



SPAIN

NATIONAL REPORT

**TO THE 14th MEETING
OF THE EASTERN ATLANTIC
HYDROGRAPHIC COMMISSION
(EAtHC)**

**CÁDIZ, ESPAÑA
18 – 20 OCTUBRE 2016**

1. Hydrographic Service

Spanish Navy hydrography Office (IHM) did not have significant organization changes since last EAthC meeting.

IHM Website <http://www.armada.mde.es/ihm> presents more detailed information about our mission, organization structure and assets.

The following report covers the period starting September 2014 up to October 2016.

2. SURVEYS

2.1. Coverage of new surveys

In the past two years and for the purpose of updating bathymetric data for our national nautical chart scheme covering the Atlantic Ocean, IHM conducted several hydrographic surveys. All these surveys were conducted by ships and small boats belonging to IHM Hydrographic Flotilla.

More specifically, in the last two years IHM planned and carried out nineteen hydrographic surveys. These surveys were performed by our hydrographic ships and small boats in the north, south and west coasts of the Iberian Peninsula. Seven of these surveys were performed in the Gulf of Cadiz (west of the Strait of Gibraltar), five in the northern coast, and two in the vicinity of the Strait of Gibraltar. In addition, one survey was carried out at the Guadalquivir Estuary mouth, and four more along the course of the same River, including the Port of Seville.



Figure 1. "Malaspina" class Hydrographic Vessel



Figure 2. Coastal Hydrographic Vessel BH Antares

For safety of navigation purposes in shallow and very shallow waters, hydrographic surveys at main Spain's ports and their approaches have been prioritized by the Hydrographic Division (in charge of hydrographic works programming). In order to execute these surveys, IHM employed multibeam echosounders (MBES) and Phase Differencing Bathymetric Sonar Systems (PDBSS) mounted onboard the Hydrographic Flotilla vessels. This allowed for the Full Sea floor Search required by the corresponding IHO Special and 1a Order surveys. Same equipment and similar methodology was employed for IHO 1b and 2 Order surveys.



Figure 3. Transportable Hydrographic Launch LHT Escandallo



Figure 4. Very shallow water bathymetry system operated from a small rubber boat

In addition to the already explained ones, IHM continued the systematic Spanish Exclusive Economic Zone (EEZ) surveys in cooperation with other Spanish national institutions and universities on board the Oceanographic Research Vessel *Hespérides*. *RV Hespérides* is assigned one month a year to Spanish EEZ surveys. In 2015 and 2016, *Hespérides* worked at the Spanish EEZ in the Cantabrian and Mediterranean Seas.



Figure 5. Spanish Navy Oceanographic Research Vessel "Hespérides"

Survey planning

All surveys have been conducted in accordance with the Order Type and purpose of each navigational area (IHO S-44). In addition, more detailed instructions have been promulgated by the Hydrographic Division as a set of «Manuals» and «Hydrographic Permanent Instructions», as the way IHO S-44 Standards can be achieved employed the available equipment. These manuals and instructions were

written with the goal for the hydrographers to have detailed and specific indications on how to use the available equipment in a survey. These procedures may increase efficiency and reduce the time required to complete the workflow from the planning of a survey, the at-sea works and the following processing and validation of data.

2.2. New technologies and / or equipment

During the past two years, IHM continued to acquire new equipment and develop new procedures.

The main acquisition and technical procedural effort was in RTK positioning. Transportable Hydrographic Launches *LHT Escandallo* and *LHT Astrolabio* were fitted with GPS RTK positioning equipment and the corresponding user's procedures were prepared. The Guadalquivir River surveys were executed with this positioning technique.

2.2.1. Echosounders

- Both Hydrographic Vessels *Tofiño* and *Malaspina* are currently fitted with two MBES each in full operation. This allows them to perform surveys in shallow and deep waters from 20 up to 5000 meters.
- *BH Malaspina* is fitted with *Kongsberg EM302* and *EM 3002 MBES*.
- *BH Tofiño* required a repair by the end of 2014 of her *Kongsberg's EM300 MBES* (now fully operational) and is fitted also with an *EM 3002 MBES*.
- For very shallow water surveys, both vessels are provided with *Kongsberg Geoswath+ PDBSS* to be fitted on their small launches.
- Coastal Hydrographic Vessel *BH Antares* was fitted in 2012 with a *Kongsberg EM2040*. This allows her to achieve Full Sea floor Search from very shallow to shallow waters up to 300 meters. For very shallow water surveys, she is provided with *Kongsberg Geoswath+ PDBSS* to be fitted on her small launches.
- All the *Kongsberg Geoswath+ PDBSS* mentioned are shared among the vessels of the Hydrographic Flotilla. IHM has a total of two *Geoswath+ 500* for shallow waters up to 50 meters and one *Geoswath+ 250* for waters up to 80 meters.
- Transportable Hydrographic Launch *LHT Astrolabio* is fitted with a *Kongsberg EM2040 Compact MBES* with *Seapath 330* (RTK positioning capable).
- Transportable Hydrographic Launch *LHT Escandallo* is fitted with a *Kongsberg EM3002D MBES*. In September 2016 she has been fitted with a *Seapath 330* (RTK positioning capable).
- Transportable Hydrographic Launch *LHT Sondaleza* has no permanent echosounder installed and is fitted with a *Kongsberg Geoswath+ PDBSS* when deployed.

