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 (Deblonde et al., 2017). Linking this new mapping to the standard SDM in vector format facilitates the in-filling 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 that can expand, following the type of information to appear on new surficial geology maps.

The generalization process included four iterations of a 3X3 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 in regions and 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 m^2 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.

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 striations (Fyles, 1963; Rainbird and LeCheminant, 2002); drumlinoid and crag-and-tail features (Fyles, 1963); and major moraine ridges (Fyles, 1963). The corresponding geodatabase for this map is also included in this publication.

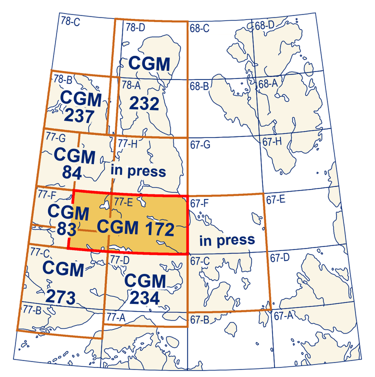
Widespread glaciofluvial erosional features and sediments, and subsequent glaciolacustrine and glaciomarine inundation, are superimposed on the landscape. Complex ice flow patterns mark the glacial terrain with five or six streamlined landform flow patterns, several showing crosscutting relationships. Significant westward and southward flow occurred around central uplands with thick sediment or ice-cored hummocky terrain. Some of these terrain features may indicate an erosional origin for drumlinoid features. Glaciomarine and glaciolacustrine limits of submergence (130–100 m a.s.l.) surround the central and western hummocky uplands. Large subglacial and proglacial glaciofluvial sand and gravel deposits highlight the highest western limits. The north-south streamlined set in the central map area contains 3–15 km wide zones of distinctive (longitudinal) sinuous ridges. The central sediment zone is truncated by a large northwesterly flowing river southeast of Namaycush Lake, exposing thick sandy sediment that has been transported 20–25 km to the southeast as an eolian veneer tens of centimetres thick.

Abstract

The predictive surficial geology map combines remotely predicted map and visually interpreted imagery from LANDSAT and SPOT data. Machine-automated classification was integrated with landform and regional ground-truth data. The tonal character of spectral data, moisture content, controlled by sediment texture, topographic position, vegetation, and material thickness is mapped by machine methods. Visual analysis of terrain form, with expert knowledge, reveals a series of crosscut streamlined flow fields that record a complex glacial history, including glaciolacustrine and marine limit water plains. Scoured bedrock in an east-west flow field indicates that it is an erosional terrain that bifurcates a high area of thick, ice-cored, hummocky terrain. Remotely predicted map methods are efficient, accurate, and save time in mapping spectral details on the ground surface, allowing the geologist more time in developing the essential 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

La carte de la géologie des formations superficielles combine la télécartographie prédictive à l’interprétation visuelle d’images révélées par des données LANDSAT et SPOT. Une classification automatisée a été intégrée aux données topographiques et à des données de la réalité de terrain à l’échelle régionale. Le caractère tonal des données spectrales, qui reflète la teneur en eau et dépend de la texture des sédiments, de la position topographique, de la végétation et de l’épaisseur des matériaux, est cartographié par des méthodes automatiques. L’analyse visuelle de la topographie par des spécialistes révèle une série de champs transversaux de formes profilées d’écoulement qui témoignent de l’histoire glaciaire complexe de cette région, laquelle a notamment été marquée par la formation de plaines glaciolacustres et de plaines littorales. Le substratum rocheux affouillé dans un champ d’écoulement est-ouest indique qu’il s’agit d’un terrain d’érosion qui bifurque de part et d’autre d’un terrain élevé à surface bosselée formé de dépôts épais à noyaux de glace. Les méthodes de télécartographie prédictive sont efficaces, précises et elles font gagner du temps pour cartographier les détails spectraux de la surface du sol, ce qui donne aux géologues plus de temps pour produire d’importants modèles géologiques des terrains glaciaires. Cette publication comprend des données prédictives de la géologie 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

Catalogue No. M183-1/172-2014E-PDF
ISBN 978-1-100-23404-5
https://doi.org/10.4095/295701

