

**8th Conference of the EAtHC**

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REPORT FROM PORTUGAL

INSTITUTO HIDROGRÁFICO  
(IHPT)



## **1- INTRODUCTION**

This report describes the main technical activities and developments of the IHPT during the period of October 2002 to October 2004. It was elaborated in order to be presented to the 8<sup>th</sup> Conference of the EAthC, and specially covered the following areas: Hydrography, Cartography, Information Technologies and GIS, Marine safety, IBCEA project and Technical Assistance and Training.

## **2 - HYDROGRAPHY**

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

The singlebeam 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 MAX). 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). One echosounder SIMRAD EA600 with two side scan transducers was recently acquired and is currently under test.

Data processing is done with the system used for the data acquisition (HYPACK MAX). For presentation and archive purposes the data is transferred to the CARIS GIS format. The CARIS files are the layout used to store the hydrographic data that can be readily used for cartographic production.

The IHPT is presently operating several multibeam echosounder systems (MBES): for shallow waters a portable system (SIMRAD EM 3000), for medium/shallow waters (SIMRAD EM 950) on board a 15 metre launch and for deep waters (SIMRAD EM 120) on the Hydrographic Ship "D. Carlos I". Each of those systems also includes 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). One portable SIMRAD EM 3002 was recently acquired and is currently under test.

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

surveyors or with a moto-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), AutoCAD MAP and in-house software COORD (for pure traditional measurements -angles and distances).

The use of GPS RTK/OTF techniques for tide measurements is sometimes used. For the areas that are surveyed on a regular basis, the local geoidal height was computed, in order to have a geoid model with an adequate accuracy.

The procedures (planning, execution and processing) of hydrographic surveys within the IHPT are in accordance with the IHO Special Publication S-44 (4th Edition, 1998). 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.

A new side scan sonar system (KLEIN 5000) was also acquired, including a digital processing software package (TRITON ELICS).

Most of the hydrographic surveys during the last two years 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 Açores and Madeira. So, the next systematic resurvey of Portuguese coastal waters will be done with MBES and GPS positioning.

The Hydrographic Ship “D. Carlos I” made three major surveys. One was in the West coast of Portugal, in the Iberian Abyssal Plain and it was related to the works of extension of the Continental Shelf. The other two were done in the South coast of Portugal, in the Horseshoe Abyssal Plain and Gulf of Cadiz, and they were requested by Portuguese universities, in cooperation with foreign universities and other research institutions.

Some surveys for environmental studies and coastal protection were also done. 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.

Using an ORACLE database management system it was developed in-house a Hydrographic Data Warehouse (HDW) in order to integrate all the bathymetric data available. The HDW is under the population phase, what implies sometimes the digitization of older survey fair sheets.

### **3 - CARTOGRAPHY**

The paper chart production in the 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 the software CARIS. 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 main development in the last years was the total transfer from UNIX workstations to WINDOWS computers, running the new versions of CARIS GIS.

All the IHPT new charts and new editions are bilingual (in Portuguese and English) and follow the INT specifications, whether or not they belong to the INT series. A list of the official paper charts produced by the IHPT since 2002 is presented in Annex A.

The production of ENC cells starts with some CARIS software modules (HOM) but the main work is done using software produced by 7 -C's (ENC Tools) and HydroServices (dKart Inspector). In 2002 the IHPT changed the cells format from S-57/Edition 3.0 to S-57/Edition 3.1.

It was acquired a desktop ECDIS software ECPINS-M to make the final validation of the ENC cells. Two of the Portuguese Navy hydrographic ships equipped with ECDIS have been used to verify the IHPT ENC cells in real navigation conditions.

After the splitting of the PRIMAR initial organization, the IHPT joined the International Centre for ENCs (IC-ENC), managed by the UKHO. The IHPT actively participated in the works of both PRIMAR and IC-ENC, including in their Technical Experts Working Groups. It is expected that 42 Portuguese ENC cells will be available for distribution at the IC- ENC by the end of 2004, charting all the oceanic and coastal waters of Portugal, as well as the main harbours and their approaches.

