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**GEOLOGICAL SURVEY OF CANADA
OPEN FILE 8717**

**Northern Canada glacial geomorphology database: part 1
— central mainland Nunavut**

Version 2020

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SUMMARY

A new glacial geomorphology database was produced in a core region of the Laurentide Ice Sheet (LIS) located in mainland Nunavut, an area for which accurate palaeoglaciological reconstructions demand significant improvement on data-based knowledge of ice sheet flow patterns, subglacial thermal regimes and ice-margin chronology. The compilation builds on recent and legacy maps and is supplemented by visual digitization of glacial features using a high-resolution digital elevation model (ArcticDEM) and Landsat 8 images. The database also includes an updated set of both remote and ground observations acquired during previous geological mapping projects or as part of recent field mapping activities within Natural Resources Canada's Geomapping for Energy and Minerals (GEM) Program (2008-2020).

All glacial geomorphological features and standardized field datasets are integrated into an ESRI ArcGIS 10.0 geospatial database (gdb) with a scalable map in mxd format. The geodatabase will be updated as new mapping is performed or new field work is completed. From this unprecedented detailed inventory of >156,000 features and >14,000 field observations, coherent patterns of landform development (landsystems) were identified, many of which are entirely new and others significantly modified or updated. The landsystems are included as georeferenced overlays in the gdb. To improve map presentation and readability, the mapped glacial features were generalized at both 1:5 million and 1:1 million scales using a semi-automated generalization method and are provided as PDF files. A complete description of the map sources, mapping method, mapped features, field datasets and interpretations of the glacial landsystems are presented in McMartin et al. (2020). A summary of the GEM project results and an historical review of previous glacial geomorphological mapping in Keewatin are provided in McMartin et al. (in press).

Related publications

McMartin, I., Godbout, P.-M., Campbell, J.E., Tremblay, T., and Behnia, P., 2020. A new map of glacial features and glacial landsystems in central mainland Nunavut, Canada; *Boreas*, 25 p.

<https://doi.org/10.1111/bor.12479>

McMartin, I., Campbell, J.E., Godbout, P.-M., Behnia, P., Tremblay, T., and Normandeau, P.X., in press. High resolution mapping of glacial landscapes in the north-central portion of the Laurentide Ice Sheet in Nunavut and Northwest Territories; In McMartin, I. (ed.): *Surficial Geology of Northern Canada: a Summary of Geo-mapping for Energy and Minerals Program Contributions*. Geological Survey of Canada, Bulletin 611.

METADATA

The gdb contains all attribute data and can be opened directly from the provided mxd.
of_8717_v2020_10_0.mxd

\\Data\\of_8717_v2020.gdb

The data are also provided in separate shapefiles.

\\Data\\of_8717_v2020_shp

study_area – outline of study area

water – areas of fresh and non-fresh water

Mapped glacial features

feature_lines – linear geomorphological features

feature_points – point geomorphological features

feature_plume_flowsets – generalized ice-flow directions within till plumes

feature_polygons – areas of regrouped glacial features

Field datasets

field_stations – ground and remote field stations

field_ice_flows – small- to medium-scale ice-flow indicators measured in the field

field_samples – samples collected for Quaternary studies

Glacial landsystems

ice_stream_flowsets – generalized ice-flow directions within areas of ice streams

ice_stream_landssystem – areas of ice streams

palimpsest_flowsets – generalized ice-flow directions within areas of palimpsest streamlined terrains

palimpsest_streamlined_landssystem – areas of palimpsest streamlined terrains

relict_cold_based_landssystem – areas of relict cold-based terrains

relict_intermediate_to_cold_based_landssystem – areas of relict intermediate to cold-based terrains

relict_intermediate_to_warm_based_landssystem – areas of relict intermediate to warm-based terrains

preserved_warm_based_landssystem – areas of preserved warm-based glacial terrains

cold_based_retreat_landssystem – areas of cold-based retreat glacial terrains

Projection:

Projected Coordinate System: NAD_1983_UTM_Zone_15N

Projection: Transverse_Mercator

False_Easting: 500000,00000000

False_Northing: 0,00000000

Central_Meridian: -93,00000000

Scale_Factor: 0,99960000

Latitude_Of_Origin: 0,00000000

Linear Unit: Meter

Geographic Coordinate System: GCS_North_American_1983

Datum: D_North_American_1983

Prime Meridian: Greenwich

Angular Unit: Degree

\Maps (in PDF)

Generalized_map_1M – Generalized map of glacial features at 1:1 million scale

Generalized_map_5M – Generalized map of glacial features at 1:5 million scale

Note: Generalized glacial features in shapefile format available upon request.

\Tables (in PDF)

Table_1 – List of mapped features, field datasets and interpreted glacial landsystems; with number of features.

Table_2 – List of maps used in the compilation. Complete list of references is given in Table 3.

Table_3 – Reference list for maps listed in Table 2. References for sources of field datasets are also included.

Table_4 – Criteria used for generalizations of glacial features.

Table_5 – Map unit legend.

ATTRIBUTE DESCRIPTIONS

Complete feature descriptions are given in McMartin et al. (2020).

Note: empty cells in attribute columns represent no data (including not measured or not applicable).

