Abstract

In 2002, 2003 and 2005, the Canada–Nunavut Geoscience Office and the Geological Survey of Canada, in collaboration with Polar Continental Shelf Program, Dalhousie University, and University of Alberta, undertook studies of northern Baffin Island to provide an improved understanding of the distribution, nature and chemistry of surficial materials, and glacial history of this region, much of which is extensively covered by thick glacial deposits. Widespread till blanket and hummocky till are common in the map area, and locally meltwater channels dissected the till blanket. Ponding of glacial meltwater resulted in deposition of glaciolacustrine sediments. Some of the smaller preserved glaciers are likely Holocene in age, rather than remnants from the continental ice sheet (Pleistocene), like the Barnes Ice Cap. A complex glacial history resulted from overprinting of both erosive and non-erosive basal thermal regimes at various stages of the deglaciation, as well as overprinting of Last Glacial Maximum (LGM)-related geomorphology.

Résumé

En 2002, 2003 and 2005, le Bureau géoscientifique Canada-Nunavut et la Commission géologique du Canada, en collaboration avec le Programme du plateau continental polaire et les universités Dalhousie et d'Ottawa, ont poursuivis des études dans le nord de l'île de Baffin à fin d'obtenir une meilleure connaissance de la distribution, nature et géochimie des dépôts meubles, ainsi que l'histoire glaciaire de la région, qui est largement couvert d'épais dépôts glaciaires. Les couvertures de till et le till boueux sont les sédiments les plus répendus, et les dépôts fluvioglaciaires constituent des sources d'agrégats. Les eaux de fontes ont permis l'accumulation des sédiments glaciolacustres. Certains glaciers mineurs datent de l'Holocène, plutôt que des vestiges de la calotte glaciaire continentale (Pleistocène), telle que la calotte glaciaire Barnes. Une histoire glaciaire complexe résulte d'une superposition de régimes thermals de base érosif et non-érosif à divers stages de déglaciation, ainsi qu'une superposition de la géomorphologie reliée au dernier maximum glaciaire.

National Topographic System reference

Cover illustration
Glaciated terrain, Icebound Lakes map sheet, Baffin Island, Nunavut. Photograph by E.C. Little, 2012-005

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CANADIAN GEOSCIENCE MAP 74

SURFICIAL GEOLOGY

ICEBOUND LAKES (SOUTHWEST)

Baffin Island, Nunavut

1:100 000

QUATERNARY

SURFICIAL DEPOSITS

HOLOCENE

NONGLACIAL ENVIRONMENTS

Snow: snow cover on ca. 1958 aerial photographs such that surficial geology could not be distinguished; thickness is greater than 50 cm.

Ice: glacier ice cover on ca. 1958 aerial photographs; thickness is variable.

Ev — **Eolian veneer:** thin, discontinuous sheets of well sorted, massive silt and sand deposited by wind; thickness is less than 1 m.

Er — **Eolian blanket:** well sorted, massive silt and sand deposited by wind; typically forms gently rolling geomorphology marked by dunes; thickness is less than 5 m.

ALLUVIAL SEDIMENTS: predominantly composed of sorted and commonly stratified gravel, sand, minor silt and organic detritus deposited by post-glacial fluvial processes; fan deposits may include gravelly diamictons.

Av — **Alluvial veneer:** thin, discontinuous deposit; thickness is less than 1 m.

Ap — **Alluvial floodplain:** typically forms a single level within approximately 1 m of active stream channel; thickness ranges from 1 to 5 m.

At — **Alluvial terrace:** deposits are of floodplain origin and presently are isolated from flooding by stream incision; thickness ranges from less than 1 to 10 m.

Af — **Alluvial fan:** forms fan-shaped landforms with gentle slopes where streams enter larger valleys; thickness can reach up to 10 m.

A — **Undifferentiated alluvial sediments:** consists primarily of alluvial units but may contain pockets of till, glaciolacustrine, glaciofluvial, glaciomarine, marine and/or colluvium sediments that are too small to be represented at the scale of mapping; thickness is greater than 1 m.

Lv — **Lacustrine veneer:** thin, discontinuous deposit; thickness is less than 1 m.

Ld — **Lacustrine delta:** active sediment build-up from flowing water entering standing water; may have gently or steeply-dipping fronts; thickness ranges from 3 m to greater than 5 m.

L — **Undifferentiated lacustrine complex:** consists primarily of exposed lacustrine units but may contain pockets of till, glaciolacustrine, glaciofluvial, glaciomarine, marine, colluvium and/or alluvium sediments, that are too small to be represented at the scale of mapping; thickness is greater than 1 m.

COLLUVIAL DEPOSITS: mass wasting debris (i.e. deposited by direct gravity-induced movement that may involve water and/or ice); typically unsorted, but may be stratified as a result of gravity induced movement (e.g. debris flows); the character of the deposit depends primarily on its parent material.

Cv — **Colluvial veneer:** thin, discontinuous deposit; thickness is less than 1 m.

Cb — **Colluvial blanket:** a mantle of sediment; thickness is greater than 1 m.

Ca — **Colluvial apron:** forms a slope deposit comprising debris flows, avalanche-dominated fans, and soliflucted sediments derived from bedrock and glacial sediment sources; thickness is up to 10 m thinning at head and toe of the deposit.

C — **Undifferentiated colluvial complex:** consists primarily of colluvial materials but may contain pockets of till, glaciolacustrine, glaciofluvial, glaciomarine, marine and/or alluvial sediments, that are too small to be represented at the scale of mapping; thickness is greater than 1 m.

GLACIAL ENVIRONMENT

GLv — **Glaciolacustrine veneer:** thin, discontinuous deposit; thickness is less than 1m.

