# THE INTERNATIONAL HYDROGRAPHIC REVIEW



75th ANNIVERSARY COMMEMORATIVE ISSUE

PART II

INTERNATIONAL HYDROGRAPHIC BUREAU MONACO

Vol. LXXIV No. 2 No. 141 OF THE SERIES

SEPTEMBER 1997



## OTHER PUBLICATIONS OF THE INTERNATIONAL HYDROGRAPHIC BUREAU

(For IHO publications and prices, the Catalogue of Publications 1997 can be obtained gratis from the IHB and from INTERNET WEB Home Page <a href="http://www.iho.shom.fr">http://www.iho.shom.fr</a> or <a href="http://www.ohi.shom.fr">http://www.ohi.shom.fr</a>)

## PERIODICAL PUBLICATIONS

## P-3 International Hydrographic Bulletin

Contains topical news, reports the work undertaken by the I.H. Bureau and the world hydrographic community, covers recent developments in hydrographic instrumentation and training programmes, describes new survey vessels, etc. Charts and publications issued by Hydrographic Offices are listed each month, and there is a comprehensive monthly bibliography on hydrography and related subjects. (Trilingual English/French/Spanish).

## P-5 IHO Yearbook

Particulars and addresses of Hydrographic Offices throughout the world. Published every year. (Bilingual English/French).

## MISCELLANEOUS PUBLICATIONS

## M-4 Chart Specifications of the IHO and Regulations of the IHO for International (INT) Charts

Gives chart specifications of the IHO for compiling nautical charts, together with agreed symbols and abbreviations adopted for general use by Member States. (English, French and Spanish Editions).

## M-5 Standards of Competence for Hydrographic Surveyors - 7th Edition

Describes the Standards for which recognition may be given to programmes of hydrographic training at Category A or B levels. Outlines procedures for submission, documentation, etc. and complete syllabi. (English, French and Spanish).

## M-11 Catalogue of International Charts and Guidance for Regional Coordinators of INT Chart Schemes

Describes by means of indexes, texts and chartlets, the IHO International Chart Series at large, medium and small scales and provides directions to assist coordinators in following the principles established for INT charts schemes. (Bilingual English/French).

### SPECIAL PUBLICATIONS

- S-32 Hydrographic Dictionary, 5th Edition
  - Definition of words and terms used in hydrography and associated activities. (English and Spanish).
- S-44 IHO Standards for Hydrographic Surveys Classification Criteria for Deep Sea Sounding Procedures for Elimination of Doubtful Data States the Standards recommended for the scale of surveys and the density of soundings; accuracy of horizontal position; accuracy of depth and other various measurements. Includes classification criteria for deep sea soundings and procedures for eliminating doubtful data. (In preparation).
- S-47 Training Courses in Hydrography and Nautical Cartography
  Lists the training courses available on hydrography and nautical
  cartography in Member States' Hydrographic Offices and elsewhere in
  their countries. (English only).
- S-50 IHO Tidal Constituent Bank Station Catalogue

Catalogue of stations for which tidal constituents data is held by the Canadian Hydrographic Service on behalf of the IHO. Includes a floppy disk. (Trilingual English/French/Spanish).

S-51 Manual on Technical Aspects of the UN Convention on the Law of the Sea

Glossary of technical terms with a description of practical applications to boundary delimitation. (English, French and Spanish).

S-52 Specifications for Chart Content and Display Aspects of ECDIS
Prepared by the IHO Committee on Hydrographic Requirements for Information Systems (CHRIS).

5th Edition (English), Appendices:

- Appendix 1 Guidance on Updating the Electronic Chart. (English).
- Appendix 2 Colour and Symbols Specifications for ECDIS (English) (including Annex "IHO ECDIS Presentation Library")
- Appendix 3 Glossary of ECDIS related Terms. (E, F and S).
- S-53 World-Wide Navigational Warnings Service Guidance Document (English and French).
- S-57 IHO Transfer Standard for Hydrographic Digital Data
  Standard prepared by the IHO's Committee on Hydrographic Requirements for Information Systems CHRIS, for the coding and exchange of hydrographic digital data, including that intended for ECDIS purpose. (English only).
- S-59 Status of Hydrographic Surveying and Nautical Charting in Antarctica

A catalogue showing the extent of surveys, charting and oceanic bathymetry for the area south of 60°S latitude based on information provided by IHO Member States. (English only).

S-60 User's Handbook on Datum Transformations involving WGS-84 Contains constants and formulas to relate local/regional geodetic datums to the WGS-84. (English and French).

