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Mapping Placentia Bay, Newfoundland

Shaw, J

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Mapping Placentia Bay, Newfoundland

Placentia Bay, in Newfoundland, is an environmentally sensitive area, hosting a diverse marine ecosystem. It is fringed by small coastal communities which rely on the adjoining waters for their livelihood. It is also the scene of significant industrial activities including oil refineries, a shipyard, and a mineral refining plant. Natural Resources Canada (NRCan) is producing a new series of ocean-floor maps, based on multibeam sonar technology, a technique of reflecting many "beams" of sound off of the ocean floor to produce images. These maps will assist ocean sector industries, such as oil and gas and telecommunications, to locate safe and appropriate places to lay underwater equipment. They will also help improve fishing industry efficiency and management practices.

Location of Placentia Bay, Newfoundland

In response to the growing importance of effectively managing the bay to address stakeholder needs, the SmartBay Project was developed by the Marine Institute of Memorial University in St. John's, Newfoundland, in partnership with NRCan, the Canadian Hydrographic Service, and Fisheries and Oceans Canada. The goal of the SmartBay Project is to provide stakeholders with access to data and information to support the effective management and sustainable development of the bay. The project will also make life at sea safer and more secure by providing accurate, detailed maps of the area. In order for the project to be successful, up-to-date information on the sea floor was needed. As such, NRCan along with the Canadian Hydrographic Service mapped the ocean floor of Placentia Bay.

Mapping Techniques

Researchers divided Placentia Bay into seven map regions. When research is complete, each region will have three map types: topography, backscatter, and geology. In order to create the maps, multibeam sonar vessels collected depth soundings in the bay over a three-year period. Tens of millions of depth soundings were processed to produce three-dimensional images of the sea floor.

In addition, scientists collected additional information such as: seabed samples; photographs; sediment cores; sidescan sonar imagery, (i.e., sound images of the seafloor); and sub-bottom profiler data (i.e., imagery of sediments below the seafloor). This added data will allow researchers to properly verify and interpret the multibeam imagery.

Currently, maps of backscatter are being made. Backscatter are acoustic signals taken from the multibeam data; when mapped, they allow researchers to analyze the sediment size on the sea floor and determine whether the ocean floor is primarily rock, gravel, sand or mud.

The Canadian Coast Guard Ship Matthew has a multibeam sonar system on board. It also carries two multibeam mapping launches, one of which is shown moored alongside the ship.

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Key Findings

1. The seafloor of Placentia Bay is very complex. Huge fields of ridges on the west side of the bay formed during the last ice sheets; these ridges may provide good habitat for fish populations.

2. The new imagery reveals megaflutes in the bay. These large pits are carved into the seafloor by an unknown process – possibly the 1929 Grand Banks earthquake and tsunami.

3. Ancient landslides were likely active in the bay about 13 000 years ago when glaciers were receding. These were mapped and have been found to be an unlikely threat to cables and pipelines.
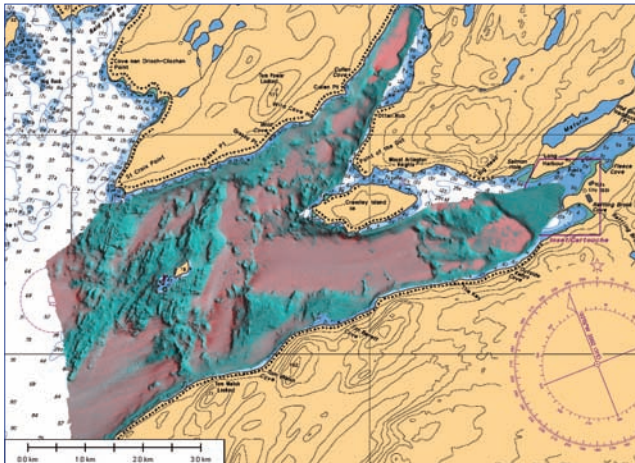

Image of the sea floor at Long Harbour is based on backscatter data. Pink areas are mud and gray are hard substrates such as gravel and rock.

Making a Difference

Experts at the Geological Survey of Canada - Atlantic (GSC-A) will continue to use the data to help a variety of companies plan safe, sustainable development within Placentia Bay. For example, the information and maps have already been used by survey companies when they were planning to lay a new fibre optic cable from Marystown to Placentia; oil and gas companies have also used them to decide where to lay pipeline. The new data will also assist in the creation of habitat maps for the bay to ensure more sustainable use of ocean fisheries.

An innovative outcome of this data is the 'Seascape' map that combines all of this data to create an integrated picture of the wildlife, geography, and geology of the bay. This new type of map will help to bridge the gap between geologists studying the physical properties of the sea floor and fisheries scientists managing the biological resources of Canada's oceans.

The topographic imagery of the seafloor created by NRCan's GSC-A is online at the SmartBay web site (http://www.smartbay.ca).
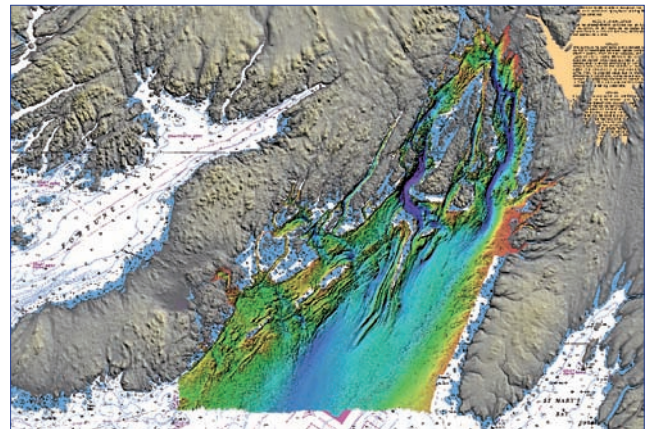
Extent of mapping in November 2006 shows the complexity of the sea floor in Placentia Bay.

For additional information contact:

Dr. John Shaw
Marine geologist
Natural Resources Canada
Geological Survey of Canada (Atlantic)
johnshaw@nrcan.gc.ca
Tel: (902) 426-6204

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