# PORTUGAL

# NATIONAL REPORT

## 10 TH SOUTHERN AFRICA AND ISLANDS HYDROGRAPHIC COMMISSION (SAIHC) MEETING

Lisbon, Portugal

16th – 18th September 2013

INSTITUTO HIDROGRÁFICO
(IHPT)

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## INTRODUCTION

This report describes the main technical activities and developments at the Portuguese Hydrographic Institute (IHPT) during the period from September 2012 to August 2013. It was elaborated in order to be presented to the 10th SAIHC Meeting and covers the following areas: Hydrography, Cartography, Information Technologies and GIS, Marine Safety, and Technical Assistance and Training.

## HYDROGRAPHIC OFFICE

The most relevant information is presented in Annex Alfa.

## 1- SURVEYS

To execute the hydrographic surveys IHPT has two oceanic hydrographic ships NRP “D. Carlos I" and NRP “Almirante Gago Coutinho” well equipped (see figure 1). Each one have one multibeam echosounder system for deep waters (KONGSBERG EM 120) and NRP “Almirante Gago Coutinho” also have a multibeam system for medium depths (KONGSBERG EM 710). Each ship may carry a small survey launch with a multibeam echosounder system for shallow waters.


Figure 1 – Hydrographic ship NRP “D. Carlos I".

IHPT also have two coastal hydrographic ships and several survey launches to survey in the coast and in the interior waters (see figure 2).


Figure 2 – Coastal hydrographic ship and survey launches.

To survey in shallow waters, IHPT have two portable systems (KONGSBERG EM 3002) on the Hydrographic Brigades.

Most of the hydrographic surveys were conducted in specific coastal areas, inside harbours and their approaches.

Hydrographic surveys are conducted, mainly, with multibeam systems. Nevertheless, several single beam echosounders are used. Positioning is obtained using GNSS (Differential or RTK/OTF).

Coastal topography and horizontal control is done, mostly, with geodetic GPS methods, including kinematics positioning and RTK/OTF. Sometimes, hydrographic surveys are complemented with low tide beach GPS surveys. Nevertheless, topographic total stations are also used to complement GPS observations.

Procedures (planning, execution and processing) of hydrographic surveys within the IHPT are in accordance with the IHO Special Publication S-44 (5$^{th}$ 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: uncertainty budgets, analysis of digital terrain model based in raw data, statistical analysis per beam and analysis of the spatial and temporal variation of sound speed profiles on depth measurement and positioning.

Hydrographic ships “D. Carlos I” and “Almirante Gago Coutinho” continue to be employed on data acquisition to complement the project of the extension of the Portuguese Continental Shelf, presented to the United Nations Organization on May 2009.

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

IHPT batymetric database, the Hydrographic Data Warehouse (HDW), which uses an ORACLE database management system, continues to be uploaded with all the bathymetric data available. Due to the limitations in the system update and to have capability to manage the bathymetric surfaces, IHPT is preparing the replacement.

## 2- CHARTS AND UPDATES

Actually both the paper chart and the Electronic Navigational Chart (ENC) production are done with two different processes. The first one, recurs to a Computer Assisted Cartography system (CAC), used since 1993, with the charts stored in individual digital files, those files are then used for the ENC production. The second process is based in our cartographic database, CARIS – Hydrographic Production Database (HPD), which allows a full integration of the cartographic production, to produce both paper charts and ENC cells. This system is already implemented and will be the unique cartographic production system in the near future.

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

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

## Paper Charts

Since the last SAIHC meeting the following charts of the region (see figure 3) have been published in a coproduction with the UKHO:

| PT Chart Number | INT Chart | NEW CHART (NC) OR NEW EDITION (NE) | SCALE | DATE | TITLE |
|---|---|---|---|---|---|
| 72101 | 2089 | NC | 1 000 000 | Apr. 2013 | Gamba a Luanda |
| 72102 | 2050 | NC | 1 000 000 | Apr. 2013 | Luanda à Baía dos Tigres |
| 73201 | 2814 | NC | 350 000 | Dec. 2012 | Pointe Tchitembo à Cabeça da Cobra |
| 73202 | 2550 | NC | 350 000 | Mar. 2013 | Cabeça da Cobra ao Cabo Ledo |
| 73203 | 2560 | NC | 350 000 | Mar. 2013 | Cabo Ledo ao Lobito |
| 73204 | 2570 | NC | 350 000 | Mar. 2013 | Lobito à Ponta Grossa |
| 73205 | 2580 | NC | 350 000 | Mar. 2013 | Ponta Grossa à Foz do Cunene |

