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Lighthouse

JOURNAL OF THE CANADIAN HYDROGRAPHIC ASSOCIATION

REVUE DE L'ASSOCIATION CANADIENNE D'HYDROGRAPHIE

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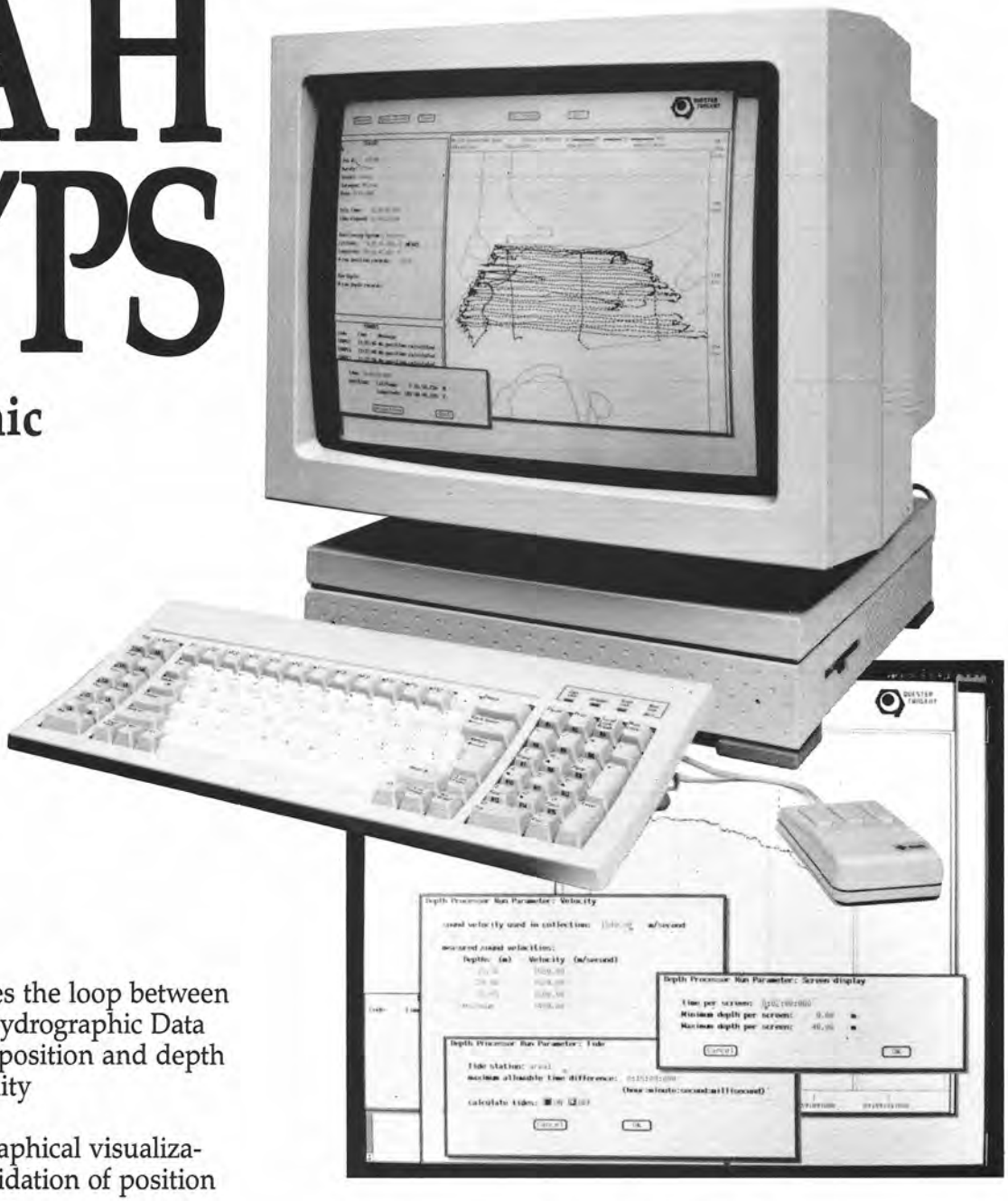

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Edition / Édition 46

LIGHTHOUSE

Fall / Automne 1992

JOURNAL OF THE CANADIAN HYDROGRAPHIC ASSOCIATION
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Spring Issue	March 1 / 1er mars	Édition du printemps
Fall Issue	October 1 / 1er octobre	Édition de l'automne

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Letters to the Editor / Lettres au rédacteur en chef

The ECDIS Paradox *(see page 19)*

Dear Mr. Richards:

The grounding of the Queen Elizabeth II this past summer could have been avoided. By implementing standardized international regulations, maritime navigation would be reduced to a series of predefined procedures, leaving fewer decisions to the subjective judgement of the captain.

This approach may seem extreme to some mariners, but an advance like this happened long ago in aviation, and nobody today would even dream of a jumbo jet flying by sight over the country according to its pilot's whims. Laws and rules have changed the way planes are flown. And they've been approved, and enforced, on an international scale with the cooperation of all countries. The same is not only possible for regulating the courses of SOLAS ships, but essential for maintaining safety in the world's waterways as Dr. F. Bianchetti, Director, President and Chief Executive Officer of C-MAP, has claimed in a recent conference.

The enclosed paper by Dr. F. Bianchetti was presented at the ECDIS Conference in Baltimore, Maryland, on February 29, 1992 and raised great interest.

Sincerely,
Sergio Balegno, President, Morse-Balegno
Hyannis, Massachusetts, USA

Cape Sable *(Edition #45)*

Dear Mr. Richards:

Many thanks for the four complimentary copies of Edition #45, which came to our mailbox in perfect condition some time ago. It really is an attractive magazine and I'm very happy to have an article in it. I hope that your readers will indeed enjoy reading about your cover lighthouse.

Thank you for your interest, encouragement and generosity. These four, and the other gift issues you have sent, are appreciated.

Sincerely,
Mrs. B. J. Smith, Barrington, Nova Scotia.

Land Settlements and Aboriginal Self-Government
(Edition #45)

Dear Bruce:

I am writing to express thanks for the publication of my article "Land Settlements and Aboriginal Self-Government" in the spring issue of Lighthouse.

I am delighted to report that I had a call from Tim Koepke, C.L.S., chief negotiator (on the government side) for the Council of Yukon Indians, Comprehensive Claim. He appreciated finding the article in Lighthouse and was interested in obtaining my latest research.

Thank you also for the extra copies of the issue that I received.

Yours Truly,
Peter Knight, Guelph, Ontario

Editor's note: Complimentary copies of Lighthouse are sent to all contributing authors.

Nelson Freeman: 1944-1992

The family of the late Nelson Freeman would like to thank the many wonderful people from Fisheries and Oceans, here in Ottawa and across Canada, for their outpouring of love and affection for their friend and colleague, who died so tragically on April 9, 1992.

Your letters and phone calls have been warmly received and treasured by Grant, Robert and myself.

The Children's Wish Foundation is very grateful for your generous donations. Due to the recession the fund was quite low and now they are able to grant some more "Wishes".

May Nelson's enthusiasm for life, his kindness and gentleness, and dedication to his work, be an example to all of us.

May God bless all of you.

Most Sincerely,
Torchy, Grant and Robert Freeman

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Message from the National President / Mot du Président national

Hydrographers seemingly have a 'knack' for being at the 'leading edge' of things, whether it was guiding sailing ships to the new world in the fifteenth century with their 'secretive carta' or by combining new technologies in the twentieth century to obtain 'the required dataset'. A dataset we know will always be in the most difficult location to survey or portray in a suitable graphic form.

Fortunately all of our experience has placed us again at the leading edge; of an emerging transition of data-collecting, data-processing and data presentation processes into a new and exciting domain - 'the geomatic community'. The geomatic evolution currently cresting through our sister surveying and mapping associations emphasizes the multi-disciplinary approach to getting the job done; a technique that hydrographers have always utilized. Required project objectives are met in a dedicated team environment through the synergy obtained by combining individual specialists, while retaining the individual's professional identity.

Opportunities for us to capitalize on our experience will abound in the 90's as marine environmental issues gain increased public and private attention. Innovations such as digital data collection, subsequent data analysis and portrayal in digital form of 'our normal working environment' combined with the individual talents of the hydrographic crew will ensure this.

Geomatics is part technology, however the larger part is process or attitude. This larger part is at the core of the ISO 9000 series standards, which are being instituted by the international marketplace to provide a foundation for homogeneous understanding in a global contracting community.

If you have the opportunity to discuss 'the geomatic question' with other members of the surveying and mapping fraternity or arts and science communities at large you may want to, after some personal deliberations, expound upon how hydrographers work every day. Talk about the diversity of professional disciplines that combine themselves to collect, process and produce a hydrographic product. Include if you will how enjoyable it is to be one within the whole.

Hydrography, in Canada, has and continues to be on the leading edge of many innovations for use by the international marine geomatic community. The incorporation of the geomatic process concept will enhance all of our professional surveying and mapping endeavours. Perhaps we might even find that someone else has already collected and portrayed that most difficult dataset!!

> *Geomatics: The science and technology of information management, including the acquisition, processing and analysis, storage, display and dissemination of temporal geo-referenced information.*

Regards,
Dave

Lighthouse Abstracts / Résumés pour Lighthouse

Perigean Spring Tide in Loughborough Inlet, July 1792

by
N. A. Doe

In July 1792 a small survey party camping overnight on a low island were flooded out by an unexpectedly high tide. This paper discusses the causes of the unusually high tide and the reasons for the survey party being caught unawares.

Page 5

Grande marée au périgée de juillet 1792 à l'anse Loughborough

par
N. A. Doe

En juillet 1792, une petite équipe d'arpentage campant pour la nuit sur une île basse a été inondée par une marée haute inattendue. Cet article traite des causes et des raisons inusuelles de la marée haute qui a surpris l'équipe.

Page 5

Oil Spill Simulations in Hecate Strait

by
W. R. Crawford

As part of an environmental impact study on an oil exploration proposal, the Pacific Region of the Canadian Hydrographic Service recently carried out a study of the near-surface ocean currents near the Queen Charlotte Islands, British Columbia. This study used Loran-C positioning of drifters, and identified a strong and narrow current flowing out into the Pacific Ocean near Cape St. James.

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Simulation d'un déversement de pétrole au détroit de Hecate

par
W. R. Crawford

Suite à une proposition d'exploration pétrolière, la région du Pacifique du Service hydrographique du Canada a récemment participé à l'étude d'impact environnementale sur les courants océaniques superficiels aux îles Reine Charlotte en Colombie-Britannique. Cette étude a utilisé le Loran-C pour positionner les dériveurs et a permis d'identifier un fort et étroit courant coulant vers l'océan Pacifique près de Cape St. James.

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The Role of Topology in Spatial Information Systems

by
P. N. Holroyd

This paper describes how topology applies to digital spatial information and discusses the need for topological data structures in digital geographic information.

Page 15

Le rôle de la topologie dans les systèmes d'informations spatiales

par
P. N. Holroyd

Cet article décrit comment s'applique la topologie à l'information spatiale numérique et montre le besoin d'une structure de données topologiques pour une information géographique numérique.

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The ECDIS Paradox

by
Dr. F. Bianchetti

This paper looks at the issue of navigation of large vessels using electronic chart systems. It then suggests that perhaps the time has come to use this new technology to limit the "freedom of navigation" of commercial vessels and thus avoid most groundings caused by human error.

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Le paradoxe d'ECDIS

par
Dr. F. Bianchetti

Cet article traite de l'usage de la carte électronique par de gros navires. Il suggère que le temps est sans doute venu de se servir de cette nouvelle technologie pour limiter la "liberté de navigation" des navires commerciaux et ainsi éviter les échouages causés par une erreur humaine.

Page 19

A Farewell to C.S.S. Bayfield

by
Capt. M. Birchall

The Canadian Hydrographic Service (CHS) has had four survey ships named after Henry Bayfield, one of Canada's most renowned early hydrographers. This article is a brief history of the latest ship to bear the name and her career with the CHS.

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Un adieu au C.S.S. Bayfield

par
Capt. M. Birchall

Le Service hydrographique du Canada a eu quatre bateaux nommés en leur honneur de Henry Bayfield, un des premiers hydrographes canadiens de grande renommée. Cet article présente un bref historique du dernier bateau ayant porté son nom.

Page 25

Perigean Spring Tide in Loughborough Inlet, July 1792

by
Nicholas A. Doe

In late June and early July 1792, Captain Vancouver's ships HMS DISCOVERY and HMS CHATHAM were anchored in the Teakerne Arm near West Redonda Island in Desolation Sound, British Columbia. From here the explorers set out in small boats to probe the maze of narrow channels and inlets that lay between them, the Johnstone Strait, and the open Pacific beyond. The last of these expeditions was led by James Johnstone and Spelman Swain, who on Tuesday, July 3 (by Captain Vancouver's reckoning), set out in the CHATHAM's cutter and launch to explore the mainland coast. They took with them enough supplies for a week.

The two boats made their way through the Yaculta Rapids and along the Cordero Channel to the entrance of Loughborough Inlet. They entered the inlet and camped for the night. We know that this must have been on the evening of July 4 as that was the day they passed the entrance to the Nodales Channel, and they spent the whole of the next day, July 5, examining Loughborough Inlet. Vancouver records that that night, i.e. the night of July 4 / morning of July 5, the crew were "incommoded" by the flood tide which they had expected to be low, as the Moon was then passing the meridian. Archibald Menzies, the expedition's naturalist, also recorded the event. In a diary entry for July 12, the day Johnstone and Swain returned to the ships, he wrote that:

> "in this arm they stopped the second evening and thought themselves secure from any disturbance by pitching upon a small island for their place of rest, but in the middle of the night they were hastily roused from their repose by the flowing of the Tide, which had risen so much higher than they expected & rushd (sic) upon them so suddenly, that every person got completely drenched before they could remove to higher ground."

The tide that so "incommoded" the explorers was an interesting example of a Perigean Spring Tide. Such tides occur at irregular intervals about two or three times a year. In recent times, particularly large Perigean Spring Tides have been accompanied by dire warnings of impending earthquakes which, some seismologists suggest, may be triggered by tidal forces. Not only were the explorers 'caught napping' as it were by the unusual height of the tide, they also had apparently not noticed that the Yaculta and Dent Rapids are a transition point between the tidal waters of the Strait of Georgia to the south, and those of the Johnstone Strait to the north, and that there is a marked difference in the timing of the tides on either side of the rapids.

Many factors go into determining the level of the tide; so many that each day's tidal cycle is almost never repeated in all its detail. My own interest in the tides of July 1792 stems from a kayaking trip I am planning to make some day, which will involve a circumnavigation of Vancouver Island: it would, I thought, be interesting to try to time my passage under approximately the same tidal conditions as pertained 200 years ago. I was also puzzled as to why such keen observers of the Moon and tides as our 18th century friends should have been so taken by surprise that night.

Loughborough Inlet is deep, has steep sides, and almost no islands. There are few campsites; there is therefore a good possibility that Johnstone and Swain camped near the mouth of Gray Creek (125° 32' W, 50° 32' N); two small islands there are marked on both British and Spanish charts. If they found this site especially welcoming because of mats of soft, green sea-grass, the author can vouch for the fact that they were not the last to make such a mistake!

The Moon, as is well known, is the main cause of the tides; but the Sun also makes a significant contribution. Theoretically, the solar tide is only 46% the strength of the lunar tide, but in coastal areas, and in narrow passage ways, this ratio is often enhanced. The Straits of Georgia and Juan de Fuca, for example, because of their length and shape, tend to swap water back and forth, see-saw fashion, in sympathy with the twice daily tides of the open ocean. In some places, near the pivot point at the southeastern tip of Vancouver Island, the principal tidal component of the Sun (P1:K1) is actually greater than that of the Moon (M2); and in my home town of White Rock beachgoers delight in the fact that the tide is always at least partially out at noon in the summer regardless of the Moon's waxings and wanings.

Spring Tides occur whenever there is a full or new moon. They are larger than usual because for a few days the lunar and solar tides are synchronised. Perigean Spring Tides occur when, the Sun, Moon and Earth are aligned, and the Moon is at its closest point to the Earth in its orbit around the Earth. Because the Moon is closer, its contribution to the tide is larger than usual. There is a similar effect for the Sun, but because the Earth's orbit is very nearly circular, the effect is less pronounced.

Perigean Spring Tides are often associated with major flooding, particularly when accompanied by strong onshore winds. The rise of the tide is accelerated because when the Moon is aligned with the Sun, the Sun's gravitational field distorts the Moon's orbit, making it more elliptical, so that the Moon swings by the Earth closer than is normal at perigee. As it does so, its orbital velocity increases, and because the Moon's orbital rotation is in the same direction as the Earth's axial rotation, the Moon appears to 'dwell' in the sky and the lunar tidal forces, enhanced by the close passage of the Moon, are given extra time to do their work.

Whilst Captain Vancouver was surveying the coasts of British

Columbia and Alaska in the 1790's, he reckoned his time as being 16 hours ahead of Greenwich, not as we do today eight hours behind. Consequently we can identify the night of the flood as actually being the night of July 3 / morning of July 4, 1792 (Julian Day 2375759.8).

Figures 1, 2, and 3 show the astronomical conditions for these two days.

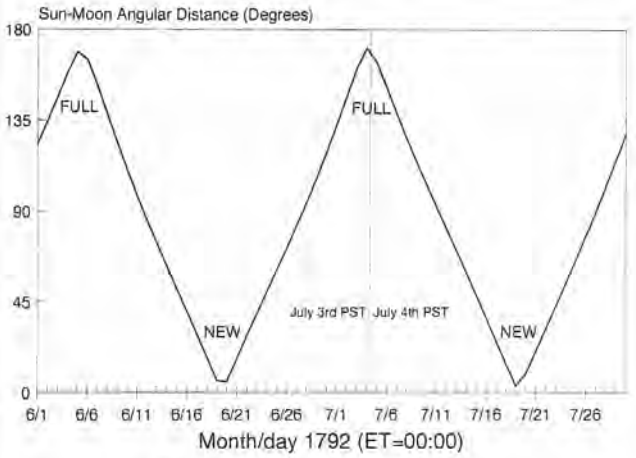


Figure 1: Phase of the Moon

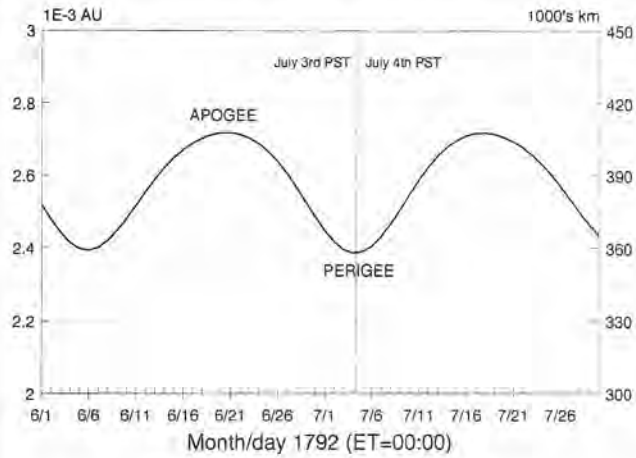


Figure 2: Earth-Moon Distance

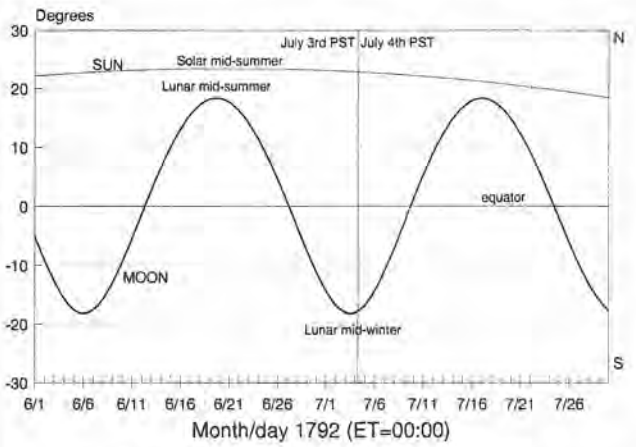


Figure 3: Sun and Moon Declinations

Figure 1 records the angular distance between Sun and Moon. An angular distance of 0° corresponds to an eclipse of the Sun, and an angular distance of 180° to an eclipse of the Moon. The Figure shows that there was a full moon on the night of the flood (July 3, 23:00 PST), but an eclipse was missed, as it often is, by a few degrees.

Figure 2 plots the distance between the Earth and the Moon. Distance is significant because the closer the Moon is to the Earth, the stronger is the lunar tidal force, so much so that each 1% decrease in distance results in a 3% increase in force. Most of the variation of distance is a consequence of the Moon's approximately elliptical orbit around the Earth, and I say approximately, because the smooth predictable curve beloved of mathematicians is constantly perturbed in a very complicated manner by the Sun, by the gravitational anomalies of the Earth, and by the other planets of the solar system. The average time between close approaches to the Earth, perigee, is 27.5 days in contrast to the 29.5 days between new or full moons. Consequently perigee seldom coincides with a new or full moon, but as Figure 2 shows, on the night of the flood it did. In fact perigee came just 1 hour before full moon, a very unusually close co-incidence.

Figure 3 shows plots of the Sun's and Moon's declinations. The declination of a heavenly body is one of those intimidating terms that is actually fairly simple. It is the latitude on the surface of the Earth at which the body appears directly overhead. Thus, if the declination of the Sun is zero, it appears directly overhead at noon on the Earth's equator. This is the time of the equinoxes. In the (northern) springtime, the declination of the Sun slowly increases until it reaches a positive maximum on mid-summer's day. The Sun is then directly overhead at noon on the Tropic of Cancer at latitude 23° 27' N, and because the northern half of the Earth is tilted towards the Sun, it gets warmer there.

The Moon goes through exactly the same cycle as the Sun, except that it does so once a month instead of once a year, and the angles are a little different and not so constant. Probably everyone has noticed that sometimes, particularly during the winter, the Moon appears very high in the sky, rising in the north-east and setting in the north-west. This is the time of the month when the Moon's declination is at its most northerly (positive) value and it is lunar mid-summer. At other times, the Moon appears very low on the horizon, even at midnight. This is lunar mid-winter.

Figure 3 shows that at the time of the flood, it was lunar mid-winter. This is no surprise as the path of the Moon is never more than five degrees from that of the Sun (the ecliptic) and consequently, the lunar season is always the opposite of that of the Sun at full Moon, and the same as that of the Sun at new moon. However, the high positive and negative declinations of the Sun and Moon had two effects on the tide on the night of the flood. Firstly, because the line joining the Moon through the centre of the Earth to the Sun was strongly tilted with respect to the equatorial plane, the levels of the two daily tides were appreciably different. This may have contributed to the element of 'surprise'. The other effect was that because at the peaks of the declinations the rate of change of declination is zero, all of the orbital motion was directed in exactly the same direction as the Earth's axial rotation, thereby maximising the effect of the increased velocity due to the approach of perigee. The increased velocity prolonged the length of the tidal day by

12 minutes at the time of the flood, three minutes of which was, by my calculations, attributable to the fact that the Moon had reached its most southerly declination. Twelve minutes may sound insignificant, but when the tide on a gently sloping beach is rising at a rate of several vertical feet per hour towards one's campsite, it does not seem that way at all!

Figure 4 shows the tide that resulted from these particular alignments, and sure enough, shortly after midnight at 0054 Local Apparent Time (01:21 PST), there was a tide exceeding 15 feet in Loughborough Inlet when the Moon was 13° passed the meridian (i.e. passed due south). The next morning at eight, the tide sank to the lower low water level for large tides.

At Redonda Bay, near where the ships were anchored, the evening tide on the third peaked between six and seven o'clock, which would be a good time to make camp. Unfortunately, in Loughborough Inlet the tide at this time had already been ebbing for several hours and it began to flood again a little more than an hour later. The evening ebb may not have been obvious because the evening low tide in the inlet was much higher than the morning low tide. It is also interesting to observe in Figure 4 that, because of differences in topography, the highest tide of the day at Redonda Bay immediately followed the lowest, whilst at Heydon Bay in the inlet, the reverse was true.

For those interested in the relative contributions of various components of the tide that night, I have plotted in Figure 5 the semi-diurnal (i.e. twice daily) and diurnal (i.e. once daily components) of both the solar and lunar tides. The Moon's diurnal and the Sun's diurnal and semi-diurnal components contributed equally to the "incommodity", while the Moon's semi-diurnal component contributed as much as these three components together. The next morning, all four components were close to their minima, and the tide was within inches of being as low as it ever gets.

