Marine Spatial Data Infrastructure

An IHO Perspective: Data, products, standards and policies

Michel Huet

International Hydrographic Bureau, Monaco

February 2009

Definitions of Hydrography on the Web:

The study of the surface waters of the Earth.
www.geographic.org/glossary.html

The mapping of the characteristics of oceans, lakes, and rivers.
museum.gov.ns.ca/mnh/nature/nhns2/glossary.htm

The measurement and study of depths and currents in open seas, lakes, estuaries, and rivers.
www. amsglossary.allenpress.com/glossary/browse

The process of charting or mapping water features and characteristics, based on specific measurements at a point or over a distance or area.
www.geography.wisc.edu/sco/references/glossary.html

IHO Definition of Hydrography

"Hydrography is the branch of applied sciences which deals with the measurement and description of the physical features of oceans, seas coastal areas, lakes and rivers, as well as with the prediction of their evolution, for the primary purpose of safety of navigation and all other marine activities, including economic development, security and defence, scientific research, and environmental protection"

New definition of "Hydrography", proposed to IHO Member States for adoption at EIHC-4 (Monaco, June 2009). Changes from the existing definition underlined.

Marine Spatial Data Infrastructure

Hydro International - March 2007

Vice Admiral Alexandros Maratos - President of the IHB DC (Monaco)

"The Hydrographic Office (HO) is an important part of the National Geo-Spatial Data Infrastructure and, of course, the International Hydrographic Organization (IHO) has an important role to play in co-ordinating the requirements and demands for data collection, interoperability, dissemination, access, standards, security, pricing policy and possible funding models".

Profile of the IHO

- Collectively, IHO Member States have approximately 400 hydrographic /oceanographic vessels.
- MS capabilities vary from providing minimal, to **world wide** chart coverage.
- Approximately 40 MS provide training at National/International level.
- Data collection and chart production are systematically performed based on agreed IHO standards and National/International charting programs.

Why is the IHO Interested in SDI ?

To share IHO experience & expertise

To promote hydrographic data, standards and policies as an important ingredient to a Marine SDI

To encourage IHO Member State Organizations to support and participate in National SDI activities.

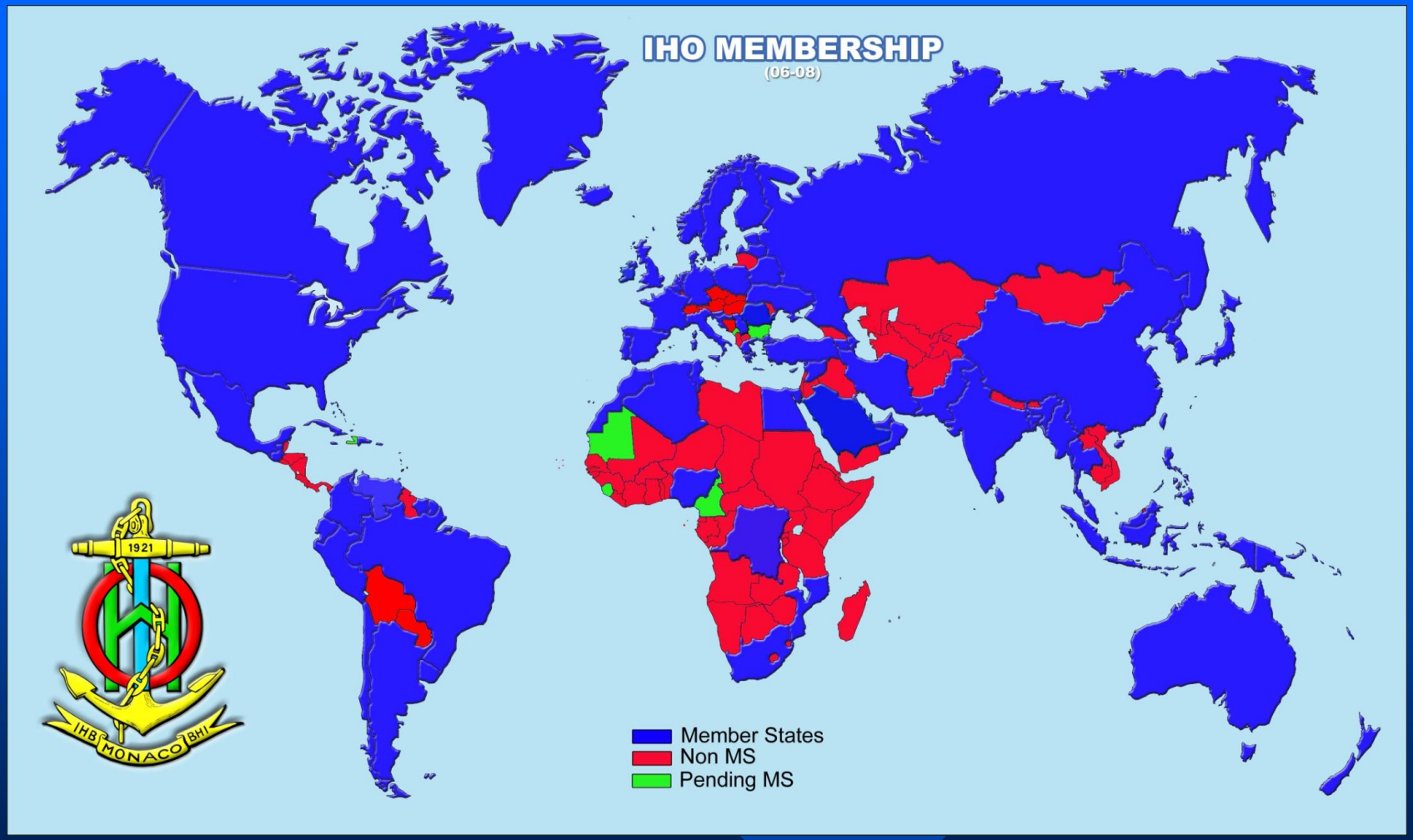
To help bridge the gap between land and marine SDI communities.

Essential Components of an IHO Spatial Data Infrastructure

- Structure
- Data Collection
- Products and Services
- Distribution Mechanisms
- Standards
- Policies

Conclusion

Structure – International Coordination/Cooperation

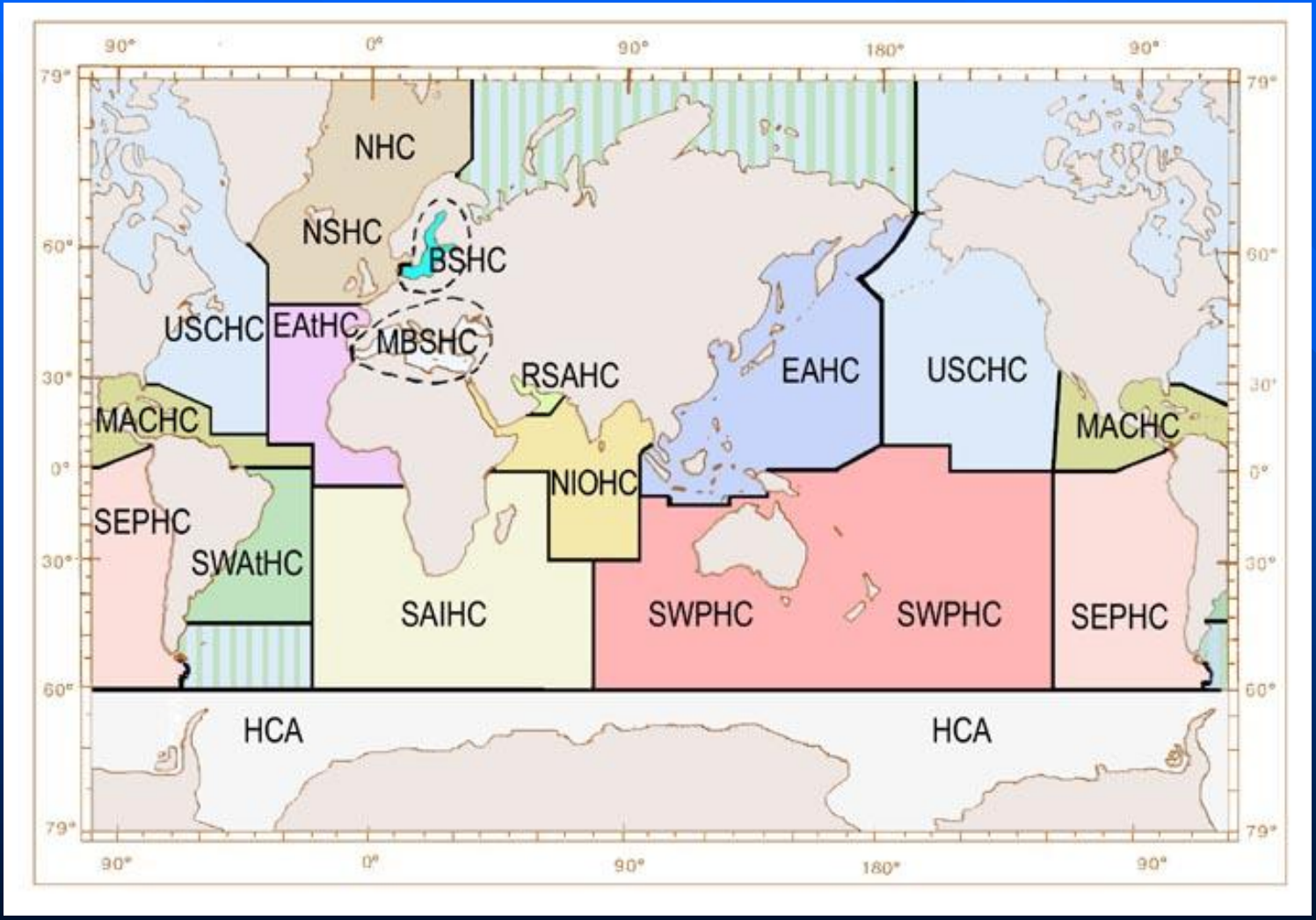


80 Member States

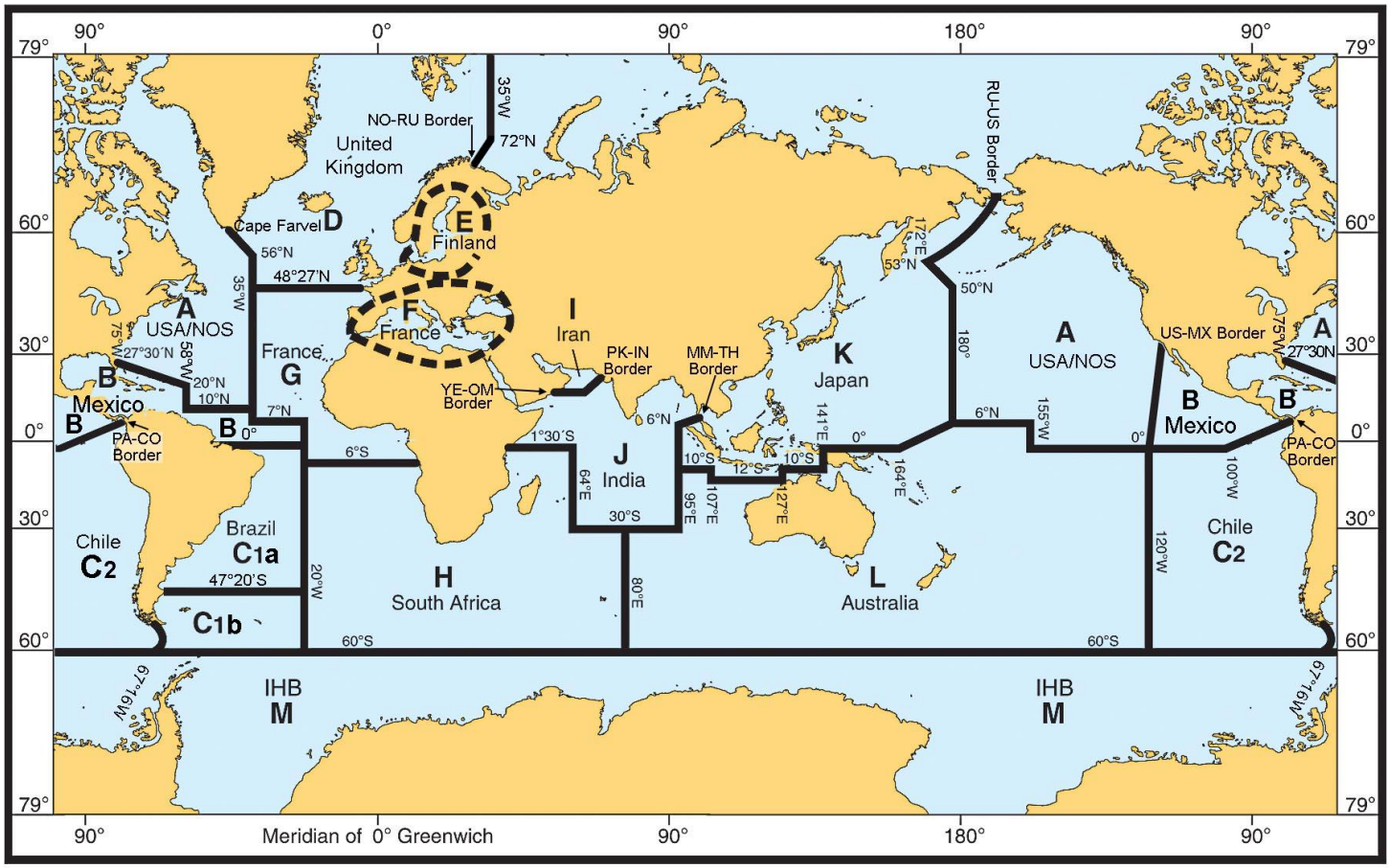
6 MS Pending Approval: Bulgaria, Cameroon, Mauritania, Sierra Leone, Montenegro, Haiti

