — Weakly to strongly foliated granite

M_{3A}mn — Weakly to strongly foliated monzonite to monzonorite

MIDDLE MESOPROTEROZOIC (M_2 1350 – 1200 Ma)

e.g., Upper North River intrusion

M_2gr — Weakly to strongly foliated granite and alkali-feldspar granite

M_2rg — Weakly to strongly foliated gabbronorite (in database only - Lourdes-de-Blanc-Sablon intrusion, Quebec)

M_2yq — Weakly to strongly foliated syenite, quartz syenite and alkali-feldspar syenite

M_2d — Mealy dykes

EARLY MESOPROTEROZOIC (M_1 1600 – 1350 Ma)

e.g., Upper Paradise River, Kyfanan Lake and 13B/12 intrusions, and Michael Gabbro

M_1an — Massive or weakly foliated anorthosite to leucogabbronorite, indistinctly layered in places

M_1am — Weakly to markedly foliated amphibolite, plus leucocratic and melanocratic variants; granulite facies equivalents

M_1dr — Massive, weakly or strongly foliated diorite to amphibolite, may be metamorphic derivative of monzodiorite or leucogabbronorite

M_1gp — Moderately to strongly foliated megacrystic/porphyritic granitoid rocks

M_1gr — Massive, weakly or strongly foliated granite to quartz monzonite

M_1ln — Massive, weakly or strongly foliated leucogabbronorite and anorthositic gabbro, locally grading into gabbronorite, locally coronitic

M_1mn — Moderately to strongly foliated monzonorite

M_1mq — Moderately to strongly foliated monzonite to quartz monzonite

M_1mz — Moderately to strongly foliated monzonite to monzodiorite

M_1rg — Massive to strongly foliated gabbro, norite and troctolite, commonly layered; subophitic and locally coronitic; includes recrystallized derivatives retaining igneous textures

M_1um — Massive, weakly or strongly foliated ultramafic rocks, commonly layered and locally showing cumulate textures

M_1yq — Moderately to strongly foliated syenite and quartz syenite

M_1d — Mafic dykes; includes Michael Gabbro

LATE PALEOPROTEROZOIC AND EARLY MESOPROTEROZOIC (PM 1800 – 1350 Ma) (Ages generally unknown, but ca. 1650 Ma and 1500 – 1470 Ma rocks identified)

RECRYSTALLIZED IGNEOUS ROCKS

PMdr — Medium-grained, equigranular, recrystallized weakly to strongly foliated diorite, quartz diorite and to leucoamphibolite

PMgd — Weakly to strongly foliated granite to granodiorite

PMgp — Megacrystic/porphyritic recrystallized granite to quartz monzonite

PMgr — Medium- to coarse-grained, recrystallized weakly to strongly foliated granite and alkali-feldspar granite

PMln — Medium- to coarse-grained, recrystallized leuconorite, leucogabbro

PMmd — Medium- to coarse-grained, recrystallized, weakly to strongly foliated, monzodiorite to monzonite

PMmq — Medium- to coarse-grained, recrystallized, weakly to strongly foliated quartz monzonite

PMrg — Medium- to coarse-grained, gabbro, norite and troctolite

PMtn — Medium- to coarse-grained, recrystallized, weakly to strongly foliated tonalite to granodiorite

PMyq — Medium- to coarse-grained, recrystallized, weakly to strongly foliated syenite, alkali-feldspar syenite and quartz syenite

PMam — Amphibolite; generally thought to be derived from mafic dykes

SUPRACRUSTAL ROCKS PROVISIONALLY ASSIGNED AS PITTS HARBOUR GROUP

Sedimentary protolith

PMsc — Calc-silicate rocks, compositionally layered, medium grained

PMsp — Pelitic schist and gneiss

PMsq — Quartzite, meta-arkose, thin to thick bedded

PMss — Quartz-feldspar psammitic schist and gneiss; medium grained

PMsx — Coarse-grained to pegmatitic-granitic material (diatexite), characteristically associated with psammitic gneiss and quartzite