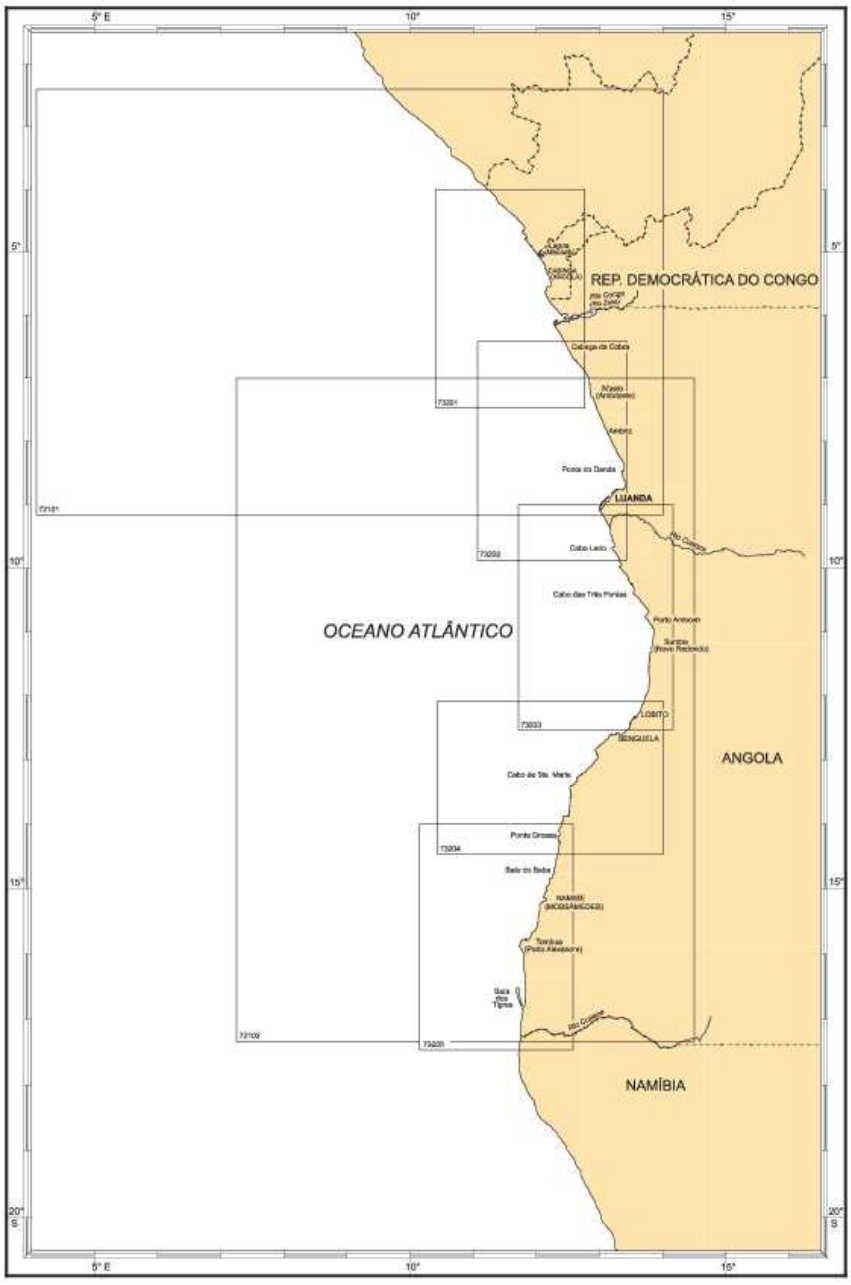


Figure 3 – Nautical Paper Charts of Angola published in 2013.

## Print on Demand (PoD).

Following the full digital cartographic process, since middle 2005, IHPT is using Print-on-Demand (PoD) system to print the Nautical Charts, as well as their sub products, upon request by the users. Presently IHPT provides 100% of national Nautical Charts using this process. The PoD-charts are continuously updated according to the published "Notices to Mariners".

**Electronic Navigational Charts (ENCs**).

IHPT ENC cells format is S-57/Edition 3.1. Each ENC is broadly equivalent to a paper chart both in terms of its coverage area and its content.

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

On the SAIHC region IHPT produced in 2008 two ENC cells (usage band 2) corresponding to two small scales INT charts of Mozambique and Angola coasts (see figure 4 and 5).

