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Lighthouse

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Edition 40 **LIGHTHOUSE** Fall 1989

JOURNAL OF THE CANADIAN HYDROGRAPHIC ASSOCIATION

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Back issues of Lighthouse, Editions 24 through 39, are available at a price of $10 per copy. Please write to the Editor.

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Closing dates for articles are:

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Letters to the Editor

Dear George,
I'd like to express my appreciation for your comments in the last issue. Specifically, I'm referring to those remarks relating to man's "continuing process of environmental disruption".

I feel that everyone has a role to play in the creation process, and that role starts at home and in our own community. When a person like yourself takes the initiative to help create an awareness among his professional associates, another step is taken to improve rather than erode the quality of our world. Let's keep on walking!

Sincerely,
Ray Chapeskie

Editor's note: All our readers are in a position to make a positive contribution towards improving the quality of our world. You, the reader, have to take the first step!

Dear George,
I am not sure whether it's just the position of the planets or the showing of my age (pushing the big four O), but I find myself organizing my life, especially my professional life. The mound of notes, textbooks and journals which have lived happily in a cardboard Crown Royal Box in my den for the last 15 years must now be sorted by volume and subject. But, how? I pondered this for awhile and, as hard as this is to believe, I had an idea. Binders. You know, like the ones you see in other magazines with the caption "Keep your Modern Sexual Practices Journal Like New in the Beautiful Designer Jackets".

Seriously, I would like to suggest to Lighthouse and the CHA that they explore the idea of selling three-ring binders bearing the Lighthouse logo to keep their fine journal in. Lighthouse is a comprehensive source of both technical and historical information about hydrography. If it was bound in a series of volumes it would be a comprehensive reference set. I hope that you and the association will give this proposal serious consideration.

Yours truly,
Geof Thompson

Editor's note: This will be discussed at the next Director's meeting. The editor supports the idea.

Dear Mr. Macdonald,
I would have preferred using your first name but I'm not sure what the G stands for. Glen? Gary?

Recently returned from the North Sea, I wanted to let you and your editorial staff know how much I appreciate the effort you put into Lighthouse. As I'm away quite often, I rely on Lighthouse to keep up-to-date on general CHA news and topics. As a member of the Atlantic Branch executive, I also know the problems you must face, firstly finding funding, and secondly finding the inspiration (noticeably lacking in some members) to carry on with quality items.

Can I make a small suggestion? It may be advantageous to print a listing of all members and their profession every second or third edition. Each issue a random number of members could be described in short paragraphs, perhaps with an associated work photo. Anything to keep us in contact and familiar through the branches. Good Luck! I hope to meet you people one day.

Best regards,
Peter Barr

Editor's note: A membership list is included in this issue. The article by Green in this issue, and the Social News column contain information about our membership at large. Branch Newsletters also contain news of our members.

Application for Membership/Formule d'adhésion

I hereby make application for membership in the Canadian Hydrographic Association
Je désire devenir membre de l'Association canadienne d'hydrographie en tant que

☐ member / membre ☐ sustaining member / membre de soutien ☐ international member / membre international

and if accepted, agree to abide by the constitution and by-laws of the association
et si ma demande est acceptée, je m'engage à respecter la constitution ett les règlements de cette association

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Message from the National President

As my three year term as National President draws to a close I would like to thank all the Branches of the Canadian Hydrographic Association for their support. I would also like to thank the editor of Lighthouse for rescuing our Journal from the difficulties it was experiencing and compliment him and his staff for making Lighthouse once more a powerful voice of hydrography in Canada. As we all know, Lighthouse is the voice of hydrography in Canada and its success is also our Association's success. I feel that we have accomplished a great deal during these past three years and can look forward to more in the years to come.

Our joint CIDA projects have gone well and our involvement in them has contributed to substantially advancing one of our most important raisons d'être - to assist in the development of hydrographic sciences in the Third World Countries. In our dealings with these countries, we must consider their limited resources and realize that purchasing sophisticated equipment may not be a priority. Hydrographic expertise may come slowly and we must be prepared to continue our assistance over the long term in a committed fashion. Sporadic and erratic assistance will not accomplish our purpose. The CHA should be proud of its contribution in helping these countries develop a hydrographic expertise. Special thanks must be extended to Tom McCulloch and Jean-Marie Gervais for their contribution to this international assistance.

Our guests from many Pacific Rim countries enjoyed their visit to British Columbia and Alberta this spring. They contributed substantially to the success of the Discovery '89 Conference. Those of our members who hosted their visits deserve a great deal of credit for its success. Many volunteered their time and effort. They have been thanked and know their efforts were appreciated.

Three Malaysian Navy personnel attended the cartographic course in Ottawa in February, 1989 and continued their instruction and practice in Burlington and Victoria. The Canadian Hydrographic Service has shown its generosity many times before and continues to assist in helping its Third World neighbours. The CHA can only say that this generosity is appreciated by both our Association and the Third World participants. The organization and execution of the programs of instruction was excellent. The three participating students who spent 6 weeks in Victoria, and also visited my home, were charming, dedicated and appreciative.

Our application for a grant from the Canadian Hydrographic Service and the Department of Fisheries and Oceans is about to become a reality and this money will allow us more independence in the future conduct of our affairs. A second grant has been applied for through Science Culture Canada and this application will be considered in October. This latter request for assistance is directed entirely towards Lighthouse and any monies received will be used to support this publication.

We have now, after considerable correspondence, taken the first step towards exploring areas of cooperation between the CHA and The Hydrographic Society. We will exchange two copies of each issue of our journals and continue to offer free advertisements to each other in our respective journals. Reduced registration fees to conference and workshops sponsored by either the CHA or The Hydrographic Society to provide our members with substantial savings, will be one of the avenues explored. Advertising each other's conferences will also be promoted.

The Geomatics Industry Association of Canada has requested our participation in an important study of the issues facing the geomatics industry in Canada. We have volunteered to promote this study within our membership, to provide names of potential Task Force members and to participate in an action plan to address the findings of the study. We are looking forward to the results.

Your Association continues to be involved in the activities of the Canadian Institute of Surveying and Mapping. As President, I have been the Chairman of the Hydrographic Technical Committee and meetings have been held during the past three years in Charlottetown, Prince Edward Island; Winnipeg, Manitoba; and Halifax, Nova Scotia. We, as an Association, have been asked to consider the practicality of associating ourselves more closely with the management services that CISM is prepared to offer. As you know, CCLS and ACLS will now share the larger office space that CISM has recently acquired, and a common office staff and a new executive director will be providing a management service to those affiliated groups. CHA has expressed an interest in a closer business association, but the Directors have not discussed it thoroughly and no decision has as yet been made. The CHA was jointly involved with CISM's Public Awareness Program for Science and Technology and manned a display on hydrography at the British Columbia Institute of Technology as well as participating in other displays across Canada. CISM felt that the programme was a success, as did we.

Due to a general unhappiness with our CHA logo, a contest was held to find one which would be more acceptable to the general membership. After two separate votes, a winner was declared and the CHA can now put behind it the struggle for an identifiable and distinctive logo. The winner of the contest was Boyd Thorson of Central Branch. The logo remains substantially the same but with a reduced yellow light radiating from the lighthouse and a more bilingual motif. The national office will now recommend a consistent use of this lighthouse in all correspondence, at both the national and branch level. This modified logo will become more and more a part of the CHA persona.

As I indicated earlier, this is the end of my three year term as your President and we are now involved in establishing a slate of nominees to replace me. As usual this is not an easy task and nominees have been slow to come forward. At this writing negotiations are underway with a number of potential and qualified candidates and I am certain that the CHA will be left in good hands. Once the nominees have been declared a vote will be held among the general membership and the new President will be declared on January 1. I would encourage all 488 of our members to take an active part in choosing my replacement and would like to emphasize how important the National President can and must be to the success of the CHA. We have a myriad of activities that we can involve ourselves in, not the least of which are the following: continued support of our CIDA projects and the support of future projects; support of workshops and conventions which deal with hydrographic related interests; continued involvement in the CISM and support of survey-related activities in Canada; and the promotion and encouragement of hydrographic sciences among our members and potential members.

Our most important contribution to hydrography in Canada is our journal Lighthouse. It can be improved and it can be more effective in echoing the voice of hydrography across Canada and throughout the world. If you have something to say, Lighthouse provides an ideal medium. This journal is distributed to 900 interested readers around the world who look to the CHA to keep them informed. The new National President will wish to build on this well-deserved reputation.

In conclusion, I would like to bid you all good-bye and thank you all for your help in making the CHA an important and influential association. We have the opportunity for bigger, more important accomplishments and I am confident that your new Board of Directors will recognize this opportunity and take advantage of it.

I would be very remiss if I did not thank that one important person who has looked after our money. Ray Chapeskie has happily, and capably handled the finances of our Association during my Presidency. Without him my books would not balance and every Branch would be in arrears. Thanks Ray for the books; Thanks George for Lighthouse; Thanks Sam for our International members; and Thanks to all the Branches for your continued support.

I will stay in touch.

Barry Lusk

About the Authors

An Arctic Mid-Summer's Night Frolic

Joe Green is the principle with Hi-Flight Engineering Ltd. An electronics engineer, he has worked on arctic projects since 1971. The problems of positioning in the arctic and concern for the environment inspired the paper. For more information contact:

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Digital Terrain Models in Marine Cartography

Hans Schenke is a senior scientist for geodesy and bathymetry at the Alfred-Wegener-Institut for Polar and Marine Research. The paper was presented to the GEBCO Consultative Group on Ocean Mapping during a meeting in Bremerhaven in December, 1988 and appeared as an Annex to the final report. It is used with permission. For more information contact:

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Geographical Naming Practices of William J. Stewart

Dave Gray is a geodesy and radio positioning specialist with the Canadian Hydrographic Service in Ottawa. His paper was originally published in CANOMA volume 14, number 2, December 1988. It is used with permission. For more information contact:

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Nautical Chart Production Using Digital Data and Interactive Compilation

Sherman Oraas is a computer graphics specialist at the Institute of Ocean Scieces in Sidney, British Columbia. The other co-authors are all senior cartographers with the Canadian Hydrographic Service in Sidney. Sev Crowther is the Regional Chart Superintendent; Ken Holman is the Production Chief; Ray Chapeskie is a Quality Control Officer; Ron Bell and Dave Jackson are Production Unit supervisors. A similar paper on interactive compilation was presented at the CISM convention in Halifax this past June. The text has been updated for Lighthouse. For more information contact:

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Probability of Detecting Errors in Dense Digital Bathymetric Data Sets by Using 3D Graphics Combined with Statistical Techniques

Herman Varma and Hank Boudreau work with the Data Base Group of the Canadian Hydrographic Service (CHS) in Dartmouth, Nova Scotia. Messrs McConnel, O'Brien and Piccott are with Sirius Solutions Limited of Halifax and have worked under contract to CHS on 3D graphics applications. For more information contact:

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Acoustic Surveys: Implications to the Geoscience Discipline

R.L. Thomas, is a senior scientist with the Department of Environment. He works at the Canada Centre for Inland Waters in Burlington, Ontario. R.K. McMillan is president of McQuest Marine Research and Development Company Limited, which is located in Burlington, Ontario. D.L. Keyes works for McQuest as a senior marine geophysical technologist. For more information contact:

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Lighthouse Abstracts

Résumés pour Lighthouse

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An Arctic Mid-Summer's Night Frolic
by
J. Green

Every year, members of the Prairie Schooner Branch of the CHA perform hydrographic operations for government and private industry in the Canadian Arctic. This photo essay discusses some of the problems associated with horizontal positioning and the potential environmental impact of these operations.

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Les ébats d'une nuit arctique mi-estivale
par
J. Green

À chaque année, les membres du 'Prairie Schooner Branch' de l'Association hydrographique du Canada effectuent des travaux hydrographiques pour le gouvernement et l'industrie privée dans l'arctique canadien. Ce photomontage discute des problèmes de positionnement horizontal et du potentiel d'impact sur l'environnement de ces opérations.

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Digital Terrain Models in Marine Cartography
by
Dr. Ing. H. W. Schenke

Digital terrain models are becoming more important as a source of geographical and morphological analysis and digital mapping. The paper explores the types of digital terrain models, the determination of digital terrain models for bathymetric data and the potential uses of this modelling as it pertains to marine cartography.

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Les modèles de terrain numérisés en cartographie marine
par
Dr. Ing. H. W. Schenke

Les modèles de terrain numérisés deviennent de plus en plus importants pour l'analyse géographique et morphologique, et la cartographie numérisée. Ce rapport explore les sortes de modèles de terrain numérisés, leur rendement envers les données bathymétriques et leur utilité de configuration en relation avec la cartographie marine.

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Geographical Naming Practices of William J. Stewart
by
David H. Gray

William J. Stewart was one of Canada's early hydrographers. He was obliged to select names for many unnamed charted features in Georgian Bay and Lake Huron. The paper researches the extent of Stewart's influence in naming geographic features after family, crew, friends and politicians.

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Les habitudes d'attribution de noms géographiques de William J. Stewart
par
David H. Gray

William J. Stewart était un des premiers hydroraphe canadien. Il fut obligé de choisir plusieurs noms pour des traits cartographiés de la baie Georgienne et du lac Huron qui n'avaient jamais été nommés. Ce rapport recherche l'influence de Stewart dans sa désignation des points géographiques qu'il attribua d'après sa famille, l' équipage, les amis et les politiciens du temps.

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Nautical Chart Production Using Digital Data and Interactive Compilation
by
R. D. Bell, R. E. Chapeskie, W. S. Crowther, K. R. Holman, D. M. Jackson and S. R. Oraas

The Canadian Hydrographic Service presently uses graphical source data to compile nautical charts. Once the compilation has been digitized, it is used to draft the chart using computer-assisted techniques. The paper describes a Pacific Region project to use interactive methods to compile chart 3493 of Vancouver Harbour, directly from digital source data.

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L'utilisation d'une base de données et de la compilation interactive pour la production d'une carte marine
par
R. D. Bell, R. E. Chapeskie, W. S. Crowther, K. R. Holman, D. M. Jackson et S. R. Oraas

Présentement le Service hydrographique du Canada utilise des données de source sous forme graphiques pour compiler les cartes nautiques. Une fois la compilation numérisée, elle est utilisée pour le dessin de la carte en utilisant les techniques assistées d'ordinateur. Ce rapport nous informes d'un projet de la région du pacifique qui utilisa des méthodes interactives pour compiler la carte 3493 du port de Vancouver, directement d'une source de base de données.

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Probability of Detecting Errors in Dense Digital Bathymetric Data Sets by Using 3D Graphics Combined with Statistical Techniques
by
H. Varma, H. Boudreau, M. McConnel, M. O'Brien and A. Piccott

This paper explores the feasibility and flexibility of the high-tech use of parallel-processing work stations married to statistical packages in order to meet hydrographic needs in detecting and rectifying errors in large digital bathymetric data sets, such as those obtained by SWATH, SWEEP and airborne depth acquisition systems. These techniques provide new concepts and methodologies for verification of large data sets in order to build conventional data bases.

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La probabilité du dépistage d'erreurs contenue dans les ensembles saturés de données bathymétriques en utilisant l'union des graphiques de trois dimensions avec des méthodes statistiques
par
H. Varma, H. Boudreau, M. McConnel, M. O'Brien et A. Piccott

Ce document explore la flexibilité et la faisabilité de l'usage de haute technologie du traitement en parallel des stations de travail qui sont mariées à des paquets de statistiques pour rencontrer les besoins hydrographiques tant qu' à la découverte et la rectification d'erreurs contenues dans les ensembles de données bathymétriques tel que le 'SWATH', le 'SWEEP' et les systèmes aériens d'acquisition de profondeurs. Ces techniques nous donnent de nouveaux concepts et méthodologies de vérification d'ensembles de données pour en retour établir des bases de données conventionnelles.

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Acoustic Surveys: Implications to the Geoscience Discipline
by
R.L. Thomas, R.K. McMillan, and D.L. Keyes

Acoustic surveys routinely conducted by the Canadian Hydrographic Service have wide-ranging implications for other geoscience disciplines. Data with sufficient resolution for geoscience purposes have produced remarkable information in Lake Ontario. Survey equipment such as side-scan sonar and sub-bottom profiling echo sounders have provided direct evidence of earth structures in recent lake sediment which can only be explained in terms of recent earth movements.

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Levés acoustiques: Leurs implications à la discipline de géoscience
par
R.L. Thomas, R.K. McMillan, and D.L. Keyes

Les levés acoustiques dirigés par le Service hydrographique du Canada produit une gamme d'implications pour les autres disciplines de la géoscience. Les données avec suffisamment de résolution pour fins géoscientifiques, ont produit de remarquable information du fond du lac Ontario. Les instruments de levé, tel que le sonar 'side-scan' et l'écho-sondeur profileur de sous-fond; nous a prouvé qu'il existe des structures continentales de sédiments de lac qui ne peuvent qu'être expliquées que par des mouvements récents de la croûte terrestre.

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An Arctic Mid-Summer's Night Frolic

(with apologies to Wm. Shakespeare)

A young engineer from the West
Swore G.P.S. was the best,
His cousins out East,
Said Syledis was least.

But our hero, unmoved on that score,
Muttered softly, "shore stations ... no more!"
And as quick as a wink
Established 'differential link'.

Our young hero completed
A difficult feat
And replaced sixty watts
with a kilo.

(further apologies to Henry Wadsworth Longfellow)

by
J. Green

Every year for the past two decades or more, members of the Prairie Schooner (PS) Branch of the Canadian Hydrographic Association (CHA) have journeyed to the furthest Arctic reaches to perform complex hydrographic operations for industry and government. Like the great white swans that nest on Richardson's Island, hydrographers in the PS Branch migrate north in early spring. In early April or May these restless birds begin their preparations. In June the swans lose their flight feathers and cannot fly. During mobilization, hydrographers cannot navigate. Sometimes the birds fight over the best nesting sights. Has anyone seen the navigation towers on Pullen Island or Atkinson Point this year?

After the initial nesting rituals (complete with land use permits and radio licences) the swans settle down to the matter at hand of raising the young. Equipment configurations are finalized and tested, and the hydrographers are off to another season in the Arctic.

1989 saw many PS Branch members active on northern offshore projects in the Arctic and in other parts of the world. We are now in a maddening period between the time when GPS will solve all our problems, and when we continue to operate and improve terrestrial systems used for offshore hydrographic work.

In addition, we are now faced with introducing the North American Datum (NAD) '83 adjustments, just after we had figured out how to handle network distortions in the NAD '27 system. Add to this recipe a dash of Transit Satellite Doppler surveys and a few Static GPS surveys, and we have a formula for making a number of interesting puzzles over the next several years.

As oil companies gear up to put the Beaufort Sea oil fields into production, and as government agencies nervously increase their surveillance efforts over environmental issues, it is clear that the PS Branch of the CHA is entering the most interesting and productive period in its history.

It is vital to understand that much of the offshore Arctic drilling expertise in the world resides in Canada and in Canadian companies. A considerable amount of that expertise and experience rests with the members of PS Branch. In Alaska, for example, offshore drilling has been conducted by both Canmar and Beaudril, activities which involved members of PS Branch.

After the Exxon Valdez accident, a fearful public on both sides of the border is uncertain as to the future of exploration activity in environmentally sensitive areas. If we are going to develop the domestic energy supplies we need in the future, we must take these public concerns into account and come up with workable, scientific, and credible solutions. Members of PS Branch have a vital role to play in this effort.

One area we need to address as a user community is the transition from our current hydrographic practices to GPS? And if we are going to continue to depend upon terrestrial systems, how will we co-ordinate our activity to prevent radio interference to other users, and to operate in an environmentally responsible manner? How are we going to integrate all of our survey information and how do we implement the NAD '83 adjustments without introducing confusion and more technical problems?

These issues that affect us and are affected by our work can well be addressed by the CHA, particularly at the Branch level. Representatives of government, parks and regulatory agencies, native communities and localities have expressed an interest in meeting with industry representatives to talk about issues that are important to them. We should not lose the opportunity. Unlike the USA, where many environmental issues have become extremely polarized, Canada enjoys a cool and rational approach to issues on both sides. The key to maintaining this atmosphere is dialogue and technical enhancements where these may be required.

It is said that a picture is worth a thousand words. Actually it's more like 2.0E6 bytes! The following pictures from the Arctic showing some of the activity of Prairie Schooner Branch members.

Figures 1, 2 and 3 were taken aboard the S.S.D.C. when it was being moved from Alaska to its winter harbour in Herschel Basin. As you can see, Patrick Eddy is on the job and not out with the boys at the Finto Inn in Inuvik.

Figure 1: Canmar Fleet towing S.S.D.C. to Herschel Basin.
The Canmar "Kigoriak" towing the S.S.D.C. to its winter location at Herschel Basin. Note the light ice and sunshine.

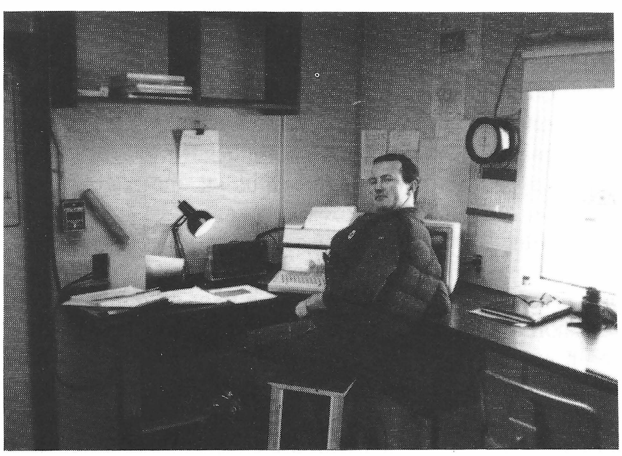


Figure 2: Prairie Schooner Branch Member Patrick Eddy aboard the S.S.D.C.
Patrick is with Canadian Marine Drilling Ltd. and poses with his navigation computers and navigation systems. Note Syledis receiver under the table on Patrick's right.

Figure 4 is a picture of the author, who is straddling the border. No simple decisions here!

Figures 5 and 6 have been provided to answer the question "How do you guys get up a tower in four hours?" In truth, we cheat and use two towers.

Figure 7 shows a universal practice for field crews around noon hour on the tundra.

Figure 8 shows typical conditions in remote areas where 94 ore stations are located. Because everything must be transported by helicopter, several propane bottles must be manifolded together to operate for the season. Amazingly this arrangement works, except during cold weather when the vapour pressure is too low. However, even this can be overcome with the proper dash of "know-how".

Figure 3: This photo shows the typical friendly relationship between electronics technicians and surveyors!
Bruce and Patrick have a good working relationship aboard the S.S.D.C. Bruce demonstrates the basic repair procedure!

Figure 4: Author at International Border between Alaska U.S.A. and Yukon Territory, Canada
An interesting picture of our "open border" with the U.S.A. even in very remote territory. One must admire the early surveyors from both countries who established these remote monuments without the assistance of modern transportation (seen in the background).

The industry has operated in the Arctic for over a decade using light-weight portable "Texas Towers". These are preferred because they are easy to install and transport. But generally speaking, they will not survive severe winter weather. Figure 9 shows ice buildup on a 3/8 inch nylon guy rope after a storm that produced freezing rain on Herschel Island. These light towers are liberally guyed with rope, but when ice builds up on the ropes, a great deal of loading gets put on the tower. Furthermore, ice builds up an enlarged cross section area exposed to the wind, as shown in figure 10. In high winds, this causes greatly increased tower loading. When freezing rain and wind combine in sufficient force, the tower fails. Figure 11 shows what a mess this can create at a station that offshore users are depending upon for navigation support. We obviously require a more sturdy tower system which retains the portability and flexibility of the Texas Tower design.

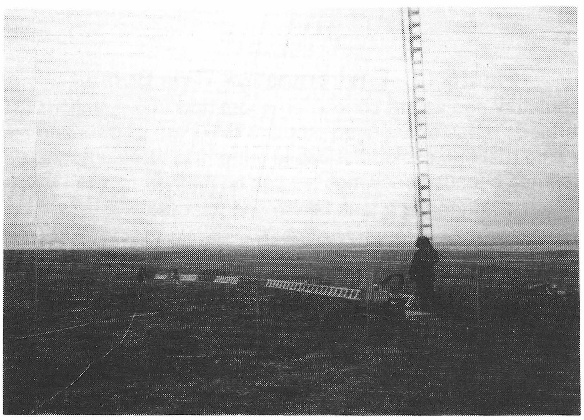


Figure 5: Erecting a 100 Foot Syledis navigation tower.
The gin pole method is used to rapidly erect and install a navigation facility in remote areas without the need for special personnel trained to climb towers." The complete tower installation is checked out while on the ground.

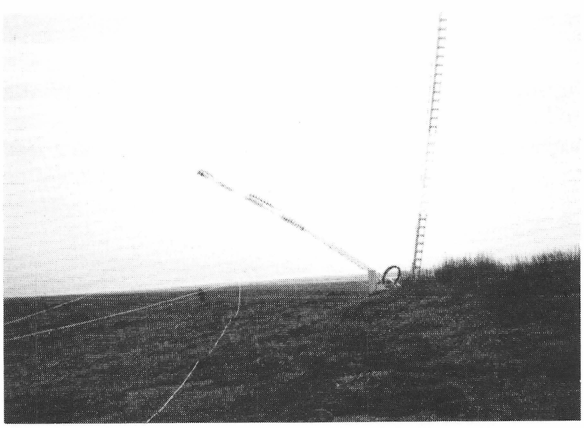


Figure 6: Erecting the Tower.
Once the tower is assembled, it is winched into position in a few minutes.

In the future, at least until GPS displaces terrestrial systems, PS Branch members will have to pay closer attention to land use and environmental issues. Much of this is common sense. Yet look at figure 12 and see if there is any common sense in this picture.

Virtually all our members know the frustration of navigation tower failures in remote areas. I have enclosed some typical samples for our members' pain and/or delight. Figures 13 to 15 capture most clearly how things that are not supposed to happen, do.

Finally, I have enclosed a picture in figure 16 of a survey site on Herschel Island. This site is in a territorial park. How many of us would leave this kind of a mess in our parks in Banff or Jasper?

I would like to encourage our members to take a greater interest in our environment and make the extra personal effort it takes to keep it clean.

Figure 7: Lunchtime!
Tower erection crew take a lunch break.

Figure 8: "Propane is one of life's best bargains!"
Hi-Flight Engineering Ltd. electronic technicians fuel shore station on Herschel Island. Propane systems require additional arrangements to work well in the low Arctic winter temperatures.

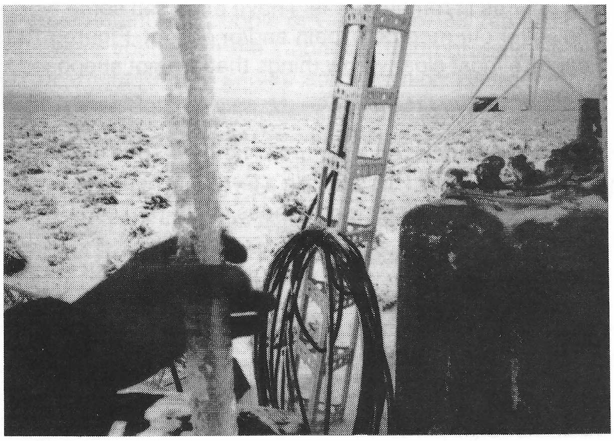


Figure 9: Author illustrates the effect of freezing rain on summer grade navigation towers.
Taken in August after a freezing rain storm.
The freezing rain overloads the light towers and increases their area caught by the wind. This leaves the structure susceptible to mechanical failure.

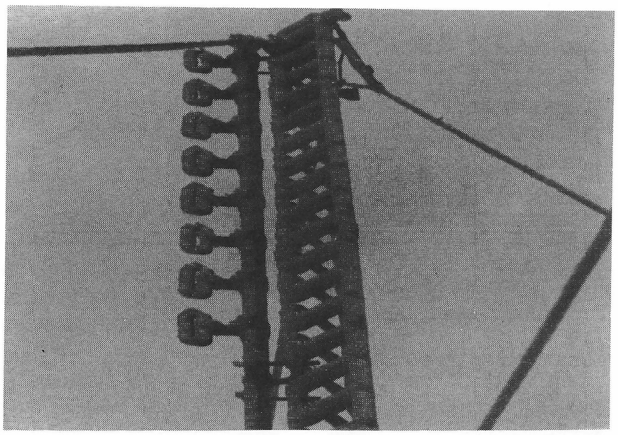


Figure 10: Iced up Syledis Station before failure.
Freezing rain can ice up a light portable navigation tower and dramatically increase its tower load and wind area cross section.

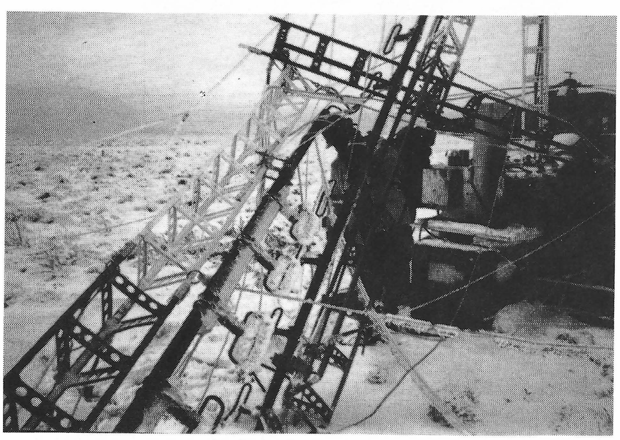


Figure 11: Station Failure due to Ice Load
A light "Texas Tower" used by most offshore surveyors in the Arctic, after a freezing rain storm. The failure can require up to a day to restore navigation service.

Figure 12: Environmental Time Bomb!
Regulatory people are concerned about how shore stations are operated. These abandoned propane tanks are pressurized and over time rust out, explode or cause a fire. Native communities are concerned because snowmobiles can hit the half covered bottles, triggering a tank failure and possible fire.