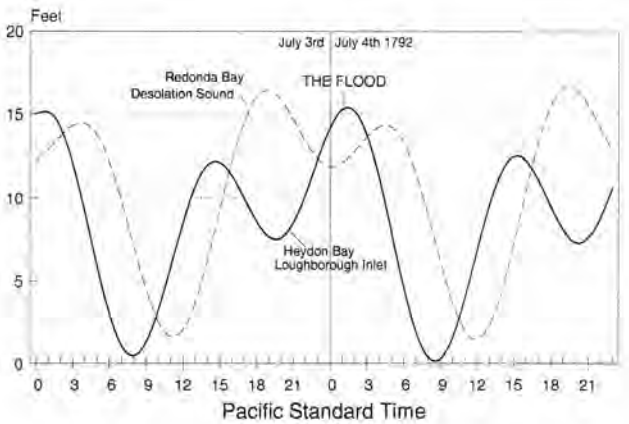


Figure 4: Tides

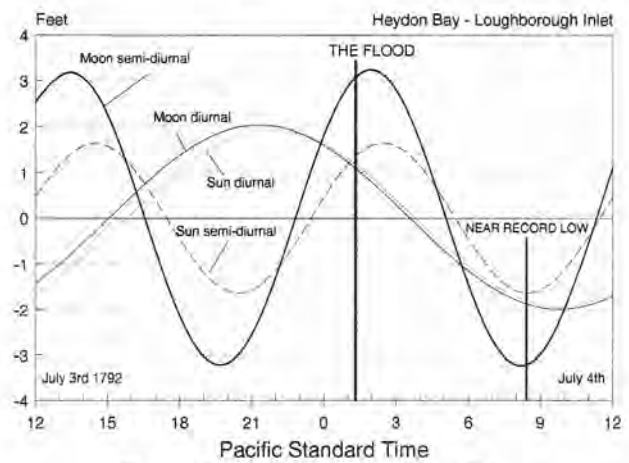


Figure 5: Components of the Tide

During their passage through the rapids, Johnstone and Swain had moved from the waters of the Strait of Georgia to those more akin to the open coast. They had obviously observed the tides of the Strait quite closely, for it is a general rule there that Spring Tides are low when the Sun or Moon are due south. However, on the open coast it is very different.

The author first became aware of this after planning a very unsuccessful trip to see the tidepools on Botanical Beach near Port Renfrew based on the timing of the tide at Ambleside Beach in West Vancouver! It was a long way to go to see surf sweeping up to the salal *(Webster's Dictionary - "salal: a small shrub ... found on the Pacific coast of North America")* at the top of the beach.

Calculating the delay between the tides at different places is not quite as straightforward as it may seem. Because the pattern of the rise and fall varies from day to day, and from location to location, any comparison based on the timings of a particular point in the cycle, higher high water (HHW) for example, is likely to give a different answer from a comparison based on the timings of say lower low water (LLW). What we need is a comparison method that includes all of many cycles, not just one particular point.

Engineers have long since had the solution to problems of this sort; what they do is to look for the peak in the cross-correlation function of the two patterns. This sounds terribly technical, but in fact is quite simple. Imagine you had two rolls of film each of which had been exposed to a light whose intensity varied with the height of the tide at the two separate locations. The clear patches on the films would correspond to high tide, and the darker, unexposed areas would correspond to low tide. The pattern of light and dark would be different on the two films, but to find a best match, you could lay the films together, hold them up to the light, and then slide one strip of film over the other until the maximum amount of light could be seen through the two films. The offset of the two films is then a measure of the time delay between the two patterns.

Using a computationally equivalent technique, I have plotted in Figure 7 the relative time delay between the tides at Tofino and the various points around Vancouver Island shown in Figure 6. The picture that these calculations paint is as follows. Envisage the Strait of Georgia as an inland sea whose level rises and falls with little variation in the timing of the tides around its shores. The rise and fall of this inland sea is close to being in anti-phase with the rise and fall of the open ocean; when it is high tide at Tofino, it is within an hour and a half of being low tide in the Strait. Consequently at either end of the Strait, water pours in and out continuously through the narrow confines of the Gulf and San Juan Islands to the south, and the Discovery Passage and Desolation Sound Islands to the north. The back and forth flow along the Strait of Juan de Fuca is fairly evenly distributed, but through the narrow channels of the north the flow becomes, almost literally,

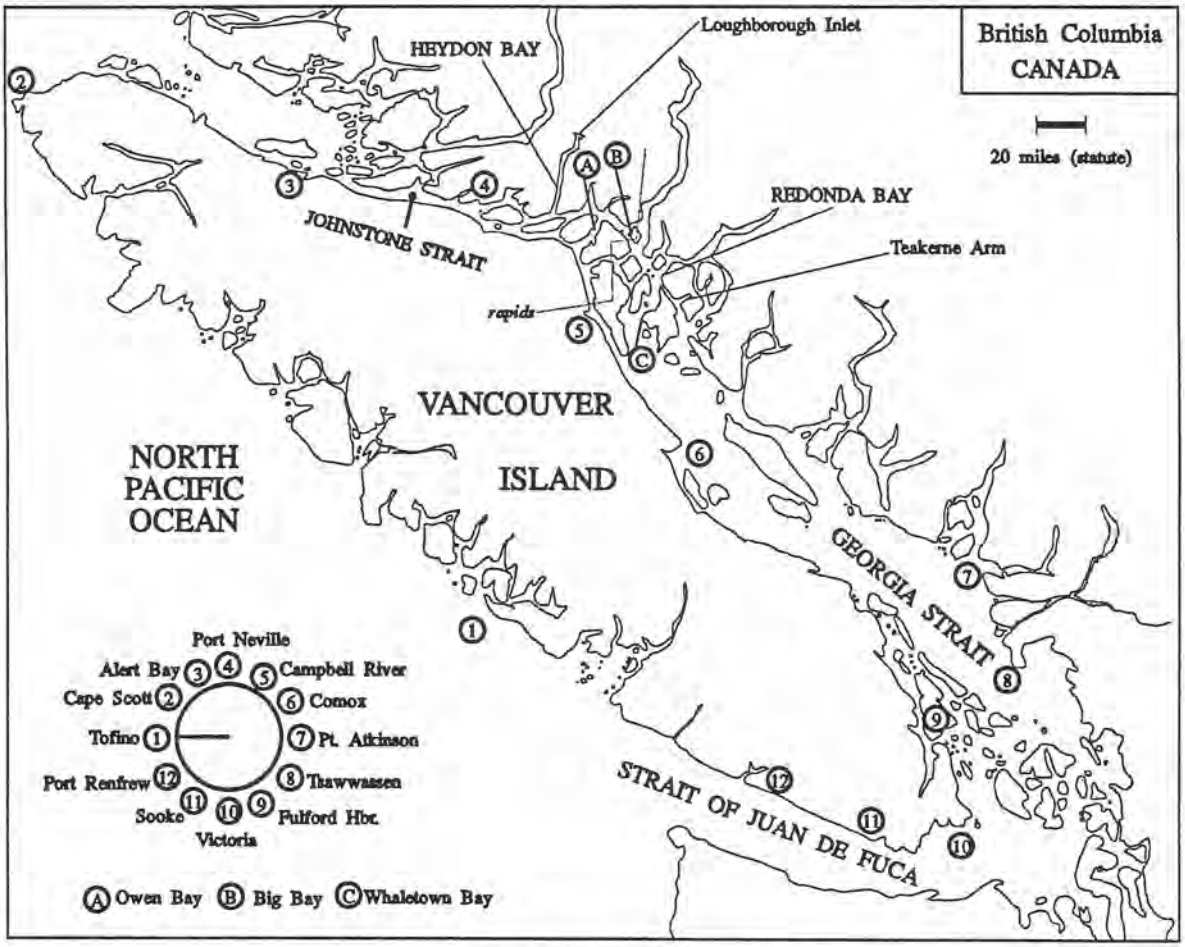


Figure 6: Tidal Stations - Vancouver Island (see Figure 7)

precipitous, with no let up in the powerful and turbulent currents that result from the differing heights of the tide at the ends of the rapids.

As shown in Figure 7, Johnstone and Swain in a short journey had moved from a tidal region where the presence of the Moon due south signalled low tide, to one where, the tides being a substantial fraction of a 13 hour semi-diurnal tidal day earlier, it signified almost exactly the opposite.

Could the flood have been foreseen? Most certainly yes. The movement of the Moon was closely observed by Captain Vancouver, because he used it almost exclusively for fixing his longitude. The unusual alignment of Sun and Moon at perigee was not only tabulated in his Nautical Almanac, but exaggerated, as noted in Figure 8. The series of tidal rapids obviously marked connecting points between substantial bodies of water. Possibly everyone was too busy to notice: the expedition lacked the presence of a professional astronomer, and as Vancouver remarks in his Journal on hearing the news of the death of the astronomer William Gooch, who was to have joined the expedition in August 1792:

> "...we had little leisure for making such miscellaneous observations as would be very acceptable to the curious, or tend to the improvement of astronomy"

Perhaps we should add "... or keep the crew's bedrolls dry".

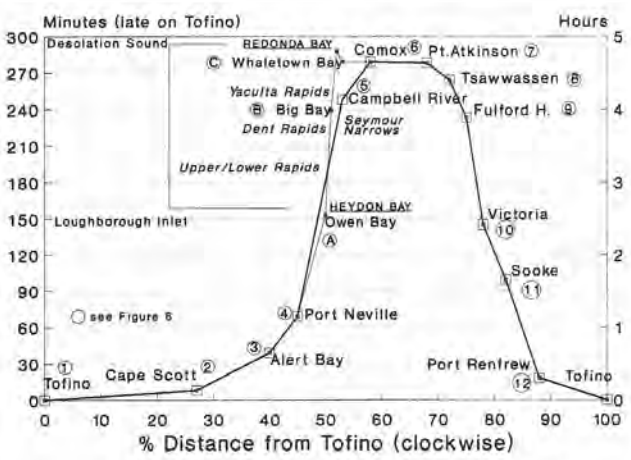
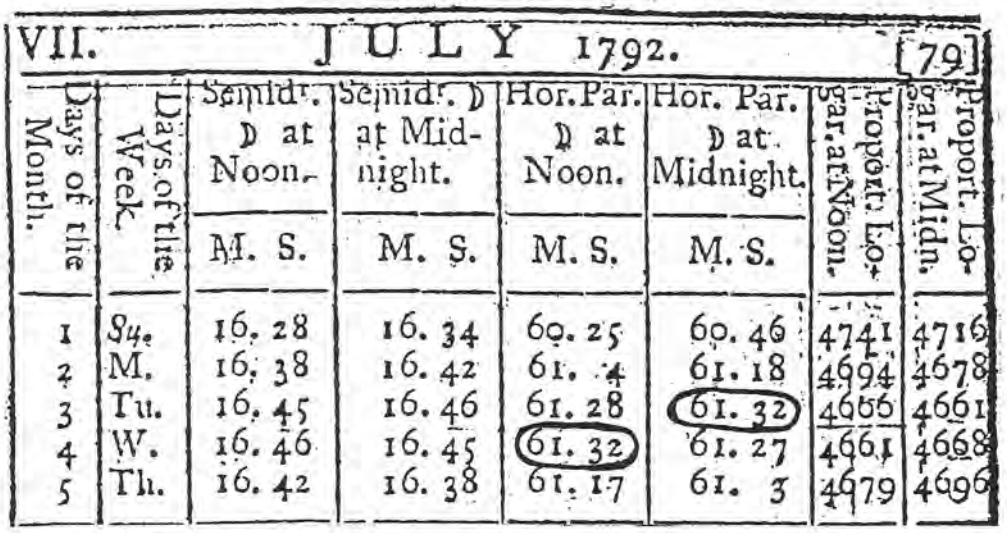


Figure 7: Tidal Delay - Vancouver Island

Acknowledgements
The author gratefully acknowledges the help of Dr. Myles Standish of the Jet Propulsion Laboratory, Pasadena, California who supplied an accurate Ephemeris for the Moon 1792 (DE-118 + LE-062), and also of Mike Foreman and Fred Stephenson at the Institute of Ocean Sciences, Sidney, B.C. who supplied harmonic constants, sample predictions and other useful data for the tidal calculations.



VII. JULY 1792. [79]

Days of the Month.	Days of the Week.	Semidr. ☽ at Noon.	Semidr. ☽ at Midnight.	Hor. Par. ☽ at Noon.	Hor. Par. ☽ at Midnight.	Proport. Log. ar. at Noon.	Proport. Log. ar. at Midn.
		M. S.	M. S.	M. S.	M. S.		
1	Su.	16. 28	16. 34	60. 25	60. 46	4741	4716
2	M.	16. 38	16. 42	61. 4	61. 18	4694	4678
3	Tu.	16. 45	16. 46	61. 28	61. 32	4666	4661
4	W.	16. 46	16. 45	61. 32	61. 27	4661	4668
5	Th.	16. 42	16. 38	61. 17	61. 3	4679	4696

FIGURE 8: Captain Vancouver's Nautical Almanac shows the Moon's parallax peaking at 61' 32" on the night of July 3, 1792 (Greenwich time).

Parallax is a measure of the closeness of the Moon to the Earth and was an important figure in 18th century navigational calculations. The tabulated parallax is the maximum value that can ever be achieved, a very rare event. The Moon comes this close to us only once or twice a century, the last time being in 1912. However, on this particular occasion, the Nautical Almanac is in error: the correct figure was 61' 26".

The average value of lunar parallax is 57' 03". At the July 1792 perigee the Moon was 8% closer than average, and the lunar tidal forces 25% stronger than average.

Also tabulated in the Almanac is the apparent size (semi-diameter) of the Moon's disc.

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Oil Spill Simulations in Hecate Strait

by
William R. Crawford

Introduction

The Pacific Region of the Canadian Hydrographic Service (CHS) has recently completed two summers of observations of near-surface currents near the Queen Charlotte Islands, using Loran-C drifters and moored current meters. Although the drifters have been available since 1984, this is the first time they have been used on a summer-long project to map out ocean currents patterns. From our Queen Charlotte Sound study in 1990 we found a strong, narrow jet of water flowing out to the Pacific within 12 km of Cape St. James, on the Queen Charlotte Islands, and a persistent eddy trapped over North Bank, a shallow water region in mid-Sound.

The program is funded by the federal Panel on Energy Research and Development (PERD) and the Department of Fisheries and Oceans, to map and model the near-surface currents in northern British Columbia waters. The study was motivated by the application by Chevron of Canada Ltd. to explore for hydrocarbons in Hecate Strait and surrounding seas. After a series of hearings to examine the environmental implications of this program, the Environmental Assessment and Review Panel recommended that the Institute of Ocean Sciences (IOS) study the near-surface currents in the region to provide the necessary information to run numerical simulations of currents. We conducted this program to satisfy these recommendations.

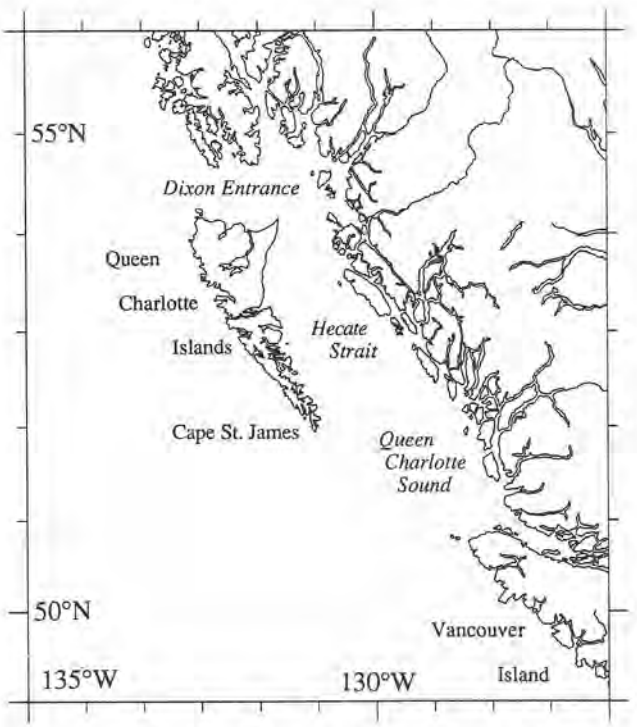

Figure 1: North Coast of British Columbia

Instruments and Observation Program

The Loran-C drifter program was contracted to Seakem Oceanography Ltd. (now AXYS Environmental Consulting) who chartered the fishing vessel WESTERLY WIND. We carried eleven Loran-C drifters, designed to float in the ocean and flow with the current. When in the water, each held a 5-metre-deep drogue tethered below to keep it flowing with the ocean currents. By following the near-surface currents they would help us to simulate the flow with our numerical models. Each drifter carried a Loran-C position finder, and a VHF radio to transmit a position every 30 minutes. The signals were received on the WESTERLY WIND where computers plotted the positions of these drifters as they whirled in the weird currents near Cape St. James (Figure 2).

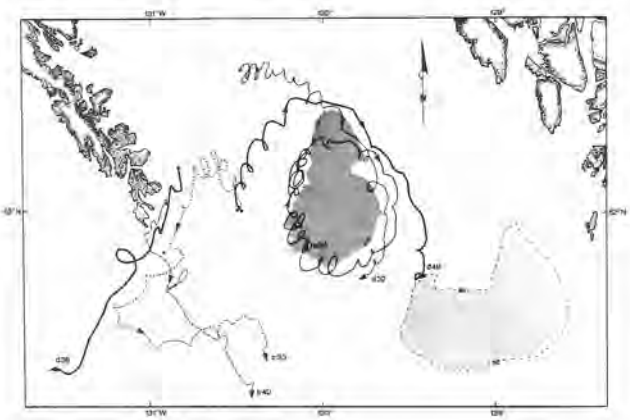

Figure 2: Loran-C Drifter Tracks - July, 1990
(between Cape St. James and the B.C. mainland). The cross to the southeast of Cape St. James marks the position of Gray Rock. Note how drifter 'a34' flowed around North Bank (marked by the shaded region).

And weird they were! The first drifter launched sped into the Pacific Ocean past Cape St. James at two knots. In the morning it stopped and floated gently back on its track, waiting in a back eddy for the flood in the afternoon to carry it north along the west coast of Moresby Island. Having chased it for five hours, we couldn't let it slip away on the next tide. We picked it up and turned east to reset the drifter in Hecate Strait. Eventually the WESTERLY WIND was able to track all eleven drifters at once, and the computer plots traced out currents that surprised even the veteran fishermen on the boat.

Loran-C drifters are a Canadian contribution to the hydrographer's set of seagoing instruments They were developed in Sidney, B.C. by several Canadian engineering companies, now headed by Candel Industries Ltd. Recently Seimac Ltd. of Dartmouth, Nova Scotia, has built similar units. Mike Woodward of the CHS oversaw the most recent Candel version, which carries a removable floatation collar around a

pressure case holding the microprocessor and Loran-C package (Figure 3).

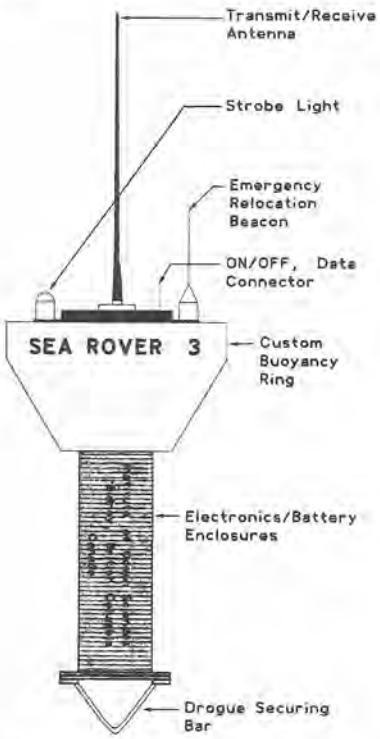

Figure 3: The Sea Rover 3 Drifter (as configured in 1990). The drogue attaches to the bottom by a 'bungee' cord.

Since 1984 more than 30 of these units have been sold to oceanographic labs in Canada and the U.S. to track surface currents for Coast Guard Search and Rescue operations, fisheries research, and oil spill simulations. The units process the 100 kHz Loran-C radio signals continuously, telemeter the Loran-C time delays to the ship every 30 minutes, and store these time delays in solid state internal memory, for transfer to a computer on board ship upon recovery. Our group has developed editing and plotting programs for the ship-board computers to draw charts of the drifter tracks, while the drifters are still in the ocean, by using the Loran time delays sent by radio. With this information we can launch drifters to fill in gaps left by those that float out of the study region.

Our drifter observations are part of a larger study. Two weeks prior to our departure on the WESTERLY WIND, Mike Woodward and fellow CHS scientists at IOS sailed with the CSS PARIZEAU to Hecate Strait and Queen Charlotte Sound to moor current meters and subsurface pressure gauges, and measure water temperature and salinity, to complement our drifter tracks. Their instruments remained in place for six months to a year to observe seasonal changes in currents.

Numerical Simulations Of Wind-Driven Currents

Our study team included Charles Hannah, a doctorate student in physics at the University of British Columbia. We asked him to set up a computer model of the wind-driven currents in waters around the Queen Charlotte Islands. Computer models are hungry for computer time, and we tested Charles' ingenuity at finding free time on big computers.

Charles began with some assigned time on the University of Toronto Cray computer. When that source dried up he switched to our Alliant at IOS, grinding away on his allotment of three hours of computer time a day and an occasional weekend of dedicated time. He plotted the output on the IOS VAX computer, and occasionally found a few more valuable hours on the Cray for a spree. By June, a few weeks before our cruise, he presented us with his currents map for typical winds. In summer, gentle winds are expected from the north. His model showed the strongest currents in the northern end of Hecate Strait, and slower but upwind currents closer to the south end (Figure 4).

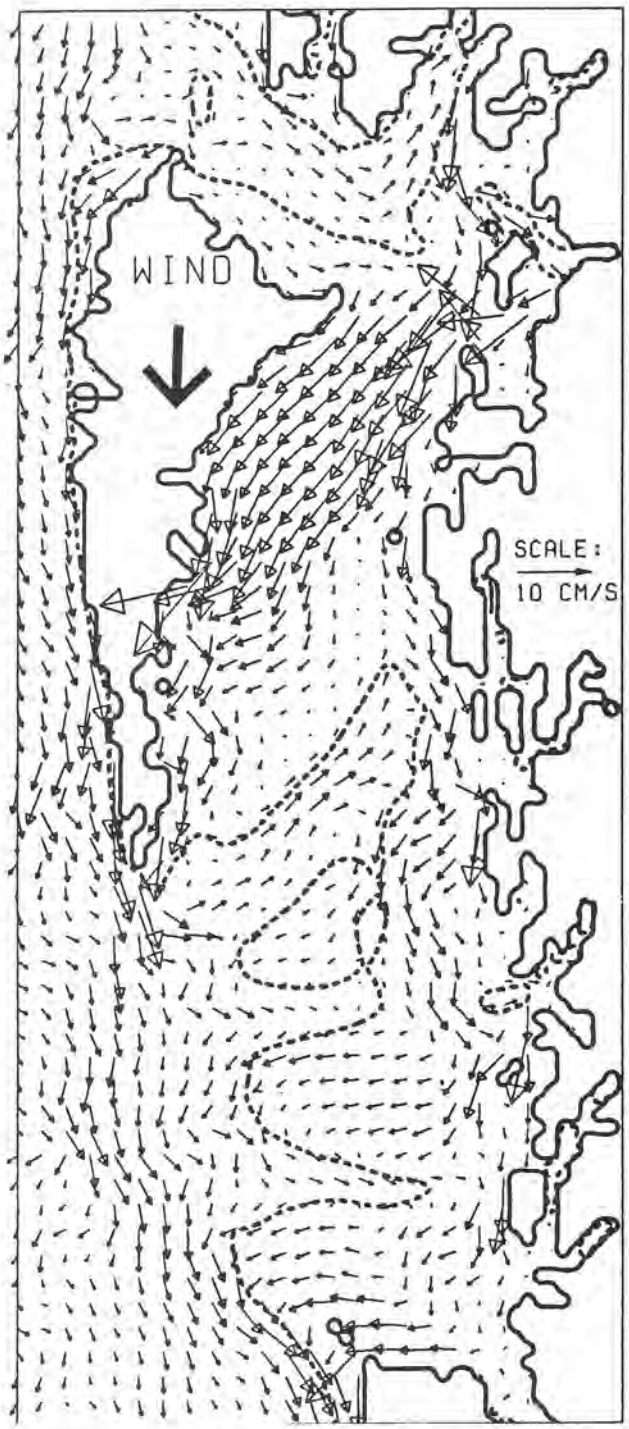

Figure 4: Currents simulated by the Charles Hannah model. The large black arrow in the Queen Charlotte Islands marks the wind direction. Smaller arrows indicate current direction and speed (scale is shown on right side of figure).