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.

A list of the official ENC cells produced by the IHPT is presented in Annex B.

The IHPT acquired a CARIS Hydrographic Production Database (HPD) which will allow a full integration of the cartographic production, both paper

charts and ENC cells. The HPD works with an ORACLE 9i database management system and permits to have a single and seamless database for all the cartographic information available in the IHPT. The data format follows the S-57 specifications and all the spatial information use WGS84 coordinates. This system is currently in tests and data population.

Following the full digital cartographic production, and after exhaustive tests of plotters, papers and inks, the IHPT is now installing a Print-on-Demand system, in order to print the nautical charts as they are requested by the users.

The IHPT joined the COASTCHART project, funded by the European Space Agency, as well as UKHO, SHOM-FR and IHM-ES. This project aims to get the digitized coastline of central and western Africa with the recourse to satellite imagery.

#### **4- NAUTICAL PUBLICATIONS AND MARINE SAFETY**

The IHPT provides a 24h service of Navigational Warnings, including NAVTEX and cooperation with the NAVAREA II coordinator.

Every two weeks the IHPT publishes a Group of Notices to Mariners, containing all the permanent, preliminary and temporary warnings in force for the corresponding period.

Since 2002, the **IHPT** published the following nautical publications:

- Annual Group of Notices to Mariners (2003)
- Annual Group of Notices to Mariners (2004)
- Coast Pilot of Portugal – Archipelago of Açores – 2<sup>nd</sup> edition – Supplement 01 (2003)
- Coast Pilot of Portugal – Archipelago of Madeira – 3<sup>rd</sup> edition – Supplement 01 (2003)
- Aids to Navigation – List of Lights, Buoys, Beacons and Fog Signals – 6<sup>th</sup> edition (2003)
- Aids to Navigation – List of Radiosignals and Services – 4<sup>th</sup> edition (2003)
- Catalogue of Symbols and abbreviations used on Portuguese Nautical Charts – 2<sup>nd</sup> edition (2003)

Annually, the IHPT also publishes the Tide Tables for the main harbours of Continental Portugal and the Archipelagos of Açores and Madeira. During the last years some of the tidal constituents continued to be recalculated using more recent tidal observations. In 2002 started a project to automate the tidal stations in order to provide remote access to their data.

The Broadcast Stations of the Differential GPS National Service in Portugal are now operational. The mainland component consists of two DGPS Broadcast Stations, with redundancy and integrity monitoring, located at Cape Carvoeiro and Sagres. There are also two Broadcast Stations at the

Portuguese archipelagos, which are on validation/test period: one in the Azores (Horta station) and another one in Madeira (Porto Santo station).

## **5 - INFORMATION TECHNOLOGIES AND GIS**

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

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

Databases and related applications are being developed using ORACLE 8i or 9i. 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.

The system was designed to be explored both internally and externally. Due to security reasons, the internal computer network is physically separated from any external network. To keep system coherency, a replica of a subset of the database is published in the internet-enabled network and feeds Internet users with two information products: tide predictions and sea state data available at the IHPT already referred Internet site.

The sea state information process was designed to automate data acquisition. A set of moored wave buoys measure sea-state offshore Portugal and send their readings, every 3 hours, to the nearest Portuguese Navy facility (generally a lighthouse) that relays then via modem to the Office. An application then directs these data to the database and updates sea state information on intranet and Internet servers. Available sea state information includes wave height, direction and sea temperature in both chart and tabular format. Historic information is available in chart format only (last week, month, trimester and year). Both tide prediction and sea state information products can also be explored via WAP -cell phone with Internet access - at [www.vizzavi.pt/~vb39873a/default.wml](http://www.vizzavi.pt/~vb39873a/default.wml)

Budget issues and data policy limit the external exploration of the system, but it is expected that a complete Internet catalogue of the IHPT data holdings and a metadata engine for their documentation will be publicly available in the near future.