Structure – Regional Coordination/Cooperation

15 Regional Hydrographic Commissions



Structure – Regional Coordination/Cooperation

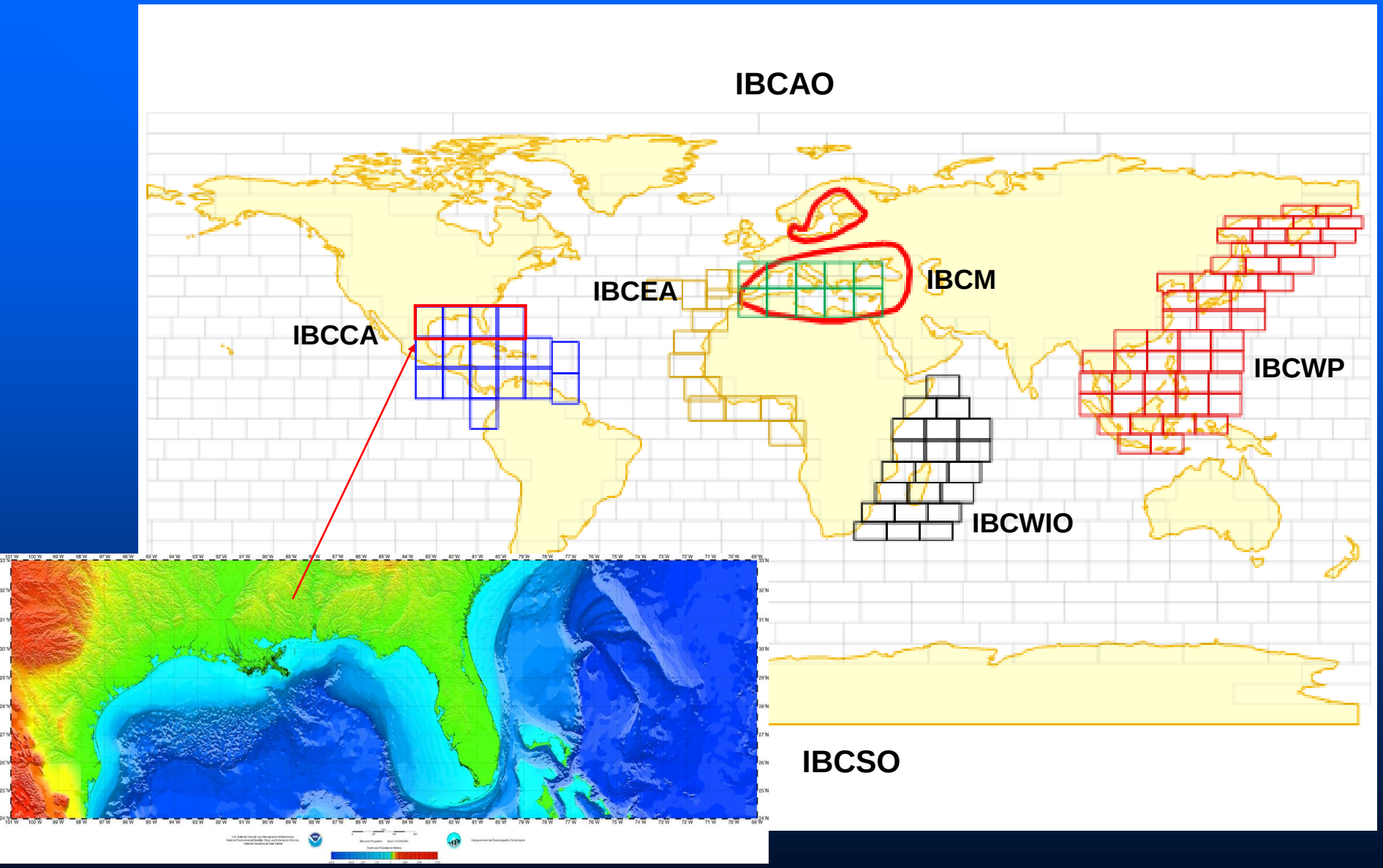


THE INTERNATIONAL (INT) CHART

Adopted in 1971 - worldwide chart series (INT Charts) produced to a single set of agreed specifications.

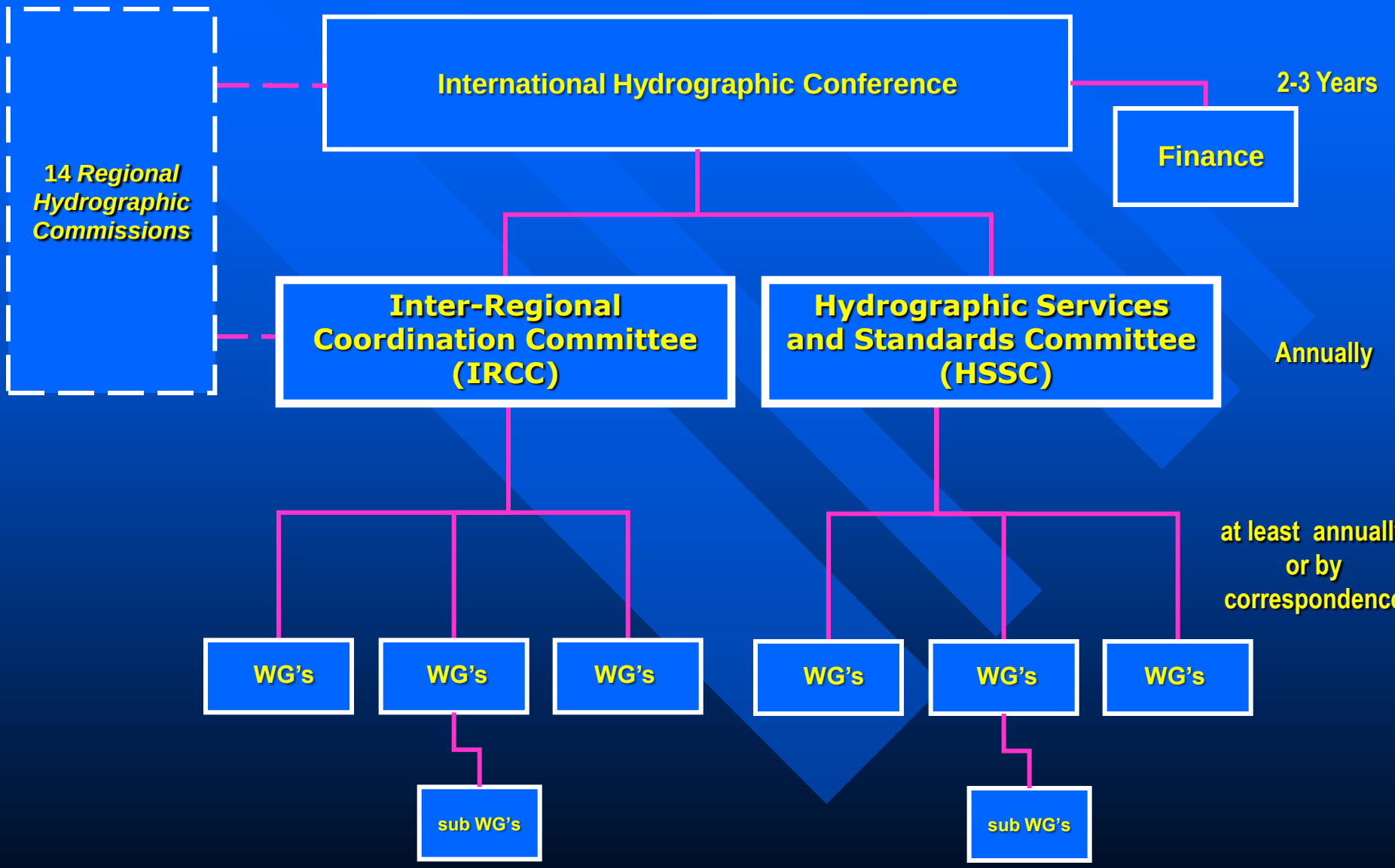
Under this arrangement, member nations wishing to produce their own versions of another members INT charts, may do so by obtaining (by mutual agreement), copies of the necessary reproducible material and printing their own copies.