Charles Hannah had run a two-dimensional computer model, a sophisticated one, but limited by its nature from predicting deep counter currents or near-surface wind-driven flow. At any point in Charles Hannah's model, currents were the same whether ten or one hundred metres below surface. We expected his model would work in winter when water density from, surface to bottom, changes little. But in summer the fresh water from rivers spreads over the ocean, and dense ocean water can, in mid-Strait, creep along the bottom of the deep channels. Would his model work then?

Comparison Of Observations And Numerical Simulations
Surprisingly to me, it did simulate many of the loops in the currents. The flow around the north end of North Bank shown in Figure 2, which carried our drifters, is also found in his model. Both are following the bathymetric contours more than 200 metres below the surface. We had found a massive eddy, locked over North Bank between Cape St. James and the mainland coast. The flow is gentle and interrupted by the tidal currents every half-day, but along the western flank of this bank the water glides upwind at the stately speed of about a tenth of a meter per second, or for the mariners, at a fifth of a knot. Any oil escaping into these waters could remain in this eddy for weeks, until a storm blew it ashore or into the Pacific Ocean. Some oil could survive a short storm and drift in these waters for weeks after the spill.

The model failed, however, at Cape St. James. We expect that some tidal effect is acting there like a pump to push the water to the west on every ebb tide. Without tides his model cannot simulate the real current, which jets into the Pacific in a flow only twelve to twenty kilometres wide. Does this current carry food to the fish and sea lions that gather there? It must, and if oil is in the water, it too will flow past the Cape, past the sea lion colonies on the Kerouard Islands, and past the schools of herring and salmon feeding there. We expect that life in these waters is sensitive to oil.

Implications For Marine Life
In our eight weeks of observations in 1990, twelve Loran-C drifters exited Hecate Strait past Cape St. James. All but two passed within twelve kilometres of the Cape, yet the mouth of Queen Charlotte Sound is more than 200 kilometres wide. Obviously, the masses of marine life near the Cape are at risk if oil is spilled on the surface in western Hecate Strait, although the exposure time might be only a few hours in this fast flow before the slick passes by. If there is a positive side to this outflow, it is that the catchment area for the current appears to be confined to the western side of Hecate Strait, and we found no flow toward the eastern shore of Hecate Strait while the winds blew from the north.

Outflow on the east and south sides of Queen Charlotte Sound sweeps into the Pacific further to the south. Our Loran-C drifters did not venture into these waters, but a few satellite-tracked drifters set there looped around Queen Charlotte Sound, and several flowed into the Pacific (Figure 5).

These measurements will help us determine the drift of surface waters, not only for oil spill monitoring, but also for Search and Rescue operations of the Canadian Coast Guard and for fisheries research. Hecate Strait is the second richest groundfish region in British Columbia; our knowledge of winter currents there has already led to better models of Pacific cod recruitment.

Figure 5: Satellite-tracked drifters (July-Aug., 1990).
Tidal loops are poorly resolved by these drifters, but the longer-period, non-tidal motions can be seen in the tracks.

The Seakem crews survived eight weeks on the WESTERLY WIND, by rotating staff every two weeks and reducing staff to four after the first two weeks, once operations became routine. I departed after two weeks. Several, such as Paul Greisman, the skipper Bill Johnson, and deck hand Ken Dexter, stayed on for four weeks, providing continuity.

Wave-Current Interactions
We lived with the constant threat of storms. The tidal currents near Cape St. James can ebb to the south at several knots, and if a southeaster blows in, the ocean waves carried by the storm flow directly against the ebb, steepening the waves suddenly. We encountered such conditions early in the trip and were stopped at Cape St. James, unable to beat into the seas, while the CSS PARIZEAU had little trouble a few miles out to sea in slower currents. We chased one of our wayward drifters that had escaped into the Pacific, to prevent the oncoming storm from dashing it on the rocks near the Cape. After 30 minutes of beating into the lumpy seas, we turned around for a safe harbour. The drifter survived the night and all was well the next morning.

Autumn and winter bring the fiercest storms. The most alarming account comes from the Shell Drill Rig (SEDCO 135F) which rode out a storm here on October 22, 1968. The significant wave height rose from 1 metre to 20 metres in eight hours.

Numerical Simulations Of Tidal Currents
Numerical models of ocean currents have been developed since the early 1960's. All simulate the ocean at discrete points called grid points. For the model in Hecate Strait a known horizontal force was applied to the sea surface to simulate the wind. Charles Hannah used 14,400 elements (squares representing part of the ocean), and calculated currents every ten seconds for three months of simulated currents, and repeated this whole run several times to determine the best values for friction and wind stress.

Mike Foreman has developed 'finite element' numerical models for the tidal currents. His studies in Hecate Strait are just beginning. These models use triangular grids, with water height and current calculated at the vertex of each triangle.

'Finite difference' models such as used by Charles Hannah are limited to square grids, whose alignment and size can be changed only with difficulty. The grid set up by Mike Foreman contains 6984 elements, each with a realistic depth determined from digitized soundings provided by the CHS. Element size varies according to depth, with smaller grids in shallower areas and in regions where the water depth changes rapidly in a short distance.

The setting up of this network of grids is first done automatically by a computer program called TRIGRID, developed at IOS by Falconer Henry. The first time Mike Foreman ran TRIGRID over the region, it set up large elements near Cape St. James, too large to resolve the narrow outflow. Once our observations of the narrow jet were available, he manually reduced the size of the grids there to produce the most recent picture of tidal currents (Figure 6).

The finite-element model is ideal for tides, whose regular forcing in time can be represented in the model by cosine functions. The model does not actually 'time-step' its way through; instead it solves the series of equations representing the motion of water under cosine type forcing of the tides. Wind, whose behavior in time is less regular, cannot be represented as well. So the Foreman model simulates the tides and the Hannah model predicts wind-driven motion.

Recent Studies

At present we are limited to two-dimensional models, but Patrick Cummins of the IOS Physical and Chemical Sciences Division has begun work on a wind-driven three-dimensional model for the waters of northern British Columbia. This model will rely on currents measured by IOS beginning in 1977 and continuing until 1993, including those measured at the eighteen moorings set by Mike Woodward in Queen Charlotte Sound and Hecate Strait in June 1990, prior to the arrival of the WESTERLY WIND.

These drifter measurements themselves are valuable for oil spill trajectory predictions. When the fishing vessel TENYO MARU sank off the west coast of Vancouver Island in July 1991, we were able to predict the drift of the oil slick using our Loran-C drifter tracks observed in 1985 and 1986. These tracks showed that the wreck of the TENYO MARU lay near the centre of a 50-km wide eddy in surface currents that would carry the oil to the south, away from Canadian shores. With similar measurements now available in Hecate Strait and Queen Charlotte Sound, we are ready for possible oil spills there. Surprisingly, our knowledge of flow in Juan de Fuca Strait is less well known. Flow simulations there will await funding for future work.

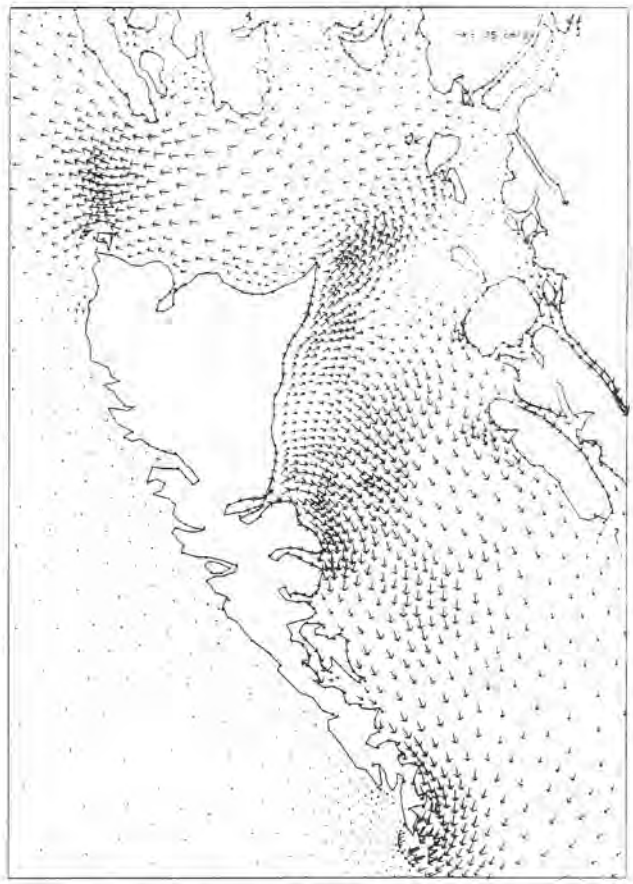

Figure 6: Simulated Tidal Currents - Mike Foreman Model (10:00 PDT, Aug. 1, 1991). These currents reverse direction with the ebb and flood of the tides. The length of each arrow indicates the strength of current. Currents stronger than 25 cm/s have multiple shafts. Scale of arrows is at top right.

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The Role of Topology in Spatial Information Systems

by
Paul N. Holroyd

From Data To Information

Topology plays an important role in elevating the digital file from data to information. This is true in several ways.

By definition, topology is the study of spatial relationships that exist between graphic elements [1]. Geometric properties and relationships are retained within the topology, and facilitate 'spatial reasoning' [2]. Thus it becomes possible to determine: line lengths; which lines meet at the same point; which lines form a closed polygon; the area of a polygon; the amount of overlap between polygons; whether a polygon contains another polygon (i.e. an island); nearest neighbours; and so forth.

Topology also brings order. Digital files, layered according to a predetermined and consistent thematic scheme, are composed of information that is 'clean' and exact. Topological information is composed of a network of lines called arcs whose end-points meet to form precise nodes and which form non-overlapping polygons within each thematic layer.

As illustrated in Figure 1, no arc within a given thematic layer overshoots (crosses over) or undershoots (falls short of) another arc unless that is what the information dictates. This situation occurs, for example, when the data contains a dead-end street or a river, in which case the arc is referred to as a dangling arc if just one end of an arc does not meet another arc to form a node, or a floating arc if neither arc end is attached.

Figure 1a shows a section of an unstructured digital file. Figure 1b points out the shortcomings of the data and illustrates the idea of undershoots and overshoots. Figure 1c represents the data after repairs to the data have been made and a network analysis performed. It also illustrates concepts such as nodes, arcs, and dangling arcs. Polygon topology is then built, as shown in figure 1d, and the individual polygons are labelled to define the colour and other attributes for each area [3].

Topological structuring also provides a framework wherein geographic information can more accurately reflect the real world and geographic information systems (GIS) can be used to determine and analyze spatial inter-relationships [4]. By

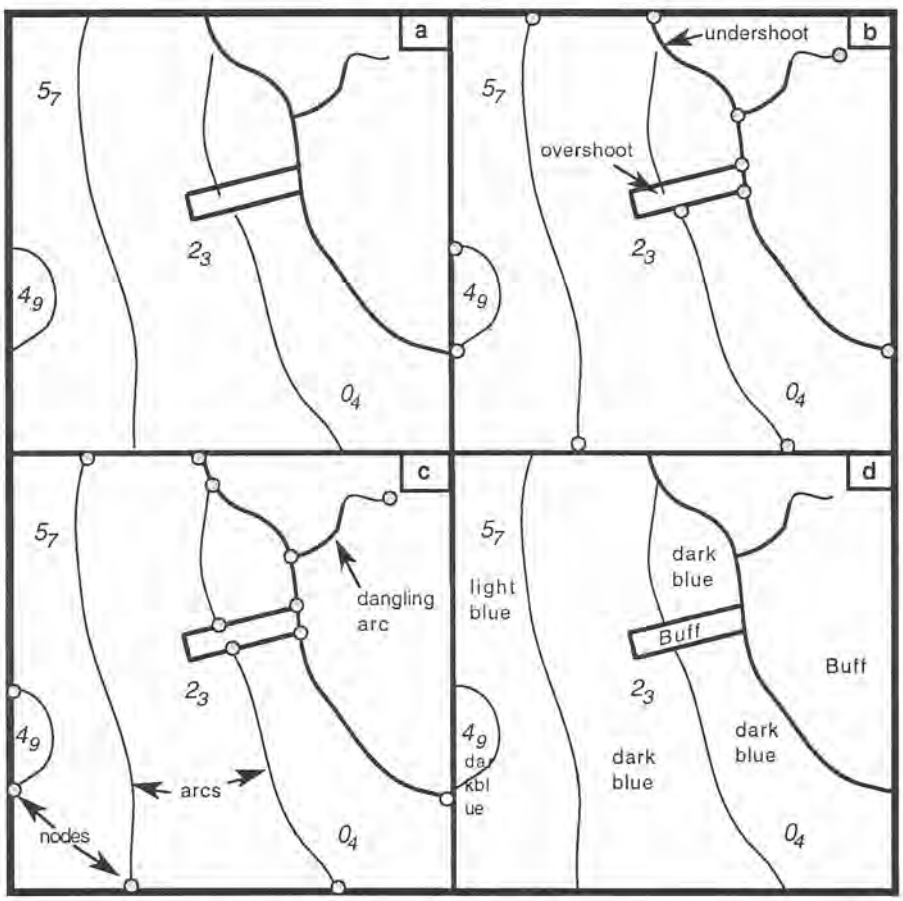

Figure 1. Building Topological Structures

linking graphics systems with database management systems (DBMS) much more information or attributes about the features being portrayed in the graphics can be carried, without necessarily hurting graphics performance.

In GISs, the mechanism for accomplishing this is to assign keys to topological features. These keys are duplicated in a DBMS and are the link between graphic and non-graphic information.

Figure 2 illustrates how common keys are used to link the graphic information with the alphanumeric information held in a DBMS. In a typical GIS environment, the user can point at graphics features and get information about the feature(s) from the DBMS or, conversely, queries can be initiated through the DBMS and the response shown in graphical form. For example, the feature with a label of key #3 (in figure 2) may be a wharf. Any pertinent information about the wharf, such as height, length, date of construction, owner, number of berths, and so forth, can be kept in the DBMS. When the user points at the wharf on a graphics screen, the attribute information can be retrieved. Alternatively, the user could ask the attributes database to highlight features according to a particular criterion, such as all the wharves with a construction date between 1988 and 1990.

Topology has permitted automated mapping systems to evolve beyond the 'feature code and line' type of attribution that is prevalent in non-topological data sets. These older data sets are often colloquially called 'spaghetti' because of their inherent lack of order. End-points do not match exactly and intersections may be close, but not exact. Lines can also cross other lines with no consequence.

It is often of value to consider an analogy when trying to understand a new concept. One way to think about topology is to borrow an example from music. A symphony orchestra consists of many individual musicians and many different instruments. Anyone listening to the orchestra fifteen minutes before a performance would hear little more than a cacophony of sound as instruments were tuned and pieces rehearsed. Only when a structure is imposed, through common leadership, functional groupings, written music, sense of purpose, and goals, does the orchestra become a definable entity.

If unstructured data could produce sounds it would also be a cacophony! It is only through the organizational mechanism of topology that sense can be made of the myriad of meanings and nuances in digital information.

The Rise Of Topology

There are several reasons why topology has become popular. Creators and consumers of digital geographic information have become more numerous and more sophisticated over the past decade, as a direct result of the dramatic improvement in the price and performance of computer hardware and software. Stemming from this has been an increase in the exchange of digital information and a resultant need to organize information to make it more easily understood by third party users. The ability to build topological information is now an integral part of most commercial GISs.

GIS is an enabling technology. It allows non-cartographers to manage spatial information and to create geographic products. It provides the less technical person with the ability to combine information from disparate sources. The 'cleanliness' of topological information makes it easier for third parties to use 'foreign' information. When digital data was used only in-house, ambiguities were acceptable because the people using the data understood its intent and the discipline within which it was being used. When data is to be used outside the organization for which it was originally intended, the meaning or the intent of the data is not always clear. Pre-defining what the data will look like means that others can be told about it. There are in-house benefits too; if it is unambiguously defined, maintenance is easier, and the information can be adapted for other uses.

A Break From The Past

In nautical chart production, digital files have mostly been used to create negatives for the lithographic printing process. As long as the data looked good to the human eye and could be separated into colour layers, everything was fine. Raster plotters, which can recreate full colour-filled graphics directly from digital files, combined with topology, provide a way to break away from the lithographic press. Topological information is layered according to thematic groupings instead of the requirements of a particular output device or methodology.

Figure 3 illustrates layering according to thematic groupings and that topology involves the creation of non-overlapping areas from a set of joined, enclosing lines. In nautical charting, topology is required to define all colour-filled areas currently shown on the paper chart, as well as additional deep water bathymetry and special limits for other uses, such as in electronic chart systems. In this example, the digital chart is separated into three thematic layers: bathymetry; overlay areas; and non-topological information such as names and notes [5].

Digital nautical charts and bathymetric maps are being used increasingly in applications, other than paper chart and map production, such as electronic fisheries charts, electronic navigation charts, studies related to the management of the marine environment, and in database creation. This means that digital information cannot simply look right, but it must be correct and consistent with respect to the underlying file

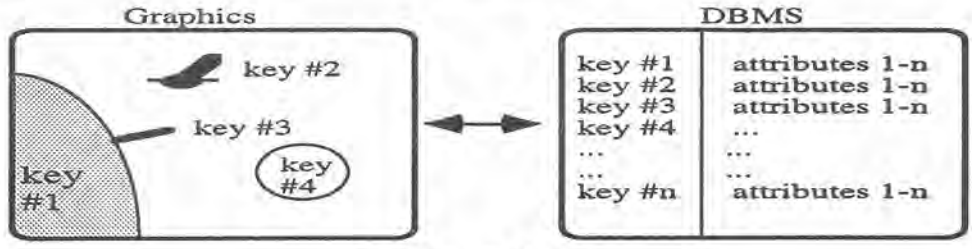

Figure 2. GIS Model

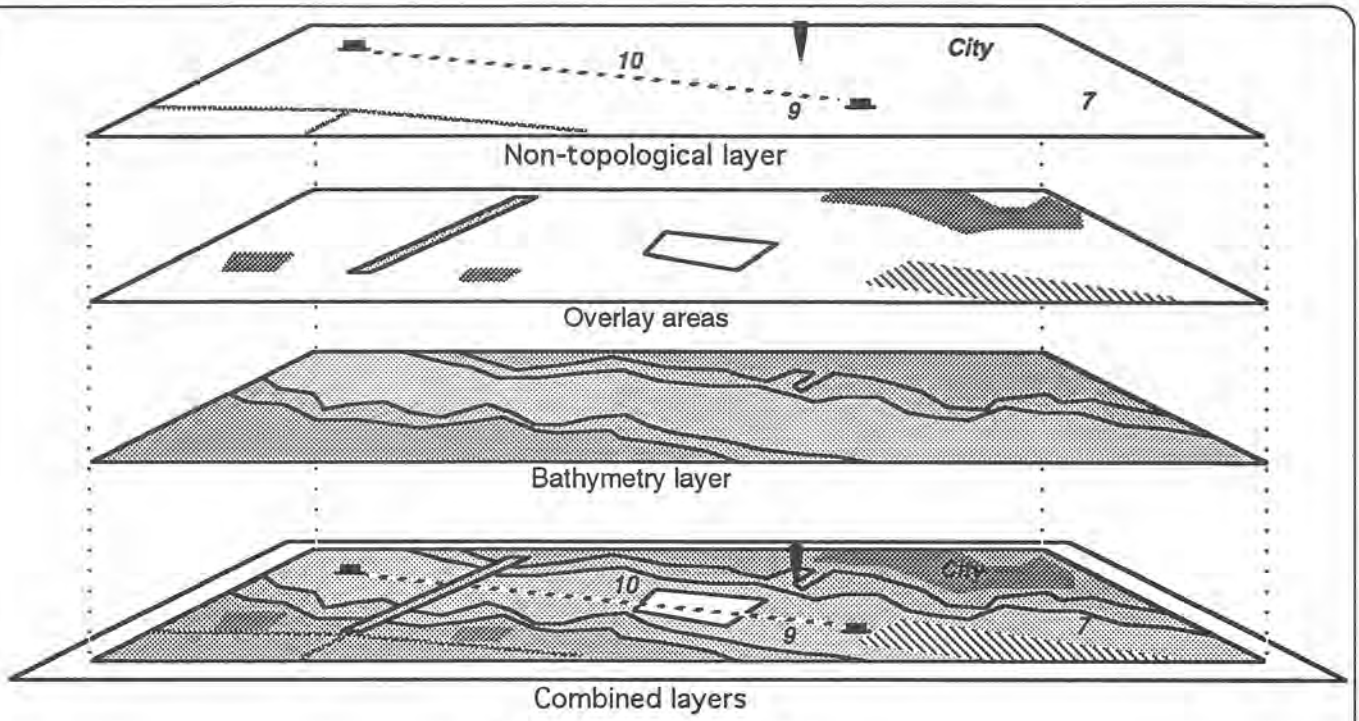

Figure 3. Thematic Layering

organization and structure. Electronic chart (EC) systems rely on both accurate graphics and content. The EC must, for example, know what depth range the ship is positioned within, or when the ship is in a traffic separation scheme. The graphics showing these features must be correct, and so must the feature coding, depth information, and all other pertinent details.

Although topological processing adds time to the digital production cycle, information is an investment; one with a much longer life cycle than software or hardware. Investing the time, up front, will save maintenance and 're-working' time over the life of the information.

It is important to remember that the benefits of digital data are not as much in its creation and first time use, but in the ease with which it can be re-used and adapted to other uses. In these days of environmental awareness, even data is re-used and recycled!

Conclusion

This paper has described topology and why it is important to digital spatial information. It has shown how structure and standards are fundamental to the shift from data to information. Topology not only enhances the investment in information but also provides a foundation for additional uses of the information. Information that is clearly and unambiguously defined is more easily maintained and more easily understood by third-party users.

Finally, a quote. The author and publication are unknown:

> "Turning information into knowledge is the creative skill of the age, for it involves discovering ways to burrow into the abundance, rather than augment ... to illuminate rather than search".

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The ECDIS Paradox

A Controversial View on Navigation, Freedom and Safety at Sea

by

Dr. Fosco Bianchetti

Introduction

Today, C-MAP, with more than 25,000 chart plotters and 100,000 chart cartridges in the field, is the world's largest supplier of high resolution electronic charts and ECDIS (Electronic Chart Display and Information Systems) for marine navigation.

There is a catch, though. These systems belong to the so called 'category 3', the somehow demeaning class that identifies those systems not approved as legal replacement of paper charts. Nevertheless, we like to believe that this commercial success has been one of the forces which has put significant pressure on regulators to achieve an international standardization of ECDIS for larger ships. I also like to believe that our experience can contribute to the broader scope.

I was personally involved in the development of the ECDIS concept from the very early days of the RTCM (Radio Technical Commission for Maritime services) recommendations and I must say that, then, it seemed reasonable to me that ECDIS for big ships should have been just an extension of what we were doing for smaller boats. Over the following years, partly because of growing first-hand experience with our large customer base and partly because of a philosophical rethinking of the whole issue of navigational safety, I have better focused my ideas on the subject and have totally changed my mind.

On Paper Charts

It must be realized that the concept of ECDIS is rather generic, therefore any standardization effort must start by clearly defining the purposes and objectives of the specific ECDIS that it is considering.

For instance, an ECDIS optimized to assist dredging will be different from one conceived for sail boat racing. This is the key issue, as I don't think that we can envision an ECDIS for all seasons and all purposes.

So far, the standardization process for SOLAS (the International Convention for the Safety Of Life At Sea) class ECDIS has assumed, as the major guideline, that these electronic systems should be the legal equivalent of the existing official nautical paper charts. This assumption has far reaching consequences and, in the past, I have often asked myself if this could be the legitimate objective for what is the real scope of all these efforts: to improve the safety of commercial ships.

To answer this tricky question it was then necessary to understand what are the real purposes of the nautical paper chart that is at the basis of this specific ECDIS concept.

Trying to be schematic, I have come up with three fundamental purposes.

1. Scientific / Geographic

This purpose is common to maps of all kinds. It is scientific in the sense of providing a knowledge of the environment. This information can be used for a variety of scopes; for instance, depth data is significant for fishing or for selecting dumping areas.

It is geographic, because of the graphical representation of the earth and its features. Examples of this use can be found in the planning of a new port or an anchoring zone.