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

Using the GIS capacities of CARIS GIS and CARIS LOTS, several studies for maritime delimitations were done, in accordance to the United Nations Convention on the Law of the Sea (UNCLOS). These included the Desktop study relative to the possible extension of the Portuguese Continental Shelf, during 2003.

## **6 - IBCEA PROJECT**

The IBCBA Sheet 1.01 (Portugal - Continental Portugal) was edited in February 2002. The corresponding digital information was also supplied to the British Oceanographic Data Centre in order to be integrated in the new edition of the GEBCO Digital Atlas, edited in 2003 during the GEBCO Centenary.

The IBCEA Sheet 1.02 (Portugal - Archipelago of Madeira) is under compilation of bathymetric information at the scale of 1:250 000, but the progress is quite slow.

Relatively to the IBCEA Sheet 1.03 (Portugal - Archipelago of Açores), the compilation of information at the scale of 1:250 000 is completed. The bathymetric information was transposed to the final scale of 1:1 000 000 and completed with land information. Initial reviews and colour tests were also made. Several dozens of new names were proposed to the Sub-Commission for Undersea Feature Names (SCUFN). The final review is now underway by Professor Jean Vanney. The edition of IBCEA 1.03 is expected to occur in 2005, depending on the availability of Professor Vanney, which coordinates the project.

The work for IBCEA Sheet 1.05 (Cabo Verde) was not initiated yet.

## **7 - TECHNICAL ASSISTANCE AND TRAINING**

The IHPT continues to compute and publish annually the Tide Tables for the Portuguese Speaking African Countries, including, within the EAtHC area, Cabo Verde, Guiné-Bissau and S. Tomé e Príncipe.

In 2001 it was realized in Lisbon the Meeting for Technical Cooperation in Hydrography and Aids to Navigation with the Western and Central Africa Countries. The Meeting was organized by the IHPT, in cooperation with the IHB, and it was co-chaired by the Director-General of the IHPT, the President of the IHB and the Director of the IHMES, Chairman of the EAtHC

at that time. It was attended by representatives of: France, Morocco, Portugal and Spain, as EAthC Members, United Kingdom and United States of America, as observers, and Angola, Cameroon, Republic of Guinea and Ivory Coast. Representatives of IMO, IOC and PMAWCA also attended the Meeting. The main results were an initial assessment of the needs for hydrography and aids to navigation in the area and the constitution of West Africa Action Team (WAAT) to visit several of the affected countries, in order to contact their political and administrative authorities and start the planning of specific actions.

This WAAT has done several visits during 2002, 2003 and 2004. These visits included: Gabon, Nigeria, Ghana, Mauritania, Senegal, Cabo Verde, Guinea, Gambia, Democratic Republic of Congo, Republic of Congo, Equatorial Guinea, Benin, Togo, Cameroon, Sierra Leone and Guiné-Bissau. One representative of the IHPT participated in the visits to Cabo Verde and Guiné-Bissau.

In 2000, a delegation of the Directorate of Commerce Navy and Ports of the Republic of Guiné-Bissau visited the IHPT and the Lighthouse Authority of the Portuguese Navy, to present the needs of its country relatively to marine safety, hydrography and aids to navigation. In 2002, two elements of the Administration of the Ports of Guiné-Bissau visited the IHPT during two months. They attended the Specialization Course in Hydrography in the early nineties and were now integrated in the work of the Hydrographic Team of the IHPT. This included their participation in the field works and data processing of several harbour and costal surveys, in order to adapt them to the new techniques and equipments, especially in what concerns to automated data acquisition and GPS positioning. They also had a refresh in hydrographic data management and nautical cartography at the Hydrography Division of the IHPT. The Institute of Cooperation of Portugal funded this visit. In 2004, following the WAAT visit, the Minister of Transports of Guiné-Bissau requested the Portuguese government to make a study for the survey of River Geba, in order to provide a safe navigation channel of access to Bissau harbour. This study is currently in progress at the IHPT.

