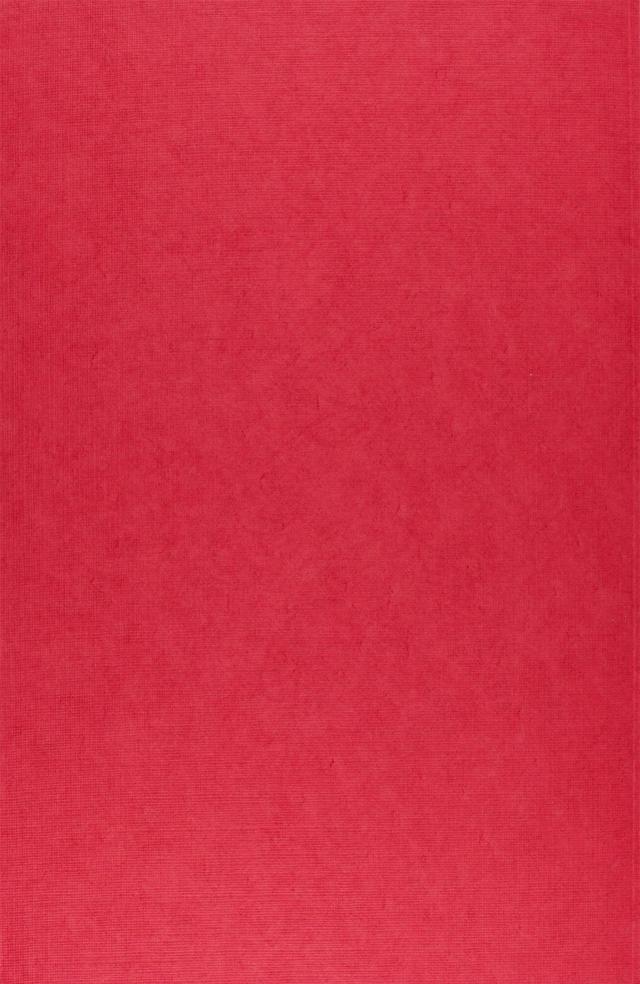
INTERNATIONAL HYDROGRAPHIC REVIEW



INTERNATIONAL HYDROGRAPHIC BUREAU MONACO

Vol. LXVI No. 2

JULY 1989



ADDENDUM

The IHB has been requested by the Norwegian Hydrographic Service to give the following additional information about the paper 'Data Management of Swath Sounding Systems', by A. MIDTHASSEL, E. SØLVBERG and F. PØHNER, published in the *International Hydrographic Review*, Vol. LXV, No. 2, July 1988, pp. 91-115:

'STATOIL, the Norwegian national oil company, has contributed with considerable resources and has experience in the present and the future development of most of the techniques mentioned in the article. Geoconsult, working under contact to Statoil, put the ideas into practice. Further information can be found in the paper 'Fully Automated Sea Floor Charting', by Mr. B. Anda, presented at Geilo, Norway, January 1988.'

FRENCH INSTITUTE OF NAVIGATION

3, Avenue Octave-Gréard - 75007 PARIS

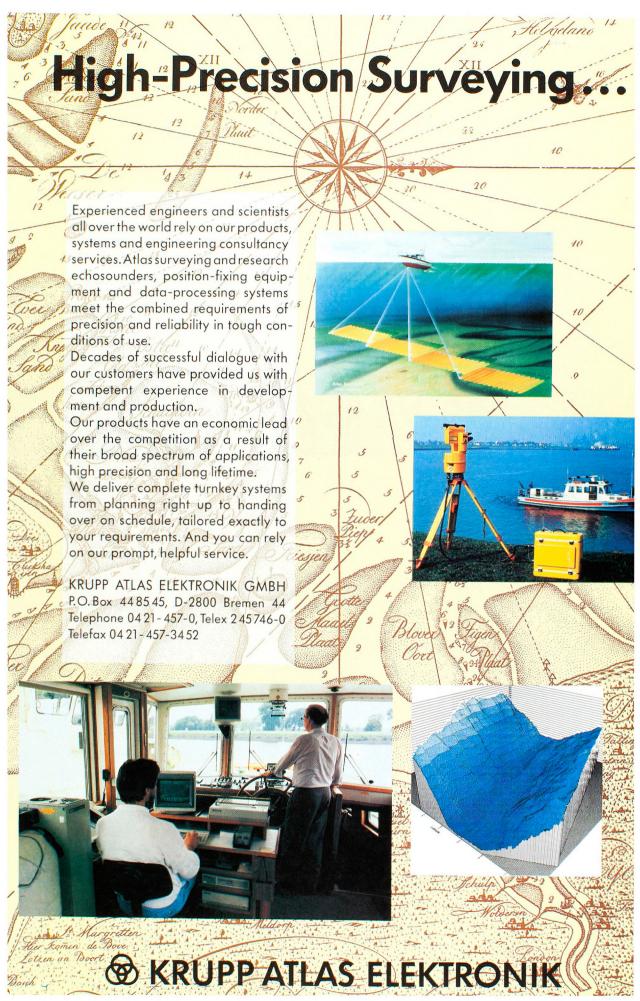
Publishes a Technical Review on Maritime, Aerial and Spatial Navigation entitled:

