

# SOUTH AFRICAN NAVY HYDROGRAPHIC OFFICE



GLOSS National Report for South Africa

2009

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## 1. Introduction

The South African coastline is approximately 3000km in length and for aesthetic, recreational and economic reasons; it is an enormous national asset.

The South African Navy Hydrographic Office (SANHO) is the responsible authority for the installation and maintenance of the tide gauge network around the South African Coastline. The SANHO is also responsible for the acquisition, processing, archiving and dissemination of sea level data for South Africa. The data is retrieved and processed in accordance with the International Hydrographic Organisation's (IHO) guidelines and standards.

This report describes the current status of the SANHO tide gauge network, as well as future plans for the network.

## 2. History

The SANHO was formed in 1954. Installation of the first of its own KENT float-type gauges followed in 1957 and the operation of certain SA Railways and Harbours gauges seems to have been taken over at about the same time. Occasional additions were made to the original network of KENT gauges using LEA, OTT and SIAP float-type gauges. Twelve tidal stations were in operation by 1989 but it was considered that most of the gauges were getting too old (Note that two of the original mechanical gauges continue in service in tandem with their modern replacements).

At this stage, the EMATEK Division of the Council for Scientific Industrial Research (CSIR) was commissioned to design and construct acoustic Automatic Water Level recorders (AWLRs) incorporating barometers and temperature sensors. A total of eight were acquired but they never proved to be a success and after several years of perseverance, they were abandoned in 1996/97. The exception was the AWLR at Walvis Bay, which actually operated successfully and produced good, accurate datasets for 1997/98 only.

The AWLRs, in South Africa, were replaced with ten acoustic gauges, which were installed in 1996/97. These produced continuous datasets but their accuracy was, in many cases, unacceptably variable.

Towards the end of 2002 a Radar tide gauge was put on trial in Simon's Town and the results indicated that the Radar gauge performed with a higher degree of accuracy and stability that had been previously encountered. The Institute of Maritime Technology (IMT), after independent study, reaffirmed the results obtained by the SANHO trials. All 10 of the South African tide stations as well as the two stations in Namibia are Radar gauges.

### 3. Status of the SANHO Tide Gauge Network

The South African tide gauge network consists of 10 tide gauge stations along the South African coastline and 2 tide gauges in Namibia. The SANHO tide gauge network is presented in Figure 1

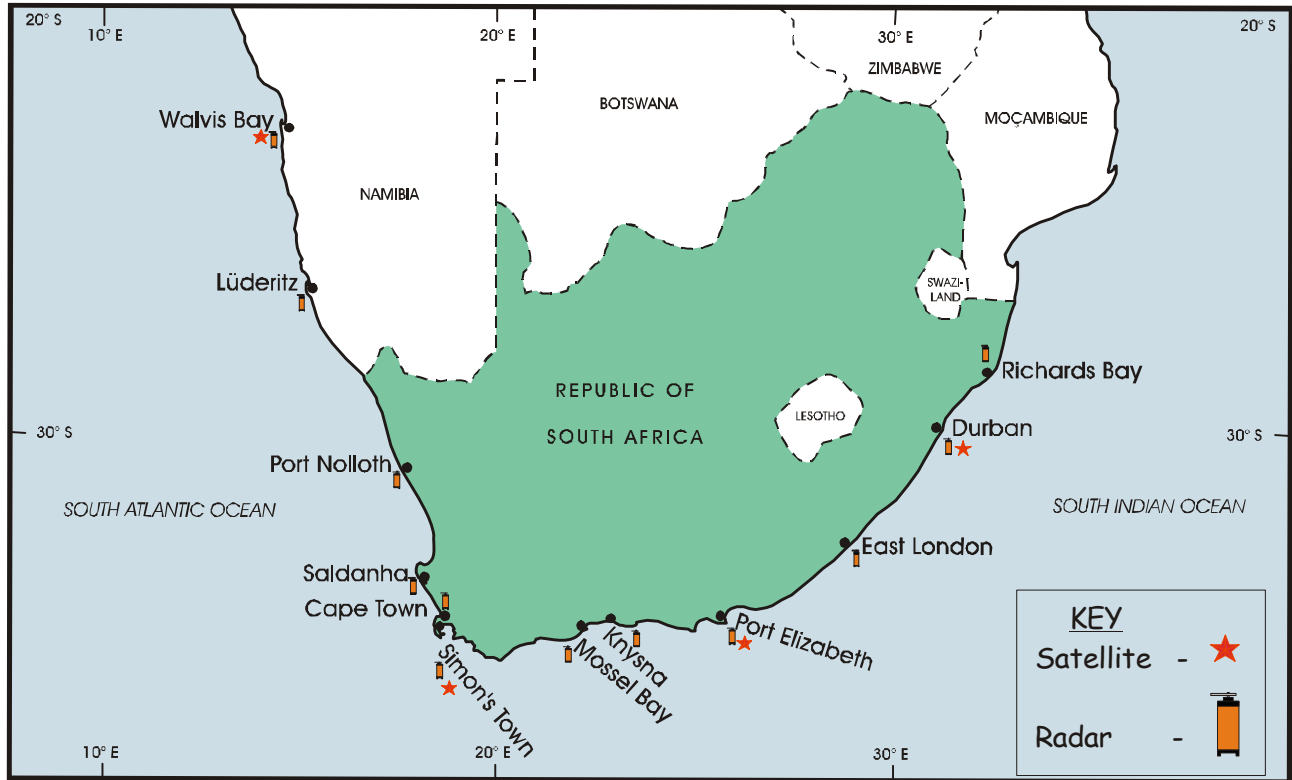


Figure 1: SANHO Tide Gauge Network

#### 3.1 Gloss Stations

Table 1- South African Gloss Stations

GLOSS Number	Station Name	Latitude	Longitude	Time Zone	Type of Gauge	Responsibility
13	Durban	29°52'S;	31°03'E	GMT + 2	Radar fitted with satellite transmitter	SANHO
76	Port Elizabeth	33°57's	25°37'E	GMT + 2	Radar fitted with satellite transmitter	SANHO
268	Simon's Town	34°11'S	18°26'E	GMT + 2	Radar fitted with satellite transmitter	SANHO
314	Walvis Bay	22°57'S	14°30'E	GMT + 2	Radar fitted with satellite transmitter	SANHO/ NAMPORT

All GLOSS stations are operational.