In 2001 the IHPT cancelled five harbour charts of Cabo Verde from its official folio, as the local maritime authorities issued updated editions of the original charts published by the IHPT. After the WAAT visit to this country, the local authorities requested, under the existing Cooperation Agreement with Portugal, the survey of several harbours and the corresponding update of the nautical charts produced by the IHPT. The survey of three harbours is at this time underway, in the islands of Sal, Boavista and Santiago, by a team of IHPT surveyors with local assistance provided by the Marine and Ports General Directorate of Cabo Verde. A meeting of the Commission that coordinates the referred Cooperation Agreement is also expected to occur by mid November 2004, in Cabo Verde.

Outside the EAthC area, the IHPT has realized several actions of cooperation with Moçambique and Angola. The IHPT participated in the feasibility study for the implementation of a hydrographic and lighthouse service in Angola.



In October 2002 an IHPT team visited Luanda, in order to assess the present situation and gather information about the local capacities and special needs. A product of this study was an outline of the organization, functionalities and development steps of the new service. Later, in March 2004, another visit was done in order to analyse locally more practical details for the implementation of the service. This diagnostic team included, by the IHPT, the Technical Director, the Head of Navigation Division, the Assessor for Maritime Spaces and the Chief of the Hydrographic Team, as well as a representative of the Portuguese Navy Lighthouse Authority. The team produced a Diagnostic Report which was delivered to the Angolan authorities.

Several foreign students attended the Specialization Course in Hydrography (FIG/IHO Category A) at the IHPT. However, they were mainly from Mozambique and Angola, outside the EAtHC area. In the academic year or 2002/2003 the Course was attended by one student from Moçambique and two navy officers serving at the Hydrographic Service of the Royal Navy of Morocco. In 2003/2004 the Course was attended by six civilian from Angola, under the initiative to install a Hydrographic Service in that country. In this academic year, 2004/2005, the Course is attended by one civilian from Moçambique and one navy officer from the Tunisian Navy.

## Annex A

## PAPER CHARTS EDITED BY PORTUGAL SINCE 2002

NUMBER	INT	TITLE	EDITION	REPRINT	DATE
25R10	-	PONTA DA ATALAIA AO BURG AU	1 <sup>a</sup>	3 <sup>a</sup>	OCT 02
464 01	-	ILHAS DAS FLORES E DO CORVO	1 <sup>a</sup>	-	DEC 02
362 01		ILHA DA MADEIRA	1 <sup>a</sup>	-	JAN 03
26303	INT 1875	BAÍA DE CASCAIS E BARRAS DO RIO TEJO (PORTO DE LISBOA)	6 <sup>a</sup>		MAR 03
26304	INT 1876	PORTO DE LISBOA (PAÇO DE ARCOS AO TERREIRO DO TRIGO)	5 <sup>a</sup>		APR 03
25R11		PONTA DE SAGRES A VILAMOURA	1 <sup>a</sup>	3 <sup>a</sup>	JUL 03
25R12		VILAMOURA À FOZ DO GUADIANA	1 <sup>a</sup>	3 <sup>a</sup>	JUL 03
232 03		LISBOA AO CABO DE SÃO VICENTE	2 <sup>a</sup>	-	NOV 02
311 01	1921	ARQUIPÉLAGO DA MADEIRA	1 <sup>a</sup>	-	DEZ 03
25R02		LEIXÕES A AVEIRO	1 <sup>a</sup>	1 <sup>a</sup>	FEV04
25R07		CABO DA ROCA AO CABO ESPICHEL	1 <sup>a</sup>	3 <sup>a</sup>	FEV04
25R01		CAMINHA A LEÇA DA PALMEIRA	1 <sup>a</sup>	1 <sup>a</sup>	ABR 04
25R03		AVEIRO À FIGUEIRA DA FOZ	1 <sup>a</sup>	1 <sup>a</sup>	ABR 04
25R10		PONTA DA ATALAIA AO BURG AU	1 <sup>a</sup>	4 <sup>a</sup>	ABR 04
263 10		BARRA E PORTO DE PORTIMÃO	3 <sup>a</sup>	-	ABR 04
263 11	INT 1885	BARRA E PORTOS DE FARO E OLHÃO	2 <sup>a</sup>	-	MAI 04
263 09		PORTO DE SETÚBAL – Da CARRACA À ILHA DO CAVALO	2 <sup>a</sup>	-	MAI 04