NAVIGATION

which is issued quarterly (January, April, July, October)



- Registration. Applications for registration should be addressed to the Secretary-General. Membership of the French Institute of Navigation and dispatch of the review NAVIGATION are acquired for the full year from 1st January.
- Annual Dues. 1989 :
- Payment. Preferably by bank transfer or postal payment to the Association's Postal Order Account: I.F.N. 1581-32 N Paris.
- $\bullet \mbox{Bank}$ cheques only in French francs, payable in Paris; bank charges for the subscriber.



Lighthouse

Journal of the Canadian Hydrographic association

A journal dedicated to promoting the free exchange of information within the hydrographic community and to advancing the technical and professional ability of hydrographers.

It includes a variety of articles and topical news on advances in hydrography and historical perspectives.

Published twice yearly, in April and November, and is free to Association members.

Yearly subscription rates to non-members: Residents of Canada \$20.00 Non-residents \$25.00 (Cdn.)

For further information regarding membership, article submission and advertising, please address all correspondence to:

The Editor, LIGHTHOUSE
Canadian Hydrographic Association
P.O. Box 5050
867 Lakeshore Road
Burlington, Ontario

Phone: (416)336-4856

Canada

THE INTERNATIONAL HYDROGRAPHIC ORGANIZATION

an intergovernmental organization also publishes the

INTERNATIONAL HYDROGRAPHIC BULLETIN

(PP-03)

A monthly journal published by the International Hydrographic Bureau for the benefit of the world hydrographic community, in a bilingual edition (English and French), 21×30 cm in size, with an average of 45 pages per issue, and comprising:

- SECTION I IHO Notes: News from Hydrographic Offices; Appointments of Hydrographers; New Membership of the IHO; Description of new survey vessels; Recent developments in hydrographic instrumentation; Operational assessments of equipment; Reports of international commissions, committees and other bodies; Training programmes in hydrographic surveying, marine cartography and other relevant courses; Conferences scheduled; Comments on general events at the Bureau and its personnel; List of recent publications produced by the Bureau and future plans; Reports on surveys carried out or projected by Member States or non-Members.
- SECTION II Hydrographic Commentary: Comments on the work of other organizations of interest to hydrographers; On various published articles; On international marine developments; Notes devoted to hydrography and related sciences; and 'From the Chartroom': notes on charts and nautical documents.
- SECTION III New Charts and New Editions: Listing of new charts and new editions published by Member States, with reference number, title, limits, scale and date of publication. Charts and new editions in preparation are also listed. Status catalogue of International Charts in the International Set of Charts, with International reference number, title, limits, scale, date of publication, and the names of the producer and any printer nations.

 Publication and new editions of Sailing Directions, Lists of Lights, Tide and Current Tables, Radio Signals, Radio Aids to Navigation, Chart Catalogues.
- SECTION IV Bibliography: Lists of selected recent publications and articles concerning hydrography and allied disciplines.

 Hydrographers will be interested in: Includes summaries of annual reports by Member States' Hydrographic Offices and other relevant organizations as well as reviews of some recent publications of particular interest to hydrographers.

The International Hydrographic Bulletin is distributed free to the Hydrographic Office of governments belonging to the International Hydrographic Organization.

It is also available for sale to the public on yearly subscription (price 150 French Francs) or per copy (15 French Francs) plus postage.

