Notes on classification

The 1:250 000 scale map of Quttinirpaaq National Park of Canada is based on information compiled from aerial photographs of a scale of approximately 1:64 000. This represents a fourfold reduction in scale which necessitated some generalization and combining of units. The reduction process involved an intermediate step of plotting the information on base maps of 1:125 000 scale. Plotting and scale reduction was accomplished with a projection table on which corrections for distortion could be made.

The most substantial amalgamation was for glaciofluvial sediments (unit GF). These deposits are commonly concentrated in narrow valleys were they form terraces (unit GFt), active outwash plains (unit GFp), outwash fans (unit GFf), and combinations of the three. Except where large terraces are found (unit GFt), some of these units were combined on the final map. Melting and undercutting of permafrost in these sediments produces thermokarst and slumping.

The 1:250 000 scale map also includes the amalgamation of bedrock units: weathered bedrock (felsenmeer; unit W) and unaltered bedrock (unit R). Different tills were also amalgamated. On slopes, both R and T units were transported downslope by periglacial processes (e.g. C units).

The glacier cover on the topographic base map is generalized and not very accurate in some areas, therefore, minor supraglacial features interpreted on the airphotos were not retained on the final map.

During the scale reduction process the units become progressively more generalized as the boundaries between adjacent units become smoothed out. This means that actual delineations on the airphotos, are not entirely 'real' on the final map. Nonetheless, an attempt was made to maintain the character of the original landscape.

Ice shelves mapped along the north coast were originally included as a basic unit, but large changes have occurred along the margins in recent years which may make some of the delineations on the airphotos taken in the late 1950's inaccurate. Due to this difficulty, the ice shelf designation represents generalized polygons based on extent of glaciers between 1959 and 2011; data vary locally depending on date of glacier ice coverage. Some valley glaciers were also classed as Isn when they float in deep fiords and display ice shelf morphology.

References and select ice flow data

Christie, R.L., 1966. Surficial geology, northeastern Ellesmere Island, District of Franklin and northwestern Greenland; Geological Survey of Canada, Map 1192A, scale 1:506 880. doi:10.4095/107408.

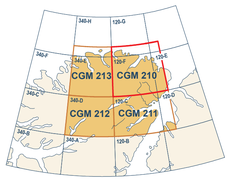
Deblonde, C., Plouffe, A., Eagles, S., Everett, D., Huntley, D.H., Inglis, E., Kerr, D.E., Moore, A., Parent, M., Robertson, L., Smith, I.R., St-Onge, D.A., and Weatherston, A., 2014. Science language for an integrated Geological Survey of Canada data model for surficial geology maps, version 2.0; Geological Survey of Canada, Open File 7631, 464 p. doi:10.4095/294225

Abstract

The Quttinirpaaq National Park region is mountainous including the highest peak in eastern North America. Glaciers cover about half of the map area, including unique floating ice shelves along the north coast, which have largely broken up in the last few decades but many fiord and valley glaciers still contact the sea. Sedimentary rock outcrops form the dominant surficial unit, including large areas of frost shattered rubble mantling broad summits and slopes. Glacial debris is also widespread normally forming a thin discontinuous veneer of till or as isolated erratic boulders. In the past, as now, the main source of run-off and sediment is supplied by glacial meltwater. Consequently most of the unconsolidated sediment lies within formerly glaciated valleys and coastlines where there are complex associations of moraines, glaciofluvial and glaciomarine deposits related to the advance and retreat of valley glaciers and ice caps, coupled with falling sea levels caused by postglacial crustal uplift.

Résumé

La région du Parc national Quttinirpaaq est une zone montagneuse, avec le plus haut sommet de la partie est de l'Amérique du Nord. Les glaciers couvrent environ la moitié de la région de la carte et des plateformes uniques de glace flottante, qui se sont en grande partie disloquées au cours des dernières décennies, sont présentes le long de la côte nord, mais des glaciers de vallée sont encore en contact avec la mer à la tête de nombreux fjords. Des affleurements de roches sédimentaires constituent l'unité superficielle dominante, et comportent de grandes étendues de blocaille résultant de la gélifraction de la roche qui couvrent les larges sommets et les versants. Des débris glaciaires non triés, déposés lors de la dernière glaciation, sont également répandus, mais se présentent habituellement sous forme d'un mince placage de till discontinu ou de blocs erratiques isolés, dispersés à la surface du substratum rocheux. À l'heure actuelle, comme dans le passé, les eaux de fonte glaciaire représentent la principale source de ruissellement et d'apport de sédiments. Ainsi, la plupart des sédiments meubles reposent dans d'anciennes vallées glaciaires et sur les côtes, là où se trouvent des associations complexes de sédiments de moraines, de dépôts fluvioglaciaires et glaciomarins associés à l'avancée et au retrait des glaciers de vallée, en combinaison avec la baisse du niveau de la mer causée par le relèvement postglaciaire de la croûte terrestre.