2.2.2. Bottom mapping sonars

- IHM's bottom mapping capability is based on several Side Scan Sonar (SSS) systems.
- A *Klein 3900* Side Scan Sonar, with the capability of being fitted with a magnetometer, was acquired in 2012 and is in operation ever since. This equipment is shared among the vessels of the Hydrographic Flotilla.

- For shallow waters, all three *Geoswath+* PDBSS available for the Hydrographic Flotilla small boats, have side scan imaging capability. Both bathymetry and side scan image is acquired during surveys with these equipment. This allows for precise georeferenced bottom images.
- Small boats are also fitted with pole-mounted *Starfish* SSS for very shallow water surveys.

2.3. New Ships

Although fitted with state-of-the-art hydrographic systems, *BH Antares* is the oldest and not yet refurbished vessel of the Hydrographic Flotilla. In summer 2016 some main engine works have been conducted aimed to extend her operational live, at least, two more years. There are plans for a new vessel but no date or budget has already been assigned for.

3. NEW CHARTS & UPDATES

3.1. ENC's

3.1.1. Production

Up to September 15, 2016, the IHM has produced 46 ENC's within the area of the EAtHC (out of a total of 259 published for all areas). Table 1 and 2 shows the distribution according to their navigational purpose:

Purpose 2	Purpose 3	Purpose 4	Purpose 5
General	Coastal	Approach	Harbour
0	1	10	35

Table 1. Distribution of ENC production in the EAtHC area

EAtHC ENC Production until July 5, 2014					
Purpose	Total	Published	Pending	% Published	% Pending
2	0	0	0	100%	0%
3	1	1	0	100%	0%
4	10	10	0	100%	0%
5	35	35	11	77%	23%
Total	46	46	11	85%	15%

Table 2. Distribution of ENC production and percentage in the EAtHC area

Since the date of the last meeting 35 new ENC's (Purpose 5), 10 ENC's (Purpose 4), 1 ENC's (Purpose 3), 22 new editions and 791 updates have been produced within the EAtHC area. This shows the increasing workload associated with maintaining and updating the ENC catalog, which slows the production of new ENC's.

Tables 3 and 4 shows the new ENC / editions within the EAtHC published since the date of the last meeting.

NEW EDITIONS FROM 05/07/2014 TO 15/09/2016		
NUMBER	TITLE	ED.
ES561002	Puerto de Las Nieves	1
ES504411	Puerto de Huelva	4
ES560502	Puerto de Puerto del Carmen	1
ES539301	Puerto de Lekeitio	1
ES503922	Puertos de Mutriku y Ondarroa	1
ES540413	Puerto de San Esteban de Pravia	1
ES540702	Puerto de Foz	1
ES544301	Puerto de Gallineras	1
ES504450	Puerto de Tarifa	3
ES544001	Puertos de Isla Cristina y El Moral	1
ES560301	Puerto de Puerto del Rosario	2
ES504125	Rías de Ares y Betanzos	1
ES504126	Puerto de La Coruña	1

ES400445	Aproches de Algeciras	7
ES300105	Estrecho de Gibraltar	6
ES400412	Aproches rías de Ferrol y La Coruña	4

Table 3. New ENC editions produced since the date of the last EAtHC meeting.