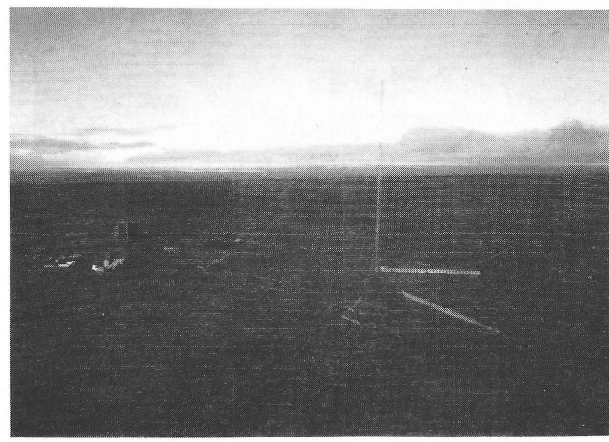


Figure 13: Shore Station Failure due to High Winds on Herschel Island.
A light navigation tower failure, taken immediately after a wind storm on Herschel Island.

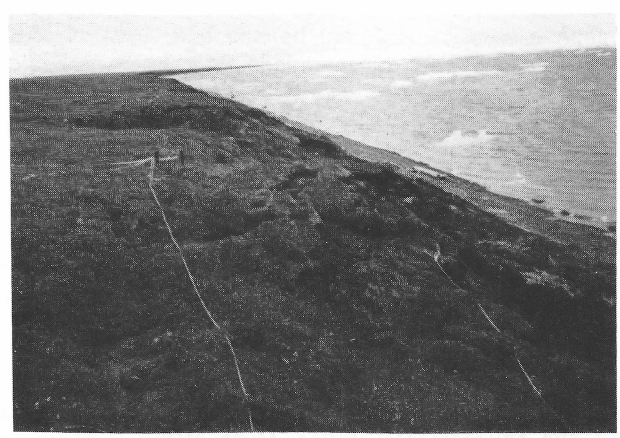


Figure 14: Station Failure due to Bank Erosion.
This perfectly good shore station failed because it was placed too close to the shoreline. The shore was unstable, and caused the tower to fail after the anchors slid into the sea.

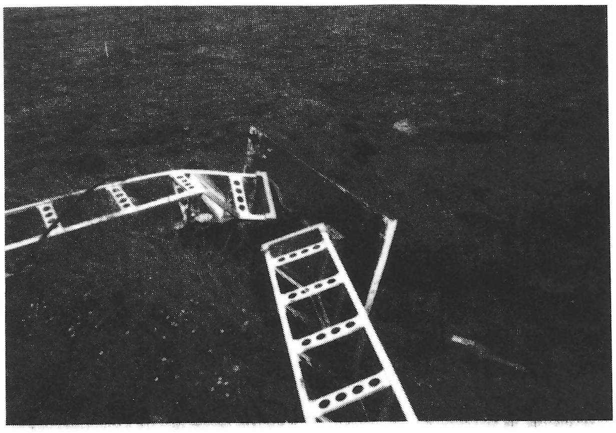
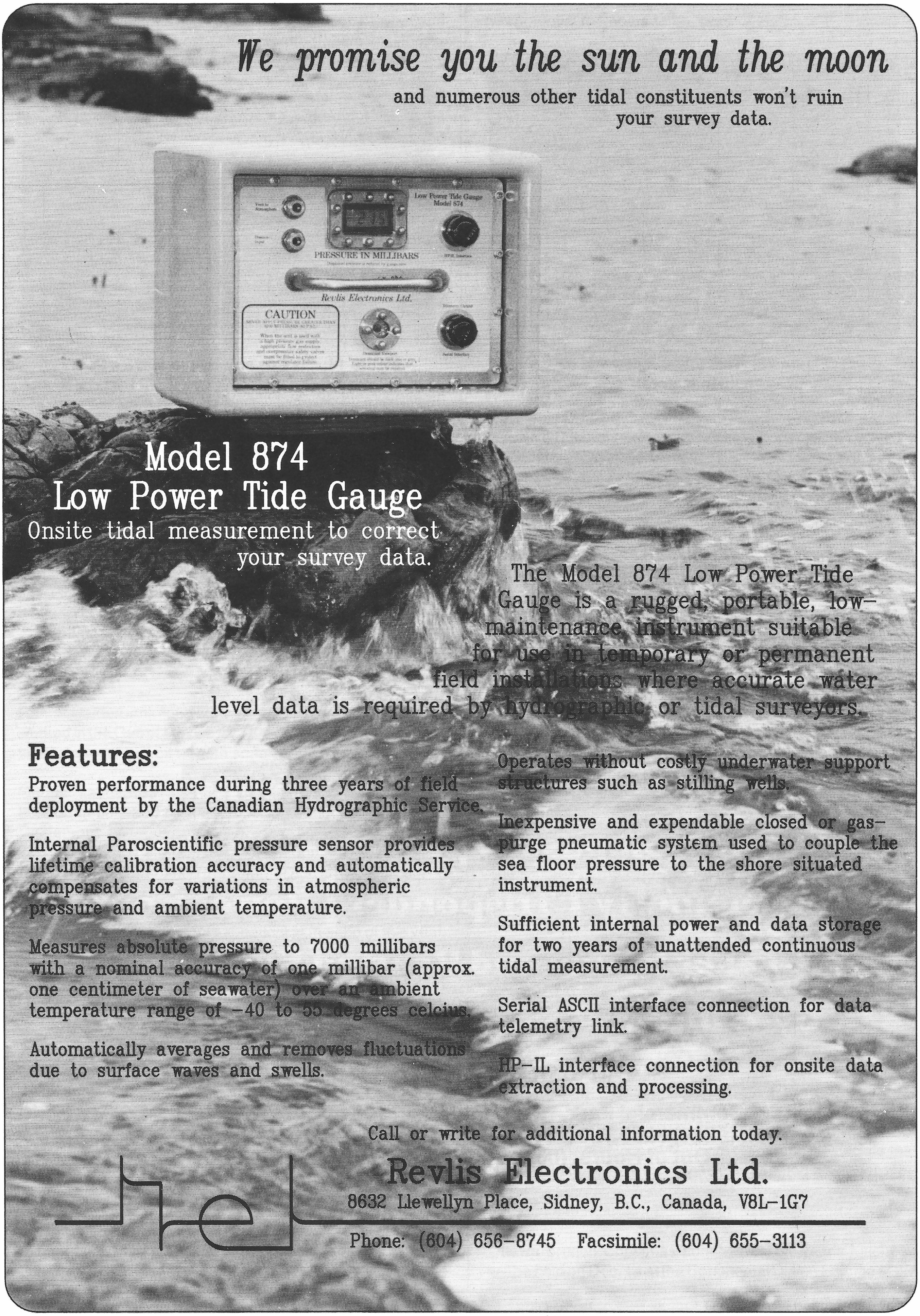


Figure 15: This tower failed due to "human factors!"
This tower was located in a very remote area near Komakuk Beach. No guy ropes were in sight! The bottle on the lower right hand side leave a clue as to how the tower failed. The nylon guy ropes are very popular in the north, not only for guying navigation towers.

Figure 16: "Is this any way to leave a Park?"
Herschel Island at a site prior to mobilization. The large boulder contains a geodetic monument from which many surveys in the area are referenced. The junk and debris left by previous survey parties are a major reason why Park Rangers now closely inspect shore activities by survey parties.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Digital Terrain Models in Marine Cartography

by
Dr. Ing. H. W. Schenke

Introduction
The Digital Terrain Model (DTM) is increasingly becoming important as a source for geographical and morphological analysis and digital mapping.

In the wake of the fast-developing computer technology, DTMs are becoming more and more useful. DTMs are used nowadays not only in Geographical Information Systems, Remote Sensing and the Geosciences, but also Geography, Oceanography and related fields. Possible application areas include terrain analysis (for example, slope, aspect and visibility) and erosion studies. Various display products such as contour lines, shaded relief, profiles and three-dimensional perspective views can be derived from DTMs.

Since the 1970s, intensive research has been carried out to improve the interpolation techniques and the algorithm used, especially for study of morphology and the identification of significant structural trends for interpolation purposes. Today, an important objective is the automatic determination of morphological or surface structure lines.

Furthermore, the determination of derived DTM products and their quality analysis, one of the most serious possibilities for bathymetry, is of high interest. Because the seabed is not visible, DTMs are fundamental elements for the development of marine cartographic databases. With smoothing techniques, small-scale charts may be developed from DTMs and last (but certainly not least) DTMs will become the main component and basis for automatic nautical charts (the so-called electronic chart).

Definition of Digital Terrain Models
A DTM can be defined as any machine-readable representation of the topography from the earth's surface, as well as from the seabed. In the field of Marine Cartography two different types of DTMs are of interest:

1. the model with direct digitized contour lines; and
2. the universal model.

The DTM is a simplification of the real world, derived by computing a matrix of discrete depth values from all available data in the area. It is prepared by computer processing and systematic modeling, and may be seen as a variable-scale map, the maximum accuracy of which is only limited by the accuracy of the basic measured data. A general bathymetric DTM is substantially nothing more than a matrix containing the water depths of the grid cells. Each DTM contains a header line with the number of rows and columns of the matrix and the co-ordinates of the area corner points. In addition, for each grid element a quality or accuracy value can be given as well as information about the interpolation algorithm and morphological structure lines. An important advantage of DTMs is that they can be stored easily on computer disks.

Types of Digital Terrain Models
1. Model with Direct Digitized Contours
Digitization is conversion of analogue cartographic material to digital computer representation by means of electronic, optical, laser, solid state or mechanical processes. The most common forms of digitization are manual, automatic, line-following and raster scanning.

Digitization is usually carried out at constant time- or distance-intervals. Time-constant digitizing is to be preferred because of a closer point sequence on the curves, due to slower manual line following.

Advantages: Faster plotting of contour lines; easy and quick smoothing for smaller scales.

Disadvantages: For bathymetric charts covering different and heterogeneous morphology of the continental slope and abyssal plains, DTM determination uses a lot of computer time, especially to transfer from digitized isolines to a gridded DTM. Also, interpolation is more complex. Only with a DTM would it be possible to combine new data with a digitized chart.

2. The Universal Model
The Universal DTM contains the mean or discrete depths of a regular raster, the co-ordinates of the corner points, the number of rows and columns of the model, and additional information such as structure lines, fault lines, break lines, significant terrain points and holes. It also contains, in the form of a regular raster, corresponding estimates of the accuracies, if available.

The grid or raster width needs to be chosen so that linear interpolation between adjacent points on the grid or along the morphological structure lines is possible.

Problems with DTM Determination for Bathymetry
The seabed is very heterogeneous. For the determination of DTMs of the seafloor, standard values for the various model parameters, such as grid width, search radius and fitting surface, cannot be given, especially when the sample point data distribution is not regular.

The main problem with DTM-determination for bathymetry is the task of determining a regular gridded base from irregularly distributed data. The assumption of normal distribution of the measurements is not valid for bathymetry.

With bathymetry, maximum data distribution is along the profiles. A reduction of this influence on the DTM-determination can only be achieved by special search and selection procedures for the sample points that are used. With multi-beam surveys, the problem is easier to solve using a moving averaging technique along track. Considerable experience is required for the modeling and determination of DTMs.

Bathymetric Data of Different Origin and Quality
Bathymetric surveying has a long history. Systematic echo-sounding surveys have been carried out for more than half a century. The accuracy of the isolines depends directly on the accuracy of the depth measurement combined with positional accuracy. Over the last 50 years positional accuracy has improved from ± 5 km to ± 500 m (with Integrated Navigation Systems), to better than ± 50 m (with GPS). In nearshore areas, ± 5 m accuracies are possible with radio navigational systems. This clearly shows the difference in quality of so-called "old" bathymetric data, as used to compile most nautical charts, and data from modern precision surveys.

As it is not feasible to discard all the "old" data, it is necessary to combine them with newer measurements, taking into account both positional and depth measurement accuracies. This is a difficult problem which cannot be solved with the help of software alone; human intelligence is also needed to compile new bathymetric maps from these different data sources. This is where scientists, working with interactive computer-graphics systems, become a necessity.

Variation in the Accuracy of Multi-beam Systems
Spurious and erroneous measurements must be edited out from single- and multi-beam sonar data. Incorrect data will show up in the DTM and produce artifacts. Data "snooping" should be carried out in near-real-time, which means at sea, while the survey is in progress. With multi-beam systems the size of the reflected sea bottom area increases with larger beam-fan centre-angles; this has to be taken into account when defining parameters such as grid width and search radius for the DTM determination.

The Use and Determination of DTMs
One very important result of a DTM determination is the listing of values for Standard Deviations, for the entire DTM or for single elements. Highly sophisticated post-processing techniques, running on large Main Frame computers, can be used for final map compilation. Or fast programs can be used for a quick look and data check on low-cost PCs.

"KRIGING"
"Kriging", as a computer technique for DTM determination and for plotting the cartography of the sea floor, was first introduced more than ten years ago in an article in the International Hydrographic Review, which showed some results and presented a number of computation procedures. This technique, which takes into account the surrounding relief structure, was developed by Professor G. Matheron from the French Institut de Geostatistique in Fontainbleau; it was named after D.G. Krige, a mining specialist.

The problems associated with the determination and plotting of isolines are not new; various methods have been developed by way of solution, such as Least Squares Adjustment, bi-cubic spline functions and moving polynomial surfaces. But all these models lead to solutions which take only small account of the spatial structure of the variable. They are, moreover, not even capable of analyzing this structure. As a result, the same estimations will be given whether the variable is regular, such as the bathymetry of an abyssal plain, or chaotic, as with a fracture zone.

The "Kriging" technique does take into account the structure of the phenomenon by employing a "structural function": the Semi-Variogram, which is determined on the basis of sample points. "Kriging" is in fact very similar to Least Squares Prediction, the main difference being that "Kriging" uses the morphological structures for interpolation and for this reason is the best technique that can be used for marine cartography.

However, the quality of the Semi-Variogram determination is most important and directly influences the quality of interpolation; therefore, it is responsible for the cartographic results. Determination and fitting of the Semi-Variogram cannot be automated, but a fundamental knowledge of the geomorphological environment and the data structure is essential. The geomathematical approach to this problem provides a distinct advantage for "Kriging" over other techniques.

The "Kriging" technique has in addition other advantages:
1. minimum variability of the estimator; and
2. explicit output of estimation errors.

Scientific and Technical Uses of DTMs
DTMs are used today in many different scientific disciplines. Besides isoline determination, DTMs are also used for the determination of derived products such as 3-dimensional perspective views, profile determination, mass determination, difference-DTMs, slope maps and aspect maps.

<u>Cartography</u>
DTMs are used in cartography as the fundamental basis for isoline determination, and as a tool for automated shading, determination of slope and aspect values of the terrain.

<u>Geography</u>
DTMs are basic and fundamental components of Geographical or Land Information Systems. In addition, some derived products may also be incorporated therein.

Products from DTMs
<u>Isolines</u>
Determination and plotting of isolines is an important application and use for DTMs. Smoothing of isolines can be carried out, thus allowing for scale changes.

<u>Along-track and cross profiles</u>
Along-track and cross profiles are used for survey engineering, for river dredging, for mass determinations in connection with dredging, for volume determination of rivers and lakes, or for determination of water masses flowing through deep sea channels.

<u>Slope and Aspect Maps</u>
Terrain slope is determined for each point on the DTM. A DTM can then be determined for slope groups which can be plotted in colour. Instead of water depth, the slopes are shown and colour-coded. This technique is used by geologists and oceanographers for erosion and current analysis.

A very interesting marine application is slope aspect. A vector field is determined with aspect directions, the thickness or length of the vector indicating the main slope in the grid cell.

Determination of Volumes and Volume Differences
Volume differences can be determined by additional analysis from two DTMs of the same area.

Determination of Spot Heights
This is very important for terrain analysis, for instance terrain maxima and minima for presentation and interpretation.

The Value of DTMs to Commercial and Scientific Users Compared With Traditional Line Contouring
From the operational point of view the main steps for making maps are: data acquisition, data processing, editing and drafting. In contouring with DTMs, working phases are: data acquisition and analysis, interpolation of contours, editing and plotting of contours.

Contouring by interpolation with DTMs is becoming increasingly popular, particularly with modern sonar survey techniques such as multi-beam systems. Small digital computers and even some enhanced PCs have become more and more powerful and now allow efficient collection, storage and processing of DTM data. The digital method has many advantages in comparison with direct digitizing or manual plotting of contours.

Conventional Method of Contouring
With the conventional method, isolines are directly interpolated and drawn. Further processing may or may not be carried out manually. The result is a single product, a contour map. The advantage of this method lies with the freedom of interpolation accorded to the cartographer. Based on his professional knowledge, he can represent contours as smoother or rougher, thus allowing the map to show additional information about the topography and characteristics of the sea floor.

Contouring using a DTM
For the interpolation method, the first step is to create a DTM. Contours are then derived as one of a number of DTM products. As contours are the result of an interpolation process, their quality depends on the right choice of reference points and the algorithm to be used therein. However, the way in which the morphology of the seabed is handled is probably the most important factor for the interpolation. Parameters describing the morphology are the cartographer's, especially the marine cartographer's, interpretation tools. Non-availability of the terrain-describing parameters results in a poor "automatically generated"-looking contour map, even when the contours fall within accepted height or position tolerances.

Geographical Naming Practices of William J. Stewart

by
David H. Gray

The name William James Stewart is well known to all hydrographers and those interested in charting Canadian waters. As Chief Hydrographer, Department of Marine and Fisheries, he became a member of the Geographic Board of Canada in 1915. This association with the Board continued until his death on May 5, 1925.

William J. Stewart was born in Ottawa on January 23, 1863, the son of Major John Stewart, a contractor in Ottawa and also Commanding Officer of the Ottawa Field Battery. William Stewart had received his education at Collegiate School (now Lisgar Collegiate) in Ottawa. On February 5, 1880, at the age of 17, he joined the Royal Military College (RMC), having taken first place in entrance marks in his class of seventeen. As Company Sergeant-Major in the Cadet Battalion, he graduated on June 26, 1883, at the top of his class at RMC. He was presented with the Governor General's Gold Medal, awarded to the cadet standing first in General Proficiency, as determined from the date of joining to that of graduation. RMC records show that he was 5'7" tall, with dark complexion, brown hair and hazel eyes.

Stewart started work for the Rideau Canal Office, Ottawa, and joined the one-year old Georgian Bay Survey (later to become the Canadian Hydrographic Service) in March 1884. He took over as Chief Hydrographer in 1893 and continued to survey in Georgian Bay and the North Channel until 1894. (1891 was his only absence from this survey, when he was sent to survey Burrard Inlet in British Columbia.) From 1895 to 1897, Stewart with his ship **'Bayfield'** was in Lake St.Clair, Lake Erie and Lake Huron. In 1898, he was back at Parry Sound, in Georgian Bay. During 1901, Stewart took part in the first year of the Lake Winnipeg survey but, for the next two years, he was in Lake Superior surveying with a new **'Bayfield'**.

W.J. Stewart also carried out several important works on behalf of the Dominion and British Governments. He was a member of the International Waterways Commission in 1909. Later, when the Chicago drainage scheme was a matter of international importance in 1912 and 1913, he was appointed by the Dominion Government to determine its effect on the level of the lower St. Lawrence River. At the request of the British Government, he went to Europe to assist in laying out the new international boundaries as determined by the 1919 Treaty of Versailles.

Stewart died on May 5, 1925, leaving his wife, Clara Lasher, and two unmarried daughters, Avis and Sybil. He is buried in Beechwood Cemetery, Ottawa.

Over the past few years I have been researching the origin of place names in the Pointe au Baril area of Georgian Bay, so recently I was consulting the records of the Secretariat of the Canadian Permanent Committee on Geographical Names (CPCGN) and various publications, such as James White's **'Place Names in Georgian Bay'** (1913). To my surprise I soon found my great-grandfather (Col. Charles M. Boswell) was honoured with the name of an island, and upon further searching, quickly found that William J. Stewart (my grandmother's uncle) had sprinkled the countryside with names of his in-laws, who at the same time were also my own ancestors. My family records do not include the family tree of the Stewarts, so it is quite possible that William J. Stewart may also have named features in the area for his parents and other blood relatives.

Figure 1: William J. Stewart (1863-1925)
(Source: Canadian Hydrographic Service)

In ten years of surveying in Georgian Bay and the North Channel, Cdr. J.G. Boulton and W.J. Stewart, his assistant, were obliged to select thousands of geographical names in an area where all but major features remained unnamed on existing charts. So it is not surprising that they followed

TABLE 1: Geographical names definitely honouring relatives

Features	Coordinates	Relative honoured	Relationship to W.J. Stewart
Boswell Island	46° 19' - 83° 55'	Col. Charles M. Boswell	brother-in-law
Caroline Island	46° 08' - 82° 49'	————————	sister
Clara Island	46° 09' - 82° 49'	Clara Lasher (Mrs. Wm. J. Stewart)	wife
Now officially named Sanford Island			
Davy Island	45° 20' - 80° 13'	Henrietta Davy (Mrs. John Lasher)	mother-in-law
Davy Rock	45° 20' - 80°13'	ditto	ditto
Emily Island	46° 10' - 83° 48'	Emily Lasher (Mrs. C.M. Boswell)	sister-in-law
Hannah Ground	46° 17' - 83° 53'	Hannah Lasher (Mrs. M.G. Poole)	sister-in-law
Hannah Rock	45° 23' - 83° 53'	ditto	ditto
Hawkes Shoal	46° 17' - 83° 50'	————————	cousin of Mrs. W.J. Stewart (?)
Helen Island	46° 07' - 82° 12'	Helen Lasher (Mrs. Hurt)	sister-in-law
Henrietta Point	45° 22' - 80° 21'	Henrietta Davy (Mrs. John Lasher)	mother-in-law
Hurt Rock	46° 20' - 83° 55'	Mr. Hurt	brother-in-law
Judd Bank	44° 57' - 79° 58'	————————	sister
Lasher Island	46° 20' - 83° 55'	Clara Lasher (Mrs. Wm.J. Stewart)	wife
Poole Island(s)	46° 19' - 83° 55'	Rev. Montague G. Poole	brother-in-law
Stewart Island	46° 06' - 82° 10'	Wm. J. Stewart	
Stewart Rock	45° 30' - 81° 50'	ditto	

TABLE 2: Geographical names possibly honouring relatives

Features	Coordinates	Relative honoured	Relationship to W.J. Stewart
Alfred Bank	44° 56' - 79° 59'	Alfred Lasher	brother-in-law
Avis Ground	46° 17' - 83° 51'	Avis Stewart	daughter
Davy Islands	46° 20' - 83° 56'	Henrietta Davy (Mrs. John Lasher)	mother-in-law
Helen Island	48° 33' - 88° 20'	Helen Lasher (Mrs. Hurt)	sister-in-law
Lasher Island	48° 33' - 88° 21'	Clara Lasher (Mrs. Wm. J. Stewart)	wife
Montague Islands	46° 19' - 83° 59'	Rev. Montague G. Poole	brother-in-law
Stewart Patch	44° 33' - 80° 18'	Wm. J. Stewart	
Stewart Point	52° 23' - 97° 06'	Wm. J. Stewart	
As Chief Hydrographer, he commanded the survey of the southern portion of Lake Winnipeg in 1901. He was elsewhere in 1902-3 when the rest of the lake was surveyed. Thus, Stewart Point was probably named by his subordinates.			
Sybil Island	48° 24' - 88° 34'	Sybil Bayfield Stewart	daughter

certain commemorative naming themes: family, crew, friends, and politicians. Sixty years earlier Capt. (later Admiral) Bayfield had named the principal land and water features of this area in a similar way.

James White's paper of 1913 lists at least a dozen features named by Stewart for his relatives, almost the whole crew of his ship **'Bayfield'**, and several of his RMC classmates. In addition, through my knowledge of the family tree and student lists from RMC, I am suggesting possible origins of several other feature names in the same area.

Geographical names suggest that W.J. Stewart honoured his wife's family more than his own. **Clara Island** and **Lasher Island** were named after his wife, Clara Lasher; **Emily Island, Hannah Ground** and **Helen Island** are named after her sisters; **Boswell Island, Montague Islands, Poole Island** and **Hurt Rock** are named after their husbands (Col. C.E. Boswell, Rev. Montague Poole and Mr. Hurt). His mother-in-law, Henrietta Davy, is remembered by the naming of **Henrietta Point, Davy Island** and **Davy Rock** near Parry Sound and by **Davy Islands** in St. Joseph Channel. His own daughters, Avis and Sybil Stewart, are recalled by **Avis Ground** and **Sybil Island. Alfred Bank** may possibly be named after his wife's brother; **Caroline Island** and **Judd Island** are recorded as being named after Stewart's sisters. **'Place Names in Georgian Bay'** claims that **Hawkes Shoal** is named after a cousin of Mrs. W.J. Stewart, but my family records give no indication to whom this refers. It is rather ironic that **Clara Island**, (that is, the island named after his wife) has, since 1970, been officially approved as **Sanford Island**. Tables 1 and 2 summarize features definitely or possibly honouring Stewart's relatives.

The **'Bayfield'** - the ship that Boulton and Stewart used for all the Georgian Bay survey - is well remembered in geographical features named for its officers and crew as recorded in **'Place Names in Georgian Bay'**. Also **Edsall Bank** recalls the former name of the **'Bayfield'** itself. The Captain, Alexander Murray McGregor (1828-1903+), is remembered through such names as: **Alexander Passage, Murray Point, Murray Rocks, McGregor Bay, McGregor Bank** and **McGregor Island**. The pilot's name was Tranch, so we have a **Tranch Rock** in two different locations. The engineers are recorded on charts with **Baker Rocks, Linter Island, Linter Rock, Nisbet Rock** and **Nisbet Island**. The hydrographer in charge, Cdr. J.G. Boulton, seems only to be remembered once - in **Boulton Reef**. His assistants, D. Colin Campbell and W.J. Stewart, are more frequently honoured: **Colin Rock, Campbell Rock, Stewart Island, Stewart Rock** and **Stewart Patch**. Of the crew, John McNeil, the coxswain, is acknowledged in **John Ledge** and **McNeil Ledge**. We know of features named for 25 boatmen - the men who rowed the cutters each day to take the soundings.

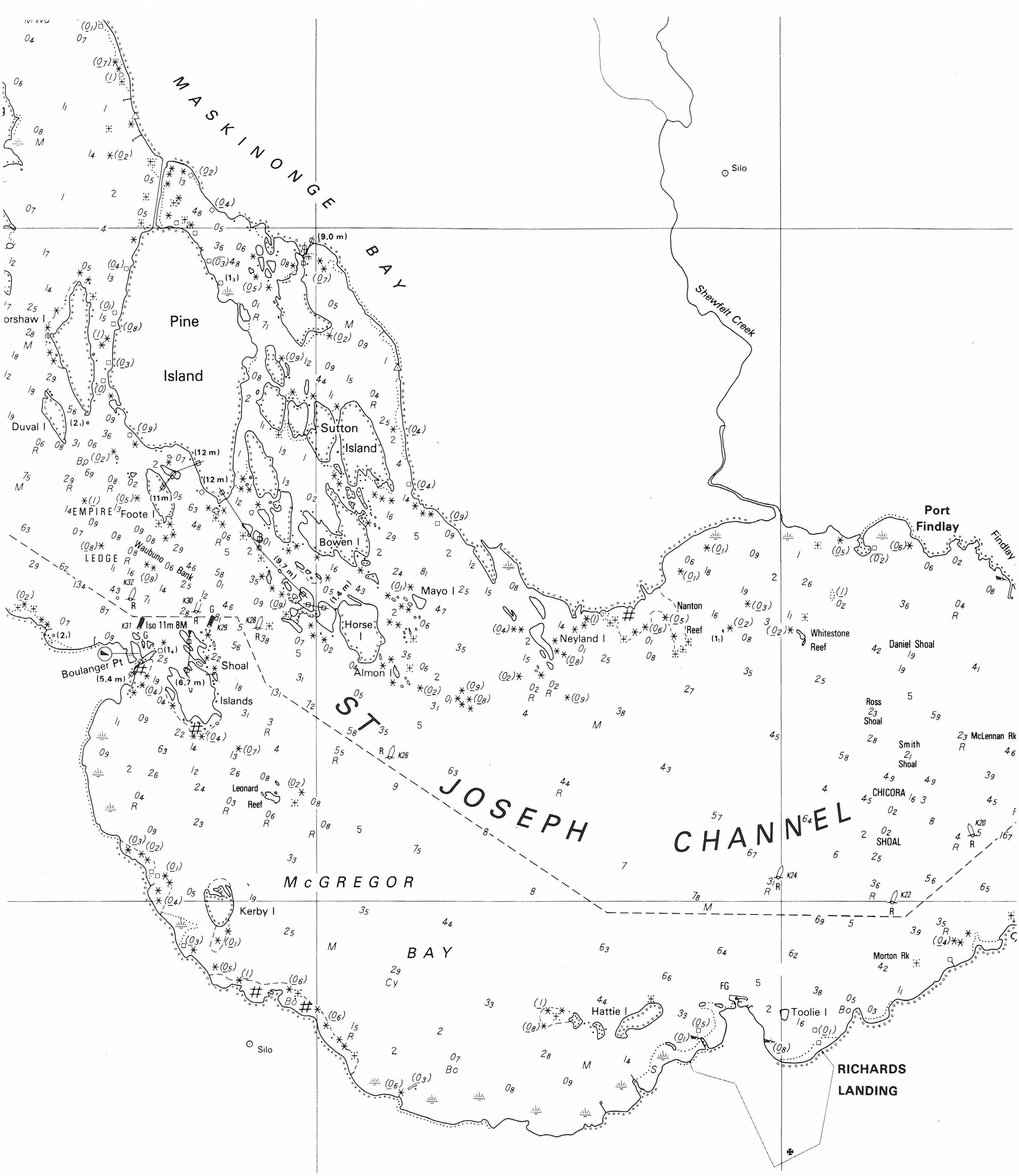

Figure 2:
Part of Canadian Hydrographic Service Chart 2250, showing features in St. Joseph Channel, Lake Huron, named for the crew of the 'Bayfield' (McGregor Bay) and Stewart's RMC colleagues (Almon Island, Bowen Island, Daniel Shoal, Duval Island, Forshaw Island, Kerby Island, Leonard Reef, Mayo Island, Neyland Island and Ross Shoal)

Obviously, there was a large turnover of boatmen through the years as probably only eight would have been on the **'Bayfield'** at any one time. The stewards **(Chatwin Rock, Leo Rock, Moreland Bank)**, the waiter **(Fagan Ground)** and the cook **(Vivian Rocks)** are all honoured. There are also nine crew members with features named for them. Table 3 provides an alphabetical listing of features in Georgian Bay which were named by W.J. Stewart in honour of crew members of the **'Bayfield'**. Two questions remain to be answered:

1. why were no features named for the mates, and
2. has any other ship had so many of its crew honoured by geographical names.

