Descriptive Notes

The predictive surficial geology raster-based remote predictive mapping (RPM) map was generalized in order to conform to cartographic standards for a 1:250 000 vector-based surficial geology map sheet, based on the Surficial Data Model (SDM), v. 2.3.14 (Deblonde et al., 2018). Linking this new mapping to the standard SDM in vector format facilitates the infilling of designated unmapped areas and co-ordinating the new mapping to previously mapped adjoining areas. The common science language and common legend is to enable and facilitate the efficient digital compilation, interpretation, management, and dissemination of geological map information in a structured and consistent manner. This provides an effective knowledge-management tool designed around a geodatabase which can expand following the type of information to appear on new surficial geology maps.

The generalization process included 4 iterations of a 3 X 3 pixel majority filter, conversion of the data from raster to vector format and removal of polygons less than 30 000 m^2. Polygons below this minimum size threshold were replaced with the neighbouring classes using the expand tool in ArcGIS.

Special treatment was given to predicted bedrock outcrops to maintain the spatial distribution of small discrete outcrops without overloading the map sheet with bedrock clusters. Predicted bedrock polygons smaller than 15 000 m^2 were removed, and the ones between 15 000 and 30 000 m^2 were converted to points ("x" symbol) using the centroid command in ArcGIS. The outline of the polygon was also smoothed by 150 m using the smooth line command in ArcGIS. Any existing vector data was maintained.

It is customary over the last few years for the Geological Survey of Canada to include any relevant legacy data in new vector-based predictive surficial geology maps that cover unmapped areas. The reason is because these predictive surficial geology maps are meant to represent our best summary of knowledge over large areas where traditional systematic mapping has not been done. Some of these additional features, many being field observations, include drumlinoids and crag-and-tails (Fyles, 1963), and major moraine ridges (Fyles, 1963). Some terrain features identified in RPM training areas by air-photo interpretation are included locally. The corresponding geodatabase for this map (Sheet 2) is included in this publication.

A widespread series of crosscut, streamlined flow fields record the complex glacial history of eastern Victoria Island, including marine-limit water plains. Scoured bedrock in several flow fields indicates that these are erosional terrains, with little or no sediment cover.

References

Deblonde, C., Cocking, R.B., Kerr, D.E., Campbell, J.E., Eagles, S., Everett, D., Huntley, D.H., Inglis, E., Parent, M., Plouffe, A., Robertson, L., Smith, I.R., and Weatherston, A., 2018. Surficial Data Model: the science language of the integrated Geological Survey of Canada data model for surficial geology maps; Geological Survey of Canada, Open File 8236, ver. 2.3.14, 1 .zip file. https://doi.org/10.4095/308178

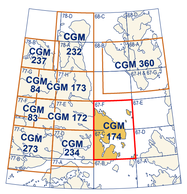
Fyles, J.G., 1963. Surficial geology of Victoria and Stefansson islands, District of Franklin; Geological Survey of Canada, Bulletin 101, 49 p. https://doi.org/10.4095/100620

Abstract

This 1:250 000 predictive surficial geology map of Denmark Bay–Qikiqtagafaaluk area, combines remote predictive mapping (RPM) and visually interpreted imagery from LANDSAT and SPOT data. Machine-automated classification of training data, conversion to surficial geology, and terrain reclassification were integrated with landform and regional ground-truth data. The map captures a sediment mosaic because spectral data realistically record moisture content on terrain surfaces in this permafrost setting. Tonal character of moisture content is controlled by sediment texture, topography, vegetation, and material thickness. Visual analysis of terrain form, with expert knowledge, reveals a series of crosscut streamlined flow fields recording complex glacial history, including marine inundation limits. Scoured bedrock in flow fields indicates erosional terrains, with little or no sediment cover. RPM methods are efficient and accurate in mapping surface spectral details, allowing more time to develop geological models of glaciated terrain. This publication includes the predictive surficial geology data in two formats: Sheet 1, raster (~75%)/vector (~25%), and Sheet 2, vector.

Résumé

Cette carte de la géologie prédictive des formations superficielles de la région cartographique de Denmark Bay–Qikiqtagafaaluk à l'échelle 1/250 000 combine la télécartographie prédictive et l'interprétation visuelle d'images obtenues par LANDSAT et SPOT. La classification automatique des données d'apprentissage, la conversion en une carte des formations superficielles et la reclassification des terrains ont été intégrées à des données sur les formes de terrain ainsi qu'à des données de la réalité de terrain à l'échelle régionale. La carte représente une mosaïque de sédiments car les données spectrales enregistrent de manière réaliste la teneur en eau des surfaces du terrain dans ce milieu à pergélisol. Le caractère tonal des données spectrales, qui reflète la teneur en eau, dépend de la texture des sédiments, de la topographie, de la végétation et de l'épaisseur des matériaux. L'analyse visuelle des formes de terrain par des spécialistes révèle une série de champs de formes profilées d'écoulement qui présentent entre eux des relations de recouvement, témoignant ainsi d'une histoire glaciaire complexe, ainsi que l'existence de limites de submersion marine. Le substratum rocheux affouillé dans les champs d'écoulement est l'indication de terrains d'érosion, qui présentent peu ou pas de couverture de sédiments. Les méthodes de télécartographie prédictive sont efficaces et précises pour cartographier les détails spectraux de la surface, ce qui donne aux géologues plus de temps pour produire des modèles géologiques des terrains glaciaires. Cette publication comprend des données de la géologie prédictive des formations superficielles en deux formats : feuille 1, matriciel (~75%)/vectoriel (~25%), et feuille 2, vectoriel.