NEW ENC FROM 05/07/2014 TO 01/09/2016			
NUMBER	TITLE	ED.	DATE
ES561104	Puerto de Pasito Blanco	1	09/07/2016
ES541522	Puerto de A Pobra do Caramiñal	1	25/06/2016
ES541601	Puerto de Piedras Negras	1	04/06/2016
ES506100	Puerto de Las Palmas	5	19/03/2016
ES506100	Puerto de Las Palmas	4	27/02/2016
ES400610	Aproches Gran Canaria. Zona norte	5	27/02/2016
ES400442	Aproches de Sanlúcar de Barrameda	3	27/02/2016
ES541101	Ría de Cedeira	1	12/12/2015
ES504167	Puertos de Panxón y Baiona	1	12/12/2015
ES540701	Puerto de Tapia	1	12/12/2015
ES540612	Puerto de Navia	1	12/12/2015
ES504162	Puerto de Marín	5	05/12/2015
ES504083	Puertos Espasante, Ortigueira y Cariño	1	28/11/2015
ES504082	Rías de Viveiro y O Barqueiro	1	28/11/2015
ES400417	Aproches de A Guarda	2	21/11/2015
ES540412	Puertos de El Puntal y Tazones	1	21/11/2015
ES541701	Puerto de A Guarda	1	22/08/2015
ES541642	Puerto de Bueu	1	01/08/2015
ES539102	Puerto de Donostia-San Sebastián	1	27/06/2015
ES400451	Aproches de Ceuta	2	27/06/2015
ES504162	Puerto de Marín	4	16/05/2015
ES400416	Aproches rías de Pontevedra y Vigo	5	16/05/2015
ES504012	Ría de Suances	1	09/05/2015
ES503921	Puertos de Getaria y Zumaia	1	04/04/2015
ES400614	Aproches de Los Cristianos	3	04/04/2015
ES400613	Aproches de Granadilla	2	04/04/2015
ES400415	Aproches de rías de Muros y Arousa	5	21/03/2015
ES504430	Puerto de Cádiz	4	27/08/2016
ES504431	Puerto Rota, Base Naval y Pto Sta. M ^a .	5	27/08/2016
ES504437	Arsenal de la Carraca	2	27/08/2016

Table 4. New ENC cells produced since the date of the last EAtHC meeting

Next figures show the new ENC cells and editions within the EAtHC published since the date of the last meeting.

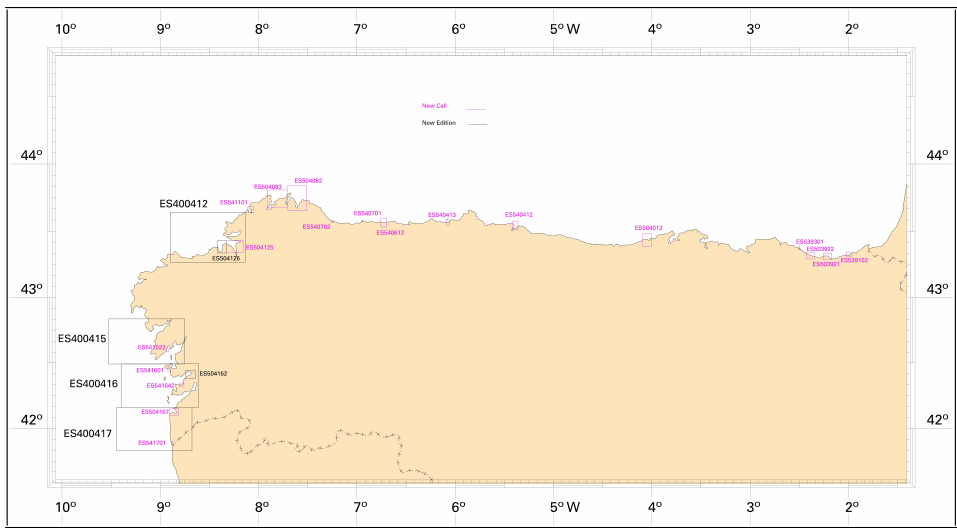


Figure 9. New ENC cells and editions produced in North of Spain since the date of the last EAthC meeting (purposes 4 and 5)

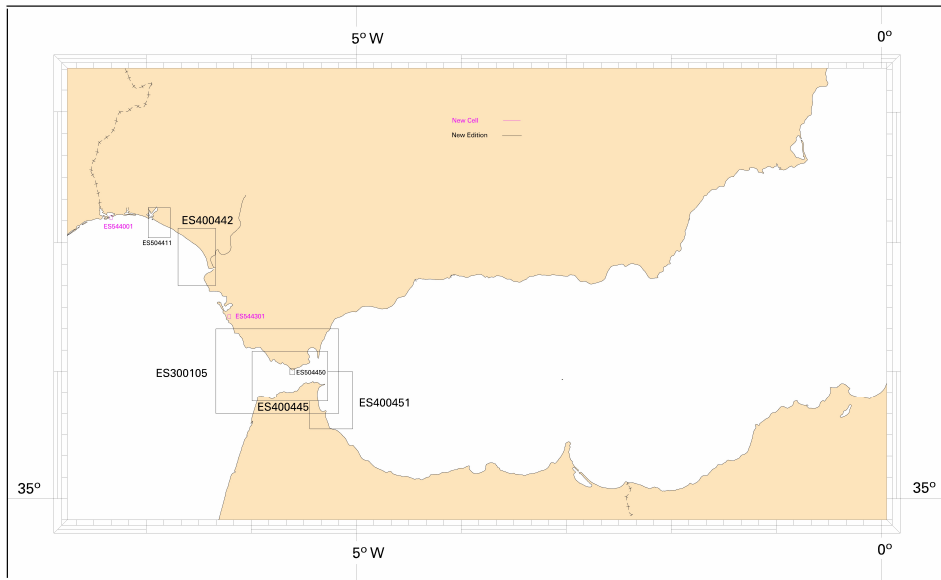


Figure 10. New ENC cells and editions produced in Gulf of Cádiz since the date of the last EAthC meeting (purposes 4 and 5)