## **BATHYMETRIC PUBLICATIONS**

## B-1 General Bathymetric Chart of the Oceans (GEBCO) - 5th Edition

A series of 18 separate sheets in colour (75 x 110 cm) covering the world, plus one World Sheet in colour (100 x 126 cm).

## B-4 Information Concerning Recent Bathymetric Data

Issued annually, this publication lists, for the previous 12 months, information concerning recent bathymetric data. (Bilingual English/French).

## B-6 Standardization of Undersea Feature Names (Guidelines, Proposal Form, Terminology)

This publication is intended to ensure maximum standardization of the names of undersea features (English/French, /Spanish, /Russian, /Japanese and /Chinese Editions).

## **B-7 GEBCO Guidelines**

This IHO-IOC publication, published by the IHB through collaboration between the IHO and the IOC under the aegis of the Joint IHO-IOC Guiding Committee for GEBCO, describes the role of each participant involved in the production of GEBCO. (English and French Editions).

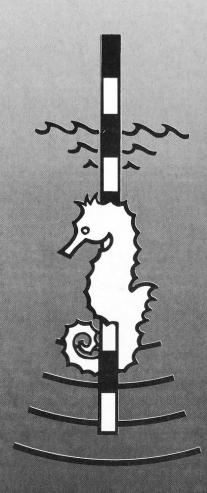
These publications as well as a free catalogue and information papers are available from:

THE INTERNATIONAL HYDROGRAPHIC BUREAU
4 quai Antoine I°

B.P. 445

MC 98011 MONACO CEDEX
Telephone: +377 93 10 81 00
Telefax: +377 93 10 81 40

Telex: 479164 MC-INHORG e-mail (INTERNET): ihb@unice.fr



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

## The Hydrographic Society

UNIVERSITY OF EAST LONDON LONGBRIDGE ROAD DAGENHAM ESSEX RM8 2AS • UK TELEPHONE: 0181-597 1946 • FAX: 0181-590 9730

## **AUSTRALASIAN**

40 Osborne Road East Fremantle WA 6158 Tel: + 619 430 5900 Fax: + 619 430 5901

## BENELUX

RWS Dir Noordzee Postbus 5807 2280HV Rajswijk (ZII), The Netherlands - Tel: + 45 42 18 73 90 Tel: 070-3366600 Fax: 070 3900691

## DENMARK

Vinkelyej 21 DK 3540 Lynge Fax: + 45 42 18 73 90

## UK

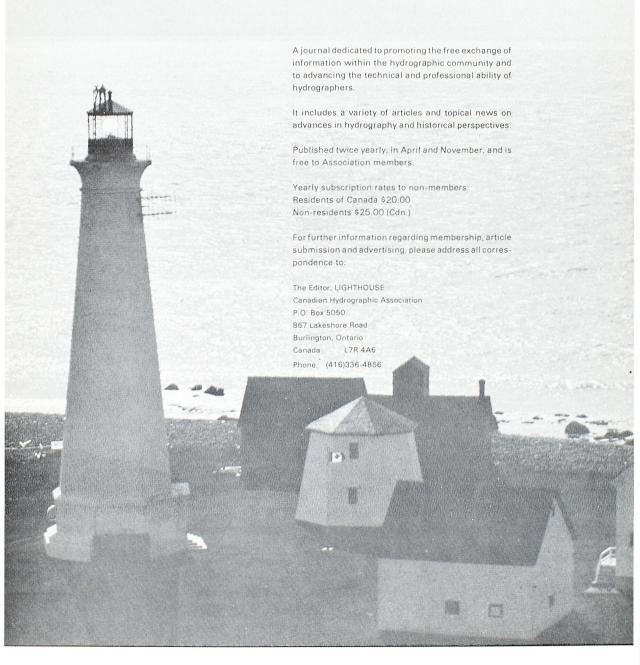
c/o UEL Longbridge Road Dagenham, Essex RM8 2AS Tel: 0181 597 1946 Fax: 0181 590 9730

## USA

PO Box 732 Rockville Maryland 20848-0732 Tel: 301 460 4768 1-ax: 301 460 4768

## Lighthouse

JOURNAL OF THE CANADIAN HYDROGRAPHIC ASSOCIATION



## The JOURNAL of NAVIGATION

## Published for the Royal Institute of Navigation

EDITOR: PROFESSOR J. F. KEMP

The Journal of Navigation contains original papers on every aspect of navigation – over and through land, sea, air and space – including those papers presented at the meetings of the Institute together with the following discussion. Papers cover every aspect of the subject from the highly technical to the descriptive and historical. Subjects include: electronics, astronomy, mathematics, cartography, command and control, psychology and zoology, operational research, risk analysis, theoretical physics, operation in hostile environments, instrumentation, ergonomics, and financial planning and law. The journal also publishes selected papers and reports from study groups, and book reviews. Contributions come from all parts of the world.