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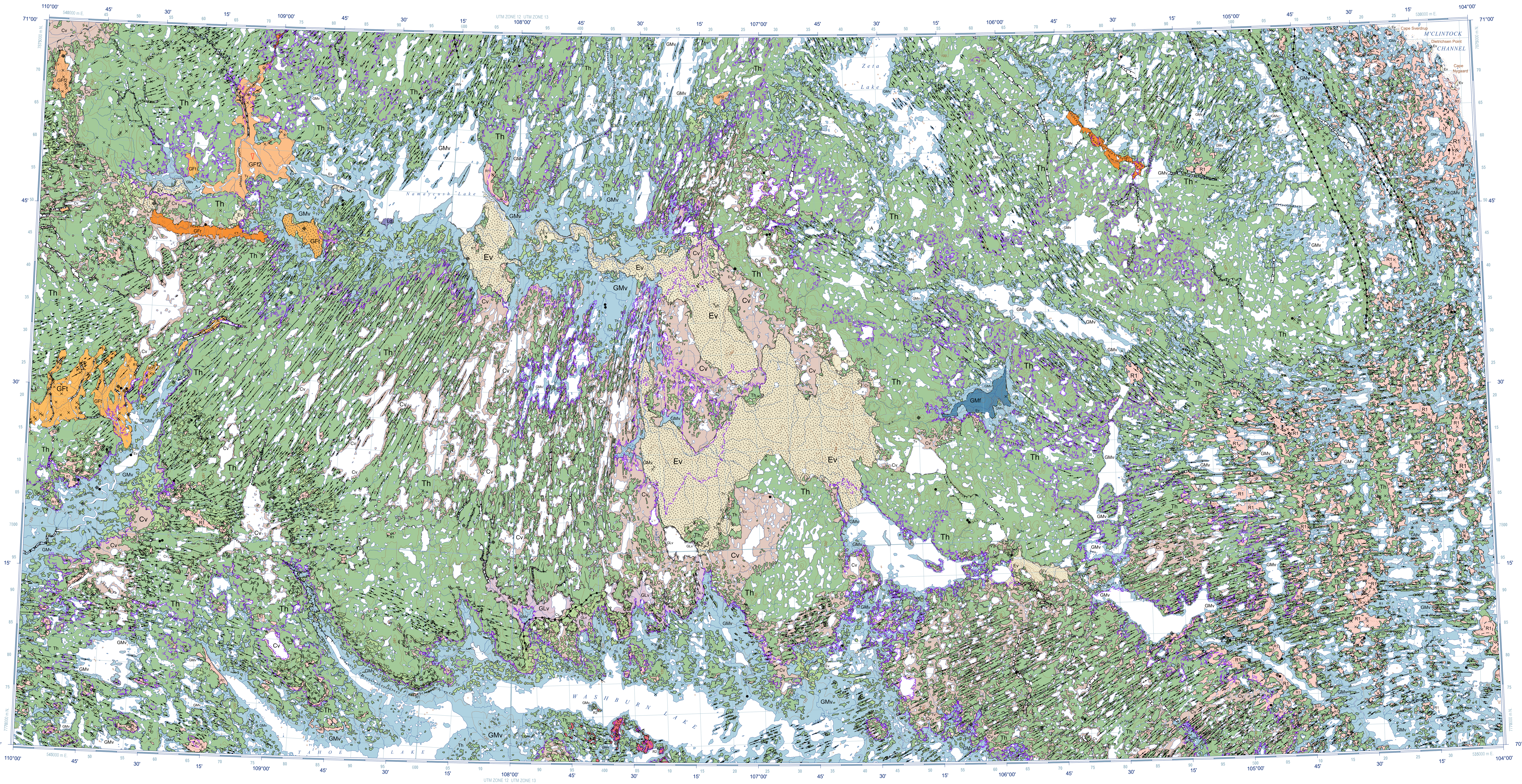
CANADIAN GEOSCIENCE MAP 172
PREDICTIVE SURFICIAL GEOLOGY
WASHBURN LAKE AREA
Victoria Island, Nunavut
NTS 77-E and 77-F east
1:250 000



QUATERNARY

HOLOCENE

NONGLACIAL ENVIRONMENT

Ev	**Eolian veneer:** fine sand, 1–2 m thick, deposited downflow (southeast) of Namaycush River sandy floodplain.
Cv	**Colluvial veneer:** sandy silt diamicton, 1–5 m thick, deposited by thermokarst erosion of ice or ice-bonded sediment above marine limit.
A	**Alluvial sediments, undifferentiated:** sand and gravel, stratified, 1–2 m thick, deposited along modern rivers in terraces and floodplains.
Ld	**Lacustine deltaic sediments:** fine sand, 1–2 m thick, deposited where modern streams enter lakes.
M	**Marine sediments, undifferentiated:** silt, sand, and gravel lag; 1–3 m thick; deposited or wave reworked during marine regression.