Volcanic protolith

PMvf — Fine- to medium-grained, banded quartzofeldspathic rocks; locally having lensoid shapes, possibly indicating felsic volcaniclastic protolith

PMvm — Fine- to medium-grained, banded amphibolite containing quartz-feldspar layers and calc-silicate pods; interpreted as mafic volcanic rocks

AGE GENERALLY POORLY CONSTRAINED

β — Brittle deformation; cataclastic rocks, pseudotacholite

δ — Ductile deformation; mylonite, straight gneiss

AGE GENERALLY POORLY CONSTRAINED

f — Aplite, microgranite (felsite)

k — Carbonate vein

p — Pegmatite

q — Quartz vein

LATE PALEOPROTEROZOIC (P_3 1800 – 1600 Ma)

LATE LABRADORIAN GRANITOID INTRUSIONS (P_{3C} 1660 – 1600 Ma) e.g., Paradise Arm intrusion and Hawke Bay intrusive suite

P_{3C}dr — Diorite, quartz diorite and tonalite; locally grading into leucogabbronorite

P_{3C}ga — Alkali-feldspar granite, granite and quartz syenite forming discrete plutons

P_{3C}gd — Granite to granodiorite forming discrete unmigmatized plutons

P_{3C}gp — Megacrystic/porphyritic granite to granodiorite

P_{3C}gr — Granite and minor alkali-feldspar granite

P_{3C}mn — Monzonorite and monzogabbro

P_{3C}mq — Quartz monzonite, including rare quartz syenite

P_{3C}mz — Monzonite, including minor syenite

P_{3C}yq — Syenite to quartz syenite forming discrete plutons

P_{3C}d — Unnamed mafic dykes

LATE LABRADORIAN ANORTHOSITIC AND MAFIC INTRUSIONS (P_{3C} 1660 – 1600 Ma) e.g., White Bear Arm complex and Sand Hill Big Pond intrusion

P_{3C}ag — Weakly to markedly foliated mafic granulite, plus leucocratic and melanocratic variants

P_{3C}am — Weakly to markedly foliated amphibolite, plus leucocratic and melanocratic variants

P_{3C}an — Massive to strongly foliated anorthosite and leucogabbronorite

P_{3C}rg — Massive to strongly foliated gabbro and norite, commonly layered; subophitic and locally coronitic

P_{3C}ln — Primary textured to recrystallized leucogabbronorite and leucogabbro; coronitic locally

P_{3C}lt — Primary textured to recrystallized leucotroctolite

P_{3C}um — Massive, weakly or strongly foliated ultramafic rocks, commonly layered and locally showing cumulate textures

EARLY LABRADORIAN MAFIC AND ASSOCIATED ROCKS (P_{3B} 1710 – 1660 Ma) e.g., Alexis River anorthosite (assigned here although age is uncertain)

P_{3B}ag — Weakly foliated to gneissic amphibolite and mafic granulite, plus leucocratic and melanocratic variants

P_{3B}an — Weakly foliated to gneissic anorthosite and leucogabbronorite

P_{3B}ln — Weakly foliated to gneissic leucogabbronorite and leucogabbro; coronitic locally

P_{3B}mn — Weakly foliated to gneissic monzonorite and monzogabbro

P_{3B}rg — Weakly foliated to gneissic gabbro and norite

P_{3B}um — Massive, weakly or strongly foliated ultramafic rocks, commonly layered and locally showing cumulate textures

EARLY LABRADORIAN GRANITOID AND ASSOCIATED ROCKS (ca. 1678 and 1671 Ma) e.g., Neveisik Island and Red Island events

P_{3B}dr — Foliated to gneissic diorite to quartz diorite, and compositionally equivalent well-banded gneiss; in part derived from leucogabbronorite

P_{3B}gd — Foliated to gneissic granodiorite and compositionally equivalent well-banded gneiss