## The Journal of Navigation is essential reading for:

- Professional and amateur navigators at sea, in the air or on land
- Managers and executives of companies involved in the operation of airlines, shipping fleets or trucking
- Military personnel concerned with communications, command, control and information
- Managers and executives of companies involved in the development, production and sales of navigational equipment
- Governmental Departments responsible for the safety of air, marine and road traffic, including the deployment of emergency services
- Scientists and engineers in research establishments involved in navigational topics
- Academic staff associated with teaching or research in navigational topics, or with an interdisciplinary interest in navigation.

The Journal of Navigation is published by Cambridge University Press, The Edinburgh Building, Shaftesbury Road, Cambridge CB2 2RU, England. Subscription rates: Volume 46: January, May and September 1993; £83/\$155, £29/\$53 for single parts; delivery by airmail £12 per year extra (dollar price includes airfreight to New York). ISSN 0373-4633



## Why you should read *The Journal of Navigation*

- ◆ It deals with the whole range of navigation, not just satellite navigation, but history, finance and law, navigation of birds and animals so you are informed about the whole range of your subject
- ◆ It varies the type of article to suit the information being given; it includes book reviews and short discussion papers, not just full length research articles.
- Material is of a very high standard all articles are refereed, and material is published in an average time of 6 months so that what you read is current and topicald
- It often carries a group of papers about one topic, so that you get a complete picture of the current situation

ıa	ke a closer look – FREE!
_	Please send me further information about The Journal of Navigation Please send me a sample copy
Na	ne
Ado	lress
lou	rnals Marketing Department,
	nbridge University Press, FREEPOST*
	Edinburgh Building, Cambridge CB2
IBR	UK TEL: (0223) 325806 or FAX
	23) 315052 (* no postage stamp
nec	essary if posted in UK)



In USA, Canada & Mexico, write to

Cambridge University Press, 40 West 20th

Street, New York, NY 10011-4211, USA

## GeologicalMagazine

## Scope

**Geological** Magazine is a bi-monthly journal covering the entire field of earth sciences. Coverage extends from hard rock to soft rock geology, palaeontology to geochemistry, turbidites to magmas, mineralogy to orogeny.

## Why you should read Geological Magazine

- Journal of international standing and distribution
- Coverage of all geological topics
- Extensive book review section keeps you up-to-date with other publications in your field
- Original scientific papers by leading authors
- Numerous diagrams and maps illustrate each article
- Important Rapid Communications section

## **Essential reading for...**

- practising geologists in industry
  - geological research workers •
- teachers and students of geology
- conservationists and land use specialists
  - earth science librarians •

## Special offer

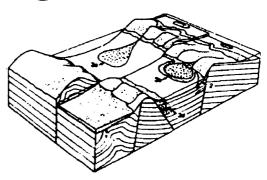
Get the world's most celebrated geological magazine for less than half price! As a special offer to students and members of the societies listed, we are offering **Geological**Magazine at a greatly reduced price.

Individual members of the following societies can subscribe for just £72 (normally £152).

- Geological Society of London
   Geological Society of New Zealand
- European Union of Geosciences Palaeontographical Society Geologists' Association

## Offer to students

Subscribe now and pay only £36! A huge saving on the normal subscription rate of £152.



## **Editors**

M. J. Bickle, C. P. Hughes, I. N. McCave & N. H. Woodcock, *Department of Earth Sciences, University of Cambridge* 

## Subscription

Volume 132 in 1995 published bi-monthly. £152; £72 for members of selected societies (see panel for details); £36 for students; airmail £31 per year extra. ISSN 0016-7568.

Take a closer look - FREE!	2072
☐ Please send me a free sample copy of <b>Geologica</b> lMagazine	
$\square$ Please send me further information	
Name	
Address	
Send your order to: Journals Marketing Departmen	nt,
Cambridge University Press, FREEPOST*, The	
Edinburgh Building, Cambridge, CB2 1BR, UK.	

Tel: +44(0)1223 325806 Fax: +44(0)1223 315052 (\*No postage stamp necessary if posted within UK)
In USA, Canada and Mexico send to: Cambridge University Press, 40 West 20th Street, New York,

Tel: (914) 937 9600 x 154 Fax: (914) 937 4712

NY 10011-4211, USA.