Structure – Ocean Mapping Projects

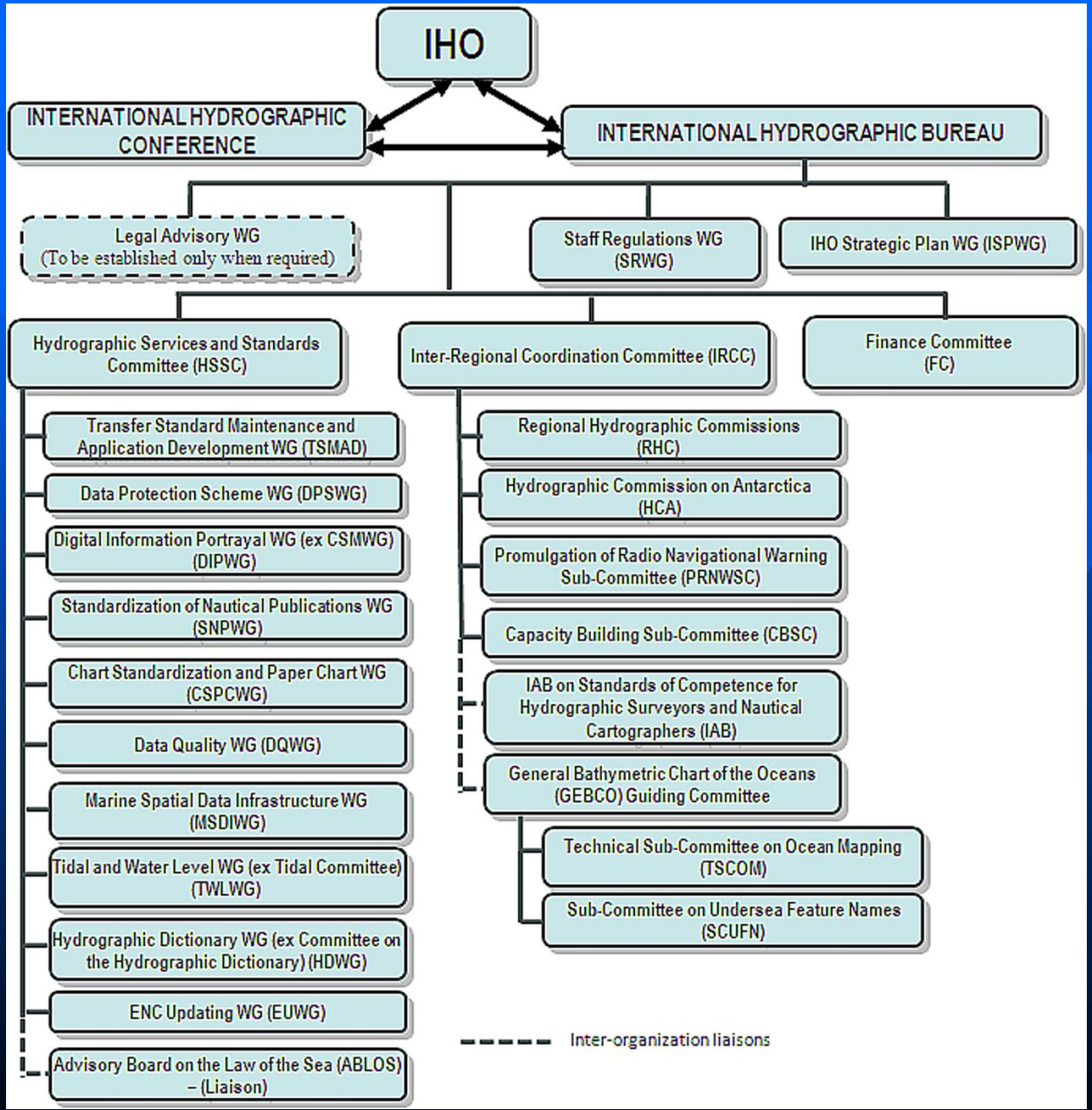


International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico

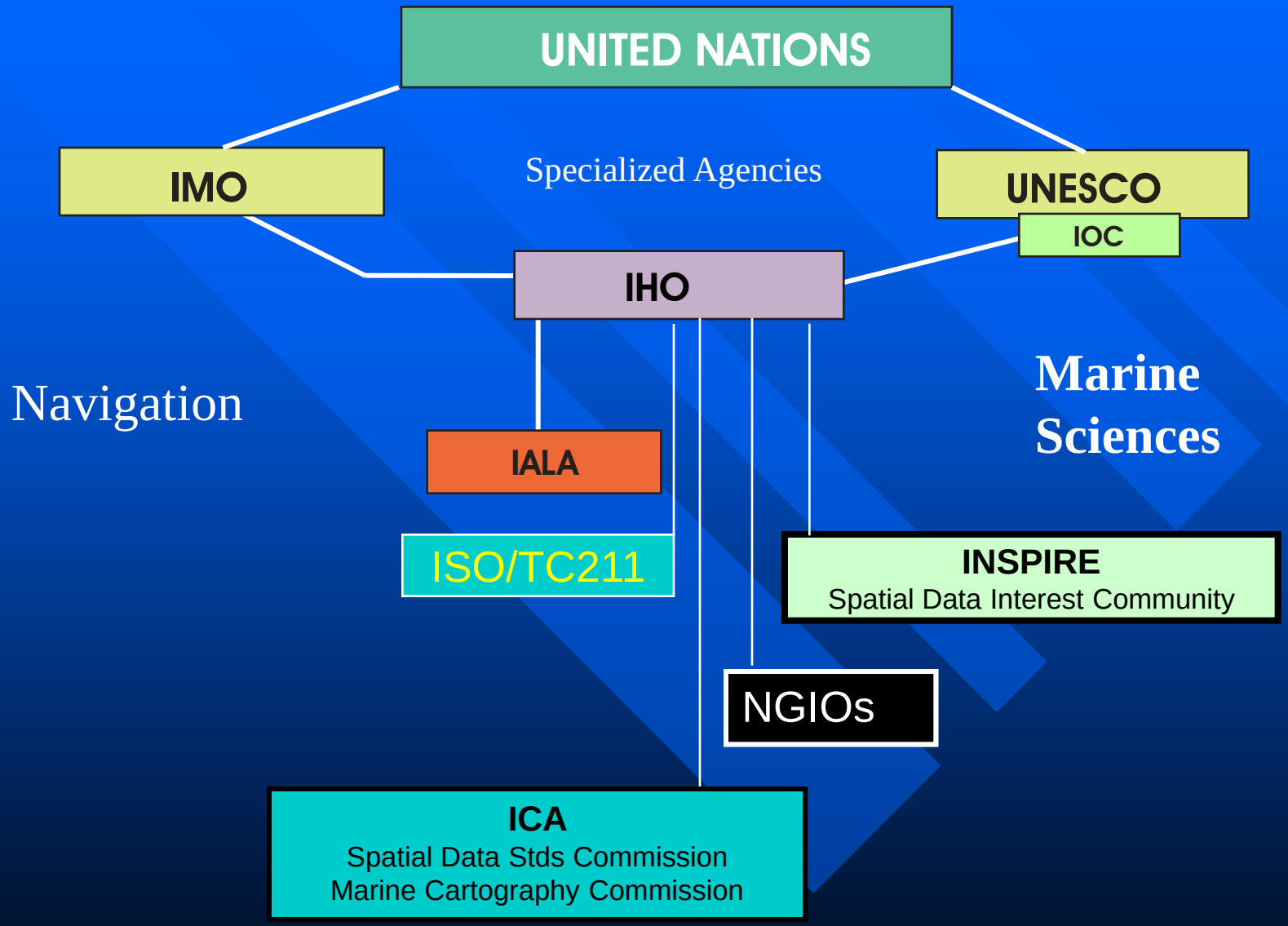
Revised IHO – Structure – January 2009



Structure – IHO Committees, Commissions and Working Groups

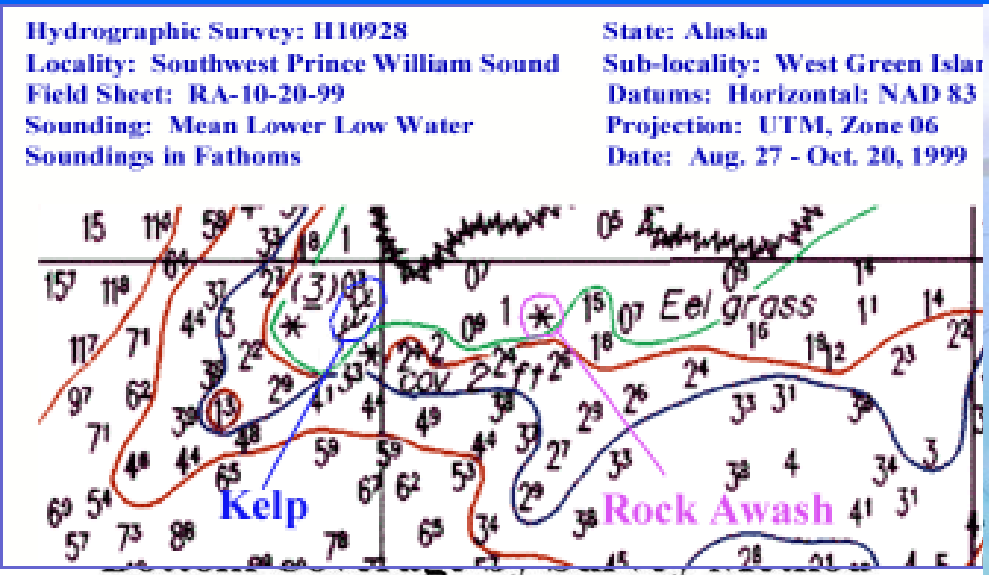


Cooperation with International Organizations

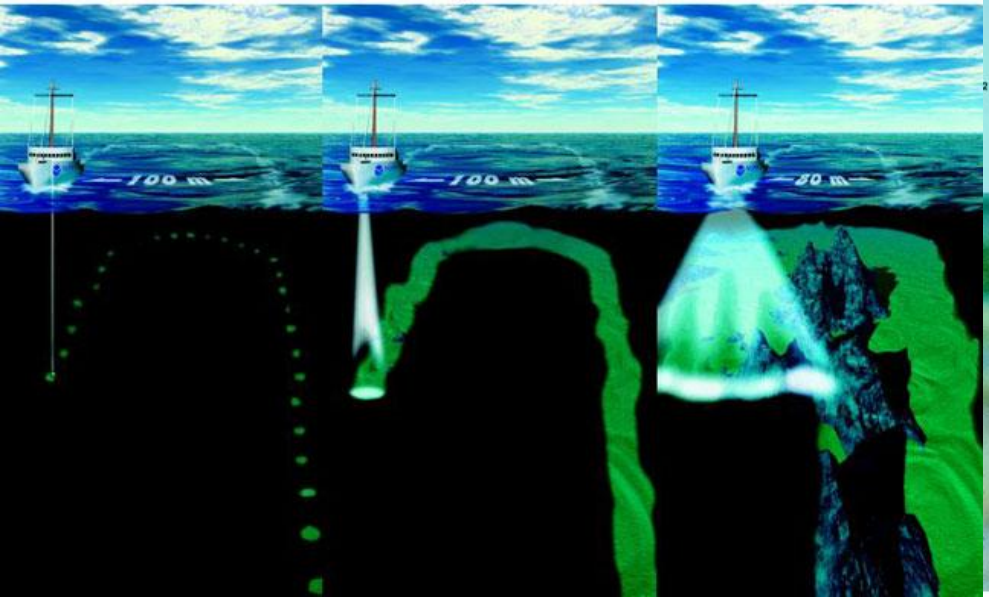


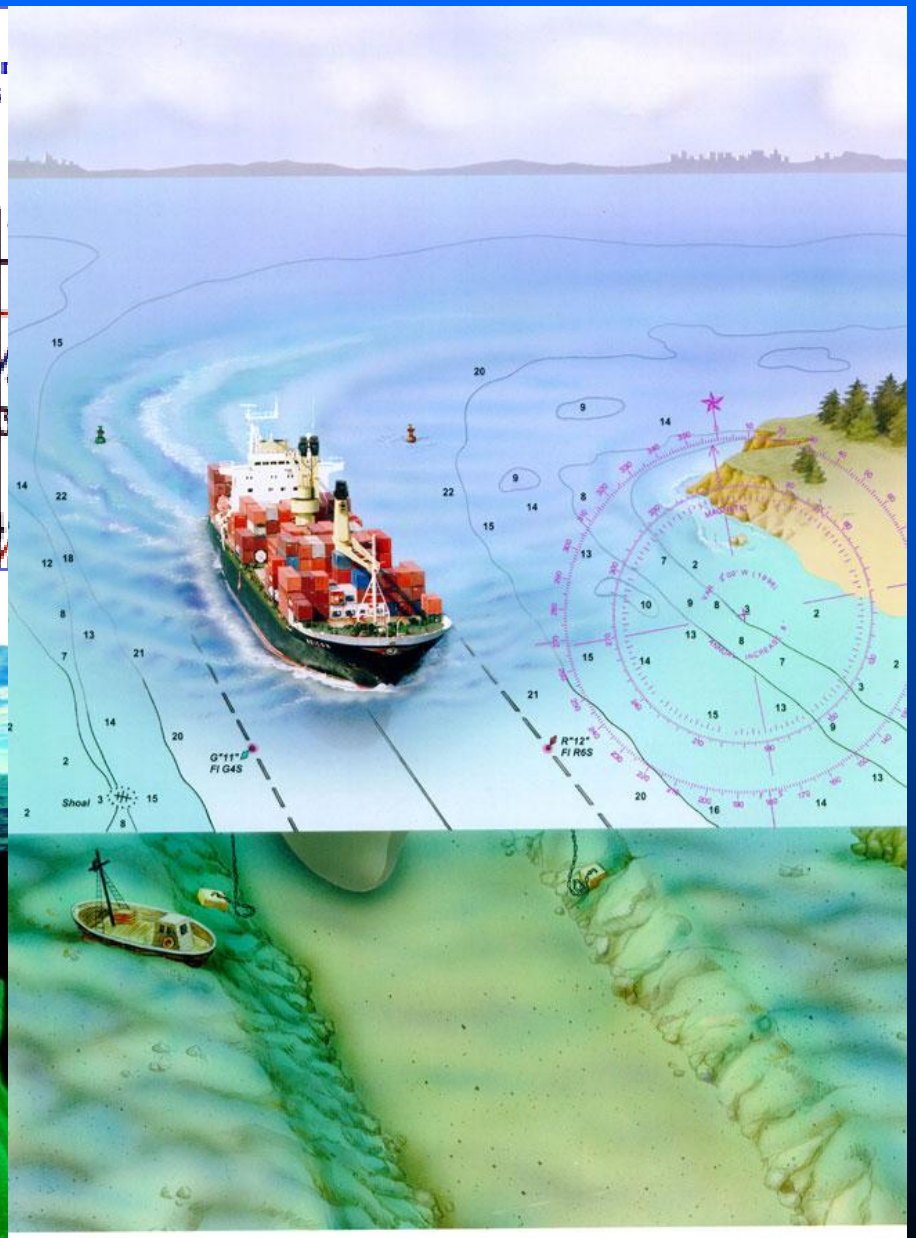
Data Collection

Data Collection – Coastal/Offshore Surveys



Leadline *Single Beam* *Multibeam*





Data Collection – Continental Shelf Surveys

EEZ and Beyond 200 Mile (subject to Art 76 provisions of UNCLOS)