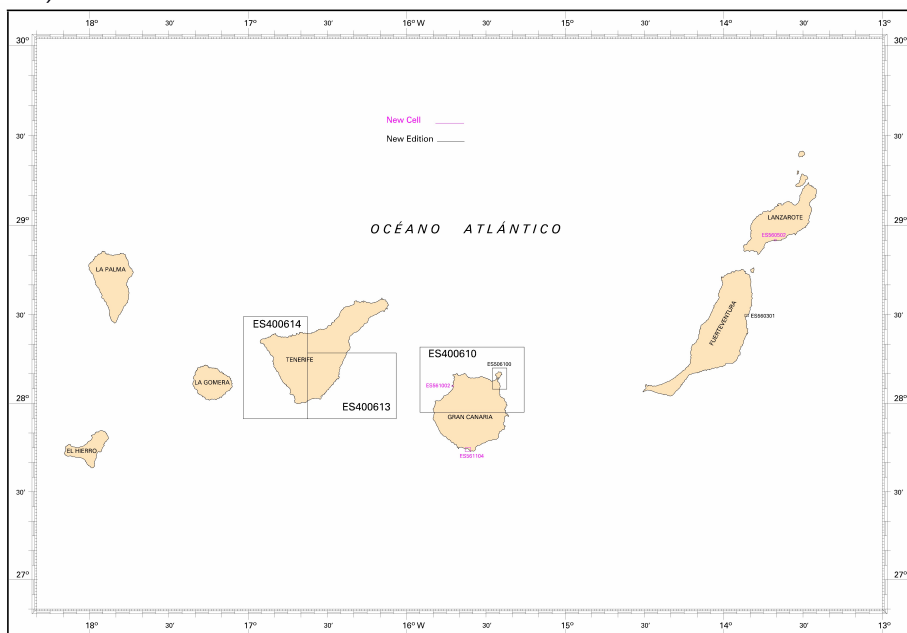


Figure 11 New ENC cells and editions produced in Canary Islands since the date of the last EAthC meeting (purposes 4 and 5)

The objectives that we will face are to complete the project finishing Purpose 5 cells left, and begin a new project with Purpose 6 cells to cover major Spanish ports.

3.1.2. Cooperation

Under the cooperation with the IC-ENC and PRIMAR RENCs, IHM continues to exchange all the ENC information needed with Portugal (IHPT) and France (SHOM) in order to accomplish with the IHO recommendations regarding horizontal and vertical consistency on the adjacent ENC

3.2. ENC Distribution method

IHM is a member of the IC-ENC RENC, which carries out ENC validation and consistency checking before distribution, and distributes the ENCs via its chain of Value Added Resellers (VARs).

3.3 RNCs

NTR.

3.4 INT paper charts

Table 5 and figure 12/13, shows the new International paper charts/editions within the EAtHC published since the date of the last meeting. These are new editions (NE).

NUM (INT)	SCALE	TITLE
4430 (INT 1903)(NE)	1/12 500	Puerto de Cádiz
6100 (INT 1928) (NE)	1/12 500	Puerto de Las Palmas

Table 5. INTERNATIONAL paper charts published since the date of the last EAtHC meeting



Figure 12: Peninsula Ibérica.

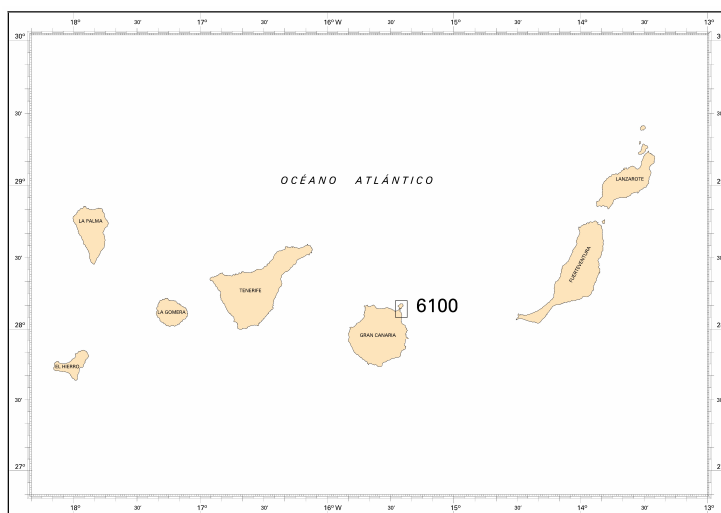


Figure 13: Canary Islands

3.5 National paper charts

Since the date of the last meeting, within the area of the EAtHC, a number of national paper charts have been published. These are new editions (NE). These charts are either produced from national data or adopted from charts produced by other Hydrographic Offices). All of them are shown in Table 6 and figure 14/15.