2. Positional

The chart has traditionally, and usefully, acted as a positioning device assisting the navigator who, comparing the chart clues with those of the world around him, was able to identify his position.

That is why charts are filled with these clues (visual, radar, echo) in the form of navaids, coastlines, piers, hills, towers, soundings, etc.

3. Navigational

Course planning is obviously the main scope of a nautical chart, but navigation is much more than this. Classical marine navigation is actually an obstacle avoidance exercise and most accidents originate from a failure of this function. Charts provide the information relevant to all known possible obstacles, physical or legal (forbidden areas), and the navigator must decide which ones are really dangerous to his ship.

Of course the same piece of information, say a spot sounding, can satisfy all three purposes, while others are specific to a single purpose. It appears to me that nautical charts were designed to satisfy these purposes and are still produced according to the same principles by the Hydrographers.

How good is this chart to the mariner? Very good indeed for many users, because it provides the pleasure boat skipper, as well as the professional, with the broadest possible body of information, offering him a very flexible, reliable and powerful instrument of navigation.

It is definitely an instrument that fully respects the freedom of navigation and the authority of the captain. But how good is it for some other users, namely the SOLAS class ships?

SOLAS class ships don't need scientific/geographic information for obvious reasons. They don't need positional clues from the chart either. They are already, or soon will be, "precise navigators" by virtue of GPS/DGPS and Radar. Even less, they need to play an obstacle avoidance exercise

through reefs and shallow bottoms by interpreting charts or screens, unless there is no other alternative. Why should merchant ships need unrestricted and unregulated freedom of navigation, if not for illegal purposes?

My conclusion is that the current paper chart is far from being the ideal tool for a large ship. It is actually an obsolete and dangerous instrument for this specific purpose. No other better tool is presently available, though. Therefore, charts well deserve the awe they have gained in the marine community.

What does not seem wise is to plan their extension, in electronic form, into the end of this century and beyond; at least as the major navigational instrument for large ships.

On SOLAS Class Electronic Charts

Of course electronic charts could be designed as replicas of paper charts. Present technology is good enough to do so, if this is the requirement, and electronic companies (including ours) will produce whatever ECDIS is regulated, if financially rewarding. As we have seen in the previous section, though, present paper charts are the ideal tool for smaller boats, but not for the large ships that we are discussing today.

Respecting my own rule, I will start the discussion on an ECDIS for large merchant ships by laying down the purposes and objectives that such a system should aim for. The following is a rough outline of these purposes.

1. Definition of Operational Space
The concept of describing the environment and allowing the captain to choose a safe course should be replaced by the concept of a legally defined usable space. Of course the usable space should be defined according to the class of ship and loading conditions. This should drastically reduce interpretation errors and subjective judgement. Given the incredible potential for disaster, it seems unwise to me that captains of different skill, or bravery, should be free to navigate closer to, or farther from, a reef.

2. Definition of Navigational Rules
Within the usable spaces, rules of navigation should be clearly specified. As examples of this I would mention: allowed directions, anchoring areas, speed limitations.

3. Definition of Procedural Instructions
It seems critical to the safe organization of maritime traffic to impose a certain amount of predictability to the ship's actions and some degree of compulsory interaction with the surrounding vessels and control centers. Reporting points are a typical system of predictable interaction with the outside world, while compulsory checking points, visual or Radar, implement a self checking procedure.

4. Implementation of a Safety Engine
I have used this catchy name for that automatic warning mechanism necessary to alert the captain of any violation of the set rules that should be followed.

It will detect proximity to illegal areas, overspeed conditions, and missed procedures. It will also implement all course prediction functions as well as other navigational envelope calculations (turning radius, etc.).

5. Navigation
Navigation according to this new concept will be stripped of all obstacle avoidance functions and hence greatly simplified. It will basically require little more than simple point-to-point navigational tools. Some approved and updated information (e.g., radio frequencies) will be included as part of the navigational data base.

I believe that all the above considerations show that the problem of electronic charting for big ships requires a reassessment of the cartography itself, more than a discussion of how to display the existing charts.

A typical VTS (Vessel Traffic Services) chart (see Figure 1), hints at how this new cartography might look. An electronic cartography, redesigned with these objectives, will effectively be a gigantic leap forward in the safety and orderly flow of merchant traffic. It will eventually make full use of known position and effectively integrate with VTS systems.

The ECDIS Paradox

What I consider to be the "ECDIS paradox" should now be quite clear.

Small boats need full freedom of navigation and all the perks that paper charts can offer. Therefore they would need a fully fledged electronic replacement of a paper chart; something like what is currently on the point of becoming the legally approved ECDIS. But this would be, of course, too big and too expensive.

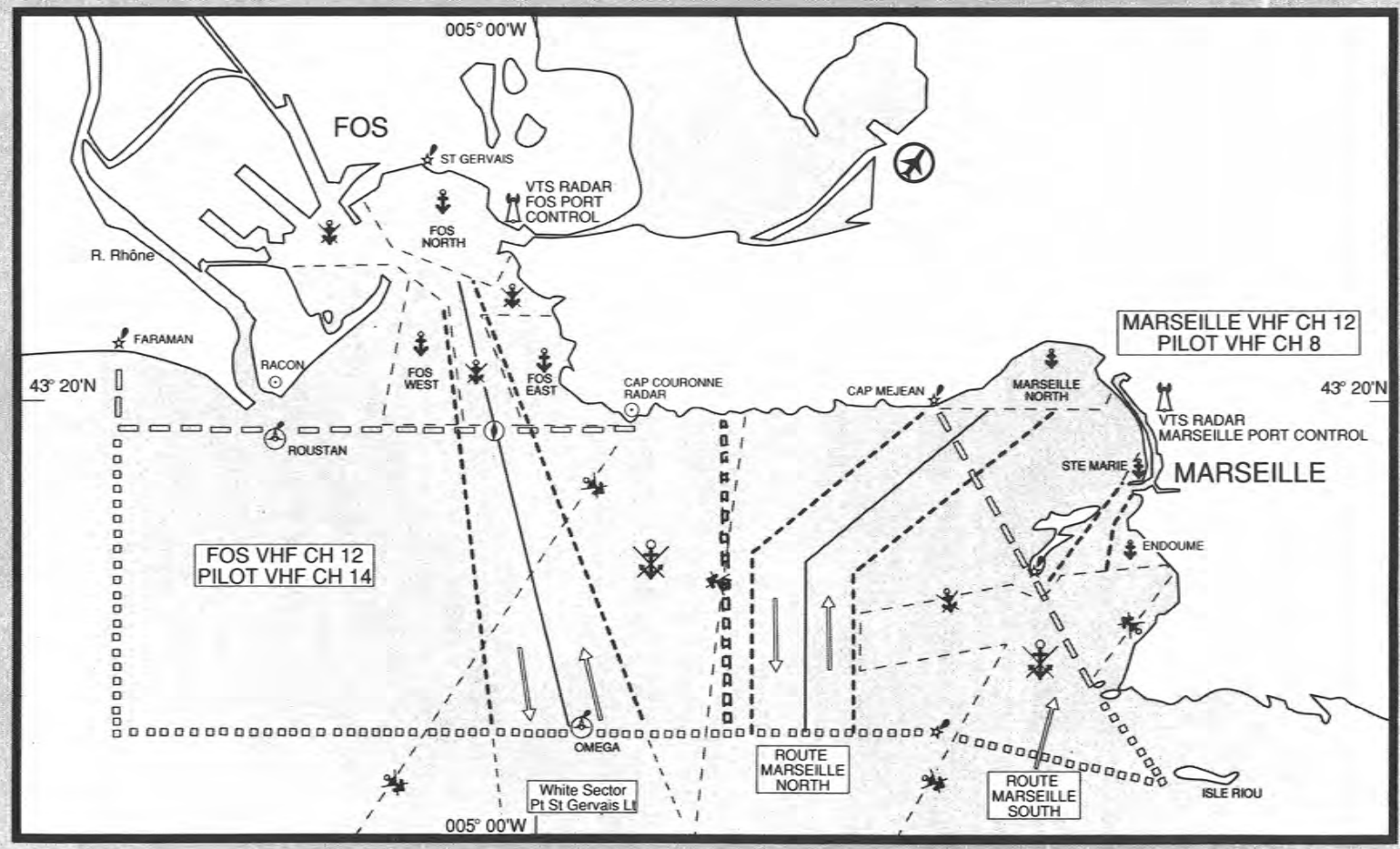
Big ships, on the other hand, must have a much simpler cartography and hence a cheaper machine with a more manageable set of data. This is a pity for us manufacturers, because they have the money and the room to afford a large, complex and expensive system. We should be careful, though, not to impose a demand just because we could create a product. This is probably a case where smaller and cheaper is better than big, complex and expensive.

We, as the leading company in small boat ECDIS, are working on the edge of compromise, with our customers asking for more and more detail, better graphics, and a never ending list of features. Yet their budget confines our design margin within very narrow boundaries.

EPNIS, an Electronic Navigational Instrument for SOLAS Class Ships

Electronic charts, as envisaged by the current ECDIS regulatory efforts, will have a future in big ships even in the unlikely case that these ideas should be accepted. There are many reasons for this, but the main one is that hydrographers are already heavily committed to electronics, even just to produce paper charts. As the electronic data will gradually be available as a by-product at no extra cost, it will then be natural to present this data on a screen even if no regulations were imposed.

My point is that this kind of ECDIS will not be a significant improvement to the safety or efficiency of large ship naviga-



NOT TO BE USED FOR NAVIGATION

FRANCE	MARSEILLE FOS	AREA AND REPORTING	EDITION No.	REVISION DATE	PAGE No.
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Figure 1: A Typical VTS Chart

tion and therefore should not be made mandatory. It should nevertheless be regulated just to prevent gross misimplementation, which could be a hazard to the safe conduct of a ship, but it should not be made an official replacement of paper charts. There is no need for a legal replacement of paper charts on big ships, and paper charts should be considered an irreplaceable back-up of last resort.

Moreover the efforts, regulatory and technical, to achieve an acceptable electronic replacement of a nautical chart will divert precious resources that could be used to develop an alternative concept. I have named this alternative concept EPNIS (Electronic Procedural Navigation And Information System), to stress the philosophical difference from the ECDIS we have known so far.

An EPNIS should be designed keeping in mind the purposes and objectives of the previous section, which basically reduce navigation to a set of predefined procedures that leave very little room for the subjective judgement of the captain. This approach may sound abusive to old time sailors, but this shift happened long ago in aviation and nobody today would even dream of jumbo jets flying by sight all over the country according to their pilots' whims.

Every flight is planned beforehand in detail and the authorities know where the plane is every moment and what it will do next. No action is undertaken without a specific clearance and all navigation is along well-defined airways and reporting points. Laws and rules that have changed the previous way of flying have been approved and are now enforced, on an international scale even outside national boundaries, with the cooperation of all countries.

In practice an EPNIS will aim at simplicity, both in the man-machine interface and in its technology. It will not need to be complex or have complex graphic displays, because of the dramatic simplification derived from a procedural approach. Actually, the most significant guideline for the EPNIS standardization groups will be that of conceiving a system not meant to be the legal equivalent of paper charts. It should be a legal requirement in itself, parallel to that of the charts. This principle alone will probably be powerful enough to stimulate the creation of a genuinely innovative system for the future.

Other important concepts which should be embedded in an EPNIS are the following:

- Mandatory use of differential GPS.

- All positional, cartographic and procedural data should be based on differential GPS working on a fixed universal datum (e.g., WGS84). There is no need to introduce more datums which can only cause dangerous mistakes.

- A few fixed scales should be standardized, with a real-size representation of the ship on the larger scales. This should create an immediate visual perception of the navigational situation after minimal experience using the system.

- Replacement of the safety depth contour concept with that of safe draft areas. Areas where ships of a certain class can safely navigate should be defined. These areas will only indirectly be related to the real depth. Outside the safe draft areas the sea should just be considered unsafe even if deep enough. This will be left to the discretion of the authorities to decide. Some areas could be declared unsafe for a variety of reasons: poor or old depth data of the area, proximity to reefs, strong currents, environmental concerns, etc. Actually, the concept of 'unsafe' will take the broader meaning of unsafe not only to the ship but to others.

- Introduction of compulsory and untamperable logging of the journey to be exhibited at each landing. This will assure an easy, and maybe automatic, check of compliance with the rules.

The Advantages of an EPNIS Approach

The equipment on board will be inexpensive and therefore reliable and easy to maintain. This should win the support of serious ship owners who will be able to increase the safety and the control of their crews at a very acceptable cost.

The lower cost will make the compulsory introduction of the systems to a smaller boat class economically viable, thus extending the benefits of the concept.

Cartography will be extremely simplified, therefore the task of covering all commercial areas will be feasible within a very short time span.

Updating, which is now an unsatisfactory aspect of present ECDIS prototypes, will become an easy task.

All problems created by a standard related to paper charts (colors, symbols, etc.) will be removed.

Even the timing could be right, as, eventually, we will have all the required technology. We may even take advantage of the present favorable political mood, which could help the funding for such an environmentally significant move.

Can the Future Still Be Changed?

I fear that the momentum that ECDIS development has gained cannot be easily braked or steered, even if some criticism of the current course is not unheard of. I also fear that to brake these efforts, which somehow belong to the wide scope of electronic charting, could be a mistake. Nevertheless, the scope of the marine safety issue is so great, especially from an environmental point of view, that I believe there is a moral obligation in trying to push in a direction that appears to promise a safer future.

The first big environmental disaster dates back to twenty-five years ago, when the TORREY CANYON tanker spilled 120,000 tonnes of oil running aground on a reef off the southwest coast of England. In 1978, the AMOCO CADIZ slammed into the shore of Northern France leaking 220,000 tonnes of crude. One year later the ATLANTIC EMPRESS suffered a collision off the coast of Trinidad pouring 270,000 tonnes of oil into the sea.

It is nearly impossible to describe the havoc created by these tragedies of the sea on beautiful beaches and on marine life. To have an idea of what happened then, and what can happen in the future, it is enough to compare those accidents to the

relatively minor one which occurred recently, when the EXXON VALDEZ spilled 36,000 tonnes running aground off Alaska. Imagine what damage the SEAWISE GIANT could cause, with a deadweight of 565,000 tonnes, the largest VLCC (Very Large Crude Carrier) ever built.

Today most VLCCs are between 200,000 and 300,000 tonnes. More than 400 are afloat today. The accidents quoted were caused by trivial navigational errors or uncontrolled navigation as when the AMOCO CADIZ ran ashore following a fault in the ship's steering gear. The proximity to the shore, and endless discussion of salvage terms with a nearby tug, were blamed as the real causes of the disaster.

All these accidents could have been prevented by simple procedural navigation, which would have prevented the captains from executing their improper conduct.

The outcry following the EXXON VALDEZ accident led very quickly to the US Oil Pollution Act, which unilaterally requires tankers operating in American waters to have double hulls (with a 3 meter gap). This law should be applied to all tankers ordered after 1990 and has an estimated (and astonishing) cost of 30 million dollars per ship. Moreover there is no agreement on the real benefits of this protection which is believed not adequate at speeds over 4 knots; an EPNIS could actually be more effective and cheaper than double hulling.

This example leads one to believe that radical laws can be enacted in a short time if there is enough motivation and agreement, even bypassing lengthy international procedures. The possibility that such motivation and agreement can be gathered around the concept of EPNIS is doubtful; and this is for many reasons. One obvious reason is that most people may not agree with these views.

Another more subtle reason is rooted in the environment in which ECDIS was born. This environment is the world of hydrographers, who, rightly from their point of view and in agreement with tradition, are more concerned with the cartographic aspects than with the navigational and regulatory issues. As their role in this issue stems mainly from the legal requirement for a paper chart, it is reasonable for them to play the game that they were requested to play.

The purpose of this paper is also that of verifying if there is any consensus around the EPNIS concepts (disregarding the acronym, which is negotiable). Should any such consensus materialize, the first step to undertake will be a reassessment of the ECDIS activities, with the aim of separating two issues which have been intermingled, but don't necessary belong to each other: classic cartography (e.g. the DX90 standard for the exchange of cartographic data); and safe navigation.

An RTCM working group, which is very flexible and relatively informal, could also be set up. Coordination with the IMO and IALA (International Association of Lighthouse Authorities) VTS working groups would be essential. The Woods Hole test bed could also be used immediately to test some of the ideas.

If all this happens, then, just maybe, the future will be changed.

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Notes:

This paper was presented at the ECDIS Conference in Baltimore, Maryland, on February 29, 1992.

In the fall of 1992 C-MAP will deliver ECDIS 'category 1' test data to a few major ECDIS manufacturers.

About the Author

Dr. Fosco Bianchetti is president and chief executive officer of C-MAP, which he founded in 1986. He has been an innovative force in the fields of marine electronics and is the recognized pioneer of electronic cartographic products. He also conceived the first commercially successful electronic chart plotter when he co-founded Navionics in 1984.

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A Farewell to C.S.S. Bayfield

by

Capt. M. Birchall

Early in June 1992 a small vessel slipped her lines at the Canada Centre for Inland Waters (CCIW) in Burlington, Ontario and set off for the shipyard at Pictou, Nova Scotia. This is where she would be refurbished as a yacht for her new owners SECUNDA Marine Services Ltd. of Dartmouth, Nova Scotia. Thus ended the BAYFIELD's nineteen year career as a Canadian Scientific Ship.

The vessel was originally built in 1960 in Kristiansand, Norway and christened as M.V. VICCA by American owners. She was built to work either as a corporate yacht or research vessel. After a period of cruising she was chartered to the University of Miami to conduct oceanographic studies around the Bahamas. At the end of this charter she was bought by Mr. John David Eaton, converted to an ocean-going yacht, and

Photo 1: Canadian Scientific Ship BAYFIELD.
Named for Admiral Henry Wolsey Bayfield, the Royal Navy hydrographer who surveyed and charted Canadian waters of the Great Lakes during the early 19th century. Length 32.2 metres, beam 6.4 metres, draft 2.7 metres, displacement 177 tonnes, cruising speed 10 knots, range 2300 nautical miles, crew 10.
(courtesy of the Department of Fisheries and Oceans, Canada)

renamed HILDUR. In 1973 Mr. Eaton died and the vessel was put up for sale. It was acquired by the federal Department of the Environment and renamed BAYFIELD in honour of Admiral Henry Wolsey Bayfield (see Photo 1). She was then outfitted for survey work and went into service early in 1974.

In the years to follow BAYFIELD was used mostly for hydrographic purposes (by the Canadian Hydrographic Service) on the Great Lakes and lower St. Lawrence River. One notable hydrographic survey was conducted after the loss of the EDMUND FITZGERALD between Caribou and Michipicoten Islands on Lake Superior. In her later years at CCIW, the ship was used mainly to conduct scientific studies in eastern Lake Ontario and the Bay of Quinte.

The vessel was well built, and although her profile had been considerably altered over the years, nothing could disguise the beauty of her hull lines. All of the decks and furnishings were teak. She was a twin screwed vessel with a single rudder and two 260 h.p. Caterpillar engines. The accommodation was of a high standard and although the rooms were small they were comfortable and well appointed. The dining room/lounge was very spacious and attractively furnished. She had a well-fitted bar and, yes, we did have a few parties.

During her career as a survey vessel BAYFIELD was visited by quite a few dignitaries including Pierre Elliott Trudeau (at that time Canada's Prime Minister), accompanied by his wife (Margaret) and son (Justin). Another honoured guest was the Honourable Madam Jeanne Sauve (at that time the Environment Minister and later the Governor-General of Canada).

This was the fourth vessel to have the illustrious Bayfield name, the first being an ex-American vessel EDSALL, renamed BAYFIELD in 1884. The LOUIS M. LAUZIER has replaced the most recent BAYFIELD at CCIW. It is a great pity that this vessel has not yet been renamed in honour of Admiral Bayfield.

The BAYFIELD has now been renamed BELLE ISLE SEA and will once more be used as a corporate yacht. I recently saw a photograph of her refurbished (photo 2). She looks just fine, and as she starts into this next phase of her career I wish her and all who sail in her the very best of good fortune!

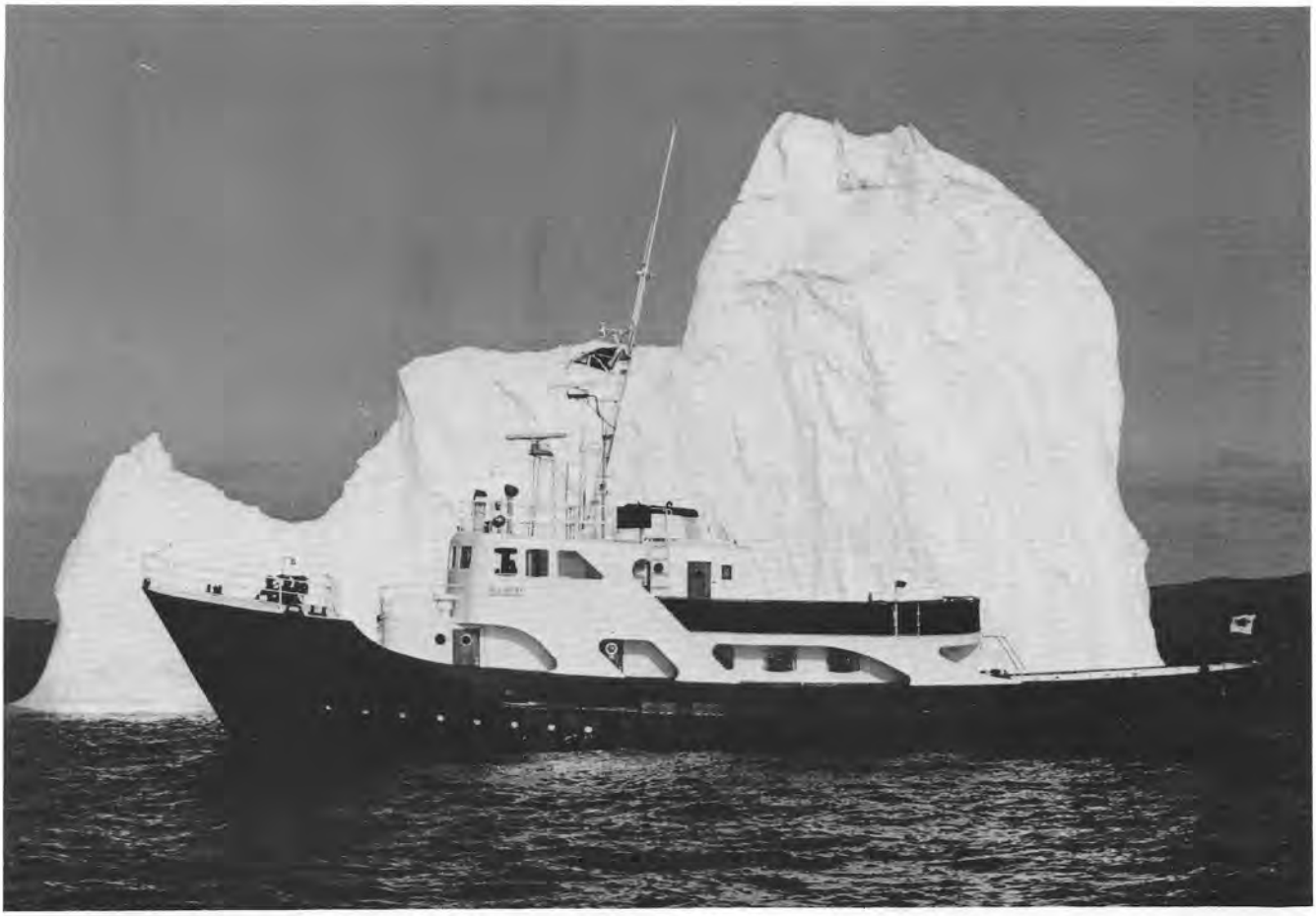

Photo 2: The BELLE ISLE SEA. (photo by Alfred A. Smithers, courtesy of SECUNDA Marine Services Ltd.)

About the Author

Captain Maitland Birchall was the Master of the Bayfield; 1974-1978, 1990-1991. For further information contact:
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Book Review / Critique d'un livre

by
R. W. Sandilands

"Charting the Inland Seas: A History of the U. S. Lake Survey"
Arthur M. Woodford. U.S. Army Corps of Engineers, Detroit District, Detroit, 1991. xv, 271 p. : illus., maps, ports.
Available from "USAED", Finance and Accounting, Corps of Engineers, P.O. Box 1027,
Detroit, Michigan, U.S.A. 48231-1027. $10.50 U.S.