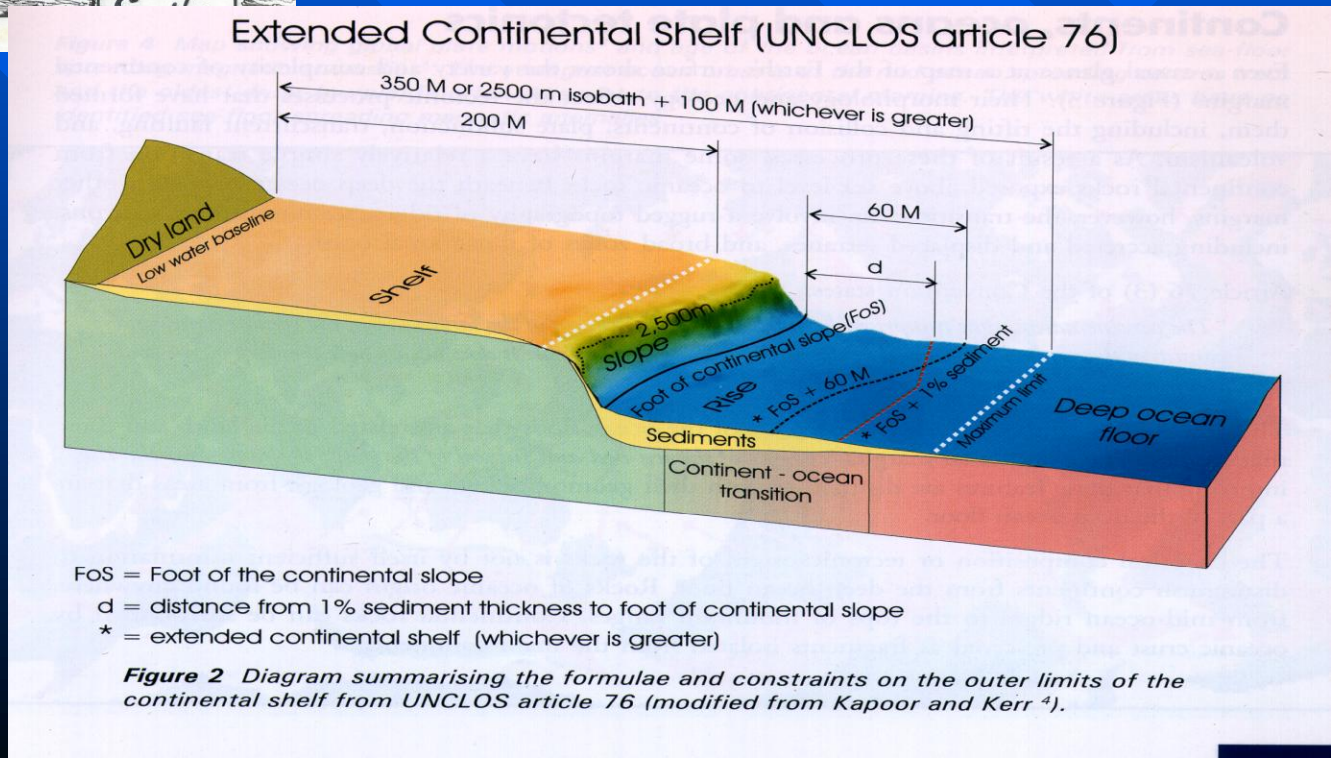
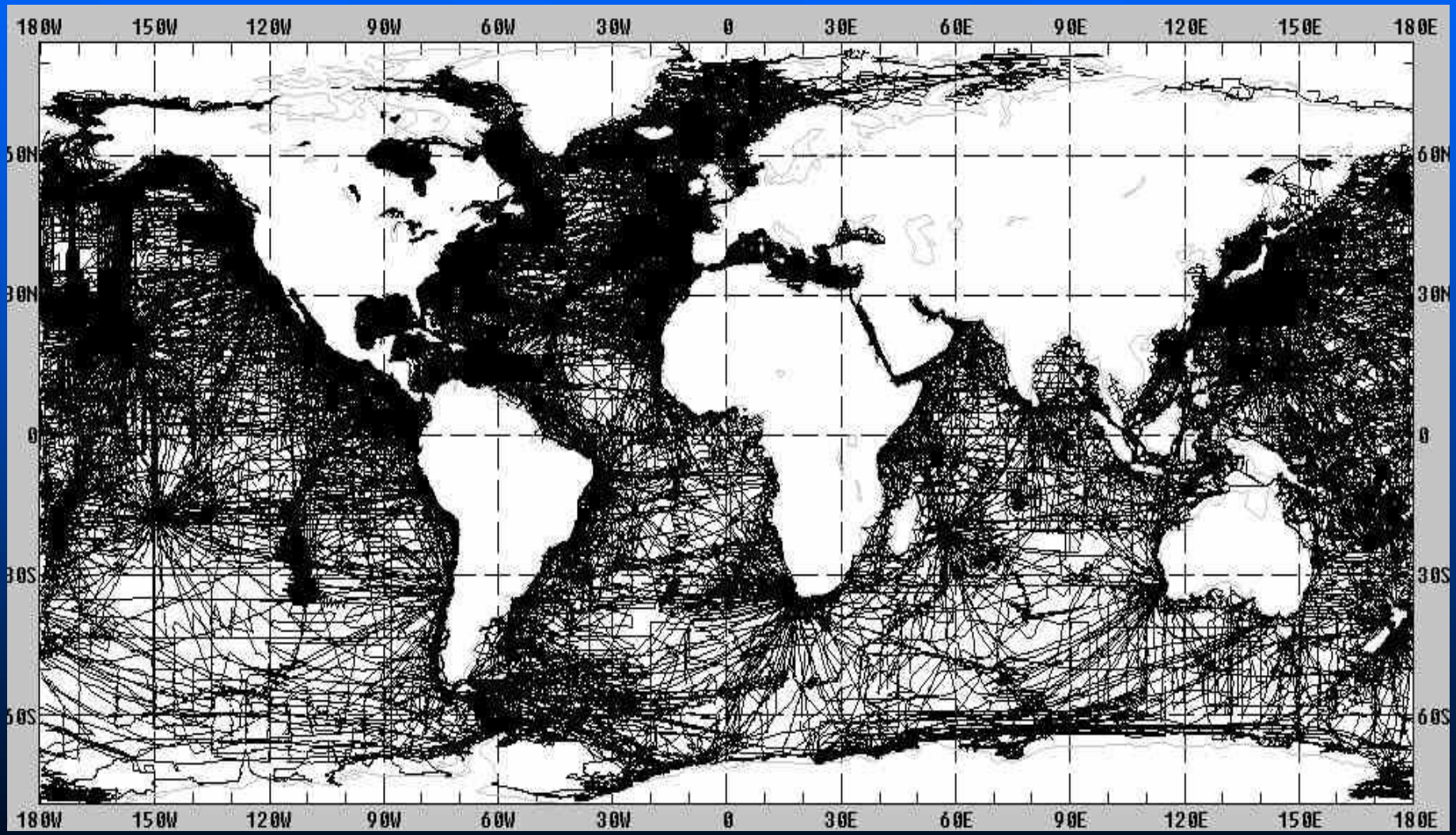


Figure 2 *Diagram summarising the formulae and constraints on the outer limits of the continental shelf from UNCLOS article 76 (modified from Kapoor and Kerr [4]).*

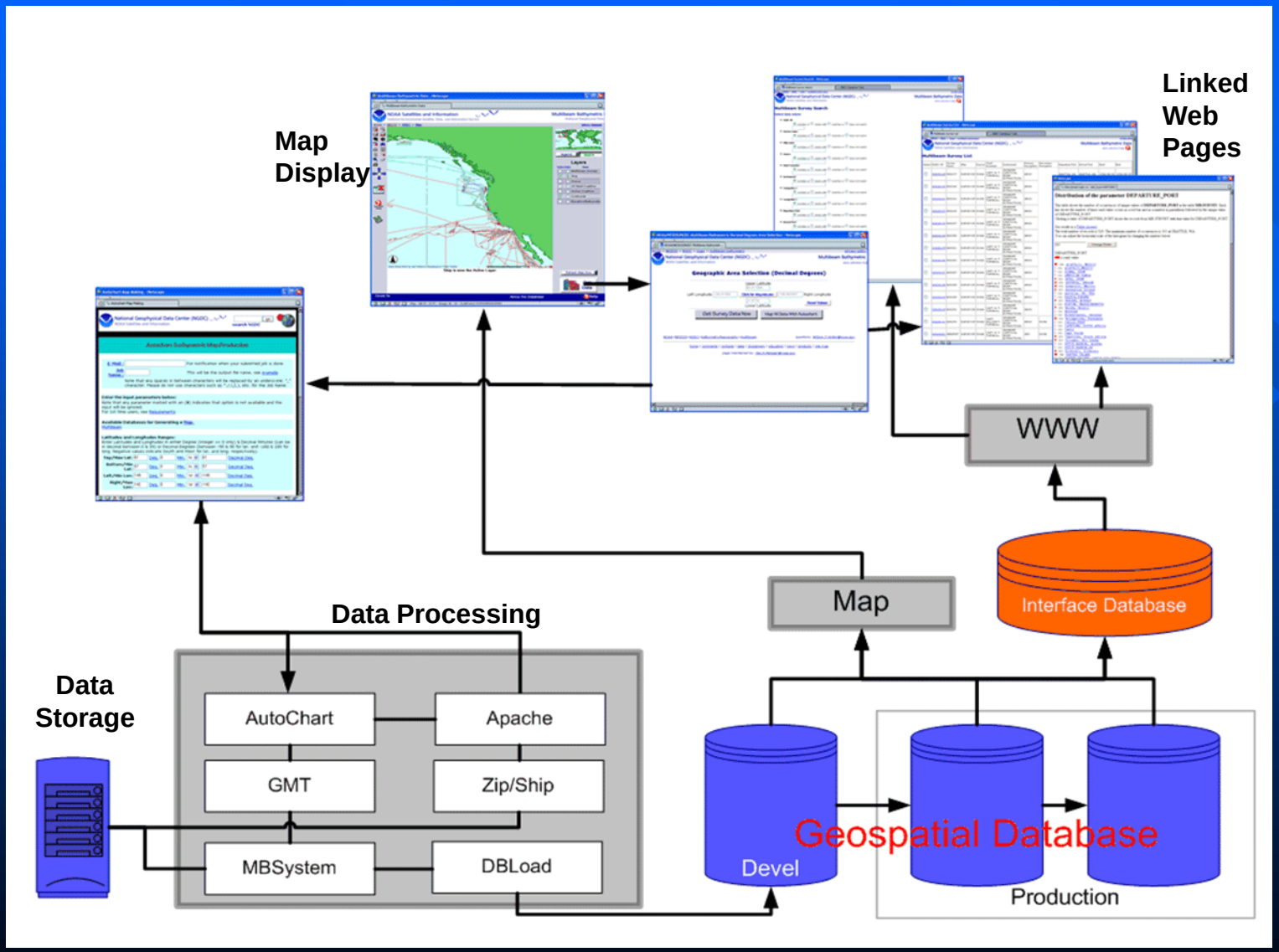
Data Collection – Deep Ocean (Trackline) Data

Deep ocean track line survey data.

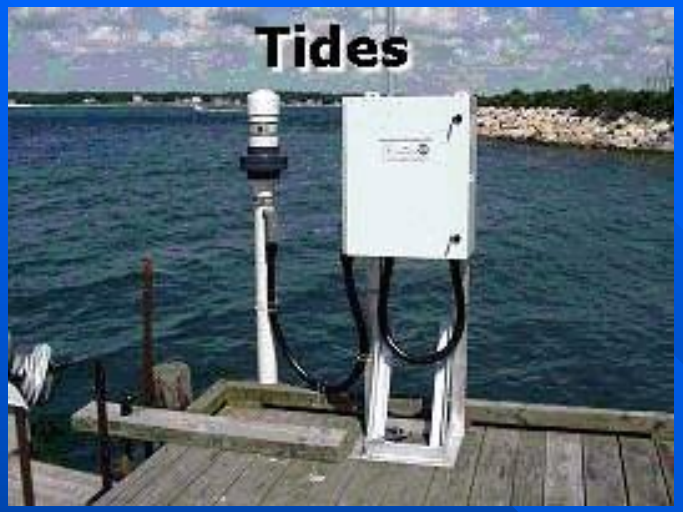


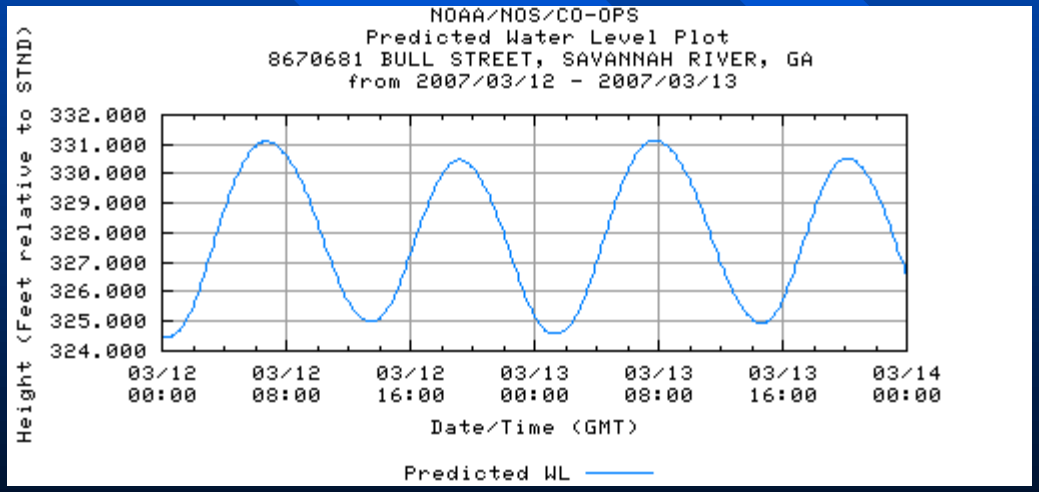
Data Collection – Deep Ocean (Trackline) Data

IHO Data Centre for Digital Bathymetry (DCDB) – (Boulder Colorado, USA)