Conditions of sale of International Hydrographic Bureau Publications

Prices are quoted in French Francs. IHB invoices will be expressed in French Francs or in US dollars at current exchange rates, as appropriate. Packing and postage or shipping expenses will be added to invoices. Payments may be made to the International Hydrographic Bureau by bank transfer or by cheque.

No credit can be allowed on unwanted publications unless returned immediately.

Orders can be sent either to a bookseller or direct to :

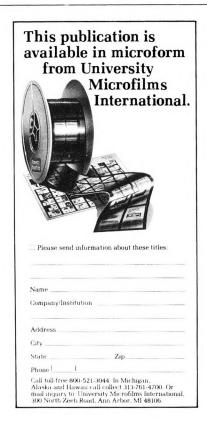
International Hydrographic Bureau, B.P. 445, 7, avenue Président J.F. Kennedy MC 98011 MONACO CEDEX, Principality of Monaco.
Teleph.: +33 93.50.65.87 — Telex: (France) 479164 MC INHORG Telefax: +33 93.25.20.03 — Teleg.: BURHYDINT, Monaco

Bathymetric charts available from the International Hydrographic Bureau:

N.B. — All IHB prices are subject to periodic review.

The following Information Papers are available free from the International Hydrographic Bureau:

- No. 1 The International Hydrographic Organization (September 1987)
- No. 2 The FIG/IHO International Advisory Board on Standards of Competence for Hydrographic Surveyors (November 1987)
- No. 3 IHO Special Publication No. 39: Precise Positioning Systems for Hydrographic Surveying (Series 1977) (December 1982)
- No. 4 IHO Tidal Constituent Bank (February 1986)
- No. 5 The IHB's Views on Proposals for a World Chart Series (November 1987)
- No. 6 Technical Assistance (November 1987)
- No. 8 GEBCO (July 1987)
- No. 9 The INT Chart Concept (March 1985)



Recently published by the International Hydrographic Bureau:

BP-0008	Gazetteer of Geographical Names of Undersea Features Shown (or which might be added) on the GEBCO and on the IHO Small- Scale International Chart Series (Part I) and Standardization of Undersea Feature Names: Guidelines, Proposal Form, Termino-	
	logy (Part II), 1st Edition, October 1988 (English/French)	200.00 FF
MP-005	Normas de competencia para os hidrografos (Portuguese)	25.00 FF
MP-009	Catalogue of Agents for Sale of Charts, January 1989 (English/French)	75.00 FF
PP-05	IHO Yearbook 1989 — particulars and addresses of Hydrographic Offices throughout the world (English/French)	75.00 FF
SP-47	Cursos de Formación en Hidrografía y Cartografía Náutica (Spanish)	30.00 FF
SP-52	Electronic Chart Display and Information Systems (ECDIS) — Draft Specification (Third), October 1988 (English)	30.00 FF
SP-52	ECDIS — Updating the Electronic Chart —Appendix, 1st Edition, November 1988 (English)	20.00 FF

The following is soon to be released:

MP-003	Resoluciones Técnicas y Administrativas de la OHI (Spanish)	150.00 FF
SP-54	Proceedings — Digital Data Exchange Seminar (English)	30.00 FF
BP-0006	Standardization of Undersea Feature Names (Guidelines, Proposal Form, Terminology) (English/French)	Gratis
BP-0007	GEBCO Regulations (English/French)	30.00 FF

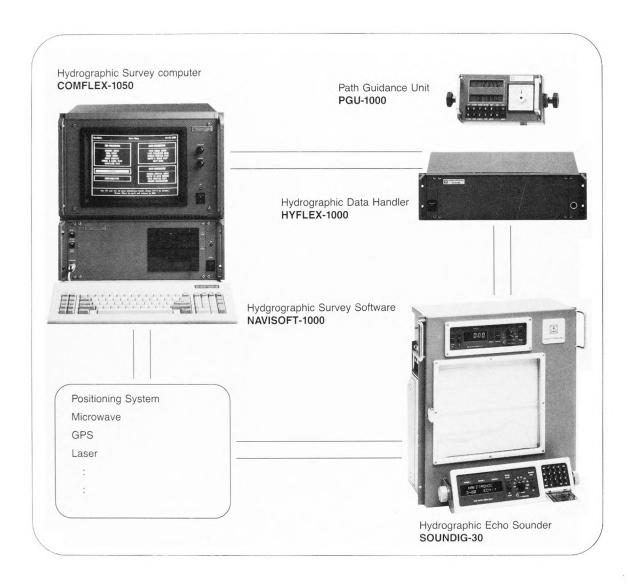
The following publication is in the process of preparation:

The Catalogue of the IHO Publications, 1989 can be obtained gratis by writing to the

INTERNATIONAL HYDROGRAPHIC BUREAU
BP 445
7 avenue Président J.F. Kennedy
MC 98011 MONACO CEDEX

Looking for the Survey System of the 90's?

