

REPORT FROM PORTUGAL

INSTITUTO HIDROGRÁFICO
(IHPT)

7th SAIHC Meeting
14-17 September 2009, La Réunion

INTRODUCTION

This report describes the main technical activities and developments of the IHPT from July 2007 to July 2009. It was elaborated in order to be presented to the 7th SAIHC Meeting and specially covers the following areas: Hydrography, Cartography, Information Technologies and GIS, Marine Safety, and Technical Assistance and Training.

1- HYDROGRAPHIC OFFICE

All the information is included in Annex Alfa.

2- SURVEYS

The hydrographic surveys within the IHPT are done with both multibeam and single beam echosounders, using the GPS (Differential or RTK/OTF) for positioning.

The single beam echosounders with digital output (ATLAS DESO 20/22/25, MARIMATECH E206, and KNUDSEN 320 M) are used with automated data acquisition systems (currently the HYPACK). The values of sound speed in the water are collected by sound speed profilers (APPLIED MICROSYSTEMS SVP-16 and SVP PLUS). ATLAS calibration transducers are also used. The heave is measured with an inertial motion sensor (TSS 320/333/335, SEATEX MRU5 or MRU H).

Data processing is done with the same applications used for the data acquisition (HYPACK). For presentation and archive purposes the data is transferred to CARIS GIS.

The IHPT is presently operating several multibeam echosounder systems (MBES): two portable systems for shallow waters (KONGSBERG EM 3002) and two systems for deep waters (KONGSBERG EM 120) on the hydrographic ships "D. Carlos I" and "Almirante Gago Coutinho". The "Almirante Gago Coutinho" is also operating a multibeam system for coastal surveys (KONGSBERG EM 710).

All the referred multibeam systems include one SEATEX SEAPATH 200 or SEAPATH 200 RTK (for positioning, heading, pitch, roll and heave measurements), one sound speed sensor at the transducer draft (APPLIED MICROSYSTEMS SMART PROBE) and a sound speed profiler (APPLIED MICROSYSTEMS SVP-16 or SVP PLUS). Data processing is done with the Hydrographic Information Processing System (CARIS HIPS).

The coastal topography and horizontal control is being done, for the most part, with geodetic GPS methods, including kinematics positioning and RTK/OTF (with TRIMBLE 4000/5700/5800 series). Sometimes hydrographic surveys are complemented with GPS

surveys on-shore, done by walking surveyors or with a motto-quad. Nevertheless, to complement GPS observations, topographic total stations (LEICA TC 305 and LEICA TC 1800) are also used. Data processing is performed with TRIMBLE software (TRIMBLE Geomatics Office).

The procedures (planning, execution and processing) of hydrographic surveys within the IHPT are in accordance with the IHO Special Publication S-44 (5th Edition, 2008). Special attention has been paid to the development of procedures for Quality Assurance (QA) and Quality Control (QC) of hydrographic data. These include: error budgets, analysis of the digital terrain model from the raw data, statistical analysis per beam, and analysis of the spatial and temporal variation of sound speed profiles on depth measurement and positioning.

During the last two years, most of the hydrographic surveys were done in specific coastal areas and in harbours and their approaches. The geological continental shelf of Continental Portugal is completely surveyed with echosounders and electronic positioning systems, as well as the more critical areas of the archipelagos of Azores and Madeira. So, the next systematic resurvey of Portuguese coastal waters will be done with MBES and GPS positioning.

The hydrographic ships “D. Carlos I” and “Almirante Gago Coutinho” were employed on the surveys for the project of the extension of the Portuguese Continental Shelf, presented to the United Nations Organization on May 2009. Nevertheless, these ships have also been used in several research projects in cooperation with national and foreign universities and other research institutions.

Some surveys for environmental studies and coastal protection were also carried out. In these surveys, hydrographic and topographic integrated methods were used and, commonly, simultaneous wave, tidal and current data were acquired. In some cases, these surveys included light seismic geological methods and sediment and water chemical analysis.

The Hydrographic Data Warehouse (HDW), using an ORACLE database management system, is being uploaded with all the bathymetric data available. All the survey fair sheets, from the Portuguese territory, were vectorized to integrate the HDW too.

3- NEW CHARTS AND UPDATES

The paper chart production at IHPT is fully done by the Computer Assisted Cartography system (CAC), since mid 2004. All charts are stored in digital files, which are then used for Electronic Navigational Chart (ENC) production.

The CAC is based on CARIS GIS, running in WINDOWS workstations. Some topographic data processing and import/export are also done using AutoCAD MAP. Developments using the several CARIS modules were done, as for instance the automatic chart correction and several scripts for QC and spatial data assimilation, these using specially the Visual Basic, C and TCL/TK programming languages.

The IHPT also produces nautical charts for special purposes, for instance: charts for fishermen, charts for pleasure crafts and special charts for training purposes. All those charts are in accordance with IHO specifications and were very well accepted from end users.