Tidal / Ocean Current etc

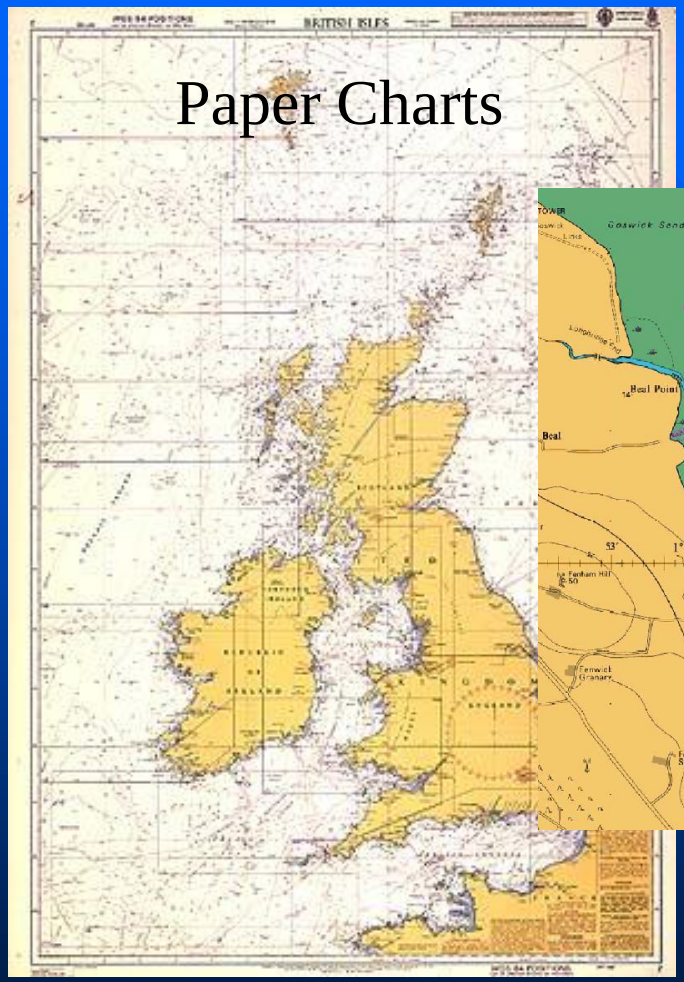


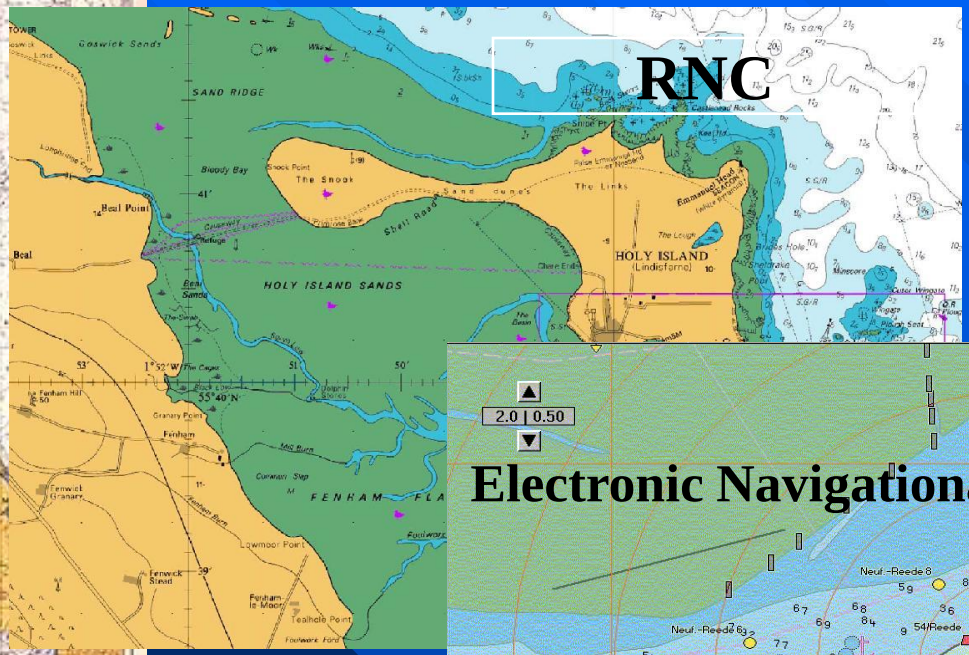


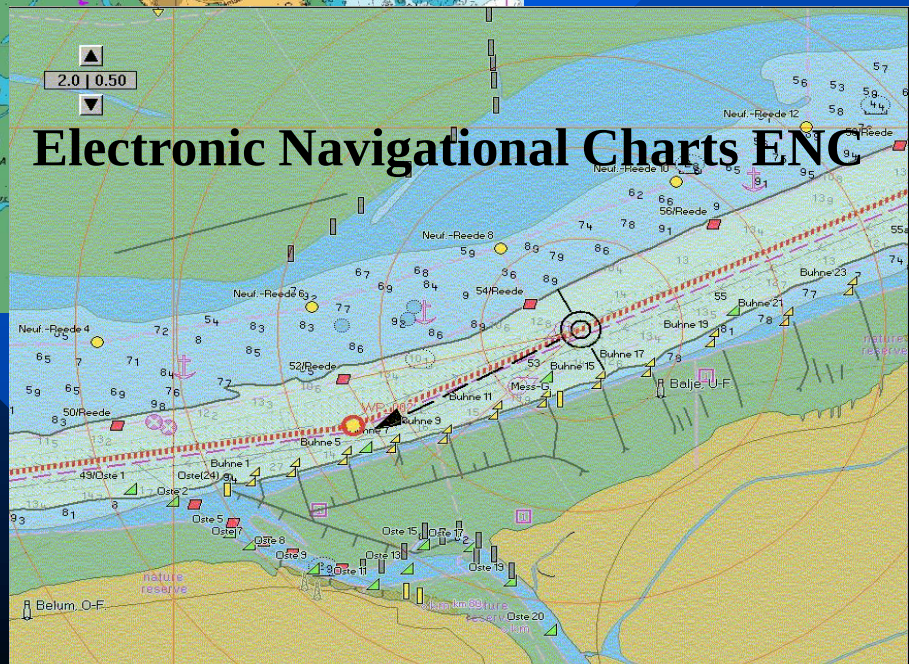
Products and Services

Products/Services – Navigational Charts

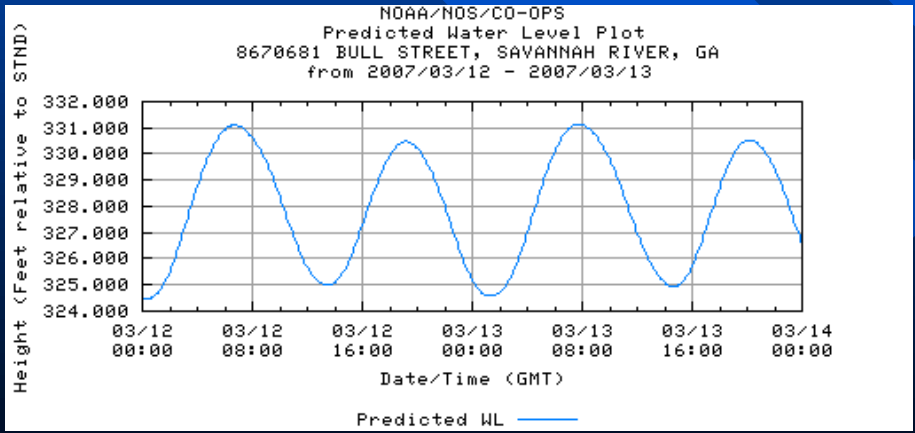
Update Service



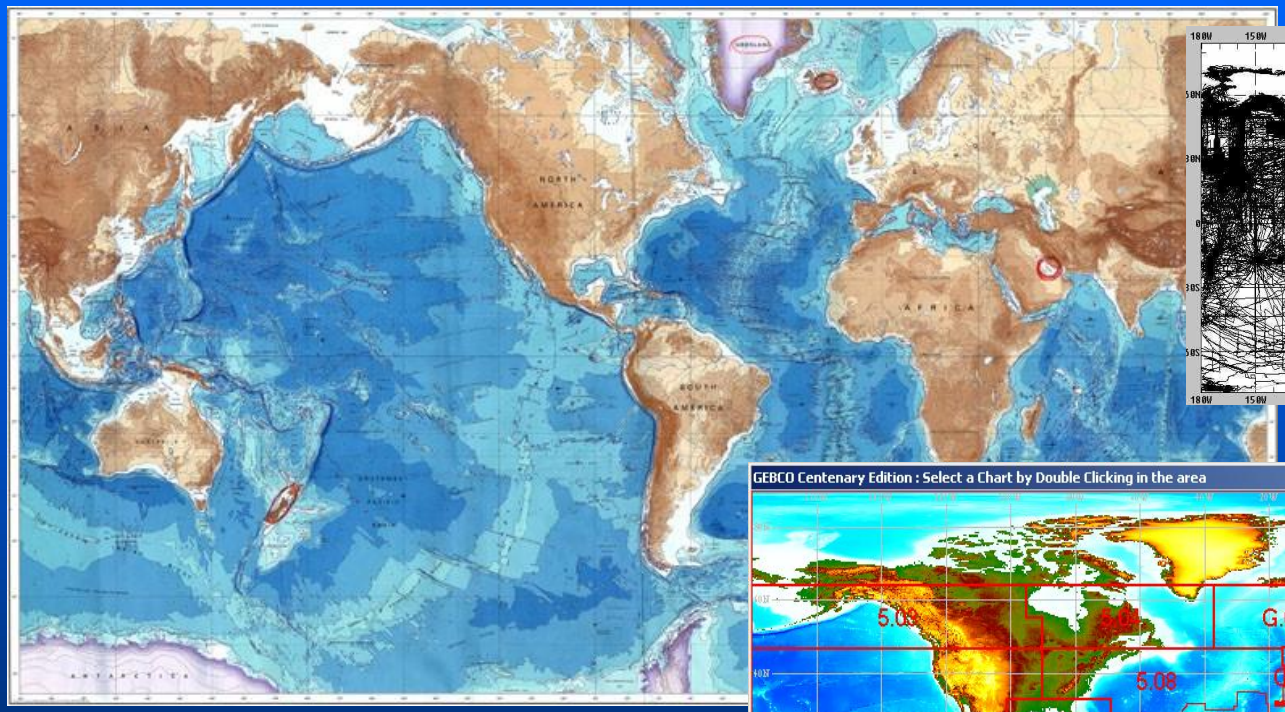


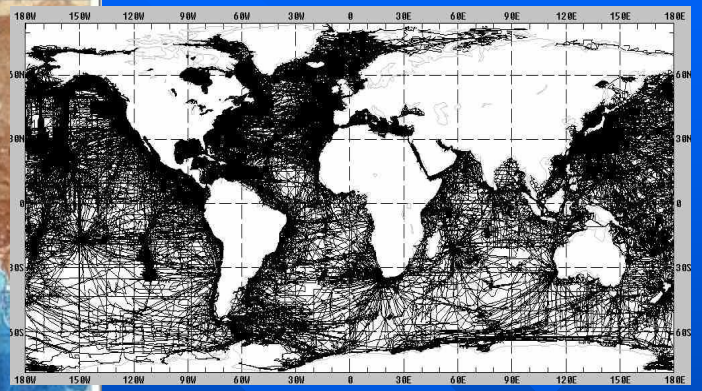


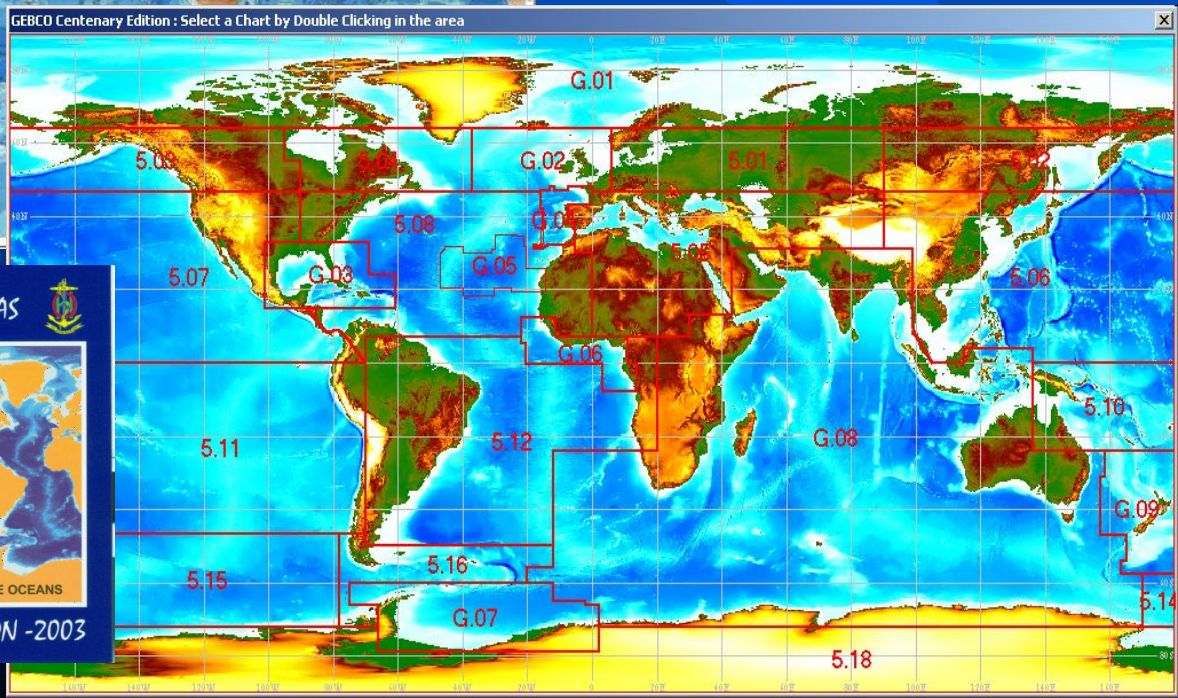
Products/Services – Nautical Publications