NUM	SCALE	TITLE
39 (NE)	1/350 000	De Hourín a cabo Mayor
6140 (NE)	1/3 500	Puerto de los Cristianos
4423 (NE)	1/12 500	Río Guadalquivir. Del caño de San Carlos al caño de la Lisa
4162 (NE)	1/10 000	Puerto de Marín

Table 6: National paper charts published since the date of the last EAtHC meeting

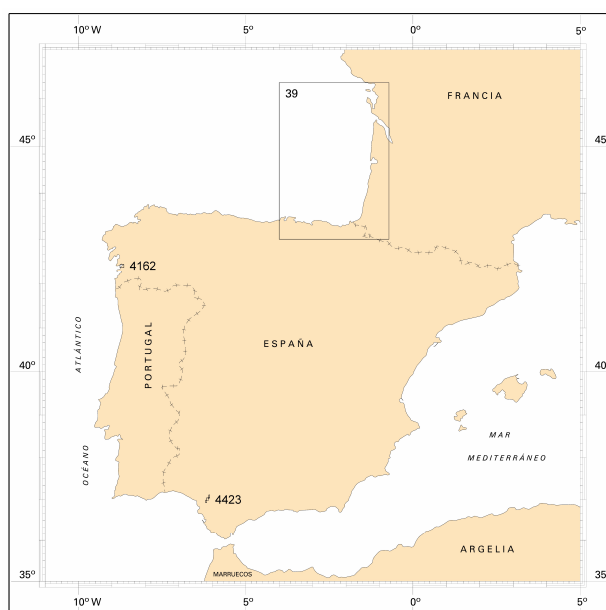


Figure 14: Peninsula Ibérica

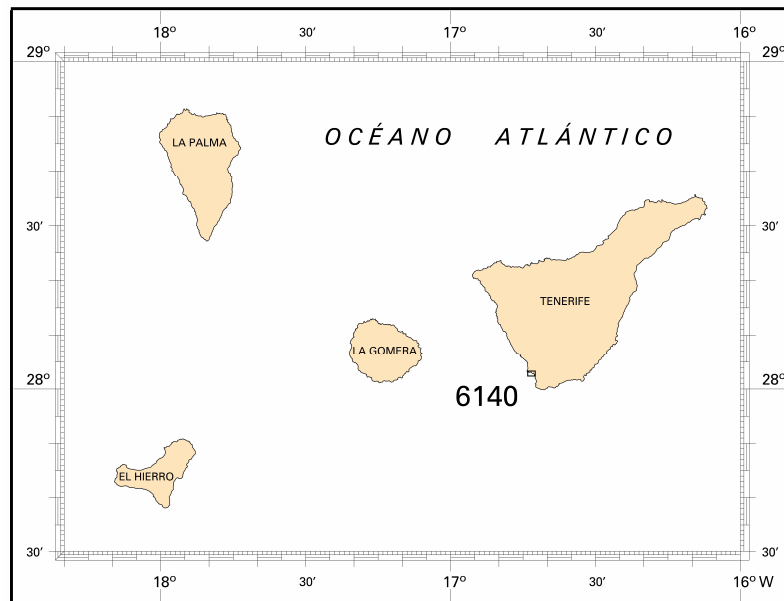


Figure 15: Canary Islands

3.6 Problems encountered

Even though the Spanish catalogue lists nautical charts covering part of the western African coast, no systematic surveys have been carried out by IHM in that area for decades, except for soundings of opportunity when vessels transit between the Iberian Peninsula and the Canary Islands. Therefore, no data are available for IHM to publish up-to-date editions of the existing charts.

3.7 Updates INT Catalogue.

During this period has been made cartographic updating of the INT charts assigned to Spain in the region G, according to the catalogue INTOGIS.

4. NEW PUBLICATIONS AND UPDATES

4.1. New publications

NTR.

4.2. Updated publications

Edition in Spanish of the IHO S4 Publication, “Regulations of the IHO for International (INT) Charts and Chart Specifications of the IHO”, Edition, 4.5.0 (2015) and 4.6.0 (2016).

