Integration of Multibeam Bathymetry and LiDAR Surveys of the Bay of Fundy, Canada

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Abstract

In 2006, the Geological Survey of Canada (GSC), in conjunction with the Canadian Hydrographic Service (CHS) and several universities, commenced a three year program to map the Bay of Fundy on the east coast of Canada. The Bay of Fundy has the largest recorded tides in the world, with a maximum range of about 17 metres at the head of the bay. Tidal current velocities that exceed 4.5 m s^{-1} in restricted narrow passages at various points in the bay are currently being studied to determine the potential for in-stream tidal electrical power generation. By the end of 2007, about 10,000 km^2 of multibeam bathymetry have been collected in the bay, with another 90 days of multibeam bathymetry surveys scheduled for 2008. Sub-bottom profiler data were collected simultaneously to provide information on the character and thickness of the sediments on the sea floor. Large drying areas were surveyed using airborne terrestrial laser (LiDAR), providing an opportunity to generate a continuous map of the marine, intertidal and terrestrial areas. Information from geophysical surveys, seafloor samples, photographs and video transects will be integrated to produce surficial geology and benthic habitat maps. The presentation will focus on the status of the project near the completion of three years of data collection, a preliminary interpretation of the most recent data, and challenges and future plans of the project.

Some key findings are:

- The mapping has delineated the extent and morphology of an array of glacial landforms that may provide suitable substrates for fish and shellfish.
- Strong tidal currents are reworking sediments deposited during the last glacial period; reworked material has accumulated in fields of sand waves whose morphology and extent have been precisely delineated for the first time.
- The mapping has revealed the extent of deep tidal-scour channels in several areas. About 4 km^3 of material has been eroded from the Minas Passage Scour Channel (depth 150 m below sea level), and 0.75 km^3 from near Cape Enrage.

- The new imagery has delineated the extent and morphology of the extensive horse mussel reefs.