There were 23 graduates from Royal Military College in 1883, W.J. Stewart and D.C. Campbell being two who joined the Georgian Bay Survey. Most of their classmates, some professors and earlier graduates are remembered by geographical names - mostly for features in St. Joseph Channel. Starting at the west end is **Sankey Island**, named for Major Sankey, Professor of Military Engineering. Side by side are **Duval Island** and **Forshaw Island**, also named for professors, the latter for Forshaw Day, Professor of Drawing. **Bowen Island** is named after Major Bowen W.S. Van Straubenzie, South Wales Borderers. **Almon Island** honours M.B. Almon, C.E., and **Leonard Reef** honours Major R.W. Leonard, Chairman, National Transcontinental Railway. Nearby is **Kerby Island** which is named after Forbes M. Kerby, C.E., of Grand Forks, B.C. **Mayo Island** and **Neyland Island** are named after Mayo W. Neyland. Next is **Nanton Reef** which honours Lt. Col. H.C. Nanton, R.E. **Daniel Shoal** is named after Rev. A.W. Daniel who graduated in 1881, and **Ross Shoal** after A.B. Ross who graduated in 1880. **Twyning Island**, after Lt. Col. P.G. Twyning, R.E., is now part of the road connection to St. Joseph Island. **Weller Island** is named after J.L. Weller, Superintending Engineer of the Welland Canal. (**Port Weller** is also named after him.) **Kensington Point** commemorates Col. Kensington, Professor of Mathematics at RMC. **Wurtele Point** is named after Lt. Col. E.F. Wurtele who, according to White, was a graduate of RMC in 1882. Near the west entrance of Portlock Harbour are **Lambe Islands**, honouring Lawrence M. Lambe, Invertebrate Palaeontologist with the Geological Survey. Down the harbour is **Joly Rock** named for Lt. Col. Alain Joly de Lotbiniere, and near the south entrance to the harbour is **Woodman Point**, named after John Woodman, C.E., of Winnipeg. Tables 4 and 5 summarize Stewart's geographical names which either definitely or possibly honour his RMC colleagues.

TABLE 3: Geographical names honouring the crew of the 'Bayfield'

Features	Coordinates	Person honoured	Duty on 'Bayfield'
Alexander Passage	46° 38' - 80° 34'	Alexander Murray McGregor (q.v.)	captain
Alwin Rock	45° 53' - 80° 46'	————————	seaman
Baker Rocks	45° 33' - 80° 30'	————————	engineer
Barrett Bank	46° 08' - 83° 25'	————————	boatman
Ben Back Shoal	45° 41' - 81° 18'	————————	one of the crew
Boulton Reef	45° 54' - 81° 51'	Staff Cdr. John George Boulton, R.N. (1842-1929)	hydrographer-in-charge
Bray Reef	45° 52' - 80° 49'	————————	seaman
Cadotte Point	45° 19' - 80° 07'	————————	boatman
Callady Rock	45° 28' - 80° 25'	————————	boatman
Campbell Rock	45° 15' - 80° 14'	Donald Colin Campbell, RMC graduate, 1883	hydrographic assistant
Chatwin Rock	46° 05' - 82° 05'	————————	steward
Colin Rock	45° 28' - 80° 31'	D.C. Campbell (q.v.)	hydrographic assistant
Doyle Rock	45° 49' - 81° 38'	————————	one of the crew
Duett Rock	45° 26' - 80° 24'	————————	boatman
Eagor Bank(not approved)	Muskoka	————————	boatman
Edsall Bank	45° 49' - 80° 52'	previous name for 'Bayfield'	
Fagan Ground (Shoal Bank)	45° 23' - 81° 48'	————————	waiter
Flummerfelt Patch (Shoal)	45° 22' - 81° 32'	————————	fireman
Hall Shoal	46° 18' - 84° 00'	————————	one of the crew
Harrison Bank	45° 25' - 80° 26'	————————	boatman
Hood Island (not approved)	North Channel	————————	boatman
Horne Rock	46° 08' - 83° 21'	————————	boatman
John Ledge	45° 51' - 81° 38'	John McNeil (q.v.)	coxswain
Keegan Rock	45° 27' - 80° 24'	————————	boatman
Leo Rock	46° 08' - 83° 19'	————————	steward
Linter Island	46° 06' - 82° 10'	————————	Chief Engineer 1886
Linter Rock	45° 57' - 81° 34'	————————	Chief Engineer 1886

TABLE 3 (continued): Geographical names honouring the crew of the 'Bayfield'

Features	Coordinates	Person honoured	Duty on 'Bayfield'
McCormick Island	45° 28' - 80° 25'	———————	boatman
McGregor Bank	45° 54' - 81° 51'	Alexander Murray McGregor (1828-1903+)	captain
McGregor Bay	46° 05' - 81° 40'	ditto	ditto
McGregor Bay	46° 18' - 84° 04'	ditto	ditto
McGregor Island	46° 05' - 81° 36'	ditto	ditto
McGregor Rock	45° 31' - 80° 24'	ditto	ditto
McKinnon Rock	46° 19' - 84° 00'	———————	boatman
McLean Shoal	45° 55' - 80° 55'	———————	boatman
McNeil Ledge	45° 43' - 81° 15'	John McNeil	coxswain
McRae Patch (Shoal)	45° 57' - 82° 12'	———————	one of the crew
McRae Rock	46° 05' - 82° 04'	———————	ditto
Martin Reef	45° 57' - 82° 14'	———————	crewman who lived in Mudge Bay
Matheson Island	46° 05' - 82° 05'	———————	boatman
Matheson Shoal	45° 51' - 81° 25'	———————	ditto
Mercer Rocks	45° 07' - 80° 09'	———————	boatman
Milligan Rock	45° 41' - 81° 16'	———————	boatman
Milo Rock	45° 26' - 80° 25'	———————	boatman
Miner Rocks	45° 26' - 80° 23'	———————	one of the crew
Moorhouse Patch (Shoal)	45° 25' - 81° 44'	———————	boatman
Moreland Bank	45° 55' - 81° 15'	———————	steward
Murray Point	45° 24' - 80° 05'	Alexander Murray McGregor (q.v.)	captain
Murray Rocks	45° 52' - 80° 48'	ditto	ditto
Newburn Rock	45° 27' - 80° 24'	———————	boatman
Nisbet Rock	46° 05' - 82° 03'	———————	Chief Engineer
Nisbet Island	48° 09' - 89° 19'	———————	ditto
O'Donnell Island	46° 08' - 83° 47'	———————	boatman
O'Donnell Bank	46° 08' - 83° 46'	———————	ditto
Pat Howe Patch (Shoal)	45° 47' - 81° 26'	———————	boatman
Patterson Point	46° 07' - 82° 16'	———————	boatman
Pease Rock	45° 27' - 80° 25'	———————	boatman
Riley Patch (Shoal)	45° 42' - 81° 19'	———————	boatman
Sam Smith Rock	46° 10' - 83° 38'	———————	boatman
Smith Bay	45° 49' - 81° 38'	———————	boatman
Sutherland Shoal	45° 58' - 82° 16'	———————	boatman
Tranch Rock	45° 23' - 80° 08'	———————	pilot
Tranch Rock	45° 40' - 81° 20'	———————	ditto
Vivian Rocks	45° 31' - 80° 29'	———————	cook

Elsewhere in the North Channel, we have **Benson Point** and **Thomas Island,** both named after Col. Thomas Benson. Fathers of three RMC graduates are recalled through names on charts: **Casgrain Rock**, after P.B. Casgrain, M.P.; **Strange Bay** and **Strange Point**, after Maj. Gen. Thomas Bland Strange, who commanded the Alberta field force in the Riel Rebellion; and **Straubenzie Point** and **Straubenzie Reef**, after Lt. Col. B.W.S. Van Straubenzie, Commander of the Infantry Brigade at the Battle of Batoche, 1885. There are also **Hewett Shoal** and **Oliver Rock**, named after Commandants of RMC. Major Rigg of RMC is honoured by **Rigg Rock** in the Pointe au Baril area. **Stairs Island**, in the same area, is named after Capt. W.G. Stairs, who accompanied Stanley in Africa. James White, the author of **Place Names in Georgian Bay** also graduated in 1883, and is probably honoured with White Island. By 1913, James White was Chief Geographer, Department of the Interior. Was he too modest to include his own name in his treatise on the origin of geographical names? I think so!

As mentioned earlier, there are other naming themes that could be traced from **Place Names in Georgian Bay**. There are features named for politicians - the men who controlled the purse-strings of the newly founded organization. There are names honouring members of the clergy as well as individuals involved in the Riel Rebellion of 1885. It is hard to say whether those geographical names can be attributed to Stewart, rather than Boulton, so they have been excluded from this study.

Since the recording of reasons for naming geographical features was often very lax a century ago, the modern researcher is left with many names of unknown origin. At that time, no authority existed in Canada to formalize geographical names, and no rules prevented surveyors from selecting any names they wished, to identify features on maps and

TABLE 4: Geographical names honouring RMC colleagues

Features	Coordinates	Person honoured	RMC graduation date
Almon Island	46° 19' - 84° 04'	M.B. Almon, C.E.	1883
Benson Point	45° 36' - 81° 54'	Col. Thomas Benson Master-General of the Ordnance, Ottawa	1883
Bowen Island	46° 19' - 84° 04'	Bowen W.S. Van Straubenzie	1883
Campbell Rock	45° 50' - 81° 33'	Donald Colin Campbell Hydrographic assistant	1883
Casgrain Rock	46° 11' - 82° 28'	P.B. Casgrain, lawyer in Quebec and M.P., the father of P.H. DuP. Casgrain, RMC graduate in 1883	
Colin Rock	45° 28' - 80° 31'	D.C. Campbell (q.v.)	1883
Daniel Shoal	46° 19' - 84° 01'	Rev. A.W. Daniel, Rothesay, N.B.	1881
Doucet Rock	46° 08' - 82° 51'	Emile Doucet, C.E. District Engineer, National Transcontinental Ry.	1880
Duval Island	46° 19' - 84° 05'	Prof. Duval, RMC	
Forshaw Island	46° 20' - 84° 05'	Prof. Forshaw Day, Professor of Drawing, RMC	
Forshaw Island	45° 26' - 80° 21'	ditto	
Freer Point	45° 57' - 82° 04'	Capt. H.C. Freer, South Staffordshire Reg't.	1880
Hensley Bay	45° 48' - 82° 48'	Capt. C.A. Hensley, Royal Dublin Fusiliers	?
Hewett Shoal	46° 04' - 82° 04'	Gen. Hewett, Commandant, RMC	
Joly Rock	46° 20' - 83° 53'	Lt. Col. Alain Joly de Lotbiniere	1883
Kensington Point	46° 19' - 83° 57'	Col. Kensington, Professor of Mathematics, RMC	
Kerby Island	46° 18' - 84° 05'	Forbes M. Kerby, C.E., Grand Forks, B.C	1883
Lambe Islands	46° 20' - 83° 54'	Lawrence M. Lambe, Invertebrate Palaeontologist, Geological Survey	1883
Leonard Reef	46° 18' - 84° 04'	Major R.W. Leonard, Chairman, National Transcontinental Rwy.	1883
Mayo Island	46° 19' - 84° 04'	Mayo W. Neyland (q.v.)	1883
Nanton Reef	46° 19' - 84° 03'	Lt. Col. H.C. Nanton, R.E.	1883
Neyland Island	46° 19' - 84° 03'	Mayo W. Neyland	1883
Oliver Rock	46° 04' - 81° 56'	Maj. Gen. J.R. Oliver, Commandant, RMC	
Rigg Rock	45° 32' - 80° 26'	Major Rigg, RMC	
Ross Shoal	46° 18' - 84° 02'	A.B. Ross	1880
Sankey Island	46° 21' - 84° 06'	Major Sankey, Professor of Military Engineering	
Sapper Island	46° 19' - 83° 58'	A graduate of RMC (a 'sapper' is the common term for an engineer)	
Stairs Island	45° 32' - 80° 26'	Capt. W.G. Stairs. He accompanied Stanley through Africa	1882
Strange Bay	46° 01' - 82° 04'	Maj. Gen. Thomas Bland Strange, commanded Alberta field force in Riel Rebellion. Father of H.B. Strange, RMC graduate in 1883	
Strange Point	46° 01' - 82° 04'	ditto	
Straubenzie Point	46° 00' - 82° 04'	Lt. Col. Bowen W.S. Van Straubenzie (b. 1829), commanded the Infantry Brigade at the Battle of Batoche, 1885. Father of Bowen W.S. Van Straubenzie, RMC graduate in 1883 (see Bowen Island)	
Straubenzie Reef	46° 00' - 82° 05'	ditto	
Thomas Island	46° 11' - 82° 26'	Col. Thomas Benson (q.v.)	1883
Twyning Island	46° 19' - 83° 59'	Lt. Col. P.G. Twyning, R.E.	1883
Weller Islands	46° 19' - 83° 58'	J.L. Weller, Superintending Engineer, Welland Canal	1883
Woodman Point	46° 18' - 83° 52'	John Woodman, C.E., Winnipeg	1883
Wurtele Point	46° 19' - 83° 53'	Lt. Col. E.F. Wurtele	1882

TABLE 5: Geographical names possibly named after RMC colleagues

Features	Coordinates	Person honoured	RMC graduation date
Davidson Point	44° 47' - 79° 57'	R. Davidson	1884
Smith Island	46° 12' - 82° 39'	E.O. Smith	1884
Smith Point	45° 52' - 83° 29'	ditto	
Smith Shoal	46° 18' - 84° 02'	ditto	
White Island	46° 10' - 82° 33'	James White, Geographer, Dept. of the Interior	1883
Wood Island	45° 03' - 80° 01'	Z.T. Wood	1882

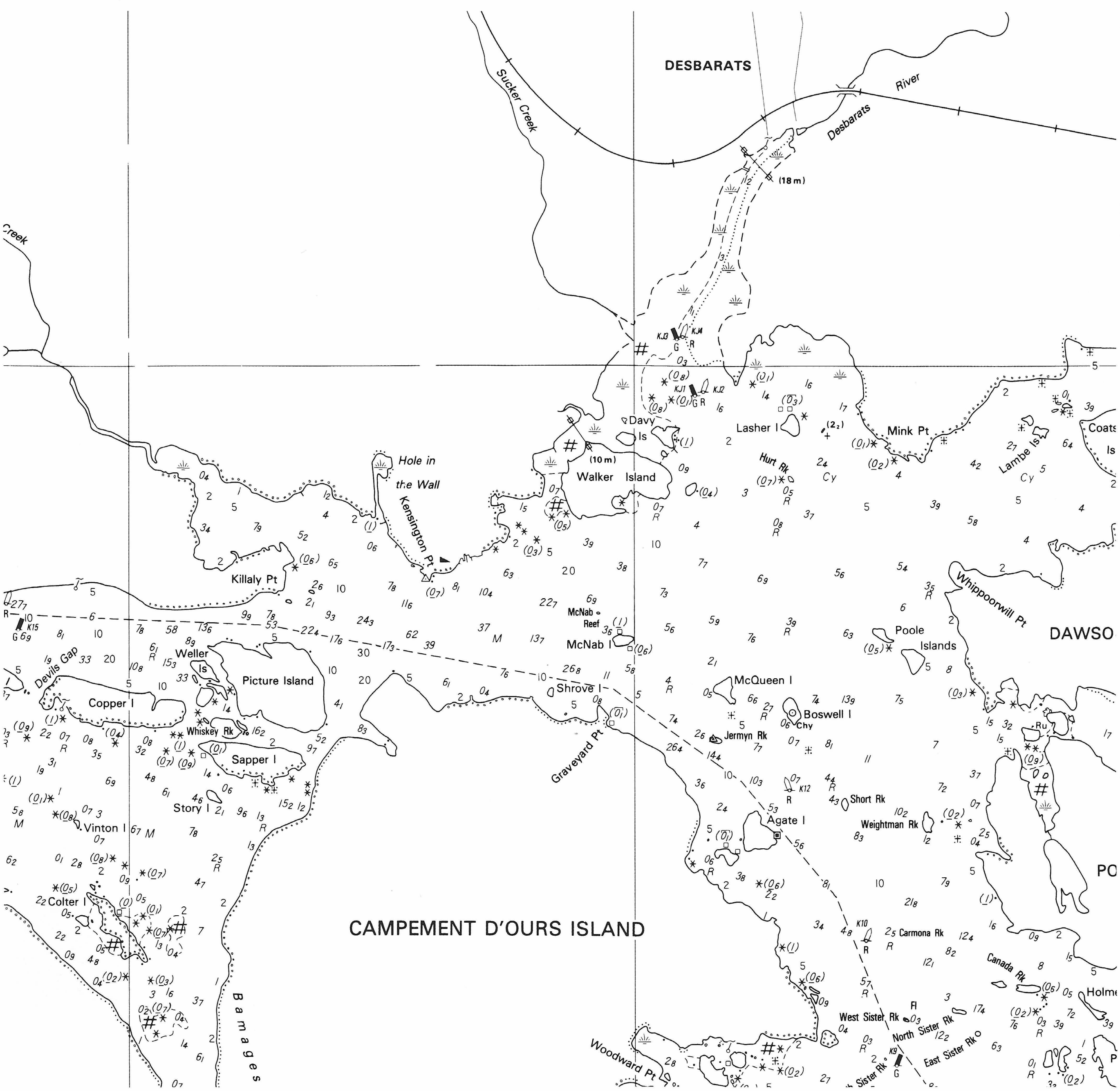

Figure 3:
A more easterly part of Canadian Hydrographic Service Chart 2250, showing features in St. Joseph Channel, Lake Huron, named for members of Stewart's extended family (Boswell Island, Hurt Rock, Lasher Island, Poole Islands and Davy Islands) and for his RMC colleagues (Kensington Point, Lambe Islands, Sapper Island, and Weller Islands)

charts they were preparing for publication. As living relatives were often honoured, it is possible from genealogical records to provide information which, in some instances, will help to solve some of these outstanding questions.

Acknowledgement
Thanks are extended to Peter C. Fortier, Registrar at Royal Military College, Kingston, for providing the much needed information about the student records of W.J. Stewart and his classmates, without which this article would have little substance.

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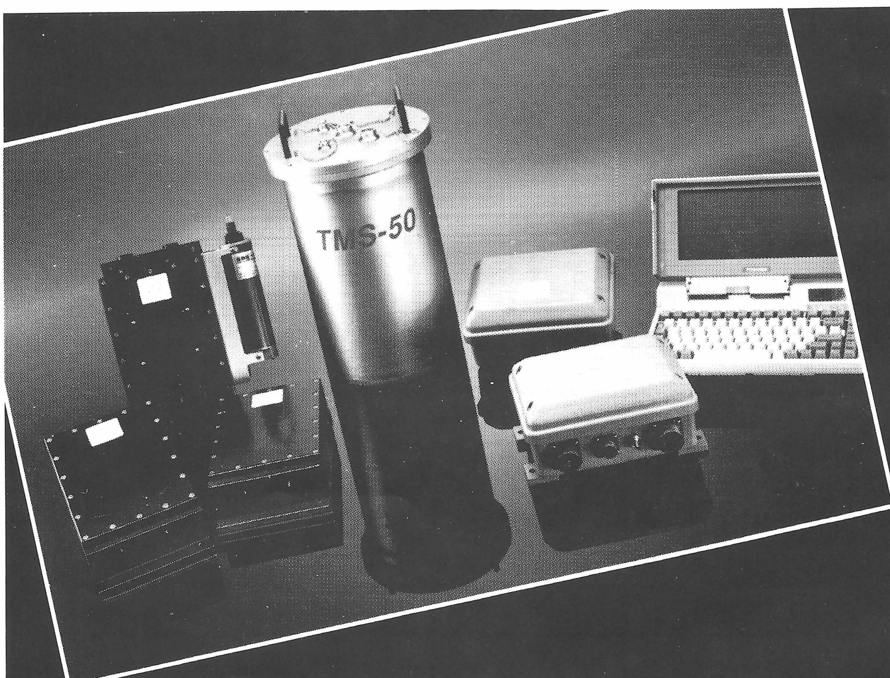

Nautical Chart Production Using Digital Data and Interactive Compilation

by
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K. R. Holman, D. M. Jackson and S. R. Oraas

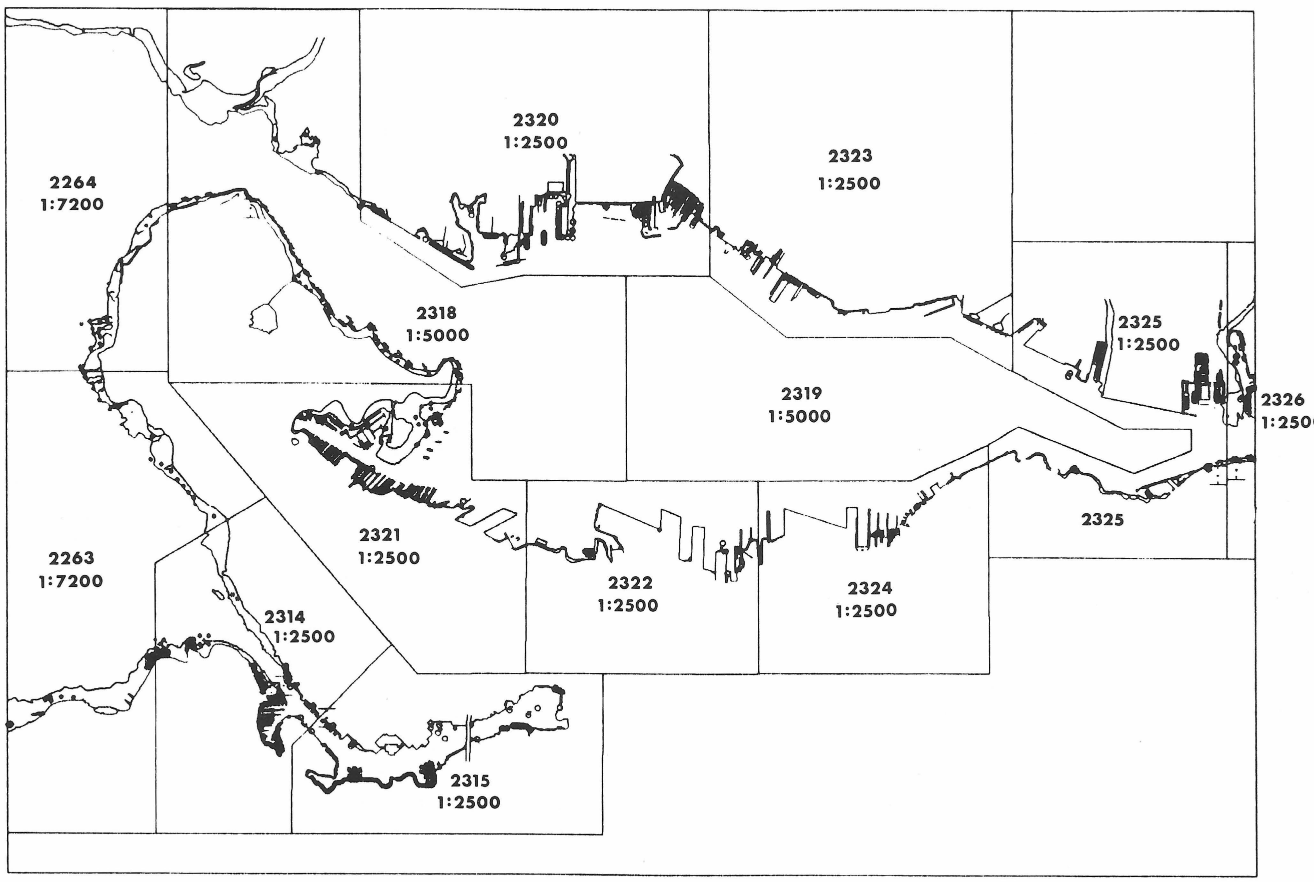

Figure 1: Data Sources for Chart 3493

Introduction

The Canadian Hydrographic Service (CHS) has a mandate to produce nautical charts for all the navigable waters of Canada. In 1967, the CHS began to use computers in data acquisition and chart production processes. However, the actual chart production process presently involves a mix of both analog and digital techniques, which leads to a number of inefficiencies.

Pacific Region of the CHS recently began a project to produce a chart using predominantly digital techniques. The area chosen for this development project was Vancouver Harbour, which was recently surveyed, with an output product of 11 digital field sheets. The intent is to produce chart 3493 directly from these digital data, without going to analog form and having to re-digitize.

Source Data

The survey of Vancouver Harbour in 1987 was accomplished using two main systems. Data acquisition and initial processing were performed using the Integrated System for Automated Hydrography (ISAH). ISAH is produced by Quester Tangent Corporation. The system performs hydrographic data logging and processing using a Motorola 68000 chip under Unix. The final products of the survey, eleven field sheets, were constructed using the Computer Aided Resource Information System (CARIS). CARIS is a powerful computer graphics system produced by Universal Systems Limited. This system is presently being used by the CHS for both field work and chart production.

The Vancouver Harbour survey was very successful. Approximately three million soundings were logged and processed to produce eleven field sheets containing over 300,000 soundings. Seven of these sheets are at a scale of 1:2,500 and the rest are at a scale of 1:5,000. Since CHS, Pacific Region, still considers the plotted field sheet to be the official product of the survey, mylar sheets were produced directly from the digital files. It is not within the scope of this paper to give further details on this survey, since other papers on the subject have already been published. Interested persons should refer to "An Automated Survey of Vancouver Harbour" by A. R. Raymond and R. W. Sandilands [1].

Of the thirteen field sheets which were the major hydrographic data source for chart 3493, nine were supplied by this digital survey. The remaining four field sheets required for the chart were in analog form only, and had to be digitized to provide a complete digital hydrographic data set. Two of these field sheets, covering False Creek and approaches, were surveyed in 1985 at a scale of 1:2,500. The other two sheets, covering the remaining portion of English Bay and the approaches to First Narrows, were surveyed in 1963 at a scale of 1:7,200. The sources for chart 3493 are shown in figure 1.

The four field sheets not already in digital form were digitized using standard CHS digitizing procedures [2]. First, a photographic negative of the original plot was made, and from this a blue line on scribe coat was produced. This was then placed on the digitizing table, and after a suitable wait for climatic adjustment, the data were digitized.

Three problems were encountered during the digitizing process. First, every item of data had to be assigned a feature code which allowed the computer to recognize different features. These feature codes were originally developed for chart production and not for field sheets. Thus a number of situations arose where a suitable feature code for certain data items was not available. These features were digitized using available codes which produced an acceptable visual presentation, but was nevertheless incorrect. This procedure was a potential source of problems if data were manipulated using feature codes as a key.

A second problem was the sheer volume of data that had to be digitized. Field sheet 2315L, portraying the eastern half of False Creek, covered only about 60 square centimeters of area on the final chart. However, the field sheet contained over 9,300 soundings which had to be digitized one by one. This was a very tedious and exacting procedure as extreme care had to be maintained throughout to ensure accurate positioning of soundings of correct value.

Once digitizing was completed, each digital field sheet was edited interactively. Field sheet files were then individually plotted at their original scale and submitted to the Quality Control section for checking. Once again this proved to be a tedious process requiring each and every sounding to be verified as well as all the other data. Mistakes made during the digitizing process were fortunately few, and these were quickly corrected.

A third problem arose because the two older field sheets that were digitized potrayed imperial units of measurement, with soundings shown in fathoms and feet to 11 fathoms, and in whole fathoms in deeper water. In addition, elevations were shown in feet. Conversion to metres, to agree with other field sheets, was carried out after the checking process had verified the quality of the digital data, and after files had been converted to CARIS. CARIS stores all depth and height values in millimetres and displays these values in any chosen unit of measurement. While conversion from imperial source to metric product seemed easy, it soon became clear that this conversion did not distinguish between soundings in fathoms and elevations in feet. Similarly the fact that depths deeper than 11 fathoms were rounded off to whole fathom values on the field sheet and thus required a different conversion, was not recognized by the system. Fortunately the number of elevations and soundings deeper than 11 fathoms was not great, and correct values were entered individually using the CARIS editing system. However, there is an obvious need for a conversion program that can handle the many different situations that are encountered on a wide variety of field sheets. Metric contours were developed by hand on a plot of metric soundings and then digitized. This again highlighted an obvious need for a contouring package suitable for hydrographic (that is, shoal-biased) applications.

Chart Production

Although this was the first interactive compilation project undertaken in Pacific Region, other Regions of the CHS have participated in projects of this nature. In particular, the production of the Belleville Harbour chart by CHS Ottawa [5] and the Foxe Basin chart by CHS Atlantic Region [4] have provided invaluable insights into the project.

Production of the chart began by combining all data sources into one large file, at the projection and scale (1:10,000) of the chart. MOSAIC, one of the CARIS modules, was used to do this. Windowing the data to the limits of the chart occurred at the same time. Although basically a simple operation, this process was slowed down by the size of the files . The resulting file was about 10 Mbytes in size, containing 120,000 soundings as well as all the other field sheet data. In fact, the size of this file made all subsequent processing operations proceed rather slowly.

The next step was to join all the lines across field sheet boundaries, using the CARIS command "JOIN EDGES". This procedure would normally have been a very tedious and time-consuming job to do interactively, but the CARIS command made it easy. The entire file took about 30 minutes to process and the software did a generally good job, with only a few lines requiring interactive joining. The manually digitized sheets required more interactive line joining than the other digital sheets.

Interactive compilation then began with on-screen manipulation of data using a CARIS workstation. This process was carried out to remove data that appear on field sheets but are not used on charts, and to deal with excess data produced by reducing data from field sheet scale to chart scale. There were several ways in which this was achieved.

First, some types of data were eliminated completely, a good example being text. Much of the text appearing on field sheets, such as title and control point information, does not appear on the printed chart and therefore has to be deleted. In addition, the text that does appear on the final chart is different in content, size, style, spacing and position, and has to be re-entered.

Second, the reduction of scale, in some cases from 1:2,500 to 1:10,000, required generalization by selecting certain features to represent many which had become too congested. A good example in this case was bottom samples. The selection procedure requires that all the original data be assessed by the cartographer and that items be selectively deleted until a suitable density for final chart portrayal is reached.

