SOUTH AFRICAN NAVY HYDROGRAPHIC OFFICE

GLOSS National Report for South Africa

2015/2016

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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, with four of these tide gauges being fitted with satellite transmitters which form part of the Indian Ocean Tsunami Warning system.

At the end of 2012, beginning 2013 - the SANHO (with the co-operation of CSIR) began upgrading the communication systems on the tide gauges from 56k analogue modems to 3G cellular communications. New loggers with built in 3G modems (OTT NetDL) have

been installed in 8 of the South African tide stations, 4 of the stations have also had their transducers upgraded from the OTT Kalesto Radar to the OTT RLS radar. The remaining South African Tide stations will be upgraded over the next 2 years.

A solar panel power system has been on trial in Cape Town since November 2013

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. The SANHO tide gauge network is presented in Figure 1

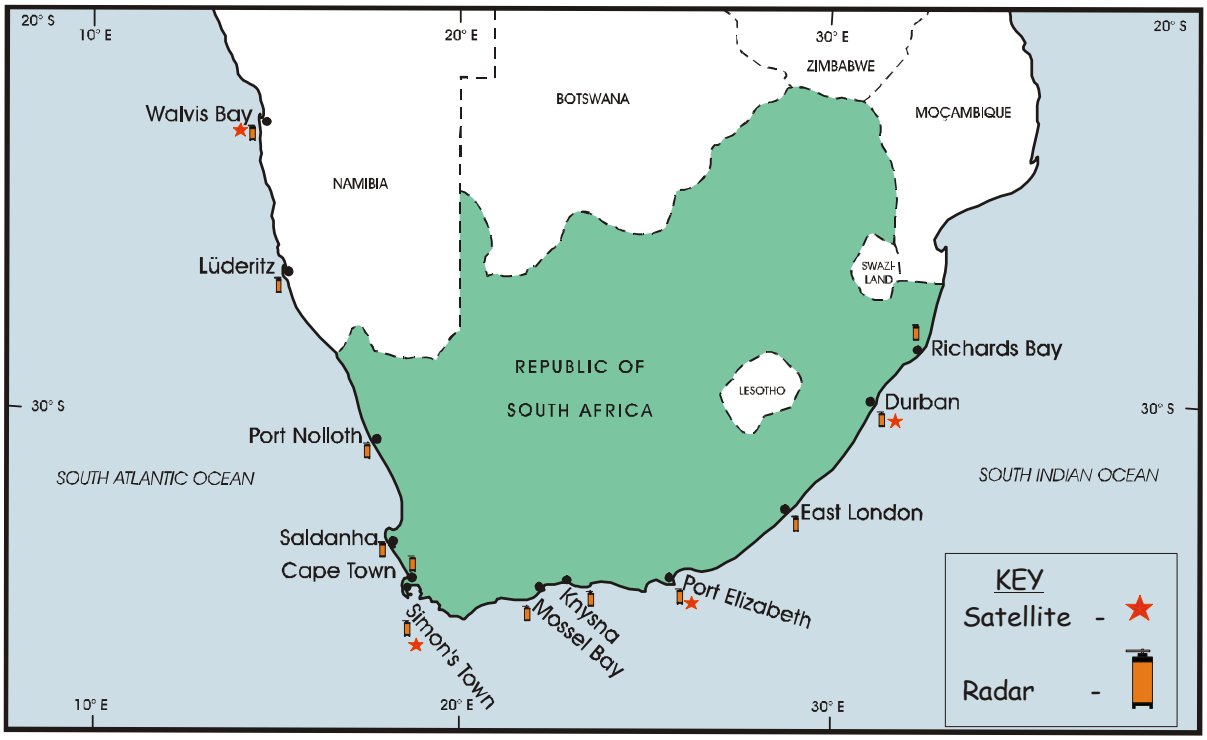

Figure 1: South African Tide Gauge Network

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	NetDL, RLS fitted with satellite transmitter	SANHO
76	Port Elizabeth	33°57'S	25°37'E	GMT + 2	NetDL, RLS fitted with satellite transmitter	SANHO

268	Simon's Town	34°11'S	18°26'E	GMT + 2	NetDL, and Kalesto Radar fitted with satellite transmitter	SANHO
314	Walvis Bay	22°57'S	14°30'E	GMT + 2	Kalesto Radar fitted with satellite transmitter	SANHO/ NAMPORT

All GLOSS station are operational.

The DCP satellite transmitter for Durban was installed in April 2006, and became fully functional in early June 2007. The system was removed due to the widening of the harbour entrance and was reinstalled in May 2011. Durban was upgraded to 3G and a RLS transducer in November 2013. Durban is successfully transmitting data, via satellite and 3G, every 15 minutes.

The DCP satellite transmitter for Port Elizabeth was installed on the 17th May 2007 and is functioning as desired. Port Elizabeth was upgraded to 3G and a RLS transducer in May 2013.

The DCP satellite transmitter for Walvis Bay was installed in May 2008 and is functioning as desired. It is the intention of the Namibian Ports Authority to upgrade the logger from the logosens2 to the Net DL in the next 12 months

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	Katelsto Radar	SANHO/ NAMPORT
Port Nolloth	29°15'S	16°52'E	GMT + 2	Kalesto Radar	SANHO
Saldanha Bay	33°01'S	17°57'E	GMT + 2	NetDL, RLS Radar	SANHO
Cape Town	33°54'S	18°26'E	GMT + 2	NetDL, RLS Radar	SANHO
Mossel Bay	34°11'S	22°08'E	GMT + 2	NetDL Radar	SANHO
Knysna	34°02'S	23°02'E	GMT + 2	Kalesto Radar	SANHO
East London	33°01'S	27°55'E	GMT + 2	NetDL, RLS Radar	SANHO
Richards Bay	28°48'S	32°05'E	GMT + 2	NetDL, RLS 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. This is being conducted by the Department of Geospatial information as part of an employee's Honours project at the University of Cape Town.

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. These benchmarks do however need to be checked. The underside of the jetty is set to be repaired in December 2015 and the tide gauge may need to be uninstalled for this project, however no definitive decision has been made.

Over the following 5 years the entire South African tide gauge network will be installed with solar power systems, which should alleviate the problem of power failures, damaged power lines and power surges damaging equipment. The purchase of these solar power systems is in process.

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.

At the end of February 2015 the SANHO, in conjunction with the IHO Southern Africa and Islands Hydrographic Commission (SAIHC) Capacity Building project, presented a Tides and Water levels Technical Workshop. The workshop was attended by representatives from Angola, Comoros, Kenya, Malawi, Mauritius, Mozambique and Tanzania. One of the main focuses of this workshop was the installation, calibration and maintenance of tide gauges, so as to gather the best possible quality data.

The Tides and Water levels Technical Workshop, as presented for SAIHC, was also presented by South Africa to the Ropeme Sea Area Hydrographic Commission (RASHC) at the beginning of September 2015.

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

A radar tide gauge, satellite transmitter and GPS system has been installed on Marion Island. The contact person for this project is Dr Ludwig Combrink of the Hartebeesthoek Radio Astronomy Observatory (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).