Edition of the Spanish Catalog of Nautical Charts and other publications, 2015 and 2016 editions.



Figure 16: Catalogue of Nautical Charts and other Publications

Edition in Spanish of the IHO publication INT 1 «Symbols, abbreviations and terms used on charts, 5th edition, 2015».

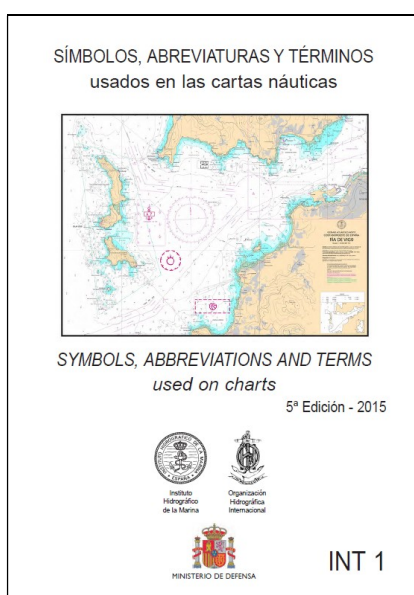


Figure 17: Publication INT 1

Sailing Directions num.1, 2016 edition. North Coast of Spain, from Río Bidasoa to Ría de Ribadeo.

Sailing Directions num. 2, 2016 edition. North and Northwest Coast of Spain, from Ría de Ribadeo to Cabo Finisterre.

Sailing Directions num.3, 2016 edition. Northwest Coast of Spain, from Cabo Finisterre to Rio Miño.

Sailing Directions num.4, 2016 edition. Coast of Portugal and Açores Islands.

Sailing Directions num. 5, 2016 edition. Southwest and South Coast of Spain, from Río Guadiana to Cabo Sacratif including the North and South Coasts of Gibraltar Strait.

Sailing Directions num. 9, 2016 edition. Northwest Coast of Africa, from Cabo Espartel to Cabo Verde, including Madeira, Selvagens and Cabo Verde Islands.

Sailing Directions num. 10, 2016 edition. Canary Islands.

List of lights and fog signals, part I, 2016 edition. Coasts of Spain and Portugal on the Atlantic Ocean, Africa West Coast from Cabo Espartel to Cape Verde (Senegal), Azores Islands, Madeira, Canary Islands and Cape Verde.

List of lights and fog signals, part II, 2016 edition. Gibraltar Strait, Balearic Islands and Mediterranean coasts of Spain, Morocco and Algeria.

Radiosignals, 2016 edition.

4.3. Means of delivery.

A digital version of the publication *List of Lights and Fog Signals* is currently available online (an interactive internet tool) in the following internet address:

http://www.armada.mde.es/ihm/Aplicaciones/LibroFaros/LF_jquery/index.html

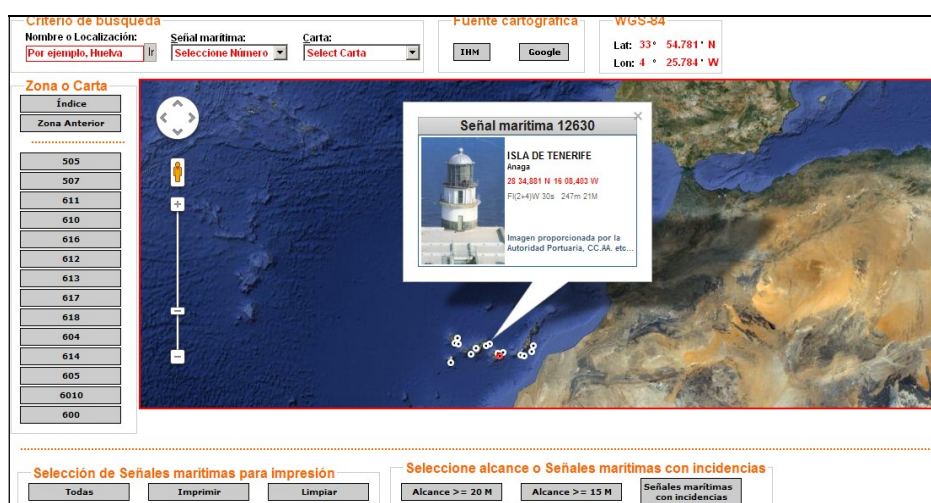


Figure 18. Screenshot of the List of Lights and Fog Signals interactive tool

5. MSI

5.1. Existing Infrastructures for transmission

The current situation of the dissemination of Maritime Safety Information (MSI) can be summarized as follows:

5.1.1. Radio Navigational Warnings

National Coordinator: SASEMAR (Spanish Maritime Safety Agency) is the national Coordinator for coastal and local radio navigational warnings. The National Rescue Co-ordination Centre (CNCS) is located in Madrid.