The third technique used for interactive compilation was to redraw certain features using a reduced number of points. A good example is the abundance of floats at many marinas along the shores of Vancouver Harbour. On the field sheets, these floats are portrayed as two parallel lines. At chart scale, these lines were too close together and were, in many cases, touching. The two lines were replaced by a single, slightly thicker, line which produced a much clearer presentation.

On a chart portraying an area as complex as Vancouver Harbour, and with the high 4:1 reduction factor, a lot of work was necessary to interactively produce chart data from field sheet data. In a number of cases this workload could have been significantly reduced if the original digital field sheet data had been produced with interactive compilation in mind. For example, if all the information not used by cartography was coded differently from the information that is used, the unwanted data could be eliminated as a group rather than item by item. Interactive compilation places different demands on field sheets. The portrayal and coding of field data needs to be examined to better support interactive compilation and to fully exploit its potential.

Sounding Selection

The next step in the production of a chart is sounding selection. However, the problem of overplotted soundings is quite acute in the case of a 4:1 reduction in scale. When all the soundings are plotted at chart scale, the overplot is so severe that individual depths cannot be distinguished. On the other hand, if the soundings are plotted at a reduced feature size, a magnifying glass is required to read them. Figure 2 shows a portion of all the depth data for one small area of chart 3493. Note the area which includes data from a field sheet at 1:2,500.

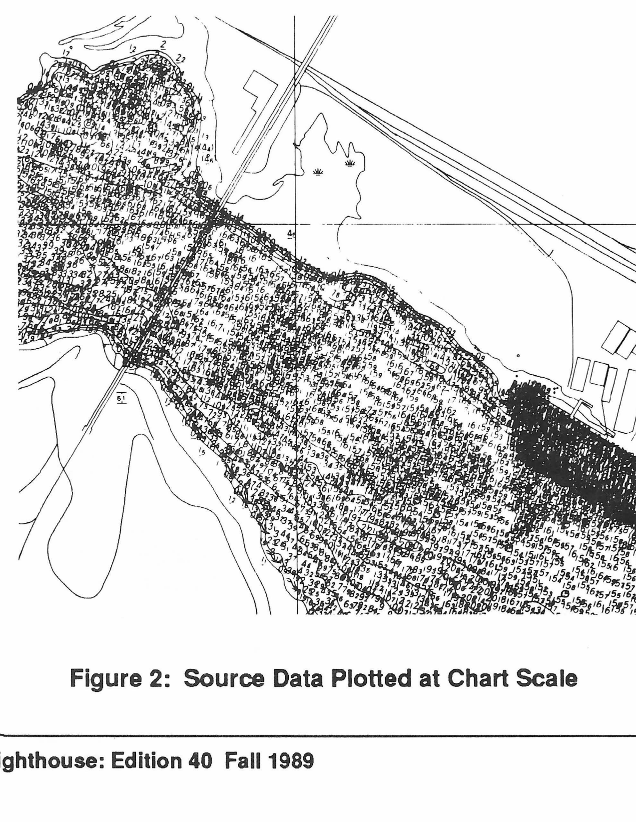

Figure 2: Source Data Plotted at Chart Scale

In past years it was felt that a totally automated sounding selection algorithm would soon be developed to resolve this problem, but it is now believed that some manual intervention will be required, at least for the foreseeable future. The method we chose was to use the computer to reduce the data to a manageable subset, and then to make an interactive selection from that subset. This process made the selection easier, and also allowed Quality Control to use a plot to check the final selection.

The sounding "thinning" algorithm was a modification of the standard sounding overplot removal software used for years by field hydrography at CHS, Pacific Region. The basic algorithm used was the "Carillo-Doakes" algorithm, as described by Macdonald [3]. Since it has been in use for so long, its characteristics are well known as they pertain to field hydrography, however its use in cartography is less well defined.

Two modifications were made to this procedure for digital compilation purposes. First, deeps could be selected instead of shoals if the soundings were sorted with the deepest depth first, rather than the shoalest first. The CARIS software used for interactive editing has the capability of storing the complete set of soundings (including non-selected ones), and having some soundings flagged as "shoal" and others flagged as "deep". This allowed maximum flexibility in displaying and selecting soundings on the screen.

The second modification made was to allow the spacing between the selected soundings to be varied. This was done by varying the sizes of the covering rectangles by adding margins around them, based on a percentage of the height of the sounding digits. By this means we were able to select soundings that were very widely spaced.

In the first attempt to apply this to chart 3493, a dense shoal-biased selection was performed, followed by a sparse deep-biased selection. The reasoning behind this was that most soundings on charts are shoal-biased. Only in special circumstances, such as in narrow channels, are deeps used. A plot was made and submitted to Quality Control for checking against reductions of the analog field sheets. The following shortcomings of the plot were noted:

1. Gaps, or blank areas, were found where it appeared that one or more soundings could fit. These were caused by the order in which the soundings were selected, and an examination of these gaps revealed that there were no shoaler soundings within them. Although the computer selection was not as pleasing to the eye as a manual one, the selected shoal soundings were deemed to provide a suitable shoal-biased data set for chart production purposes (see figure 3).

2. The deep-biased selection was found to be inadequate. Contoured depressions did not always have the deepest depth selected (see figure 3) and there were insufficient depths in long, narrow channels (see figure 4). The problem was caused by the wide spacing between depths. Although not many deeps are required for a chart, a dense data set is needed for selection purposes.

To summarize, it was found that the shoal-biased selection was adequate, but the widely-spaced deep soundings did not provide an adequate set of data for the final selection.

It was then decided to use the overplot removal program to produce two sets of soundings. Both were dense sets, with closely spaced soundings, and one set was shoal-biased while the other was deep-biased. Two separate plots were made and submitted to Quality Control for checking. Figures 5 and 6 illustrate these plots. These data sets were found to be suitable for performing a manual selection.

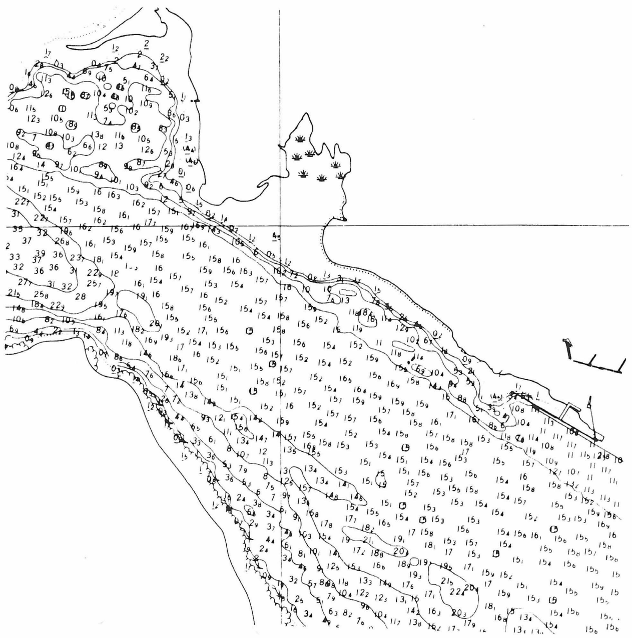

Figure 3: Chart Data with Overplot Removed. Shoals with 50% Margins and Deeps with 2000 % Margins

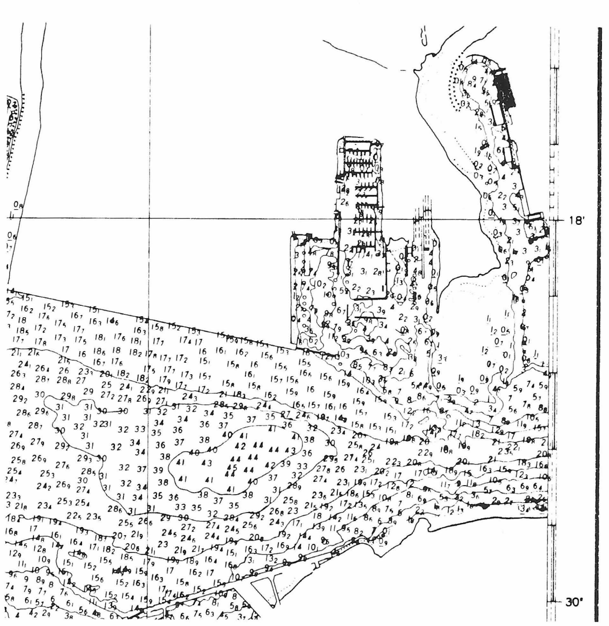

Figure 4: Data with Overplot Removed Illustrating Channel Problem

The sounding selection was done interactively from these two sets using CARIS. Since it was very difficult to judge the sounding spacing on a graphics screen, the cartographer first had to preselect and plot a small section of the chart. He then used that selection as a guide, to determine a suitable sounding spacing on the screen.

The selection was complete and ready for quality control checking, which was done using the two aforementioned plots.

Figure 5: Data with Overplot Removed, Shoals with No Margins

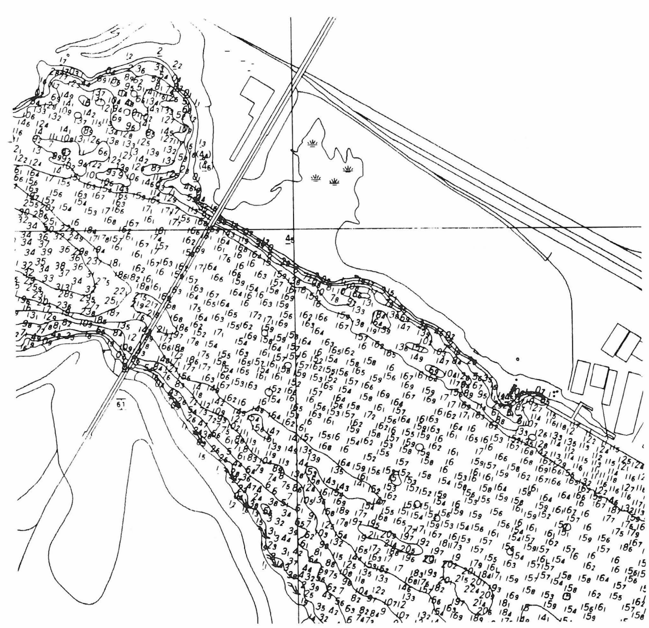

Figure 6: Data with Overplot Removed, Deeps with No Margins

Additional Features

In the case of chart 3493, contour development was not required, since the field sheets were already contoured. However, some contour generalization was necessary, and was done directly on the screen.

Many of the navigational aids were already present on the field sheets. Additional aids required for chart presentation were entered interactively using CARED. A plot file containing the border, coastline, and aids to navigation was sent to CHS Headquarters in Ottawa for plotting. This file was used as the official navigational aids copy.

Future Plans

Text will be added directly on the screen if possible. Previous versions of the CARIS software did not produce text of adequate quality for CHS charts. Tests will be conducted on current software, and the text will be entered interactively if sufficient quality is achieved. Otherwise, traditional typesetting methods will be used.

Place Names will be entered using batch mode in CARED. Crests, bar scales, compass roses, and so on will also be entered using the automated system, as recommended by Tremblay [5].

Recommendations

The major deficiencies found so far have to do with assigning feature codes. The codes were originally developed to meet the needs of cartography rather than hydrography, and no thought was given to the special problems of interactive compilation. There are two main problems here:

1. Some features which appear on field sheets have no counterpart on charts, and therefore have no assigned feature code.

2. Some operations in interactive compilation would be greatly simplified if the feature codes had been assigned differently. For example, Survey Standing Orders state that all pilings must be surveyed, but charts display only those which are significant to navigation. If pilings which are not significant to navigation could be coded differently, they could be deleted as a group.

A working group within the CHS has been established to address these problems.

Conclusions

In the last twenty years, the Canadian Hydrographic Service has invested a lot of resources to develop digital techniques for both data acquisition and chart production. However, the link between the two has been sadly neglected. With the recent decision by CHS, Pacific Region, to produce all field sheets in digital form, that link has been strengthened.

The CHS is currently developing several digital databases of hydrographic data, one for depths, one for navigational aids, and so on, with links between them. These databases will be implemented one at a time, in an evolutionary rather than revolutionary fashion. The data from them will be used for chart production, as well as for other purposes. In order to use these data effectively, techniques developed through projects such as this one will be important.

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Lighthouse Puzzler

by
B. Weller

Hardnose Hank, the Hydrographer-in-Charge of the survey party in Georgian Bay this past year, was of the old school: we should all go back to using sextants and leadlines. In fact Nelson did just fine with his quadrant! In a word, Hank didn't care much for new-fangled technology, nor for the new graduates of technical colleges and universities.

His first day with the survey, Bill, the newest hydrographer (fresh from the best technical college in Ontario), was sent out by Hank to establish and monument a station on a bleak windswept islet about ten miles offshore. He was told to give it a certain name.

Hank gave Bill a simple code using hydrographic words. Bill must solve the code and stamp this new station with the given name. Can you help him with his little difficulty?

1. YUJGV _ _ _ _ _
2. YUPJANJS _ _ _ _ _ _ _ _
3. RBGVK AGKPT _ _ _ _ _ _ _ _ _ _
4. YPVEWLUV _ _ _ _ _ _ _ _
5. MUYKUJ ZBGCWV _ _ _ _ _ _ _ _ _ _ _ _
6. AWOKB _ _ _ _ _
7. YBUGC _ _ _ _ _
8. HNWCA ZUVX _ _ _ _ _ _ _ _ _
9. YWQKGJK _ _ _ _ _ _ _
10. FWJNKB _ _ _ _ _ _
11. DPGAVGJK _ _ _ _ _ _ _ _

The station's name is: IGFF _ _ _ _

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Probability of Detecting Errors in Dense Digital Bathymetric Data Sets by Using 3D Graphics Combined with Statistical Techniques

by
H. Varma, H. Boudreau,
M. McConnel, M. O'Brien and A. Piccott

Introduction

Over the years, the science of hydrography has moved towards optimized recording, storage and retrieval of spatial data in the field. Due to the very large data volumes, the current processing techniques for data validation must be investigated for optimum efficiency and economy.

It is clear that large volumes of data increase data processing times significantly, but it is unclear which data-handling steps are affected the most, and what the trade-offs are between various data-handling techniques. The current techniques concerning methods of dealing with the data volume problem, particularly large volumes of SWEEP and SWATH data, are not well developed. The idea of thinning the data set to speed up processing time and reduce data storage, causes a major problem in utilizing statistical techniques in validation. This results in a net slowdown of the overall process. Significant to the analysis of this problem are the concepts of data density and data determination, and the question of which data-handling steps are density-dependent and which are density-independent.

Apparent savings in data storage have been offset by increased processing time in data reduction (overplot removal, figures 1, 2, 3) and cleaning operations (where all the "non-data" points must be examined and discarded).

There is a general failure to appreciate the amount of data that is being collected by survey vessels today. It is in the order of half a million to a million data points a day. This has led the

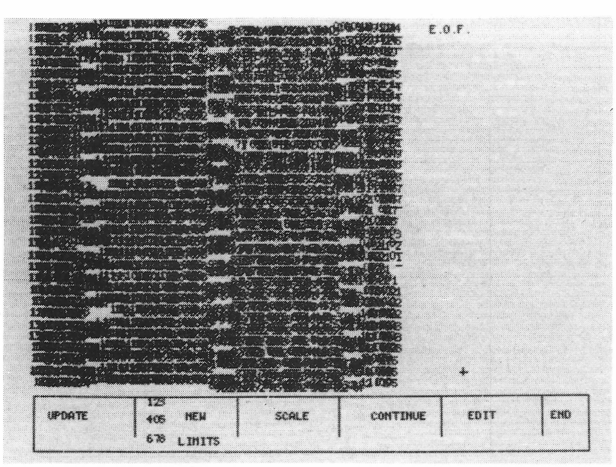


Figure 1: Dense Data Set Obtained From Sweep

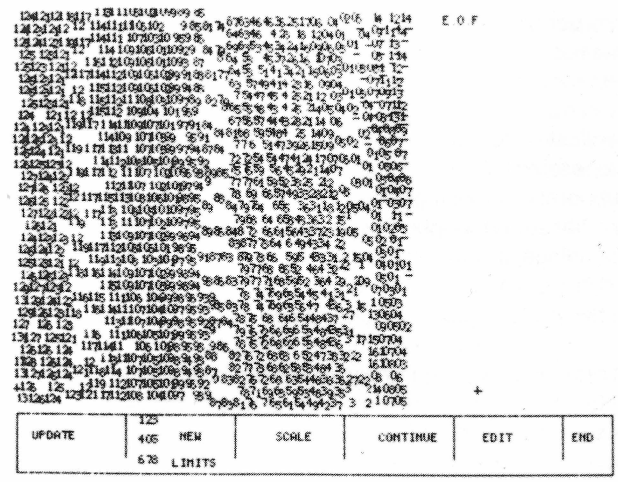


Figure 2: Overplot Removed

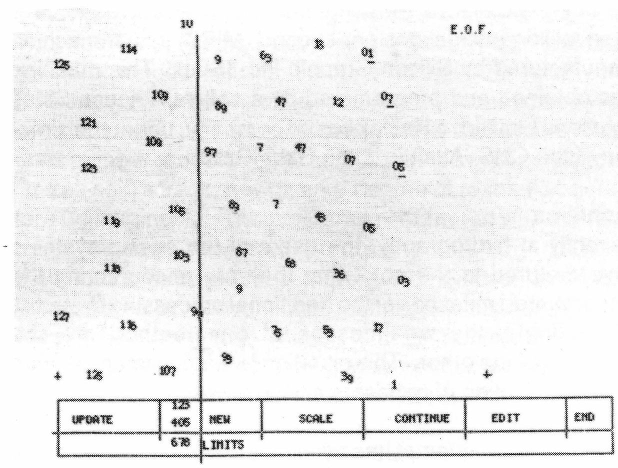


Figure 3: Thinned Data Set

Canadian Hydrographic Service (CHS), Atlantic, Data Base Group to investigate and evaluate newer technologies and image analysis techniques to properly validate this rapidly growing information base.

Workstations

Recently, the workstation revolution, combined with the associated proliferation of supercomputers and near supercomputers into the academic and industrial workplaces, has given rise to a rapid and dramatic revolution in the practice and utilization of scientific visualization.

During the last ten years there have been several major technical breakthroughs in computer design. These have dramatically reduced the cost of computing and significantly increased the potential for handling massive spatial data sets in an efficient fashion. The prices of many specialized peripheral units have dropped more than an order of magnitude in this period. These factors present today's users with a pattern of hardware availability which scarcely resembles the situation of a few years ago.

Due to the immense volume of the data obtained, the current high-tech collection methodologies have created a demand for powerful and efficient visual presentation methods. The hydrographic data collected today are presently being thinned at the collection level, for example, by the depth preprocessor (DPP) in the current hydrographic SWEEP system. This is being done in order to use antiquated verification techniques. But instead of speeding up the total processing time, it has created a problem with validation. The supporting soundings, on which sound statistical decisions are based, no longer exist to give credence to the selected soundings, as they have been removed by the DPP. This has led to great delays in data processing, sometimes in the order of five days of processing for every one day of logging.

In order to use image analysis and statistical techniques, the data set should contain millions of numerical values. However, there is no hope of digesting such large data sets, of finding their essential features or exposing their hidden details, without the application of high-resolution, high-speed computer-based visualization tools.

For our evaluation, a Personal Iris computer was used. It is a ten million Instructions per second (MIPS) scalar machine manufactured by Silicon Graphic Inc. (SGI). This machine was obtained and programmed by a software house Sirius Solutions Limited, a Halifax based company, under the direction of the CHS Atlantic, Data Base Group.

Problems

Recently in hydrography, the users of the sweep systems have matured to the point that they are encountering the fundamental limitations of the traditional processing systems. Interestingly, the weaknesses of one method are the strengths of the other. This situation is leading to an obvious cross-fertilization of concepts and systems.

In this paper, an attempt has been made to concentrate on the problem of developing techniques for displaying and analyzing hydrographic data with the intent of isolating peculiar features. The development of the methods described in this paper was motivated by practical experience, which revealed the inadequacy of customary methods of data validation and processing.

Clearly, efficient data handling is important, and significant improvements in efficiency can be realized by improving traditional methodology. This requirement forced the Data Base Group to look at the tools themselves, the manner in which they worked and the ways in which they were being used in hydrography. The technique presently being utilized by the CHS for data validation is the traditional method of plotting information after overplot removal, contouring it and then visually examining the plot for anomalies (which are identified with the aid of a digitizing table). This method was adequate in the seventies when the data were not as dense as they are today.

One of the fundamental problems is the nature of soundings themselves. The errors always seem to be biased to the shallow since fish, kelp and aeration give false shallow echoes. For example, if a million soundings are collected with a typical 5 percent error, that would mean 50,000 soundings are in error. The interesting aspect of this phenomenon is that overplot removal is shallow biased and would literally select most of the 50,000 errors for portrayal. This causes the users to have a reduced confidence in the data, since all they see are errors. This would also cause problems in validating information if the majority of the plotted information consists of errors. This has led to multiple iterations in overplot removal and plotting in order to clean up the data. It appears that decreased processing efficiency was initially accepted in order to retain data structures and algorithms which imitate traditional pen and ink methods. Such reduced efficiencies should not be accepted when they lead to excessive resource expenditures.

Binning

Due to the very large data volumes, the data have to be processed in a manner that handles the data separately in bins. The two-dimensional digital data structures can be broadly classified as either topological or grid: each has different advantages for representing certain types of data and for supporting data processing operations. Topological data structures are ordered point sets; that is, isolated points, line segments (point pairs) and lists of points which outline geographical features. However, soundings are a true point set. Grid structures subdivide the area of interest by a rectangular mesh, with each grid cell corresponding to a bin of data points. The gridded systems provides the means to easily manipulate the data in the bins and give a three-dimensional display, using the centroid of the bin (figure 4) as the representative position point. This facilitates the graphic portrayal of information on the screen with minimal computation. The binning strategy uses a divide-and-conquer methodology. The problem is divided into a set of simpler problems which, when solved individually, provide the solution to the overall problem.

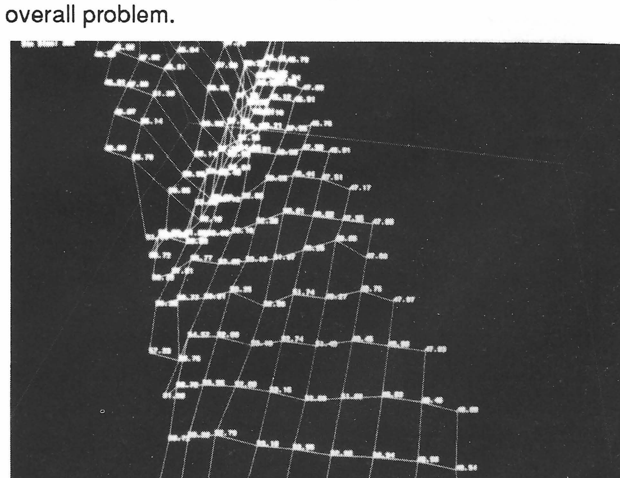


Figure 4: Binning of Data

The binning statistics on the Personal Iris is shown as:

1. 250,000 data points in a matrix of 200 X 200 bins takes 8 seconds, and
2. 50,000 data points in a matrix of 50 X 50 bins takes 4 seconds.

This system, as it stands, permits one more step toward the display of some complex areas in a reasonable time.

Hardware

The machine utilized for the 3D application experiment was the SGI Personal Iris Workstation, provided by the company Sirius Solutions Ltd. This is a three-dimensional workstation introduced by SGI in October 1988. It was designed to bring inexpensive, high speed interactive 3D graphics to the modern user.

The central processing unit (CPU) of the Personal Iris is the MIPS R2000 RISC architecture chip, with the optional MIPS R2010 floating point unit (FPU). In addition to, and separate from, the CPU and FPU was the SGI proprietary graphics subsystem. This separation of the CPU from the graphics subsystem splits the computation load, thus resulting in a very fast graphics engine.

The CPU runs at 12.5 MHz and is rated at 10 MIPS. The installation of the FPU further optimizes performance to reach 0.9 million floating point operations per second (MFLOPS). This is approximately ten times the performance of a VAX 11/780.

The Personal Iris workstation used for this proof-of-concept experiment was a fully configured machine with 16 megabytes of RAM, a 380 megabyte Winchester disk drive (a 1.1 gigabyte drive is available), a 150 megabyte cartridge tape drive, 24 color bit planes, a 24 bit z-buffer (for hidden surface removal) and a 19 inch 1280 X 1024 RGB high resolution color monitor. The total price for the fully configured system was approximately fifty thousand Canadian dollars.

The standard software on the machine includes a UNIX V3 operating system with SGI enhancements, such as its powerful Graphics Library, 4 Sight Windowing System (NEWS and GL windows) and diagnostics software. Also included was an optional Software Developer's Package with C compiler, including a window-based debugger that simultaneously displays a command window and graphics output window. The other high-level language compilers such as Fortran, Ada, Pascal and PL/1 are also available as extra options.

Graphics Library

The SGI Iris Graphics Library (recently licensed by IBM) has powerful routines to manipulate three-dimensional objects on the screen. In a typical application, a graphics window is opened on the screen with the 'winopen' routine. A viewing projection is then defined with the 'perspective' call. It defines a viewing volume in the shape of a pyramid by specifying a field-of-view in degrees, and the near and far clipping planes (in world coordinates). If an orthographic projection is preferred, the subroutine 'ortho' is used. It defines a viewing volume in the shape of a cube. The parameters passed to it are the world coordinates of the left, right, bottom, top, near and far clipping planes.

To obtain differing views of the 3D object, the 'lookat' routine can be called. It defines a line of sight from a viewpoint to a reference point. The parameters passed to it are the (XYZ) world coordinates of the viewer's location and the point at which he wishes to look. Modeling transformation calls are also available that will rotate, translate or scale objects to be drawn.

Once the projection, viewing and modeling transformations are defined, the user draws his object on the screen by giving world coordinates to routines that draw points, lines and polygons. The graphics library then scales the world coordinates to screen coordinates according to the user-supplied transformation, and draws the objects on the screen.

To create the effect of animation, (for instance, to smoothly move the 3D object on the screen) the technique of double buffering is used. When in double-buffer mode, two video buffers are utilized (the front buffer and the back buffer). The front buffer contains the pixel information for the scene currently displayed on the screen. All drawing is done to the back buffer. When the user calls 'swapbuffer', the back buffer becomes the front buffer, and is displayed. What was previously the front buffer becomes the back buffer.

New Collection Technologies

The 'Law of the Sea', sponsored by the United Nations, defines the off-shore development zones where marine resources belong to the country with the adjacent coastal boundaries. The determination of the economic viability of exploiting the resources in these zones, and the understanding of the sea floor morphology, require the presence of highly detailed bathymetric charts.

Bathymetric data acquisition is performed by emitting an acoustic signal and measuring the return time of the pulse. The traditional method used single-beam echo sounders, which produced returns along a straight-line path only. However, multi-beam echo sounders are now becoming commonplace. The use of an array of transducers, to measure a number of depth points across a wide swath perpendicular to a ship's track, has given a degree of resolution heretofore unimaginable. The problem encountered with the multibeam systems was that processing the large mass of bathymetric data required a greater amount of automation than utilized by conventional techniques, especially in the area of data validation. This led to the utilization of visualization tools both in developing geometrical techniques for automation and for the statistical interpretation of the data.

Experiment with Caraquet Bay Survey Data

The computer graphics utilized by SGI was a key element in the design of the new processing package. Many of the evaluators pointed out the amazing capability of the computer graphics to combine and display the hydrographic data in various manners. The different displays constitute, in practice, the basic tools for qualitative and dynamic use of statistical methods in evaluating the validity of the sounding data. The package can be enriched by broader features to cover the generality of problems and, more specifically, to adapt to certain applications such as relief mapping. These new approaches to generating perspective views of surface images (figure 5) could result in substantial savings of processing time. The realistic surface depictions are valuable, not only in a graphics context, but also in the simulation of 3D scenes for representing digital terrain models and data portrayal over a geographic area (figure 6, 7). This forms a powerful simplifying tool for general visibility problems. When features such as shadowing, specular reflection and depth cueing are included, the user is free to manipulate the viewpoint as well as the positioning and intensity of the light sources. Such images are extremely valuable in depicting and performing data analysis. In a wider context, the potential of performing various types of processing on a spatial transformation of the original data, has not been adequately explored. The computational time savings in these applications suggest that there is substantial scope for exploiting this concept more generally.

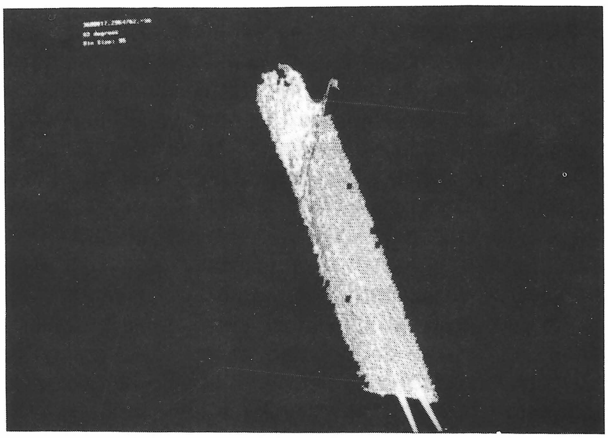


Figure 5: Flat Shaded Surface Display

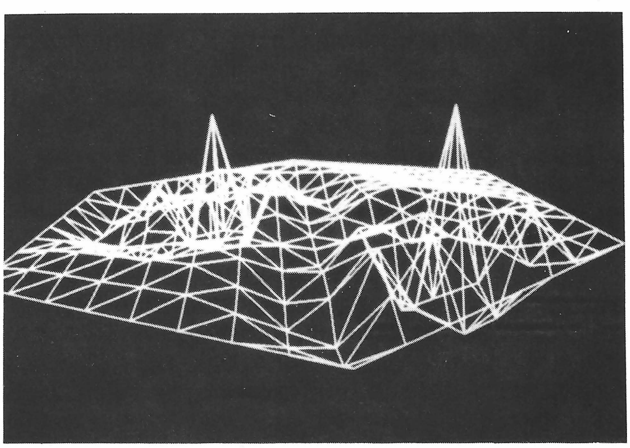


Figure 6: Example Wire Frame Display

A feature of the graphics library that proved to be very useful for this project was a method of identifying objects on the screen that appear near the cursor. To identify an object near the cursor, 'picking mode' is entered. When drawing commands are executed while in picking mode, nothing is actually drawn on the screen. Instead, the names of any objects near the cursor are recorded in a 'picking buffer'. The program begins by loading a portion of sounding data from tape or disk into RAM memory. In the test program, it took approximately 3 minutes to transfer a quarter of a million data points from Caraquet Bay into memory, due to disk latency and I/O. Each point has associated with it a northing, easting, depth, day and time, along with other attributes.

