Natural Resources Canada | Ressources naturelles Canada

# CANADIAN GEOSCIENCE MAP 429

## SURFICIAL GEOLOGY

# LAC AUX GOÉLANDS

Quebec

NTS 23-P southeast

## Map Information Document

## Geological Survey of Canada Canadian Geoscience Maps

2022

Canada

## MAP NUMBER

Natural Resources Canada, Geological Survey of Canada
Canadian Geoscience Map 429

## TITLE

Surficial geology, Lac Aux Goélands, Quebec, NTS 23-P southeast

## SCALE

1:100 000

## CATALOGUE INFORMATION

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## RECOMMENDED CITATION

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## ABSTRACT

The Lac aux Goélands area is of moderate relief characterized by till blankets in the lowlands and till veneers with large expanses of bedrock outcrops in the western and eastern margins. Bedrock was variably eroded by the Laurentide Ice Sheet, east of the Ancestral Labrador ice divide. Phases of ice flow imparted multiple sets of glacially streamlined landforms and erosional paleo-flow indicators on the landscape. However, the dominant eastward-trending, elongated streamlined landforms were formed by ice streaming during deglaciation. Multiple sets of discordant meltwater channels were formed from both an early phase of deglaciation, which fed into an eastward-trending esker network, and a subsequent late-phase ablation of the ice sheet, with north-south trending channels parallel to the retreating ice margin. Glaciolacustrine strandlines and littoral sediments within the upper George River basin mark the former northeastern extent of inundation of the earliest phase of glacial Lake Naskaupi.

## RÉSUMÉ

La région cartographique de Lac aux Goélands présente un relief modéré et est caractérisée par la présence de nappes de till dans les basses terres et de placages de till avec de grandes étendues d'affleurements rocheux le long de ses marges ouest et est. Le substratum rocheux a été érodé à des degrés divers par l'Inlandsis laurentidien, à l'est de la protoligne de partage glaciaire du Labrador. Les phases d'écoulement glaciaire ont donné lieu à de multiples ensembles de formes de relief glaciaires et d'indicateurs de paléo-écoulements de nature érosive dans le paysage. Toutefois, les formes de relief profilées et allongées dominantes, dirigées vers l'est, ont été formées par des courants glaciaires lors de la déglaciation. De multiples ensembles de chenaux d'eau de fonte discordants ont été formés à la fois lors d'une phase précoce de déglaciation, avec des chenaux intégrés à un réseau d'eskers de direction est, et lors d'une phase tardive ultérieure d'ablation de la nappe glaciaire, avec des chenaux d'orientation nord-sud parallèles à la marge glaciaire en retrait. Les lignes de rivage glaciolacustres et les sédiments littoraux dans le bassin supérieur de la rivière George marquent l'ancienne étendue nord-est de l'inondation associée à la phase initiale du Lac glaciaire Naskaupi.

# SHEET 1 OF 1, SURFICIAL GEOLOGY

## GENERAL INFORMATION

Authors: R.C. Paulen, J.M. Rice, and M. Ross

Geology based on air-photo interpretation and fieldwork by R.C. Paulen and J.M. Rice, 2014 to 2016.

Geological compilation by R.C. Paulen, 2016 to 2018

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

Geomatics by L. Robertson

Cartography by M.J. Baldock

Scientific editing by A. Weatherston

Initiative of the Geological Survey of Canada, conducted under the auspices of the GEM-2 Hudson-Ungava Core Zone Surficial Activity as part of Natural Resources Canada's Geo-mapping for Energy and Minerals (GEM) program.

Logistical support provided by the Polar Continental Shelf Program (PCSP) as part of its mandate to promote scientific research in the Canadian north, PCSP 060-16

Map projection Universal Transverse Mercator, zone 20
North American Datum 1983

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

Mean magnetic declination 2022, 20°33'W, decreasing 15.1' annually
Readings vary from 20°21'W in the SW corner to 20°45'W in the NE corner of the map.

This map is not to be used for navigational purposes.

Title photograph: On the bedrock uplands looking northeast to Lac aux Goélands, Quebec. Photograph by R.C. Paulen. NRCan photo 2019-254

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/).

### MAP VIEWING FILES

The published map is distributed as a Portable Document File (PDF), and may contain a subset of the overall geological data for legibility reasons at the publication scale.