P_{3B}gp — Foliated to gneissic megacrystic/porphyritic granitoid rocks, augen gneiss

P_{3B}gr — Foliated to gneissic granite and alkali-feldspar granite, and compositionally equivalent well-banded gneiss

P_{3B}mq — Foliated to gneissic quartz monzonite, grading into diorite or syenite, and compositionally equivalent well-banded gneiss

P_{3B}mz — Foliated to gneissic monzonite and monzodiorite, and compositionally equivalent well-banded gneiss

P_{3B}ya — Foliated to gneissic syenite, alkali-feldspar syenite and alkali-feldspar granite, and compositionally equivalent well-banded gneiss

P_{3B}am — Amphibolite skialiths, lenses and layers (mainly remnants of former dykes)

PRE-LABRADORIAN GRANITOID ROCKS (P_{3A} 1800 – 1710 Ma)

P_{3A}ag — Mafic granulite skialiths, lenses and layers

P_{3A}dr — Foliated to gneissic diorite to quartz diorite, and compositionally equivalent well-banded gneiss

P_{3A}gd — Foliated to gneissic granodiorite and compositionally equivalent well-banded gneiss

P_{3A}gp — Foliated to gneissic megacrystic/porphyritic granitoid rocks, augen gneiss

P_{3A}gr — Foliated to gneissic granite and alkali-feldspar granite, and compositionally equivalent well-banded gneiss

P_{3A}ln — Foliated to gneissic leucogabbronorite, and compositionally equivalent well-banded gneiss

P_{3A}am — Amphibolite skialiths, lenses and layers (mainly remnants of former dykes)

PRE-LABRADORIAN SUPRACRUSTAL ROCKS (P_{3A} 1800 – 1710 Ma) (Age uncertain; certainly pre-1670 Ma, probably 1800 – 1770 Ma)

Sedimentary protolith

P_{3A}sc — Calc-silicate rocks, compositionally layered, medium grained

P_{3A}sp — Fine- to medium-grained pelitic schist and gneiss

P_{3A}sq — Quartzite, meta-arkose, thin to thick bedded

P_{3A}ss — Quartz-feldspar psammitic schist and gneiss; medium grained and commonly rusty-weathering

P_{3A}sx — Metasedimentary diatexite; coarse grained to pegmatitic and characteristically white-weathering

Volcanic protolith

P_{3A}vf — Fine- to medium-grained, banded quartzofeldspathic rocks; locally have lensoid shapes, possibly indicating felsic volcaniclastic protolith

P_{3A}vm — Fine- to medium-grained, banded amphibolite containing quartz-feldspar layers and calc-silicate pods; interpreted as mafic volcanic rocks

MID PALEOPROTEROZOIC (P_2 2100 – 1800 Ma)

LATE MID PALEOPROTEROZOIC (P_{2C} 1900 – 1800 Ma)

Granitoid and related intrusive rocks

P_{2C}dr — Foliated to gneissic diorite to quartz diorite, and compositionally equivalent well-banded gneiss

P_{2C}ga — Alkali-feldspar granite, granite and quartz syenite

P_{2C}gd — Foliated to gneissic granodiorite and compositionally equivalent well-banded gneiss

P_{2C}gp — Foliated to gneissic megacrystic/porphyritic granitoid rocks, augen gneiss

P_{2C}gr — Foliated to gneissic granite and alkali-feldspar granite, and compositionally equivalent well-banded gneiss

P_{2C}mq — Foliated to gneissic quartz monzonite, grading into diorite or syenite, and compositionally equivalent well-banded gneiss

P_{2C}mz — Foliated to gneissic monzonite to monzodiorite, and compositionally equivalent well-banded gneiss

P_{2C}ya — Foliated to gneissic syenite to alkali-feldspar syenite, and compositionally equivalent well-banded gneiss

P_{2C}yq — Syenite to quartz syenite

Mafic and associated intrusive rocks

P_{2C}am — Amphibolite skialiths, lenses and layers (mainly remnants of former dykes)