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

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2nd EDITION

CANADIAN GEOSCIENCE MAP 210

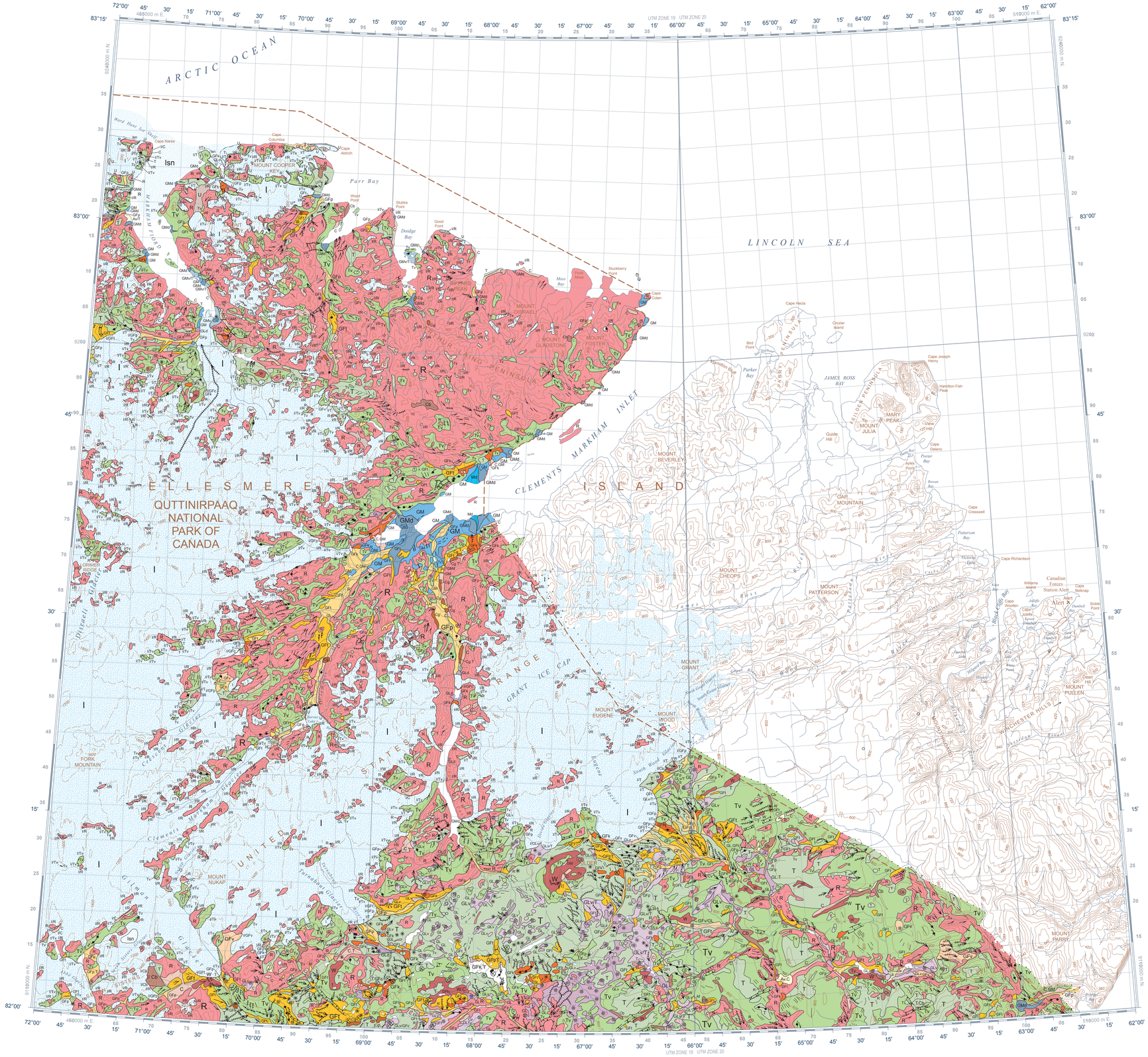
SURFICIAL GEOLOGY

CLEMENTS MARKHAM INLET AREA

Nunavut

NTS 120-F and parts of 120-E and G

1:250 000



QUATERNARY

HOLOCENE

GLACIAL ENVIRONMENT

Isn — **Ice shelf, floating ice:** grounded ice shelf, floating ice, snowpacks, or river icings (aufeis); variable thickness.