Government-sponsored histories can be somewhat dull chronicles of the names of all the top officials who have ever served in the organization and all the statistics related to its being - all linked with turgid prose. In the main, Woodford manages to avoid these pitfalls in his well–written history of the U.S. Lake Survey. Granted, it is all here but it is incorporated into a flowing text that keeps the reader's interest. Father Louis Hennepin, writing of the Great Lakes, penned the following: "Those who shall be so happy as to inhabit that noble country cannot but remember with gratitude those who discovered the way by venturing to sail upon unknown lakes", and Woodford details the efforts of the men and women of the Survey who followed in Hennepin's tracks.

The Lake Survey was established in 1841 and continued its mandated mission of charting the lakes until 1970 when the U.S. Corps of Engineers passed the responsibility to the National Oceanographic and Atmospheric Administration (NOAA). Early chapters outline the history of the exploration of the lakes and the development of the shipping industry on them. It was the shipping losses due to the lack of navigational charts and aids to navigation that led to the formation of the U.S. Lake Survey. There was little knowledge of safe harbours and dangerous shoals on the thousand mile voyage from Buffalo to Chicago; little chance of shelter from the fierce storms of the lakes; and few lighthouses to aid the mainly coastal navigation of the day along the U.S. shore. Bayfield's Canadian charts were of little use to American shipping.

The task of charting some six thousand miles of coastline from Saint Regis, New York, to Duluth, Minnesota, was to take some forty-two years the first time around, and the approach taken to this project facing the Lake Survey is outlined. As a hydrographer I found it interesting that throughout the book the methods used to survey the waters and set up the survey control are described; an omission in many historical works of this nature.

There is sufficient detail on the financial allotments made by Congress, the cuts necessitated by the Civil War, and military requirements in Mexico which affected the completion of the task. The use of a broad range of sources keeps these first three chapters sailing briskly with interjections of human details of working conditions, rations, rates of pay and the odd interpersonal antipathies and internal feuds. I felt that the winds dropped somewhat in the next few chapters where the bibliography was almost entirely from the U.S. Army, Corps of Engineers' *"Annual Report of the Chief of Engineers"*.

In 1882 the Lake Survey officially completed its task and the office closed, but hydrographic charting standards never remain static for long. Steam propulsion and iron/steel hulls replaced sail and wood and the new lakers grew in size, with greater draughts, requiring new surveys. Fluctuations in lake levels caused concerns and the Detroit District Office of the Corps which had been printing and maintaining charts recommenced field surveys. The rebirth and growth are covered in detail, including the discovery of the infamous Superior Shoal.

A separate chapter describes the work of the cartographic and lithographic section during WW II when it became heavily involved in training cartographers and producing such varied products as aeronautical charts, military maps and even survival maps, printed on nylon, for air crews. An Appendix further outlines the equipment used in printing throughout the existence of the survey.

The impact of the construction of locks is covered and water flow, particularly during St. Lawrence Seaway construction, became a major study carried out in conjunction with fresh water studies.

As one would expect of a librarian and historian, this book is well referenced and indexed. Five Appendices summarize who's who and where and when; also listed is a selection of papers published by staff from 1959 – 76. Ships and floating equipment used in the survey are detailed in the narrative and the historical illustrations are interesting. If one could nit-pick it would be the lack of chart illustrations but at this selling price it would obviously be beyond budget. "Charting the Inland Seas" is a recommended starting place for researchers in Great Lakes nautical history.

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About the Author

Robert William (Sandy) Sandilands retired as Regional Field Superintendent with Pacific Region of the Canadian Hydrographic Service (CHS) on October 30, 1989 (see Lighthouse Edition 40, Fall 1989). He currently lives in Victoria, British Columbia.

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Lighthouse Puzzler / Casse-tête du Lighthouse

by
Beth Weller

Four hydrographers (one of whom is Mr. Eaton) are planning to take their spouses along on their next field trip. Each person shares a surname with his/her spouse.

Based on clues from an overheard conversation, can you figure out who were honeymooning on the Polar Continental Shelf?

The clues:

1. Three of the four couples share a first initial.
2. Mrs. McCulloch is looking forward to her first trip out of Canada.
3. Jim is not going to Bali; Barbara's husband is not leaving Canada.
4. The Andersons will use a tent while surveying the upper reaches of Sixteen Mile Creek.
5. Mr. and Mrs. Sandilands; Craig and his wife; the honeymooners; and Caitlin and her husband will all be at the CHA Farewell Party the night before they leave.
6. Craig and his wife are sorry not to be going to Bali.
7. Cathy's husband, outdoor man that he is, would rather be tenting

hydrographer	spouse	surname	field trip

	Barbara	Caitlin	Cathy	Jackie	Bali	16 Mile Creek	PCSP	Rockville	Eaton	McCulloch	Anderson	Sandilands
Craig												
Jim												
Bill												
John												
Eaton												
McCulloch												
Anderson												
Sandilands												
Bali												
16 Mile Creek												
PCSP												
Rockville												

Solution to Fall Puzzler

Terese is the woman sawing timber (Clue 3). She is not from Ottawa (Clue 1), New Zealand (Clue 2), or Edinburgh (Clue 3), therefore she is from Grimsby. Jennifer is not from Grimsby, New Zealand, or Edinburgh, so she must be the student from Ottawa. Andrew is not from New Zealand so must be from Edinburgh, thus Ken is from New Zealand, is rigging the mast, and is the International Member. By elimination, Jennifer is picking oakum (Clue 2). Neither Ken nor Andrew can be the cartographer (Clue 6), and Jennifer is the student, so Terese must be the cartographer, and Andrew the hydrographer.

Canadian Hydrographic Association / Association canadienne d'hydrographie

The **Canadian Hydrographic Association (CHA)** is a non-profit, scientific and technical group of about 500 members with the objectives of:

- advancing the development of hydrography, marine cartography and associated activities in Canada;
- furthering the knowledge and professional development of its members;
- enhancing and demonstrating the public need for hydrography;
- assisting in the development of hydrographic sciences in the developing countries.

It is the only national hydrographic organization in Canada. It embraces the disciplines of:

- hydrographic surveying;
- marine cartography;
- marine geodesy;
- offshore exploration;
- tidal and tidal current studies.

The Canadian Hydrographic Association is formally affiliated with the Canadian Institute of Geomatics. It is informally associated with the Hydrographic Society.

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- advance your knowledge of hydrography, cartography and associated disciplines, and keep you abreast of the latest development in these disciplines;
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These benefits are provided through the publication of LIGHTHOUSE (one of only three journals in the world devoted exclusively to hydrography), through the sponsorship of seminars, colloquiums, training programs, national conferences, and branch and national meetings.

Lighthouse

The journal of the Canadian Hydrographic Association, LIGHTHOUSE, is published twice yearly and distributed free to its members. Timely scientific, technical and non-technical papers and articles appear in the journal with authors from national and international academia, industry and government. Present circulation of LIGHTHOUSE is approximately 900.

Membership

Membership is open to all hydrographers, those working in associated disciplines, and those interested in hydrography and marine cartography.

Branch & Regional Activities

The Canadian Hydrographic Association has eight (8) branches located across Canada. National headquarters is located in Ottawa.

For further information write to:

National President
Canadian Hydrographic Association
P.O. Box 5378, Station F
Ottawa, Ontario
Canada
K2C 3J1

L'Association canadienne d'hydrographie (ACH) est un organisme sans but lucratif réunissant un groupe scientifique et technique de plus de 500 membres ayant des objectifs communs, comme:

- faire progresser le développement de l'hydrographie, de la cartographie marine et de leurs sphères d'activités au Canada
- permettre les échanges d'idées et le développement professionel de ses membres
- rehausser et démontrer l'importance de l'hydrographie auprès de public
- assister au développement des sciences de l'hydrographie dans les pays en voie de développement

Au Canada, l'Association est la seule organisation hydrographique qui embrasse les disciplines suivantes:

- levé hydrographique
- cartographie marine
- géodésie marine
- exploration extra-côtière
- étude des marées et courants

L'Association canadienne d'hydrographie est affiliée à l'Association canadienne des sciences géomatiques, et non-officiellement liée à la Societée de l'hydrographie.

Ce qu'elle peut faire pour vous

L'ACH vous offre des avantages tels que:

- parfaire vos connaissances de l'hydrographie, de la cartographies et des disciplines connexes, tout en vous tenant au courant des nouvelles techniques et des derniers développements réalisés dans ces domaines;

- établir et maintenir des contacts avec ceux qui oeuvrent en hydrographie, au niveau national et international.

Ces avantages sont transmis par l'entremise de LIGHTHOUSE (une des trois revues au monde traitant exclusivement d'hydrographie) et par la tenue de séminaires, de colloques, de programmes de formation et d'assemblées régionales et nationales.

Lighthouse

La revue de l'Association canadienne d'hydrographie. LIGHTHOUSE, est publiée deux fois l'an et distribuée gratuitement aux membres. Des articles scientifiques, techniques et non techniques, provenant du milieu de l'industries ou du gouvernement autant national qu'international, apparaissent dans cette revue. Le tirage actuel de la revue est d'environ 900 copies.

Comment devenir membre

Le statut de membre est offert aux hydrographes et à tout ceux oeuvrant ou ayant un intérêt dans des disciplines associées à hydrographie ou à la cartographie marine.

Sections et activités régionales

L'Association canadienne d'hydrographie possède huit (8) sections à travers le Canada. L'administration central se trouve à Ottawa.

Pour plus d'informations, s'adresser au:

Président national
Association canadienne d'hydrographie
C.P. 5378, station F
Ottawa, Ontario
Canada
K2C 3J1

Coming Events / Événements à venir

ECDIS '93

The second annual conference dedicated to the subject of Electronic Chart Display and Information Systems has been scheduled for March 8-9, 1993 at the Baltimore Marriott Inner Harbour Hotel in Baltimore, Maryland, USA. The ECDIS Conference & Exposition will inform the industry about recent advances in technology, standards, regulations and the future of ECDIS.

For further information contact:
ECDIS '93
P.O. Box 265
Buckeystown, MD, 21717 USA
Phone/FAX (301) 874-2668

Canadian Conference on GIS

The Fifth International Conference on Geographic Information Systems will be held in Ottawa, from March 23 - 25, 1993. This conference is organized by the Dept. of Energy, Mines and Resources, in cooperation with the Candian Institute of Geomatics (CIG - formerly CISM, see p. 42) and The Inter-Agency Committee on Geomatics.

Conference paper themes include Management Issues, Applications and Case Studies, Technology Issues, and Education and Training.

For further information contact:
Canadian Conference on GIS
GISD, SMRSS, EMR Canada
615 Booth Street
Ottawa, Canada
K1A 0E9
Fax: (613) 952-0916

(see advertisement on page 34)

DSNS 93

The 2nd International Symposium on Differential Satellite Navigation Systems (DSNS) will be held in Amsterdam, from March 29 to April 2, 1993. This conference is organized by the Netherlands Institute of Navigation representing the European Institutes of Navigation.

The programme highlights recent developments and future prospects of DSNS technologies and applications. DGPS/GLONASS/INS integration, wide area DGPS networks, dynamic real-time carrier phase DSNSA, and many other subjects will be presented.

For more information contact:
Symposium Secretariat
2nd International Symposium on Differential Satellite Navigation Systems (DSNS 93)
c/o RAI Organisatie Bureau Amsterdam bv
Europaplein 12
1078 GZ Amsterdam
The Netherlands
Telephone: +31(0)20.549.12.12
Telefax: +31(0)20.646.44.69

1993 Surveying and Mapping Conference

The 1993 Surveying and Mapping Conference is jointly sponsored by the Canadian Hydrographic Service and CIG (formerly CISM). This combined Canadian Hydrographic Conference and CIG 86th Annual Meeting) will be held at the Royal York Hotel in Toronto, from June 8 - 11, 1993.

The conference theme is *"Celebrating Our Heritage, Charting Our Future"*. National and international technical papers on hydrography and other survey disciplines will be presented in plenary and concurrent sessions. The Royal York Hotel is just a short walk from a wide variety of restaurants, entertainment, and the SkyDome (home of the Toronto Blue Jays).

A number of daytime and evening social events are scheduled.

For further information, contact:
1993 Surveying and Mapping Conference
P.O. Box 186, Station Q,
Toronto, Canada
M4T 2M1
Telephone: (416) 336-4812 (Burlington)
Fax: (416) 336-8916 (Burlington)

(see advertisement on page 52)

1992 Advertising Rates / Tarifs publicitaires

POSITIONING
The acceptance and positioning of advertising material is under the sole jurisdiction of the publisher. However, requests for a specified position will be considered if the position premium of $25 has been included in the insertion order.

MECHANICAL REQUIREMENTS
Advertising material must be supplied by the closing dates as camera-ready copy or film negatives (Colour ads must be film negatives). Copy preparation, including colour, bleed and photos will be charged at the printer's cost plus 10%. Proofs should be furnished with all ads.

Single-page inserts will be charged at a full page body rate. Material must be supplied by the client. Page size must conform to the single page insert trim size (below).

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PRINTING
Offset screened at 133 lines per inch.

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All rates are quoted in Canadian Funds. Sustaining Members receive a 10% discount.

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Monsieur K. Weaver ,Directeur de la publicité
LIGHTHOUSE
P.O. Box 5050
867 Lakeshore Road
Burlington, Ontario
CANADA L7R 4A6
Téléphone: (416) 336-4538 Télécopieur: (416) 336-8916

Sustaining Members / Membres de soutien

In 1987 the CHA defined a new form of membership to allow companies, closely linked with the hydrographic field, to become more involved with the activities of the CHA and to maintain closer contact with users of their products. Through LIGHTHOUSE these Sustaining Members are also able to reach a world-wide audience of people involved with hydrographic work. The benefits of Sustaining Membership include:

- a certificate suitable for framing;
- three copies of each issue of Lighthouse;
- copies of the local Branch newsletters, where available;
- invitation to participate in CHA seminars;
- an annual listing in Lighthouse;
- an annual 250 word description in Lighthouse; and
- discounted advertising rates in Lighthouse.

The annual dues for Sustaining Membership in the CHA are $150.00 (Canadian).

Current Sustaining Members are listed below.

Aanderaa Instruments Ltd.
4243 Glanford Avenue
Victoria, British Columbia,
Canada V8Z 4B9
contact: Gail Gabel *(affiliation - CHA Pacific Branch)*

ATLAS ELEKTRONIK
1075 Central Avenue,
Clark, New Jersey,
USA 07066
contact: Karl Wm. Kieninger *(affiliation - CHA Central Branch)*

EG&G Marine Instruments
P.O. Box 498,
1140 Route 28A,
Cataumet, MA,
USA 02534
contact: Paul Igo *(affiliation - CHA Central Branch)*

Garde Cótière canadienne
104 rue Dalhousie, Suite 311,
Québec, Québec,
Canada G1K 4B8
contact: Claude Duval *(affiliation - ACH Section du Québec)*

l'Institut maritime du Québec
53 St-Germain Ouest,
Rimouski, Québec,
Canada G5L 4B4
contact: Claude Jean *(affiliation - ACH Section du Québec)*

Quester Tangent Corporation
9865 West Saanich Road,
Sidney, British Columbia,
Canada V8L 3S3
contact: John Watt *(affiliation - CHA Pacific Branch)*

Racal Positioning Systems Ltd.
118 Burlington Rd.,
New Malden, Surrey,
United Kingdom KT3 4NR
contact: Paul Deslandes *(affiliation - CHA Central Branch)*

SIMRAD Mesotech Systems Ltd.
202 Brownlow Avenue
Dartmouth, Nova Scotia,
Canada B3B 1T5
contact John Gillis *(affiliation - CHA Central Branch)*

SURNAV Corporation
89 Auriga Drive,
Nepean, Ontario,
Canada K2E 7V2
contact: Harold Tolton *(affiliation - CHA Ottawa Branch)*

terra surveys ltd.
1962 Mills Road,
Sidney, British Columbia,
Canada V8L 3S1
contact: Rick Quinn *(affiliation - CHA Pacific Branch)*

Sustaining members of CHA are offered space in Lighthouse each year for a 250-word description of their services.

terra surveys limited

Established in 1966, 'terra surveys ltd.' provides consulting and technical services in the photogrammetric, hydrographic and marine geophysical fields. The survey and mapping capabilities include state-of-the-art GPS remote sensing using airborne scanning laser and digital techniques for GIS applications.

As one of Canada's largest resource mapping and development organizations, 'terra' is an employee-owned Canadian company whose shareholders are the professional and technical staff directly involved in the firm's day-to-day operations.

'terra' provides a complete surveying service in all waters; offshore, coastal, inland and arctic. Its proven capabilities in collecting and compiling hydrographic and geophysical data are applicable to projects such as: charting, drill site investigation, port and harbour development and maintenance, pipe and transmission line crossing, water inventory, marine park development, and environmental assessment.

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Fifth International Conference on Geographic Information Systems

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- Environnement
- Systèmes d'aide à la décision
- Études et formation
- Recherche
- Gestion
- Questions touchant les autochtones
- Nouvelles tendances en cartographie

For more information, contact:

Lou Aubrey, Director
The Canadian Conference on GIS
615 Booth St., Room 403
Ottawa, Ontario
K1A 0E9

Pour plus de renseignements, communiquez avec :

Lou Aubrey , Directeur
Conférence canadienne sur les SIG
615, rue Booth, pièce 403
Ottawa (Ontario)
K1A 0E9

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et
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93 GIS/SIG

Workshops / Ateliers — March 20-21-22 mars

- Management Issues in GIS
- GIS for Enviromental Management
- Modelling with a GIS (Two Hands-on workshops)
- Cadastral Mapping: Municipal Application
- Geomatic Standards (Panel discussion)
- Digital Elevation Models

- Gestion des SIG
- SIG pour la gestion de l 'environment
- Modélisation au moyen d'un SIG (deux ateliers pratiques)
- Cartographie cadastrale : application municipale
- Les normes en matière de géomatique (discussion entre experts)
- Modèles numériques d'altitude

News From Industry / Nouvelles de l'industrie

Canadian Hydrographic Service (CHS)

CHS Headquarters

Electronic Chart Pilot Project

In the last issue of Lighthouse the CHS outlined four projects that are a response to the Marine Environmental Emergencies Response Strategy announced by Transport Canada, Environment Canada, and the Department of Fisheries and Oceans. These projects are (1) the Electronic Chart Demonstration Project (Pilot Project), (2) the Electronic Navigation Data Base Program, (3) the IMO/IHO Standardization Project, and (4) the Industrial Partnership Program. These projects collectively pursue the recommendations of the Canadian Public Review Panel on Tanker Safety and Marine Spills Response Capability for the development of a new electronic navigation chart capability that can alert ships to possible groundings or collisions.

As part of the Pilot Project, the CHS intends to install six Electronic Chart and Display Systems (ECDIS) for trial periods on twelve different vessels operating off the east and west coasts and along the St. Lawrence River. The objective is to evaluate the potential of ECDIS technology as an aid to safer navigation and to discover what technological problems might be encountered in introducing this new technology. The CHS will submit its findings to the appropriate authorities for use in enacting new regulations governing the technology, and to the IMO/IHO for their proposed ECDIS specifications. Although there have been several testbed projects, including the major North Sea Project sponsored by the Norwegian Government, the CHS will be embarking on the largest EC project ever.

The CHS's strategy in the Pilot Project is to turn to the marine industry and the mariner for their cooperation. As a first step, and with the intention of evaluating current ECDIS technology, a contract has been awarded to Offshore Systems Ltd. (OSL) in North Vancouver, B.C. to supply six ECDIS systems and to oversee their installation on the selected vessels. The reason for multiple installations on a wide range of vessels is the need to gather real-world practical information and to test the viability of ECDIS under a wide variety of operational and environmental conditions. The information collected will help in defining the ultimate standards sanctioned by the IMO.

Phase One of the Pilot Project involves selecting candidate routes and vessels; selecting differential GPS sites; and developing software to convert two standard data formats (NTX and DX90) into a format acceptable to the ECDIS. Progress has been made on all fronts and the CHS expects to run its trial of the first ECDIS in the early spring. Following the successful completion of this trial, the Pilot Project will enter Phase Two, during which the ECDIS will be installed on board the different candidate vessels.

Marine Cartography

The Marine Cartography Division at headquarters spent a busy summer producing 25 reprints and 3 new editions, processing 500 Notices to Mariner, applying 2,000,000 hand amendments to charts in stock, compiling and drafting reprints, distributing 150,000 charts and 80,000 publications, administering a dealership network of approximately 400 dealers, providing computer support to cartographic and data base applications, checking colour proofs of all charts printed, arranging and overseeing printing, and completing and releasing the new editions of the St. Lawrence River Sailing Directions.

This new edition of the Sailing Directions for the St. Lawrence River was published in a new booklet format, housed in a 3-ring binder. There are four booklets; a general information booklet and 3 booklets each covering a stretch of the St. Lawrence from the Gulf of St. Lawrence to Montreal. Extensive user consultation was carried out in planning the new format and the new edition was released with much fanfare and a planned marketing campaign. We have been rewarded with increased sales, especially of the French language versions, and the concept of the booklet format has been adopted nationally.

The Data Management activities focus primarily on enhancing, implementing and loading the Source Directory System (SDS) which can digitally record information about source data, the status of data, and where these data have been incorporated in products. Central and Arctic Region is now fully operational, and Atlantic is verifying their information in the data base, while Pacific is coding data for input, and Quebec is testing the suitability of the system to meet their Hydrographic Data Centre needs. Work is now underway to provide graphical output of the SDS data base information.

Cartographic Development continues to support production by identifying and testing new hardware and commercial software, as well as developing, refining and introducing new application software. These activities include the development of a Digital Chart Management System (DCMS). This is designed to manage product data, the processes involved in production, and to link the products to other data bases through a Product Specification Data Base, the upgrading and distribution of a Notices to Mariners Data Base to regional offices, and supporting Chart Distribution systems.

The role of this Section in supporting operational applications is increasing. This includes providing CARIS user support, plotting support, and system support for production. The Quick Mail network, which is becoming an essential part of our day to day operation, allows headquarters and the regional offices to exchange messages as well as formatted text, graphics and spread sheet information.

The Ocean Mapping Section has been busy turning 1:250,000 scale bathymetric maps into digital form. All production in this section is now done digitally. The importing of scanned raster data for vectorization using SAMI (Semi-Automated Map Input), and the importing of data that has been scanned and vectorized by industry has virtually eliminated manual digitizing. The Section is presently combining the bathymetric

maps of the Pacific coast into a continuous digital data base which resides in CARIS format. The Section has also been active in exploring data conversion, raster scanning and vectorization, and training of regional people in the use of topology, all in preparation for operating in the digital world and supporting Electronic Navigational Charts.

Headquarters has also been active in supporting the development of international standards for digital data, the data base work of the International Hydrographic Organization (IHO), and work on the Electronic Charting Program which is being partially funded through the Green Plan initiative.

The CHS recognizes that the world, and our business, are changing, and very rapidly. We are challenged continuously by: the demand for digital data which grows on a weekly basis; client expectation which continue to exceed our capability; and technological advances. Thus it is a period of transition as we seek new and more efficient ways of responding to traditional and new demands.

One response has been to develop a career plan for hydrographers that provides both training and experience in marine cartography and in hydrographic surveying, thus providing a more flexible workforce. During the past year considerable energy and resources have gone into a retraining program to train existing marine cartographers in hydrographic surveying and navigation. Virtually all of the Headquarters cartographic staff received training in the winter and spring of 1992, and four people spent the summer on survey parties. In the near future, existing hydrographic surveyors will be offered a similar opportunity to be trained and receive experience in marine cartography.

CHS (Atlantic)

Management
Mr. Paul Bellemare was seconded to DFO Headquarters in early September to undertake a Platform Study as part of the 10 Year DFO Science Perspective. This study is expected to take four to five months to complete.

Long term plans for delivery of CHS products have been updated to reflect present conditions and priorities. On-going data acquisition and nautical publications programs are on schedule.

DD/EG conversion training has been completed. On-going training is being addressed through in-house and external courses and by contract.

The CHS has played a key role in coordinating and promoting Geomatics initiatives in the region. Its participation in the Atlantic Coastal Zone Information Steering Committee, the Data and Information Management Committee, and the ICOIN Management Board has proved to be a driving force in several initiatives designed to develop the necessary infrastructure for ready access to required information, both within DFO and with other agencies. Products, such as the "User Needs Analysis" and the "Directory of Data Bases", have been completed under the auspices of CHS and are being seen as the first requisite steps in working towards a more functional ICOIN to serve data and information needs.

Interactive compilation has been implemented for all new chart production and for all digital new editions and chart correction patches.

Two employees have been following the Internship Program and are presently on educational leave. CHS staff participated in the Service Challenge Workshop in Sydney, N.S., in September.

