ASSEMBLAGE AGE, PERIOD: Series (Stage, Absolute age range)

VOLCANIC ASSEMBLAGES (Volcanic rocks dominant)
- Unit 2 (Label)
- Unit 1 (Label)

ASSEMBLAGE NAME: *Assemblage description, in the following form: major rock types; minor rock types; tectonic environment; stratigraphic relationships; metamorphic grade; deformation; age; other.*
Allow correlative and portrayal of lithological continuity on a regional scale.
2. Separately distinguished and described components of the assemblage are indicated by units
1, 2, 3, ... (or by letters a, b, c, ...) in order of decreasing abundance. Subdivision based on major rock types and features; rare rock types and features; or ash/(ss) (black cross/diamond, white cross/diamond, respectively) in a formations, unless indicated otherwise as "_group", "_n-member", "_suite", "_dyke".
3. Map units within an assemblage units within an assemblage are distinguished by their own colour to aid detail and clarity to the map.

PLUTONIC ASSEMBLAGE AGE, PERIOD: Series (Stage, Absolute age range)

PLUTONIC ASSEMBLAGES (Intrusive rocks dominant)
- Label
- Label
- Label

PLUTONIC ASSEMBLAGE NAME: *Plutonic assemblage description, in the following form: major rock types; minor rock types; tectonic environment; stratigraphic relationships; metamorphic grade; deformation; age; other.*
Allow correlative and portrayal of lithological continuity on a regional scale.
2. Separately distinguished and described components of the assemblage are indicated by units
1, 2, 3, ... (or by letters a, b, c, ...) in order of decreasing abundance. Subdivision based on major rock types and features; rare rock types and features; or ash/(ss) (black cross/diamond, ...suite, "_n-member", "_intrusion", "_intrusive complex" names are indicated in bold text).
3. Map units within an assemblage units within an assemblage are distinguished by their own colour to aid detail and clarity to the map.

For clarity at this map scale, not all units in the legend are indicated separately on the map. For example, units of the Scrivedy Bay assemblage, labelled Cm-sb1, Cm-sb2, and Cm-sb3 are amalgamated under the colour of their parent (Cm-sb).

Brackets indicate grouping of assemblages and component units by type of tectonic setting and colour coded as follows:

- [grit; overlap assemblages (Cretaceous only)]
- red: plutonic arc, stitching plutons
- brown: Trail/thrust belt-derived clastic wedge
- yellow: passive margin (continental or oceanic)
- purple: slope and deep water settings
- light blue: shelf, platform
- grey: intracratonic basin
- orange: rift-related
- green: large igneous province (LIP)
- dark blue: orogen, craton

Figure 1. Explanation of map unit features.

National Topographic System reference and index to adjoining published Geological Survey of Canada maps

Abstract

This map and the related geodatabase illustrate the bedrock geology of south-eastern Axel Heiberg Island, the greater part of Ellef Ringnes Island, all of King Christian Island, and numerous small islands and islets. The islands, in addition to various other small islands, Major features of the area include mostly Mesozoic strata of the Sverdrup basin, penetrated by salt diapirs on Axel Heiberg Island and the Ringnes islands. Compressive structures are present in the northeastern part of the area, due to the west, Cretaceous basaltic and alkaline rocks (mostly gabbro) are associated with the High Arctic Large Igneous province.

Résumé

Cette carte et la géodatabase qui s'y rapporte documentent la géologie du substratum rocheux dans le sud-ouest de l'île Axel Heiberg, la majeure partie de l'île Ellef Ringnes, toute l'île King Christian et de petites îles. Cornwall et Griffith en entier, de même que diverses autres petites îles. Les principales entités géologiques de la région sont des strates surtout mésozoïques du bassin de Sverdrup, qui sont percées de diapirs de sel dans l'île Axel Heiberg et les îles Ringnes. La déformation en compression est concentrée sur l'île Axel Heiberg, alors qu'elle l'est moins dans l'ouest. Le basalte et les roches ultramafiques (principalement du gabbro) cristallisés sont associés à la grande province magmatique du Haut-Arctique.