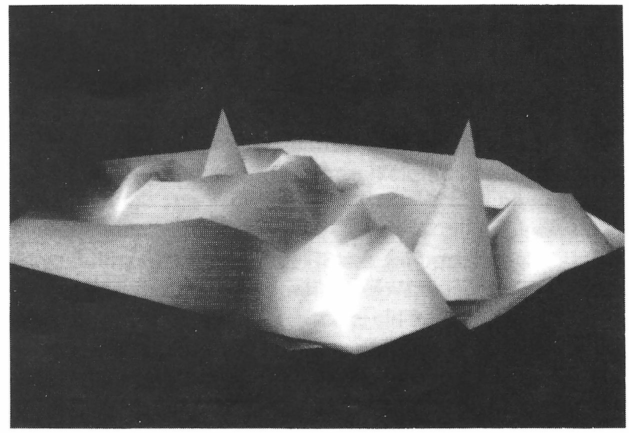


Figure 7: Example Gouraund Shaded Display

Once memory is loaded, a 2D orthographic projection of the points is mapped onto the screen and colour-coded according to depth. This gives a solid-colour contouring effect (figure 8). The user then uses the cursor to draw a square around the area selected for editing, and exits from the screen.

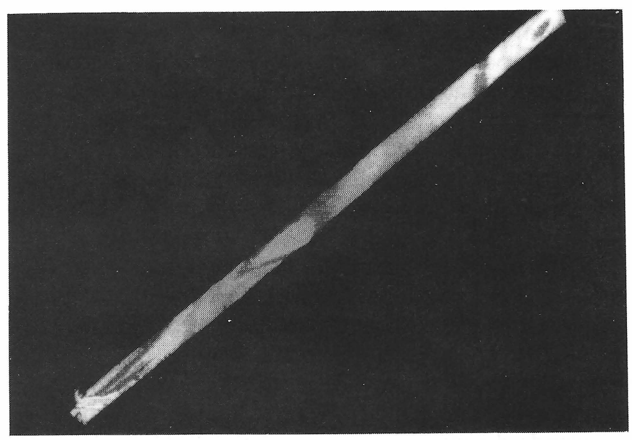


Figure 8: Colour-Coded 2D Orthographic Projection of Raw Data Points

The next screen to be displayed is a 3D view (figure 9) of a wire-frame grid representing the ocean floor. The grid is created by dividing the area of the ocean floor into equal-sized bins. The intersections of the lines running East to West and the lines running North to South represent the centroid of each bin. The depth of the intersections is determined by the shoalest depth in the bin. Future versions of the program could use deepest depth or statistical values of the bin as the plotted Z value, or combinations of both.

The orientation of the grid can be altered by changing the user's viewpoint in space using the mouse controls. The reference point (the point at which the user is looking) remains centred on the grid. Therefore, the user can travel in space around the grid in order to get different views of it.

The user can pick a bin by placing the cursor over the intersection of the two lines (representing the centre of the bin) and pressing a mouse button. The chosen bin is highlighted by displaying the intersecting lines in a different

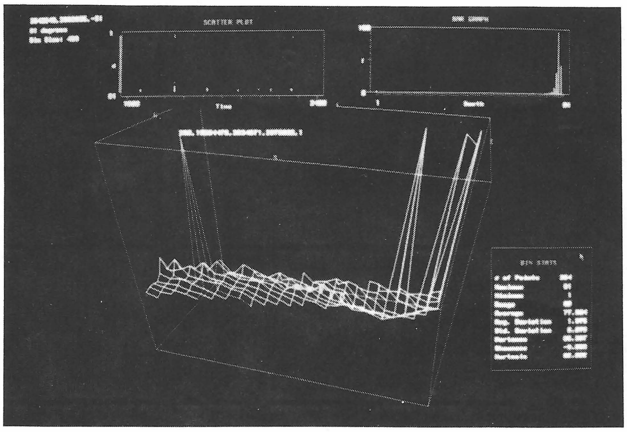


Figure 9: 3D View of Binned Data with Bin Information Windows

colour from the rest of the grid. Next to the chosen bin is a string of text, with information on the shoalest point in the bin stack. This includes date, time, latitude, longitude and depth.

Once a bin is chosen, the user can bring up small windows of information on it. In this version, the types of information windows displayed were:

- Bin statistics: - Displays statistics on the bin, such as the number of points, range of depths, and standard deviation. (figure 10)
- Bar graph: - A plot of frequency counts against depth.
- Scatter plot: - A plot of depth counts against time. This facilitates viewing the correlation of points with respect to different passes.

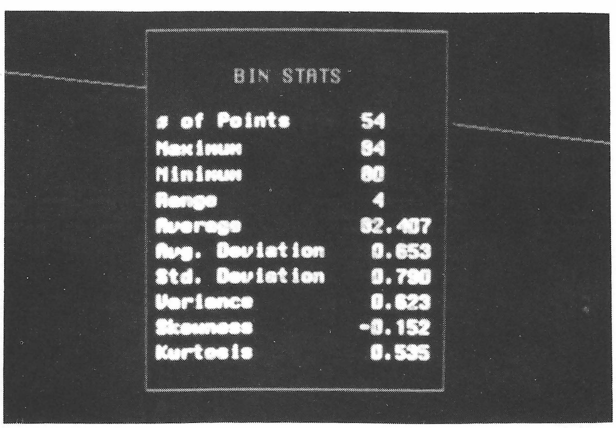


Figure 10: Statistics on a Selected Bin

An alternative method of displaying data is to draw each individual point, colour coded according to depth, in a 3D perspective view. In this mode, the user can pick individual points by clicking on them with the mouse. When a point is selected it blinks, and a line of text is displayed next to it with information on the point.

The editing of the data can be accomplished in one of several ways. When the data are displayed as individual points, the purge option can be chosen from the main menu (figure 11). This will purge all selected blinking points. In a similar manner, when the bin grid is displayed and the purge option (figure 12) is chosen, the shoalest point in the selected bin is purged. This leaves the next shoalest point in the stack to be used as the depth of the plot. The method of editing that would be used the most, however, would be by using the bar graph window. In this window, the user clicks on one of the bars. All points at that depth (or less than, or greater than, depending on the purge mode selected) will be purged from the bin stack.

Once the user has finished editing the data in a particular section of the ocean floor, he exits the screen. He then returns to the 2D projection to choose another section of the ocean floor.

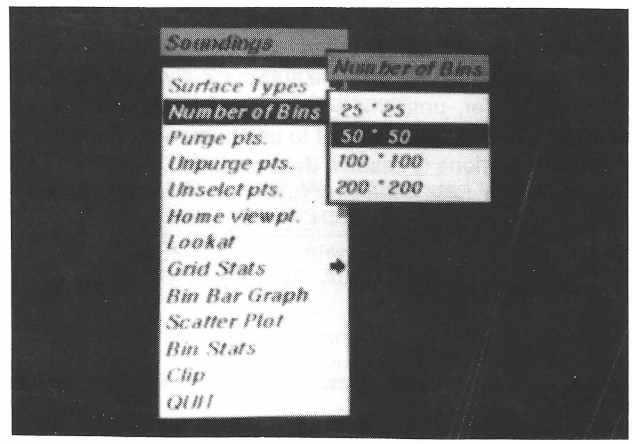


Figure 11: Main Menu

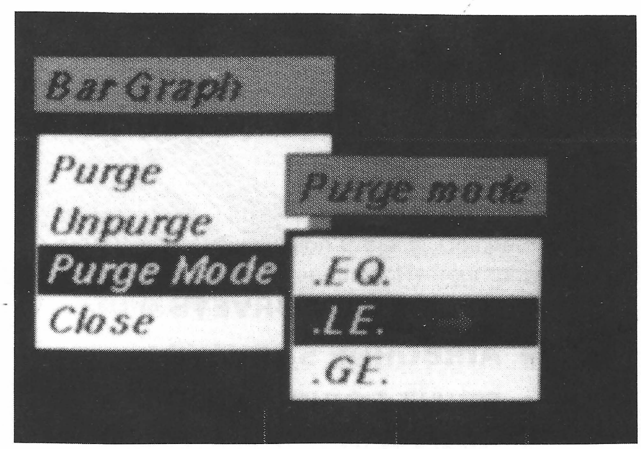


Figure 12: Bar Graph Purge Menu

Conclusion

The above work represents a sample of sweep data obtained from the Bedford Institute of Oceanography. The examples shown were of an interactive nature, specifically in the form of statistical data analysis utilizing bin structures. The visualization techniques (figure 13, 14) allow the hydrographer to view and manipulate data in geometrical rather than in numerical format, thus using the capabilities of the eye/brain to perceive and infer patterns. This method of viewing statistical models, rather than numerical models, appears to be the only way to validate and process large data sets in an efficient time frame.

This type of visualization, comparing statistics of surround

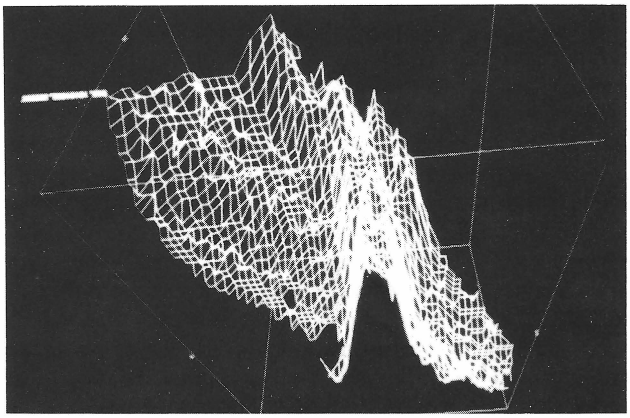


Figure 13: 3D View of Binned Data (Caraquet)

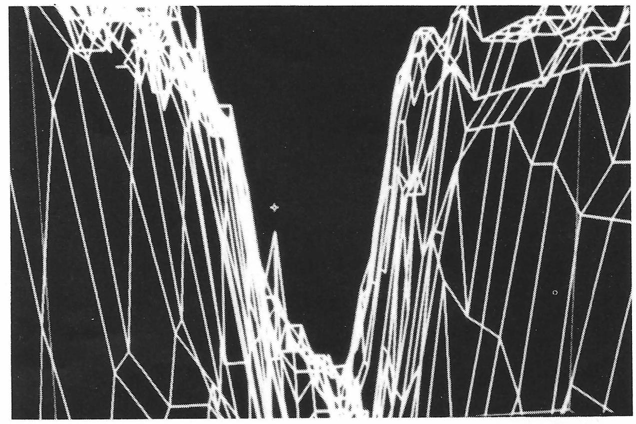


Figure 14: 3D View of Binned Data (Caraquet)

ing bins, could possibly be done automatically by Expert Systems. However, until the science of Artificial Intelligence matures, there is no choice but to use human subjective and cognitive decisions to resolve data conflicts.

Finally, it appears that traditional techniques are rapidly losing ground with the advent of new collection technologies. It is imperative that the CHS start exploring and utilizing imaging techniques in order to resolve the problems of validating and processing large data sets.

Acoustic Surveys: Implications to the Geoscience Discipline

by
R. L. Thomas, R. K. McMillan and D. L. Keys

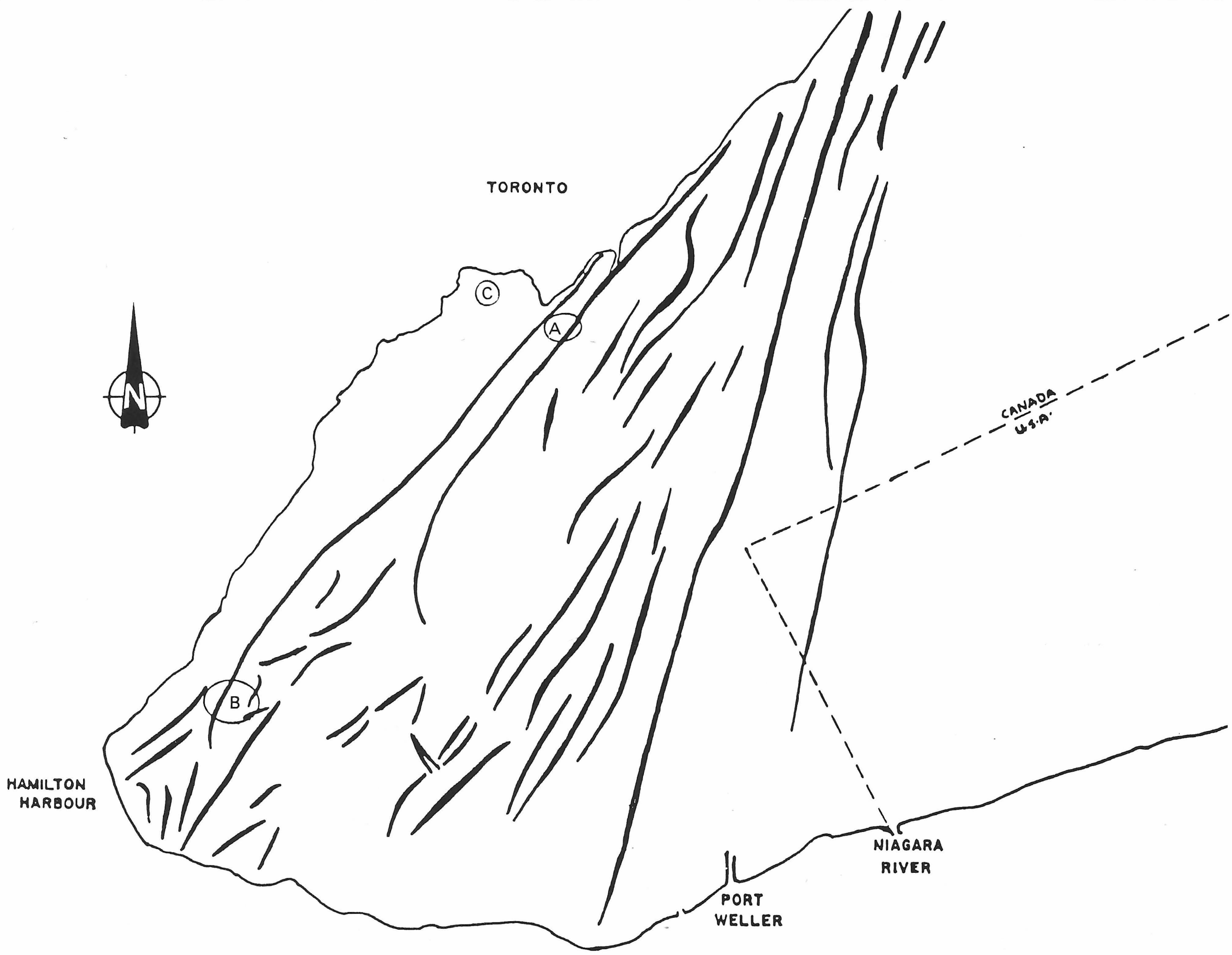


Figure 1: Survey areas in western Lake Ontario

Introduction

Hydrographic surveys have collected many thousands of line miles of data in Canadian waters. Most of the depths are from high-frequency echo sounders, and are used to produce nautical charts. On occasion, hydrographers also utilize side-scan sonar to investigate shallow regions for locating shoals. Coverage each year is extensive, and often includes areas which require geophysical and geological investigations for the installation of physical structures or for shoreline protection. However, unless high-resolution information is collected, the requirements of the engineering geologist and the structural geologist cannot be met. In addition, biologists require information on bottom substrate conditions to define fish spawning, nursery, and specific fish habitat areas.

The work described in this paper was not performed for hydrographic charting purposes. The findings were a byproduct of the primary objective of the sounding program, which was to search for and locate missing aircraft or water craft lost in western Lake Ontario. The side-scan sonar and echo sounder records collected on these projects were used to determine structural properties in recent sediments in Eastern Lake Ontario.

Equipment

The surveys were conducted using Klein side-scan sonars (various models including 521, 521T, 531T, and 595) operated by McQuest Marine Research & Development Company Limited and an Atlas dual-frequency echo sounder operating at 120 kHz and 32 kHz. While the side-scan sonar was used to locate the targets, the echo sounder was used simultaneously to locate earth movements affecting modern lake sediments.

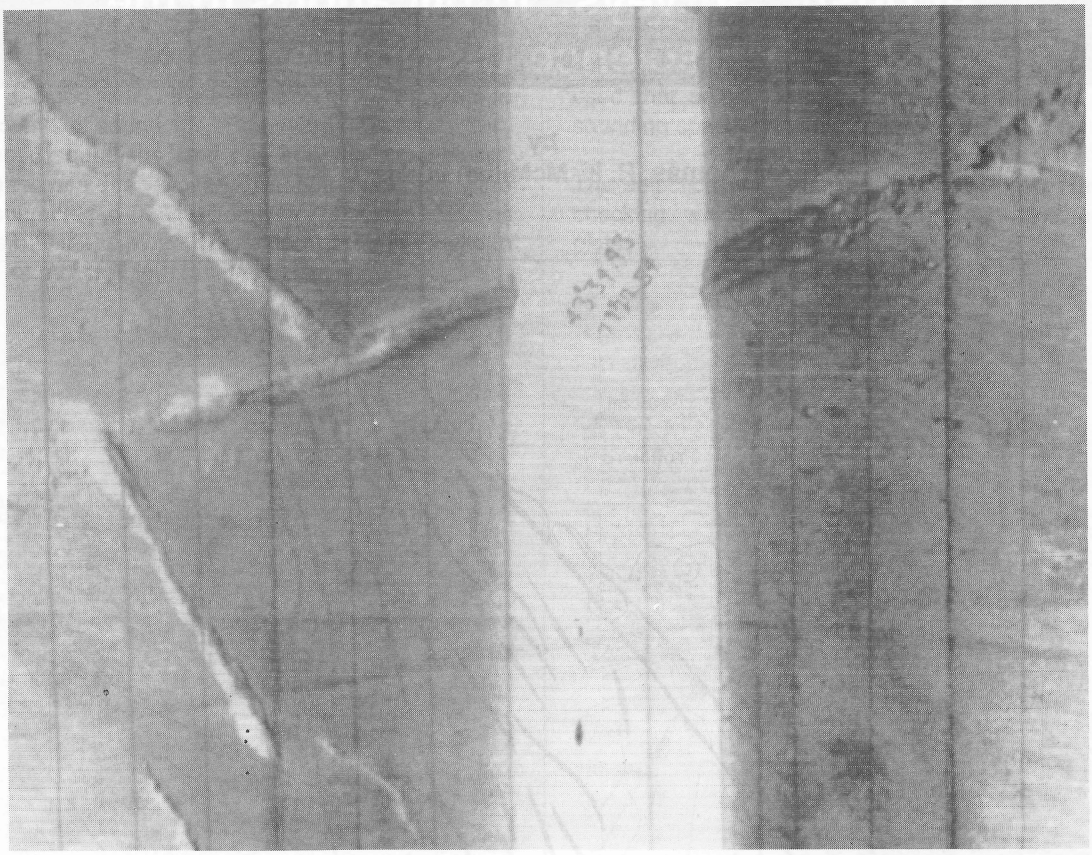


Figure 2

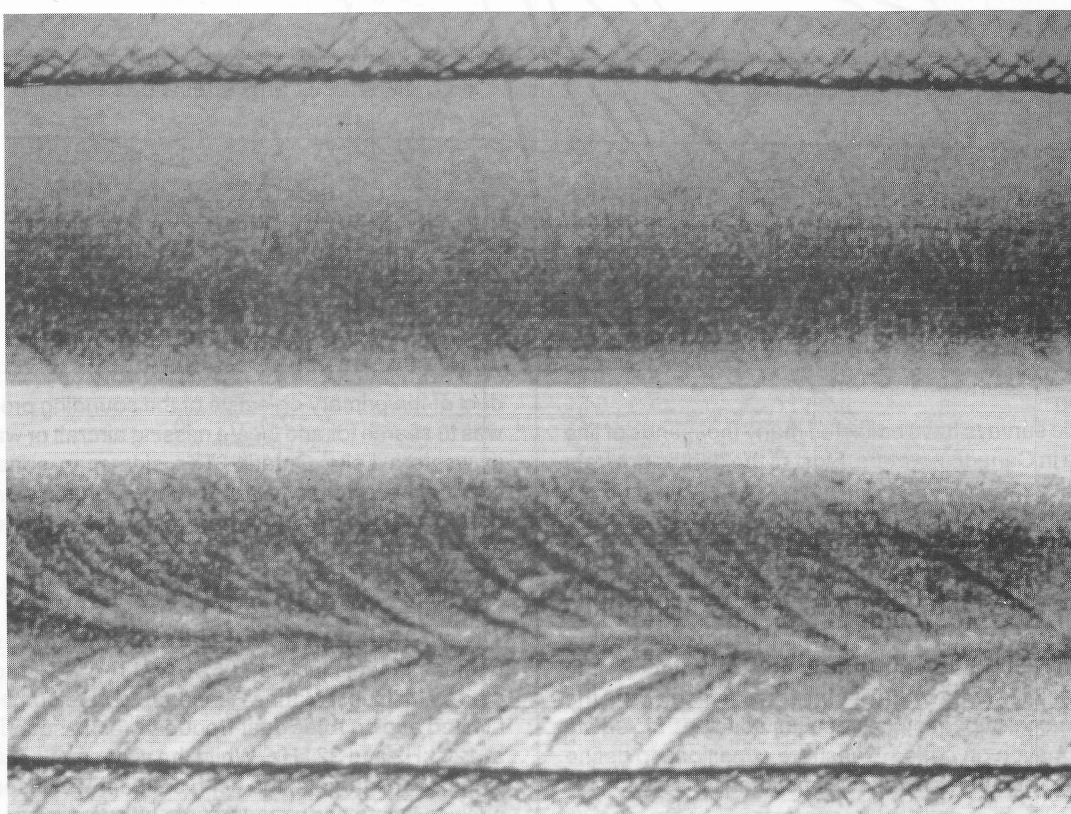


Figure 3

Results and Discussion

Figure 1 shows the location of three areas in western Lake Ontario situated from a point immediately south of the Toronto islands to a position south of Oakville. Locations A, B, and C are areas which were searched for downed aircraft. Location C also overlaps a search area for a sunken yacht.

Area A

In March 1987, the Canadian Aviation Safety Board Engineering Laboratory asked McQuest Marine Research & Development Company Limited to conduct a side-scan sonar search in the area south of Toronto Island for an Islander aircraft which had crashed on approach to Toronto Island Airport. The search area was about 2.5 kilometres long and extended to a width of approximately 1.5 kilometres before the aircraft was found. While searching for the craft, a number of linear features were observed in the lake-bottom sediments (figure 2).

The substrate throughout the search area is composed of thin glacio-lacustrine clay, overlying bedrock. The linear features commonly occur as long, scar-like structures predominantly oriented northwest to southeast, with a conjugate set of structures aligned generally in the same direction. Overall, the structures seem to be quite complex with various crossings, displacements and triple junction-like features. The largest scars observed, when compared to the image of the aircraft (which had a wingspan of 12 metres), indicate a width in the order of 6 metres and an elevation above the glacio-lacustrine clay surface of 1.5 and possibly 2 metres. Some of the features extend across the survey area and exceed 1.5 kilometres in length.

Area B

In February 1988, a Metroliner aircraft crashed into Lake Ontario and McQuest Marine Research and Development Company Limited was again asked by the Canadian Aviation Safety Board Engineering Laboratory to conduct a search for the plane. This time, the search area was located to the south of Bronte and is indicated as area "B" in figure 1. Two other types of sedimentary structures were observed, interfering with recent silty clays on the lake bed.

The first structure extended for many kilometres and displayed a very delicate, plumose-like character etched into the surface of the silty clays (figure 3). Based on the side-scan records, these structures must exist as very low amplitude features. Their formation must be due either to distortion induced by torsional stress in the surface muds or to subsurface stress which allows a unique, but obviously characteristic, subsidence to occur in the surface. This could be due to extensional stresses occurring in the bedrock, tills and glacio-lacustrine clays which underlie the recent muds in this location [2].

Parallel and quite close to the plumose structures, a straight line with a darker acoustic return appears on the side-scan record (figure 4). This has a relatively constant acoustic return, yet at locations along its length there is a more intense darkening where focal points seem to occur. The origin of this feature remains conjectural, but it is clear that the reflectivity of the acoustic return-signal has been changed for some

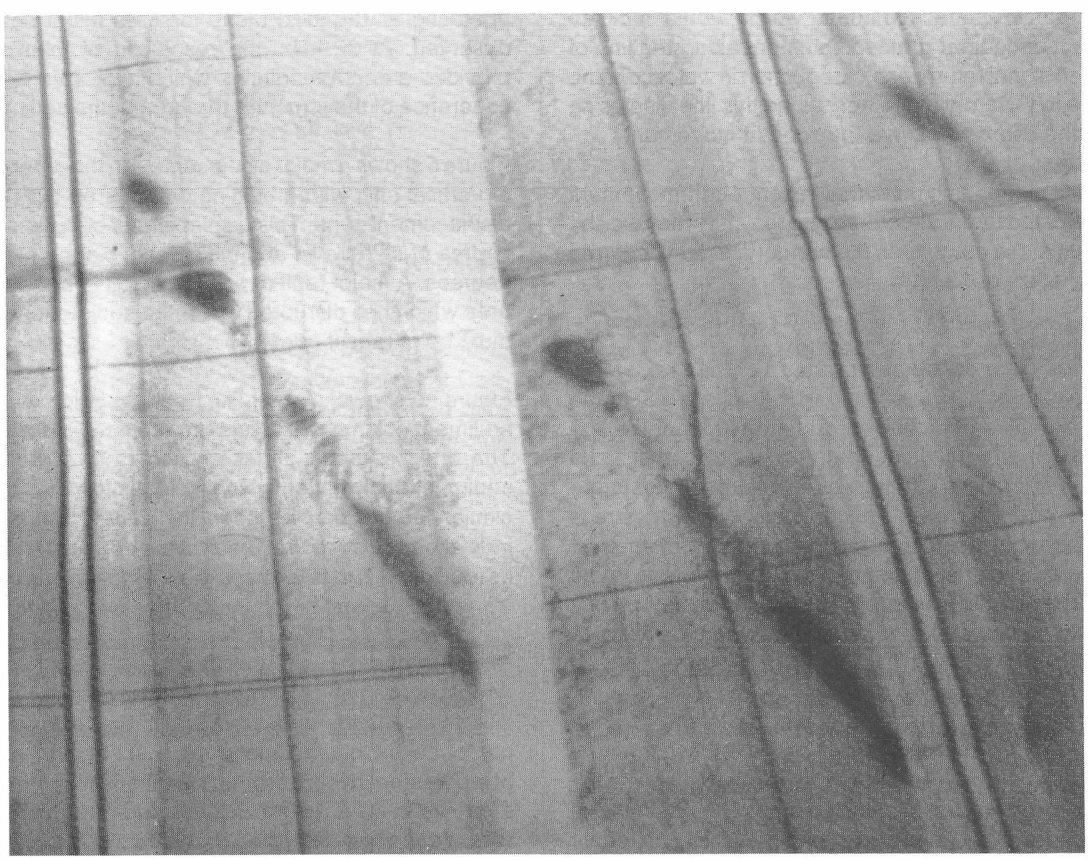


Figure 4

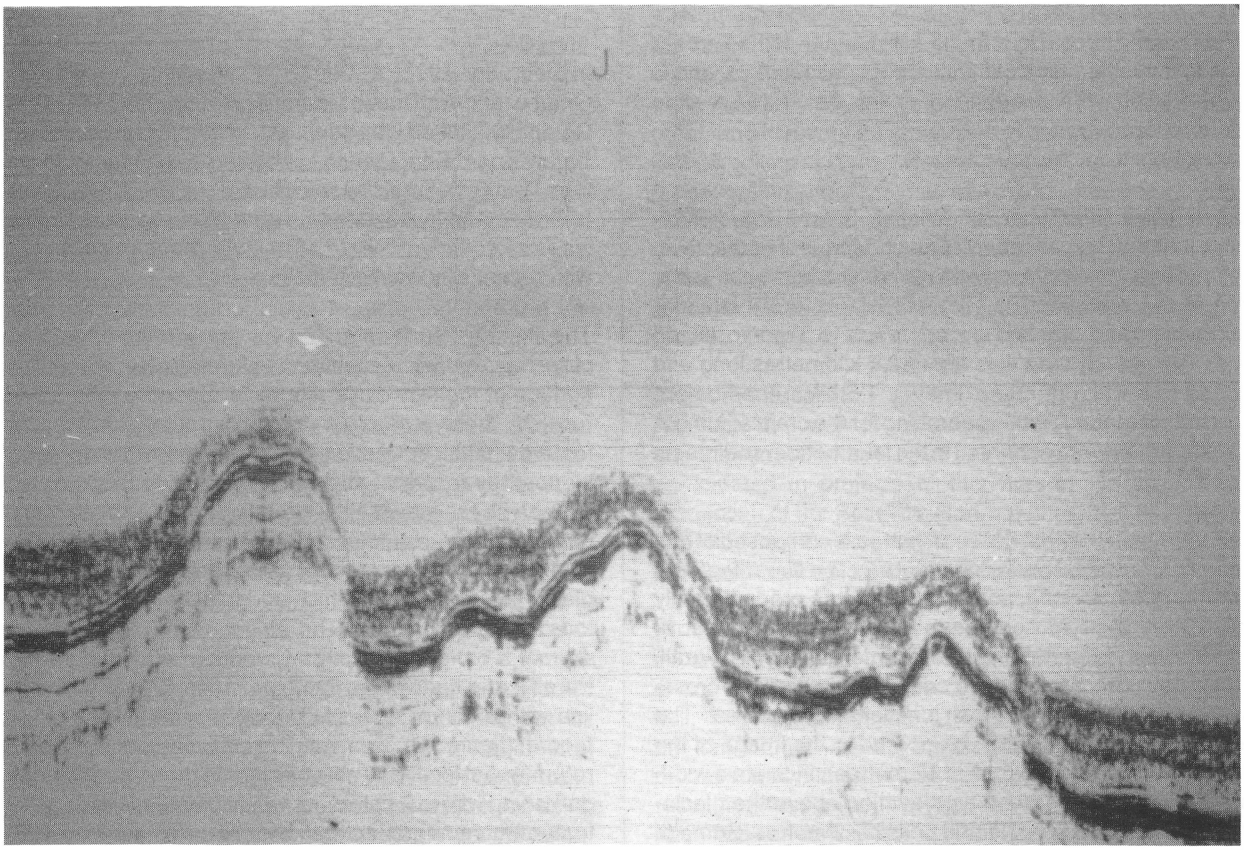


Figure 5

reason. This could be caused either by a change in the textural property of the sediment, which would indicate emplacement of coarser grained sediment along the line of the enhanced signal return; or by a reduction in water content, possibly due to vibratory movement along this line displacing water from the sediment above the zone of movement.