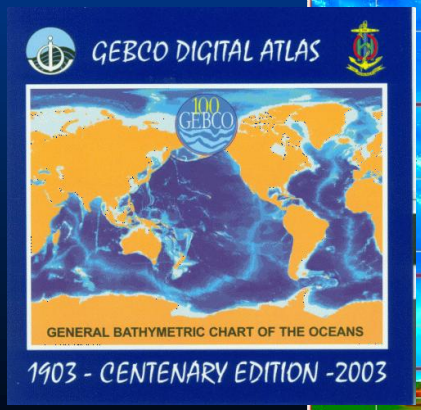


Products/Services – Ocean Mapping



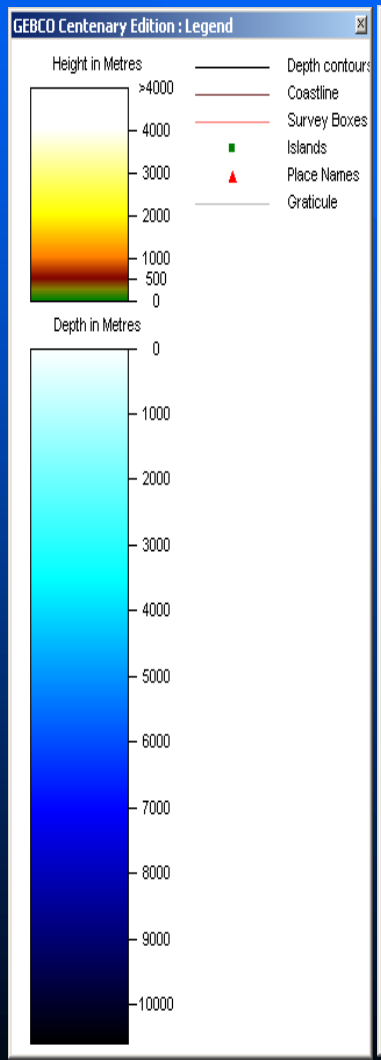


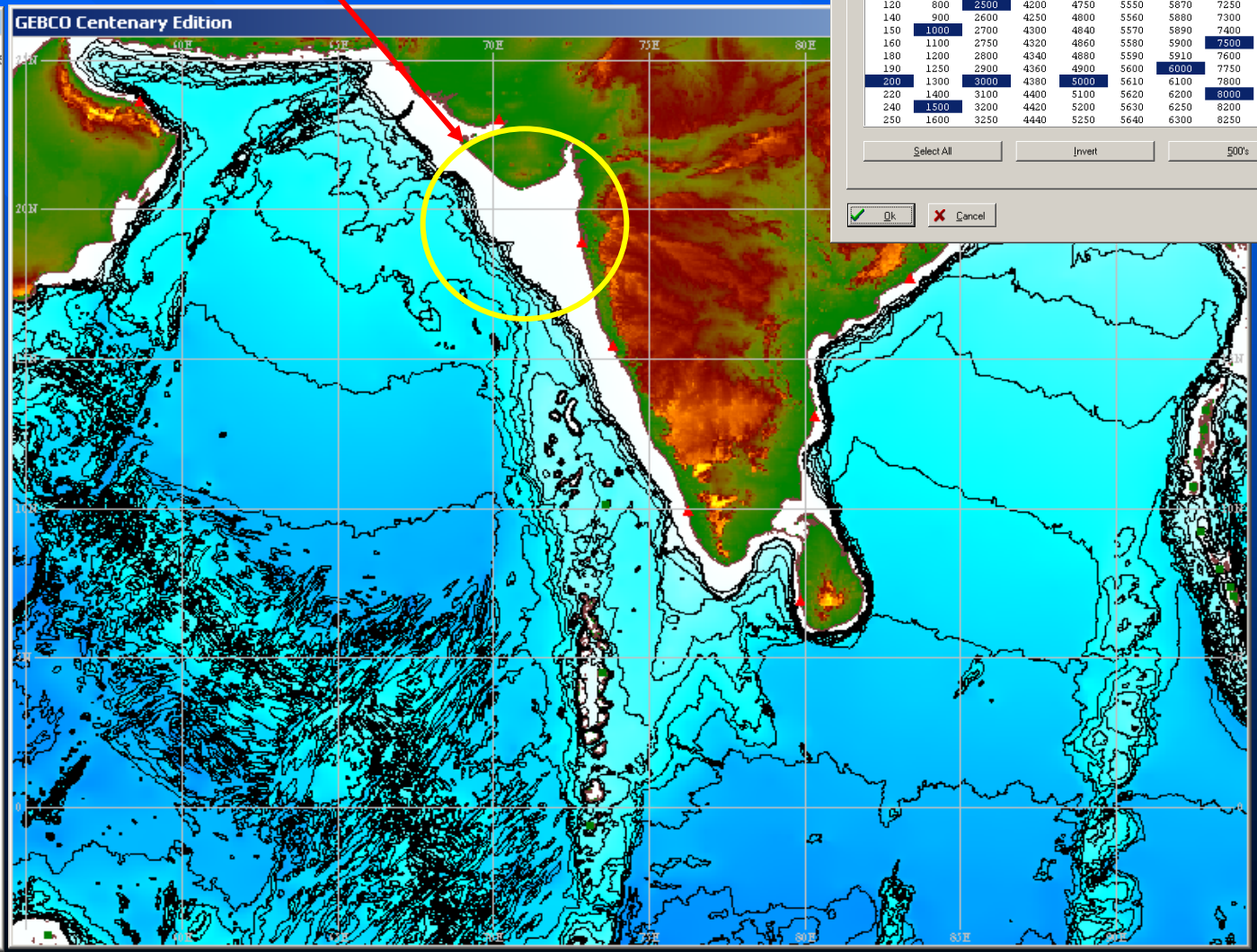


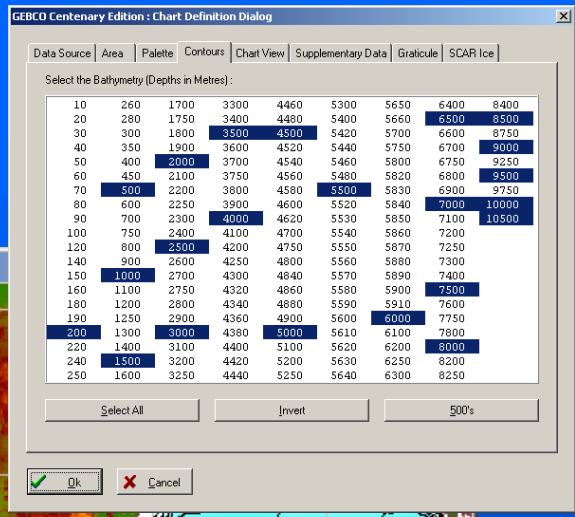


Products/Services – Ocean Mapping

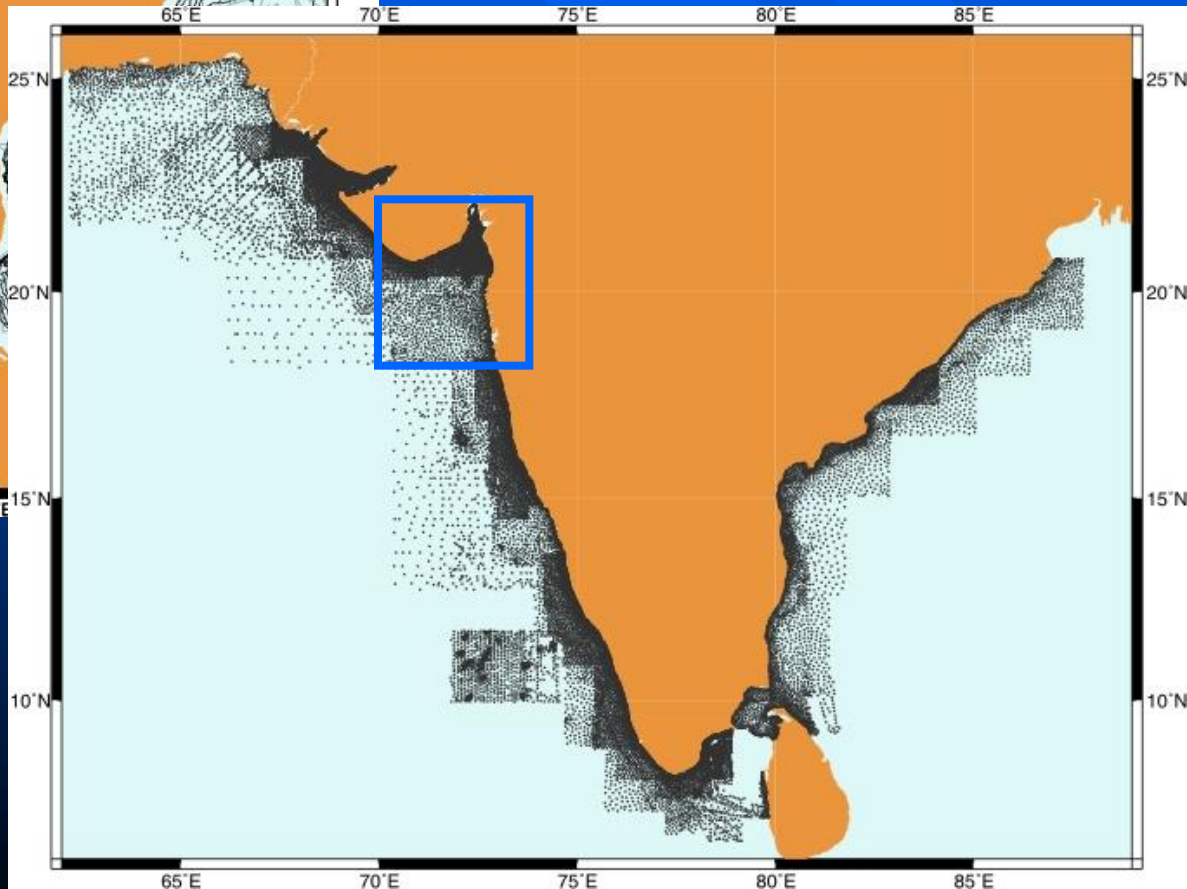
Lack of Shallow Water Bathymetry



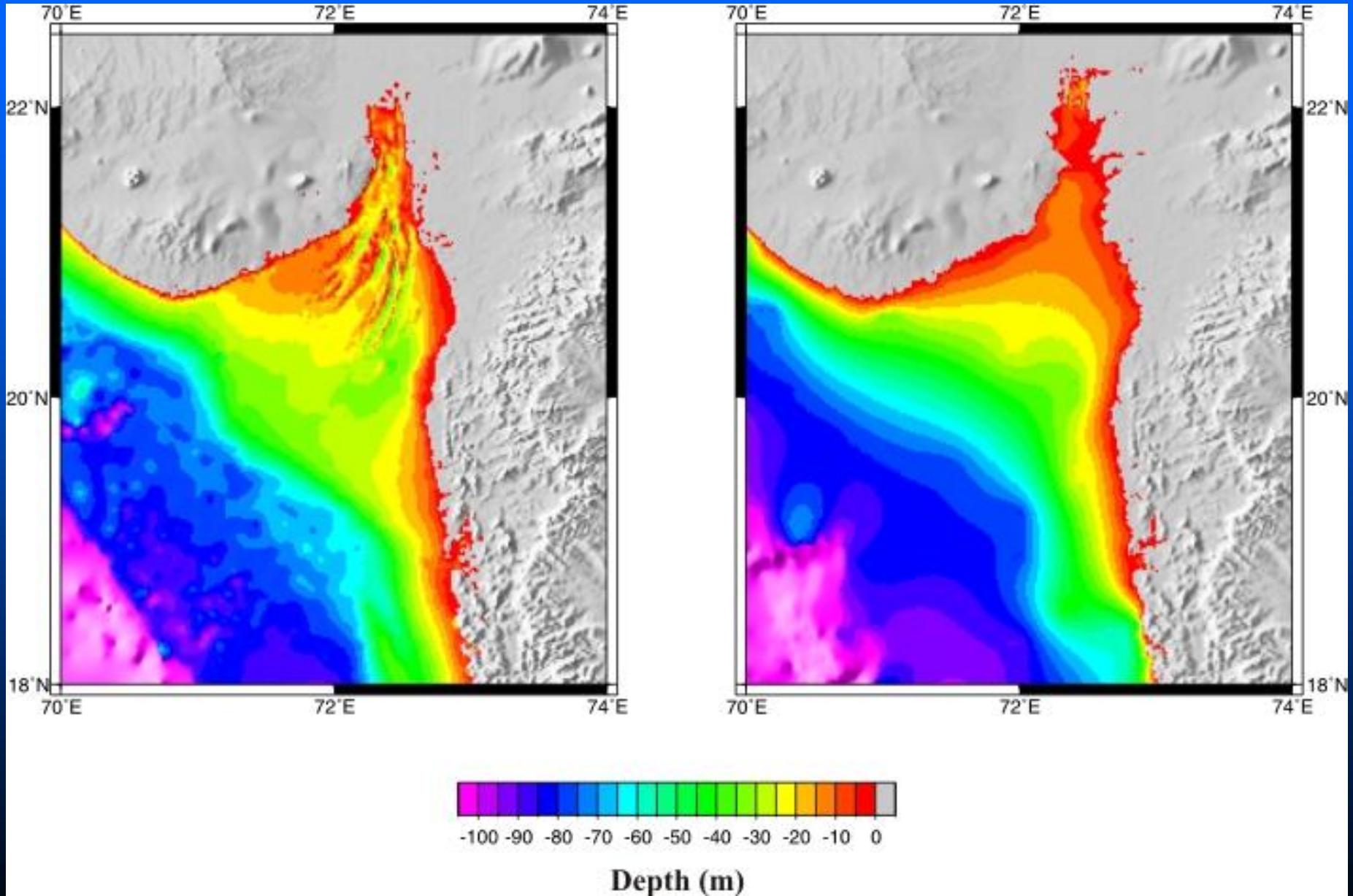




Products/Services – Ocean Mapping

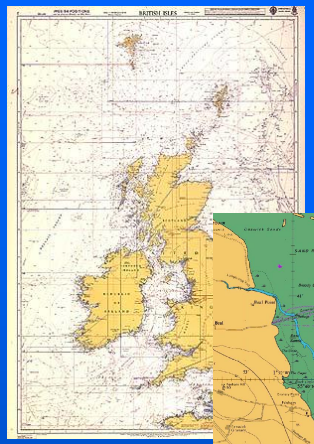


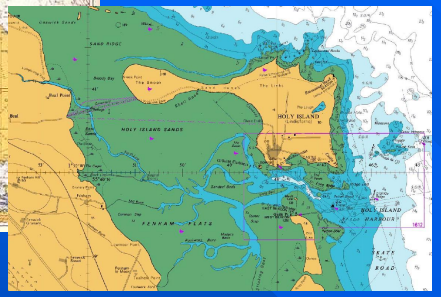
Products/Services – Ocean Mapping



Distribution

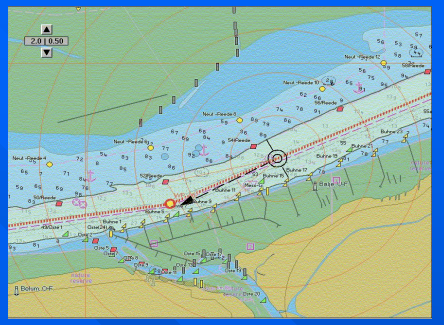
Distribution – Navigational Products





Paper Charts , RNCs and Nautical Publications

ENCs



RENCs

VARs

Distributor

Distributor

Distributor

Standards

Standards - General

S-44 IHO Standards for Hydrographic Surveys

M-4 IHO Chart Specifications

S- 52 Specifications for Chart content and display aspects of ECDIS

S-57 The IHO Transfer Standard for Digital Hydrographic Data

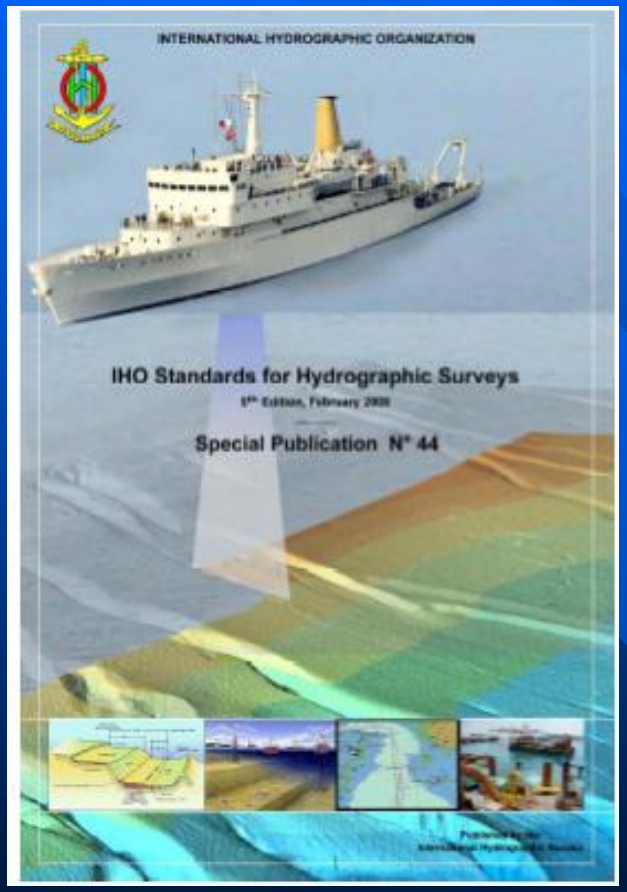
S-100 The IHO Geospatial Standard for Hydrographic Data

S-101 ENC Product Specification

IHO STANDARDS

S-44

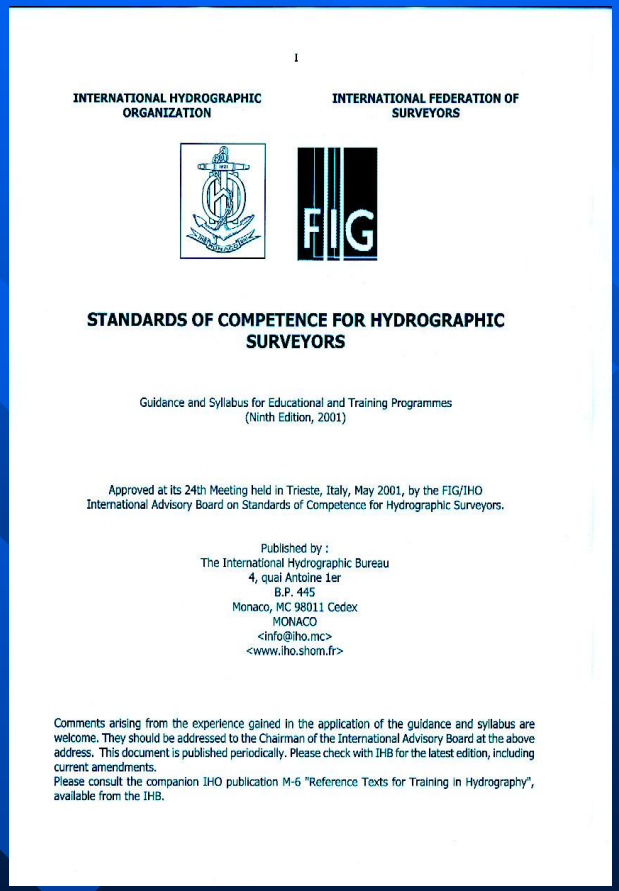