Catalogue No. M183-1/29-2013E-PDF
ISBN 978-1-100-22345-2
doi:10.4095/292024

© Her Majesty the Queen in Right of Canada, as represented by the Minister of Natural Resources Canada, 2015

Natural Resources Canada | Ressources naturelles du Canada

CANADIAN GEOSCIENCE MAP 29

GEOLOGY

TECTONIC ASSEMBLAGE MAP OF MASSEY SOUND, AMUND RINGNES ISLAND, AND SURROUNDING ISLANDS

Nunavut

1:500 000

Canadian Geoscience Maps

ess.nrcan.gc.ca

Canada

Authors: J.C. Harrison,, M. Le, T. Lynds, A. Ford, H.R. Balkwill, R. Thorsteinsson, and A.V. Okulitch

Geology by H.R. Balkwill, R. Thorsteinsson, J.C. Harrison, and A.V. Okulitch

Geological compilation by J.C. Harrison

GIS development by M. Le and T. Lynds

Spatial data capture by Gismo Solutions Ltd. (Edmonton) and A. Ford

Cartography by A. Galloway

Critical review by L. Currie

Initiative of the Geological Survey of Canada, conducted under the auspices of the Tri-Territorial Project as part of Natural Resources Canada's Geomapping for Energy and Minerals (GEM) program.

CANADIAN GEOSCIENCE MAP 29

GEOLOGY

TECTONIC ASSEMBLAGE MAP OF MASSEY SOUND, AMUND RINGNES ISLAND, AND SURROUNDING ISLANDS

Nunavut

1:500 000

Map projection Lambert Conformal Conic, standard parallels 77°30'N and 79°30'N. North American Datum 1983

Base map at the scale of 1:250 000 from Natural Resources Canada, with modifications.

Proximity to the North Magnetic Pole causes the magnetic compass declination to vary by 30° to the west.
Mean magnetic declination in 2016, 47° 30' W, decreasing 76.9' annually. Readings vary from 12°42'W in the SW corner to 55°30'W in the NE corner of the map.

This map is not to be used for navigational purposes.

Title photograph: Agate North Diapir, western Axel Heiberg Island, Nunavut. Photograph by J.C. Harrison, 2013-065

The Geological Survey of Canada welcomes corrections or additional information from users.

Data may include additional observations not portrayed on this map. See documentation accompanying the data.

This publication is available for free download through GEOSCAN (http://geoscan.nrcan.gc.ca/).

Glacier

Glacier ice: Ice cap.

QUATERNARY

PLEISTOCENE

Q — **Surficial:** Sand, silt, clay, gravel; glacial, fluvial, and nearshore marine deposits.

NEOGENE

MIOCENE AND PLIOCENE

Tp1 — **BEAUFORT:** Sand, gravel, minor peat; mostly fluvial braidplain.
1. Sand, unconsolidated; fine-grained, quartzose, pale yellowish orange, cross-stratified; wood; peat; minor gravel; mud; fluvial braidplain and overbank (**Beaufort Brook, Beaufort**).

PALEOGENE

PALEOCENE AND EOCENE (Selandian to middle Eocene)

Te1 — **EUREKA SOUND:** Sandstone, siltstone, shale; local conglomerate; minor coal; volcanogenic sandstone; mostly fluvial and deltaic; local synteshonic alluvial fan deposits.
1. Sandstone, fine- to coarse-grained; siltstone; shale; local conglomerate; coal, volcanogenic sandstone; common plant fossils; mostly fluvial and deltaic; local synteshonic alluvial fan deposits (**Eureka Sound group**).