## ATTI

## DELL'ISTITUTO ITALIANO DI NAVIGAZIONE

Rivista tecnica della navigazione







aerea



marittima



terrestre

Gratuita per i Soci dell'Istituto Quota sociale L. 50.000 - Studenti L. 25.000 - c/c post. 37277001 Via Prisciano, 42 - 00136 Roma - Tel./Fax 06/3452841

## INTERNATIONAL HYDROGRAPHIC REVIEW

## **PART II**

## **IHO MEMBER STATES**

The following Member States have not been included in this volume, as, at the time of going to press, their contribution had not been received:

- Cyprus
- \* Democratic People's Republic of Korea
- \* Egypt
- \* Estonia
- \* Iran
- \* Papua New Guinea
- \* Sri Lanka
- \* United Arab Emirates

## **FOREWORD**

The *International Hydrographic Review* is published twice a year (March and September) in separate English and French editions.

Original articles are welcomed on hydrography, oceanography, cartography, geodesy, navigation, photogrammetry, 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 January for the March issue,

- 1 July for the September issue,

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. It is the normal practice that articles are accepted based on external reviewers.

### Notes for contributors

Papers should be as concise as possible and an abstract of up to 150 words is desirable. Uncommon expressions or constructions and particularly professional jargon 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 could be accepted for translation in the Bureau.

Articles should be provided in floppy disk, in Wordperfect or compatible for DOS or WINDOWS. The floppy disk should be accompanied by a typed copy of the article.

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 transparencies (repromats) are preferred. Photographs should be black and white with good definition and be limited to those necessary for an understanding of the text. Colour transparencies cannot be accepted. Coloured photographs and plates can only be accepted under special terms that must be discussed directly with the Editor. Reproduction of charts and maps must provide clear definition of the features to be portrayed.

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.

# THE INTERNATIONAL HYDROGRAPHIC REVIEW

Vol. LXXIV



No. 2

(No. 141 OF THE SERIES)

PUBLISHED AND PRINTED BY

THE

## INTERNATIONAL HYDROGRAPHIC BUREAU

B.P. 445 - 4, quai Antoine I<sup>ER</sup>
MC 98011 MONACO Cedex
PRINCIPALITY

## INTERNATIONAL HYDROGRAPHIC ORGANIZATION

## MEMBERS OF THE IHO

**ALGERIA** ARGENTINA AUSTRALIA **BAHRAIN** BELGIUM BRAZIL CANADA CHILE CHINA CUBA CROATIA **CYPRUS** DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA DEMOCRATIC REPUBLIC OF THE CONGO DENMARK DOMINICAN REPUBLIC ECUADOR **ESTONIA EGYPT** FIJI **FINLAND** FRANCE

**GERMANY** 

GUATEMALA

GREECE

**ICELAND** 

**INDONESIA** 

INDIA

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 RUSSIAN FEDERATION SINGAPORE SPAIN SRI LANKA SURINAME SWEDEN SYRIAN ARAB REPUBLIC THAILAND TONGA TRINIDAD AND TOBAGO TUNISIA TURKEY UNITED ARAB EMIRATES UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN **IRELAND** UNITED STATES OF AMERICA **URUGUAY VENEZUELA** 

## INTERNATIONAL HYDROGRAPHIC BUREAU

YUGOSLAVIA

## DIRECTING COMMITTEE

President: Rear Admiral Giuseppe Angrisano (Ret.) (Italy)
Directors: Commodore Neil Guy (Republic of South Africa)

Commodore John LEECH (Australia)

For conditions of sale see Catalogue of IHO Publications.

## TABLE OF CONTENTS

Algeria	
Argentina	
Australia	
Bahrain	
Belgium	
Brazil	
Canada	
Chile	
China	
Croatia	
Cuba	
Denmark	
Ecuador	
Fiji	
Finland	
France	
Germany	
Greece	11-54
Iceland	II-57
India	
Indonesia	II-63
Italy	11-66
Japan	
Malaysia	II-73
Monaco	
Netherlands	11-79
New Zealand	
Norway	
Oman	
Pakistan	II-91
Peru	
Philippines	
Poland	
Portugal	
Republic of Korea	
Republic of South Africa	
Russian Federation	II-112
	II-115
Spain	II-118
Sweden '	
Syrian Arab Republic	
Thailand	
Tonga	
Trinidad and Tobago	
Turkey	
United Kingdom	
United States of America	II-142
	II-147
Venezuela	
Yugoslavia	II-152