PORTUGUESE HYDROGRAPHIC INSTITUTE

COUNTRY REPORT ON PORTUGUESE SEA LEVEL NETWORK

1. Introduction

The Hydrographic Institute (IH) 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 IH is done according with international/GLOSS standards.

This Report describes the status of our Sea Level Network as well as the perspectives of our work for the next few years[1].

2. Status of the Sea Level Network

In total, 19 stations from the Portuguese Sea Level Network: 13 in the Continent, 5 in the Azores Archipelago and 1 in Madeira Island. The Portuguese Sea Level Network is presented in Figure 1.

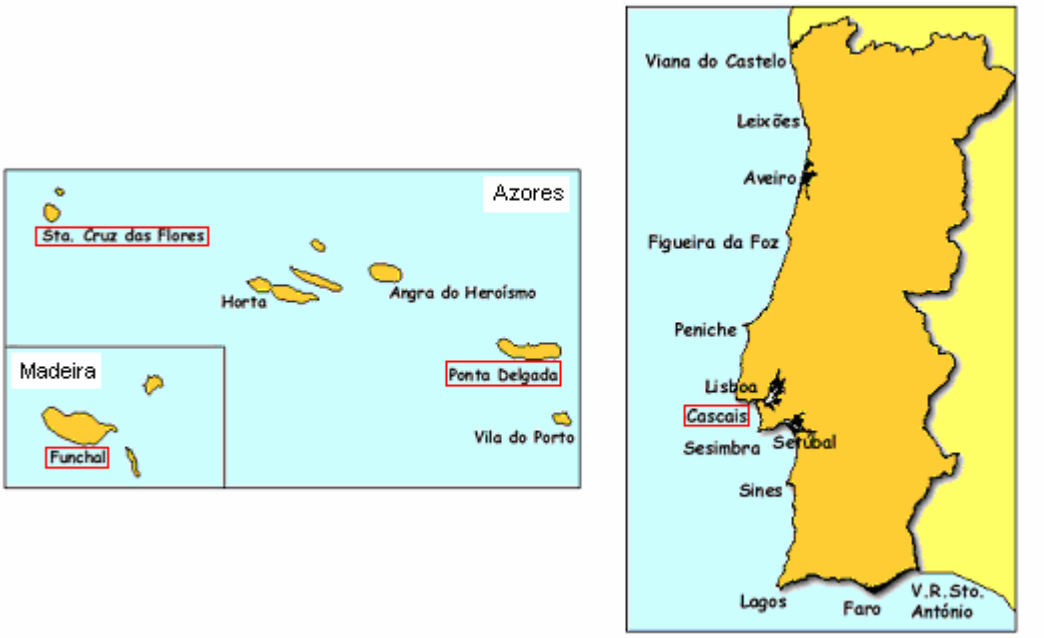

Figure 1 – Portuguese Sea Level Network. The stations highlighted belong to the GLOSS Network.

[1] An extended version of this Report was delivered to GLOSS Data Centres: *Portuguese GLOSS Stations' Tidal Data*, Instituto Hidrográfico, 2004.

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

GLOSS Number	*Station Name*	*Latitude*	*Longitude*	*Datum*	*Time Zone*	*Type of Gauge*	*Responsible*
244	Santa Cruz das Flores (Azores)	39º 27,28'N	31º 07,45'W	WGS84	015W GMT -1hr	Analogical Float and Stilling Well	IH
245	Ponta Delgada (Azores)	37º 44,16'N	25º 40,27'W	WGS84	015W GMT -1hr	Acoustic	IH
246	Cascais	38º 41,67'N	9º 24,99'W	ED50	000E GMT	Analogical Float and Stilling Well (+ Acoustic)	IGP
250	Funchal (Madeira)	32º 38,62'N	16º 54,65'W	WGS84	000E GMT	Float and Stilling Well (Analogical+Digital[2])	IH

On the 8th Session, the group of GLOSS experts has agreed to change the tide gauge station of Santa Cruz das Flores to Lajes das Flores as the well's structure is damaged. In Lajes station the IH installed a float and stilling well tide gauge with analogical and digital (Thales) data reception. However, data wasn't yet obtained in good conditions.

In the beginning of the 90's, the University of Hawaii provided the acoustic tide gauge in Ponta Delgada station. Until 1991 data from this station was obtained with a float and stilling well tide gauge.

Although Cascais station belongs to the Portuguese Geographic Institute (IGP), the IH gives technical support in terms of data processing. An acoustic tide gauge was recently installed at this station.

In Funchal station, the stilling well has a couple of fissures that couldn't yet be repaired. The IH is now operating a Thales with remote access. This GLOSS station may 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.

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

2.2 Other Main Stations

We consider main stations those whose tide predictions are included in our Tide Tables. At the moment Portugal has 13 operational stations including the ones that belong to the GLOSS Network: 8 in the Continent, 4 in the Azores Archipelago and 1 in Madeira Island. Table 2 gives some details about the operating stations.

Table 2 – Some of the Main Tide Stations in Portugal

Station Name	*Latitude*	*Longitude*	*Datum*	*Type of Gauge*	*Responsible*
Viana do Castelo	41º 41,17' N	8º 50,35' W	ED50	Float and Stilling Well (Analogical + Digital)	IH
Leixões	41º 11,27' N	8º 42,19' W	ED50	Float and Stilling Well (Analogical + Digital)	IH
Aveiro	40º 38,67' N	8º 44,89' W	ED50	Analogical Float and Stilling Well	IH
Lisboa	38º 42,69' N	9º 07,44' W	ED50	Float and Stilling Well (Analogical + Digital)	IH
Setúbal/Tróia	38º 29,77' N	8º 54,09' W	ED50	Float and Stilling Well (Analogical + Digital)	IH
Sines	37º 57,14' N	8º 53,29' W	ED50	Float and Stilling Well (Analogical + Digital)	IH
Lagos	37º 05,97' N	8º 39,89' W	ED50	Analogical Float and Stilling Well (+Acoustic)	IGP
Angra do Heroísmo (Azores)	38º 38,99' N	27º 13,34' W	WGS84	Analogical Float and Stilling Well	IH
Horta (Azores)	38º 31,99' N	28º 37,24' W	WGS84	Analogical Float and Stilling Well	IH

Besides the stations referred above, the stations of Figueira da Foz, Peniche, Sesimbra, Faro/Olhão, Vila Real de Santo António and Vila do Porto (Azores) are also considered main stations.

- The Figueira da Foz station is active since the 1st semester 2004 and is situated down the river. At the moment, the IH also has a portable tide gauge at this place.
- This year the IH plans to build the tide gauge shelter in Peniche station. Meanwhile, a portable tide gauge is installed at this place.
- In Sesimbra station, the tide gauge shelter was built recently but there is still no electric power to activate the equipment.
- The IH has a portable tide gauge in Farol de Santa Maria Island (Faro/Olhão) since 2003.
- In Vila Real de Santo António the tide gauge shelter was dismantled and it's not planned to reconstruct it in a short term.
- In Vila do Porto (Azores) the tide gauge shelter is under construction and the tide gauge will be installed in the 1st semester 2005.

3. Conclusions and Future Work

Although the lack of human resources, specially qualified technicians, progress is being made to improve Portugal's Sea Level Network.

In the future, the IH intends to continue supplying data to GLOSS as well as proceed with the renewal of the harmonic constants of all main stations until 2007 and replace by acoustic tide gauges all GLOSS stations until the end of 2005. For the other main stations, radar tide gauges will complement float and stilling well gauges and pressure tide gauges will continue to be used in secondary/temporary stations.