## Annex B

## ELECTRONIC NAVIGATIONAL CHARTS – CELLS EDITED BY PORTUGAL

		Navigation Purpose			
PT 111101	11101	1	Portugal Continental e Arquipélago da Madeira	1	14 FEV 03
PT 141101	41101	1	Arquipélago dos Açores	1	13 DEZ 00
PT 141101	41101	1	Arquipélago dos Açores	2	06 JUL 01
PT 223202	23202	2	Cabo Silleiro ao Cabo Carvoeiro	1	21 ABR 03
PT 233101 *	33101	2	Arquipélago da Madeira	1	23 SET 04
PT 243101	43101	2	Arquipélago dos Açores – Grupo Ocidental	1	22 ABR 03
PT 243102	43102	2	Arquipélago dos Açores – Grupo Central	1	25 SET 00
PT 243102	43102	2	Arquipélago dos Açores – Grupo Central	2	04 JUL 01
PT 243103	43103	2	Arquipélago dos Açores – Grupo Oriental	1	25 SET 00
PT 243103	43103	2	Arquipélago dos Açores – Grupo Oriental	2	04 JUL 01
PT 324201	24201	3	Caminha a Aveiro	1	26 MAR 02
PT 324202	24202	3	Aveiro a Peniche	1	30 JAN 01
PT 324202	24202	3	Aveiro a Peniche	2	22 JUN 01
PT 324203	24203	3	Nazaré a Lisboa	1	17 JUL 01
PT 324204	24204	3	Cabo da Roca a Sines	1	17 DEZ 01
PT 324205	24205	3	Cabo de Sines a Lagos	1	24 JUL 00
PT 324205	24205	3	Cabo de Sines a Lagos	2	03 JUL 01
PT 324206	24206	3	Cabo de S. Vicente à Foz do Guadiana	1	24 JUL 00
PT 324206	24206	3	Cabo de S. Vicente à Foz do Guadiana	2	21 JUN 01
PT 324206	24206	3	Cabo de S. Vicente à Foz do Guadiana	3	16 OUT 01
PT 336201	36201	3	Ilha da Madeira	1	30 JUL 03
PT 346405	46405	3	Ilha Terceira	1	30 JUL 02
PT 346406	46406	3	Ilha de S. Miguel	1	30 JUL 02