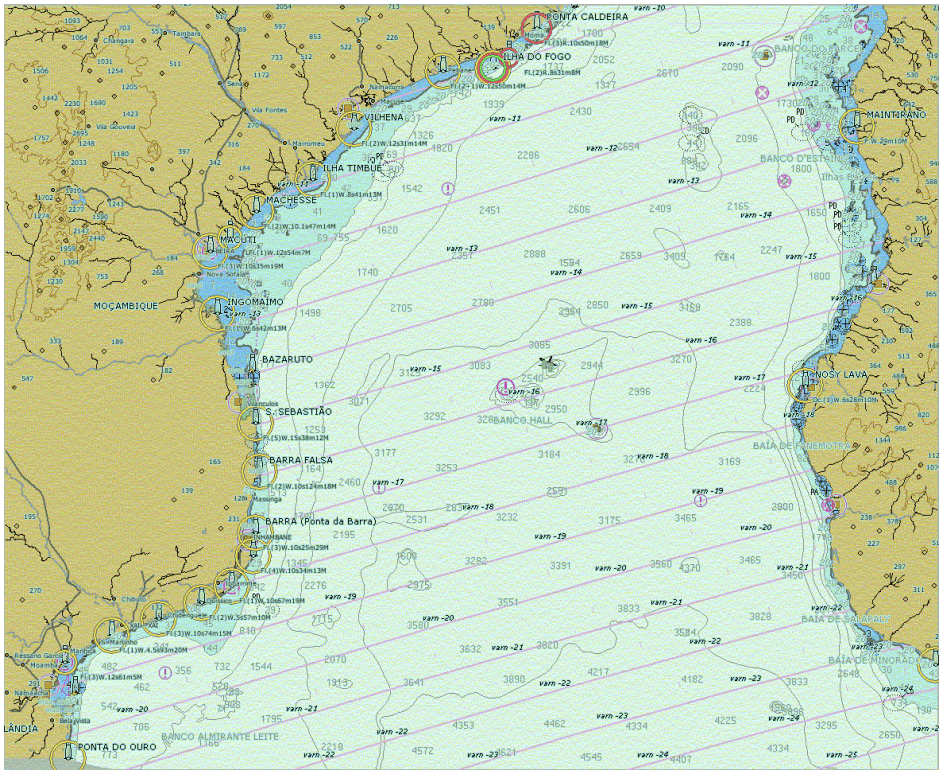


Figure 4 – ENC PT281101 – Canal de Moçambique (produced in 2008).

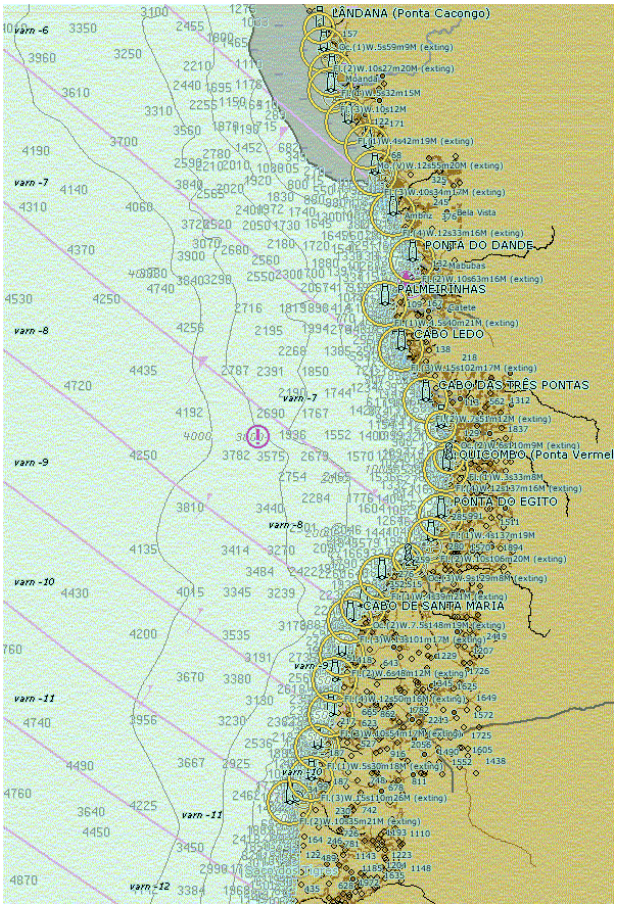


Figure 5 – ENC PT271101 – Luanda à Baía dos Tigres (produced in 2008).