Data Management and Planning
Validation was carried out on 350 new documents causing 250 old documents to be superseded. Notices to Shipping and Foreign Notices to Mariners were reviewed and 25 Notices to Mariners were recommended.

Validation of data was completed for one New Edition and three Chart Correction Patches plus the equivalent of one New Edition through work resulting from the Saint Pierre-Miquelon boundary settlement. Validation was also completed on the equivalent of 2 New Charts, with work done on Charts 7565, 5051, 5052 and the Green Plan.

Nautical Publications
Sandra Weston returned from her one-year assignment with Internal Communications in the Regional Director-General's Office in September of this year.

Consultations have been conducted with 35 chart dealers in the Maritime Provinces and eastern Maine, U.S.A. Exhibits are planned for two major boat shows in February and March 1993. Three backgrounders (press releases) have been written to announce new charts, and a five-minute news clip on the survey of Halifax Harbour was televised nationally. Seminars and tours have been conducted on a regular and on-going basis.

The Region has published seven new charts (three for New Brunswick, one for Newfoundland, and three for the Eastern Arctic), one New Edition, 19 chart correction patches, and 68 Notices to Mariners. A new edition of the Sailing Directions volume for the Gulf of St. Lawrence has also been produced.

Hydrographic Surveys
Hydrographic surveys were carried out in Notre Dame Bay and Bonavista Bay, Newfoundland, for the production of New Charts and New Editions. The duration of each program was drastically reduced due to budget reductions, resulting in several of the projects being carried over into the next fiscal year.

A seven-week Ocean Mapping Program was carried out on the approaches to Halifax Harbour. The EM100 Simrad system was used to collect 100% bottom coverage for bathymetry. Other parameters collected were gravity, magnetics, and sound velocity profiles.

A complete revisory survey was undertaken in Halifax Harbour. The CSS F.C.G. SMITH finished a sweep survey (100% bottom coverage) to bring the harbour surveys and charts up to modern standards. In addition, revisory work was carried out from Fredericton to Baker Brook, on the Saint John River, N.B., and in St. Peter Harbour, P.E.I.

The DGPS (Differential Global Positioning System) was used for the first time in this region on production surveys. It was

used on the Ocean Mapping Program, and in Bonavista Bay and Notre Dame Bay, with excellent success and everyone was pleased with the results and ease of operation.

All bathymetric survey data was collected digitally using ISAH for the launches, Navitronics for the sweep and Mermaid for the EM 100 Simrad. The new HYPS (Hydrographic Processing System) package developed by Quester Tangent to clean navigation and depth data was introduced in 1992 and functioned well. This was integrated with HIPP (Hydrographic Information Processing Package). The HIPS (Hydrographic Information Processing System) developed cooperatively by UNB and USL was Beta tested during the Ocean Mapping and Sweep survey projects. Most of the software bugs have been identified and corrected at this time.

Tides, Currents and Water Levels

Four Atlantic Permanent Water Level Network (PWLN) sites were discontinued due to major operational budget reductions. Scotia-Fundy Region now has only 11 permanent plus 2 experimental sites (18-21 sites are ideal for monitoring regional water levels).

Vertical control was established at ten sites as part of a long term program for the hundreds of Atlantic coast small craft harbours. This is a significant reduction from last year's total of 47 sites due to budgetary reductions for field operations.

A large amount of time was spent on development of several tidal databases such as station histories, datums, chart tidal blocks, lunitidal information, etc. A software utility to merge CARIS with these databases was completed as was the capability to port the HYPERCARD vertical benchmark information to Dbase IV. The ORACLE utility to input vertical control information into the SDS index system was finally completed and is ready for use.

Several hundred public sector tidal data requests were processed to-date, as were an equivalent number of vertical control verifications of bathymetric field data.

Development

CHS Atlantic, in cooperation with Universal Systems Ltd., is testing the beta version of the HIPS Software-Hydrographic Information Processing System that has been acquired to process swath data.

A request for proposal has been issued for the replacement of the Cyber mainframe. The Bedford Institute of Oceanography (BIO) is in the process of phasing out the Cyber mainframe and replacing it with a distributed computing network utilizing a FDDI network. The acquisition will be phased over several years. A number of services will be offered including compute serving and file serving. Of particular interest to hydrography will be the infinite storage server that will be used for auto backup and DBMS file storage.

A request for proposal has also been issued in support of an ocean mapping and data base development initiative. Tasks identified include: the processing of bathymetric and magnetic data; the development of an ocean bottom magnetometer; the evaluation of side scan data collected at higher speeds; a DOLPHIN demonstration survey; data base studies; and the acquisition of a processing system.

The Eastcan Group is digitizing a number of charts and field sheets for the CHS Green Plan Electronic Chart Program. Eastcan has extensive experience with the Universal Systems Ltd. CARIS Geographic Information System which the CHS uses to digitally create and manage its nautical charts. Eastcan is also experienced with the concept of topology and its use on the CARIS system. Topology is very important for ensuring good quality data for use in Electronic Chart systems. In a related contract, Eastcan is conducting a survey of the holdings of a number of data bases in the Maritimes with particular emphasis on the type, volume and accuracy of data that could potentially be used by the CHS in its charting program. Eastcan is also studying the problems associated with transfer of that data into the CHS CARIS format.

The Atlantic branch of Software Kinetics Ltd., Dartmouth, N.S., is doing a design study for a Quick Graphics display interface to the CHS Source Directory System(SDS). SDS is an Oracle-based relational data base management system that is used to keep track of all the digital and analogue source data and documents that are used in the production of CHS products such as Charts, Sailing Directions and Tide Tables.

Geometrix Inc., Dartmouth, N.S., is preparing presentation material under contract on various aspects of Electronic Charts. This material will be used by CHS staff during the Green Plan Electronic Chart Program over the next several years.

As part of a pilot project initiated in HQ a standing offer has been put in place for digitizing. Three students have been hired to provide temporary help in SDS loading. A contract has been put in place for the SDS Graphical User Interface.

Herman Varma has accepted an Interchange Canada assignment with Oracle Corporation Canada Inc. to develop multi-dimensional data base for managing very large spatiotemporal data sets. The goal is to develop efficient and functional software tools that will enable spatiotemporal data to be effectively managed within a relational data base environment. This project is one facet of the Green Plan electronic chart infrastructure program and a key potential component for the implementation of a comprehensive data base management capability within the Canadian Hydrographic Service.

Julian Goodyear under the Interchange Canada program accepted an assignment in September, 1992 with Offshore Systems Ltd. (OSL) in Vancouver, B. C., for a 3 year period. He will be the Project Liaison Officer for the Electronic Chart Pilot Project. His primary responsibilities will be the coordination for, and liaison with testbed vessels, monitoring the project deadlines through monthly reports, and supervising field-support personnel

SHC Région du Québec

Division de la Géomatique Marine

Le SHC Région du Québec travaille actuellement à développer un système d'information qui vise à gérer certaines données hydrographiques sources. Ce projet, réalisé à contrat par la firme DMR Québec Inc., est présentement rendu à la phase d'architecture du système.

La firme ASA Consulting Ltd. de Dartmouth en Nouvelle-Écosse a soumis son rapport sur la sécurité du nouveau réseau d'enregistreurs numériques de niveaux d'eau de la région du Québec. Les objectifs de cette étude étaient d'identifier les zones vulnérables du système d'information des niveaux d'eau côtiers et océaniques (projet SINECO), d'évaluer l'impact de pannes ou de bris d'équipement sur l'accès des données aux usagers, de proposer des mesures et des recommandations pour diminuer les risques de perte de données et minimiser leur étendue.

Une entente préliminaire d'une durée de quatre mois d'opération, de gestion, d'entretien et d'exploitation du nouveau réseau d'enregistreurs de niveaux d'eau et du système d'information SINECO a été signée entre le SHC Région du Québec et la compagnie Service maritime INFOMAR inc. de Sainte-Flavie (Québec).

La firme Geometrix de Dartmouth en Nouvelle-Écosse vient de soumettre son rapport sur l'analyse statistique du marémètre numérique TMS-1000 développé et produit par la compagnie SOCOMAR inc. de Québec. Ce rapport examine la précision théorique obtenue sur la mesure du niveau d'eau, précise les erreurs systématiques lors de la calibration des capteurs du TMS-1000, présente une étude statistique des différences entre les paramètres mesurés pour l'ensemble des capteurs du TMS et également pour le marémètre TATS et examine certaines considérations de filtrage (temps d'intégration, intervalle d'acquisition, effets d'un puits de tranquillisation).

CHS - Central and Arctic Region

Field Surveys Division
The planned activities of the Field Surveys Division in fiscal year 1993/1994 are as follows:

Arctic Survey: A TIBS survey will take place in Coronation Gulf to collect data for shipping routes. The survey camp will be located at Coppermine from the beginning of March to the end of April, 1993.

Hudson Bay Survey: Based in Churchill, a LARSEN survey will collect data north and east from Churchill. LARSEN ground-truthing and a shipping corridor survey will be completed by launch. The survey will extend from mid-July to mid-September, and will proceed if anticipated external funding support is received.

Lake Huron Survey: A continuation of the 1992 survey, the project will collect data for new charts on the west side of the Bruce Peninsula. The survey area, between Stokes Bay and Point Clark, has been surveyed by LARSEN. The survey will commence at the beginning of May and continue until mid-September.

Lake Ontario Survey: The area between Cobourg and Toronto will be re-surveyed to complete the sounding program on Lake Ontario and provide data for new charts. The survey will start in May and finish in mid-September.

Revisory Survey: The Revisory survey will resolve chart queries on scheduled new editions, and review compilations of new charts. In addition, large-scale surveys of harbours on the Great Lakes and Lake Winnipeg may be scheduled. The survey will commence at the beginning of May and continue until the end of September.

Dealership Inspections: Chart dealers will be visited by field staff from the various surveys to check for outdated stock and to ensure the terms of the contract are being followed.

Nautical Publications Division
Nautical Publications Division planned activities for the 1993/1994 fiscal year are as follows:

New Chart Program: All Central and Arctic Region new charts are produced using computer-assisted techniques. In 1993/1994, the Nautical Publications Division will complete ten New Charts.

Chart	Area	Scale	Canc. Charts / Remarks
1434	St. Lawr. R. (Cardinal)	25000	1415/1416 - CHS/NOS
1435	St. Lawr. R.(Cardinal)	25000	1417 - CHS/NOS
1450	St. Lawr. R.(1000 Is.)	15000	strip chart
2013	L. Ontario (Picton)	5000	
2047	L. Ontario (Clarkson)	7500	2070 (inset)
2212	Georgian B. (Wiarton)	8000	
2214	Georgian B. (Meaford)	3000	2271 (inset)
5720	James B. (Chisasibi)	30000	5820
5640	Hudson B. (Churchill)	12000	5596
????	Arctic (Pelly Bay)	100000	1:25000 scale inset

In addition to those scheduled for completion in 1993/1994, many other new charts will be underway for scheduled completion in the 1994/1995 fiscal year.

New Edition Program: In 1993/1994 the Nautical Publications Division will complete two new editions:

Chart	Area	Scale	Remarks
2202	Port Severn to Parry Sound	20000	revised format
2021	Trent-Severn (Trenton)	20000	cancels 2031

In addition to those scheduled for completion in 1993/1994, several other new editions will be underway for scheduled completion in the 1994/1995 fiscal year.

Notices To Mariners: In addition to regular charting projects, all hydrographic data accessions will be reviewed weekly and Notices to Mariners drafted as appropriate.

Sailing Directions: The Nautical Publications Division was expanded to take in Sailing Directions in October, 1992. In 1993/94 the Supplement to Great Lakes Volume 1 will be completed. In addition, work will commence on two new editions: the Georgian Bay Small Craft Guide; and the Rideau Waterway Small Craft Guide.

Electronic Chart Pilot Projects: In 1993/94 the Nautical Publications Division will prepare digital chart files for use on three Regional electronic chart pilot projects: Toronto to Hamilton (during and after the 1993 CHS/CISM Conference); the Chi Cheemaun ferry route between Tobermory (Bruce Peninsula) and South Baymouth (Manitoulin Island); and a shipping corridor between Windsor and Thunder Bay (1994).

Development Division
In fiscal year 1993/1994, the Development Division will continue to develop, test, evaluate and implement procedures, equipment and systems that will increase the efficiency and effectiveness of CHS. The Division will also operate and

maintain the computer network. The following is a brief summary of planned activities.

Team Building: This is an ongoing project to develop a team approach to development projects in the Region that will include the operational Divisions in the development process. The Division will continue to build this type of project team for most of the projects and continue to implement the principles of project management for all projects.

Knudsen Sounder: The development of the Knudsen sounder will be complete by the start of fiscal 93/94 and the prototype will have been demonstrated in each of the Regions.

Through-Ice Bathymetry System (TIBS): TIBS will be deployed in Coronation Gulf on a reconnaissance survey of the area. Operational experience with the system will provide valuable feedback on the incremental improvements that were carried out in 92/93 and will determine the direction of some of the changes for 93/94. In addition, the development program will include completion of the work on calibration procedures; completion of the integration of the real time depth and the digital receiver; and completion of the modeling studies.

GPS: The Division will be actively involved in the implementation of GPS systems for field surveys. It will also participate in the GPS working group and monitor developments in the private sector.

Radar Sounder: DOE have expressed considerable interest in the radar sounder system and have been attempting to organize field tests of a Canadian-made system without success. We will monitor the progress of this work in 93/94.

Tidal Instrumentation: This is an ongoing project to support tidal activities in all Regions by providing equipment repair and maintenance.

Field Processing: This project includes software enhancements and maintenance of our existing processing software.

Hydrographic Information Network (HIN): The coordination of the HIN development will be led by the Regional Development Division. In addition, the development of the NAVAIDS data base will be conducted in the Region. Other data base projects will include active participation in the bathymetry data base and the tidal data base.

The Division has also been actively involved in the provision of digital field and chart level data to third party clients.

Generalization: A contract with USL to develop generalization routines for use with digital chart/source data will be completed in 92/93. However, some work will be required to integrate the software with the CHS version of CARIS and to implement it in the chart production process.

Automated Names Placement: 1993/94 will be the second year of a two year project to develop CARIS software to automate the placing of names on a chart. The work will consist of evaluating the positions of the text that has been placed on the chart to ensure that the correct rules have been used. It will also determine the quality of the placement. For example, does the text belong to the correct feature or does it overlap with other text or symbols.

Electronic Chart: The Division will lead a project to conduct pilots and demonstrations of the OSL Electronic Chart System. Although the details have not been finalized, a regular run between Thunder Bay and Sarnia aboard a Great Lakes bulk carrier and the Tobermory ferry (Chi Cheemaun) are being considered.

Tides, Currents and Water Levels Division

The Tides, Currents and Water Levels Division provides vertical control information and water level gauging equipment to the Field Surveys Division and vertical adjustments and information to the Nautical Publications Division. The Division also provides and reviews information for Sailing Directions, Small Craft Guides and Tide Table publications. The monthly Water Level bulletin for the Great Lakes and Montreal Harbour is prepared, printed and distributed. The Division responds to requests for water level data and vertical control information.

In fiscal year 1993/1994, the Division will: continue to manage and operate the 36 stations in the Permanent Water Level Network (2 northern stations by CHS and 34 stations on Great Lakes and connecting channels under a MOU with DOE, IWD); operate and maintain the real-time data loggers and voice-announcing gauges in the Network; install additional Sutron data loggers with redundant sensors to replace old TATS loggers; acquire the data from the Sutron gauges in the Network to ensure data quality and accuracy; and support required repairs or reconstruction of stations in the Network if funding is available.

The Division will complete the implementation of IGLD 1985 with modifications to the bench mark data base and the gauge history files. The Division will contribute to the final report on IGLD 1985.

Engineering and Technical Services Division

The planned activities for the Engineering and Technical Services Division are as follows:

Survey Electronics Maintenance and Field Support: The Division will provide technical support for field survey activities through on-site or call-out technicians, support Ship Division by installing and certifying equipment on Regional vessels, and repair and maintain electronic equipment. Support will be provided to other DFO and DOE users as required and as resources are available.

Radio Communications: The Division will continue to replace obsolete radio equipment for all users. Support is provided to Regional radio users through resources from the Departmental Radio plan.

CHS Pacific Region

Field Hydrography

Nootka Sound (PENDER): Hydrographer-in-Charge (HIC) K. Czotter spent the summer moored in Nootka Sound combining training and survey production, using differential GPS, sidescan sonar and conventional survey methods.

Northern B.C. Coast (R.B. YOUNG): HIC P. Milner made excellent progress on the Wales Island survey on the Alaska

Border. The R.B. YOUNG was fortunate to have NOAA/CHS exchange Lt. D. Cole. His experience as a senior USCGS field operations officer aided the survey greatly.

Local Surveys: A survey of Ganges Harbour was done to meet a Small Craft Harbours Branch requirement. B. Lusk (HIC) was ably assisted by D. Thornhill. The party surveyed off Sidney and completed sounding in Patricia Bay.

Arctic Surveys: Asbestos pollution canceled the western arctic patrol by the NORMAN MACLEOD ROGERS. R. Woolley carried out a revisory survey of Tuktoyaktuk Harbour.

Sailing Directions: Revisions are underway to Arctic Pilot, Volumes 1 - 3 and work has started on the 8th edition of Small Craft Guide Volume 1.

Data Management: Under M. Woods, manual digitization of field sheets continues steadily along with Geodetic control re-computation, and contouring of digital surveys. The expertise of the multi-disciplinary hydrographers working on digitization has expedited the projects greatly.

Management & Other Activities: G. Eaton continued his work for the electronic chart demonstration and customer survey project. R. Hare devoted time to GPS development activities.

Chart Production
Five Reprints, one Rerun and five Chart Amendment Patches were released. Production is continuing on a further eight New Editions, four Reprints, One Rerun and four Chart Amendment Patches.

The Maintenance Program has been severely handicapped and the New Charting Program remains on hold as staff participate in the DD-EG training program.

HDC: Staff continued with Source Directory System activities; 131 documents were coded, 509 documents were verified, and 1000+ field sheets were reviewed.

Chart Sales and Distribution: 34,000 charts and 5,000 publications were distributed.

Tides And Currents
Management
F. Stephenson (Regional Tidal Superintendent), spent 5 days in Gulfport, Mississippi, at Navoceano (US Navy) instructing tides and currents (practical and theoretical) to students from the USA, Mexico, Egypt, Taiwan and Indonesia.

F. Stephenson visited Meteor Communications Corp. in Kent, Washington, to discuss the meteorburst communications network. At present there is no operational meteorburst system for tsunami warning and we are relying on TATS gauges and modems at Bamfield and Winter Harbours.

F. Stephenson then represented IOS at the first Arctic Regional Environment Emergency Team (AREET) meeting in Yellowknife, Northwest Territories.

Tides
Processing of all 1991 temporary station data (analog records) was completed. The multi-disciplinary hydrographers have been a great help in reducing our backlog and in helping in other projects which until now have suffered for lack of resources. An inventory of heights and clearances was compiled and recorded on SDS data entry forms for all west coast charts. This project has been useful as a check on the quality of our historical data.

Arctic
Servicing of gauges and the installation of bottom-mounted pressure recorders at Cape Parry, Tuktoyaktuk, Coppermine and Cambridge Bay

Pre and post dredging surveys were carried out at Point Atkinson to determine the effectiveness of dredging carried out by commercial divers.

Currents
The last cruise, studying surface currents in the Queen Charlotte Islands, was completed. *(see article on page 11)*

Seven current meter moorings were recovered in eastern Dixon Entrance and tests were conducted on an experimental GPS drifter.

Oil Spill Trajectory Requests
One request was handled for a barge broken up off Esperanza Inlet and another for an exercise by Exxon in Juan de Fuca Strait near Port Angeles.

Andrews Hydrographics Ltd.

The days when offshore survey data was gathered in specific formats on dedicated marine systems are rapidly being replaced by the move to more 'customer-oriented' data-processing. Today's contractors wish to receive and process their data on 'standard' readily-available computers, such as office PC's, in formats such as IBM and UKOOA.

This philosophy lies behind the development by Andrews Hydrographics of their NAVBOX portable data acquisition system. The latest version has IBM-compatible software for logging hydrographic, oceanographic and environmental data.

Data gathered on a NAVBOX can be processed on most office PC's. Where necessary, Andrews can provide specially formatted data discs to suit the user's requirements e.g. for mathematical modeling or special charting.

The lightweight system I is suitable for use with small survey launches, including those open to the elements. It incorporates all of the necessary computers, disk drives, a video display printer, and interfaces in a robust portable box.

The system is controlled through an operator's keyboard by selecting various menu options. System parameters set by the operator are saved in disk files as they are entered so that the system can be re-started quickly and accurately using the saved parameters on subsequent occasions.

The operator can select which input devices to use and when they should be logged to the internal disk drives.

All incoming data is time-tagged to the nearest 0.01 second as it arrives so that subsequent processing of the data can interpolate values at precisely synchronized times.

The control software will accept inputs from a wide range of navigation and sensor systems including GPS, Artemis, Trisponder, Decca MK53, Loran and Microfix. These navigation systems can be fully configured by the operator to use selected readings in computation of X, Y co-ordinates using selected spheroids and projections or simply logged to disk.

The operator can monitor the quality of the position fixes and the raw data and display them in real-time together with the values from any selected incoming sensors. The computed vessel position can be displayed graphically on the video screen or chart plotter at user-selected scales.

The headings and distances from selected targets and lines can also be displayed numerically and can be pre-defined and recalled selectively from computer files.

In addition to logging and time tagging all raw data, position fixes can be recorded at operator-selected intervals (typically every 10-60 seconds) on the internal disks and printer. The navigation update rate is set at 1 Hz.

l'Institut maritime du Quebec

Près de 20 000 $ en bourses ont été remis à des élèves inscrits à l'Institut maritime du Québec au cours de la dernière année scolaire, dont près de 9000 $ durant la cérémonie annuelle de fin d'études, le samedi 16 mai dernier.

En cours d'année, la Fondation de l'Institut maritime du Québec a distribué 8050 $ en bourses d'excellence, de perfectionnement et d'encouragement, le chantier naval M.I.L. Davie inc., de Lauzon, a remis quatre bourses de 500 $ chacune à des élèves inscrits en architecture navale. L'Administration de la Voie maritime du Saint-Laurent, par le biais de l'Association des universités et collèges du Canada, remettait une bourse de 1000 $ au fils de l'un de ses employés inscrit en navigation.

D'autre part, durant la cérémonie de fin d'études, près d'une vingtaine d'élèves sortants, inscrits en techniques d'architecture navale, navigation, génie mécanique de marine et radiocommunication et électronique maritime, se sont partagé différentes bourses offertes par des entreprises et des organismes du milieu maritime de différents organismes de la région de Rimouski et de l'Est du Québec intéressés à promouvoir l'excellence scolaire.

Les compagnies de transport maritime Enerchem Transport inc. et Atlantic Container Express, dont les sièges sociaux sont situés à Montréal et Lygnos Brothers Shipping Inc., du New–Jersey aux États–Unis et la Société des traversiers du Québec remettaient plus de 4000 $ en bourses et prix à des élèves méritants.

The Grunt Club Inc., un organisme qui regroupe plusieurs armateurs canadiens, l'Association des armateurs du Saint–Laurent inc., la Corporation des pilotes du Bas Saint–Laurent et la Corporation des pilotes du Saint–Laurent Central, le Syndicat canadien des officiers de la marine marchande, l'Association canadienne des techniques maritimes et l'Association des anciens des instituts de marine du Québec inc. remettaient, pour leur part, plus de 2500 $ en bourses et en prix.

Quelques organismes de l'Est du Québec ont également contribué à souligner l'excellence scolaire d'élèves inscrits à l' I.M.Q. Il s'agit du Club Rotary de Rimouski, de la Corporation du Prêt d'honneur de l'Est du Québec et de l'Association coopérative étudiante du Cégep de Rimouski qui ont remis 950 $ en bourses.

Médaille du Gouverneur Général

La Médaille du Gouverneur Général, qui est remise annuellement dans tous les établissements d'enseignement collégial à l'élève sortant qui a obtenu les meilleurs résultats scolaires, a été remise à M. Thierry Richard, de Beauport, près de Québec, élève inscrit e b ÿ ê

Plus de cent cinquante personnes, élèves, parents et amis de ceux-ci, représentants d'entreprises et d'organismes maritimes, membres du personnel de l'Institut, ont assisté cette année à la cérémonie de fin d'études. M. Jean–Marie Vignola, directeur de l'Institut, a remercié les entreprises et les organismes pour leur générosité et leur souci d'encourager l'excellence chez les jeunes qui choisissent de faire carrière dans le domaine maritime. Le Directeur invitait également tous les sortants et sortantes, ils sont plus d'une quarantaine, à garder le «cap sur l'excellence», à agir comme des ambassadeurs de l'Institut dans les milieux où ils évolueront et à viser les postes–clés dans l'industrie maritime, à l'instar de nombreux anciens de l'Institut.

