THE ART OF MAPPING WITH A CATALOGUE OF GEO-KNOWLEDGE: SABLE ISLAND BANK AND THE GULLY

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INTRODUCTION

The "Art of Mapping" is a process that starts from a concept at the first meeting of the stakeholders and continues on a timeline until an area is mapped and a final digital or hard copy map is produced. The modern day mapper will use a catalogue of geo-knowledge, not unlike the artist who uses a palette of colours, to bring the mapped area to realism. With the aid of a cartographer the final layout is achieved and we see a work of art in its own right. The following poster shows how geo-knowledge is used in marine mapping at the Geological Survey of Canada.

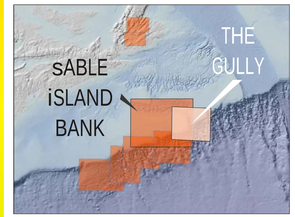
The ESSIM (Eastern Scotian Shelf Integrated Management) area is one identified by the Canadian Government as one of the first Large Ocean Management Areas on the east coast where a plan is in progress for management of the sustainable use, by a multitude of stakeholders.
One foundation of knowledge key to management is the seabed and near sub-seabed, which has a strong control on the resources, habitat, oceanography, and long and short-term physical processes of the area. This is a compilation bringing together some of the relevant past and ongoing scientific efforts of GSC and academic scientists over the past 30 or more years.

The GSC project has a benthic habitat component and a geological component. Progress on the later is the subject of this poster.

GSC is developing a new series of marine geological maps of which at least two fall in the ESSIM area.

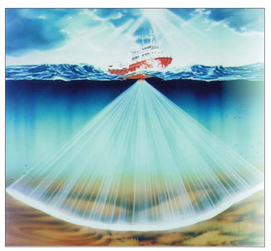
Despite over 30 years of GSC presence in the ESSIM area there remain large expanses with little survey or sample information. It was clear from the outset of this project that, while parts of the region could be enhanced in terms of mapping, the focus would be on two or three higher priority and higher data-density areas within the ESSIM area. Sable Island Bank, with its fishery, cables, pipeline, environmental sensitivity, hydrocarbon exploration and production, and (The Gully) a Marine Protected Area.

MAP locationS



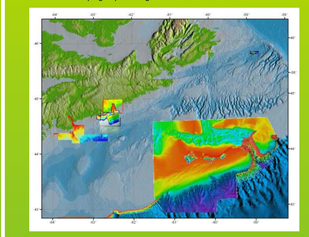
Several maps in the ESSIM area are in preparation for our new "flagship" map series. Maps of Sable Island Bank, The Gully, and a series on the slope are being compiled. Most have their basis in multibeam bathymetry and also include seabed sediment texture and Quaternary geology maps, generally with sub-surface information.

MULTIBEAM BATHYMETRIC SURVEY

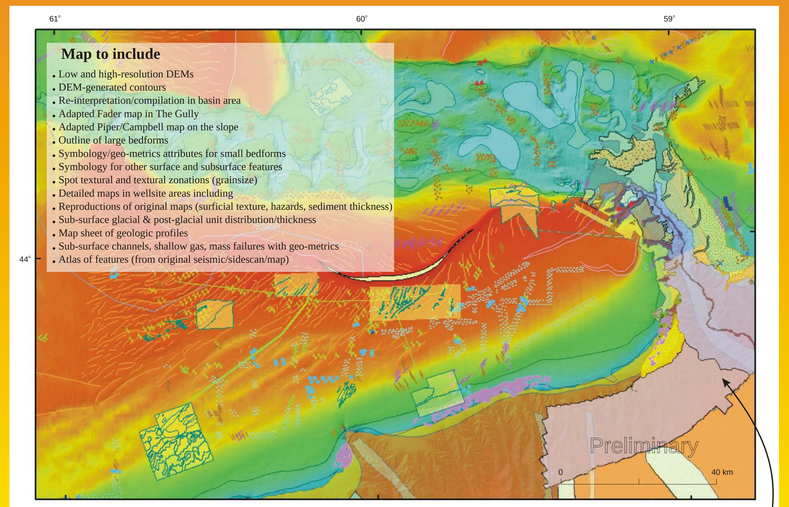


A wide swath (up to 7 times the water depth) can be surveyed in a single pass through an area. Survey lines are spaced to provide overlapping coverage of the seafloor. The data are used to generate high resolution images which contain information about the morphology of the

