



PORTUGUESE NATIONAL REPORT 2007

1. Introduction

The Portuguese Hydrographic Institute (IHPT) is the Portuguese Navy's Laboratory of Ocean Sciences and is the main responsible for the installation and maintenance of tide gauge stations as well as acquisition, processing, archiving and dissemination of sea level data. The data retrieval and processing at the IHPT is done according with international/GLOSS standards.

At the moment there are 21 operational sea level stations in Portugal (see Appendix 1). The IHPT is in charge of 19 of those stations and the Portuguese Geographic Institute (IGP), which is the authority in Portugal responsible for geographic information and cartography, is in charge of the Cascais and Lagos stations. Figures 1, 2 and 3, in Appendix 2, give the location of the main sea level stations in Portugal.

This Report describes the status of our Sea Level Network as well as the perspectives of our work for the next few years.

2. Status of the Portuguese Sea Level Network

2.1 GLOSS Stations

The GLOSS Network in Portugal consists on 4 stations: Cascais, Funchal, Ponta Delgada and Santa Cruz das Flores. Table 1 gives some details about these stations.

Table 1 – GLOSS Tide Stations in Portugal

<i>GLOSS Number</i>	<i>Station Name</i>	<i>Coordinates</i>	<i>Datum</i>	<i>Time Zone</i>	<i>Type of Gauge</i>	<i>Responsible</i>
244	Santa Cruz das Flores (Azores)	39° 27,28'N 31° 07,45'W	WGS84	015W GMT -1hr	Analogical Float and Stilling Well	IHPT
245	Ponta Delgada (Azores)	37° 44,16'N 25° 40,27'W	WGS84	015W GMT -1hr	Acoustic	IHPT
246	Cascais	38° 41,67'N 9° 24,99'W	ED50	000E GMT	Analogical Float and Stilling Well (+ Acoustic)	IGP
250	Funchal (Madeira)	32° 38,62'N 16° 54,65'W	WGS84	000E GMT	Float and Stilling Well (Analogical+Digital ¹)	IHPT

Santa Cruz das Flores station will soon be replaced by a station in the same island but in Lajes das Flores. Figure 2 in Appendix 2 shows the location of this new station. At the moment, in Lajes station the IHPT has installed a float and stilling well tide gauge with analogical and digital data reception with electric power supplied by a solar panel. An acoustic tide gauge by Sutron has been acquired for Lajes station and will be installed as soon as the station is supplied with electric power provided by the Portuguese Electric Network.

¹ Digital data reception is made by an OTT tide gauge – Thales - and the communication is by way of GSM



In Funchal station, the IHPT is now operating a Thales with remote access. This GLOSS station will soon be transferred to Caniçal as this place is situated in the open sea, has more resistant infrastructures and offers better security conditions for the equipment. Figure 2 in appendix 2 shows the location of this new station. The tide gauge shelter in Caniçal has already been built and soon this station will be equipped with an acoustic tide gauge similar to the one that will be installed in Lajes das Flores.

The acoustic tide gauge installed in Ponta Delgada was provided by the University of Hawaii in the beginning of the 90's. Until 1991 data from this station was obtained with a float and stilling well tide gauge. Data from this station is being received in good conditions.

Although Cascais station belongs to the IGP, the IHPT gives technical support in terms of data processing. The acoustic tide gauge installed in 2003 is giving good results.

2.2 Other Sea Level Stations

Apart from the GLOSS stations referred above, at the moment Portugal has other 15 operational stations: 11 in Continental Portugal and 4 in the Azores Archipelago. The Table in Appendix 1 gives some details about Portugal's Sea Level Network. It was made to analyse the current status of Portugal's Sea Level Network with the main target of evaluating possible stations to be included in a Tsunami Warning System.

In 2005, 3 radar gauges from Krohne, were installed in Sesimbra, Peniche and Vila do Porto in Santa Maria Island (Azores). The radar gauges are working with a Druck sensor as a backup gauge. So far, these systems have been working in a satisfactory way.