The evidence clearly suggests that recent earth movement must have caused these structures and that they may well be a direct result of the magnitude 3.5 earthquake that occurred in this area in July of 1987.

Area C
Two searches were conducted in area C. The first was to locate a sunken yacht. The second was to locate one of the two Tudor aircraft which collided during the Canadian National Exhibition air show just south of Toronto, over Lake Ontario, in September. Plumose and line structures were observed in both searches which again relate to stress induced in the surface sediment by deeper earth movements. It is tempting to relate the structures observed in areas B and C to a single structure in Western Lake Ontario, though this would require continuous coverage by side-scan sonar.

Echo Sounding Records
A single echo sounding traverse down the length of Lake Ontario was carried out to describe the recent sedimentary structure and history of Lake Ontario. The traverse across the Eastern or Rochester Basin indicated a number of structural features of considerable significance in unravelling the recent tectonic history of the Lake. The features are shown in figures 5, 6, and 7. It is clear that, had the Atlas echo sounder been operating at 120 kHz, these features might not have been observed. At 32 kHz, the resolution of internal reflectors provides a depth resolution which allows verification of the coherence of the structure throughout the sediment column.

Figure 5 shows a major displacement in the order of 30 metres of vertical shift with matching patterns on both sides of the displacement zone. This displacement occurs in less than 30 metres of ship travel and indicates a slope of more than 45 degrees. A major fault or series of faults has occurred in this area which has disrupted the entire sediment sequence and must be of recent origin.

Figure 6 shows a vent-like feature going deep into the sediment column which has not been refilled with sediment. The origin is uncertain but it occurs in a region of major sediment deformation which includes the fault in figure 5. A similar feature can be seen in figure 7 but here, a clear indication of a structural break in the deeper sediment deposits is evident. These features may be due to gas venting along a line of structural break in the underlying bedrock.

Conclusions
Acoustic techniques have provided a wealth of information of direct value to the understanding of the tectonic structure of part of Lake Ontario. One area occurs along the north shore of the western basin between Hamilton and Toronto. An other area lies in the Eastern Basin to the north of Rochester. A recent paper by Adams et al [1] infers that the St. Lawrence rift may extend into Lake Ontario. It is tempting to suppose

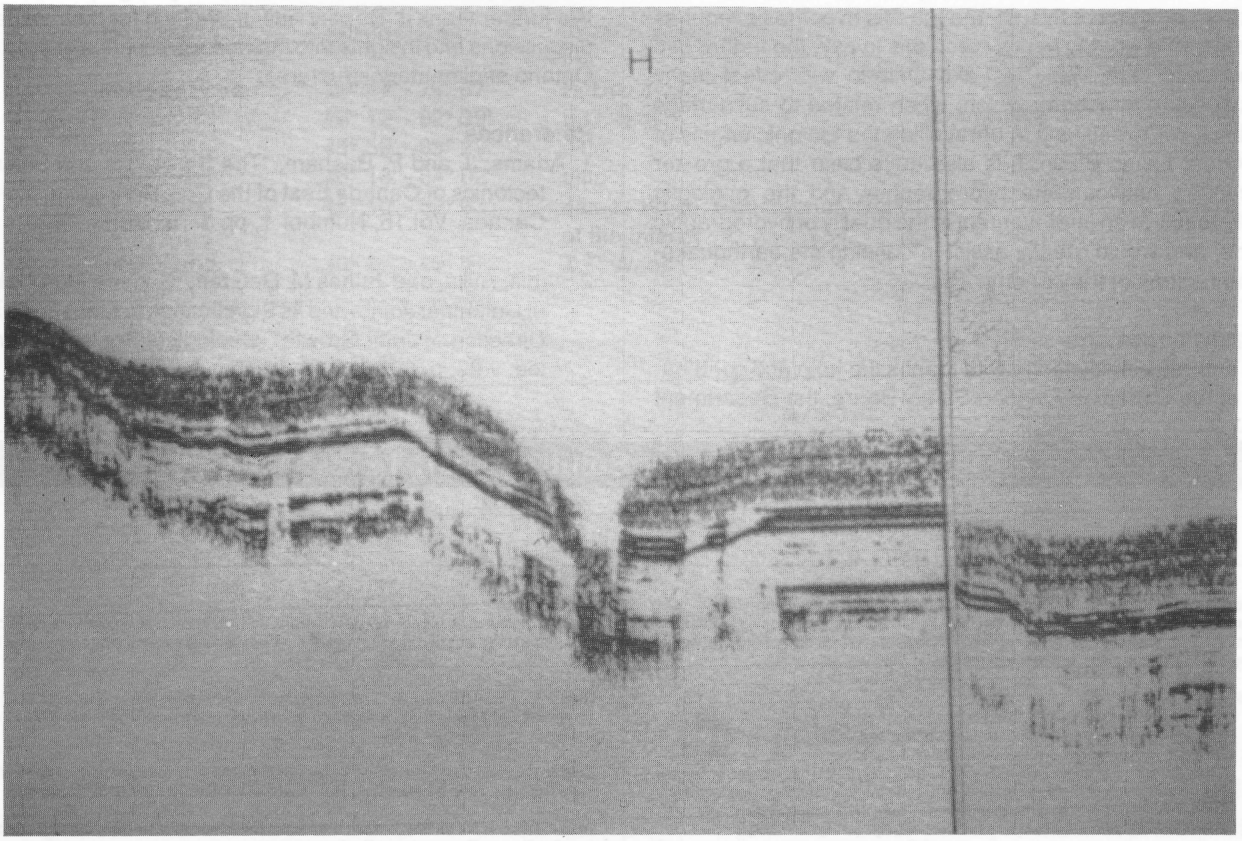


Figure 6

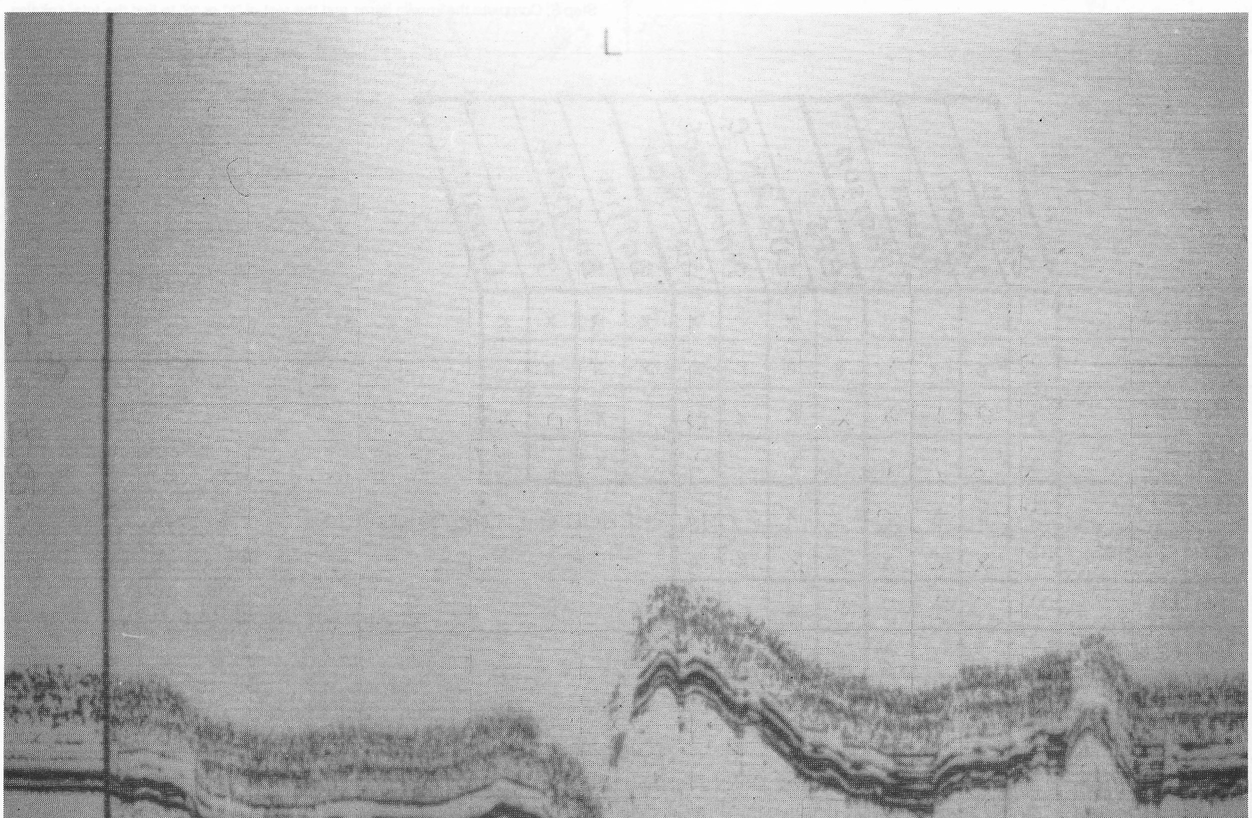


Figure 7

that the two areas noted here represent the northern and southern margins of this rift, though this hypothesis requires considerable work to verify. Needless to say, the further use of acoustic techniques in Lake Ontario will reveal many unsuspected structures which, when related to subsurface geology, will greatly aid in unravelling the tectonic origins of the Great Lakes Basin. It is also quite clear that a greater interaction between the hydrographer and the geologist would result in an improvement in the quality of hydrographic charts, and would greatly assist in defining the earthquake-prone regions of the country.

Acknowledgements
The authors acknowledge with thanks the help and contribution of the Canadian Aviation Safety Board, the Department of National Defense and the Canadian Hydrographic Service. We further thank J. Bowlby and J. Wallach for their valuable discussions and insights into the true significance of the Lake Ontario sedimentary structures.

References

1. Adams, J. and P. Basham, "The Seismicity and Seismotectonics of Canada East of the Cordillera", Geoscience Canada, Vol.16, Number 1, pp 3-16, March 1989

2. Aydin, Atilla, and James M. DeGraff, "Surface Morphology of Columnar Joints and its Significance to Mechanics and Direction of Joint Growth", Geological Society of America. v.99. p. 605 to 617, 1987

Spring Puzzler Solution - part 1

Four exceedingly senior hydrographers (one of them is Tony) are doing surveys using various ships. As it happens, each of them chose to use a different positioning system. The Dominion Hydrographer wants to know their full names and who is using which positioning system on the various ships, but he's lost the memo. Can you tell him?

The clues

1. Denis (who does not use Sat-Nav) is on the Bayfield.
2. Earl and Power and the hydrographer who used the Baffin all like beer.
3. Only one hydrographer has the same first and last initial.
4. Elliott and the man with LORAN-C and the Baffin all left the dock at the same time.
5. Paul and Dixon and the hydrographer who is on the Bayfield don't use Navitrack.
6. The ship with Sat-Nav and the Bayfield and Thorson all stop for lunch.
7. The LORAN-C that Earl used was not on the Tully.

The Solution

Step 1: There can be only one correct item in each row or column, so mark the clues on the diagram with "o" where correct and with "x" where items are wrong or are eliminated by an "o".

Step 2: Earl must have Loran-C on Lauzier so mark "o" in both places and an "x" in all other spaces in these rows/columns. Bayfield must have GPS so mark "x" in the other relevant spaces.

Step 3: Paul and Tony must be on Tully or Baffin with Navitrack and Sat-Nav so Paul must have Sat-Nav, Tony the Navtrack. This means that Denis has the GPS on Bayfield.

Step 4: Dixon is not on Bayfield so Dixon is not Denis nor does he have the GPS, and Paul has Sat-Nav so Thorson is not Paul.

Step 5: Earl has Loran-C so Elliott is not on Lauzier. Tony has Navitrak so Dixon is not Tony and must be Earl so Thorson must be Tony. This means that Power is not Paul [clue 3] so must be Denis and Paul must be Elliott.

Step 6: Complete the known items and the rest of "x" or "o" to find the total solution.

	Dixon	Elliott	Power	Thorson	GPS	LORAN-C	Navitrack	Sat-Nav	Baffin	Bayfield	Tully	Lauzier
Denis						x		x	x	o	x	x
Earl		x	x		x	o	x	x	x	x	x	
Paul	x					x	x			x		
Tony						x				x		
Baffin		x	x			x						
Bayfield	x			x			x	x				
Tully						x						
Lauzier												
GPS												
LORAN-C		x										
Navitrack	x											
Sat-Nav				x								

For the complete solution, please turn to page 62

Report on the Annual General Meeting March 1989

The annual general meeting of the Canadian Hydrographic Association took place on March 8, 1989 in the Pan Pacific Hotel in Vancouver, British Columbia. This meeting was held in conjunction with the Canadian Hydrographic Conference which was jointly sponsored by the Canadian Hydrographic Service and the Captain Vancouver Branch of the Canadian Hydrographic Association.

The meeting was called to order at 16:25 and there were forty-seven members present. The minutes of the last general meeting held in Winnipeg, Manitoba on May 27, 1988 were read by the Secretary-Treasurer.

Each branch presented both a financial report and a written report of individual activities which took place during the previous year. The National President reported on the national activities, and the National Secretary Treasurer read the financial report and the proposed budget for the coming year. A motion to investigate the requirement for having a professional audit or review of the national books was made and passed. This will be looked into before the end of the 1989 fiscal year (December 31, 1989).

The Director from Atlantic Branch, Galo Carrera, briefly described a proposal to initiate professional study groups on specific fields of interest to the Canadian Hydrographic Association. He specifically highlighted a "Special Study Group on Geodetic Aspects of International Maritime Boundary Delimitation". Atlantic Branch presented a Life Membership in the CHA to long-time member Mr. M. Eaton, who accepted with gratitude. Mr. G. Macdonald, Editor of Lighthouse, requested 50% of Sustaining membership dues be committed to support Lighthouse. The National President asked Mr. Macdonald to speak to him later on this subject, as the cost of producing Lighthouse was a National as well as a Central Branch responsibility.

Resolution 1989-1 called for an increase in National dues from $12 to $15. A subsequent vote resulted in approval of this motion. It was also recommended that all branches increase or decrease their dues to a consistent level of $30 per member per year. However, the setting of Branch dues remains the responsibility of each Branch.

The last order of business was a suggestion by Mr. Browning that no motions from the floor be entertained until all Branch reports and National reports have been completed. This was taken under advisement. This successful annual general meeting was adjourned. Members who wish to receive a copy of the minutes of the Annual General Meeting or the minutes of the Annual Directors Meeting should contact their Branch Vice-President.

B. M. Lusk
National President

Coming Events

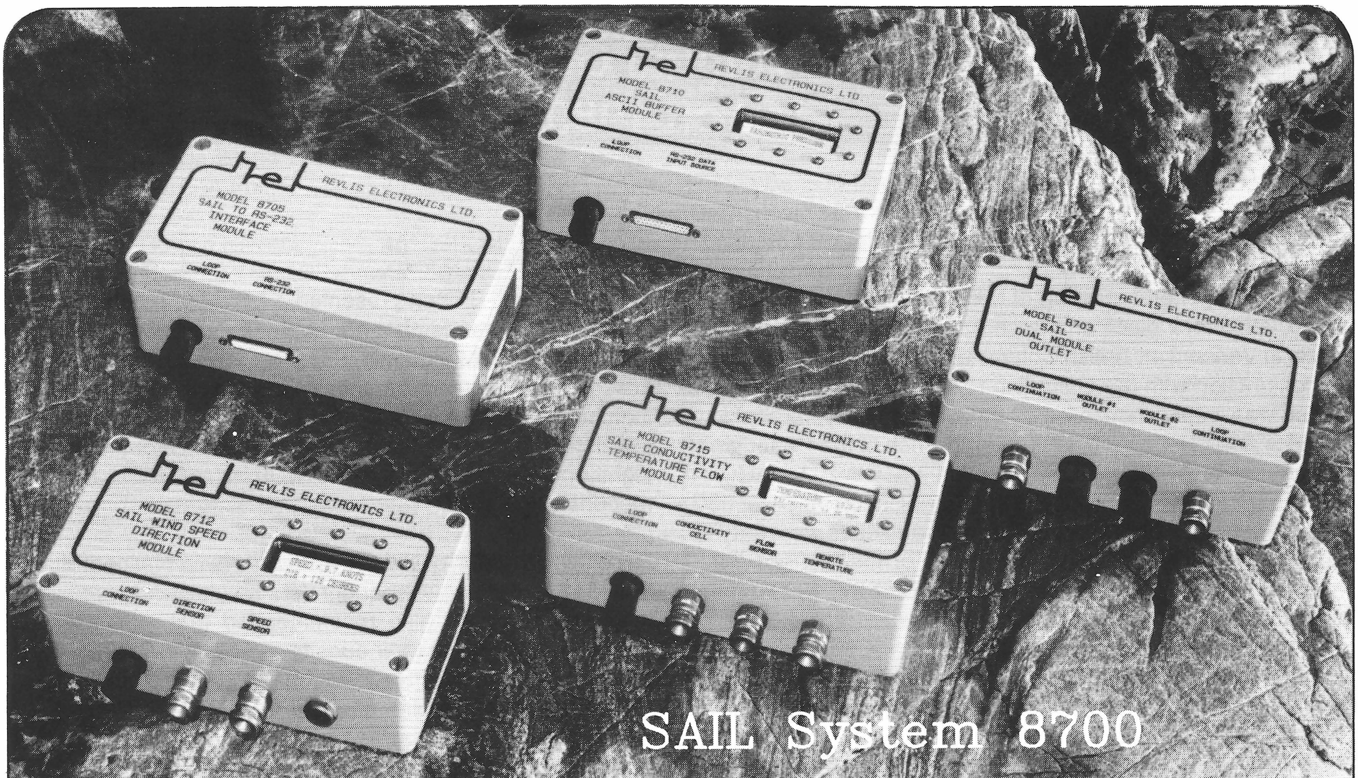
U.S. Hydrographic Conference '90 is at the Omni International Hotel, Norfolk, Virginia, May 1-4, 1990. Co-sponsored by the National Ocean Service and The Hydrographic Society, theme is "Navigating the Nineties" with presentations and exhibits on a wide variety of scientific disciplines in hydrography and oceanography.

Canadian Institute of Surveying and Mapping annual conference is in Ottawa, May 22 to 25, 1990. This is co-sponsored by The Canadian Geophysical Union, with the theme: "To Know the Earth". Presentations will be on a wide range of the survey fields represented by CISM and CGU including hydrography and cartography.

Canadian Hydrology Symposium: 1990 (CHS-90) is in Hamilton, Ontario, May 28 to June 1, 1990. The themes will be the water resource engineering areas of sedimentation, navigation, channel design and water quality, and the application of environmental statistics in the water resources area.

FIG XIX Congress is in Helsinki, Finland, June 10 - 19, 1990. The Congress theme is "The Challenge of the Information Society for Surveyors". Each of the nine Commissions will have a program of presentations and Commission IV (hydrography) will no doubt have an outstanding program as it did at Congress XVIII in Toronto.

Hydro 90, the 7th Biennial International Symposium of The Hydrographic Society, will be at the University of Southampton, UK, 18 to 20 December 1990. This is co-sponsored by the International Hydrographic Bureau and the Nautical Institute as well as two other major groups. Themes cover wide areas of charting and navigating concerns including the electronic chart, remote sensing, GPS, and the environment.



SAIL System 8700 family of components provide a simple, economical, and modular approach to constructing a high performance hydrographic data acquisition and processing system best suited to solve your unique application. SAIL is an acronym for Serial ASCII Instrumentation Loop, a data collection network and protocal defined by ANSI/IEEE Std. 997–1985. All System 8700 family components may also be utilized in non–SAIL environments to enhance the capabilities of your existing hydrographic data acquisition and processing systems.

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News From Industry

TSS (UK)

TSS (UK) report that a New Zealand group used their 320B Heave Compensator to help beat an "impossible" deadline in a recent inspection of the inshore ends of the Maui A gas and condensate pipelines.

The 3,000 tonne ocean-going research vessel GRV RAPUHIA was using an ELAC narrow-beam echo sounder with a TSS model 320B microprocessor-based Heave Compensator. This latter feature let them finish the survey under swell conditions off the Taranaki coast which were described as "marginal at best". Without the Heave Compensator the rockberms would have remained hidden by the swell effect.

Marimatech APS

Marimatech APS of Aarhus, Denmark, report that they are a new Danish company dealing with survey instrumentation for the hydrographic and oceanographic community as well as the environmental field.

The owners of Marimatech APS are Mr. Erik Brinch Nielsen and Mr. Henning Pedersen, formerly with Navitronic of Aarhus. They have many years of experience in the above fields and Mr. Hans Joern Korsgaard, a former colleague, has recently joined them as Software Manager. He will be responsible for the development of new hydrographic software as well as upgrading of existing software based on HP series 200/300 and IBM compatible PCs.

Their product range is a combination of new developments and systems from Marimatech APS as well as a few new agencies of which Marimatech APS will have the marketing and service responsibility.

Their address: Marimatech APS, Fiskerivej 4, DK-8000 Aarhus C, Denmark.

Resource Group

Resource Group plc of Fareham, UK, report that the Port of Bristol now has a fully automated survey system including post-dredge-updating supplied by them.

Their systems can be either on-line for survey vessels or dredgers or their new "Smallboat" system for work boats.

Resource Group say this is the third successful installation of their automated survey systems in UK ports and harbours, and they take pride in pointing out that no other system has more than one user.

Klein Associates

Klein Associates Inc of Salem, New Hampshire, announce that they have a new Video Display Monitor for high resolution display of Side Scan Sonar data. This Model 615 Video Display is a modular accessory to their 590 Digital SSS System and users can display up to six sonar channels simultaneously on the 590 system. This is done by displaying four channels on the thermal printer and two on the monitor. Previously the system could handle six channels but display only four at a time.

The new video display hooks into the 595 Combined SSS Transceiver and Graphic Display Unit with the insertion of two boards and some alterations to the operating software.

The Model 615 offers very high resolution with 1024 x 768 pixels and B & W or colour scales selected from the 595 menu. The Video Monitor Display supports multiple monitors with no loss of resolution.

The main menu on the 595 Recorder allows the operator to select which four channels - if any - are to be printed and the video submenu selects which two channels are to be viewed on the monitor.

Klein also offers Model 620 and 640 series Target Signal Processors which provide sonar enhancement features for improved target selection and marking. Other target signal processor models are also available with even greater capabilities such as two level imagery to help in target detection, automatic target detection and operator cueing.

Inpark BV

Inpark BV, of Leidschendam, Netherlands, announce that they merged the activities of Keynes Inpark BV, Fugro Geodetics BV and Netherlands Hydrographic Services BV under the name Inpark BV. Their total staff now numbers some 350 and offer services in several related fields:

- Land surveying and cartography;
- Software and consulting;
- Civil engineering;
- Utilities;
- Sewer inspection;
- Hydrographic, geophysical and oceanographic surveys;
- Photogrammetry;
- Geographical Information Systems.

Geophysics GPR International

Geophysics GPR International Inc of Longueuil, Quebec, announce that they are now working in Zimbabwe on a two million dollar technical assistance contract. This is the second development phase, following on from the first phase in which Geophysics GPR uncovered a rich new mineral deposit.

Geophysics GPR will provide all the necessary technical assistance for the next two years, including an aeromagnetic survey for other potential mining areas. This will be in co-operation with Zimbabwe Geological Survey. The company's geophysicists and professional engineers will also provide professional training for the regional geologists.

Founded in 1974, Geophysics GPR has some 100 employees, most of them professional engineers, geologists, geophysicists, computer experts and skilled technicians, and has worked on projects in many countries throughout Africa and the Americas as well as Asia.

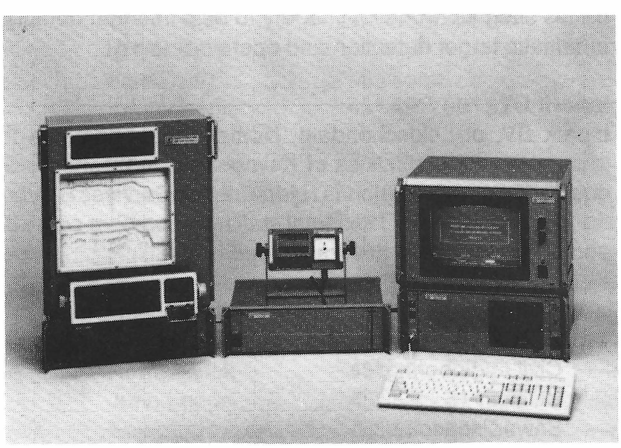
Del Norte

Del Norte of Euless, Texas, report that their Trisponder Microwave Navigation system is being installed in Denmark as a navigational aid. This is to meet a need in the early phases of construction of a ten mile tunnel and bridge link between two Danish islands. The chain of eight shore stations and eight mobile units will be used by all ships navigating in the area, with more mobile units to be added as needed.

Navitronic

Navitronic AS of Aarhus, Denmark, have expanded in recent months and report new items of survey equipment:

NAVIPRO 2000 is a rugged new hydrographic survey computer with several interfacing facilities. This IBM AT compatible computer was developed especially for use in the difficult environment of the survey vessel and gives fast processing capabilities as well as a compact robust construction. It has a built-in 9" Electro luminescence monitor; output for external EGA monitor; two built-in RS-232C interfaces; Centronics interface; and an optional HP-IB interface. It also has 5 free slots for user selectable interfaces for which several options can be offered.



Hydrographic survey packages are also available. The NHS-SYSTEM 500 and NHS-SYSTEM 3000, for instance, with the 500 being a very simple low cost system with the basic survey needs and the 3000 being one of the most sophisticated systems available to satisfy even the most demanding surveyor.

All Navitronic systems can be upgraded at any time and other configurations are being planned. By bringing hardware and software together in such packages they make it easier to select the specific system the hydrograper needs without worrying about connecting external devices.

Marshall Macklin Monaghan

Marshall Macklin Monaghan Ltd. are busy with the new Terminal Three of Pearson International Airport at Toronto. As prime consultant and project manager their responsibilities include co-ordinating the usual legal survey and mapping crews as well as land-use planners, transportation, municipal, mechanical, electrical and structural engineers.

This huge project involves up to one third of MMM's 550 people at any one time, some of them having the sole task of coping with the maze of government and other agencies. This effort culminated in a start on construction the day after the deal with Transport Canada was finalized, and allowed the two-year design phase to be completed in six months, and final completion of the project expected in 1990.

International Centre for Ocean Development

The International Centre for Ocean Development (ICOD)) has recently developed a suite of computer programs to help with delimiting maritime boundaries. Known as DELMAR, this program will run on IBM and compatible PCs and performs many of the functions previously requiring a large mainframe.

Galo Carrera [who is also V-P of Atlantic Branch of the CHA] developed this suite of programs which computes areas; determines 12, 200 or 350 mile offshore limits; delimits equidistant boundaries; and also handles "partial effects" or abnormal delimitations over part of the boundary. He says it is an ideal tool to answer all those What if? questions that come up when working on agreements to resolve maritime disputes.

Knudsen Engineering

Don Knudsen, President of Knudsen Engineering of Perth, Ontario (and a member of Central Branch of CHA), has won the 1989 Manning Award of Merit for Knudsen's DAISY sonar. This $25,000 award is an annual award established to salute Canadian innovation.

DAISY (Digital Acoustic Imaging SYstem) bridges the gap between underwater video cameras which are effective only in clear water at short ranges and conventional sonars. Knudsen Engineering is now developing a forward-looking version of DAISY for detecting mines and other underwater obstructions. This is expected to be introduced early in 1990.

Ross Laboratories

Ross Laboratories Inc of Seattle, Washington have won a contract to provide a fully automated multi-track hydrographic survey system for the USACE/Philadelphia District. This will be installed on board the S/V Shuman.

The sweep system will include retractable booms and 10 transducers, providing a swath width of 60 feet. With booms retracted the system can operate either on single track or as a 25' sweep employing only the hull-mounted transducers.

The contract includes complete software for set-up, vessel guidance, data collection and post-processing. Off-line programs include contours, colour plots and volume computations. In a word, a turn-key system including installation, interfacing and training.

Krupp Atlas Electronik

Krupp Atlas Electronik of Bremen announce that their new Atlas Fansweep swath sounding system gives 100% coverage of the bottom with a width of four times water depth for inshore and coastal use. Using electronic beam-forming techniques to give the coverage with a single transducer assembly, it is designed for operation in depths of 3 metres to 100 metres.

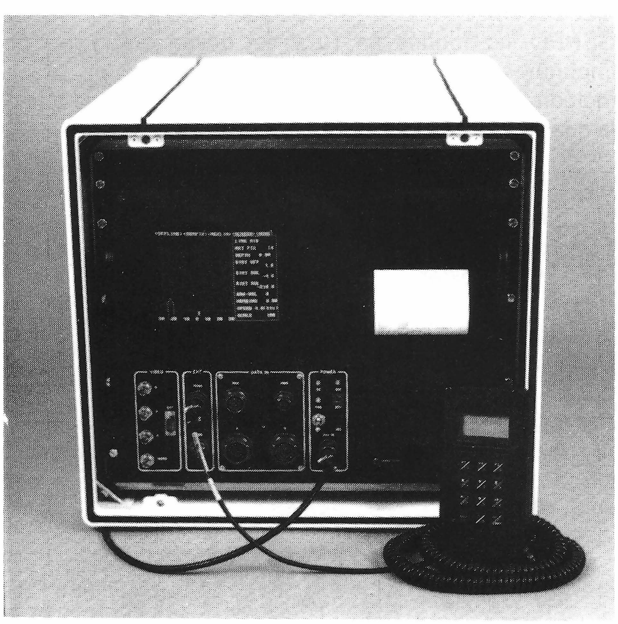
Producing a fan of up to 52 hydro-acoustic beams to scan the bottom in a sector of up to 126 degrees, the system provides correction for roll and pitch by optional addition of an Atlas HECO 10 heave compensator. It also allows relatively high survey speeds: 10 knots with a longitudinal beam width of 8 degrees or 5 knots for the higher definition resolution of a 4 degree beam width.