Means: NAVTEX, MF and VHF Stations.

There are three Spanish NAVTEX stations broadcasting in the NAVAREA II region: La Coruña (NW Iberian Peninsula), Tarifa (Strait of Gibraltar and Gulf of Cadiz), and Las Palmas (Canary Islands). They broadcast in English and Spanish.

The Spanish Hydrographic Institute (IHM) is the NAVAREA III Coordinator (Mediterranean and Black Sea).

There is a fluid exchange of NAVAREA warnings between the NAVAREA II and NAVAREA III Coordinators.

Likewise SASEMAR exchanges MSI messages with Morocco and Portugal to promulgate the pertinent coastal warnings.

Morocco also sends MSI to IHM that can be used to promulgate NAVAREA III warnings, or be sent to SASEMAR to transmit coastal warnings.

5.1.2. SAR Organisation

Coordinator: SASEMAR through its National Centre (CNCS) and its Area, Regional and Local Centres.

Means: NAVTEX stations and communication stations at SASEMAR Centres, as well as coastal MF and VHF stations.

5.2. New infrastructure in accordance with GMDSS Master Plan

NTR.

5.3. Problems encountered.

NTR.

6. C-55

6.1. SPAIN. CHARTING REGION G

6.1.1. Hydrographic Surveying

Survey coverage, where:

A = percentage which is adequately surveyed.

B = percentage which requires re-survey at larger scale or to modern standards.

C = percentage which has never been systematically surveyed.

	A	B	C
Depths < 200 m	67	33	0
Depths > 200 m	92	0	8

6.1.2. Nautical Charting

Status of nautical charting within the limits of the EEZ

A = percentage covered by INT series, or a paper chart series meeting the standards in S-4.

B = percentage covered by Raster Navigational Charts (RNCs) meeting the standards in S-61.

C = percentage covered by ENC's meeting the standards in S-57.

Purpose/ scale	A	B	C
Offshore passage/ Small	100	0	100
Landfall and Coastal passage/ Medium	100	0	100
Approches and Ports/ Large	100	0	85

Regarding to ENC large scale coverage is important to notice that current percentage (85%) has been calculated over the new ENC production project, which aims to cover all national main and secondary ports.

6.1.3 . Maritime Safety Information (MSI).

NAVIGATIONAL INFORMATION (S-53)

SERVICE	Yes	No	Partial	Notes
Local Warnings	X			Via SASEMAR
Coastal Warnings	X			Via SASEMAR
NAVAREA Warnings	X			Via NAVAREA II Coordinator
Port Information	X			Port Authorities

GMDSS IMPLEMENTATION (IMO Publication 970–GMDSS Manual)

SERVICE	Yes	No	Partial	Notes
Master Plan	X			
Area A1	X			
Area A2	X			
Area A3	X			
NAVTEX	X			
SafetyNET	X			

6.2. SPAIN. CANARY ISLANDS, CHARTING REGION G

6.2.1. Hydrographic Surveying

A = percentage which is adequately surveyed.

B = percentage which requires re-survey at larger scale or to modern standards.

C = percentage which has never been systematically surveyed.

	A	B	C
Dephts < 200 m	40	60	0
Dephts > 200 m	60	0	40

6.2.2. Nautical Charting

Status of nautical charting within the limits of the EEZ

A = percentage covered by INT series, or a paper chart series meeting the standards in S-4.

B = percentage covered by Raster Navigational Charts (RNCs) meeting the standards in S-61.

C = percentage covered by ENC's meeting the standards in S-57.

Purpose/ scale	A	B	C
Offshore passage/ Small	100	0	100

Landfall and Coastal passage/ Medium	100	0	100
Approaches and Ports/ Large	100	0	80

Regarding to ENC large scale coverage is important to notice that current percentage (80%) has been calculated over the new ENC production project, which aims to cover all national main and secondary ports.

6.2.3. Maritime Safety Information (Msi).

NAVIGATIONAL INFORMATION (S-53)

SERVICE	Yes	No	Partial	Notes
Local Warnings	X			Via SASEMAR
Coastal Warnings	X			Via SASEMAR
NAVAREA Warnings	X			Via NAVAREA II Coordinator
Port Information	X			Port Authorities

GMDSS IMPLEMENTATION (IMO Publication 970–GMDSS Manual)

SERVICE	Yes	No	Partial	Notes
Master Plan	X			
Area A1	X			
Area A2	X			
Area A3	X			
NAVTEX	X			
SafetyNET	X			

7. Capacity Building

7.1. Offer of and/or demand for Capacity Building

The Spanish Hydrographic School, located within the premises of the IHM, offers both hydrographic surveyor Category A and B courses. These courses are 10-month long and are taught in Spanish. Minimum academic enrolling requirements should be fulfilled.