### CARTOGRAPHIC REPRESENTATIONS USED ON MAP

This map utilizes ESRI Cartographic Representations in order to customize the display of standard GSC symbols for visual clarity on the PDF of the map only. The digital data still contains the original symbol from the standard GSC symbol set. The following legend features have Cartographic Representations applied:

- Geomorphology lines
- Geomorphology overlay patterns

### DEFINITION QUERIES USED ON MAP

This map utilizes definition queries in order to customize the display for visualization on the PDF of the map only and does not affect the digital data. The following features have a definition query applied:

- GEM_POLYS_forPDF
- FieldStations

### DESCRIPTIVE NOTES

This map encompasses three physiographic regions: the De Pas batholith to the west, the glacially eroded composite terrane Core Zone rocks in the central portion, and Neoarchean intrusive suites along the eastern margin of the map (James et al., 2003). This map area experienced a complex ice-flow history during the last glaciation, driven by the development of the Laurentide Ice Sheet and migration of the Ancestral Labrador ice divide (Vincent, 1989; Rice et al. 2019a). Ice-flow indicators provide evidence for several ice-flow phases in the map area. The oldest ice-flow phase was to the northeast, associated with the buildup of the early Laurentide Ice Sheet in the Quebec highlands to the south (Veillette et al., 1999). The second flow phase was a radial flow to the east from an ice centre that occupied the western margin of the map area and was previously documented by Peterson (1965) and Clarhäll and Jansson (2003) in the Lac aux Goélands area (Fig. 1). During deglaciation, a large ice stream developed with the onset zone at the eastern edge of the De Pas Batholith that manifests as an abrupt change in surface geomorphology. This ice stream had a profound impact on the geomorphology of the southern part of the map area. Referred to as the Cabot Lake ice stream (Paulen et al., 2019; Rice et al., 2019b), it is an east-trending ice stream that provides evidence for rapid basal-flow acceleration in close proximity to an ice divide. The Cabot Lake ice stream occupies the lowland region near the headwaters of the George River and is bounded on its onset zone and terminus by large bedrock upland regions. Streamlined landforms dominate the geomorphology within the ice stream, many with elongation ratios of 12:1 or greater.

The Cabot Lake ice stream was relatively short-lived as a fourth phase of ice flow occurred following its shutdown, characterized by sluggish and topographically controlled ice that flowed generally to the northeast. This fourth phase was also short-lived and of limited erosive power, as evidenced by the high degree of preservation of

the ice stream landforms, with only minor, palimpsest forms north of Lac Résolution. During deglaciation, large east-trending eskers formed across the map in an orientation that differs from the late northeast trajectories of ice flow (Occhietti et al., 2004). As sluggish ice continued to ablate on the De Pas Batholith, ice-marginal north-south-trending meltwater channels formed, directing meltwaters either to glacial Lake Low to the south (Paulen et al., 2017) or glacial Lake Naskaupi to the north (Ives, 1960; Jansson, 2003).

## ACKNOWLEDGMENTS

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## ADDITIONAL INFORMATION

The Additional Information folder of this product's digital download contains figures and tables that appear in the map surround as well as additional geological information not depicted on the map, nor this document, nor the geodatabase.
- PDF of each figure/table that appears in the CGM surround.

## AUTHOR CONTACT

Questions, suggestions, and comments regarding the geological information contained in the data sets should be addressed to:
R.C. Paulen
Geological Survey of Canada
601 Booth Street
Ottawa ON
K1A 0E8
Roger.Paulen@nrcan-rncan.gc.ca

## COORDINATE SYSTEM

Projection: Universal Transverse Mercator
Units: metres
Zone: 20
Horizontal Datum: NAD83
Vertical Datum: mean sea level

## BOUNDING COORDINATES

Western longitude: 65°00'00"W
Eastern longitude: 64°00'00"W
Northern latitude: 55°30'00"N
Southern latitude: 55°00'00"N

## SOFTWARE VERSION

Data has been originally compiled and formatted for use with ArcGIS™ desktop version 10.7.1 developed by ESRI®.

## DATA MODEL INFORMATION

**Surficial**

The Geological Survey of Canada (GSC) through the Geo-mapping for Energy and Minerals Program (GEM) has undertaken the Geological Map Flow to develop protocols for the collection, management (compilation, interpretation), and dissemination of surficial and bedrock geology data and map information. To this end, a data model has been created.

The Surficial Data Model (SDM) was designed using ESRI geodatabase architecture. The XML workspace document provided can be imported into a geodatabase, and the geodatabase will then be populated with the feature datasets, feature classes, tables, relationship classes, subtypes, and domains.

Shapefile and table (.dbf) versions of the data are included within the data. Column names have been simplified and the text values have been maintained within the shapefile attributes. The direction columns are numerical, to display rotation for points, and the symbol fields will hold the correct values to be matched to the appropriate style file.

For a more in depth description of the data model please refer to the official publication:

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