Andrews Hydrographics

Andrews Hydrographics Ltd of Reading, UK, announce that their new NAVBOX is now available. This is a ruggedised portable data acquisition system for offshore surveys.

The compact IBM-based system operates from a 24VDC supply to log and process in real-time. All input data can be time-tagged every 1/100 sec or related to any other readings.

Just 63 x 53 x 43 cms, this complete system includes twin processors, digitiser, keyboard, real-time colour monitors and printer. Data are recorded on standard discs and the whole system can be easily installed.



Quester Tangent

Quester Tangent announces a new ISAH Rugged Keyboard. This compact, shock-resistant, weatherproof instrument provides a full two-line console interface to your launch system. The ISAH Hydrographic terminal offers tactile feedback keys, firmware programmable key functions and a two-line by 40 character, low-power, super-twist LCD display. In combination with the ISAH backlit LCD, 640 x 200, flatscreen display, this new product provides an operator interface suited to the survey environment aboard open boats or major ships.

Association of Canada Lands Surveyors: Update

by Geof Thompson and Sean Hinds

The Association of Canada Lands Surveyors (ACLS) will become a self-regulating body in 1994 if a proposal for the transfer of responsibilities from the Board of Examiners goes as planned.

A letter dated July 7, 1989 from Gerard Raymond the Surveyor General & Director of Legal Surveys Division, Energy Mines and Resources, outlined the process. The five major points of the letter are as follows.

1. Over the next five years the Legal Surveys Division is planning to implement some major changes affecting the practice of the Canada Lands Surveyor (CLS) and the survey of Canada Lands. The changes are part of an on-going program of modernization and streamlining to meet the challenges lying ahead, particularly in the survey of Indian Lands and the offshore.

2. The Board of Examiners for Canada Lands Surveyors has changed the CLS examination syllabus in order to ensure that the CLS is adequately equipped to handle some of the functions previously handled by the Legal Surveys Division. These new examinations will be implemented in 1991 for all new candidates for a commission.

3. Legal Surveys Division has established a Liaison Committee with the ACLS which has the specific task of examining a proposed transfer of the responsibilities from the Board of Examiners to the ACLS. The proposal was approved in principle by the Department and implementation over a number of years will commence when funding is secured.

4. The transfer will mean that the ACLS will assume the responsibilities for syllabus development, examination of candidates and discipline of CLSs presently in the Board of Examiners' mandate. Membership in ACLS will then become a condition of being able to practice as a Canada Lands Surveyor. In addition, it

will become the policy of Legal Division that as sufficient number of CLSs are resident throughout various areas of Canada, surveys of Canada Lands in those areas will only be carried out by surveyors holding CLS commissions. This change will supersede the current practice of authorizing surveys of Canada Lands in a province to be made by a person holding a commission for that province.

In the summer of 1989 the ACLS conducted a ballot vote to convey the opinion of its membership to the Department on this move to self-regulation. The ACLS executive also attempted to canvas all CLSs who were not members of the ACLS by contacting them at their last known address and giving them an opportunity to join the association and vote on this important issue.

The ballots were tabulated on August 28, 1989. Ballots were received from 72.4% of the 355 ACLS members. They were 83.7% in favor of the transfer.

As a result of the ballot The Board of Directors of the ACLS passed the following Resolution:

> **That the Board of Directors of the Association of Canada Land Surveyors has been given a clear mandate by the membership to proceed with the implementation of the transfer of the responsibilities of the Board Of Examiners for Canada Lands Surveyors to the Association of Canada Lands Surveyors as described in the Proposal circulated with the ballot.**

Future ACLS Updates will discuss the proposal and its ramifications on the hydrographic profession in terms of jurisdiction, membership costs, professional recognition, continuing education and related topics as they become apparent. Updates will also track the proposal as it works its way to becoming Law. If you have any questions regarding the proposal, the ACLS or membership, their address is:
Association of Canada Lands Surveyors
P.O. Box 4059, Station E
Ottawa, Ontario, Canada K1S 5B1

Sustaining Members

Aanderaa Instruments Ltd.
560 Alpha Street, Victoria, British Columbia, V8Z 1B2
contact Gail Gabel

CARTOSAT Inc.
6020 Jean Talon Est Bureau 800
Montreal, Québec, H1S 3B1
contact G.-H. Huard

Garde côtière canadienne
104 rue Dalhousie, Suite 311, Québec, Québec, G1K 4B8
contact Claude Duval

GENEQ
7978 rue Jarry Est, Anjou, Québec, H1J 1H5
contact Maurice Parisé

Hydro-Québec
855 rue Ste-Catherine Est, Montréal, Québec, H2L 4P5
contact A. Turgeon

IDON Corporation
875 Carling Avenue, Ottawa, Ontario, K1S 2E9
contact Herbert Brown or James Feeley

Institut Maritime du Québec
53 St-Germain Ouest, Rimouski, Québec, G5L 4B4
contact Claude Jean

Krupp Atlas Elektronik
1075 Central Avenue, Clark, New Jersey, USA 07066
contact Karl Wm. Kieninger

Quester Tangent Corporation
9865 West Saanich Road, Sidney, British Columbia, V8L 3S3
contact John Watt

Terra Surveys Ltd.
1962 Mills Road, Sidney, British Columbia, V8L 3S1
contact Rick Quinn

TOPOMARINE Inc.
2960 Boulevard Laurier, Suite 501
Ste-Foy, Québec, G1V 4S1
contact G. Biliveau

Each issue of Lighthouse contains information about some of our sustaining members. This time we can tell you about five of them:

GENEQ inc.
GENEQ inc. fondée en 1972 est devenue l'un des plus importants distributeurs canadien d'équipement pour la météorologie, l'hydrologie, la limnologie, l'océanographie et la qualité de l'eau.

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GENEQ inc. publiera sous peu un nouveau catalogue décrivant les produits qu'elle distribue. Les personnes intéressées à recevoir ce catalogue peuvent en faire la demande immédiatement aux adresses suivantes:
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Le secteur Aides et Voies Navigables
La Garde côtière canadienne comporte huit divisions, dont sept à caractère opérationnel: parmi ces divisions mettons pour un instant le cap sur celle des Aides et Voies Navigables et découvrons ses principales activités.

Bien connu des gens de l'industrie maritime, la division Aides et Voies Navigables a comme rôle de mettre en oeuvre les politiques, plans et règlements régissant la prestation, l'exploitation et l'entretien du réseau d'aides à la navigation et du Système des services du trafic maritime. Elle doit aussi administrer et appliquer la législation sur la protection des eaux navigables et du receveur d'épaves et assurer la conception, la réalisation ou l'acquisition, l'acceptation technique et l'entretien des bâtiments, structures et installations nécessaires aux opérations de la Garde côtière canadienne. Les Aides et Voies Navigables sont également responsables des levés hydrographiques et du dragage du Chenal du Fleuve Saint-Laurent, de Montréal à l'île aux Coudres et de Saint-Fulgence à Pointe-à-l'Islet.

Pour assurer tous ces services de la façon efficace faisant la renommée de la division, sept secteurs permettent de remplir les objectifs visés, soit: Voies Navigables, Bases, Planification, Services du Trafic maritime, Protection des eaux Navigables, Génie et Dessin et graphisme, le tout sous la direction du Gestionnaire régional, M. Claude Duval.

Bref, la division des Aides et Voies Navigables est l'un des maillons importants de la Garde côtière canadienne, organisme gouvernemental ayant à coeur la sécurité du public.

Département de navigation
Institut maritime du Québec à Rimouski
L'institut maritime du Québec à Rimouski est affilié au réseau des CEGEP du Québec. L'institut est composé des départements de navigation, de mécanique marine, d'architecture navale et de radio électronique maritime. Maintenant parlons plus spécifiquement du département de navigation.

Le département de navigation dispense une série de cours menant au droit à l'obtention d'un brevet d'officier de marine marchande. Pour ce faire en plus des cours données à l'institut maritime, une partie des cours est suivie au centre de Fonction d'Urgence en Mer situé à St-Romuald sur la rive sud près de la ville de Québec. Ce centre est rattaché à l'institut maritime du Québec.

Une formation complémentaire est aussi donnée dans d'autres domaines touchant le milieu marin, par exemple un cours donnant droit à un brevet de plongée sous-marine. Et tout récemment un cours d'hydrographie qui est reconnu au niveau du ministère des Etudes Supérieures et de la Science du Québec ainsi que par le service hydrographique du Canada. L'institut maritime est sur le point de soumettre sa canadidature pour fair homologuer son cours d'hydrographie par le FIG/OIH.

IDON Corporation
IDON Corporation have an update for us on their MACDIF Project Activities: T.V. Evangelatos of the Canadian Hydrographic Service, and C.D. O'Brien and W.T. Lalonde of IDON Corporation took part in a successful MACDIF/GIS Workshop organized by the Alberta Research Council in Edmonton in September.

D.G. McKellar, DND, made a presentation at SHAPE in Bruxelles on MACDIF and GDA (Geographic Document Architecture) in October.

C.D. O'Brien gave two presentations on MACDIF and Electronic charts to the International Symposium on Operational Fisheries Oceanography in St. John's Newfoundland in October.

IDON staff are working with USL in Fredericton, assisting Offshore Systems Ltd. (OSL), a west coast-based company in developing their enhanced Electronic Chart Display System (ECDIS). CHS, Central & Arctic Region is also heavily involved in this project. It is possible that there will be a demonstration of a shore-to-ship telecommunication of chart updates in the spring of 1990.

Krupp Atlas Elektronik GmbH
Krupp Atlas Elektronik is headquartered in Bremen in the Federal Republic of Germany. The activities of Krupp Atlas cover a wide variety of applications including the engineering, design, and marketing of high technology radar, echo sounders, sonar and hydrographic survey equipment.

SURNAV CORPORATION is the KAE agent in Canada for hydrographic survey equipment. Their address: 1000-38 Antares Drive, Nepean, Ontario, Canada K2E 7V2. Telephone: (613) 723-1830. Telefax: (613) 723-0786. Contact: Harold Tolton.

Krupp Atlas Elektronik is a company dedicated to continuous future oriented research and development. The equipment and systems which are developed will meet not only the demands of today but also the needs of tomorrow.

Krupp is introducing the following products:
FANSWEEP KAE is applying the electronic beamforming techniques used in the deep water HYDROSWEEP to coastal areas. The fan of up to 52 beams, sweeps the bottom in a 126 degree sector, i.e. a swath can cover a width equal to four times the water depth. The acoustic transducer can be installed on a small boat and can also be supplied in a portable outboard configuration.

POLARTRACK is a 3-dimensional laser tracking and dynamic position fixing system that has the following features: automatic tracking of "passive targets"; 3-dimensional position fixing up to 10 times per second; centimetre resolution; single, compact fixed station; full remote control facilities via telemetry link; and simple integration into data processing and automated survey systems.

DESO 25 is a universal survey echosounder that has two active sounding channels and two additional recording channels for echo strength and for the overview recording. A noise free, dust-free thermal recording technique has replaced the revolving stylus. Achievable depth of measurement can be increased to 10,000 metres.

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CHA Social News

Obituary - D'Arcy Charles 1910-1989

The Canadian Hydrographic Association is saddened by the death of D'Arcy Charles, one of the earliest members of the CHA, and a longtime staff-member of the Canadian Hydrographic Service.

Mr. Charles was born in Westmount, P.Q. in 1910. After two years at McGill University, where he studied biology, engineering and surveying, he held a number of jobs in agriculture. Mr. Charles enlisted in the Navy in 1939 and served throughout the war as a Canadian officer on loan to the Royal Navy, all his service being on minesweepers. After the war, with his expertise gained in minesweeping which required great precision in navigation, Mr. Charles joined the Canadian Hydrographic Service in 1945 as a hydrographer.

In 1950 Mr. Charles was appointed HIC of his first Arctic survey, working at the head of Frobisher Bay. At the completion of the survey, on a hunch that Pike-Resor Channel might be a feasible route he sent a launch through the Channel and obtained a line of deep soundings. This route was developed in 1957 and is now the recognized safe navigational passage into upper Frobisher Bay.

Mr. Charles returned to Frobisher Bay in 1951 and from 1952 to 1956 he surveyed Ungava Bay. In 1957 he surveyed the south coast of Newfoundland from Cape Race to Cape Ray. In 1958 he returned to the Arctic as HIC on board CSS Baffin, and surveyed Resolute Bay and Radstock Bay.

From 1950 to 1962 Mr. Charles spent 12 seasons in the Arctic; his surveys opened much of Ungava Bay and the eastern Northwest Passage to shipping. Although D'Arcy Charles retired in 1969, having spent his last 2 years with the CHS as Chief of Ships Division, he remained a member of the CHA and participated in many of Ottawa Branch's activities.

We extend our condolences to D'Arcy's wife Colleen, and to their children: Christopher, Jennifer and Peter.

Obituary - Ralph Wills 1918-1989

Ralph Wills was a longtime CHA supporter and a Life Member of Pacific Branch. He died peacefully on June 12, 1989 at Royal Jubilee Hospital, Victoria, BC, after a lengthy illness.

Born in Ottawa on September 2, 1918, Ralph was educated in Montreal and Winnipeg and on HMS Conway. He served with the RNR from 1939, transferring to the RCNR in 1946 with the rank of Lieutenant Commander. He obtained his Master (Foreign Going) Certificate in London, UK, in 1946 and sailed with Western Canada Steamships until he joined the Canadian Hydrographic Service in 1954.

He retired as Regional Field Superintendent of the Pacific Region of the CHS at the Institute of Ocean Sciences. He is survived by his loving wife Susette, son Mike and daughter-in-law Debbie, daughter Maureen and her husband Peter Songhurst, and grand-daughter Jennifer.

A donation has been made to the Victoria Cancer Clinic by his friends in the Pacific Branch of CHA.

Section du Québec

Le conseil d'administration de la Section du Québec a accueilli en ses rangs Geneviève Robichaud en remplacement de Patrick Hally, administrateur démissionaire.

Notre Section a soumis différents projets au Programme de création d'emploi Défi 89, à l'Article 25 (antérieurement Article 38), à Science et Culture Canada et à Science et Culture Québec. Tous ces projets se rapportent au kiosque et au vidéo dont notre Section s'est dotés l'année dernière.

Le projet Défi 89 a été accueilli favorablement, ce qui a permis l'embauche d'un étudiant, Frédéric Cyr. Il s'est occupé principalement de la promotion du kiosque ainsi que de la révision de la comptabilité de la Section du Québec.

Les projets Article 25 et Science et Culture Canada n'ont pas eu de réponse favorable par manque de fonds des organismes concernés. Notre Section est dans l'attente d'une réponse du projet Science et Culture Québec.

La Section du Québec a participé à deux expositions qui se sont tenues à Rimouski. La première exposition avait pour thème les loisirs et tout ce qui s'y rattache, elle a été rendue possible par la participation exceptionelle des membres de notre Section, en tant que représentants au kiosque pour y faire le promotion de 'Association Canadienne d'Hydrographie.

La deuxième exposition avait pour thème la sécurité et le travail à bord des navires. L'Association Canadienne d'Hydrographie a pu bénéficier d'une visibilité internationale, car des participants des cinq continents étaient présents à ce colloque. Des entretiens des plus intéressants y ont été réalisés entre les représentants de la Section du Québec et des autres participants. Les coordonnateurs de ce colloque ont l'intention d'en tenir un autre dans deux ans. C'est à voir.

Le kiosque est disponible pour des expositions ou autres événements d'intérêt qui se tiendraient dans les autres Sections de l'Association. Notre Section est à monter une cassette vidéo de deux heures bilingues (versions française et anglaise en alternance) pour les événements où le kiosque sera présent.

Des démarches ont été entreprises pour obtenir une franchise de distribution des cartes marines du Service hydrographique du Canada. La Section du Québec veut ainsi atteindre les navigateurs et les pêcheurs de façon plus tangibles, en mettant une emphase sur la sécurité nautique en plus de les informer sur l'hydrographie.

La Section du Québec a lancé une campagne de recrutement en début d'année. Le tirage d'un montant de $100.00 a été attibué parmi les membres qui ont recruté un ou plusieurs nouveaux membres en octobre dernier. Félicitation à M. Sylvain Guimont qui s'est mérité le prix.

Central Branch

We wish a warm "Welcome back" to our members returning from their labours in the field. Now is the time to catch up on cutting the grass, painting the bedrooms, fixing the storm windows, and all those other delights our families have been saving up for us.

Our Membership Committee reports that Central Branch paid-up membership now stands at 79, with 38 members with CHS at CCIW in Burlington and 40 members in private industry etc. We also have Krupp Atlas Elektronik as a Sustaining Member and our contact there is Karl Kieninger, Manager of Marine Systems. Karl sent us a note about the new FANSWEEP system introduced by KAE. He says "With the new FANSWEEP system, KAE is now applying the electronic beamforming techniques used in the deep-water HYDROSWEEP to coastal areas". Harold Tolton of Surnav, the Canadian agent [and a Sustaining Member of Ottawa Branch of the CHA], would be glad to answer your questions. Contact him at (613) 723-1830.

Since our last Lighthouse report we have signed on four new members: Darren Keyes, Marine Geophysical Technologist, McQuest Marine Sciences, Burlington; Don Knudsen, President of Knudsen Engineering Ltd., Perth, Ontario; John Halsall, President of J. Halsall Engineering Surveys, Richmond Hill, Ontario; and Mark Stortini, Hydrographic Survey Assistant with Public Works Canada. Welcome aboard! We look forward to introducing you to fellow members at our Branch meetings. Not to mention the free beer and Pizza.

This is the year that our membership matured to the point where the Out-House members out-number the In-House members! At the moment our Branch Executive includes one Out-House member - Jim Berry - and he has been contributing a lively column to our newsletters this past year. His column helps keep a very valuable communication link open between our members which is vital to the health of an organization such as ours with its members so widely spread.

Our Branch NewsLetter appears after each Branch meeting primarily as a vehicle to circulate minutes of our meetings, along with news of members and reports from our committees. This is a very effective way of keeping our members in touch and also ensures that everyone knows about upcoming seminars, meetings and other events. The summer editions of our newsletter are bigger and have special articles and reports as well as news of the other Branches and items of general interest.

Our Seminar Committee arranges an interesting and worthwhile program for us, with most seminars scheduled in conjunction with our evening business meetings and some during the day. This format works well and enables all our members to attend most of our Branch events.

Our mid-summer barbecue this year was again hosted by Bruce and Jo Anne Richards. They moved this summer to an even more spacious lot than they had last year (to give space for their three horses) so our barbecue made a good house-warming for them. Lots of fun, great weather, and a good time was had by all. Not to mention the case of wine and the keg of chilled beer!

This coming February we will be presenting our Annual H2O Bonspiel. This will be our 20th Annual Bonspiel. There are only 64 spaces due to ice limitations so make your bookings early. Thanks to our generous sponsors there are prizes for all curlers as well as trophies for the winning teams. Get your names in soon so you too can have an active part in our 20th Annual H2O Bonspiel.

The Central Branch of the Canadian Hydrographic Association also sponsors the Wade Essay Award in honour and memory of G.E. Wade. This annual competition is designed to encourage good writing skills and is open to all full-time students enrolled in any cartographic or hydrographic courses. Any assignment written during the course of study - either as an assignment for one of the courses or especially written for our competition - is eligible and entries to the 1989/90 Wade Essay Award are being accepted [write to V-P, Central Branch of C.H.A., P.O. Box 5050, Burlington] until the end of May.

The ideal length for this Award is about 2,500 words but shorter or longer contributions are equally welcome. Two First Prizes of $100.00 are available to be won each year. Two Second Prizes of $50.00 may be awarded at the judges' discretion. Winning entries are also submitted to Lighthouse for publication.

We are delighted to announce that the 1988/89 Wade Essay Award was won by Gillian de Gannes for an essay on the Cartographic History of Australia. Originally written as an assignment for a cartography course at Western University, London, Ontario, this will be published in the next edition of Lighthouse. Congratulations, Gillian! Your First Prize of $100.00 is on its way.

International Membership

Membership in the Canadian Hydrographic Association is open to people in other countries as well as residents of Canada. It is available to anyone who is interested in keeping in touch with hydrography in Canada, and the International Member is a full member with the same rights and privileges as other members.

Since our last Lighthouse report we have welcomed several new International Members to the CHA: Lieut. Zaaim bin Hasan, a hydrographer with the Royal Malaysian Navy; L/S Razalini Ruji, a cartographer with the Royal Malaysian Navy; Lieut.Cdr Ian M. Bartholemew RN, the Chief Hydrographer of Fiji; Stephen Hart, hydrographic surveyor with Survey Directorate of Bahrain; Pat Sanders, Director of Coastal Oceanographics, Durham, CT, USA; N.J. Margetson, hydrographic student, Amsterdam Nautical College, Nederland; Captain Keith Millen, Hydrographic Officer, Port of London Authority, UK; Fosco Bianchetti, Director of C-Map (Coded Mapping) of Italy; and W.P.H. Kouijzer, Hydrographer with Royal Netherlands Navy.

To each of you we extend a warm welcome to the CHA and remind you that you have a full voice and vote in our Association. You are most welcome to attend meetings of any Branch of the CHA if you happen to be within reach, so let us know in good time if you are planning a trip to Canada.

As specified in our by-laws, the International Membership is administered as directed by the National President and he has arranged that Central Branch will administer this important segment of our membership.

The cost of International Membership per year is $30.00 (Canadian) or the equivalent in Sterling or US currency. As well as receiving their copy of Lighthouse each Spring and Fall, International Members also receive the Central Branch NewsLetter. This newsletter helps keep us in touch with CHA happenings between issues of Lighthouse and is published several times each year, one being issued after each Branch meeting to circulate the Minutes and one or two larger issues being published during the summer (field season) months with more general news.

Input by Members (and non-members) to the Central Branch NewsLetter and to the journal Lighthouse is always welcome, so drop us a line with your news and views. And finish that article you were working on last month and send it to us!

Due to administrative difficulties the CHA lost touch with many International Members enrolled prior to 1987. If you are one of these earlier members please contact us. We would like to re-establish contact with you and have you on the correct mailing list again.

Newfoundland Branch

Julian Goodyear will participate in evaluating the Swath Ocean 2000 vessel from November 1989 to January 1990. This vessel is designed to operate with negligible pitch or roll in weather conditions with swells of up to two metres. It is claimed that under such conditions a glass of water will stand without a spill. Well. Julian is going to check it out and let the world know.

Graham Rankin is going on the Hydrography II course, where he will be joined by Dave Thornhill who has just transferred to Pacific Region.

Newfoundland Region will be participating in the Marine Show in St. John's November 2 to 4, 1989. We took part in the Fish, Fun & Folks Festival at Twillingate, Newfoundland, in July and came back with good memories. We'll join them again next year!

This is probably the last full season for CSS MAXWELL because our new survey vessel is expected in 1990. There is a contest in the high schools of Newfoundland to name this new vessel. This contest has really caught the imagination of our communities, perhaps partly because of the interesting prize: an all-expenses-paid trip to British Columbia to participate in the launching ceremonies! The ship is being built at the Versatile Pacific Shipyards Inc. in B.C. The main dimensions are: Length 51.25 m, breadth 10.5 m, draft 3 m. Her operational speed will be 12 knots with a range of 4,000 nautical miles. Loaded displacement tonnage 950 with a crew of 12 and 7 scientific staff. She is twin screw with a bow thruster.

This vessel is being designed with oceanography studies in mind as well as hydrography and will be much appreciated by our scientific community here in the Maritimes. Two survey launches have already been built for the new survey vessel: Penguin and Pipit. These are very similar to the P class launch in Atlantic Region but a little smaller.

Our Branch, young though it is, produces a regular newsletter. As well as the usual CHS and CHA news we have also been including a regular computer program for programmable calculators. This is a feature we feel will be of increasing value to our members and would make our newsletter part of a surveyor's reference library.

Our membership continues to grow and we are eager to get back from the field so we can resume our Branch activities. We'll be in touch!

Captain Vancouver Branch

The 1989 Canadian Hydrographic Conference is now a done deal. The Branch extends its sincere thanks to all attendees that made the conference so special and so successful. By all reports, a good time was had by all and the technical sessions were interesting and varied. Furthermore, the excellent attendance has enabled the Branch to donate $3,000.00 to support Lighthouse.

Our first general meeting was a dinner meeting that was held at a local restaurant. Both the meeting and the meal were excellent. The next regular technical meeting was held in September and featured Dr. John Luternauer, Geological Survey of Canada, who is a recognized expert on the growth and development of the Fraser River delta. Dr. Luternauer's topic was "The Physical Development of the Fraser River Delta". The meeting was well attended and a membership to the Vancouver Maritime Museum Society was provided as a door prize.

The Branch's final meeting for this year will be on December 6. It will be our annual general meeting and elections for a new Vice-President and executive will be held.

The Captain Vancouver Branch continues to grow as we seek out opportunities to meet and co-operate with other CHA members from across Canada and around the world. Our Branch's newest member is K.T. Cheang from Borneo and he gave us a very interesting talk one evening on his surveying experiences there. He is a former International Member who now lives in Vancouver.

Best wishes to all Branches in 1990.

Prairie Schooner Branch

The Prairie Schooner Branch has had a quiet summer with most of its members being in the field in Canada and abroad. There has been a bit of an increase in offshore oil and gas related activity this year with the most of it being in the Arctic.

Activities for the year have included several meetings and a luncheon sponsored by the Branch while we were hosting the CIDA-sponsored participants on the Calgary leg of their studies during the Hydrographic Study Program.

Several of our members attended the Hydrographic Conference in Vancouver in March. Papers written and presented there by P.S.B. members were: Integrated SYLEDIS Positioning and Communication by Joe Green, Hugh Stewart and Rae Sutherland; and Prospects for Hydrographic Positioning in the 90's by Gerard Lachapelle.

COLLOQUIUM V was the most notable event in which the Branch participated this year. Sponsored by the Canadian Petroleum Association and co-sponsored by the Alberta Land Surveyors Association; the Canadian Institute of Surveying and Mapping; and the Prairie Schooner Branch, the meeting was a success. Over 100 participants were registered for the 3 days of papers relating to land and offshore surveying in the 90's environment. The GPS courses preceding the Colloquium were well attended. Congratulations for a job well done to the organizing committee; Gerard Lachapelle - Chairman, Jim McLellan - Logistics, Brent Wanless - Publicity, Tony Melton - Finance, Stephen Nichol - Exhibits, Gordon Steeves - Secretary and Diana Parnell - Registration & Information.

Don Roberts and Frank Colton spent the better part of the summer involved with rig positioning in the Canadian Beaufort Sea and Alaska for Canadian Engineering Surveys.

Hugh Stewart spent much of his time in the Arctic involved in Gulf's exploration activities in the north.

John Brigden of Brigden Survey Consulting, had two stints of one month each doing site survey work in Papua, New Guinea.

Joe Green of Hi-Flight Engineering was involved with the design of an Arctic navigation network used for various exploration activities this year. He also did some R & D work on a navigation and guidance project for unmanned airborne surveys.

Bruce Calderbank of Hydrographic Survey Consultants worked in the Gulf of Mexico for Teledyne Raydist on a project to locate a sunken oil rig with sonar.

Gerard Lachapelle attended the Inmarsat conference in London in July and recently participated in the I.O.N. GPS Conference in Colorado Springs as chairman of the Differential GPS session. He was elected chairman of the Canadian Navigation Society during the summer and is presently acting chairman of the Department of Surveying Engineering at the University of Calgary until the newly appointed chairman Dr. K.P. Schwartz returns from sabbatical at the end of this year.

Welcome to the Prairie Schooner Branch to new member Joe Green and a former International Member Trudy Kamphuis who is now living in Calgary.

Atlantic Branch

Atlantic Branch now has 75 paid-up members, with a few delinquents still not heard from. Those persons waited too late so their names are now missing from the membership roll. We apologize to certain other members if their names are inadvertently missing from the list. We'll issue corrections in the next issue of Lighthouse.

Two new CHS field staff, Steve Nunn and Tom Rowsell, were taken on strength this summer. Both are prospective new members of Atlantic Branch of CHA. Our Membership Committee have this matter in hand and we are just waiting for the two potential members to be "born-again".

The ranks of our future hydrographic personnel grow apace: Steve and Ann Forbes had a son Andrew William on March 23, 1989, as also did Mike and Karen Collins: Sean Patrick on April 25, 1989.

Our V-P, Galo Carrera, and Martha are expecting their first child around November 3, 1989.

Gordie Stead is getting married on October 28 to Betty Brooking. Congratulations!

Stu Dunbrack managed to get a hole-in-one while playing golf the other day. Stu says the chances of achieving this are around 1 in 47,500, which are somewhat better than the chances of him a) having a good drive off the first tee or b) sinking a nice putt on the 18th green.

Heather Joyce has moved from Tidal Section to a full-time position in field surveys.

CHS/CHA Volleyball started up on October 18 for our fall and winter season. Judy Lockhart deserves our warm thanks for organizing everything single handed. Now let's all get out and join in!

Odette Nadeau was DFO's United Way Employee Campaign Co-ordinator for BIO this year and reports a 20% increase in the number of CHS contributions. A total of $2,931.00 was collected from CHS which makes us eligible for a Merit Award. Mike Lamplugh and Dick MacDonald served as canvassers for CHS staff.

Ottawa Branch

Ottawa Branch membership now totals 60 members and we warmly welcome our newest members: Helen Morgan (DFO); Richard Horrigan (CHS); Denis Chartrand (CHS); Jan Wentzel EMR); Robert Janes (EMR); Anna Singereff (CHS); Carole Prest (CHS); and David Black (CHS). Another addition to our ranks this year is Peter Kielland, recently transferred to Ottawa from Quebec Region of CHS.