The station in Lisbon harbour will soon be relocated in a nearby place. The equipment to be installed will be a radar gauge with a Druck sensor as backup. The current sample of all radar and Druck gauges is 1 minute.

3. Conclusions and Future Work

In order to improve Portugal's Sea Level Network, efforts are being made to automate all the stations, so that data is remotely received. At the moment, only 4 of our stations still have exclusively analogical data recording. Our goal is to automate these stations in the next couple of years.

To conclude, Portugal will continue sending validated data to the GLOSS Data Centres every year and, when possible, some old data not yet validated.

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APPENDIX 1 - Status of Sea Level Stations in Portugal (May 2007)

N.º	STATION NAME	COORDINATES	AUTHORITY RESPONSIBLE	CURRENT STATUS	TYPE OF SENSOR	CURRENT SAMPLE (MIN)	TRANSMISSION INTERVAL	TYPE OF TRANSMISSION	NETWORK
1	Viana do Castelo	41° 41,17' N 008° 50,35' W ED50	IHPT	3	Float	6 (Thales), Continuous analog record, digitised at 60 minute intervals (MTG)	2 days	GSM	
2	Leixões	41° 11,27' N 008° 42,19' W ED50	IHPT	3	Float	6 (Thales), Continuous analog record, digitised at 60 minute intervals (MXX)	2 days	GSM	
3	Aveiro	40° 38,67' N 008° 44,89' W ED50	IHPT	3	Float	6 (Thales), Continuous analog record, digitised at 60 minute intervals (R20)	2 days	GSM	
4	Figueira da Foz	40° 08,97' N 008° 51,29' W ED50	IHPT	3	Float	Continuous analog record, digitised at 60 minute intervals (R20)	Monthly	—	
5	Nazaré	39° 35,09' N 009° 04,43' W WGS84	IHPT	3	Pressure	6	3 Months	Laptop – Direct Link	
6	Peniche	39° 21,22' N 009° 21,47' W WGS84	IHPT	3	Pressure	6	3 Months	Laptop – Direct Link	
7	Cascais	38° 41,67' N 009° 24,99' W ED50	IGP	3	Acoustic	6			GLOSS
8	Lisboa	38° 42,69' N 009° 07,44' W ED50	IHPT	3	Float	6 (Thales), Continuous analog record, digitised at 60 minute intervals (R20)	2 days	GSM	
9	Sesimbra	38° 26,37' N 009° 06,69' W ED50	IHPT	3	Radar Pressure	1	2 days	GSM	
10	Setúbal/Tróia		IHPT	5					
11	Sines	37° 57,14' N 008° 53,29' W ED50	IHPT	3	Float Radar Pressure	1 (Radar, Pressure), 6 (Thales), Continuous analog record, digitised at 60 minute intervals (R20)	2 days	GSM (Radar, Pressure) PSTN (Thales)	
12	Lagos	37° 05,97' N 008° 39,89' W ED50	IGP	3	Acoustic	6			
13	Barra de Faro/Olhão	36° 58,57' N 007° 51,99' W ED50	IHPT	3	Pressure	6	3 Months	Laptop – Direct Link	