I — **Glacier ice:** glacier ice; variable thickness.

NONGLACIAL ENVIRONMENT

O — **Organic deposits, undifferentiated:** plant material; 1 m to 4 m thick; allochtonous or autochtonous; accumulations of organic matter by either in situ growth, in fen-like conditions, or as detrital matter accumulated in depressions.

Cv — **Colluvial veneer:** unsorted rock debris; generally less than 0.5 m thick; discontinuous; mantling valley slopes and floors; solifluicted or washed from upslope weathered rock.

Cb — **Colluvial blanket:** unsorted rock debris; greater than 1–2 m thick; solifluction deposits mantling valley slopes and floors; solifluicted from upslope weathered rock.

Cg — **Rock glacier:** unsorted detritus containing an ice core or interstitial ice; variable thickness; mobilized; may be derived from lateral moraines or colluvial deposits.

C — **Colluvial deposits, undifferentiated:** unsorted rock debris; variable thickness; mantling valley slopes and floors; solifluicted or washed from upslope weathered rock.

Af — **Alluvial fan sediments:** sand and gravel; variable thickness; occur as fans along steep valley sides, transported by water having no apparent glacial source.

Av — **Alluvial veneer:** sand and gravel; generally less than 0.5 m thick; discontinuous; may occur as fans along steep valley sides; transported by water having no apparent glacial source.

A — **Alluvial sediments, undifferentiated:** sand and gravel; variable thickness; has been transported by water having no apparent glacial source.

Md — **Marine deltaic sediments:** sand and gravel; variable thickness; active; transported by water having glacial source; generally the downvalley end of a sandur.

PROGLACIAL AND GLACIAL ENVIRONMENT

GMd — **Glaciomarine deltaic sediments:** fine to coarse grained; generally horizontally stratified; variable thickness; generally inactive; transported by water with glacial source and deposited in seawater forming a delta; generally the downvalley end of a sandur; some deltas near coastline may have alternated with glaciomarine environment, depending on glacial ice history.

GMv — **Glaciomarine veneer:** fine to coarse grained; generally less than 0.5 m thick; discontinuous; has glacial source deposited in seawater.

GM — **Glaciomarine sediments, undifferentiated:** fine to coarse grained; generally horizontally stratified fines comprising the bottomset component of a delta sequence; 5 m to 10 m or more thick; has a glacial source deposited in seawater; fine marine sediments are subject to erosion and often become extensively gullied.

GLd — **Glaciolacustrine deltaic sediments:** fine to coarse grained; variable thickness; transported by water with glacial source and deposited in glacial lakes; may be terraced; generally the downvalley end of a sandur; some deltas near coastline may have alternated with glaciomarine environment, depending on glacial ice history.

GLv — **Glaciolacustrine veneer:** fine to coarse grained; generally less than 0.5 m thick; discontinuous; associated with modern lakes; may include proglacial environments.

GL — **Glaciolacustrine sediments, undifferentiated:** fine to coarse grained; variable thickness; associated with modern lakes; may include proglacial environments; may be gullied.

GFp — **Glaciofluvial outwash plain sediments:** sand and gravel; variable thickness; deposited in front of the marginal zone of a glacier; may include modern active and inactive sediments; may include sandurs, minor terraced sediments, ice-contact sediments, fans, thermokarst; may contain buried glacier ice and ground ice.

GFt — **Glaciofluvial terraced sediments:** sand and gravel; less than 0.5 m thick or greater; forming terraces; inactive; elevated above present level of activity; may include ice-contact, kame terraces, thermokarst.

GFv — **Glaciofluvial veneer:** sand and gravel; generally less than 0.5 m thick; discontinuous; deposited beneath and in front of the marginal zone of a glacier; may include modern active sediments and inactive sediments; may include terraced and ice-contact sediments, kames, outwash plains, and fans.

GFf — **Glaciofluvial outwash fan sediments:** sand and gravel; variable thickness; deposited subaerially in front of the marginal zone of a glacier; active; may include thermokarst.

GFc — **Ice-contact sediments:** gravel and sand; variable thickness; usually forming perched, ice-contact terraces, elevated above the active surface.

GFk — **Kame terrace sediments:** gravel and sand; variable thickness; usually forming perched, ice-contact kame terraces, elevated above the active surface.

GLACIAL ENVIRONMENT

Tv — **Till veneer:** diamicton; unsorted; generally less than 0.5 m thick; discontinuous; deposited directly by a glacier; may exhibit solifluction.