Atlas Elektronik

John E Chance & Associates Inc (JECA), the largest offshore survey company in the United States which is now a member of the Netherlands-based Fugro-McClelland group of companies, has ordered a second Fansweep multibeam swath sounding system from Atlas Elektronik.

The system, which will be used for worldwide survey operations, complements an earlier unit delivered last year as part of JECA's HI-MAP (Hydrographic Inland Marine Acoustic Platform) system aboard the USCG approved 38-ft catamaran, "HI-MAP Surveyor". Capable of simultaneously acquiring geophysical and bathymetric data, HI-MAP is primarily designed to meet the specific needs of the company's major clients such as the US Army Corps of Engineers.

According to a recent official report by the USCOE, the HI-MAP Fansweep configuration provides significantly more detailed topographic depiction of bottom structures compared with conventional survey techniques. It has therefore been certified as suitable for the highest registered class of survey operations (such as those covering dredge payments) for which vertical depth measurement errors are not to exceed +/-0.5 feet (0.15 metres).

Developed by Atlas Elektronik for precision inshore and coastal surveys, the Fansweep system provides coverage equal to four times water depth over ranges from 3m-100m. It uses advanced electronic beam-forming techniques to give 100% bottom coverage via a single transducer assembly.

Typical system measurement accuracy is +/- 0.15 metres +/- 0.5% of depth with system control being maintained via a keyboard-controlled colour graphic display unit showing real-time cross profiles as well as other survey parameters.

Brown and Root Survey

The Middle East Division of Aberdeen-based Brown & Root Survey has established a Differential GPS navigation service in Bahrain providing continuous coverage throughout the Arabian Gulf over ranges up to 500 kilometres via a single local long-range reference station sited at Manama, in the Mina Salman industrial area of Bahrain.

Introduced primarily for geodetic and hydrographic survey applications, the service ensures recurring positional accuracies of better than 5 metres on a year-round, all-weather basis. It is available using a single, easily-operated mobile receiver comprising either Sercel purpose-designed GPS NR 53 or NR 103 parallel channel units.

The Sercel series of receivers provides accurate 3D position and speed together with full waypoint programming facilities. For survey users, position and GPS raw data are available in addition to a full QC monitoring suite. No filtering of data is required. With no modification other than an antenna ground plane, the same units can also be used as geodetic receivers in order to provide extremely versatile solutions to offshore and onshore positioning requirements.

Current long-term users of the service include the Bahrain Hydrographic Service for hydrographic nautical charting operations, and the Qatar General & Petroleum Corporation aboard three diving support vessels. Seafloor mapping in Kuwait, site surveys in Saudi Arabia and jacket positioning as well as pipe laying support in the UAE are among other recent applications.

Canadian Institute of Geomatics
(formerly Canadian Institute of Surveying and Mapping)

In response to a majority vote of its members, the CISM has changed its name to the **Canadian Institute of Geomatics (CIG)**, effective immediately. The change in the English name followed a vote, in 1991, to change the French name of the Institute to **Association canadienne des sciences géomatiques.**

The term 'geomatics' has been adopted by the Institute as part of its overall strategic plan. As defined by the Institute, geomatics is a field of activities which, using a systemic approach, integrates all the means used to acquire and manage spatial data.

David F. Woolnough, head of the Survey Department of the College of Geographic Sciences in Lawrencetown, Nova Scotia, was elected President of the CIG for 1992/93 at its recent annual meeting in Whitehorse, Yukon. He succeeds Donald B. Thomson of The McElhanney Group, Vancouver.

Woolnough, a native of Scotland, graduated with an honours degree in geography from the University of Glasgow in 1969. He graduated with an M.Sc.E. from the University of New Brunswick (UNB) in 1970.

He has been a field surveyor in Switzerland, Iceland, Scotland, France, Alaska and Canada and has specialized in surveying techniques for glacier movement.

An active member of CIG since 1970, Woolnough has held various positions on Council. He is the next-to-last Dominion Topographic Surveyor and is a Canada Lands Surveyor (CLS), as well as a professional associate of the Royal Institute of Chartered Surveyors. Woolnough is married with three children.

Klein Associates Ltd.

Klein Associates, for over twenty-four years the innovative leader in side scan sonar R&D technology, announces the development of a Multi-Scan High Speed High Resolution Focused Side Scan Sonar System. The Multi-Scan system is a cost-efficient side scan sonar system for use in various high area coverage rate applications. Such a system can significantly improve area coverage rates compared to unfocused, single-beam sonars for survey or search operations, while improving sonar detection capability through the use of Multi-Scan sonar techniques.

Multi-Scan High Speed High Resolution Focused Side Scan Sonar offers the following operational advantages: high resolution; high speed recording (up to 10 knots towing); high area coverage; and 100% coverage

Through the use of five side scan sonar beams, operating at a frequency of 380 kHz, the technology permits a speed of more than 10 knots and a maximum operating range of 150 metres per side, while maintaining 100% coverage of the sea bottom. The resolution of the Multi-Scan system is higher than that of a single beam sonar at all operating speeds due to the creation of the multiple, dynamically focused beams.

The comparison of a single beam and a Multi-Scan system operating at 100 metre range at the optimum speed of 4 knots for the single beam sonar and at 10 knots for the Multi-Scan shows that the area coverage rate of the Multi-Scan is 2.5 times that of the single beam, unfocused sonar at double the resolution.

Laser Plot Inc.

Christopher Columbus launched the "Age of Exploration" with his daring voyages to the New World. His navigation instruments consisted of a crude compass, a quadrant, a sand timer, and his own skill and intelligence.

Navigation technology has advanced considerably since Columbus' day. "The Admiral of the Ocean Seas" would be especially impressed by the ChartNav integrated navigation system, by Laser Plot, of Auburn, MA, which represents the cutting edge of that technology.

Laser Plot's ChartNav system, 'The UltiMate Navigator', displays on a computer screen a continuously updated ship's position. This vessel position is overlaid on an electronic version of an official government chart. The system enhances the safety and efficiency of recreational and commercial mariners all over the world.

The ChartNav system recently helped the T/S PATRIOT STATE retrace parts of Columbus' historic voyage when it visited several Mediterranean ports this past winter. The

PATRIOT STATE is the training vessel of The Massachusetts Maritime Academy. Laser Plot products were used by both the defender (AMERICA3) and the challenger (MORO DI VENEZIA) in the America's Cup finals. Thousands of recreational, commercial, and military vessels use Laser Plot products to improve the safety of their operations.

There is another way to learn about this impressive advance in navigation technology. A ChartNav system is part of an exhibit entitled "1492: Two Worlds of Science", at the New York Hall of Science in Flushing Meadows, NY, which began July 4. Hall of Science visitors will experience first hand the techniques used by Columbus in navigating his fleet to the New World.

NovAtel Communications Ltd.

NovAtel Communications Ltd. is pleased to announce its Global Positioning System (GPS) technology. NovAtel's entries into the GPS market include the GPSCard for use in applications requiring a high level of GPS performance and the GPSAntenna for superior RF signal reception and multipath rejection.

The GPSCard has 10 dedicated channels that independently track the code and carrier phase of all GPS satellites in view. Powered by a 32-bit CPU complete with integrated math co-processor, the unit permits rapid data and position update rates without restricting the operation of other concurrent tasks. A major feature of the GPSCard is its ability to track the pseudo range measurement to a resolution of under 10 centimetres.

The design features of NovAtel's GPSCard permit P-code accuracies, relative ionospheric delay measurements and carrier phase cycle slip detection and correction, while using only the GPS C/A code.

The unique design of the GPSAntenna gives it a precise phase center while providing superior low elevation angle gain. Solid construction and high quality components make the antenna suitable for the most demanding applications.

NovAtel will offer its GPS technology as an Original Equipment Manufacturer (OEM). NovAtel is pursuing a niche market opportunity by selling GPS as an OEM product. The product will be available in both a board level OEM version and a personal computer card version. NovAtel does not plan to produce a product at the end-user level.

The GPSCard and GPSAntenna were scheduled to be available in production quantities by mid-1992. Both products will be manufactured at NovAtel's production facility in Lethbridge, Alberta.

Qubit UK Ltd.

Qubit have won a contract to supply Van Oord ACZ with their proven TRAC VB and CHART VB integrated navigation data acquisition systems, together with their highly successful SCANS pipeline data-logging system, for use on the company's new flexible fallpipe rock dumping vessel, FFPV Tertnes. This contract follows the success of both the Trollnes and the Rocky Giant and continues a long-standing association between the two companies that spans more than ten years.

SCANS V is a stand-alone data acquisition system which collects raw data from proprietary pipeline scanning systems. It is linked to TRAC to provide correlation with position. SCANS are corrected for roll and heave and the system has the capability to output acquired pipeline scans to a laser printer in real-time.

The SCANS editing module within CHART V data processing and plotting system uses advanced pattern recognition techniques to automatically determine a pipetop profile and its associated engineering levels. The scans are rectified, depth corrected and co-ordinated to chainage and grid positions. Final data is stored on disk to allow subsequent plotting of longitudinal plots and cross-sections, by the well established CHART V plotting system.

The systems will be delivered and installed by Qubit engineers in October 1992 and made ready for acceptance sea trials.

Surveying World

GITC bv, Lemmer (The Netherlands), publishers of the international trade journal Geodetical Info Magazine, have taken the opportunity to add a second title to their publishing program. GITC, and the Royal Institution of Chartered Surveyors (RICS), of the UK, will begin publishing "Surveying World" (SW) from November 1992, six times a year.

SW's initial distribution will be to approximately 2,000 RICS members and another 2,000 subscribers and potential subscribers mainly in the United Kingdom, Australia, Hong Kong, Malaysia, Singapore, South Africa, Canada and other commonwealth countries.

The editorial board is composed of five professionals, all highly qualified Chartered Surveyors. Editor-in-Chief is Mr. Peter Gilbert, Director of the RICS Land and Hydrographic Survey Division. The new journal reflects the best practice, effective client-solutions and current business news in land surveying, hydrographic surveying and land information management aspects of GIS.

Surveying World will publish professional articles and features, company and client-solution profiles, practical guidance, product news and assessments, personality news, company news, conferences, meetings and trade show news, and sources of continuous professional development and training on a local level.

Swath Ocean Systems Inc.

Swath Ocean Systems Inc. of Chula Vista, California, announces the sale of a hydrographic research vessel to Monterey Bay Aquarium Research Institute (MBARI) of Monterey Bay, California.

This is a larger and more sophisticated vessel than the two smaller Small Water Plane Area Twin Hull (SWATH) boats built and sold to the US. Corps of Engineers and the Canadian

government for similar types of research. Also under construction are a swath boat for the Houston Pilots Association and a 90-foot sport fisher, all privately funded.

The choice of the SWATH design was made to accommodate the requirement for a stable research platform from which to deploy the institute's remote operated vehicles (ROV'S) and other oceanographic instrumentation, under the rough operating conditions that typically prevail off the central California coast.

In addition to the inherent stability of the SWATH design, swath ocean systems will incorporate its patented strake buoyancy structure and an adjustable cavitation dampening structure which will increase the already inherent stability of a SWATH.

"No Day Too Long"
by The Pentland Press

Few books on hydrography have been written this century and none with the skillful blend of personal experience and technical detail which make "No Day Too Long" both informative and entertaining.

In a fascinating account of his life, Admiral Steve Ritchie (Hydrographer of the Royal Navy from 1966-1971) traces the dramatic advances in techniques that have taken place during his fifty years of cartographic and hydrographic endeavour. At the same time he provides the reader with a very personal insight into the sea surveyor's life ashore and afloat, relating with delightful humour many incidents and personalities encountered along the way.

When Steve Ritchie joined his first surveying ship, the old coal-burning HERALD, in 1936, sounding (with lead and line) and fixing the ship's position (with sextants and station pointers) differed little from the methods in use 150 years earlier. Within his working life he has seen these methods being superseded by computerized surveying and automated cartography.

From 1936 onwards Steve Ritchie worked continuously in the Surveying Service of the Royal Navy, traveling all over the world and commanding four of Her Majesty's Surveying Ships: CHALLENGER, on a world circling voyage with scientists on board, LACHLAN, the New Zealand survey ship, DALRYMPLE in the Persian Gulf, and VIDAL in the West Indies and North Atlantic.

Twice elected as President of the Directing Committee of the International Hydrographic Bureau in Monaco, Admiral Ritchie served the fifty Member States of the Organisation for 10 years (1972-82).

H.S.H. Prince Rainier III of Monaco has written the Foreword. "No Day Too Long" is now available from:

The Pentland Press,
3 Regal Lane,
Soham, Ely,
Cambridgeshire,
CB7 5BA, United Kingdom.
ISBN 1 872795 63 3

Universal Systems Ltd.

Universal Systems Ltd. have announced a new data processing package to complement their line of CARIS products; Hydrographic Information Processing System (HIPS). HIPS is a powerful software system which has been designed to process the very large quantities of sounding data now being collected by swath systems. The system is generic; that is , it can be applied to any swath sounding system.

HIPS is designed to receive logged sounding data, automatically check the data for blunders, automatically perform corrections, and merge data sources to produce "clean" soundings. The automatic processing is supported by powerful, user friendly interactive editors, developed specifically for swath data editing. Upon cleaning, the processed data files are available for plotting, inputting into a data base, etc.

More detailed information is available from:

Universal Systems Ltd.
P.O. Box 3391, Station B
Fredericton, New Brunswick
Canada, E3A 5H2
Phone 506-458-8533 Fax 506-459-3849

International Workshop on Global Positioning Systems in Geosciences
Technical University of Crete, June 8-10, 1992

This workshop was organized and hosted by the Division of Exploration and Positioning, Department of Mineral Resources Engineering, at the Technical University of Crete.

The meeting was intended to honour Professor George Veis of the National Technical University of Athens, for his contributions to Geodetic Sciences. Thirty five years ago in 1957 we saw the emergence of the satellite era both in practice, with the launching of Sputnik 1, and in theory, as it was also that year George Veis started his doctorate on "Geodetic Applications of Observations of the Moon, Artificial Satellites and Rockets". His thesis was the conception of the idea of three-dimensional positioning, not by stars and ground beacons but by earth-orbiting satellites. This revolutionary inspiration of Professor Veis opened new horizons and transformed the realm of positioning to such an extent that in the last thirty five years we have seen a vast expansion in the sheer breadth of applications and disciplines in the field of Geosciences where positioning is required. This Workshop was held to honour the "founding father" of satellite positioning for his contribution to geodetic sciences.

The meeting was opened by Professor P. Theocharis (Secretary-General of Athens Academy). The keynote address was given by the past-president of the International Association of Geodesy (IAG) Professor Ivan I. Muellen.

There were more than ninety participants from Germany, Canada, The United States, France, Greece, Italy, the Netherlands, Switzerland, United Kingdom, People's Republic of China, South Africa, Poland and Austria.

During the Workshop, two special workshops on the "Mediterranean Sea, Environment and Geosciences" and on the "IAG International GPS Services" were held.

About thirty paper presentations were divided into five sessions and addressed salient aspects of the Workshop theme:

1. Global Positioning Systems (Status, Policy, Plans);
2. Land applications;
3. Techniques and applications (Precise real-time differential applications of global navigation satellite systems);
4. Marine applications; and
5. Airborne applications.

The following resolutions were agreed on:

Resolution 1
The Workshop participants, recognizing that precise positioning alone is insufficient to provide insight in the complex structure of the crust and the lithosphere and the mechanisms behind their evolution, and that accurate separation of geoidal and oceanographic signals over the Mediterranean Sea is required for global climate change studies, recommend:

a) The extension of tidal gauge monitoring networks, preferably via continuous-tracking GPS observations;
b) the extensive use of altimetric data sets such as of ERS-1, and in the future, TOPEX/POSEIDON, to determine accurate dynamic models of the Sea Surface Topography and its periodic variations; and
c) the unconditional support of missions designed to determine high resolution, high accuracy geoidal models of global extent, and in particular the ESA/NASA ARISTOTELES mission.

Resolution 2
The Panel on "Mediterranean Sea, Environment and Geosciences" recommends that, through coordinated efforts of all European countries, a number of collocated data collection systems be established throughout the continent, and in the periphery of the Mediterranean Sea in particular, comprising instruments of use to various disciplines:

a) to produce spatially and temporally in situ data sets readily available for assimilation in general models;
b) to reduce the cost of gathering, transmitting and sorting/archiving data by sharing networks and data bank facilities;
c) to make possible the realization of a network of "total stations" throughout the area so that all scientific disciplines can benefit from this information;
d) to aid large scale studies of interdisciplinary nature which are impossible to execute within one science group alone; and
e) to foster and encourage discussion and cooperation between diverse scientific disciplines for the achievement of broader goals encompassing those of the individual disciplines.

Resolution 3
The organizing committee of the International Workshop has decided to donate the amount of 100,000 Greek Drachmae to the International Association of Geodesy (IAG). It is recommended that this amount is to be awarded as a prize to the author(s) of the best paper published in Bulletin Geodesique (IAG's official publication journal) and the Manuscripta Geodeatica journal. The papers to be considered shall be submitted during the period of January 1-December 31, 1993. The organizing committee leaves the responsibility of establishing the selection procedure to the IAG.

Proceedings of the "International Workshop on Global Positioning System in Geosciences" will be published and can be obtained through:

Stelios P. Mertikas,
Division of Exploration and Positioning,
Department of Mineral Resources Engineering,
The Technical University of Crete,
GR-73100, Chania, Crete, Greece
Telephone 3-0821-64864, FAX 3-0821-53571.

Quester Tangent Corporation

Quester Tangent Corporation is pleased to have been awarded a research grant under the Technology B.C. program. This grant provides partial funding for a two year development program valued at about $450,000. The company is collaborating with the University of New Brunswick (UNB) Ocean Mapping group in the development of bottom classification techniques using acoustic data. Research efforts at UNB and at the company will result in the development of a prototype instrument for trials in 1993, and a production instrument by the following summer. This instrument, called ISAH-S, will offer the positioning, data acquisition, and survey management functionality of the ISAH as well as digitization, real-time signal processing and specialized bottom displays.

The company has completed development of a new geophysical instrument called ISAH-T. This "tail buoy tracking computer" is targeted at the marine geophysics market. It receives pseudo ranges and phase data from up to six GPS receivers located on tail buoys, an additional receiver located on the survey ship as well as differential corrections from a shore-based receiver. Each receiver is differentially positioned approximately once per second.

In response to these developments and some significant export sales successes of ISAH and HYPS, Quester Tangent is growing. In the past 6 months five new full-time positions as well as several contract positions have been added.

Del Norte Technology Inc.

New Del Norte 3006 GPS Receiver
Del Norte Technology announces the new Model 3006 GPS receiver, the latest addition to Del Norte's GPS product range.

The 3006 is a lightweight, portable, low-cost, 6 channel GPS receiver. This unit is primarily designed for marine mobile DGPS operations and has a diversity of interface capabilities for integration of: DGPS data link, Echo Sounder, compass, tide gauge, etc.

Data logging is simple and flexible using the internal hard drive and/or 3.5" floppy drive. Special features also include optional Helmsman's Graphic display with plotting of specific coastal displays for your application.

The 3006 accepts a variety of application software packages. Many current hydrographic software packages may be operated on the 3006 to create a total DGPS hydrographic package. As with all Del Norte products, our sophisticated but easy-to-use positioning application software is also included.

For information on this product announcement contact:

John Pointon,
Manager, Sales and Marketing,
(817) 267-3541

Del Norte Technology also announces the introduction of the new model 217E/218E Differential GPS Data Link. For dynamic use high accuracy GPS application, differential pseudo-range correction techniques are preferred and DGPS data links are required.

Differential GPS data is transferred using Del Norte's 217E/218E Trisponder Transmitter/Receiver (T/R) units. All Del Norte T/R's are now designed to carry different GPS date corrections during 'standard' Range/Range operations, giving the user the option of combined DGPS Trisponder positioning without the need for separate differential data links or additional radio frequency licensing. Current Trisponder users can, with a low-cost upgrade, use existing Del Norte T/R's for differential GPS data link operations .

Del Norte also offers a full range of data links (VHF, X-Band, UHF, & HF) available from a single source.

Aanderaa Instruments

Aanderaa Instruments has recently become the exclusive Canadian representative for Chelsea Instruments Ltd. of the United Kingdom. Chelsea's products include oceanographic and environmental monitoring sensors, including fluorometers and transmissometers. Chelsea also manufactures towed systems such as Aquashuttle and Seasoar that can incorporate a variety of sensor configurations.

Aanderaa Instruments has signed an agreement with Jon B. Jolly Inc. of Seattle, Washington, to jointly represent products in Western Canada and the U.S. Pacific Northwest. Products represented in Canada include Klein and Imagenex Sonars, Alden Electronic thermal printers, and Benthos oceanographic instrumentation.

Knudsen Engineering Limited

Knudsen Engineering Ltd. announces a new digital echosounder for survey, navigation and scientific applications. The 320M Marine Echosounder uses state-of-the-art digital signal processing while retaining a traditional look and feel. Available in single or simultaneous dual frequency models, the 320M supports frequencies from 3.5 to 250 kHz. An intelligent depth digitizer is included in both channels. The new echosounder is equipped with a 32 level grayscale recording over a wide teperature range. Hard copy records are fully annotated. Water depth is shown on large 4 digit displays, and may be communicated to an optional remote display or to an external data logger. The 320M also interfaces to GPS and heave sensors.

For additional information contact:

Judith Knudsen, V.P. - Operations
Knudsen Engineering Limited
77 Gore Street East,
Perth, Ontario,
Canada K7H1H8
Telephone (613) 267-1165 FAX (613) 267-7085

Application for Membership / Formule d'adhésion

I hereby make application for membership in the Canadian Hydrographic Association and if accepted agree to abide by the constitution and by-laws of the association.

Je désire devenir membre de l'Association canadienne d'hydrographie en tant que et si ma demande est acceptée je m'engage à respecter la constitution et les règlements de cette association.

☐ Member / membre $30.00 (for most branches/pour la plupart des sections)

☐ Sustaining Member / membre de soutien $150.00

☐ International Member / membre international $30.00

Name/Nom _____

Address / Adresse _____

_____

Telephone / Téléphone _____ (Home / Résidence) _____ (Business / Bureau)

Employed by / Employeur _____ Present Position / Post Occupé _____

Citizenship / Citoyenneté _____ Date _____

CHA News / Nouvelles de l'ACH

Central Branch

Central Branch has had a busy year due mostly to the Heritage Launch Project and the upcoming 1993 Surveying and Mapping Conference. All field staff and DD/EG converts returned safely from their field surveys.

We have had two meetings since the spring. On November 4th Brian Power hosted an evening meeting at his home. Following the meeting we enjoyed a showing of the 1992 Churchill Harbour Survey Video. Our Branch AGM was held on December 10th at the Mimico Cruising Club. Even though the weather was the worst we have had this winter, the evening was well attended. The dinner was excellent and the speaker, Guenter Bellach, was very interesting. Guenter shared with us some of his experiences from his single-handed crossing of the Pacific Ocean.

The 6th Annual Central Branch BBQ was held on September 26 at Brian and Anna Power's. A special thank you to Brian and Anna for hosting us, and to Jennifer Campbell and Andrew Leyzack for organizing the event. The weather failed to 'dampen' high spirits and a fun filled afternoon, with good food and plenty of drink, was enjoyed by all.

Central Branch was saddened to hear of the untimely death of our friend J. Robert Morgan. Bob was president of Romor Equipment Ltd. and an enthusiastic member of the CHA.

Wedding Bells rang for three of our members during 1992. Mike Johnston and Giselle Sterling were married on July 18 at Chatham, Ontario. Jennifer Thiel and Kent Campbell were married September 5 at Mississauga, and our International Correspondent Larry Robbins and Jane Hickman were married on August 29 in the UK. Congratulations to you all.

A spring wedding awaits Joe Delle Fave and Betty Virgilio, they will walk down the aisle April 24, 1993. May you have many years of happiness.