GLb — **Glaciolacustrine blanket:** a mantle of material; thickness ranges from 1 to 5 m.

GLd — **Glaciolacustrine delta:** sediment built-up from flowing glacially derived water entering a glacial lake; the feature may have gently or steeply-dipping fronts; thickness ranges from 3 m to greater than 10 m.

GL — **Undifferentiated glaciolacustrine complex:** consists primarily of glaciolacustrine materials but may contain pockets of till, glaciofluvial, glaciomarine, marine, colluvium and/or alluvium sediments, that are too small to be represented at the scale of mapping; in upper slopes of valleys with cross-valley (DeGeer) moraines, more till is present and is inferred to represent the wasting zone of a paleo-lake; thickness is greater than 1 m.

EARLY HOLOCENE AND PLEISTOCENE

GLACIOFLUVIAL SEDIMENTS: well to poorly stratified gravel, sand and silt; minor diamicton, deposited behind, at, or in front of the ice margin by glacial meltwater.

GFv — **Glaciofluvial veneer:** thin to discontinuous deposit; thickness is less than 1 m.

GFp — **Glaciofluvial plain:** typically forms a single level plain; thickness ranges from 1 m to greater than 5 m.

GFt — **Glaciofluvial terraces:** typically forms terraces separated by scarps; patches of colluvium that are too small to be represented at the scale of mapping may be present along the scarps; thickness ranges from 1 to 20 m.

GFc — **Ice contact glaciofluvial:** kettle and kame topography, including esker ridges; thickness ranges from less than 5 m to greater than 15 m.

GF — **Undifferentiated glaciofluvial complex:** undifferentiated glaciofluvial complex: consists primarily of glaciofluvial materials but may contain pockets or till, glaciolacustrine, glaciomarine, marine, colluvium and/or alluvium sediments, that are too small to be represented at the scale mapping; thickness is greater than 1 m.

Tv — **Till veneer:** thin, discontinuous deposit; thickness is less than 1 m.

Tb — **Till blanket:** surface morphology ranges from conforming to underlying bedrock topography to rolling plain masking the underlying topography; may exhibit crag-and-tails and/or flutings; occasionally exhibits roches moutonnées in areas of thin till blankets (e.g., 1 to 2 m); thickness ranges from 1 m to 20 m.

Tm — **Rolling till plain:** surface morphology forms gently rolling plains with 1 to 2 m relief; may exhibit flutings and/or other drumlinoid forms; generally masks underlying topography; thickness is greater than 5 m.

Tr — **Ridged till complex:** surface morphology forms parallel ridges (i.e. moraines) less than 15 m high and less than 50 m apart; moraines are composed of till, intervening areas may be till and/or ice-marginal glaciofluvial deposits; thickness is variable, but is usually less than 15 m.

Th — **Hummocky till:** forms hummocky surface morphology (i.e. kame and kettle topography); in places the unit may exhibit prominent ridges marking recessional ice margins, or diffuse zones marking boundaries between glacial-ice regimes; thickness is highly variable, but is usually less than 20 m.

T — **Undifferentiated till complex:** consists primarily of till but may contain pockets of glaciofluvial, glaciolacustrine, glaciomarine, lacustrine, marine, colluvium and/or alluvial sediments that are too small to be represented at the scale of mapping; thickness is greater than 1 m.

PRE-QUATERNARY

BEDROCK

R — **Bedrock:** outcrops of bedrock, may have thin mantle greater than 10 cm of unconsolidated or organic material.

Patterned ground: area exhibits a hexagonal polygon network where polygon diameter ranges from 20 to 50 m. may indicate the presence of buried glacial ice at depth.

NOTES:

Compound units: in areas where the surficial geology types are interspersed in patches or patterns too small to be discerned at the scale of mapping, compound units are used. The dominant component is listed first and separated from the secondary unit by a dot (e.g. Tb.O).

Stratigraphic relationship: where underlying units are known, the unit label shows the surface unit above underlying unit with a single slash (e.g. Tb/R).

- K — Kettle
- Geological boundary, defined
- Geological boundary, approximate
- Beach crest
- Drumlinoid (fluting)
- Esker ridge (flow direction known)
- Esker ridge (flow direction unknown)
- Fluted bedrock (ice flow direction known)
- Ice-contact terrace scarp
- Limit of submergence, marine, defined
- Meltwater channel, major (arrow indicates flow direction)
- Meltwater channel, minor (flow direction known)
- Meltwater channel, minor (flow direction unknown)
- Lateral meltwater channel, uphill left
- Lateral meltwater channel, uphill right
- Moraine ridge, minor
- End moraine ridge, major
- Lateral moraine ridge, major
- Terrace scarp, unspecified
- Delta, glaciolacustrine
- Station location, ground observation

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Geology by E.C. Little and P.J. Holme in 2002, 2003 and 2005, with additional air photo interpretation by D.E. Kerr in 2011

Geological compilation by D.E. Kerr

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Base map at the scale of 1:50 000 from Natural Resources Canada, with modifications. Elevations in feet above mean sea level.

CANADIAN GEOSCIENCE MAP 74

SURFICIAL GEOLOGY

ICEBOUND LAKES (SOUTHWEST)

Baffin Island, Nunavut

1:100 000

2 0 2 4 6 8 km

Map projection Universal Transverse Mercator, zone 17. North American Datum 1983

Proximity to the North Magnetic Pole causes the magnetic compass to be erratic in this area.

Mean magnetic declination 2013, 37°17'W decreasing 41.9' annually. Readings vary from 36°06'W in the SW corner to 38°23'W in the NW corner of the map.

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

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Preliminary publications in this series have not been scientifically edited.

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