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

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Natural Resources Canada / Ressources naturelles Canada

CANADIAN GEOSCIENCE MAP 174

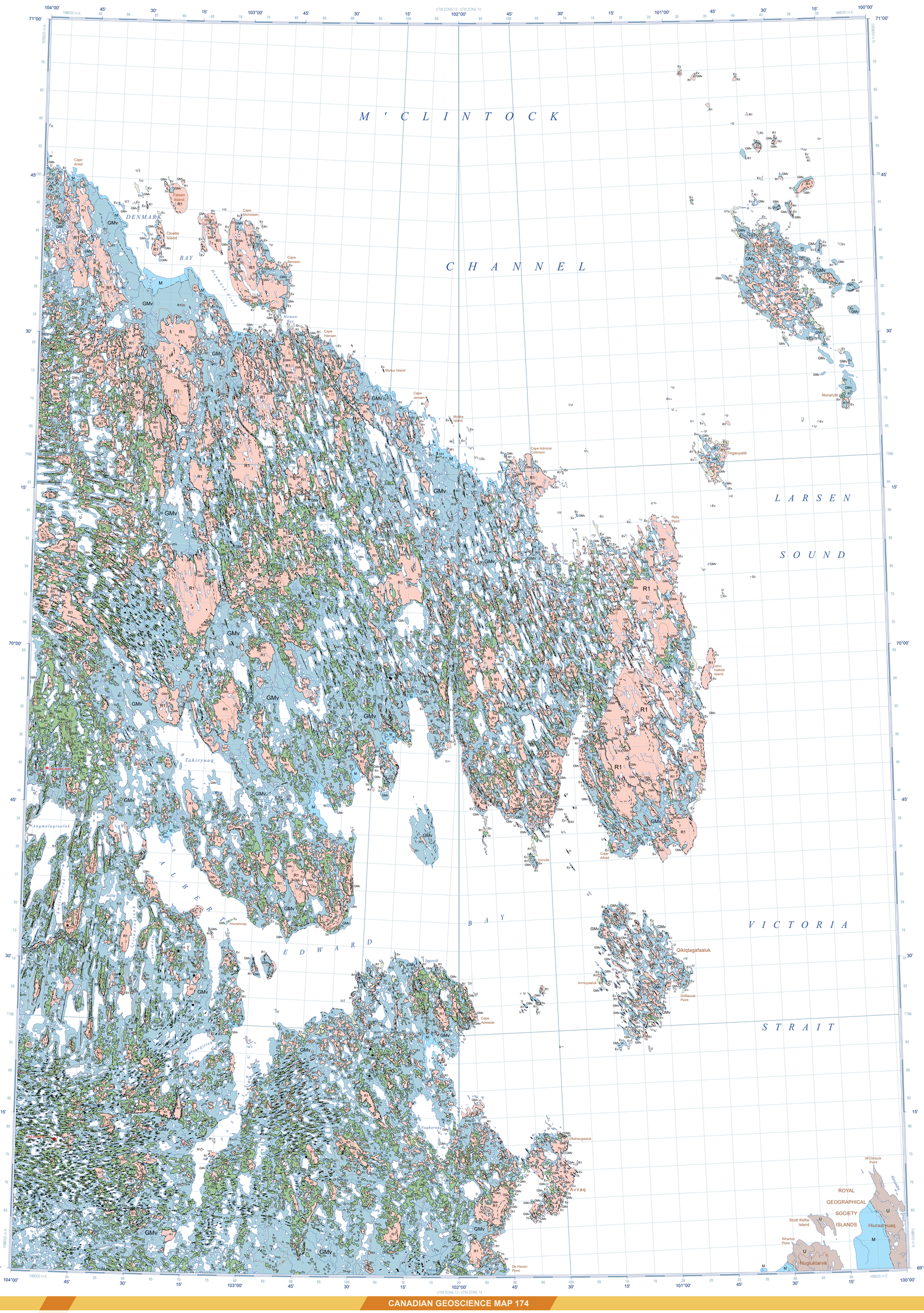
PREDICTIVE SURFICIAL GEOLOGY

DENMARK BAY–QIKIQTAGAFAALUK AREA

Victoria Island, Nunavut

NTS 67-C and F

1:250 000



QUATERNARY

HOLOCENE

NONGLACIAL ENVIRONMENT

Ev — **Eolian sediments, veneer:** <1 m of fine sand, deposited downflow of Nanook River floodplain sand.