1) Mapped glacial features

feature_lines

ID – Unique identifier

Feature:

Crag-and-tail landform

Esker ridge (Note: eskers completely reworked into beaches were removed from the compilation)

Ice-front retreat position

Ice-flow direction

Lateral meltwater channel (Note: incomplete mapping in some areas)

Marine limit (Note: incomplete mapping in some areas; also some may represent glacial lake limits slightly above the local marine limit, namely around Yathkyed Lake, Princess Mary Lake and Schultz Lake)

Major moraine ridge

Streamlined landform

Subglacial meltwater corridor

Subset

Beaded (for esker only)

End (for moraine only)

Interlobate (for moraine only)

Lateral shear (for moraine only)

Lateral uphill left (for lateral meltwater channel)

Lateral uphill right (for lateral meltwater channel)

Undefined (for lateral meltwater channel only)

Pre-crag (for crag-and-tail landform only)

Sense (only applied to esker ridge and streamlined landform)

Known

Unknown (for esker only)

Unspecified (for streamlined landform)

Source

Values are given in Table 2. References for the map sources are listed in Table 3.

Age

Values are relative ages between glacial lineations (for crag-and-tail and streamlined landforms only), interpreted remotely and confirmed by surrounding striation chronology (if available).

Notes

Values are given for modified or new feature by Mapper; Year; Nature of modification; Cartographic tools used.

feature_points

ID – Unique identifier

Feature:

Delta

Ice-contact delta (Note: include kame terraces)

Subtype

Glaciolacustrine

Glaciomarine

Ice-margin

Lacustrine

Marine

SMC (Subglacial meltwater corridor)

Direction

Values are given in azimuth degrees with zero pointing to true north.

Source

Values are given in Table 2. References for the map sources are listed in Table 3.

Notes

Values are given for modified or new feature by Mapper, Year, Nature of modification.

feature_plume_flowsets

ID – Unique identifier

Feature

Till plume flowset

Notes

Values are given by Mappers, Year, Nature of modification.

feature_polygons

ID – Unique identifier

Feature:

Till plume

De Geer moraine area

Minor moraine ridge area (undifferentiated)

Subtype (for till plumes only):

Carbonate

Non-carbonate

Notes

Values are given by Mappers, Year, Nature of modification.

2) Field datasets

field_stations

ID – Unique identifier

StationID – Unique station identifier

VisitDate – Date of field observation, or approximate year for legacy maps

Latitude – Latitude in decimal degrees

Longitude – Longitude in decimal degrees

Easting_NAD83_15N – Easting in meters

Northing_NAD83_15N – Northing in meters

NTS – 50K map sheet number from the National Topographic System (NTS)

OrgDatum – Original projection of the datasets

ElevationM – Elevation in meters based on ElevMethod

ElevMethod – Source of elevation measurement

ObservType – Remote observation (from the aircraft) or Ground observation

StnType – Nature of observation

MapUnit – Surficial map unit label (see Table 5 for complete Map unit legend)
Landform – Geomorphological feature (if recorded)
Source – References listed in Table 3
Summary_info – Field observation, Ice-flow indicator only, Legacy map data, Sample only

field_ice_flows

ID – Unique identifier
IceFlowID – Unique ice-flow indicator identifier
StationID – Unique station identifier
Latitude – Latitude in decimal degrees
Longitude – Longitude in decimal degrees
Easting_NAD83_15N – Easting in meters
Northing_NAD83_15N – Northing in meters
OrgDatum – Original projection of the datasets
Feature – Ice-flow indicator type(s)
Azimuth – Down-ice direction with zero pointing to true north
Sense – Known or unknown
Relative_age – Age relationship (1=oldest; 0: unknown)
Definition – Well, moderately or poorly defined
Main – Predominant indicator: T=True; F=False or unknown (blank if not recorded)
Source – References listed in Table 3
Mapped_symbol – Striations (include chatter marks, rat tails, grooves, crescentic gouges, etc.), Roches moutonnées (include whaleback, stoss and lee, etc.)

field_samples

ID – Unique identifier
SampleID – Unique sample identifier
StationID – Unique station identifier
Latitude – Latitude in decimal degrees
Longitude – Longitude in decimal degrees
Easting_NAD83_15N – Easting in meters
Northing_NAD83_15N – Northing in meters
OrgDatum – Original projection of the datasets
LithoType – Description of sample
DepthMax – Maximum sampling depth (in cm)
MatrixModi – Field matrix texture modifier
Matrix – Field matrix texture
Purpose – Type of analysis determined on sample
Source – References listed in Table 3
Notes – Various
Summary_info – Unconsolidated sediments, Marine fossils, Organic materials, Bedrock/boulder

3) Glacial landsystems

ice_stream_flowsets

ID – Unique identifier
Feature – Ice stream flowset
Type – Name of ice stream (see McMartin et al., 2020)

ice_stream_landsystem

ID – Unique identifier

Feature – Ice stream

Type – Name of ice stream (see McMartin et al., 2020)

References – References provided in McMartin et al. (2020)

palimpsest_flowsets

ID – Unique identifier

Feature – Palimpsest flowset

palimpsest_streamlined_landsystem

ID – Unique identifier

Feature – Palimpsest

relict_cold_based_landsystem

ID – Unique identifier

Feature – Relict cold-based (CB)

relict_intermediate_to_cold_based_landsystem

ID – Unique identifier

Feature – Relict intermediate (IB) to CB

relict_intermediate_to_warm_based_landsystem

ID – Unique identifier

Feature – Relict IB to warm-based (WB)

preserved_warm_based_landsystem

ID – Unique identifier

Feature – Preserved WB

Ice_flow_direction – General azimuth of ice flow with zero pointing to true north

cold_based_retreat_landsystem

ID – Unique identifier

Feature – CB retreat

References – References provided in McMartin et al. (2020)

ACKNOWLEDGEMENTS

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