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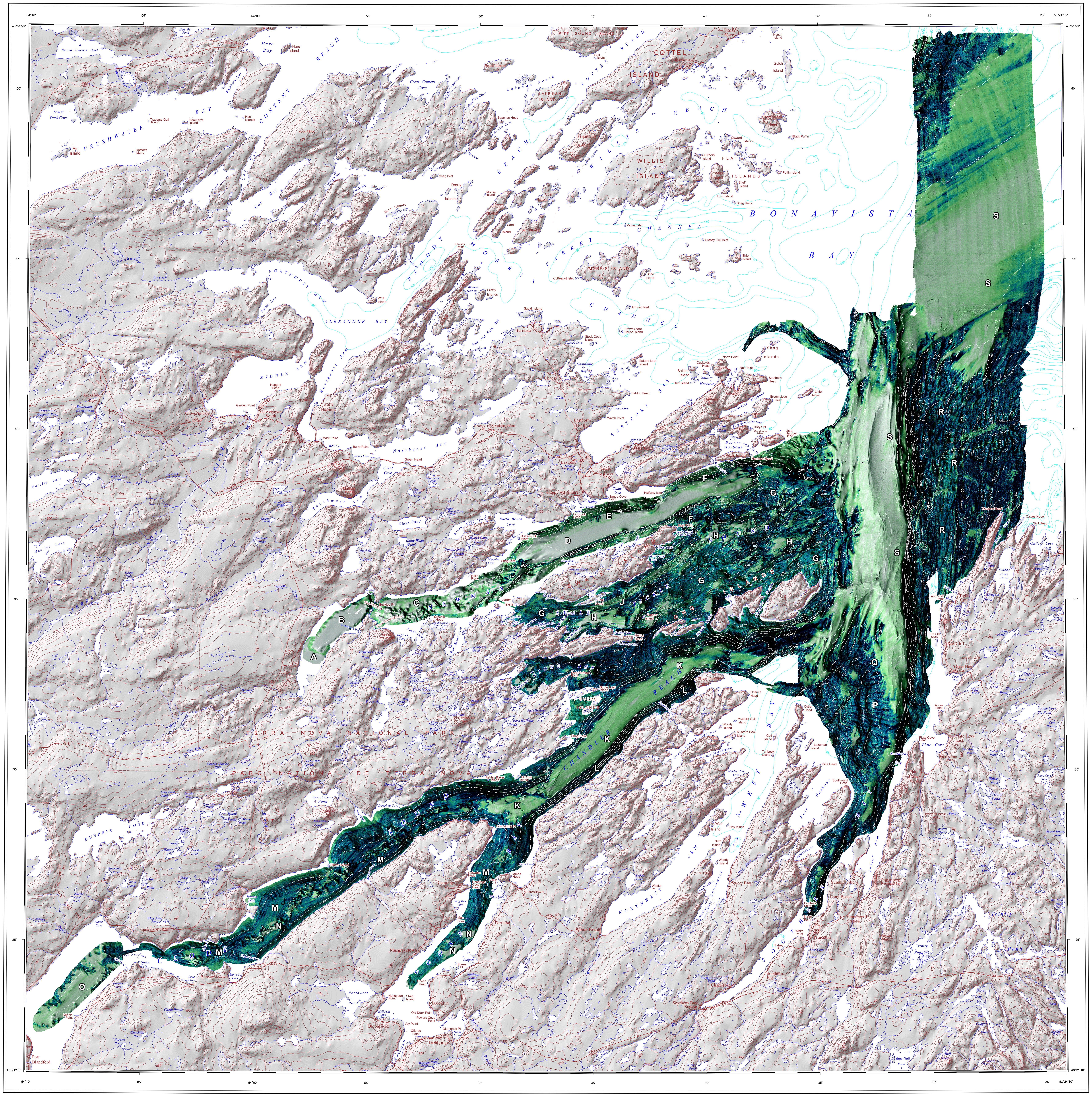
GEOLOGICAL SURVEY OF CANADA — COMMISSION GÉOLOGIQUE DU CANADA



DESCRIPTIVE NOTES

INTRODUCTION

This map is based on data from two survey phases. Newman Sound was surveyed by the Canadian Hydrographic Service (CHS) in 2002 using the CCGS Matthew equipped with a Simrad EM-1002 sounder. The vessel deployed launches equipped with Simrad EM-3000 sounders. The remaining areas were surveyed by CHS in 2008. On that occasion the CCGS Matthew had an EM-710 sounder, and two launches deployed Simrad EM-3002 sounders.

BACKSCATTER

Multibeam systems record mean energy and time series of amplitudes returned in each beam. This mean energy is commonly called the backscatter amplitude. It is tempting to use this as a direct proxy for surficial sediment type, but consideration of the physics of the problem presents a more convoluted picture (Courtney and Shaw, 2000), and there exists no direct relationship between backscatter amplitude and surficial sediment type. However, for angles of incidence greater than roughly 20° there is a general correspondence between backscatter amplitudes and surficial sediment roughness that can be used for cursory mapping and sediment identification. Coarse gravels and cobbles tend to be locally rough and return high-amplitude, wide-angle backscatter signals, while sands and fine-grained materials can be locally smooth with a much lower backscatter.

EXTRACTION OF BACKSCATTER

Backscatter was extracted from the raw datagrams using in-house tools. Raw Kongsberg datagrams from the various sounder systems used were first converted to Generic Sensor Format, an Open Source standard file format for bathymetry. The backscatter extraction software reads in gsf files and creates raster files of backscatter amplitude corrected for beam-dependence, thus reducing or eliminating the typical track-parallel corrugation artefact in the backscatter signal.