The winners of the Branch's membership drive prizes were: renewing members - Warren Forrester; new members - Richard Horrigan.

Thanks to the work of Ilona Hibert-Mullen, the Branch held a very successful Pre-Canada Day Picnic, June 29, at Mooney's Bay Park. Over 50 members and their guests attended. Special thanks to Blackburn Hamlet Loeb IGA, and the Environment Component of PSAC for helping to sponsor the event.

Lt. Commander James Bradford gave a presentation on "Canada's Navy and Coastal Defence" at a pizza luncheon on June 29, 1989. Marilyn Van Dusen organized a number of noon hour screenings of National Geographic Specials that were well attended. Peter Kielland presented his paper "The Cost Benefit of GPS for Hydrographic Surveyors" on September 25, 1989.

Ottawa Branch Christmas Luncheon: This year's luncheon will be held on Dec. 14 at the Continental Dining Lounge at the

Nepean Sportsplex. We extend an invitation to any CHA members who will be in Ottawa that day.

Activities by members:
Ross Douglas attended the Five Nations Conference on Defence Mapping and Charting held in Hawaii, October 1989.

In October Tim Evangelatos attended an IHO meeting on standards at the Belgian Hydrographic Service in Ostend, after which he went on to visit the German Hydrographic Service in Hamburg. He also got an all-expenses-paid trip to Japan to take part in the IHO Committee on Exchange of Digital Data in Tokyo, 23 - 28 October. Perhaps we'll hear more about these activities in future articles in Lighthouse.

Dick MacDougall attended the 1989 ORACLE Users Week in Dallas, Oct. 1 - 6, 1989.

Mike Casey was the coordinator of the Ontario Championship Speed Skating for the Special Olympics Meet, Ottawa, March '89. In June Mike battled wind and rain to complete the 350 km Rideau Lakes Tour.

P.K. Mukherjee has accepted a two-year assignment with the International Maritime Organization. P.K. is now the Senior Deputy Director of the IMO International Maritime Law Institute in Malta.

Pacific Branch
Traditional summer activities have occupied the majority of CHA members over the last few months. For some these involve field work from the Arctic to the Okanagan. Others, perhaps more fortunate, have taken summer vacations to exotic and not so exotic places, as well as conducting normal production routines. The CHA Pacific Branch Executive has met four times during the summer and in October Branch meetings and seminars will recommence.

The 19th Annual IOS Golf Tournament was held at Prospect Lake golf course on July 28th and, again, was a real "slice". Over 72 people, some of whom were golfers, participated and enjoyed sunshine, steak, booze and fantastic prizes. For the umpti-ninth time Mike Foreman walked away with the trophy. Our warm thanks go to Ardena Phelp and to the many sponsors who contributed so generously.

CHS activities:
The barge PENDER party finished their surveys in the Estevan-Hesquait area of Vancouver Island's west coast and in September were towed from their temporary residence in Hot Springs Cove to Ewin Inlet on Bligh Island. Later they moved to Mooyh Bay to put in control and tide gauges, planning to finish their season in Nootka Sound area in early October.

The CSS RICHARDSON party completed some work in Milbank Sound area then after the mid-season break worked on surveys in the Houston-Stewart Channel area of the Queen Charlotte Islands until closing the season at the end of September. The project will continue next year.

CSS JOHN P. TULLY sailed on July 12th for Dutch Harbour on her Arctic cruise, Alex Raymond and George Schlazintweit going on to Tuktoyaktuk to deploy ARGO for her arrival. Reports indicate that a good time was had by all during her highly successful season in the Beaufort and the team came home at the end of September.

Janet Lawson completed her Hydrography I (Field) and then went on board the barge PENDER.

Knut Lyngberg continued swath sweeping offshore south of Kristiansand/Lizzesand, Norway, then had a break, travelling by rail to Horten to pick up a survey launch and sail it back to Kristiansand, seeing much of Norway's southern coastline en route. He'll be returning home at the end of October.

Doug Popejoy received a letter of commendation from the Director Science, Dr. John Davies, for his actions in fighting a fire aboard CSS REVISOR. Though the engine compartment was heavily damaged, Bob Taylor and he helped to avoid the total loss of the vessel. Doug also recently completed 25 years with CHS. Congratulations, Doug, on both counts! Your plaque awaits.

Tony Mortimer has been seconded to the Public Review Panel on Oil Tanker Safety for a few months.

Our intrepid National President is a member of Pacific Branch. At the end of July he went on a voyage of discovery with Dr. Lyn Lewis to the Carey Islands which lie between Canada and Greenland. He carried out a reconnaissance survey to determine a safe anchorage for icing-in a research vessel which will be a base for investigation of the "North Waters" over the next three years.

Willie Rapatz went to the USSR in July to represent Canada at Tsunami-related meetings. He returned from Siberia on the Trans-Siberian Railroad and after a suitable period of recuperation returned to IOS more or less intact. Velcome back, Komrade.

Personal items. Congratulations and best wishes to Sev and Dianne Crowther on the occasion of their recent wedding.

And Carol (Nowak) and Ken (Halcro) also finally did it. A splendid affair and a new house to boot.

Congratulations to Dave and Vicki Prince on the arrival of two daughters this past year, and to Elaine and Paul Lacroix for a baby girl, also to Kathy and Ernie Sargent.

Dave Jackson, after winning a recent promotion, is off to Europe for a little R and R.

The Chart Production staff of CHS Pacific Region are excited about having become the foster parents of two children in under developed countries.

Ten year old Mungade of Zimbabwe and seven year old Marcel of the Philippines have become part of the group through Foster Parents Plan of Canada. Pictures, correspondence and progress reports are eagerly anticipated on a regular basis. Anyone interested in participating in this method of assisting the development of our global village can get information from Foster Parents Plan of Canada, 153 St.Clair Avenue West, Toronto, Ontario, M4V 1P8.

Sandilands Retires

Robert William Sandilands (also known as Sandy) has served the government and people of Canada for 36 years. Those years were spent with the Canadian Hydrographic Service (CHS), where Sandy served six Dominion Hydrographers (Smith, Gray, Colin, Ewing, MacPhee and Douglas) and three Regional Hydrographers (Young, Bolton and O'Connor).

When Sandy joined the CHS it was part of the Department of Mines and Technical Surveys. In 1966 it moved to Energy, Mines and Resources; in 1971 the Department of the Environment; in 1976 the Department of Fisheries and the Environment; and in 1979 the Department of Fisheries and Oceans.

Sandy was born and educated in Edinburgh, Scotland and he joined the Royal Navy in 1942. Sandy trained as a pilot in the Fleet Air Arm but after writing off one aircraft, agreed with the Admiralty's assessment that the war would cost less if he changed careers.

Sandy obtained his Commission and was appointed to Combined Operations aboard Landing Craft. After the war, he served with the fleet until 1948 when he became a hydrographic specialist. He had his first command serving in Home Waters and later was an assistant on surveys in the Mediterranean Sea, the Red Sea and the Persian or Arabian Gulf.

In 1954 Sandy married June who was also in naval service. Four days after his marriage, Sandy came to Canada alone, and joined the CHS. June followed nine months later. Sandy spent a few months at Headquarters before being assigned to the Pacific Region. After four years as Senior Assistant on the Marabell and on the William J. Stewart, he became Hydrographer-in-Charge of the Marabell and in 1967 the William J. Stewart.

Later, Sandy was Hydrographer-in-Charge of the Parizeau in the Western Arctic and when Central Region moved from Ottawa to Burlington, Sandy had a one year assignment to Central Region as Assistant Regional Hydrographer.

In 1975 Sandy swallowed the anchor, and came ashore as Head, Sailing Directions, Pacific Region, and remained there until he was appointed Regional Field Superintendent, the position he retired from on October 30.

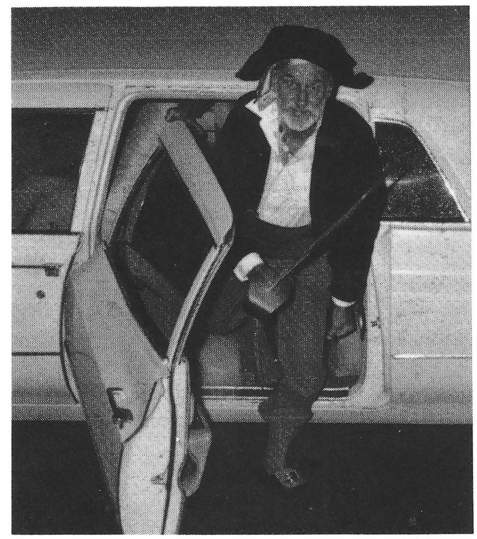
Sandy's considerable contribution, not only to hydrography and surveying in general, but to the Government of Canada as a whole, is demonstrated in the following partial list of his career highlights.

He served on the organizing committee of the First International Hydrographic Technical Conference held in Ottawa with Mike Bolton in the Chair; Sandy was also responsible for the technical program and the publications.

He was one of two CHS representatives on the Department of Energy, Mines, and Resources workshop for "Surveying Offshore Canada Lands for Mineral Resource Development", which resulted in a publication in which Canada led the world in coming to grips with the technical and administrative difficulties faced by Government and industry in conducting those complex surveys.

He served on the West Coast Termpol committee and on the development committee for the Ridley Island complex near Prince Rupert, and contributed significantly to the safety of navigation on the Mackenzie-Athabasca system.

Over the years Sandy liaised effectively with the Ministry of Transport. In particular, Sandy was a member of the MOT marine transport committee for Expo 86.



Sandy arrives at the Uplands Golf Club

Sandy also worked with the Pacific Pilotage Authority.

Sandy was an active member of the Canadian Institute of Surveying and Mapping (CISM). He served as Chairman of the Victoria Branch and as Provincial Councillor for British Columbia from 1983 to 1986. He was a member of the organizing committee of the 1983 CISM Conference held in Victoria where he chaired the technical program committee. Sandy served for many years as the associate editor for hydrography for the Canadian Surveyor, the predecessor of the CISM Journal, in which he has had many papers published.

Sandy was commissioned as a Canada Lands Surveyor (CLS) in 1982, and chaired the CLS Profession Affairs Committee. During his chairmanship, the first steps were taken towards the formation of the Association of Canada Lands Surveyors, which is now an agency with considerable power.

The Canadian Hydrographic Association benefited from Sandy's participation. He is a founding member, past Branch Vice-president, and past National President. He was assistant editor of the CHA journal "Lighthouse", and had 19 articles published in it - no other author even comes close to that figure.

Sandy had a keen interest in the British Columbia Institute of Technology (BCIT), and was a member of their Survey Technology Advisory Committee for eight years. Over seventy percent of current CHS Pacific Regional field staff were recruited from BCIT.

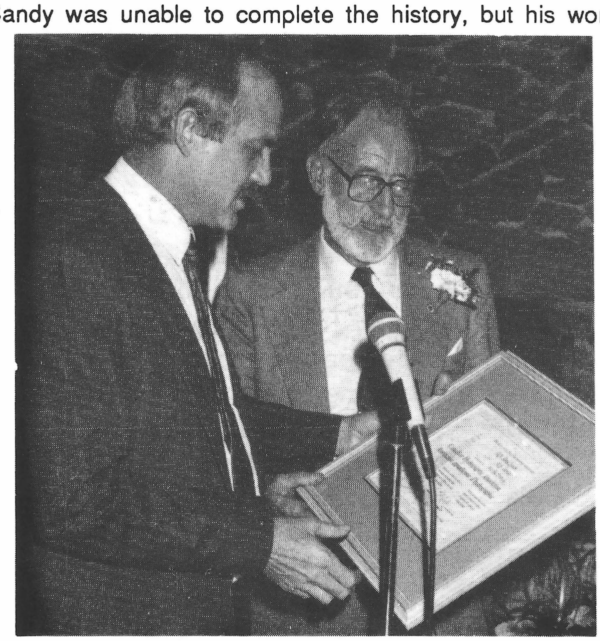
Farewell Dinner

Sandy is a Fellow of the Royal Geographic Society, and for quite a few years was a trustee of the Maritime Museum ending up as Chairman of the board for three years.

The forerunner of the Public Service Alliance of Canada (PSAC), was the Civil Service Federation (CSF). Sandy chaired the local Branch of CSF in the fifties and during his term in office campaigned for a mid-season break for hydrographers. He was successful, and hydrographers in Pacific Region were the first to enjoy a mid-season break.

Sandy's interest in the history of hydrographic surveying in British Columbia developed into a paper he presented in Edinburgh at the Challenger Centennial Conference. His interest expanded to include Great Lakes history when he was invited to deliver a paper at the NEBENZAHL lectures in Chicago in 1977. As a result of these papers and other historical papers, he was approached to write a history of the CHS, for its Centennial in 1983. His resistance to this first approach caused the Dominion Hydrographer of the day, Gerry Ewing, to approach two other individuals who in turn declined saying "why me? - you have the best man for that job in your own organization - Sandy".

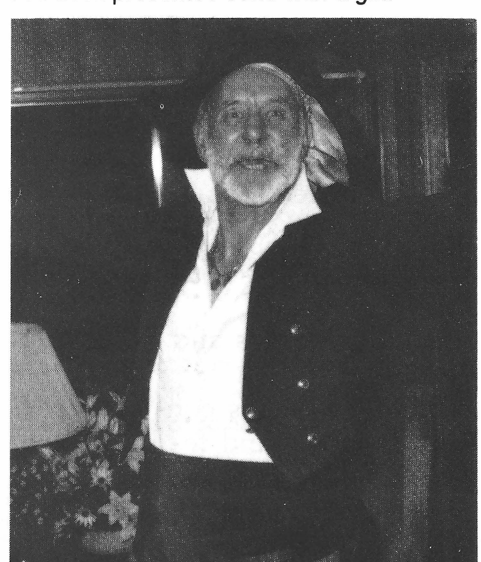
Due to his appointment as Regional Field Superintendent, Sandy was unable to complete the history, but his work resulted in the "Chartmakers" published in 1983, with Sandy listed as co-author.



Presentation by Vice-president of Pacific Branch CHA

Over the last 36 years Sandy has given freely of his time, spreading the word on hydrographers and hydrography. From being keynote speaker at the Association of Nova Scotia Land Surveyors meeting, to speaking at the Oak Bay Lions Club, Sandy is known and respected from coast to coast.

It was a sad day for hydrography in Canada when Sandy decided to retire. His friends and associates gathered on the evening of November 3 to honour Sandy at the Uplands Golf Club in Victoria. Presentations were made by: G. Ross Douglas, the Dominion Hydrographer and Director-General of the CHS; Dr. John Davis, the Regional Director of Science for Pacific Region; Willi Rapatz, representing the Marabell; Sev Crowther, the Regional Chart Superintendent; Ron Parkinson, Marine Division; the Northern Transportation Company Limited; Lorena MacDonald, from the IOS Directors office; B. Smith, the Assistant Director of Hydrography, CHS Atlantic Region; Rick Bryant, the Regional Manager of Aids & Waterways, Ministry of Transport; David Batchelor for the Pacific Pilotage Authority; Sandra O'Connor, executive Director of CISM; B. Lusk, National President of CHA; J. Watt, Vice-president, CHA Pacific Branch; and Carol Nowak, PSAC. Gail Lusk presented June with a gift.



Sandy models new CHS uniform

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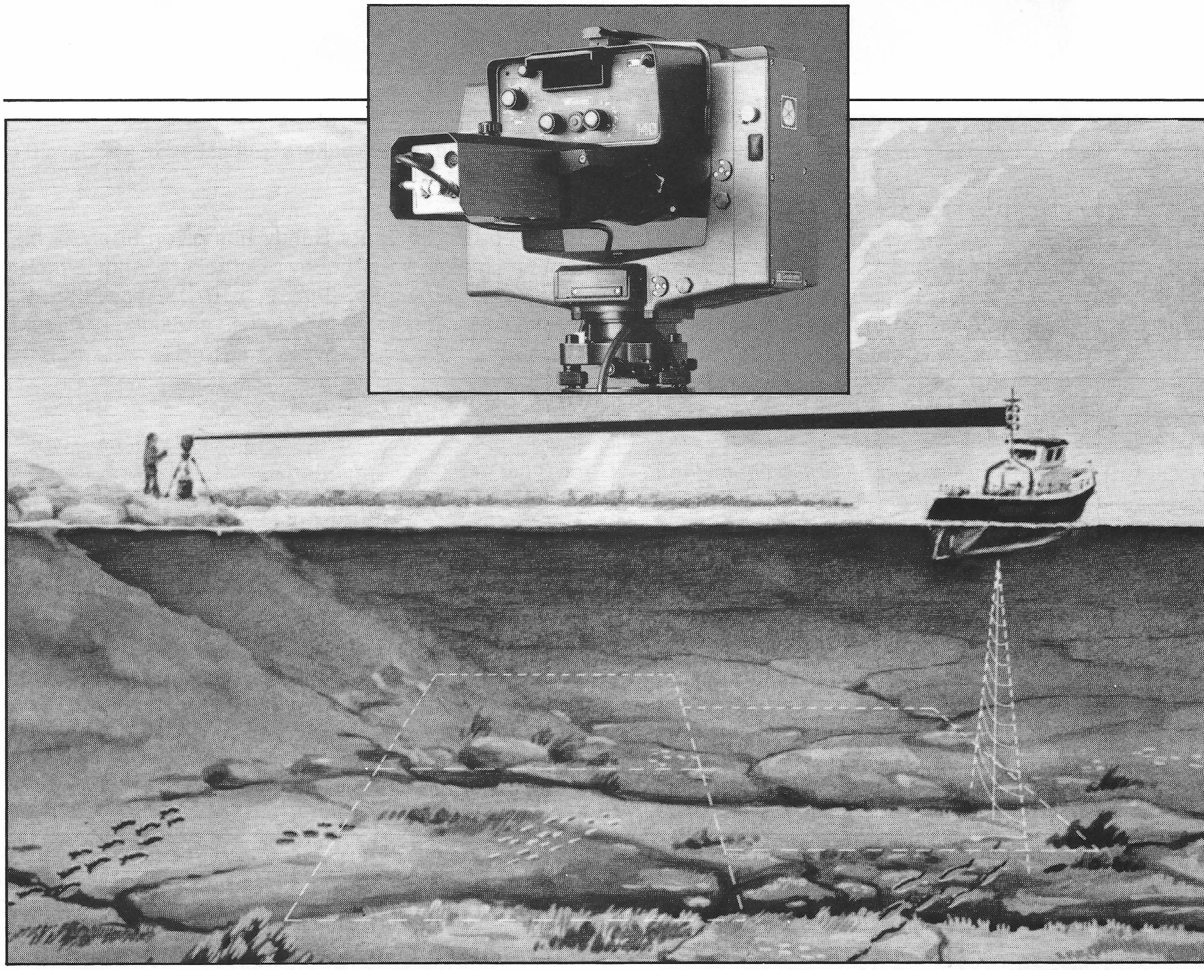

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Prest, C.	Ottawa	Ontario
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Belzile, F.	Québec	Québec
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Condal, A.	Ste-Foy	Québec
Costello, G.	Rimouski	Québec
Cormier, J.	Québec	Québec
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Costello, G.	Rimouski	Québec
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Côté, R.	Mont Joli	Québec
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St.-Pierre, L.	Victoriaville	Québec
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Toussaint, N.	St.-Augustin	Québec
Veilleux, L.	Montréal	Québec

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Dewolfe, D.	Wolfville	Nova Scotia
Dunbrack, S. S.	Dartmouth	Nova Scotia
Eaton, R. M.	Dartmouth	Nova Scotia
Fee, J.	Halifax	Nova Scotia
Ferguson, J. D.	Dartmouth	Nova Scotia
Fleming, D. L.	Dartmouth	Nova Scotia
Forbes, S. R.	Dartmouth	Nova Scotia
Gilbert, G.	Middleton	Nova Scotia
Gillis, J. B.	Middleton	Nova Scotia
Grant, S. T.	Dartmouth	Nova Scotia
Haase, R.	Dartmouth	Nova Scotia
Hunter, R.	Dartmouth	Nova Scotia
Hutchinson, F.	Dartmouth	Nova Scotia
Joyce, H.	Dartmouth	Nova Scotia
Lamplugh, M.	Dartmouth	Nova Scotia
Larose, J.	Dartmouth	Nova Scotia
Lewis, R. C.	Dartmouth	Nova Scotia
Lischenski, E.	Dartmouth	Nova Scotia
Lockhart, J.	Dartmouth	Nova Scotia
Lombardi, D. M.	Dartmouth	Nova Scotia
Lutwick, G.	Dartmouth	Nova Scotia
MacDonald, K.	Dartmouth	Nova Scotia
MacGowan, B.	Dartmouth	Nova Scotia
MacInnis, J. C.	Dartmouth	Nova Scotia
Matthews, D.	St. John	New Brunswick
Maybee, R.	Halifax	Nova Scotia
McCorriston, B.	Dartmouth	Nova Scotia

McGinn, P.	Dartmouth	Nova Scotia
Miller, K.	Halifax	Nova Scotia
Morris, D.	Bedford	Nova Scotia
Murphy, R. P.	Yarmouth	Nova Scotia
Nadeau, O.	Dartmouth	Nova Scotia
Norton, L.	Dartmouth	Nova Scotia
O'Reilly, C.	Dartmouth	Nova Scotia
Peters, E.	Dartmouth	Nova Scotia
Power, A.	Dartmouth	Nova Scotia
Pyke, B.	Dartmouth	Nova Scotia
Roberts, D. T.	Parrsboro	Nova Scotia
Rockwell, G.	Dartmouth	Nova Scotia
Rodger, G.	Dartmouth	Nova Scotia
Ross, J. B.	Dartmouth	Nova Scotia
Rozon, C.	Dartmouth	Nova Scotia
Ruffman, A.	Halifax	Nova Scotia
Ruxton, M.	Dartmouth	Nova Scotia
Senay, J.	Halifax	Nova Scotia
Smith, S. A.	Dartmouth	Nova Scotia
Stead, G.	Dartmouth	Nova Scotia
Stuifbergen, N. H. J.	Dartmouth	Nova Scotia
Surette, R.	Port Hawkesbury	Nova Scotia
Topple, E.	Dartmouth	Nova Scotia
Varma, H.	Dartmouth	Nova Scotia
Vautour, J-C.	Fredericton	New Brunswick
Wagner, B.	Halifax	Nova Scotia
Wells, Dr. D.	Fredericton	New Brunswick
White, K.	Dartmouth	Nova Scotia
White, S.	Halifax	Nova Scotia
Wright, G.	Dartmouth	Nova Scotia

Newfoundland Branch

Name	City	Province, State or Country
Aissaoui, Dr. A.	St. John's	Newfoundland
Berghuis, P. J.	St. John's	Newfoundland
Codner, N. S.	St. John's	Newfoundland
Cole, M. J.	St. John's	Newfoundland
Day, G.	St. John's	Newfoundland
Duffey, S.	St. John's	Newfoundland
Duffet, W.	St. John's	Newfoundland
Goodyear, Captain J.E.	St. John's	Newfoundland
Hall, F.	Goulds	Newfoundland
Nicholson, D.	St. John's	Newfoundland
Newfoundland and Labrador Hydro	St. John's	Newfoundland
Palmer, R.	St. John's	Newfoundland
Renouf, J. K.	St. John's	Newfoundland
Spence, K. G.	Torbay	Newfoundland
Stirling, C.	St. John's	Newfoundland
Thornhill, D.	St. John's	Newfoundland
Turpin, J.	Marystown	Newfoundland
Wheeler, Captain F.	St. John's	Newfoundland
Yates, T. L.	Lewisporte	Newfoundland

International Members

Name	City	Province, State or Country
Baksh, S.	Siparia	Trinidad and Tobago
Bartholemew, Lt. Cdr. I.	Suva	Fiji
Beisterveld, M. J. T.	Houten	The Netherlands
Bianchetti, F.	Marina di Carrara	Italy
Boland, K. M.	Bethesda	Maryland, USA
Charles, F.	Chaguanas	Trinidad and Tobago
Cheang, K. T.	Burnaby	British Columbia
de Faria, L. L.	Cova da Piedade	Portugal
Franchuk, R. J.	Houston	Texas, USA
Francis, N.	Kingston	Jamaica
Goldsteen, G. H.	Launceston	Tasmania, Australia
Griffith, C. E.	St. Michael	Barbados
Hasan, Lt. Zaaim Bin	Kuala Lumpur	Malaysia
Hart, S.	Manama	Bahrain
Kalaja, H.	Espoo	Finland
Kamphuis, T.	Calgary	Alberta
Kerr, A. J.	Monaco Ville	Monaco
Kouijzer, W. P. H.	Den Helder	The Netherlands
Margetson, N. J.	Hoek	The Netherlands
Meador, C. D.	Miami	Florida, USA
Millen, Captain K.	New Barn	Kent United Kingdom
Murphy, M.	Sherkin Island	Cork, Ireland
Robbins, Commander L.	Brighton	United Kingdom
de la Rocha, L. A.	St. John's	Antigua
Rossi, F. P.	Renton	Washington, USA
Ruji, Razalini	Kuala Lumpur	Malaysia
Sanders, P.	Durham	Connecticut, USA
Soebagio, Soegeng	Jakarta	Indonesia
Taylor, I. M. M.	Street	Somerset United Kingdom
Tupou, 'Etueni	Nuku'alofa	Tonga Islands

Sustaining Members

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GENEQ (Maurice Parisé)	Anjou	Québec
Hydro-Québec (A. Turgeon)	Montréal	Québec
IDON Corporation (Herbert Brown)	Ottawa	Ontario
Institut Maritime du Québec (Claude Jean)	Rimouski	Québec
Krupp Atlas Elektronik Karl Wm. Kieninger	Clark	New Jersey, USA
Quester Tangent Corporation (John Watt)	Sidney	British Columbia
Terra Surveys Ltd. (Rick Quinn)	Sidney	British Columbia
TOPOMARINE Inc. (G. Biliveau)	Ste-Foy	Québec

Spring Puzzler Solution - part 2

From page 42

Denis	Power	used	GPS	on the	Bayfield.
Earl	Dixon	used	LORAN-C	on the	Lauzier.
Paul	Elliott	used	Sat-Nav	on the	Tully.
Tony	Thorson	used	Navitrack	on the	Baffin.

GIS FOR THE 90s

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Who Should Attend?

All professionals, researchers, administrators and technicians associated with cartography, surveying, remote sensing, resource management, agriculture, communications, municipal planning and management, real estate, land development, marine science, forestry, transportation, environment, hydrography and related disciplines.

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GIS For The 90s
Canadian Institute of Surveying & Mapping
PO Box 5378, Station F
Ottawa, Canada K2C 3J1
(613) 820-2291 or 224-0490
Fax: (613) 224-9577

The Canadian Institute of Surveying and Mapping

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A Conference of The Canadian Institute of Surveying and Mapping

in cooperation with

The Inter-Agency Committee on Geomatics
and
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International Right of Way Association

Spatially-Oriented Referencing Systems Association

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SIG, la prochaine décennie

Deuxième Conférence Nationale sur les Systèmes d'information géographique
Ottawa, Canada du 5 au 8 mars 1990

SIG, la solution globale

Ottawa, mars 1990. Les meilleurs cerveaux des sciences de l'information géographique se concerteront pour relever le défi de la prochaine décennie. Leurs délibérations porteront notamment sur l'utilisation des Systèmes d'information géographique (SIG) pour la gestion des ressources naturelles et pour la préservation de l'environnement et sur la diffusion des données, la technologie des SIG, les matériels et les logiciels et l'état de la recherche.

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Organisée en mars 1989, la première conférence nationale sur les SIG attira 1200 participants et fut un succès inégalé. Cette seconde conférence promet d'être encore meilleure et plus importante.

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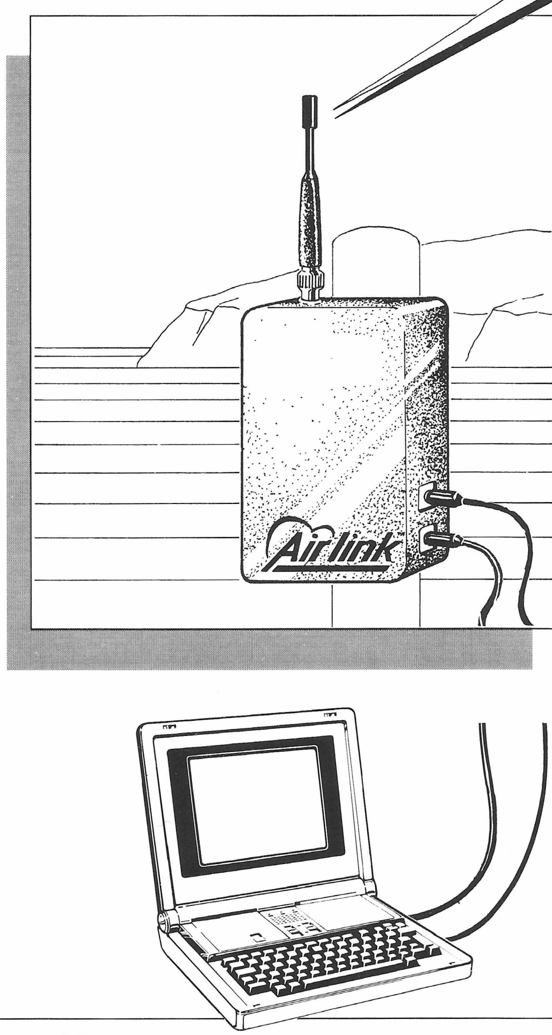
PORTABLE DATA LINKS



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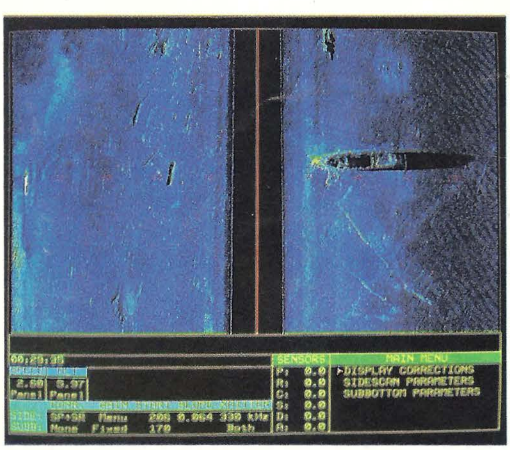

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