LAST GLACIATION (WISCONSIN)

PROGLACIAL AND GLACIAL ENVIRONMENT

GMf	**Glaciomarine subaqueous outwash fan sediments:** sand, silt, and gravel; 1–5 m thick; deposited below water plane at ice-marginal conduit.
GMv	**Glaciomarine veneer:** sand, silt, and lag gravel; 1–2 m thick; deposited by wave wash and ice-push on low-relief marine platform below marine limit (~120–140 m a.s.l.).
GLv	**Glaciolacustrine veneer:** silt and sand, 1–2 m thick, deposited above marine limit (>120–140 m and <150–160 m a.s.l.) where meltwater was impounded by ice or topography.
GFt	**Glaciofluvial terraced sediments:** sand and gravel, stratified, 1–10 m thick, deposited along proglacial meltwater channels, or flow in ice-walled channels, as terraces.
GFf2	**Glaciofluvial subaqueous outwash fan sediments:** silt, sand, and gravel; stratified; 1–10 m thick; deposited below the water plane at ice-margin conduit.
GFr	**Glaciofluvial esker sediments:** sand and gravel, stratified, 2–20 m thick, deposited by meltwater in subglacial or ice-walled tunnels.

GLACIAL ENVIRONMENT

Th	**Hummocky till:** sandy-silt diamicton, gravelly; may be stratified; 5–10 m thick; forms hillocks, swales, and elongated ridges in unganized thermokarst topography with large approximately 50 m ice wedge polygons, ice-cored terrain, and slump scars.
Tv	**Till veneer:** sandy-silt diamicton, gravelly; less than 1 m thick; basal till; surface is part of bedrock topography; meltwater-eroded surface with exposed bedrock and boulder concentrations.

PRE-QUATERNARY

R1	**Bedrock, sedimentary:** Cambrian and Ordovician carbonate rocks (dolosilite).
R2	**Bedrock, igneous and sedimentary:** Precambrian; Paleoproterozoic diabase dykes; interbedded sandstone and dolomite carbonate; Archean granite rocks.

Eolian lag deposit, deflation surface

Geological contact:
Defined
Approximate

Beach crest, glaciomarine, marine

Limit of submergence:
111 *Marine, approximate (estimated elevation m a.s.l.)*
137 *Marine, defined (estimated elevation m a.s.l.)*
161 *Glaciolacustrine, approximate (estimated elevation m a.s.l.)*

Major meltwater channel

Moraine ridge:
Other minor, unspecified
Major, end
Major, ice-cored, lateral

Esker ridge:
Paleoflow direction unknown
Paleoflow direction known

Drumlinoid ridge or fluting (1 = older, 2 = younger)

Striation:
Direction unknown
Direction known
Crossed (1 = older, 2 = younger)

Small outcrop

Field photograph location

Sample location

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., 2017. Surficial Data Model, version 2.3.0: revisions to the science language of the integrated Geological Survey of Canada data model for surficial geology maps; Geological Survey of Canada, Open File 8236, 1 .zip file. https://doi.org/10.4095/302717

Fyles, J.G., 1963. Surficial geology of Victoria and Stefansson islands, District of Franklin; Geological Survey of Canada, Bulletin 101, 38 p. https://doi.org/10.4095/100620

Rainbird, R.H. and LeCheminant, A.N., 2002. Geology, northern Wellington Inlier, Washburn Lake area, Nunavut; Geological Survey of Canada, Open File 4263, scale 1:100 000. https://doi.org/10.4095/213227

Sheet 2 of 2, Predictive surficial geology (vector)

Recommended citation
Sharpe, D.R., Lesemann, J.-E., Parkinson, W., Armstrong, L., and Dods, E., 2018. Predictive surficial geology, Washburn Lake area, Victoria Island, Nunavut, NTS 77-E and 77-F east; Geological Survey of Canada, Canadian Geoscience Map 172, scale 1:250 000. https://doi.org/10.4095/295701

CANADIAN GEOSCIENCE MAP 172

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

Geology by D.R. Sharpe, 1984, 1985, and 1987

Geological compilation by D.R. Sharpe, 2013–2014 and D. Kerr, 2015

Geology conforms to Surficial Data Model v. 2.3 (Deblonde et al., 2017)

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

Cartography by S. Eagles, R. Chan, and E. Everett

Scientific editing by E. Inglis

Initiative of the Geological Survey of Canada, conducted under the auspices 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
WASHBURN LAKE AREA
Victoria Island, Nunavut
NTS 77-E and 77-F east
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 2018, 7°56'E, decreasing 26.8' annually
Readings vary from 2°50'E in the NE corner to 12°04'E in the SW corner of the map.

This map is not to be used for navigational purposes.

Title photograph: Sinuous ridges (near view) and streamlined forms (far view) trending approximately north; view to the northwest, north of Washburn Lake, eastern Victoria Island, Nunavut. Photograph by D.R. Sharpe. 2014-068

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 data for more information about this publication.

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

CANADIAN GEOSCIENCE MAP 172
PREDICTIVE SURFICIAL GEOLOGY
WASHBURN LAKE AREA
Victoria Island, Nunavut
NTS 77-E and 77-F east

Canada