





INTRODUCTION

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° thereis a general correspondence between backscatter amplitudes and surficial sediment roughness that can be used for cursory mapping and sediment identification. Coarse gravel and cobbles tend to be locally rough and return high-amplitude, wide-angle backscatter signals, whereas sand and fine-grained materials can be locally smooth with a much lower backscatter. This map sheet is one of five maps of the Placentia Bay area (see also Potter and Shaw, 2010a, b, c, d).

DESCRIPTIVE NOTES

EXTRACTION, GRIDDING, AND LEVELLING OF BACKSCATTER Backscatter was extracted using tools developed in-house at GSC Atlantic. Raw Kongsberg datagrams from the various sounder systems used in Placentia Bay were first converted to Generic Sensor Format (GSF; http://www.saic.com/maritime/gsf/; accessed January 4, 2010), an open source standard file format for bathymetry. The backscatter extracter extracter extractions of backscatter amplitude corrected for beam dependence, thus reducing or eliminating the through track backscatter amplitude corrected for beam dependence, thus reducing or eliminating the typical trackparallel corrugation in the backscatter signal. Each contiguous survey block corresponding to a unique multibeam system and year was 'gridded' separately then later merged while applying a static shift in order to level the synthetic surface to a

common datum. Initially, histograms were generated for each survey block to assess backscatter data range. Some of the more recent multibeam systems displayed anomalously high backscatter ranges (e.g. -35 dB to +5 dB) so the merged data sets were levelled to the older EM1000 surveys that were reporting more sensible ranges of -50 dB to -10 dB. The amount of shift to apply to each survey block was determined by analysis of backscatter values in areas of overlap between surveys of differing ages and sounder systems. By generating histograms of the difference between values reported within each grid cell in the overlap, the backscatter grid for the entire Placentia Bay area was 'stitched together'. DISTRIBUTION OF BACKSCATTER VALUES

Backscatter is depicted using a colour scale ranging from almost white (low backscatter) to indigo (high backscatter). The coloured backscatter is draped over a grey digital elevation model of the bathymetry. The distribution of backscatter values in the map area is strongly bimodal, with a primary peak at -38 dB (low backscatter) and secondary peak at -25 dB (high backscatter). Throughout Newfoundland coastal waters, areas of low backscatter (mud) generally occur in the deepest areas, and in depressions, whereas areas of high backscatter (gravel and sand) occur in shallow areas and near coasts. High backscatter predominates in the centre and west of the map area, whereas low backscatter predominates in the southeast.

INTERPRETATION OF BACKSCATTER

region have high backscatter values.

The interpretations of backscatter in this area are based on the following GSC marine seismic and sampling surveys: Hudson 78-012 (G.R. Peters, unpub. report, Memorial University, 1978), Navicula 89-026 (Shaw et al., 1990), Hudson 2006-039 (Shaw et al., 2007), and Matthew 2005-051 (Shaw et al., Extensive areas of high backscatter (area 1) correspond with glacial ridges (drumlins) composed of till that were formed when glaciers flowed into Placentia Bay, from northwest to southeast. In places, narrow ridges (area 2) superimposed on the drumlins were formed during retreat of the ice. The limited number of bottom photographs and grab samples from these glaciated terrains reveal muddy bouldery gravel. Toward the southeast the ridge topography becomes increasingly muted because of a drape of glaciomarine mud (area 3). This mud has been winnowed at the seafloor, so that it has a texture of muddy angular gravel. Yet farther southeast the glacial ridges are completely buried by glaciomarine mud (area 4) that has been heavily imprinted by icebergs during deglaciation (ca. 14 000 BP). Textures at the seafloor are commonly muddy sandy gravel. Bedrock has high backscatter and occurs as parallel ridges on a series of relatively shallow banks that extend from southwest to northeast (area 5). Bedrock terrain near the coast has a more irregular morphology (area 6). Low backscatter areas are mostly silty mud (area 7) that has accumulated in seafloor depressions. In the southeast (area 8) a large area of relatively thick mud overlies the glaciomarine and glacial deposits. The mud is imprinted with pockmarks in several areas (area 9). Scuttled ships (area 10) clustered in this

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2010a: Backscatter strength and shaded seafloor relief, Placentia Bay east, offshore Newfoundland and Labrador; Geological Survey of Canada, Map 2153A, scale 1:50 000. 2010b: Backscatter strength and shaded seafloor relief, Placentia Bay north, offshore Newfoundland and Labrador; Geological Survey of Canada, Map 2151A, scale 1:50 000. 2010c: Backscatter strength and shaded seafloor relief, Placentia Bay southeast, offshore Newfoundland and Labrador; Geological Survey of Canada, Map 2155A, scale 1:50 000.

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Approximate backscatter strength (dB)

F r e s h w a t e rP o n dBURON

Copies of this map may be obtained from the Geological Survey of Canada: 615 Booth Street, Ottawa, Ontario K1A 0E9 625 Robson Street, Vancouver, British Columbia V6B 5J3 490, rue de la Couronne, Québec, Quebec G1K 9A9 1 Challenger Drive, P.O. Box 1006, Dartmouth, Nova Scotia B2Y 4A2

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This map 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, 2004–2005 Multibeam backscatter data compiled by D.P. Potter, 2007 and 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

BACKSCATTER STRENGTH AND SHADED SEAFLOOR RELIEF PLACENTIA BAY SOUTHWEST OFFSHORE NEWFOUNDLAND AND LABRADOR

Scale 1:50 000/Échelle 1/50 000

This map is not to be used for navigational purposes Cette carte ne doit pas être utilisée aux fins de navigation

Universal Transverse Mercator Projection

North American Datum 1983

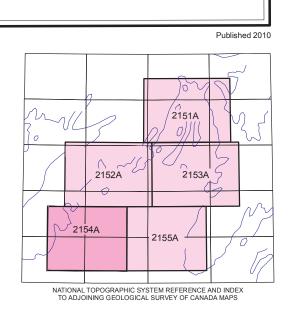
Système de référence géodésique nord-américain, 1983 © Her Majesty the Queen in Right of Canada 2010 © Sa Majesté la Reine du chef du Canada 2010

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)

Magnetic declination 2010, 19°38'W, decreasing 11.4' annually Elevations in feet above mean sea level

Depth in metres below mean sea level



Newfoundland and Labrador; Geological Survey of Canada, Map 2154A,

scale 1:50 000.