The Hydrographic Survey System **SEAFLEX-1000**



Full system responsibility is taken



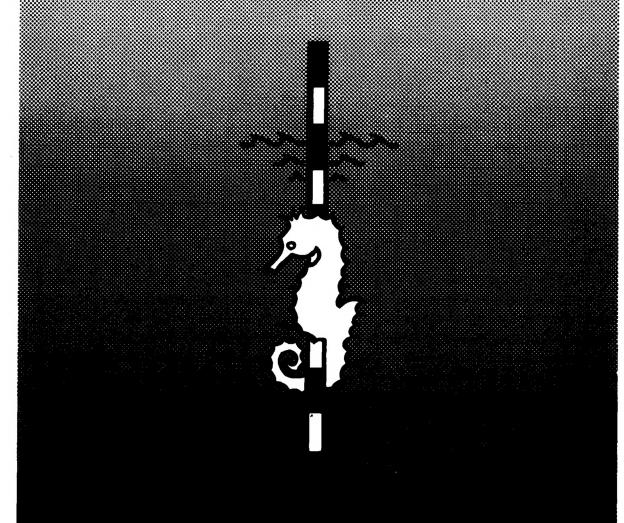
NAVITRONICAS

Designers and Manufacturers of Hydrographic Equipment

Marselis Boulevard 175 Phone: +45 6141300 · Telex : 68728 navico dk

DK-8000 Aarhus C Telefax: +45 6117017 · Cables: navitronic

Denmark



representing and serving the world hydrographic surveying community with individual and corporate members in sixty countries

The Hydrographic Society

NORTH EAST LONDON POLYTECHNIC · LONGBRIDGE ROAD · **DAGENHAM** TELEPHONE: 01-597 1946 · ESSEX RM8 2AS **ENGLAND** TELEX: 665080

AUSTRALASIA

Australian Maritime College PO Box 986 Launceston Tasmania 7250 Tel: 003 260711

DENMARK

Søopmålingen Esplanade 19 DK 1263 Copenhagen K Tel: 1 93 51 75 Tx: 22204 FRVSKA DK **NETHERLANDS**

RWS - Dir Noordzee Postbus 5807 2280HV Rijswijk (ZH) Tel: 070 949500 Tx: 33782

NELP

Longbridge Road Dagenham Essex RM8 2AS Tel: 01-597 1946

USA Rockville Maryland 20851 Tel: 301 443 8232 Tx: 248376 OBSW UR

OXFORD =

THE JOURNAL OF NAVIGATION



Editor: Professor J F Kemp

The Journal of Navigation publishes authoritative papers on every aspect of navigation—air, land, sea and space—and papers of every type—scientific, historical and narrative. It also features book reviews and keeps a 'record' of current Navigation work.

Some important articles appearing in The Journal of Navigation

An Evil So Pregnant With Mischief (Some Ups and Downs in the Development of Navigation Equipment and Practice) A E Fanning

Air Navigation Systems J E D Williams

Operation Considerations and Constraints in Ship-Based Weather Routeing Procedures **R Motte**

Magnetic Reference in Navigation—The Earth as a Magnet W F Stuart, D R Barraclough and J Preston

The Integration of GPS and Loran-C W L Polhemus

Radio Stars, What They are and The Prospects for their Use in Navigational Systems **Kevin Wallace**

ISSN 0373-4633, three issues a year

Subscription Rates for Volume 42, 1989:

UK £52, N America, US\$110, Elsewhere £65

ORDER FORM (please use block capitals)					
	Payment may be may made by cheque, credit transfer or major credit card—please give account number, expiry date and signature when ordering.				
	Please enter my subscription to The Journal of Navigation , Volume 42, 1989				
	☐ I enclose the correct remittance (cheques should be made payable to Oxford University Press)				
	Please send me a FREE sample copy				
	Name				
	Address				

Postcode Country

Oxford University Press, Walton Street, Oxford OX2 6DP, UK

JOURNALS

JOIN THE NAUTICAL INSTITUTE AND PROMOTE THE NAUTICAL PROFESSION



The Nautical Institute is a professional body for qualified mariners devoted to promoting high standards of nautical competence and knowledge. It is directed by a Council of whom the majority must be actively employed at sea. Membership is open to qualified mariners of all nationalities, based on the following classes:

MEMBERSHIP CLASSES

FELLOWS (F.N.I.)