T — **Till, undifferentiated:** unsorted debris; variable thickness; deposited directly by a glacier; may exhibit solifluction.

NONGLACIAL AND PRE-GLACIAL (?) ENVIRONMENT

W — **Weathered bedrock deposits, undifferentiated:** unsorted debris, often frost shattered, felsenmeer; variable thickness; derived from mainly sedimentary bedrock; may exhibit solifluction; may include small areas of unweathered bedrock; may include deposits of pre-glacial age.

GLACIAL ENVIRONMENT

U — **Undifferentiated deposits:** predominantly till but may include glaciofluvial sediments, colluvial deposits, or bedrock; variable thickness; associated with areas deglaciated following geological mapping (1988) of air photos taken in 1959; generalized polygons based on extent of glaciers between 1959 and 2011; data varies locally, depending on date of glacier ice coverage.

PRE-QUATERNARY

R — **Bedrock, undifferentiated:** various lithologies and ages, but mainly sedimentary rock; unaltered; may include small areas of weathered bedrock.

Complex units: where the surficial cover forms a complex pattern and the map units are too small to be mapped individually, yet constitutes a significant aerial extent of the total polygon, a dot (".") separates the first dominant map unit designator from the less abundant secondary unit (e.g. GFv.Tv, designates an area of glaciofluvial veneer with some areas of till veneer).

Stratigraphic relationship: is shown with a maximum of two map unit designators separated by a slash ("/") (e.g. GLv/T, designates glaciolacustrine veneer overlying till).

Geological contact:
- *Defined*
- *Inferred*
- *Concealed*

Limit of mapping

Wind flutings, yardings in fine marine/glaciomarine silts

Terrace scarp, unspecified

Shoreline, beach crest

Meltwater channel:
- *Minor, sense unknown*
- *Minor, sense known*
- *Lateral, barb on uphill side*
- *Major, sense unknown*

Moraines:
- *Minor*
- *Major end*

Ice-contact terrace scarp

Esker, sense known

Roche moutonnée (fluted bedrock, rock drumlin)

Crag-and-tail ridge

Retrogressive thaw flow

Thermokarst depression

Patterned ground

Kettle lake

Kame

Glacial striations:
- *Sense unknown*
- *Sense known*

Station location

Recommended citation
Bednarski, J.M., 2016. Surficial geology, Clements Markham Inlet area, Nunavut, NTS 120-F and parts of 120-E and G; Geological Survey of Canada, Canadian Geoscience Map 210 (2nd edition, preliminary), scale 1:250 000. doi:10.4095/298700

Geological Survey of Canada
Canadian Geoscience Maps

Canada

Author: J.M. Bednarski

Geology based on aerial photograph interpretation and field work by J.M. Bednarski in 1979 to 1988. Additional geological field data by R.L. Christie in 1954, 1957, 1958.

Geology conforms to Surficial Data Model v. 2.0.1

Geological compilation by D.E. Kerr, 2013–2014

Data conversion by F. Fortin, 2013 and S. Eagles, 2013, 2014

Geomatics by F. Fortin

Cartography by G.S. Hanna

Initiative of the Geological Survey of Canada as part of Natural Resources Canada's Geo-mapping for Energy and Minerals (GEM) Program, with participation from Parks Canada Agency – Nunavut Field Unit.

Map projection Universal Transverse Mercator, zone 19.
North American Datum 1983

SURFICIAL GEOLOGY

CLEMENTS MARKHAM INLET AREA

Nunavut

NTS 120-F and parts of 120-E and G

1:250 000

5 0 5 10 15 20 km

Base map at the scale of 1:250 000 from Natural Resources Canada, with modifications.
Elevations in feet above mean sea level

Proximity to the North Magnetic Pole causes the magnetic compass to be erratic in this area.
Mean magnetic declination 2016, 54°38'W, decreasing 66.8' annually. Readings vary from 50°38'W in the SE corner to 58°45' in the NW corner of the map.

This map is not to be used for navigational purposes.

Title photograph: Glaciers near Mount Grant, Ellesmere Island, Nunavut. Photograph by J.M. Bednarski. 2013-084

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

Data may include additional observations not portrayed on this map. *See* map info document accompanying the downloaded date for more information about the publication.

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Preliminary publications in this series have not been scientifically edited.

CANADIAN GEOSCIENCE MAP 210
SURFICIAL GEOLOGY
CLEMENTS MARKHAM INLET AREA
Nunavut
NTS 120-F and parts of 120-E and G