M — **Marine sediments, undifferentiated:** silt, sand with lag gravel, 1 to 2 m thick, deposited or wave reworked and pushed by sea ice during marine regression.

LAST GLACIATION (WISCONSIN)

PROGLACIAL AND GLACIAL ENVIRONMENT

GMv — **Glaciomarine sediments, veneer:** silt, sand, and lag gravel, 1 to 2 m deposited or wave reworked and pushed by sea ice during regression below marine limit (~120–140 m a.s.l.).

GLACIAL ENVIRONMENT

Th — **Glacial sediments, hummocky till:** sandy-silt diamicton, may be stratified; 5 to 10 m thick; forms disorganized hillocks, elongated ridges, and kame-and-kettle topography, with large ~50 m ice-wedge polygons; associated with ice-cored terrain and slump scars.

Tv — **Glacial sediments, veneer on bedrock topography:** sandy-silt diamicton, <2 m thick, deposited by basal glacial processes; mainly meltwater-eroded surface with exposed bedrock and boulder concentrations.

U — **Undifferentiated deposits:** sediment complex; variable thickness; below marine limit it consists of glaciomarine silt and sand veneer (unit GMv), sandy-silt till veneer (unit Tv) with exposed, mainly carbonate bedrock, and rare Precambrian igneous rock; above marine limit, it consists of sandy-silt hummocky till (unit Th) greater than 10 m thick, sandy-silt till veneer (unit Tv), and colluvial sandy-silt diamicton greater than 5 m thick, and rare glaciolacustrine silt and sand veneer.

PRE-QUATERNARY

R1 — **Bedrock, sedimentary:** Cambrian and Ordovician carbonate rocks (dolosiltite).

Geological contact:
- *Defined*
- *Approximate*

Beach crest, glaciomarine, marine

Major meltwater channel

Esker ridge, paleoflow direction unknown (meltwater channels often occur with inset eskers; however, not all inset eskers can be displayed on the map)

Drumlinoid ridge or fluting

Crag-and-tail ridge, not mapped to scale

Paleocurrent measurement, bedrock erosional forms

Striation, direction known

2018-230 — Field photograph location with NRCan photo catalogue number

Ground observation

19A2 — Sample location

Sheet 2 of 2, Predictive surficial geology (vector)

Recommended citation
Sharpe, D.R., Lesemann, J.-E., Parkinson, W., Armstrong, L., and Dods, E., 2023. Predictive surficial geology, Denmark Bay–Qikiqtagafaaluk area, Victoria Island, Nunavut, NTS 67-C and F; Geological Survey of Canada, Canadian Geoscience Map 174, scale 1:250 000. https://doi.org/10.4095/295703

CANADIAN GEOSCIENCE MAP 174

Geological Survey of Canada
Canadian Geoscience Maps

Authors: D.R. Sharpe, J.-E. Lesemann, W. Parkinson, L. Armstrong, and E. Dods

Geology by D.R. Sharpe, 1985, 1987, and 1988

Geological compilation by D.R. Sharpe, 2014 and D.E. Kerr, 2015

Geology conforme to Surficial Data Model v. 2.3.14 (Deblonde et al., 2018).

Geomatics by L. Armstrong, E. Dods, and S. Eagles

Cartography by S. Eagles, R. Chan, E. Everett, and M.J. Baldock

Scientific editing by A. Weatherston

Initiative of the Geological Survey of Canada, conducted under the auspices of the Remote Predictive Mapping activity as part of Natural Resources Canada's Geo-mapping for Energy and Minerals (GEM) program

Map projection Universal Transverse Mercator, zone 13 North American Datum 1983

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

PREDICTIVE SURFICIAL GEOLOGY

DENMARK BAY–QIKIQTAGAFAALUK AREA

Victoria Island, Nunavut

NTS 67-C and F

1:250 000

5 0 5 10 15 20 km

Proximity to the North Magnetic Pole causes the magnetic compass to be erratic in this area.
Mean magnetic declination 2023, 2°35'E, increasing 7.4' annually
Readings vary from 1°30'W in the NE corner to 6°04'E in the SW corner of the map.

This map is not to be used for navigational purposes.

Title photograph: Raised marine shoreline terraces that extend to a large sediment upland, Albert Edward Bay, Nunavut. Photograph by D.R. Sharpe.
NRCan photo 2014-066

The Geological Survey of Canada welcomes corrections or additional information from users (gscpublications-cgcpublications@nrcan-rncan.gc.ca).

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

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

CANADIAN GEOSCIENCE MAP 174
PREDICTIVE SURFICIAL GEOLOGY
DENMARK BAY–QIKIQTAGAFAALUK AREA
Victoria Island, Nunavut
NTS 67-C and F