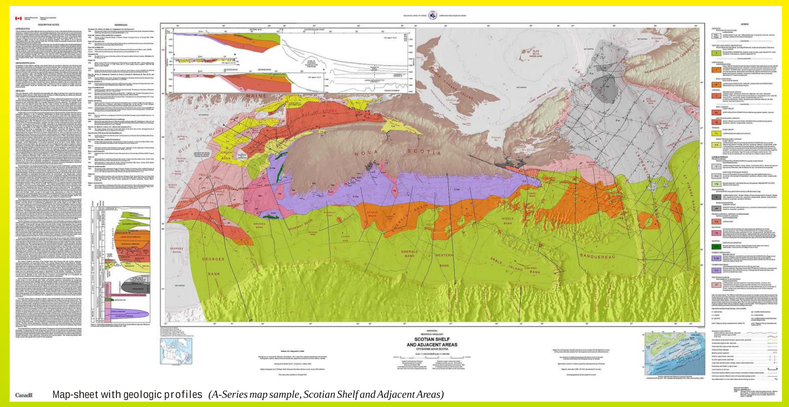
Multibeam bathymetric coverage and enhanced seabed topographic digital elevation models



SABLE ISLAND BANK (A GSC, A-SERIES MAP)

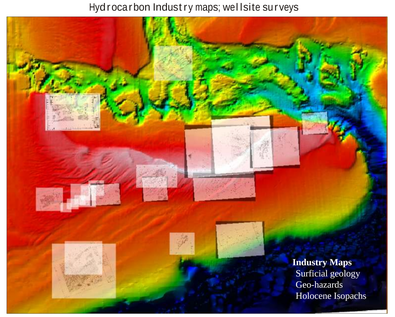


The Gully Marine Protected Area (MPA) falls within the 1:250 000 scale map area yet will be also published at 1:100 000 scale. complete multibeam coverage in the area allows superior geological mapping and habitat evaluation.

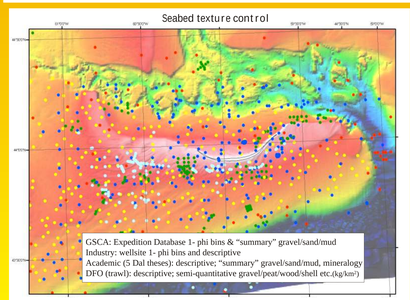


Canada Map-sheet with geologic profiles *(A-Series map sample, Scotian Shelf and Adjacent Areas)*

Hydrocarbon Industry maps; wellsite surveys

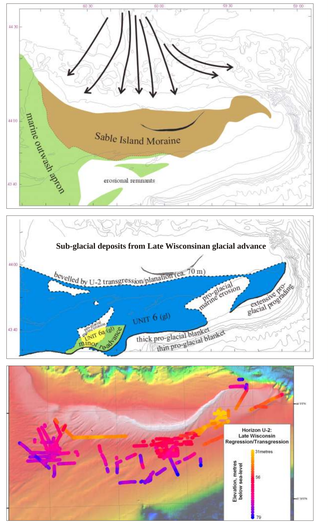


Seabed texture control

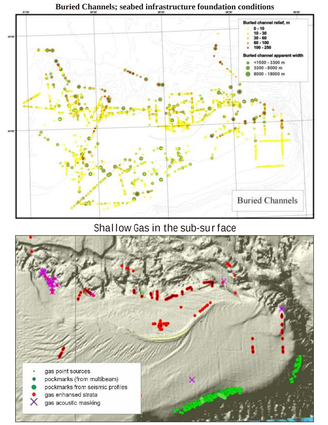


Considerable effort in this project is going to compilation of an A-series surficial geology map of Sable Island Bank, (see sample to the left of an A-series map for bedrock geology on the Scotian Shelf and Adjacent Areas). This encompasses both the seabed and shallow (upper 100 m) subsurface and addresses a wide variety of processes, including glacial and sea-level reconstruction, geohazards, foundation and seabed infrastructure engineering-related compilations, and some habitat related work. Raw data are drawn from a wide variety of sources in addition to GSC legacy data. The products will be both paper and digital; at least 3 paper sheets and numerous data layers. By the conclusion of the project most products should be web interactive. Accompanying publications related to the maps as well as sediment mobility, glacial and sea-level history, and habitat will be available. Such geo-information provides foundation data of use to most stakeholders in the area.

Sub-surface geology; distribution, thickness. elevation



Sub-surface potential geohazards



Shallow Gas in the sub-surface

SUMMARY

New geological maps are in production and better geological understanding of parts of the ESSIM area are the tangible results of a GSC project. These represent the first new maps in over 3 decades.

The project is bringing together many and varied geological information, largely with the aim to enhance both new and existing maps and information accessibility. Products are largely GIS (map) based and the intent is to make much of the past and new value-added geo-products available through normal publication channels and eventually through web access.