P_{2C}rg — Massive to strongly foliated gabbro and norite, commonly layered; subophitic and locally coronitic

P_{2C}d — Unnamed mafic dykes

Sedimentary protolith

P_{2C}sc — Calc-silicate rocks, compositionally layered, medium grained

P_{2C}so — Conglomerate and agglomerate, partially of volcanic origin

P_{2C}sp — Fine- to medium-grained pelitic schist and gneiss

P_{2C}sq — Quartzite, meta-arkose, thin to thick bedded

P_{2C}ss — Quartz-feldspar psammitic schist and gneiss; medium grained and commonly rusty-weathering

Volcanic protolith

P_{2C}vb — Volcanic breccia, angular clasts, grading into agglomerate

P_{2C}vf — Fine- to medium-grained, banded quartzofeldspathic rocks; locally have lensoid shapes, possibly indicating felsic volcaniclastic protolith

P_{2C}vi — Intermediate volcanic rocks

P_{2C}vm — Fine- to medium-grained, banded amphibolite containing quartz-feldspar layers and calc-silicate pods; interpreted as mafic volcanic rocks

P_{2C}vp — Felsic volcanic porphyry interpreted to be hypabyssal

NOTES

1. Legend is common to all maps (Map 2010-01 to Map 2010-25), but all units do not appear on every map.
2. Uncoloured units do not appear as polygons on maps, but are in unit-designator strings in database.
3. Some mafic dykes also shown as polygons (especially where orientation is unknown).

KENEMICH RIVER

A preliminary version of this map was originally published uncoloured (Nunn and van Nostrand, 1996a) and a brief description of rock types in the area was given by Nunn and van Nostrand (1996b). Unfortunately, the field notebooks of G.A.G. Nunn were lost and all his samples discarded, so the current digital database relies on the original field records of Eade (1962) and Emslie (1976) and their assistants; the field records of T. van Nostrand and R.F. Emslie collected in 1995; and data collected by C.F. Gower during brief field visits in 2007 and 2009. G.A.G. Nunn's data station locations are known, however, and have been shown on the map. A U-Pb geochronological result (Gower et al., 2008b) and Nd-Sm isotopic data (Ashwal et al., 1986; R.A. Creaser, unpublished - see digital database) are included. Localities designated as mineral occurrences are based on earlier reported observations (see Mineral Occurrence Table; current to 2009). Note that several of these are magnetic anomalies rather than ground-discovered mineralization.

The present map is modified from that of Nunn and van Nostrand (1996a) on the basis of C.F. Gower's observations, particularly with respect to the interpretation of thrusts (which have yet to be confirmed), and the distribution of cordierite-bearing metasedimentary gneiss in the eastern part of the map region. Unit modification is also partly related to an integrated compilation approach applied to the whole of eastern Labrador, and border regions of the map have been revised as a result of data collected from adjacent map areas. Geological boundaries are poorly controlled, and have been extrapolated using structural observations, regional aeromagnetic data and topographic trends. Pre-1996 data station sites have been digitized from where originally located on aerial photographs or (rarely) on topographic maps, so reliability of location is likely mostly dependent on initial plotting accuracy.

As is characteristic of metamorphic and plutonic terranes, individual outcrops are typically very complex, and commonly embody several different rock types. Generally, the unit polygon depicted is based on what was judged to be the dominant rock type present, but this approach was not universally followed, due to the exigencies of specific situations, such as the need to emphasize minor rock types deemed to have high significance. All rock types recorded from any individual outcrop may be determined by consulting the 'Unit designator' string for that locality given in the digital database. The user is alerted to the fact that, in the digital database, no attempt has been made to reconcile rock names applied to field outcrops, versus those applied to stained slabs, or petrographic thin sections. Differences may be due to subsequent, more refined identifications, but other reasons may apply, such the sample (or thin section) not being representative of its source. Unit designator and polygon labels applied are based on an awareness of such factors.