ELECTRONIC NAVIGATIONAL CHARTS – CELLS EDITED BY PORTUGAL

		Navigation Purpose			
PT 426401	26401	4	Aproximações a Viana do Castelo	1	26 MAR 02
PT 426402	26402	4	Aproximações a Leixões	1	16 NOV 00
PT 426402	26402	4	Aproximações a Leixões	2	14 FEV 03
PT 426407	26407	4	Sesimbra	1	16 JAN 03
PT 426408	26408	4	Aproximações a Sines	1	20 FEV 01
PT 436401	36401	4	Ilha de Porto Santo	1	30 ABR 03
PT 436402	36402	4	Câmara de Lobos à Pta de S. Lourenço	1	13 NOVR 02
PT 436402	36402	4	Câmara de Lobos à Pta de S. Lourenço	2	12 MAR 03
PT 446401	46401	3	Ilha das Flores e Ilha do Corvo	1	30 JUL 03
PT 526303	26303	5	Barras do porto de Lisboa e baía de Cascais	1	31 AGO 98
PT 526303	26303	5	Barras do porto de Lisboa e baía de Cascais	2	31 JAN 00
PT 526303	26303	5	Barras do porto de Lisboa e baía de Cascais	3	21 JUN 01
PT 526303	26401	5	Barras do porto de Lisboa e baía de Cascais	4	26 MAR 02
PT 526303	26303	5	Barras do porto de Lisboa e baía de Cascais	4	11 FEV 04
PT 526304	26304	5	Porto de Lisboa (Paço de Arcos ao Terreiro do Trigo)	1	09 MAI 00
PT 526304	26304	5	Porto de Lisboa (Paço de Arcos ao Terreiro do Trigo)	2	21 JUN 01
PT 526304	26304	5	Porto de Lisboa (Paço de Arcos ao Terreiro do Trigo)	3	11 FEV 04
PT 526305	26305	5	Porto de Lisboa (Alcântara ao Montijo)	1	30 JAN 01
PT 526305	26305	5	Porto de Lisboa (Alcântara ao Montijo)	2	21 JUN 01
	26305	5	Porto de Lisboa (Alcântara ao Montijo)	3	11 FEV 04
PT 526306	26306	5	Porto de Lisboa (Cais do Sodré a Sacavém)	1	31 JAN 00
PT 526306	26306	5	Porto de Lisboa (Cais do Sodré a Sacavém)	2	21 JUN 01
PT 526306	26306	5	Porto de Lisboa (Cais do Sodré a Sacavém)	3	21 NOV 02
PT 526306	26306	5	Porto de Lisboa (Cais do Sodré a Sacavém)	4	11 FEV 04
PT 526308	26308	5	Barra e porto de Setúbal	1	16 JAN 03
PT 526310	26310	5	Barra e porto de Portimão	1	14 FEV 02

**ELECTRONIC NAVIGATIONAL CHARTS – CELLS EDITED BY PORTUGAL**

		Navigation Purpose			
<b>PT 528501</b>	<b>26401</b>	<b>5</b>	<b>Porto de Viana do Castelo</b>	<b>1</b>	<b>26 MAR 02</b>
<b>PT 528505</b>	<b>26402</b>	<b>5</b>	<b>Barra do rio Douro</b>	<b>2</b>	<b>14 FEV 03</b>
<b>PT 528513</b>	<b>26407</b>	<b>5</b>	<b>Porto de Sesimbra</b>	<b>1</b>	<b>16 JAN 03</b>
<b>PT 528514</b>	<b>26408</b>	<b>5</b>	<b>Porto de Sines</b>	<b>1</b>	<b>31 JAN 01</b>
<b>PT 538501</b>	<b>36401</b>	<b>5</b>	<b>Baía e Porto do Porto Santo</b>	<b>1</b>	<b>30 ABR 03</b>
<b>PT 538504</b>	<b>36402</b>	<b>5</b>	<b>Porto do Caniçal</b>	<b>1</b>	<b>16 JAN 03</b>
<b>PT 538506</b>	<b>36402</b>	<b>5</b>	<b>Porto do Funchal</b>	<b>1</b>	<b>13 OUT 02</b>
<b>PT 548501</b>	<b>46401</b>	<b>5</b>	<b>Porto da Casa</b>	<b>1</b>	<b>28 MAI 03</b>
<b>PT 548502</b>	<b>46401</b>	<b>5</b>	<b>Porto de Santa Cruz das Flores</b>	<b>1</b>	<b>30 JUL 03</b>
<b>PT 548503</b>	<b>46401</b>	<b>5</b>	<b>Porto das Lages (Ilha das Flores)</b>	<b>1</b>	<b>28 MAI 03</b>
<b>PT 548514</b>	<b>46405</b>	<b>5</b>	<b>Porto de Angra do Heroísmo</b>	<b>1</b>	<b>30 JUL 02</b>
<b>PT 548515</b>	<b>46405</b>	<b>5</b>	<b>Porto da Praia da Victoria</b>	<b>1</b>	<b>13 NOV 02</b>
<b>PT 548519</b>	<b>46406</b>	<b>5</b>	<b>Porto de Ponta Delgada</b>	<b>1</b>	<b>21 NOV 02</b>

COMPARATIVE GRAPHIC OF THE PRODUCTION OF PAPER CHARTS AND ENC CELLS