TeW7 / TeW6 / TeW5 / TeW4 / TeW3 / TeW2 — **EUREKA SOUND-WEST:** Sandstone, siltstone, shale; local conglomerate; coal; minor limestone; common plant fossils; mostly fluvial and deltaic; local synteshonic alluvial fan deposits.
7. Sandstone, fine- to coarse-grained; siltstone; shale; local conglomerate; coal; common plant fossils; mostly fluvial and deltaic (**Iceberg Bay**).
6. Sandstone, quartz arenite; fine- to medium-grained, cross-stratified; minor siltstone, shale; coal; common plant fossils; mostly fluvial and deltaic; local fluvial, delta plain (**Iceberg Bay, Coal member**).
5. Sandstone, quartz arenite; fine- to medium-grained, bioturbated, ripples; minor siltstone, grey shale; fining-upward cycles; wave-dominated delta with interdistributary bay, prodelta, shoreface, foreshore (**Iceberg Bay, Lower member**).
4. Shale, medium to dark grey, locally bioturbated; minor sandstone, quartz arenite, fine- to medium-grained; locally trough cross-stratified; minor coal; prodeltaic with barrier island bars (**Strand Bay, Upper part**).
3. Shale; medium to dark grey; faintly colour banded; friable, no bioturbation; minor siltstone (**Strand Bay, Middle part**).
2. Shale, medium to dark grey, locally bioturbated; minor sandstone, quartz arenite in upper part, fine- to medium-grained, locally trough cross-stratified; minor coal; prodeltaic with barrier island bars in the upper part (**Strand Bay**).

CRETACEOUS AND PALEOGENE

LATE CRETACEOUS AND PALEOGENE (Campanian to Selandian)

KTe — **EASTON:** Sandstone, siltstone, shale; local conglomerate; coal; minor siltstone, shale; basalt; fluvial delta plain and delta front deposits.
6. Sandstone, quartz arenite; fine- to medium-grained, planar cross-stratified, rippled and bioturbated; minor siltstone, shale, coal; coarsening-upward cycles; progradational shoreface, strandplain, wave-dominated delta (**Expedition, Upper member**).
5. Sandstone, quartz arenite; fine- to medium-grained, trough cross-stratified, burrowed; minor siltstone, shale, ironstone with inoceramids; coarsening-upward cycles; prodelta, progradational shoreface, barrier island, distributary channels (**Expedition, Lower member**).
1. Quartz sandstone, very fine- to medium-grained, planar and cross-stratified, burrowed; minor siltstone, shale, coal, arranged in coarsening-upward cycles; deltaic, nearshore marine (**Expedition**).

CRETACEOUS

LATE CRETACEOUS (Canomanian to Campanian)

Kk — **KANGUK:** Shale, grey to dark greenish grey weathering, variably silty, bluntnose shale in the lower part, siliceous shale in the upper part; bentonite; minor tuff, local sandstone in the southern and western Arctic Islands; rare limestone concretions (Eglinton Island); shelf, sediment-starved, initially anoxic (**Kanguk**); may locally include other Cretaceous, Paleogene and Pliocene strata.

EARLY AND LATE CRETACEOUS (Albian to Cenomanian)

Kh6 / Kh5 / Kh4 / Kh3 / Kh2 / Kh1 — **HASSEL:** Sandstone, siltstone, minor shale, basalt; fluvial delta plain and delta front deposits; local tuff.
6. **Bastion Ridge, Strand Fiord, Kanguk**, undivided.
5. Basalt, olivine-bioitite, vesicular and amygdaloidal flows, pillow breccia; mafic pyroclastic rocks; minor diabase, pebble conglomerate, volcaniclastic sandstone, subaqueous and subaerial continental rift volcanic settings; adjacent fluvial and overbank deposits (**Strand Fiord**).
4. Sandstone, quartz arenite, fine- to medium-grained; (**Hassel volcanics, upper**)
3. Basalt, vesicular and aphanitic mafic volcanic breccia (**Hassel volcanics, lower**).
2. Shale, dark grey, bioturbated; minor siltstone, very fine- to coarse-grained quartz arenite, ironstone, volcaniclastic sandstone; minor pebbly conglomerate; low energy nearshore to high energy shoreface (**Bastion Ridge**).
1. Sandstone, quartz arenite, fine- to medium-grained, dark grey and yellowish grey weathering, bioturbated, variably pebbly and carbonaceous, mostly unconsolidated; siltstone, minor shale; coarsening-upward cycles; local mafic volcanic flows (Amund Ringnes Island); fluvial delta plain and delta front (**Hassel**).