INTERPRETATION OF BACKSCATTER

The interpretation of backscatter in this area is preliminary, and based on very limited groundtruthing. This includes an unpublished acoustic and sampling survey of Newman Sound (Bell, 2003). The backscatter data is bimodal, with areas of high backscatter and low backscatter. High backscatter values, equating with 'hard' surfaces, correspond with bedrock, glacial diamict (till), and lag surfaces overlying glaciomarine sediments. Low backscatter values in this area generally equate with mud with varying proportions of sand, silt, and clay. The mud generally accumulates in depressions and sheltered inlets.

NEWMAN SOUND

Newman Sound is a typical fjord, with steep sidewalls and a flat floor. The innermost part of the sound is floored by sandy mud or mud which forms a veneer over a submerged delta (A). Much thicker mud deposits cover the adjacent basin (B). The next section of the fjord (seaward) has very irregular topography, with muddy seafloor predominant (C), and also numerous areas where glacial sediments at the seabed have high backscatter (muddy gravel).

Newman Sound proper contains the stratigraphic record typical of Newfoundland fjords: thick glaciomarine mud in the trough, overlain by about 10 m (on average) of postglacial mud which has low backscatter intensity (D). Off Happy Adventure is an area of circular patches of high backscatter (E) indicating patches of dredge spoil on the fjord floor. The fjord sidewalls (F) have a patchy appearance, with alternating areas of low backscatter (mud) and higher backscatter (muddy gravel or bedrock).

SWALE TICKLE

The Swale Tickle region lies between Newman Sound and Clode Sound/Chandler Reach. It is a relatively shallow area with rugged bedrock topography that produces comparatively high backscatter values (G). However, mud or sandy mud has accumulated as ponded deposits in depressions throughout the region (H). The area of high backscatter at J corresponds with a long ridge of till - a glacial material that is probably mantled by bouldery gravel at the seafloor.

CLODE SOUND AND CHANDLER REACH

The floor of Chandler Reach has low backscatter (K), indicative of soft postglacial mud overlying glaciomarine deposits. The higher backscatter on the fjord sidewalls (L) is indicative of muddy gravel overlying bedrock. Beyond Chandler Reach the seafloor sediments display a complete change of character. The fjord shallows landwards, and most of the sea floor has high backscatter, probably indicative of muddy gravels (M) associated with a submerged terrace of glacial deposits. The terrace has a pitted appearance, perhaps caused by the melting of stagnant glacier ice during deglaciation; the pits are filled with soft postglacial mud (N). A larger expanse of postglacial mud occupies the basin at the head of the bay (O).

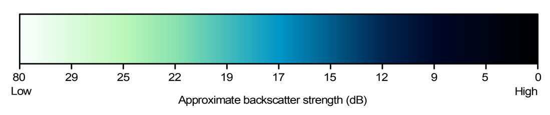
EASTERN AREAS

Bedrock at P has high backscatter. In slightly deeper water (~130 m) the bedrock is mantled by thin glacial deposits with equally high backscatter. Rugged bedrock at the east side of the bay also has high backscatter (R). The deep central channel has low backscatter (S) and contains thick postglacial mud overlying stratified glaciomarine mud.

REFERENCES

Bell, T., 2003. Report on Cruise Lauzier 2003: Surveys in eastern Newfoundland coastal waters, fall 2003. Unpublished cruise report, Department of Geography, Memorial University of Newfoundland, St. John's, Newfoundland.

Courtney, R.C. and Shaw, J., 2000. Multibeam bathymetry and acoustic reflectance imaging of the shelf seabed; Geoscience Canada, v. 27, p. 31–42.



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LOCATION MAP

Authors: E. Patton and J. Shaw

This open file was produced by Natural Resources Canada in co-operation with Fisheries and Oceans Canada

Multibeam bathymetric data collected by Canadian Hydrographic Service and Natural Resources Canada, 2008

Multibeam backscatter data compiled by E. Patton and J. Shaw, 2008

Digital cartography by P.A. Melbourne, Data Dissemination Division (DDD)

Any revisions or additional geographic information known to the user would be welcomed by the Geological Survey of Canada

Canada

OPEN FILE 6618

BACKSCATTER STRENGTH AND SHADED SEAFLOOR RELIEF

BONAVISTA BAY

NEWFOUNDLAND AND LABRADOR

Scale 1:70 000/Échelle 1/70 000

kilometres 1 0 1 2 3 kilomètres

Universal Transverse Mercator Projection	Projection transverse universelle de Mercator
North American Datum 1983	Système de référence géodésique nord-américain, 1983
This map is not to be used for navigational purposes	Cette carte ne doit pas être utilisée aux fins de navigation

Digital base map (land area) from data compiled by Geomatics Canada, modified by GSC (Atlantic)

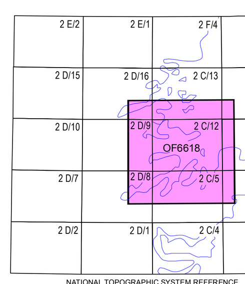
Digital bathymetric contours in metres supplied by Canadian Hydrographic Service and GSC (Atlantic)

Some geographical names subject to revision

Magnetic declination 2011, 19°57′W, decreasing 12.3′ annually

Elevations in feet above mean sea level

Depth in metres below mean sea level



NATIONAL TOPOGRAPHIC SYSTEM REFERENCE

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GEOLOGICAL SURVEY OF CANADA
COMMISSION GÉOLOGIQUE DU CANADA
2011

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