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N.º	STATION NAME	COORDINATES	AUTHORITY RESPONSIBLE	CURRENT STATUS	TYPE OF SENSOR	CURRENT SAMPLE (MIN)	TRANSMISSION INTERVAL	TYPE OF TRANSMISSION	NETWORK
14	Funchal	32° 38,64' N 016° 54,78' W WGS84	IHPT	3	Float	6 (Thales), Continuous analog record, digitised at 60 minute intervals (Bosum)	2 days	GSM	GLOSS
15	Canical		IHPT	4	Acoustic				Future GLOSS
16	Sta. Cruz das Flores	39° 27,28' N 031° 07,45' W WGS84	IHPT	3	Float	Continuous analog record, digitised at 60 minute intervals (MXX)	Monthly	—	GLOSS
17	Lajes das Flores	39° 22,70' N 031° 10,12' W WGS84	IHPT	3/4	Float (3) Acoustic (4)	6 (Thales), Continuous analog record, digitised at 60 minute intervals (R20)	2 days	GSM	Future GLOSS
18	Horta	38° 31,99' N 028° 37,24' W WGS84	IHPT	5	Float	Continuous analog record, digitised at 60 minute intervals (R20)	Monthly	—	
19	Angra do Heroísmo	38° 38,99' N 027° 13,34' W WGS84	IHPT	3	Float	Continuous analog record, digitised at 60 minute intervals (MXX)	Monthly	—	
20	Ponta Delgada	37° 44,16' N 025° 40,27' W WGS84.	IHPT	3	Acoustic	6	2 days	PSTN/GSM (IHPT) Satellite (UHSLC)	GLOSS
21	Vila do Porto	36° 56,75' N 025° 08,87' W WGS84.	IHPT	3	Radar Pressure	1	2 days	GSM	

Notes:

IHPT – Portuguese Hydrographic Institute

IGP – Portuguese Geographic Institute

Current Status: 1-upgrade completed, 2-upgrade underway, 3-requires upgrade, 4-planned new station, 5-Not operational



APPENDIX 2 - Main sea level stations in Portugal



Figura 1 – Main sea level stations in Continental Portugal

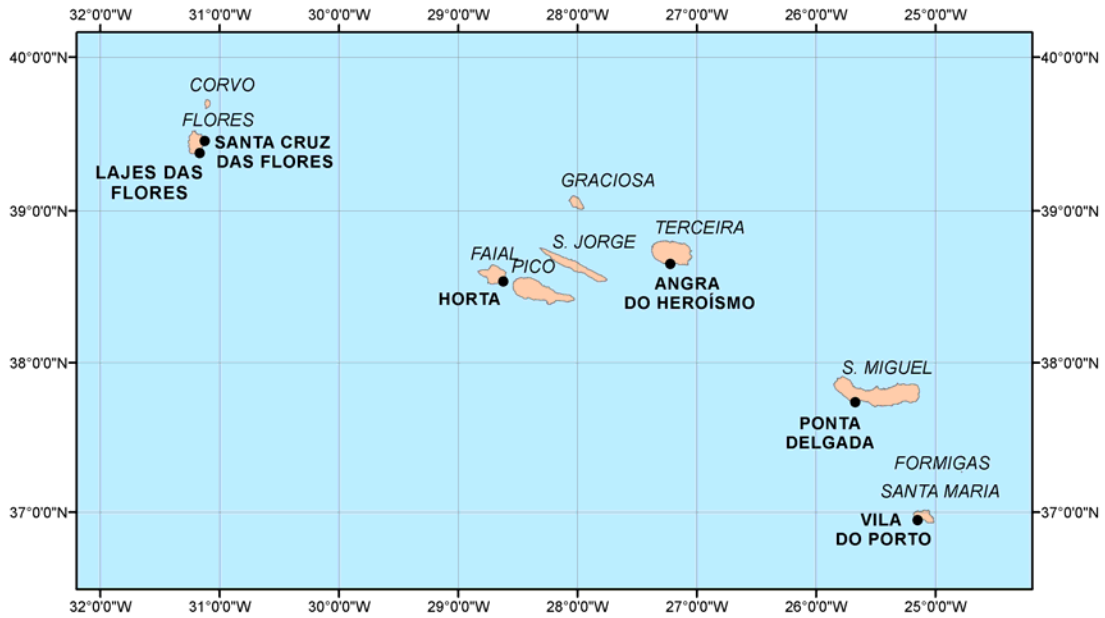


Figure 2 – Main sea level stations in the Azores



Figure 3 – Main sea level stations in Madeira Archipelago