EARLY CRETACEOUS (Aptian and Albian)

Ks5 / Ks4 / Ks3 / Ks2 / Ks1 — **CHESTOPHER:** Shale, siltstone, minor sandstone; local carbonate, tuff, bentonite; cool climate offshore shelf, distant volcanic activity.
5. Shale, dark grey to brownish black, minor limestone concretions, volcaniclastic sandstone; cool climate offshore shelf, distant volcanic activity (**Chesterfield Inlet**).
4. Sandstone, feldspathic quartz arenite, grey to greenish grey, micaceous, fine-grained, bioturbated, cross-bedded; siltstone, resistant marker; minor inner shelf and lower shoreface (**Invincible Point member, Junction beds**).
3. Sandstone, quartz arenite, siltstone; resistant marker; inner shelf and lower shoreface (**Invincible Point member, Bastion beds**).
2. Sandstone, feldspathic quartz arenite, grey to greenish grey, micaceous, fine-grained, bioturbated, cross-bedded; siltstone, resistant marker; minor inner shelf and lower shoreface (**Invincible Point member, Junction beds**).
1. Sandstone, quartz arenite, siltstone; resistant marker; inner shelf and lower shoreface (**Invincible Point member**).

EARLY CRETACEOUS (Valanginian to Aptian)

Kc1 — **ISACHSEN:** Quartz sandstone, siltstone, shale; minor conglomerate, coal; local basalt; temperate climate, deltaic, fluvial channel, and overbank deposits, local extrusive flows.
1. Quartz sandstone, fine- to coarse-grained; white, light yellowish brown and grey weathering; cross-stratified; plant fragments and plant fossils; siltstone and shale; minor coal; local conglomerate; mostly fluvial and deltaic (Fosheim Peninsula, Ellef Ringnes, northern Ellesmere islands); temperate climate, deltaic, fluvial channel and overbank deposits (**Isachsen**); may locally include younger Cretaceous strata.

EARLY AND LATE CRETACEOUS (Barremian to Cenomanian; 130 to 95 Ma)

Kg1 — **QUEEN ELIZABETH plutonic assemblage:** Gabbro, diabase; minor granophyre; LIP intrusives, olivine tholeiite association.
1. Gabbro and diabase; fine- to coarse-grained, subophitic textures; minor chill margin facies; local megaphyric and coarse-grained layering facies in sills; local amygdules in subvolcanic diabase; minor granophyre and granophyric diabase (**Queen Elizabeth swarm**).

JURASSIC AND CRETACEOUS

LATE JURASSIC AND EARLY CRETACEOUS (Kimmeridgian to Valanginian)

JKd7 / JKd6 / JKd5 / JKd4 / JKd3 / JKd1 — **DEER BAY:** Siltstone, shale; minor sandstone, limestone; local conglomerate, coal.
7. Sandstone, very fine- to fine-grained; burrowed; siltstone; shale; light to dark grey and greenish grey weathering; common bioturbates, gastropods and other shelly macrofauna; locally common sclerotic concretions; arranged in numerous coarsening-upward cycles; shallow to deep outer shelf (**Deer Bay E**).
6. Sandstone, very fine- to fine-grained; burrowed; siltstone; shale; light to dark grey and greenish grey weathering; common bioturbates, gastropods and other shelly macrofauna, locally common sclerotic concretions; arranged in numerous coarsening-upward cycles; shallow to deep outer shelf (**Deer Bay D**).
5. Sandstone, very fine- to fine-grained; burrowed; siltstone; shale; light to dark grey and greenish grey weathering; common bioturbates, gastropods and other shelly macrofauna, locally common sclerotic concretions; arranged in numerous coarsening-upward cycles; shallow to deep outer shelf (**Deer Bay C**).
4. Sandstone, very fine- to fine-grained; burrowed; siltstone; shale; light to dark grey and greenish grey weathering; common bioturbates, gastropods and other shelly macrofauna, locally common sclerotic concretions; arranged in numerous coarsening-upward cycles; shallow to deep outer shelf (**Deer Bay B**).
3. Sandstone, very fine- to fine-grained; burrowed; siltstone; shale; light to dark grey and greenish grey weathering; common bioturbates, gastropods and other shelly macrofauna, locally common sclerotic concretions; arranged in numerous coarsening-upward cycles; shallow to deep outer shelf (**Deer Bay A**).
1. Sandstone, very fine- to fine-grained; burrowed; siltstone; shale; light to dark grey and greenish grey weathering; common bioturbates, gastropods and other shelly macrofauna, locally common sclerotic concretions; arranged in numerous coarsening-upward cycles; shallow to deep outer shelf (**Deer Bay**).