The recently elected Central Branch Executive for 1993:

Vice-President:	Sean Hinds
Secretary-Treasurer:	Terese Herron
Executive Members:	Jim Berry
	Jennifer Campbell
	Andrew Leyzack
	Ken McMillan
	Brian Power
	Paola Travaglini
	Sam Weller

1993 promises to be an exciting and busy year. Welcome aboard!

Central Branch - Heritage Launch Project

The first phase of the Project, which was our outdoor exhibit at Harbourfront, is now complete. We are happy to report that this phase was a success based on the thousands of onlookers who visited our display and those interested parties that commended us on our efforts. It has been a busy summer for our builder, Ian Morgan, and all our volunteer staff. The actual construction of our Heritage Launch did not progress without its share of unpredictable obstacles. Distractions from work resulted because of an inquisitive public and their quest for knowledge; raising questions on boat-building, history, geography, hydrography and even some conversation on the political and economic climate of the day. Miscalculated too was the inconvenience of a temporary worksite in the heart of Toronto and the hub-bub of summer traffic, not to mention the unprecedented poor weather that we had. So, perhaps our construction schedule has slipped a bit but the Launch has been moved from Harbourfront and now resides in a warm, dry workshop where it can be completed.

The Heritage Launch Committee has turned its attention to preparing a promotional campaign for 1993. The first event will be the display of the Launch at the Toronto International Boatshow in January. Plans are well underway on the second major event, the official launching, which will take place at the Surveying and Mapping Conference to be held in Toronto during the 8-11 of June, 1993. Other possible appearances may be the Simcoe Day Celebrations and Harbourfront Wooden Boat Festival in August and a few fall engagements to round out the year.

Apprentice Boatbuilders
Central Branch Exec. Member Brian Power and V-P. Sean Hinds

Open House

Standing from left: Paola Travaglini, Andrew Leyzack, Brian Power, Keith Weaver, Joe Delle Fave, John Dixon
sitting - from left: Jeff Berry, Jason Power

The Central Branch Heritage Launch - Leaving Harbourfront

But our activities to date could not have progressed without the financial support that has been given to this project by our friends in the surveying community and by the public at large. We would like to thank all those that have volunteered, donated or helped out in some other way.

Corporate Sponsors
Canadian Institute of Geomatics, Toronto Branch
Canadian Hydrographic Service
1993 Surveying and Mapping Conference
Harbourfront Corporation
Canadian Hydrographic Association, National
Association of Ontario Land Surveyors
Autographix Inc.

Sponsors

Hydrographic Soc. of America	Hydroquip Ltd.
McQuest Marine Ltd.	Mr. Keith Weaver
Mr. Ken Hipkin	Mr. Roger Robitaille
William J. Beatty	Aerodat Ltd.
Quester Tangent	Kingsway & Associates
Mimico Cruising Club	Toronto Historical Board
Mr. & Mrs. J.H. (Sam) Weller	Terese Herron

Patrons

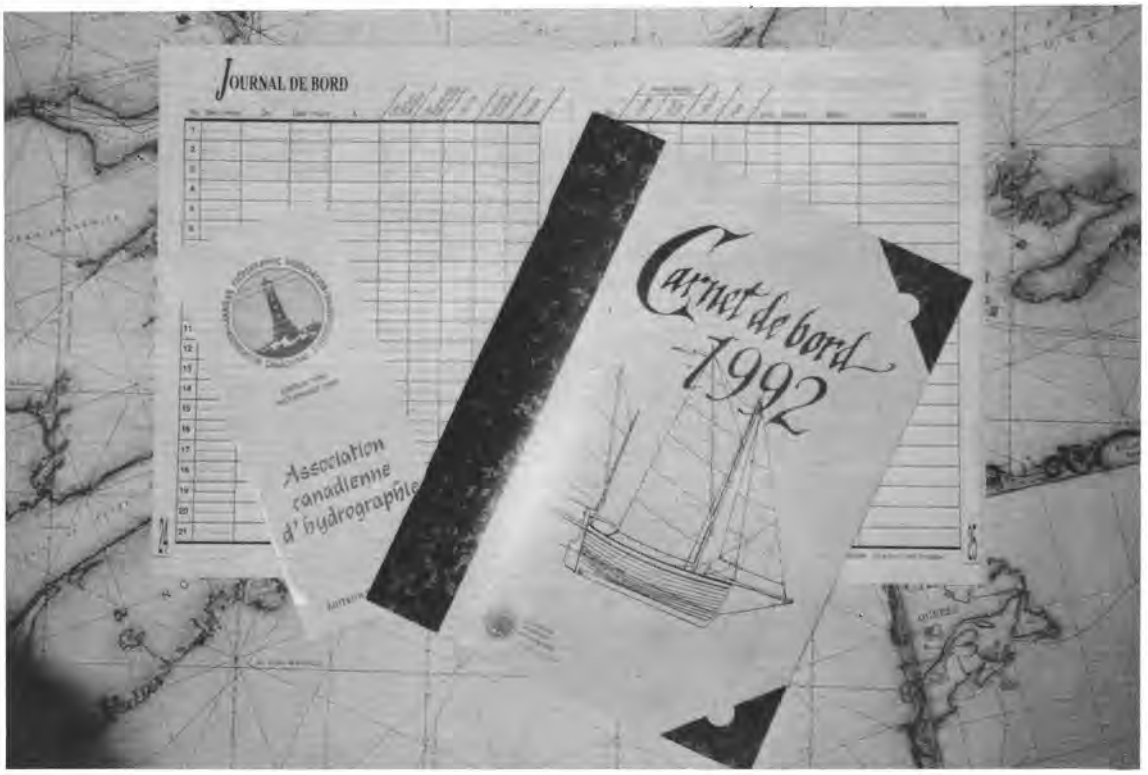
Mr. George Goldsteen	Mr. Ted Cowan
Mr. Ab Rogers	Mr. Ed Stefanek
Mr. Frank Adare	Mr. Peter Dupuy
Mrs. Brenda Rolfe	Etobicoke Historical Soc.

Section du Québec

Le lancement officiel de la 1re édition du Carnet de bord produit par la Section du Québec s'est fait lors de la cérémonie d'ouverture officielle, du 24 avril, de l'Expo-Nature de Rimouski qui se tenait du 23 au 26 avril. La Section a bénéficié d'une tribune privilégiée pour faire la promotion de son Carnet de bord ainsi que celle de l'Association. Nous avons aussi remarqué que le public commence à mieux connaître l'Association par le fait que la Section du Québec revient annuellement à cette exposition.

Equipe de réalisation du Carnet de bord:
Bernard Labrecque, VP Section du Québec;
Hélène Aubut, graphiste;
Michel Côté, directeur artistique;
Sylvie Roy, collaboratrice;
Kina St-Laurent, agente de marketing.

Suite aux commentaires favorables du public et des publicitaires, la Section du Québec s'est sentie encouragée à poursuivre pour la 2e édition du Carnet de bord. Celle-ci sera prête pour le Salon nautique de Montréal prévu en début février 1993.



Carnet de bord

Par l'intermédiaire du programme PAIE, Marie-Andrée Jobin a remplacé Pierre-Paul Beaupré à notre magasin de cartes. Elle est aussi responsable du suivi quotidien des activités de la Section.

Le programme étudiant DÉFI 1992 a permis d'engager, pendant une partie de l'été, Steve Poirier en tant qu'agent de communication. Il était responsable de la promotion du Carnet de bord 1992 et a aussi entrepris un sondage afin de mieux fixer les paramètres de la campagne de souscription de l'édition 1993.

La Section du Québec a engagé deux personnes pour la période automnale, grâce au programme de développement de l'emploi ARTICLE 25. Nous avons réembauché Hélène Aubut, graphiste, pour produire la 2me édition du Carnet de bord et engagé Julie Bellavance, agente de communication, pour conclure les ententes avec les publicitaires.

Les 25 et 26 juillet, la Section a organisé une visite à bicyclette à l'Ile Verte. Nous avons pu apprécier les charmes pittoresques de cette région. La mer et son rythme occupent encore une place prépondérante dans la vie des habitants de l'île. Le coucher s'est fait dans l'ancienne maison du gardien du phare. Nous avons aussi visité le phare, ce qui nous a permis d'en apprendre plus sur son fonctionnement avant son automatisation.

Le 17 octobre, les membres et amis de la Section du Québec visitaient l'observatoire astronomique du Témiscouata. Nous avons mis nos connaissances à l'épreuve, non seulement en astronomie, mais aussi en géologie, en séismologie, en météorologie et sur l'énergie éolienne. En surplus, plusieurs personnes du groupe ont découvert les propriétés acoustiques spéciales qu'offre un dôme.

Ottawa Branch

Congratulations to Dave and Margery Black on the birth of their first child, Jessica Rose, who arrived on August 15, 1992.

Leah Donnelly is leaving the world of hydrography and computers for a while to spend some time with her family.

We were fortunate to have Ralph Renaud as the coordinator for this year's picnic which was held on June 30. Ralph even managed to stop the rain at 9 am so that the sun would shine at noon on the almost 100 people who attended. Ilona Hilbert-Mullen and Richard Horrigan entertained the children by running the games and awarding prizes and the expert burger flippers, Ralph Renaud, Ron Lemieux and John Warren, kept everyone well fed while Ray Chapeskie and Paul Holroyd provided the music. A special thank you goes to Guy Vachon and Susan Davidson at the Loeb Island Park grocery store for all their help with this year's picnic. Not only did they provide some good suggestions, but they also provided the professional-sized barbecue and cooler, and the cooking utensils and tables that made the cooking and serving so much easier.

Don Mitchell, a long time Branch member is retiring on Dec. 31, 1992. Don will be leaving his position as Head of the Tidal Predictions and Data Inventory Section of DFO's Marine Environmental Data Service's Branch. Don and Louise have been busy building a new home near Lanark, which is scheduled for completion in December. We wish Don and Louise every happiness in their new home and in their new adventure.

The Ottawa Branch was happy to donate a few door prizes to the annual CHS golf tournament which was held on Sept. 16. Over 30 'hydrographic types' participated.

Two Branch members have recently changed jobs at CHS. Ilona Hilbert-Mullen, formerly the Supervisor of Chart Corrections has joined the Reprints Unit. Anna Singerff who was a member of the Chart Corrections Unit is now with the Notices to Mariners Unit.

Ray Chapeskie is still finding time to fulfill his duties as National Secretary-Treasurer, even though he's off on full-time French language training.

Dave Pugh, the National President, brought us up to date on the CHA's training project in Malaysia during his noon hour presentation "Malaysia: A porthole peek at the CHA/CIDA training assistance project".

The annual CHA Christmas luncheon will be held on Thursday, Dec. 17, 1992 at the Sala San Marco on Preston St. Every year members of the association and friends of hydrography get to together to celebrate the holiday season, so we invite anyone who will be in Ottawa that day to join us. Anyone interested in buying tickets can contact Sheila Acheson or Ralph Renaud at the Canadian Hydrographic Service.

Pacific Branch

Names in the News

Such notables as Laurie Thompson and Graeme Richardson have retired to a quieter, less hectic life. As I write, Al Smith having just received his 35-year pin from Ross Douglas, Dominion Hydrographer, CHS, is retiring November 27, 1992. A luncheon organized by Tony Mortimer, Rikki Chan and Carol Nowak will be held in his honour on the 13th of November at Glen Meadows Golf and Country Club.

Sailing Directions (CHS) is going to be pretty quiet without Al. What's Rikki going to do with all that spare room?

Of course

Hydrographers only retire once; not so in Tidal! At the end of September Al Ages retired for the second time! Although no longer officially a member of the numerical modelling group, an office has been secured for Al in the IOS hangar. So, does this mean we can look forward to a #2 for Stan Huggett & Willie Rapatz?

Jim Galloway has been nominated to participate in the hunt for the missing sockeye salmon misplaced in the Fraser River. Specifically he will be part of a team looking into the reliability of existing counting systems and making some recommendations for the future.

Bill Crawford is preparing a manuscript, based on the resultant measurements and satellite imagery from this years first study of the currents in the Queen Charlotte Islands. Bill had a unique opportunity this year as an external examiner for a

Ph.D. thesis in the Department of Oceanography at Dalhousie University. Bill participated in the student's successful defense of his thesis.

MDHer's

Will IOS ever be the same again now that our CHS, multi-disciplinary hydrographers (MDHer's) have returned from the field? As stated by Ross Douglas "...a tremendous success, far more than we had envisioned. This program will hold the CHS in good stead for a long time, in fact New Zealand, Germany and South Africa are all making similar moves." These words of praise were delivered in his opening remarks at the Certification of Achievement held recently at IOS, for the graduates (multi-disciplinary hydrographers) of the 'Sidney Harbour Institute of Technology'

The presentations followed the traditional nod of approval from Father Doug (Doug Popejoy), dressed in his robe of sanctity. The proceedings slowed when adorned in his traditional ermine draped gown and navy pillbox cap, befitting his lineage, the right honourable Arthur Lyon rose from where he was sitting, walked to the podium and accepted his certificate. It was a Polaroid moment!

This author wishes to congratulate all of our CHA tidal and cartographic MDHer's on a great effort. Dave Jackson, Gerry Kidson, Eric Earl, Art Lyon, Ron Korhonen, Mike Jennings, Brian Wingerter, Al Schofield, Graham Whincup, Dave Prince, Patti Dew, '100Kmer' Ron Bell and Denni Sinnott. Unfortunately, Ron Bell, Mike Jennings and Harvey Pfluger were still in the field.

Fun Things

The 5th annual IOS/PBS Golf Tournament was held at Cowichan Bay. CHA golfers were Ken Holman, Mike Bolton, Barry Lusk, Ernie Sargent, Willie Rapatz, Gerry Kidson, and our VP, Carol Nowak.

Seminars and Socials

CHA members and their families congregated at IOS for a fun and enjoyable summer barbecue.

CHA members were entertained November 3rd by Dr. Ian Barrodale of Barrodale Computing Services. His presentation entitled, "Sidescan Sonar Image Processing Using Thin-Plate Splines and Control Point Matching", was taken from a joint paper written by D. Skeg, R. Kuwabasa, R. Poeckert and I. Barrodale.

On November 19th J. Lawson and G. Schlagintweit will speak jointly on their CHS/NOAA exchange adventures.

The CHA/CIG (formerly CISM) BBBB (beer, bun and bellowing bash) is scheduled for the 25th of November.

Ninja

The expression, "Ride to Live and Live to Die", was almost a true story for Ken Halcro and his brand new Kawi - Ninja motorcycle. Ken describes the incident, as "riding on ball bearings" as he had no control when the bike hit the ground. Luckily, he was not hurt.

Health

Mikey alias Mike Ward, is recovering from heart surgery. In a nutshell, the procedure employed the use of an optical fibre equipped with various attachments which when inserted into an artery was used to repair the damage. The problem for Mikey was where they inserted the fibre!

And on this note, we close!

John S. Cookson (1934 - 1992)

We are sorry to report the death of John S. Cookson, who passed away Dec. 18, 1992 after a brief illness.

John was born in 1934 and grew up in Southampton, U.K. After fulfilling his British military service in Egypt he joined the British Ordnance Survey as a civilian. In 1957 John emigrated to Canada and settled in Ottawa. John worked for Spartan Air Services before joining the Canadian Hydrographic Service (CHS) in 1959 as a draftsman.

As a member of the CHS cartographic staff John worked his way up through the ranks and became a supervising draftsman. In 1976 he joined the Training and Standards section where he was responsible for developing and teaching the drafting and reproduction portion of the CHS cartographic training courses. John also developed the drafting standards for CHS symbology. As a Cartographic Training Officer since 1976 John was well known by most CHS cartographic staff, having taught most of them on either Carto I or II.

Students from other countries, including Malaysia, New Zealand, and Pakistan, the Seychelles, Mauritius, Korea, South Africa and Nigeria also benefited from John's knowledge and expertise. John was also generous with his time and help for students on related navigation and seamanship courses.

In winter John was an avid cross country skier and from spring to fall he spent much of his spare time on his cruiser berthed at Merrickville. He was an active member of the Britannia Power and Sail Squadron and also instructed there.

We extend our deepest sympathies to John's family, his wife Jenny, his daughters Victoria and Allison, and his son John.

A scholarship fund has been established in John's memory at the Ottawa University School of Nursing. Anyone wishing to participate can send their contribution to the John Cookson Scholarship Fund, Ottawa University School of Nursing, 190 Laurier Avenue East, Ottawa, Ontario K1N 6N5.

THE CANADIAN HYDROGRAPHIC SERVICE

and

THE CANADIAN INSTITUTE OF SURVEYING AND MAPPING

Invite you to the

1993 SURVEYING AND MAPPING CONFERENCE

TORONTO, CANADA

LE SERVICE HYDROGRAPHIQUE DU CANADA

et

L'ASSOCIATION CANADIENNE DES SCIENCES GEOMATIQUES

vous invite à la

CONFERENCE DES SCIENCES GEOMATIQUES 1993

JUNE 8-11 JUIN, 1993

The conference theme "Celebrating Our Heritage, Charting Our Future" *will allow in-depth discussions on tomorrow's predictions, today's advances and yesterday's achievements, and will feature the culmination of the year-long authentic construction and in-conference demonstration of a 1792 vintage sounding launch.*

National and international authors *are currently being invited to present papers on hydrography and related survey disciplines at plenary, concurrent and poster sessions.*

Look for new opportunities at the exhibition *of latest equipment and services by companies from surveying and related disciplines.*

The classic Royal York Hotel *in downtown Toronto will be your host. Enjoy the comfort of the hotel's modern facilities, just a short walk or ride from a wide variety of entertainment, restaurants, dinner theatre or a Blue Jays baseball game at the SkyDome.*

Renew old friendships and make new contacts *at a variety of social events. Luncheon and evening events are planned to ensure an unforgettable experience.*

The annual general meetings *of the Canadian Institute of Surveying and Mapping and the Canadian Hydrographic Association will be held during the conference.*

Le thème de la conférence "Fêtons notre héritage, traçons l'avenir" *assurera des discussions sur les prédictions de demain, les progressions d'aujourd'hui et les succès d'hier, incluant le résultat de la construction d'un bateau de levé authentique de l'époque 1792, de même qu'une démonstration hydrographique des années passées.*

Des auteurs nationaux et internationaux *seront demandés de présenter des exposés hydrographiques et sciences connexes à des sessions d'affichage, plénières, et concurrentes.*

Des expositions de compagnies commerciales *seront de la partie; ceux-ci identifieront leurs derniers services et nouvelles techniques offertes par rapport aux levés et sciences connexes.*

L'hôtel "Royal York" *localisé au centre ville de Toronto est l'hébergement officiel de la conférence. Profitez du confort et des facilités modernes de cet hôtel situé à quelques minutes de marche d'une variété de divertissements, restaurants, théatres ou partie de balle au SkyDome avec les "Blue Jays".*

Renouvelez d'anciennes amitiés et profitez de nouvelles relations *par une variété d'engagements sociaux. Les déjeuners et les diners sont organisés afin d'assurer une visite mémorable.*

La rencontre annuelle *de l'Association canadiennes des sciences géomatiques et l'Association canadienne d'hydrographie aura lieu lors de cette conférence.*

FOR MORE INFORMATION ABOUT ATTENDING, PRESENTING PAPERS, EXHIBITING EQUIPMENT AND SERVICES, AND OTHER CONFERENCE DETAILS, CONTACT:

POUR PLUS D'INFORMATION CONCERNANT PARTICIPATION, PRESENTATION, EXHIBITION D'EQUIPMENT OU SERVICE, ET AUTRES DETAILS DE LA CONFERENCE CONTACTEZ:

1993 Surveying and Mapping **CONFERENCE** des Sciences Géomatiques, 1993
P.O. Box 186, Station Q, Toronto, Canada, M4T 2M1
Phone (416) 336-4812 / FAX (416) 336-8916

GEOMATICS IN THE MARINE ENVIRONMENT
A ONE DAY WORKSHOP

Geomatics Industry Association of Canada
L'Association Canadienne des Entreprises de Géomatique

Canadian Hydrographic Association

Sponsored by
Geomatics Industry Association of Canada
and
Canadian Hydrographic Association, Central Branch

ROYAL YORK HOTEL, TORONTO
JUNE 8, 1993

The format for the workshop will be presentations in the morning followed by demonstrations in the afternoon. The presentations are as follows:

- **GIS Plays Key Role in Canadian–French Maritime Conflict**
  Garth Lawrence, Intera Information Technologies (Canada) Ltd.
- **LARSEN LIDAR – A Decade of Experience and a Focus on the Future**
  J. Vosburgh, Terra Surveys Ltd.
- **The Atlantic Provinces Optical Cable System Project**
  A. Power, McElhanney Geosurveys Ltd.
- **Technology Trends Influencing Marine Geomatics Applications**
  Dr. David Wells, Ocean Mapping Group, UNB.

In the afternoon workshop participants will be divided into groups which will view,in rotation, live demonstrations of projects illustrating marine applications of geomatics. The demonstrations are as follows:

- **Hygro–92: Hydrographic Ground Truthing Experiment**
  Ocean Mapping Group, UNB
- **Electronic Navigation Chart Data**
  Eastcan Group of Survey Consultants Ltd.
- **Pilot Electronic Chart Project**
  Offshore Systems Ltd.

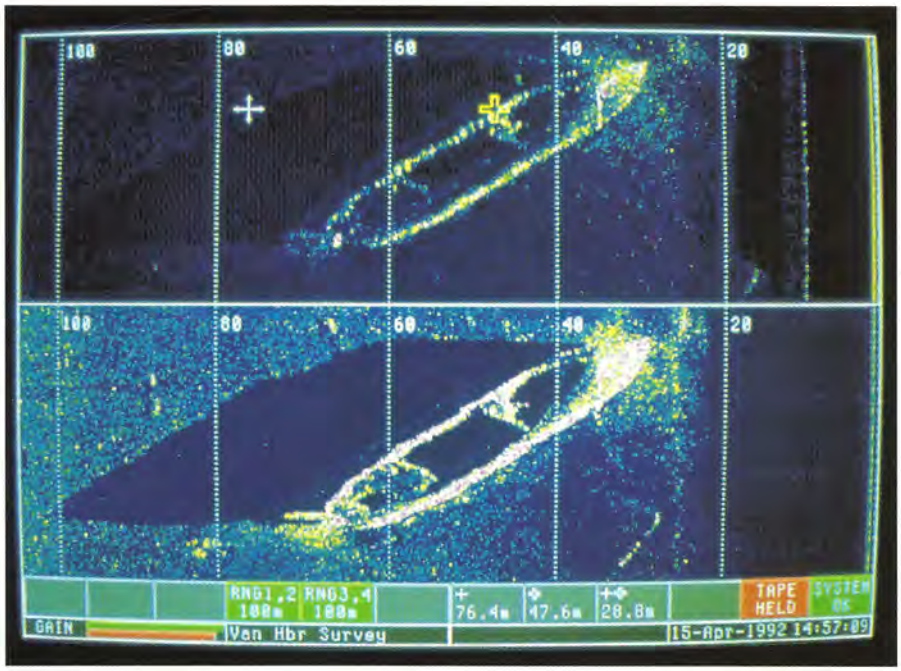
The workshop will close with an open forum on the Future of Geomatics in the Marine Environment.

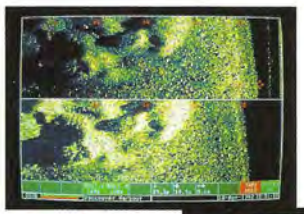
For further information on the workshop and the attractive rates being offered to CHA, CIG and GIAC members please contact:

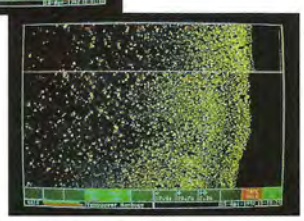
Terese Herron
Geomatics Marine Workshop
Canadian Hydrographic Association
867 Lakeshore Road
Burlington, Ontario
L7R 4A6
phone (416) 336-4812
fax (416) 336-8916

SIMRAD MS 992 SIDE SCAN SONAR

A simple, versatile, cost effective dual or single frequency side scan sonar *with two-wire telemetry*







The MS 992 is a simultaneous dual or single frequency side scan sonar with two-wire telemetry and a variety of subsurface units for stand-alone or ROV use at any depths. A permanent data record is readily available via hard copy interface or digital data recording.

Like all Simrad Mesotech sonars, the MS 992 is designed for easy operation with a combination of dedicated pushbuttons and a joystick for menus. The MS 992 is effective for commercial applications such as general search and salvage, offshore construction, cable and pipeline surveys, and hydrographic or geological studies. It provides all the features required for military mine countermeasures operations.

Send for complete information on the new MS 992 side scan sonar, the system that adds whole new levels of performance and versatility to underwater imaging.

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