Must have held positions of superior professional responsibility, been a member for five years and made a significant contribution to the profession.

MEMBERS (M.N.I.)

Must hold (a) Class 1 (deck) Master Mariner's Certificate of Competency or a similar qualification, (b) the appropriate ship command examination in the seaman specialisation of the Royal Navy, (c) a First Class Licence issued by a recognised Pilotage Authority, and three years' experience as a first class pilot.

ASSOCIATE MEMBERS (A.M.N.I.)

Must hold (a) Class 3 (deck) Certificate of Competency or its equivalent, (b) a Royal Naval Bridge Watchkeeping Certificate with an Ocean Navigation Certificate or a similar qualification approved by council.

ASSOCIATES

A non-voting grade of membership for holders of Class 4 and Class 5 Certificates of Competency or their equivalent.

To: The Nautical Institute 202 Lambeth Road, London SE1 7LQ

COMPANIONS

Any person such as a naval architect, marine engineer or yachtsman, not being a qualified member of the Nautical Profession, who satisfies council that his association with the Institute will promote the general advancement or application of Nautical Science.

STUDENTS

At least 17 years of age who are undergoing a course of training approved by the council and intend to become Associate Members of the Institute.

ENTRANCE FEES AND ANNUAL SUBSCRIPTION

Class	Annual subscription	Entrance fee	Transfer fees
Hon. Fellow	Nil	Nil	Nil
Fellow	£50	Nil	Nil
Member Associate	£45	£5	£5
member	£42	£5	£5
Associate	£38	£5	£5
Companion	£45	£5	£5
Student	£10	£1	Nil

Members can take advantage of specially reduced prices for publication and conference fees and can participate in the activities of branches in the UK and overseas. The monthly journal SEAWAYS is provided free to all members and would cost £30 pa to an outside subscriber. In the UK the membership subscription is allowable for tax purposes.

APPLICATION FOR MEMBERSHIP Surname (BLOCK LETTERS) ______ N Christian Names ______ B Style (Captain, Mr, etc) ______ Present Position _____ C Date of Birth _____ Nationality _____ SC Home Address (BLOCK LETTERS) _____ (f) Tel: ______ (o) Professional Experience If Pilot state Licensing Authority _____ and Date when licence was first issued ___ Other Qualifications _____ I enclose herewith cheque for £5 payable to the Signed _____ Nautical Institute being the Date _____ entrance fee required in the Bye-Laws.

INTERNATIONAL HYDROGRAPHIC REVIEW

FOREWORD

The International Hydrographic Review is published twice a year (January and July) in separate English and French editions.

Original articles are welcomed on hydrography, oceanography, cartography, photogrammetry, geodesy, navigation and allied subjects, radio aids, automation, new instruments, equipment and hydrographic vessels, as well as on the history and organization of hydrographic offices.

The latest date for receipt of manuscripts is:

1 August for the January issue,

- 1 February for the July issue,

but earlier submission greatly facilitates the work of preparing translations.

Articles should be addressed to: The Directing Committee, International Hydrographic Bureau, B.P. 445, MC 98011 MONACO Cedex (Principality of Monaco).

Up to 50 reprints per article can be supplied free to the author(s). They must be ordered prior to publication, and may be in either language or a proportion in each. Further copies ordered are charged at cost price, plus postage.

The Directing Committee does not hold itself responsible for statements or opinions expressed by contributors to the Review.

Notes for contributors

Papers should be as concise as possible for maximum reader value, and an abstract of up to 150 words is desirable. Uncommon expressions or constructions should be avoided since a large proportion of readers are necessarily reading the Review in a language that is not their mother tongue.

Any permission needed to incorporate material published elsewhere is the responsibility of authors, and it will be assumed that such permission has been obtained.