While some parts of the seabed in the ESSIM area have been mapped in relative detail, very large tracts of our marine territory are virtually unknown in terms of their geology and benthic habitat. This project has undertaken to fill-in major geographic and knowledge gaps on the inner shelf zone and to characterize one of the outer-shelf bank and the continental slope areas. This augments existing but more regionally-based surficial and bedrock maps.

ACKNOWLEDGMENTS

This compilation brings together the past and ongoing scientific efforts of many GSC and academic scientists over the past 30 or more years. A comprehensive list of contributors is not attempted but the following have made significant contributions, through reports and publications, over the years:

L.H. King, B. MacLean, G. Drapeau, C. Amos, M. Li, D. Piper, D. Mosher, J. Shaw, G. Fader, H. Josenhans, R.O. Miller, R. Stea, R. Boyd, S. McLaren, R. Hall, D. Scott, D.J. Stanley, A.E. Cok, N. James, J. M. Pezzetta, D. Gordon, D. Roddick, G. Cameron, J. Zevenhuisen

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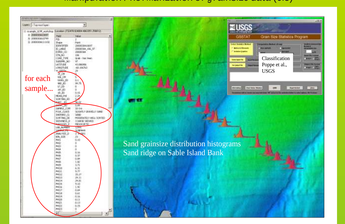
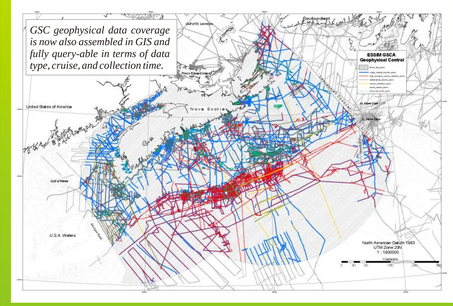
GSC's GEOLOGICAL contribution to DFO'S ESSIM *"ESSIM ESSENCE"*

- Compilation (digital) of surficial and shallow geological attributes and knowledge
  - -large component of "legacy" map data (surficial, bedrock, Open File)
  - -reports and publications (Adobe pdf's and/or FDGC metadata)
  - -significant new data (fieldwork) component (regional and local scale)
  - -new and enhanced maps: Bank & inner shelf (Halifax and Sheet Harbour)
- Provides a seabed framework for multiple Stakeholders
  - -Benthic Habitat mapping: this project (Vladimir Kosteley)
  - -Significant input to DFO and Fisheries programs (trawling, coral, quahaug, fish habitat)
  - -Utilities corridor concept (routing, multiple seabed uses)
  - -Hydrocarbon Industry (seabed processes and hazards, engineering foundation, pipeline routing/seabed interaction
  - -MPA's (mapping, seabed processes, mineral resources)
- Provides digital Accessibility through…..
  - -www (GOM website, MIRAGE?, direct full Arc GIS connectivity
- Provides Geoscience knowledge through…..
  - -publication: GSC Open Files, Bulletin, A-series map, int'n. Journals

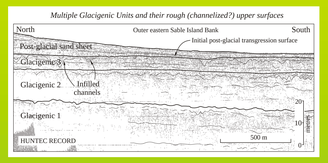
Manipulation / normalization of grainsize data (GIS)



ESSIM-area Geophysical Data Coverage

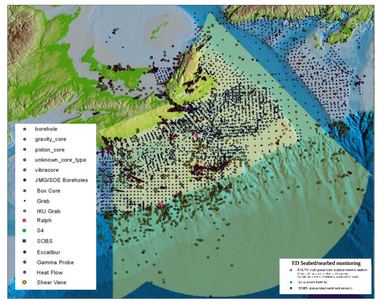


Multiple Glacigenic Units and their rough (channelized?) upper surfaces



Two instruments used in the acquisition of seismic data, the Huntec and the Sidescan

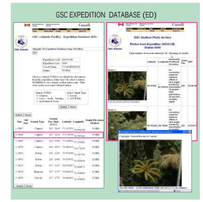
Geotechnical data from Sable Island Bank are linked to the seismo-stratigraphic units for complete characterization of the shallow sub-surface deposits.



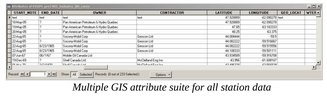
All GSCA Stations in Expedition Database

Digital image of a split vibrocore (left) and a sediment peel of the same core (right), Sable Island Bank

The vibrocore being lowered over the side of CSS Hudson



Offshore east and west coast marine datasets can now be queried online to enable the user to obtain site specific sample location data from the Physical Archive Database (PAD)



Multiple GIS attribute suite for all station data