JURASSIC

LATE JURASSIC (Oxfordian to Volgian)

Ja1 — **AWINGAK:** Quartz sandstone; minor siltstone, shale, coal; fluvial and deltaic, grading to shallow marine shelf.
1. Sandstone, quartzose; fine- to coarse-grained, cross-stratified, loosely consolidated; hematite-cemented layers; minor siltstone, shale; local coal, conglomerate; mostly coarsening-upward cycles; deltaic and locally meandering fluvial, shoreface grading to shallow marine shelf; locally also younger strata (**Awingak**).

LATE JURASSIC (Oxfordian and Kimmeridgian)

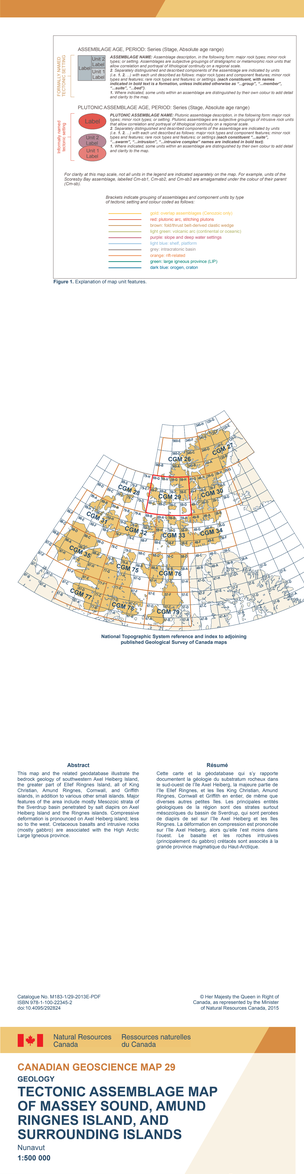
Jr — **RINGNES:** Shale, dark grey to brown and black weathering, bituminous; thin-bedded siltstone; minor fine-grained, thin-bedded sandstone; common dolomitic and sideritic concretions, local shell; anoxic (**Ringnes**).

MIDDLE JURASSIC (Bathonian and Callovian)

Jhc1 — **HICKLES COVE:** Quartz sandstone, ironstone; minor siltstone, shale; nearshore marine.
1. Sandstone, quartzose; very fine- to medium-grained; light brown, orange; calcite cemented or weakly consolidated; ironstone; minor siltstone, shale; shallow marine shelf, probably storm-dominated; nearshore marine; may include McConnell Island formation at the base (**Hicckles Cove**).

MIDDLE JURASSIC (Bajocian to Callovian)

Jmc1 — **McCONNELL ISLAND:** Shale, siltstone, ironstone; minor sandstone; deep marine shelf.
1. Shale, brown to grey weathering; siltstone, ironstone; minor sandstone, very fine-grained; ammonoids, belemnites, bivalves; deep offshore shelf (**McConnell Island**); locally also younger Jurassic strata.


Sverdrup Basin, Sverdrup Rim Zone
Sverdrup Basin, Sverdrup Basin
Sverdrup Basin, Sverdrup Basin
Sverdrup Basin, Sverdrup Basin