The DCP satellite transmitter for Durban was installed in April 2006, and became fully functional in early June 2007.

The DCP satellite transmitter for Port Elizabeth was installed on the 17<sup>th</sup> May 2007 and is functioning as desired.

The DCP satellite transmitter for Walvis Bay was installed in May 2008 and is functioning as desired.

### 3.2 Other Main Stations

Table 2- South African Tide Gauges excluding GLOSS Stations

Station Name	Latitude	Longitude	Time Zone	Type of Gauge	Responsibility
Lüderitz	26°38'S	15°09'E	GMT + 2	Radar	SANHO/ NAMPORT
Port Nolloth	29°15'S	16°52'E	GMT + 2	Radar	SANHO
Saldanha Bay	33°01'S	17°57'E	GMT + 2	Radar	SANHO
Cape Town	33°54'S	18°26'E	GMT + 2	Radar	SANHO
Simon's Town	34°11'S	18°26'E	GMT + 2	Radar	SANHO
Mossel Bay	34°11'S	22°08'E	GMT + 2	Radar	SANHO
Knysna	32°02'S	23°02'E	GMT + 2	Radar	SANHO
East London	33°01'S	27°55'E	GMT + 2	Radar	SANHO
Richards Bay	28°48'S	32°05'E	GMT + 2	Radar	SANHO

### 3.3 Future Work

It is the intention of the SANHO to re-evaluate and standardise all the benchmarks surrounding the tide stations and to confirm their accuracy in relation to the existing national benchmark network. This has been done in Mossel Bay (February 2007) with new benchmarks installed May 2007.

The jetty at Port Nolloth has recently been resurfaced and all, but one, benchmarks have been lost. The SANHO resurveyed the jetty in March 2008 and will be installing new benchmarks in mid 2009.

It is planned to install a new site on the West Coast at Lamberts Bay, however this is still in the planning stage.

#### 4 **International Work**

The success of the Radar gauges in South Africa and the United Kingdom has led to the Intergovernmental Oceanographic Commission (IOC-UNESCO) to sponsor the installation of these gauges in various countries throughout Africa. Mozambique was the first country to benefit from this. The SANHO assisted, at the IOC's request, the Mozambique Hydrographic Office (INAHINA) with the installation of two tide gauges at Pemba and Inhambane in April 2005.

Both of these gauges have since been fitted with satellite transmitters to transmit real time one minute values to the Indian Ocean Tsunami Early Warning System.

In May 2008 the SANHO in conjunction with the Namibian Ports Authority (NAMPORT) and the Benguela Current Large Marine Ecosystem Project (BCLME) installed two Radar tide gauges at Walvis Bay and Lüderitz respectively. The tide gauge in Walvis Bay is fitted with a satellite transmitter to transmit real time one minute values to the Indian Ocean Tsunami Early Warning System.

#### 5. **Other South African Tide Projects:**

Two Global Navigation Satellite System (GNSS) receivers have been installed at tide gauges as part of the TIGA (GPS Tide Gauge Benchmark Monitoring - Pilot Project) global network by the Space Geodesy programme of the Hartebeesthoek Radio Astronomy Observatory (HartRAO), ([http://www.hartrao.ac.za/geodesy/web\\_TIGA/index.html](http://www.hartrao.ac.za/geodesy/web_TIGA/index.html)) in collaboration with SANHO. The station SIMO is located at Simon's Town and was installed on 27 July 2001 while RBAY is located at Richards Bay and was installed on 10 October 2000. Both stations are equipped with Turbo Rogue SNR8000 receivers and choke ring antennas. Data are available from HartRAO or at the Crustal Dynamics Data Information System (CDDIS) of NASA.

An additional TIGA GNSS station and tide gauge was installed on Marion Island, in collaboration with GFZ (Potsdam) as part of the South African National Antarctica Programme (SANAP) infrastructure, within the framework of the Inkaba yeAfrica ([www.inkaba.org](http://www.inkaba.org)) joint Germany/South Africa project and in consultation with the Hydrographic Office of the SA Navy. The island is located between South Africa and Antarctica in the Southern Ocean. Installation occurred during Marion Island voyage 137, 8-23 August 2007. A radar type gauge was fixed to an aluminium boom structure located on a cement platform tied to bedrock. The location of the tide gauge and the construction of the boom carrying the radar unit was chosen and designed in such a way to minimise impact from waves and severe weather conditions on the island. Data from both GNSS receiver (BGAN) and tide gauge (METEOSAT) are transmitted via satellite. The contact person for this project is Dr Ludwig Combrink of HartRAO. The data from the Marion Island tide gauge is available on the following website: <http://www.ioc-sealevelmonitoring.org> .

## 6. **Conclusion**

Tidal Data from the SANHO network is used to create the South African Tide Tables and the predictions are displayed on the SANHO website (<http://www.sanho.co.za>). Currently data from all radar tide gauge stations is being sent, via email, twice weekly to the PSMSL, as well as the University of Hawaii. Real time data from the Simon's Town, Port Elizabeth, Duran and Walvis Bay tide gauges can be viewed on the IODE website (<http://www.vliz.be/vmdcdata/iode/blist.php>).