All the IHPT new charts and new editions are bilingual (Portuguese and English) and follow the INT specifications, whether or not they belong to the INT series.

The production of ENC cells started with some CARIS software modules (HOM) but the main work is done using software produced by Seven-C's (ENC Tools) and HydroServices (dKart Inspector). The IHPT cells format is S-57/Edition 3.1.

The final validation of the ENC cells is made with the ECDIS software ECPINS-M. The Portuguese Navy ships equipped with ECDIS continuously verify the IHPT ENC cells in real navigation conditions.

The IHPT is a member and participates actively in the works of the International Centre for ENCs (IC-ENC), including in their Technical Experts Working Groups. Presently, 71

Portuguese ENC cells are available for distribution through IC-ENC, charting all the oceanic and coastal waters of Portugal, as well as the main harbours and their approaches, and the coasts of Cape Verde, Angola and Mozambique.

The issuing of Notices to Mariners (NtM), which affect the paper charts and the corresponding ENC cells, is coordinated with the issue of the ENC CDs by the IC-ENC. It should be noted that the number of ENC updates increased enormously and so the production and validation of updates continues to be one of the major works of the IHPT ENC production team.

During the last two years a major effort was done by IHPT to implement the second generation of the Computer Assisted Cartography, the CARIS – Hydrographic Production Database (HPD), which allows a full integration of the cartographic production, both paper charts and ENC cells. The HPD works with an ORACLE 9i database management system and provides a single and seamless database for all the cartographic information available in the IHPT. All Portuguese ENC cells were already uploaded on CARIS HPD. This year IHPT began to use CARIS-HPD for Nautical Chart (NC) and ENC production.

Following the full digital cartographic process, since middle 2005, the IHPT is using the Print-on-Demand system to print the nautical charts, as well as their sub products, upon request by the users.

On the SAIHC region IHPT has produced one ENC cell (usage band 2) corresponding to two small scale INT charts of Mozambique coast and one ENC cell of Angola coast (usage band 2), but for this cell is still pending the oil platform information requested to the Angolan authorities.

4- NEW PUBLICATIONS AND UPDATES

Nil.

5- MARTIME SAFETY INFORMATION

The IHPT, as national coordinator for the Maritime Safety Information, provides a 24-hour service of Navigational Warnings, in cooperation with the NAVAREA II coordinator.

NAVTEX broadcast is made both in English and Portuguese and it is transmitted from Monsanto (near Lisbon) and from Horta (in the Azores Archipelago) stations. Madeira Archipelago NAVTEX will be established in the near future.

The GMDSS coverage is yet not completed due to some delays on the establishment of the Digital Selective Call capability, which are expected to be solved in a near future.

Monthly the IHPT publishes a Group of Notices to Mariners, containing all the permanent, preliminary, and temporary warnings in force for the corresponding period. This information, covering all navigation charts and publications of Portugal, Angola, Cabo Verde, Guiné and São Tomé e Príncipe, is also available on the web site (<http://www.hidrografico.pt>).

The IHPT built a friendly on-line application - ANAVnet, supported by robust and secure databases, capable of providing either entire NtM publications, or single NtM affecting individual documents; allowing in any case consultation and printing, including entire correction pages of nautical publications and graphical annexes to glue on charts.

In matters of Navigational Warnings, ANAVnet allows consultation of warnings broadcasted by any of the Portuguese NAVTEX stations (coastal and local), both in Portuguese and English languages.

Regarding the Broadcast Stations (BS) from the national differential GPS network, the Continental Portugal component consists of two DGPS BS, with redundancy and integrity monitoring, located at Cape Carvoeiro and Sagres.

There are also two BS in the Portuguese Archipelagos: one in the Azores Archipelago (Horta station) and another one in Madeira Archipelago (Porto Santo station).

AIS coastal stations are operational since the summer of 2006 both in Azores and

Madeira Archipelagos. For the continental coast of Portugal, this system started this year in parallel with the coastal VTS.

6- **S-55**

Nil.

7- **CAPACITY BUILDING**

The cooperation of Portugal within the SAIHC region in the hydrography domain, namely with Mozambique and Angola, may be summarized as follows:

a. **Cooperation with Angola**

- One hydrographer from IHPT participated on the capacity building advisory visit to Angola, June 2008.

b. **Cooperation with Mozambique**

- Instruction - One element from INAHINA attended the Hydrographic Course (category A), in Portugal, 2006/2007.
- Training in Hydrography - Training on Computer Assisted Cartography (CARIS), planning and chart scheme was given by IHPT at INAHINA, during one week, October 2007.

8- **OCEANOGRAPHICS ACTIVITIES**

Nil.

9- **OTHER ACTIVITIES**

a. **Information technologies and GIS**

The IHPT has an Internet site (www.hidrografico.pt) presenting information about its organization, main activities, products offered, and specific on-line data.

