

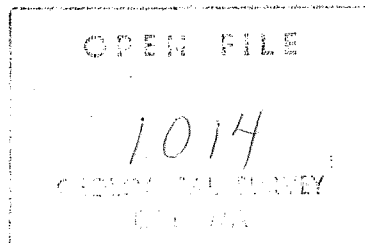
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PROPOSAL FOR AN EASTCOAST OFFSHORE SEDIMENT COREHOLE SAMPLING PROGRAM

by

Atlantic Geoscience Centre
Geological Survey of Canada
Bedford Institute of Oceanography
Dartmouth, Nova Scotia



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I. Introduction

The sediments that form the seafloor are part of the environment of Canada's east coast offshore region. They may affect, and be affected by seabed engineering activities as well as by naturally occurring events.

How the seabed will influence and respond to manmade and natural events is governed by such factors as textural composition, physical properties of the seafloor sediments and bedrock, seafloor morphology and dynamics.

Information on seabed bathymetry, sediment classification and distribution, and bedrock has been obtained in varying degrees of regional detail on Canadian east coast continental shelf areas by surveys employing various acoustic and sampling systems. The level of information is greatest in the southern part of the region, e.g. Scotian Shelf and Grand Banks, and in general decreases northward to Baffin Bay. Information to date regarding sediment dynamics is mainly by inference from samples and other observations rather than by more precise measurement in most areas.

II. Problems and concerns

1. In all Canadian east coast offshore areas collection of subsurface samples of glacially deposited and other hard sediments has been virtually impossible due to the very limited penetration/coring capabilities of conventional sampling devices in these materials. Other remotely operated seabed sampling systems such as vibracorers or the BIO rock core drill either do not have the necessary penetration or unconsolidated sediment core recovery capabilities.
2. Though far more subsurface sample information has been obtained on soft sediments, in many areas this too has been restricted by the inability of conventional shipborne oceanographic coring systems to fully penetrate the sedimentary sequences shown on acoustic profiles.
3. The nature of the seafloor sediments, in particular the presence of cobbles and boulders, has been a problem and the cause of delays, amounting to many days in some instances, in spudding many of the exploratory wells in the Labrador-Baffin offshore. Such delays potentially could have serious implications if emergency relief well drilling should ever be necessary.

4. The competence and degree of resistance of seafloor sediments and bedrock to scouring by currents, furrowing by grounding icebergs and to deformation by seismic or other natural events are considerations in the safety of pipelines, well heads, production structures and other seabed installations.

III Objectives

It is proposed that a corehole drilling program using a specialized soil sampling ship be undertaken at various east coast localities to obtain subsurface samples to provide ground truth textural, geotechnical, paleontological and other geological data on:

- (a) glacially deposited sediments (moraines) and other potential boulder-bearing sequences,
- (b) hard surficial sediment sequences (identified acoustically, e.g. sands, gravels),
- (c) thick sequences of soft sediment (silts, clays),
- (d) underlying bedrock.

The program, extending over a period of approximately 12 weeks at sea, would drill corehole transects each composed of approximately 3 to 5 holes up to approximately 100 m deep, across morainal and stratified sequences on Scotian, Grand Banks, Northeast Newfoundland, Labrador and Baffin Shelves. Emphasis would be on the latter three areas. Where possible, holes would extend into bedrock. Some holes would be sited at localities where boulders have and have not, presented problems to industry drilling in an effort to identify factors controlling boulder occurrence.

Benefits expected from the sample results include:

- (a) acquisition of data to provide an understanding of the mode of deposition and occurrence of boulders in the sediments, e.g. factors controlling their presence or absence and, whether they occur in beds forming defined horizons or whether they are scattered through the sediments and locally concentrated by spudding in procedures.
- (b) establishment of a textural and geotechnical data base that may be utilized for evaluating possible response of the seabed sediments to natural forces such as iceberg scouring and earthquake shaking, and to manmade activities.

- (c) establishment of a ground truth test range(s) across boulder bearing sediments over which different acoustic systems can be tried in future with a view to detection of boulders by remote sensing techniques.
- (d) establishment of a regional lithologic and biostratigraphic framework to guide interpretation of acoustic data.
- (e) provision of more detailed and definitive information on the geological time and modes of deposition of the sediments and on the Quaternary history offshore, particularly in the Labrador and Baffin regions.

Results from the above should provide guidelines to assist local adjustment of seafloor well siting and other relevant seabed engineering activities to minimize problems and costs due to boulders or other parameters of the sediments as well as indicating potential problem-prone areas regionally.

IV Methods

The program would be carried out from a chartered, specially-equipped corehole drillship, preferably dynamically positioned, e.g. MV PHOLAS type, having:

- (a) capability of and experience in core recovery of unconsolidated sediments in water depths ranging from approximately 100 m to about 800 m (as near 100% core recovery as technically feasible would be attempted),
- (b) ice classification and endurance suitable for operation in northern waters,
- (c) capability of in-situ geotechnical measurements and down hole logging,
- (d) space for specialized lab and core storage facilities, etc.

Fitting with conventional single channel shallow seismic and deep towed high resolution systems, and appropriate navigational systems would be required for precise siting on the geological targets and for correlation of acoustic and core sample data. Installation of temporary on-shore navigational control stations may be required.

Corehole siting to be on the basis of existing data -- AGC has adequate data to do this, but industry input and consultation on this would be welcome as would their participation at sea and in analysis.

V. Analyses

On board - x-ray, descriptive logging, photography, geotechnical core sampling and testing, down-hole logging and in-situ geotechnical measurements, measurement of geophysical parameters, and subsampling for textural, paleontological and geochemical analyses.

Ashore - textural, geotechnical, paleontological dating and geochemical analyses of samples from the above.

Results would be placed in the public domain.

VI. Schedule

The program tentatively is proposed to commence in 1984 subject to ship availability, but it may be cost effective to commence earlier should a suitable vessel be operating offshore Eastern Canada in connection with other programs and were available to do the work.

VII. Organization, Personnel

AGC staff would provide guidance to the program, evaluate results, and participate directly in specialist studies at some localities. Because of the massive organizational and analytical demands, it would be necessary and desirable that organization of the program, most on-board staffing requirements, and subsequent analyses and report preparation be contracted out. This would further the development of Canadian expertise in this field. Participation by industry staff would be welcome.

VIII. Costs

Drill ship charter and mobilization;
drill supplies and other consumables;
navigation systems rental/installation, personnel;
rental of high resolution seismic system and operator
rental of single channel seismic reflection system
analyses and report preparation;
core storage and handling
management and other personnel costs;
transportation - personnel and materials.

Estimated total cost: \$5,800,000.00 (1983 dollars).

If a support vessel is required in attendance, the above costs would escalate by approximately \$500,000.00.