Texts should be submitted in English or French (or both), though by special arrangement articles in Spanish, Italian or German could be accepted for translation in the Bureau.

Two copies of the article are required, typed in double spacing with adequate margins and on one side of the paper only. Authors should check manuscripts very carefully as no responsibility can be taken for errors of fact or presentation.

Bibliographic references should be listed at the end of the article in the standard Harvard

form. Footnotes should be kept to a minimum, and metric measures used throughout.

Illustrations, already numbered and titled, should be supplied ready for reproduction by the offset method and for reduction to 12.5 x 21 cm, the effective size of a Review page. Positive or negative transparencies (repromats) are preferred. Photographs should be black and white glossy prints and be limited to those necessary for an understanding of the text.

As the Review is a two-language publication a minimum of wording should be shown on

the illustrations themselves, explanations being confined to the legend beneath.

Printer's proofs are corrected in the Bureau and are not normally sent to authors.

INTERNATIONAL HYDROGRAPHIC REVIEW

Vol. LXVI



No. 2

(No. 125 OF THE SERIES)

PUBLISHED AND PRINTED BY

THE

INTERNATIONAL HYDROGRAPHIC BUREAU

B.P. 445 — 7, avenue Président J.F. Kennedy

MC 98011 MONACO Cedex

PRINCIPALITY

INTERNATIONAL HYDROGRAPHIC ORGANIZATION

MEMBERS OF THE IHO

ARGENTINA AUSTRALIA BELGIUM BRAZIL **CANADA** CHILE **CHINA** CUBA DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA DENMARK DOMINICAN REPUBLIC **ECUADOR** EGYPT FIJI **FINLAND** FRANCE **GERMAN DEMOCRATIC REPUBLIC** GERMANY, FEDERAL REPUBLIC OF GREECE **GUATEMALA ICELAND** INDIA **INDONESIA** IRAN ITALY **JAPAN** MALAYSIA MONACO

NETHERLANDS

NEW ZEALAND NIGERIA NORWAY OMAN PAKISTAN PAPUA NEW GUINEA PERU **PHILIPPINES POLAND PORTUGAL** REPUBLIC OF KOREA REPUBLIC OF SOUTH AFRICA **SINGAPORE** SPAIN SRI LANKA SURINAME **SWEDEN** SYRIAN ARAB REPUBLIC **THAILAND** TRINIDAD AND TOBAGO TURKEY UNION OF SOVIET SOCIALIST REPUBLICS UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN **IRELAND** UNITED STATES OF AMERICA **URUGUAY VENEZUELA** YUGOSLAVIA

INTERNATIONAL HYDROGRAPHIC BUREAU

ZAIRE

DIRECTING COMMITTEE

President: Rear Admiral Sir David W. HASLAM, KBE, CB, FRICS, Royal Navy (UK) (Retd.)

Directors: Rear Admiral A. CIVETTA, Italian Navy (Retd.)

Mr Adam J. KERR, MSc. (Canada)

Price 130.00 French Francs. For conditions of sale see Catalogue of IHO Publications 1989.

TABLE OF CONTENTS

— Survey Ship Carl Fr. Gauss — Twelve Years of Service (S. SCHIFFNER)	7
- The Technology of Interactive Compilation (T.V. EVANGELATOS)	13
- Adventures in Interactive Compilation (R. LEPAGE and P.N. HOLROYD)	29
- Experiences of Implementing a GIS-Software (FINGIS) for Nautical Charting (J. KORHONEN)	43
— Computer-Assisted Cartography: A Provisional but Promising Solution (P. SOUQUIÈRE and J. FICHANT)	63
Use of the CARIS Interactive Cartographic System for Chart Production at DHI (J. GEERKE and H. HECHT)	79
- nAutiKa - A Digital Chart Information System (Swedish Hydrographic Department)	91
— Current Developments in Computer Assisted Cartography at the UK Hydrographic Department (R. STREETER)	101
- National Oceanic and Atmospheric Administration Sea Beam System 'Patch Test' (D.R. HERLIHY, B.F. HILLARD and T.D. RULON)	119
- Evaluation of NR52 GPS Receivers in Geodesy (A. FOURGASSIE)	141
- Return Periods of Extreme Sea Levels: The Exceedance Probability Method (B.V. HAMON and J.F. MIDDLETON)	165
— Fifty Years Ago	179