On April 2013 the Specialization Programs in Hydrography & Oceanography for Naval Officers (Cat A) and for Petty Officers (Cat B) were revalidated and recognized by the FIG/IHO/ICA International Board on Standards of Competence for Hydrographic Surveyors and Nautical Cartographers.

The following is a list of the students who have attended these courses in the last three academic years:

Cat A:

Academic year 2016-2017.

- 2 Officers from the Spanish Navy
- 1 Officer from Mauritania
- 1 Officer from Morocco
- 1 Officer from Argentina
- 1 Officer from Uruguay

Academic year 2015-2016.

- 2 Officers from the Spanish Navy
- 1 Officer from Algeria
- 1 Officer from Morocco

Academic year 2014-2015.

- 2 Officers from the Spanish Navy
- 1 Officer from Algeria

Cat B:

Academic year 2016-2017.

- 3 Petty Officers from the Spanish Navy

Academic year 2015-2016.

- 3 Petty Officers from the Spanish Navy
- 1 Petty Officer from Morocco

Academic year 2014-2015.

- 3 Petty Officers from the Spanish Navy

To date, all the students taking the fore mentioned courses are military personnel. The attendance of non-Spanish students is offered through a *Collaboration Agreement with regard to military training*, signed between the Spanish Ministry of

Defense and other countries. This agreement provides grants for the attendance to the abovementioned courses.

The point of contact for these matters is generally the Defense Attaché to the corresponding Spanish Embassy

7.2. Training received, needed, offered

Currently there are several Spanish officers who are attending different master:

One is currently attending the course in «*Ocean Engineering: Ocean Mapping - MS*» at the Center for Coastal and Ocean Mapping & Joint Hydrographic Center, Univ. of New Hampshire, for a two-year period.

Another one is attending the Master of Coastal and Port Engineering at the University of Cantabria, for a period of two years.

Another attended the course of Geodesy in the geographical center of the Army, for a period of two years and finished it last July.

8. Oceanographic activities

8.1. General

IHM continues developing a database tide of national ports in order to facilitate their exploitation from the Internet.

Installation of permanent tide stations in locations that will improve the current coverage of the national tide gauge network is still in process. Once deployed, it is to share your data with other national bodies studying the tide, and also have their own permanent tide gauges.

A study is being carried out for getting to know the propagation of the tidal wave along the Guadalquivir River, in close collaboration with Sevilla Port Authority and the University of Málaga.

8.2. GEBCO/IBC's activities

NTR.

8.3. Tide gauge network

There is a tidal gauge network all around Spain with more than 40 sensors distributed along the coast. Three out of them belong to IHM, and there is a Project to install two more in the near future.

8.4. New equipment

Ten tidal stations fitted with radar sensors have been acquired. And Works are being carried out for integrating them in a tidal gauge capable of reporting data in real time. Currently they are still in trial process.

8.5. Problems encountered

The current tide database has the limitation of no access to the data and thus operatively to conduct analyzes and studies.

A new generation of database has started in order to solvent this problem and at the same time facilitate their exploitation with web applications that can be access by hydrographic commissions.

9. Other activities

9.1. Participation in IHO Working Groups

The IHM takes part in several committees and working groups of the IHO:

- Hydrographic Services and Standards Committee (HSSC)
- Nautical Information Provision Working Group (NIPWG)
- Chart Standardization and Paper Chart Working Group (CSPCWG)
- Tidal and Water Level Working Group (TWLWG)
- Marine Spatial Data Infrastructure Working Group (MSDIWG)
- World-Wide Navigational Warning Service Sub-Committee (WWNWS)
- Hydrographic Dictionary Working Group (HDWG)
- Finance Committee (FC)
- Hydrographic Commission on Antarctica (HCA)
- East Atlantic Hydrographic Commission (EAthC)
- Mediterranean and Black Sea Hydrographic Commission (MBSHC)

9.2. Meteorological data collection

We currently have deployed a weather station in the Arsenal of Ferrol and one in training camp Sierra Retin, and send their data over the Internet.

Additionally we have installed three automatic tide gauge stations with meteorological sensors.

9.3. Geospatial studies

NTR

9.4. Disaster prevention

In 2015 IHM participated giving a lecture in a Technical Conference on tsunamis that took place in Cadiz.

In 2016 the Technical Commission on Irrigation Tsunami chaired by Civil Protection and in which the IHM provided bathymetry to feed the models predicting coastal flooding.

9.5. Environmental protection

IHM continues feeding a database of whale watching with the information received from Navy ships.