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Recommended citation
Gower, C.F. and Nunn, G.A.G., 2010: Geology of the Kenemich River area (NTS sheets 13G/03, 04, 05 and 06), southeastern Labrador. Geological Survey, Mines Branch, Department of Natural Resources, Government of Newfoundland and Labrador, Map 2010-13, Open File 013G/0056.

Geological cartography by T. Paltanavage, Cartographic Unit, Geological Survey, Department of Natural Resources.

Digital NTS base maps (NTS 13G/03, 04, 05 and 06) used for this map are available from Surveys and Mapping Branch, Natural Resources Canada.
Magnetic declination at the centre of the map at the start of 2010 was 22° 36' W.
Elevations are in metres above sea level. Contour interval is 20 metres.
UTM (Universal Transverse Mercator) Grid Zone 21, NAD (North American Datum) 27.

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Copies of this map may be obtained from the Geoscience Publications and Information Section, Geological Survey, Mines Branch, Department of Natural Resources, Government of Newfoundland and Labrador, P.O. Box 8700, St. John's, NL, A1B 4J6, Canada. Email: pub@gov.nl.ca.

NOTE: Map 2010-13 is one of twenty-five maps on the geology of the Grenville Province in eastern Labrador and adjacent eastern Makkovik Province produced by the Geological Survey, Mines Branch, Department of Natural Resources, Government of Newfoundland and Labrador.

Mines Branch website: http://www.nr.gov.nl.ca/nr/mines/index.html.

MINERAL OCCURRENCE DATA SOURCES

Inventory No.	Map label	Status	Easting	Northing	Reference
013G/03/Mo 001	Mo (?)	Indication	337188	5902643	Hegler (1979)
013G/04/Fe 001	Mgt	Showing	308000	5901000	MacDougall (1953; Anomaly A532594-1; p. 4 and Map 1)
013G/04/Fe 002	Mgt	Showing	316181	5886306	MacDougall (1953; Anomaly A5312594-1; p. 4 and Map 1)
013G/05/Fe 001	Mgt	Showing	324535	5909217	MacDougall (1953, 1954; Anomaly A533594)
013G/05/Fe 002	Mgt	Showing	317830	5919141	MacDougall (1953, 1954; Anomaly A534594)
013G/05/Fe 003	Mgt	Indication	332400	5920700	MacDougall (1953, p.4 and Map 1)
013G/05/Fe 004	Mgt	Showing	330200	5924500	MacDougall (1953, p.3 and Map 1)
013G/05/Fe 005	Mgt	Indication	330200	5925200	MacDougall (1953, p.3 and Map 1)
013G/05/Fe 006	Mgt	Indication	331200	5926000	MacDougall (1953, p.3 and Map 1)
013G/05/Fe 007	Mgt	Prospect	333500	5927000	MacDougall (1953, 1954)
013G/05/Fe 008	Mgt	Prospect	333900	5929400	MacDougall (1953, 1954)
013G/06/Cu 001	Cu, Pyr	Indication	356050	5921960	Jones (1997)
013G/06/Fe 001	Mgt	Prospect	334500	5929800	MacDougall (1953, 1954)
013G/06/Mo 001	Mo	Indication	338292	5905423	Kents (1980; NALCO N-1)

GEOLOGICAL DATA SOURCES

Personnel	Stations	Year(s) data collected	Project name	Mapping references
G.A.G. Nunn (project geologist)	795*	1995	Kenemich River	Nunn and van Nostrand (1996a,b)
T. van Nostrand (assistant geologist)	235	1995	Kenemich River	Nunn and van Nostrand (1996a,b)
R.F. Emslie (project geologist)	161	1975, -95	Mealy Mountains & other visits	Emslie (1976); additional data
G.R. Dunning (assistant geologist)	110	1975	Mealy Mountains	Emslie (1976)
C.F. Gower (project geologist)	62	2007, - 09	Other visits	Additional data
?. Reynolds (assistant geologist)	38	1961	Battle Harbour - Cartwright	Eade (1962)
D. Mahaffy (assistant geologist)	29	1961	Battle Harbour - Cartwright	Eade (1962)
K.E. Eade (project geologist)	4	1961	Battle Harbour - Cartwright	Eade (1962)