## 3- NEW PUBLICATIONS AND UPDATES

Since September of 2012, IHPT published the following nautical publications:

- Annual Group of Notices to Mariners (2013);
- Lista de Luzes, Boias, Balizas e Sinais de Nevoeiro (List of Lights, Buoys, Beacons and Fog Signals) – Portugal Volume I - 10th edition (2013);
- Lista de Radioajudas e Serviços (Radiosignals and Maritime Services) - 6th edition (2013);
- Sistema de Balizagem Maritíma (Maritime Buoyage System and other Aids to Navigation) – 3rd edition (2013).

Annually, the IHPT also publishes the Tide Tables for the main harbours of Continental Portugal, the Azores and Madeira Archipelagos and African Portuguese Speaking Countries. There is also a continuous update of the tidal constituents based on the most

recent data and an effort to automate the tidal stations, in order to allow a near real time direct loading of values on the database and consequent dissemination to users.


Figure 6 – Maritime Buoyage System and other Aids to Navigation


Figure 7 – Tide table for African Portuguese Speaking Countries

## 4- MARTIME SAFETY INFORMATION

IHPT, as the national coordinator for the Maritime Safety Information, provides a 24h 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 Penalva Station (near Lisbon), São Miguel Island (in the Azores Archipelago) and from

Porto Santo Island (in the Madeira Archipelago). This broadcast stations are all new and achieved full operational capability at 1st of july. Field and coverage test are undergoing in order to assess service level on the west part of the Azores Archipelago.

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

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

IHPT on-line application - ANAVnet, provides 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 paste on charts. Regarding Navigational Warnings, ANAVnet allows consultation of warnings broadcasted by any of the Portuguese NAVTEX stations (coastal and local warnings), both in Portuguese and English languages. Access to this web service has been increasing every year. Some reports and feedbacks from leisure mariners and fisherman have pointed out that ANAVNET is a valuable and very flexible application.

Regarding 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.

## 5- CAPACITY BUILDING

The cooperation of Portugal within the SAIHC region in the hydrography domain, during this report's period, was the following:

### a. ANGOLA

IHPT established contacts with the Director of IHSMA (Hydrographic and Maritime Signalization Institute of Angola), Angola's HO, related to the future collaboration between IHPT and IHSMA. An agreement of collaboration was proposed to develop IHSMA hydrographic capacity. A proposal was also presented to execute the hydrographic and topographic surveys of the most important Angolan harbours and to produce the respective Nautical Paper Charts and ENC's.

An IHO capacity building advisory visit was planned to November 2012 with the participation of one hydrographer from IHPT but, due to problems in schedule, it was successively delayed.

### b. MOZAMBIQUE

The Director of INHAHINA (Mozambique's HO) visited IHPT in November 2009 under the Bilateral Agreement between Mozambique and Portugal in the field of Hydrography, Nautical Cartography, Safety of Navigation and Oceanography. A collaboration program was established including nine action items to be realized during three years 2010-2012 to increment INHAHINA's capabilities in the mentioned areas. However, due to financial reasons some of the action items were not achieved.

Under the mentioned agreement, in April 2013 a cartographer from IHPT was at INHAHINA providing advice/training in the production of nautical charts.

An IHO capacity building advisory visit was realized in October 2012 with the participation of one hydrographer from IHPT.

## 6- OCEANOGRAPHICS ACTIVITIES

IHPT has regular and robust activity in respect to physical, geological and chemical oceanography participating in national and European Union research projects in those fields. As contributed to the development of the renewal energy testing in Portugal through the characterization of wave and weather regimes.

IHPT is running, presently, a comprehensive network of tide gauges (17), wave and parametric buoys (7) and coastal weather stations (3) in the Portuguese EEZ. A HF radar system to measure superficial currents and waves is also being operated by IHPT along the Portuguese coast (3 stations).

## 7- OTHER ACTIVITIES

### a. Information technologies and GIS

IHPT has several portals at Internet and Intranet (hidrografico.pt) presenting information about its organization, main activities, products offered and specific geo-spatial on-line data.

Notices to Mariners and Navigational Warnings issued by the IHPT are also available at IHPT Internet portal ANAVNet, 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 IDAMAR (Geographic Spatial Data Infrastructure for the Marine Environment).

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

The use of geo-spatial data has been improved with the OGC standards employment and two portals were dedicated to provide the information.

This SDI is also being used to support IC-ENC by providing a world ENC availability catalogue (independent of maker or distributor) to support the mariners.

In more recent years IHPT has improved data safeguard by the use of Virtualization Technology which allows much more flexibility on servers and workstations management or deployment.

## b. Courses in Hydrography

IHPT School of Hydrography and Oceanography provides Specialization Courses in Hydrography (FIG/IHO Category A and B).