The Notices to Mariners and Navigational Warnings issued by the IHPT are also available in the IHPT Internet site, as well as general information on the Portuguese Nautical Charts and Nautical Publications.

Databases and related applications are being developed using ORACLE spatial. They include not only hydrographic and cartographic applications but also environmental and coastal management products. The basis of these is SIGAMAR (Geographic Information System for the Marine Environment).

SIGAMAR is a geographic information system for the marine environment under development at IHPT and deals with technical and scientific data within IHPT. The main SIGAMAR's development objectives are to improve the internal production processes and to support the operational, planning and strategic decision-making. Its core is an Oracle Spatial database management system that is explored in several ways producing tables, charts, web pages and reports, and feeding several GIS packages.

This system is also being used to support IC-ENC by providing a world ENC availability catalogue.

ANNEX ALFA

HYDROGRAPHIC OFFICE GENERAL INFORMATION

PORTUGAL (PORTUGUESE REPUBLIC)

INSTITUTO HIDROGRAFICO Rua das Trinas – 49 1249-093 LISBOA	
Department of which the Hydrographic Office is part <i>Ministère dont dépend le Service Hydrographique Ministerio del que depende el Servicio Hidrográfico</i>	Ministry of National Defence – Navy.
Principal functions of the H.O. - <i>Attributions principales du S.H. Principales funciones del S.H.</i>	Hydrographic Surveys, Analogue and Digital Nautical Charts, Sailing Directions, Lights and Radio Signals Lists, Notices to Mariners (monthly), Immediate Navigational Warnings, Tide Tables, Tidal Currents, Magnetic Compass Certification and Adjustment. Aids to Navigation Plans. DGPS, AIS projects. Oceanography. Provision of geophysical and environmental information for scientific and defence issues
National day - Fête nationale – Fiesta nacional	10 June
Telephone : Fax : E-mails : WEB site:	+ 351 21 094 3000 + 351 21 094 3299 dirgeral@hidrografico.pt dirtecnica@hidrografico.pt hidrografia@hidrografico.pt http://www.hidrografico.pt
Date of establishment and Relevant National Legislation – Date de fondation et législation nationale concernée – Fecha de establecimiento y Leyes nacionales de referencia	22 September 1960 <ul style="list-style-type: none"> • Territorial Sea: Law n° 34/2006 • Baseline: Laws n° 2130/66 and 495/85 • EEZ: Laws n° 34/2006, n° 119/78 and n° 52/85
Name and rank of the Director or Head - <i>Nom et grade du directeur –</i> <i>Apellidos y graduación del Director</i>	Vice-admiral José Augusto de Brito, General Director
Tonnage – Tonelaje	2006 = 1,271,004
Total Budget - Budget total – Presupuesto Total	10 million Euros
Staff employed - Effectifs – Plantilla	For details, consult the WEB site: http://www.hidrografico.pt
N° of charts published - Nombres de cartes publiées – <i>N° de cartas publicadas</i>	225
N° of INT charts published – Nombres de cartes INT publiées - N° de cartas INT publicadas. N° of ENC cells published – Nombres de cellules ENC publiées - N° de células ENC publicadas.	34 71
Type of publications produced (e.g. Tide Tables, Sailing Directions, List of Lights etc.) – Type de publications produites (par ex: Tables des marées, Instructions nautiques, Livres des Feux, etc. - Tipo de publicaciones producidas (por ej: Tablas de mareas, Derroteros, Libros de Faros etc.)	<ul style="list-style-type: none"> - Catalogue of Charts and Nautical Publications; - Catalogue of Nautical Charts of Portugal; - Tide Tables – Volume I – Portugal; - Tide Tables – Volume II – African Portuguese Speaking Countries; - List of Radio Aids and Services; - List of Lights – Volume I – Portugal; - List of Lights – Volume II – African Portuguese Speaking Countries; - Sailing Directions – Continental Portugal – Volumes I to III;

	<ul style="list-style-type: none"> - Sailing Directions – Azores Archipelago; - Sailing Directions – Madeira Archipelago; - Sailing Directions - Angola and São Tomé e Príncipe Ports Pilot; - Sailing Directions - Cabo Verde – Volumes I to V; - Sailing Directions (Pleasure Craft) – Continental Portugal (Portuguese/English); 		
Surveying vessels/ Aircraft – Bâtiments <i>hydrographiques/aéronefs – Buques hidrográficos/ Aeronaves</i> Almirante GAGO COUTINHO D. CARLOS I ANDRÓMEDA AURIGA ATLANTA CORAL FISÁLIA	Displacement	Date Launched	Crew
	2285	1985	34
	2285	1989	34
	245	1985	13
	245	1987	13
	38.7	1981	3
	38.7	1981	3
	38.7	1981	3
Other information of interest – Autres informations utiles - Otra información de interés.	Own coast and harbours plus main traffic routes linking the Portuguese speaking countries in Africa. Hydrography and Oceanography level A and B course		