Standards for Hydrographic Surveys



S-44 WG

M-5

Standards for Hydrographic Surveyors



I

INTERNATIONAL HYDROGRAPHIC ORGANIZATION

INTERNATIONAL FEDERATION OF SURVEYORS

STANDARDS OF COMPETENCE FOR HYDROGRAPHIC SURVEYORS

Guidance and Syllabus for Educational and Training Programmes
(Ninth Edition, 2001)

Approved at its 24th Meeting held in Trieste, Italy, May 2001, by the FIG/IHO International Advisory Board on Standards of Competence for Hydrographic Surveyors.

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Monaco, MC 98011 Cedex
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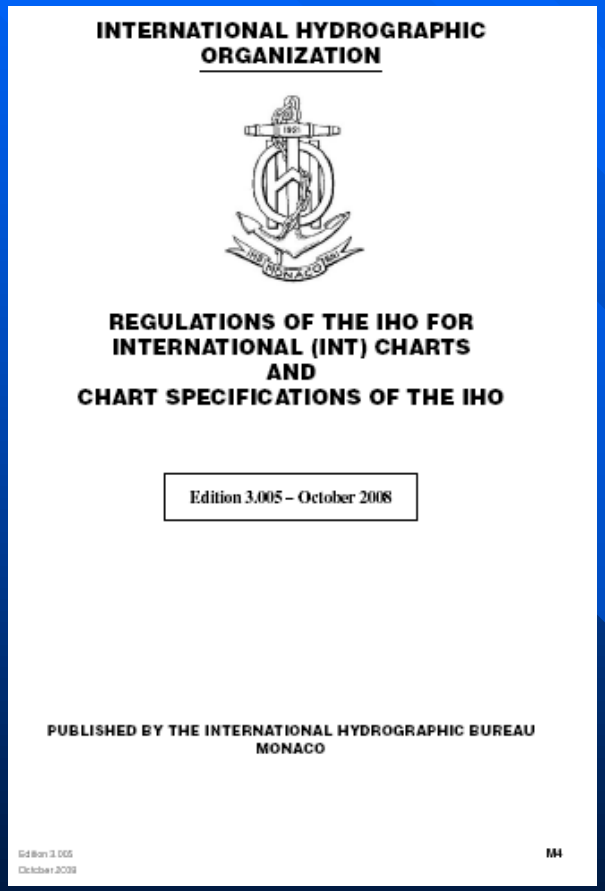
<info@iho.mc>
<www.iho.shom.fr>

Comments arising from the experience gained in the application of the guidance and syllabus are welcome. They should be addressed to the Chairman of the International Advisory Board at the above address. This document is published periodically. Please check with IHB for the latest edition, including current amendments.
Please consult the companion IHO publication M-6 "Reference Texts for Training in Hydrography", available from the IHB.