* Notebook lost; only data station locations available

ISOTOPIC DATA

U/Pb Geochronology

Sample number
Rock type
Inherited/detrital age
Emplacement age
Metamorphism/closure/cooling/undefined Pb loss age

Mineral abbreviations:
a - allanite
b - baddeleyite
m - monazite
r - rutile
t - titanite
x - xenotime
z - zircon

Concordia abbreviations:
c - concordant
nc - near-concordant
l.i. - lower intercept
u.i. - upper intercept

Nd/Sm Geochronology

Sample number
Rock type
Epsilon value
Depleted mantle age
Age of rock
(? age inferred)

Rb/Sr Geochronology

Sample number
Rock type
Initial Sr ratio calculated from time t
Age of rock
(? age inferred)
(* one of two or more analyses)

K/Ar Geochronology

Sample number
Rock type
Age
Mineral; Method
(* average of two or more analyses)

Biot - biotite
Hbl - hornblende
Musc - muscovite
WR - whole rock
plat - plateau age
tot. gas - total gas age

ISOTOPIC DATA SOURCES

Method	Reference(s)	Samples
U-Pb	Gower et al. (2008b)	GN95-392
Nd-Sm	Ashwal et al. (1986)	EC75-132
Nd-Sm	Creaser (unpublished)	GN95-392
Rb-Sr	no data	
K, Ar	no data	

Scale 1:100 000

0 2 4 6 8 10
Kilometres

MINERAL OCCURRENCE ABBREVIATIONS

- **Amz** Amazonite
- **Au** Gold
- **Bt** Biotite
- **Cly** Clay
- **Cr** Chromium
- **Cu** Copper
- **Fe** Iron
- **Fel** Feldspar
- **Fl** Fluorite
- **Gnt** Garnet
- **Ilm** Ilmenite
- **Lst** Limestone
- **Mgt** Magnetite
- **Mo** Molybdenite
- **Ms** Muscovite
- **Neph** Nepheline
- **Ni** Nickel
- **Pb** Lead
- **Pd** Paladium
- **Po** Pyrrhotite
- **Pt** Platinum
- **Pyr** Pyrite
- **Saph** Sapphire
- **Si** Silica
- **Stn** Dimension stone
- **Th** Thorium
- **Tourm** Tourmaline
- **Tpz** Topaz
- **U** Uranium
- **V** Vanadium
- **Zn** Zinc
- **Zr** Zirconium
- **(?)** Occurrence reported but validity suspect

NOTE:
All mineral occurrence and structural symbols do not appear on each map.

Vertical structures use 90° dip value.

* Generation of structure only applicable at observation site.

SYMBOLS

- *Geological contact*
- *Normal fault*
- *Strike-slip fault*
- *Thrust fault*
- *Normal fault reactivating thrust*
- *Fold axial plane (1st, 2nd, 3rd generation)**
- *S-fold axis (1st generation)*
- *Z-fold axis (1st generation)*
- *Dyke (affinity unspecified)*
- *Fault (sense of movement unknown, dextral, sinistral, normal)*
- *Joint*
- *Linear fabric (1st, 2nd, 3rd generation)**
- *Fold axis (1st, 2nd, 3rd generation)**
- *Slickenside*
- *Geological data station*
- *Geological data station (no fabric measured)*
- *Bedding (tops known, unknown)*
- *Enclave*
- *Foliation (1st, 2nd, 3rd generation)**
- *Gneissosity (1st, 2nd generation)**
- *Igneous layering (tops known, unknown)*
- *Vein*
- *Shear zone (sense of movement unknown, dextral, sinistral, reverse)*
- *Mineral occurrence*
- *Geochronology location*