During the period of this report attended the courses the following students:

- 2011/2012 – Cat. A – 4 militaries of the Portuguese Navy and 3 civilians (one Spanish);
- 2012/2013– Cat. B - 3 militaries of the Portuguese Navy and 3 Portuguese civilians;
- 2013/2014 (ongoing) – Cat. A – 5 militaries of the Portuguese Navy and 3 civilians (one Spanish). IHPT also expect 5 more students from Angola.


Figure 8 – IHPT School of Hydrography and Oceanography

# ANNEX A

## HYDROGRAPHIC OFFICE GENERAL INFORMATION

## PORTUGAL (PORTUGUESE REPUBLIC)

| **INSTITUTO HIDROGRAFICO**<br>**Rua das Trinas – 49**<br>**1249-093 LISBOA** | |
|---|---|
| **Department of which the Hydrographic Office is part** *Ministère dont dépend le Service Hydrographique Ministerio del que depende el Servicio Hidrográfico* | Ministry of National Defence – Navy. |
| **Principal functions of the H.O. -** *Attributions principales du S.H. Principales funciones del S.H.* | 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 :**<br>**Fax :**<br>**E-mails :**<br>**WEB site:** | + 351 21 094 3000<br>+ 351 21 094 3299<br>dirgeral@hidrografico.pt<br>dirtecnica@hidrografico.pt<br>hidrografia@hidrografico.pt<br>http://www.hidrografico.pt |
| **Date of establishment and Relevant National Legislation –**<br>***Date de fondation et législation nationale concernée*** *– Fecha de establecimiento y Leyes nacionales dereferencia* | 22 September 1960<br>• Territorial Sea: Law n° 34/2006<br>• Baseline: Laws n° 2130/66 and 495/85<br>• EEZ: Laws nº 34/2006, n° 119/78 and n° 52/85 |
| **Name and rank of the Director or Head -** *Nom et grade du directeur – Apellidos y graduación del Director* | Rear-admiral António da Silva Ribeiro, Director General |
| **Tonnage** – *Tonelaje* | 2011 = 1,334,011 |
| **Total Budget** - *Budget total – Presupuesto Total* | 8 million Euros |
| **Staff employed -** *Effectifs – Plantilla* | For details, consult the WEB site:<br>http://www.hidrografico.pt |
| **N° of charts published -** *Nombres de cartes publiées – N° de cartas publicadas* | 224 |
| **N° of INT charts published –** *Nombres de cartes INT publiées - N° de cartas INT publicadas.*<br>**N° of ENC cells published –** *Nombres de cellules ENC publiées - N° de células ENC publicadas.* | 35<br><br>74 |
| **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.)* | - Catalogue of Charts and Nautical Publications;<br>- Catalogue of Nautical Charts of Portugal;<br>- Tide Tables – Volume I – Portugal;<br>- Tide Tables – Volume II – African Portuguese Speaking Countries;<br>- List of Radio Aids and Services;<br>- List of Lights, buoys, beacons and fog signals – Volume I – Portugal;<br>- List of Lights buoys, beacons and fog signals – Volume II – Angola, Moçambique, São Tomé and Guiné Bissau;<br>- List of Lights buoys, beacons and fog signals – Volume III – Cape Verde Archipelago<br>- Sailing Directions – Continental Portugal – Volumes I to III;<br>- Sailing Directions – Azores Archipelago – Volumes I to II;<br>- Sailing Directions – Madeira Archipelago; |

| | | | |
|---|---|---|---|
| | - Sailing Directions - Angola and São Tomé e Principe Ports Pilot;<br>- Sailing Directions - Cabo Verde – Volumes I to V;<br>- Sailing Directions (Pleasure Craft) – Continental Portugal (Portuguese/English). | | |
| **Surveying vessels/ Aircraft –** *Bâtiments hydrographiques/aéronefs – Buques hidrográficos/ Aeronaves* | Displacement | Date Launched | Crew |
| **D. CARLOS I** | 2285 | 1989 | 34 |
| **Almirante GAGO COUTINHO** | 2285 | 1985 | 34 |
| **ANDRÓMEDA** | 245 | 1985 | 13 |
| **AURIGA** | 245 | 1987 | 13 |
| **ATLANTA** | 38.7 | 1981 | 3 |
| **CORAL** | 38.7 | 1981 | 3 |
| **FISÁLIA** | 38.7 | 1981 | 3 |
| **Other information of interest –** *Autres informations utiles - Otra información de interés.* | IHPT School of Hydrography and Oceanography provides Hydrography and Oceanography FIG/IHO category A and B courses. | | |