FIG/IHO/ICA Advisory Board

IHO STANDARDS

M-4
Chart Specifications


INTERNATIONAL HYDROGRAPHIC ORGANIZATION

REGULATIONS OF THE IHO FOR INTERNATIONAL (INT) CHARTS AND CHART SPECIFICATIONS OF THE IHO

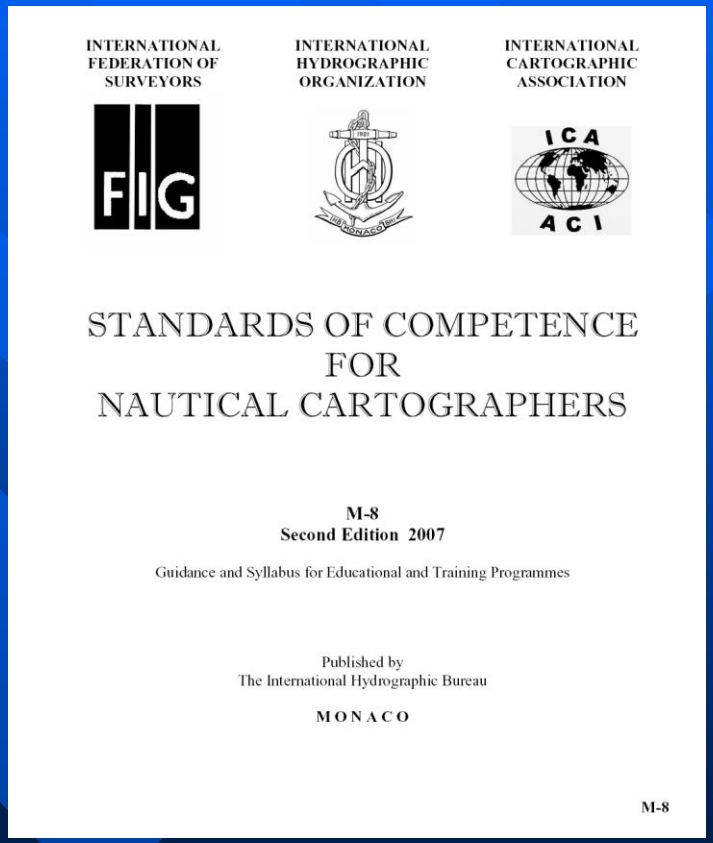
Edition 3.005 – October 2008

PUBLISHED BY THE INTERNATIONAL HYDROGRAPHIC BUREAU MONACO

M4

CSPCWG

M-8
Standards for Nautical Cartographers


INTERNATIONAL FEDERATION OF SURVEYORS

INTERNATIONAL HYDROGRAPHIC ORGANIZATION

INTERNATIONAL CARTOGRAPHIC ASSOCIATION

STANDARDS OF COMPETENCE FOR NAUTICAL CARTOGRAPHERS

M-8
Second Edition 2007

Guidance and Syllabus for Educational and Training Programmes

Published by
The International Hydrographic Bureau

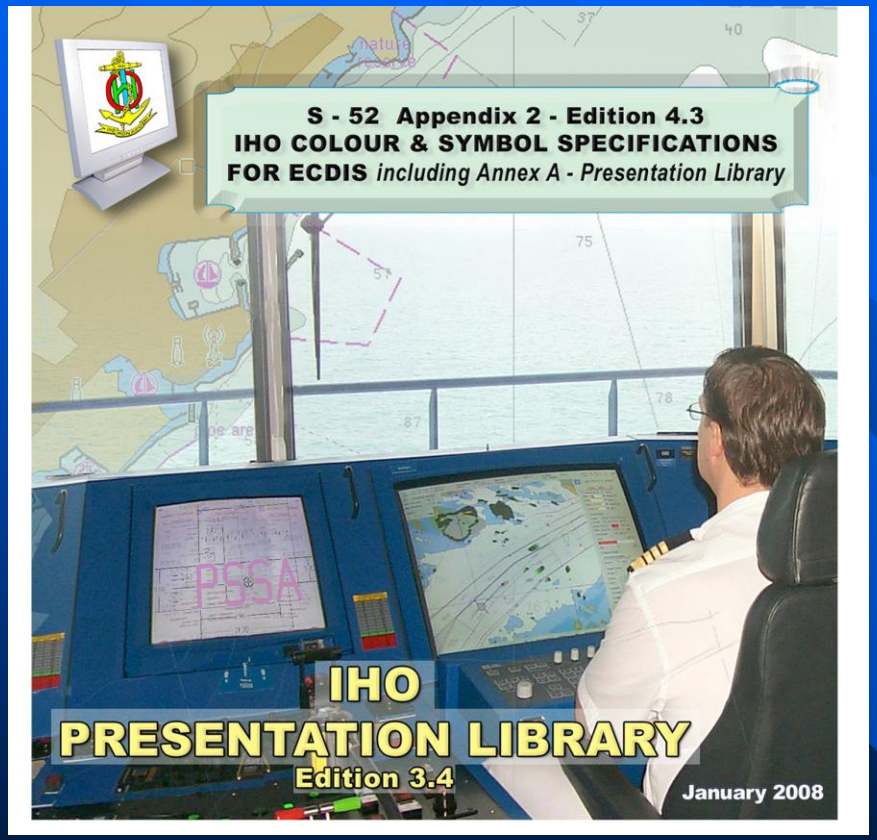
MONACO

M-8

FIG/IHO/ICA Advisory Board

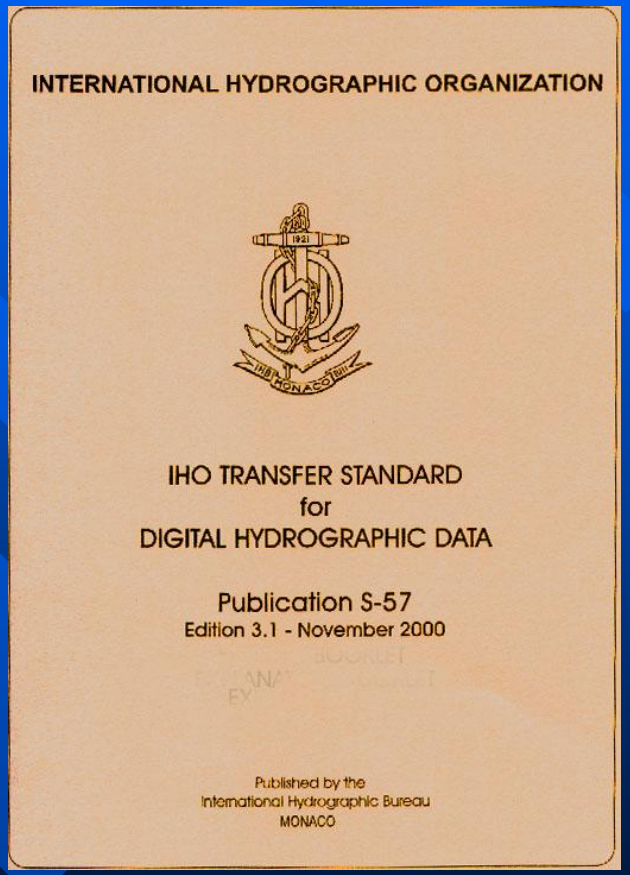
IHO STANDARDS

S-52
Specifications for ENC/ECDIS Content & Portrayal



DIPWG

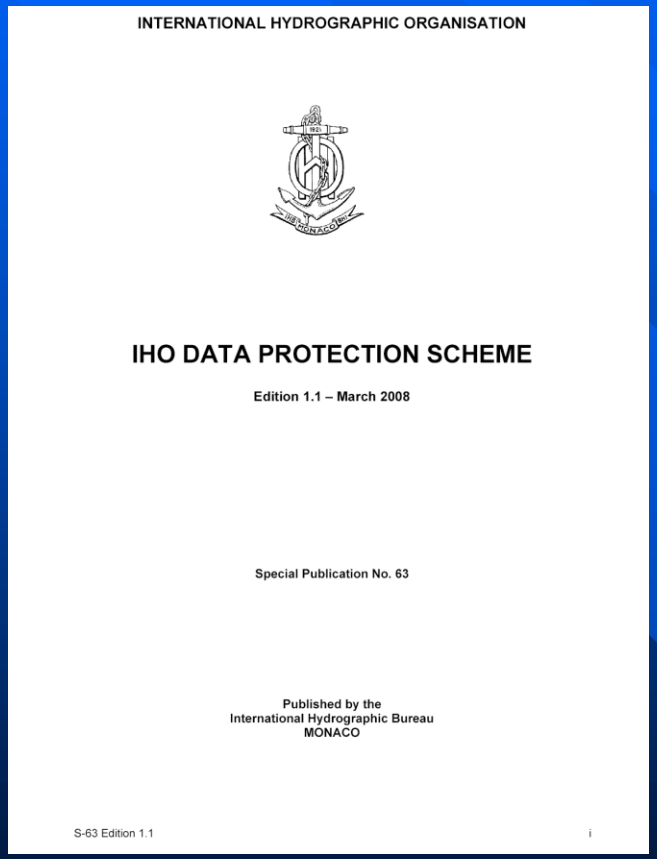
S-57
IHO Transfer Standard for Hydrographic Data



TSMAD

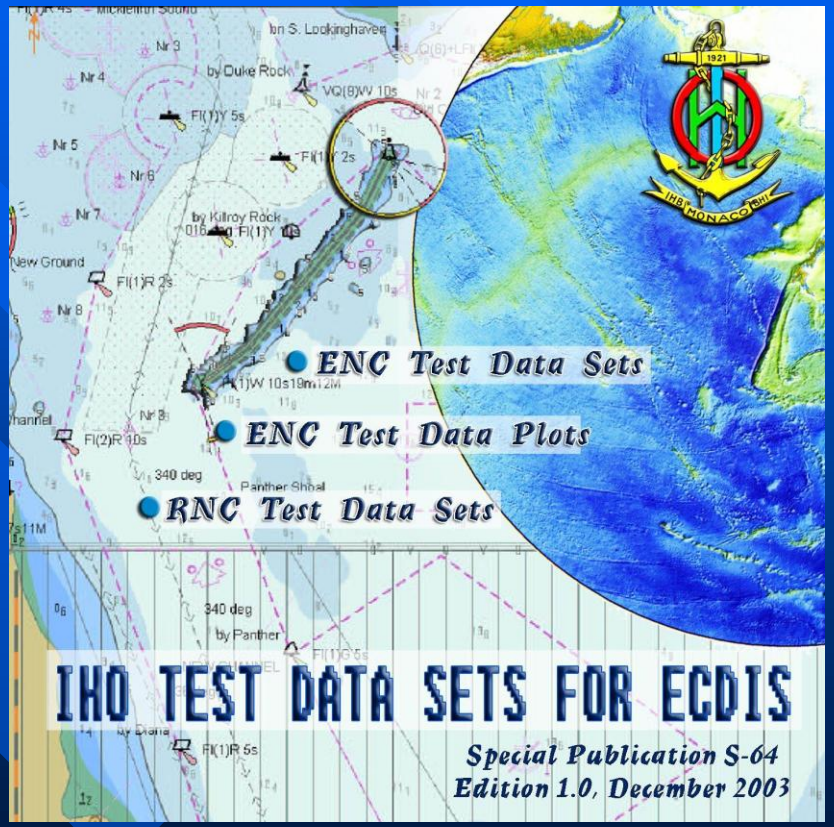
IHO STANDARDS

S-63
IHO Data Protection Scheme



DPSWG

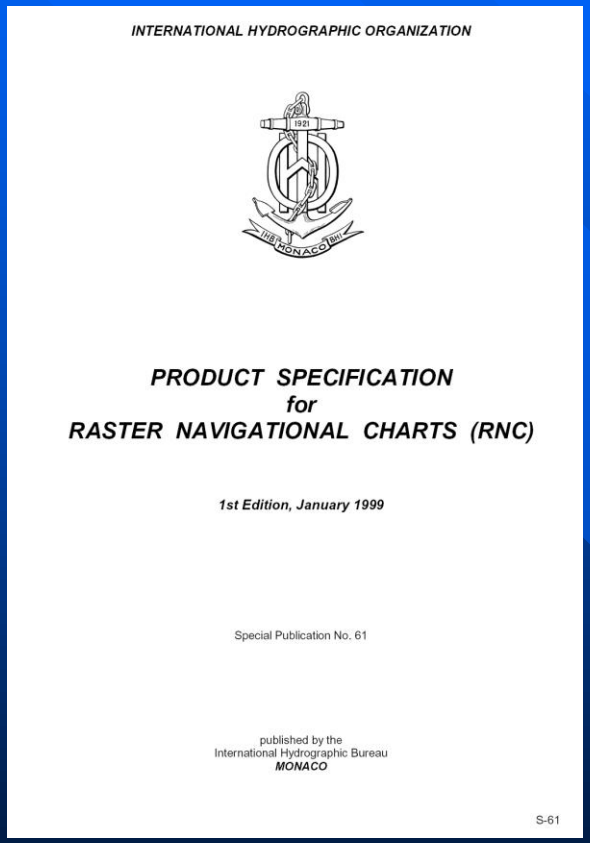
S-64
IHO Test Data Sets for ECDIS



DPSWG / CSMWG / TSMAD

IHO STANDARDS

S-61
Product Specifications for RNCs



INTERNATIONAL HYDROGRAPHIC ORGANIZATION

PRODUCT SPECIFICATION
for
RASTER NAVIGATIONAL CHARTS (RNC)

1st Edition, January 1999

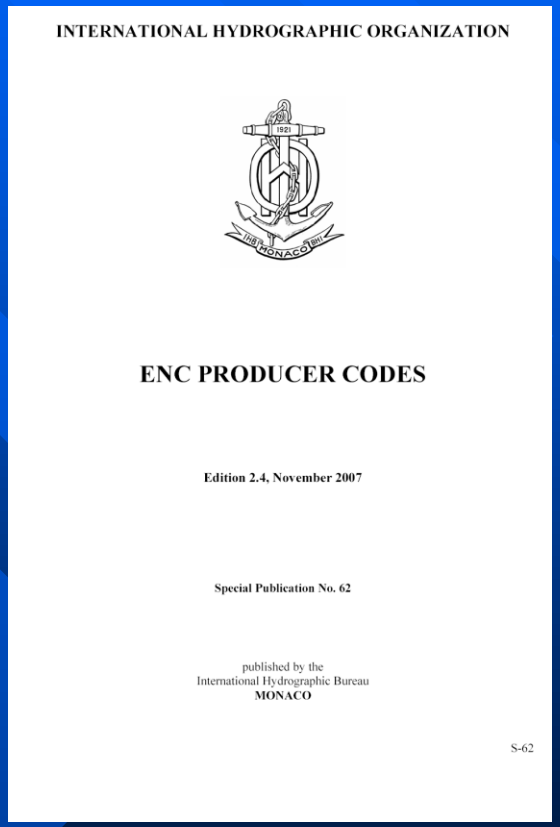
Special Publication No. 61

published by the
International Hydrographic Bureau
MONACO

S-61

TSMAD

S-62
ENC Producer Codes



INTERNATIONAL HYDROGRAPHIC ORGANIZATION

ENC PRODUCER CODES

Edition 2.4, November 2007

Special Publication No. 62

published by the
International Hydrographic Bureau
MONACO

S-62

IHB

IHO STANDARDS : THE FUTURE

S-100
IHO Geospatial Standard for Hydrographic Data

TSMAD

S-101
ENC Product Specification

TSMAD

Standards – Some Key Differences between S-57 and S-100

S-57 effectively only supports one product specification and has an inflexible maintenance regime (required the freezing of standards).

S-100 supports different types of applications and make provision for multiple Product Specifications – Product Specifications will accommodate independent update cycles.

S-57 does not make provision for data types other than vector.

S-100 does make provision for imagery and gridded data types.

S-57 limited to a single encapsulation format (data model is embedded in encapsulation). (i.e. data content tied up with the data carrier mechanism).

S-100 separates the data content from the data carrier and makes provision for the use of multiple encapsulation formats e.g. ISO 8211, GLM, KML others .. .

Distribution – Navigational Products

No IHO Standards, as the IHO does not regulate the distribution of charts and other navigational products.

However, some policies related to data distribution in M-3, e.g. SENC distribution.

A3.11 **ENC/SENC DISTRIBUTION OPTION**

It is resolved that SENC distribution can be accepted as an option, in addition to direct ENC distribution, providing that the following principles be adhered to:

1. The HO should ensure that the IHO data (ENC) is always available to any user in the S-57 ENC format.

2. As an option Hydrographic Offices may allow the distribution of their HO data (ENC) in a SENC format.

Policies

Policies – Publications containing IHO Policies

- M-2 National Maritime Policies and Hydrographic Services
- **M-3 Resolutions of the IHO**
- M-4 Part A Regulations for INTernational Charts
- M-11 Part A Guidance for the Preparation and Maintenance of International Chart Schemes
- M-13 Manual of Hydrography
- S-32 Hydrographic Dictionary
- S-65 Guidance for ENC Production

M-3 Chapter A, Section 6 (Tides)

A 6.7 **COLLECTION AND PUBLICATION OF TIDAL DATA**

1. *It is recommended that Member States gather tidal data from as many locations as feasible and maintain sets of harmonic constants in National Tidal Constituent Data Banks.*

2. *It is recommended that Member States make public, using their WEB site or other suitable means, a list of locations included in their own Tidal Constituent Data Banks.*

Conclusion

"Hydrography is the branch of applied sciences which deals with the measurement and description of the physical features of oceans, seas coastal areas, lakes and rivers, as well as with the prediction of their evolution, for the primary purpose of safety of navigation and all other marine activities, including economic development, security and defence, scientific research, and environmental protection"

for the purpose of safety of navigation

- Structure ☑
- Data Collection ☑
- Products and Services ☑
- Distribution ☑
- Standards ☑
- Policies ☑

all other marine activities including economic development, security and defence, scientific research, and environmental protection

- Structure ☑
- Data Collection ☑
- Products and Services ☒
- Distribution ☒
- Standards ☒
- Policies ☒

Thank You