As a young female engineering surveyor I have been confined by the South African shores and although I survey for the betterment of my country, beyond the coastal shores of this beautiful country lies so much more opportunities for Surveyors to cast their line. In this article we look at how Hydrographic surveys came about and take a trip on board the SAS Protea.
Although the history of hydrography is nearly as old as sailing, in the United States it officially began on February 10, 1807 according to the NOAA Office of Coast Survey. The Coast Survey which is the oldest scientific agency in the U.S. was established when President Thomas Jefferson and Congress authorised a “survey to be taken of coasts of the United States.”

The first Superintendent of the Coast Survey was Ferdinand Rudolph Hassler, who brought together mathematicians, cartographers, geodesists, meteorologists, hydrographers, topographers, sailors, labourers, and administrators to survey and chart the coast of the United States.

The first official hydrographic survey in the U.S. was conducted along the south shore of Long Island in 1834. Five years later, in 1839, the U.S. government produced its first nautical chart.

Early hydrographic surveys consisted of depths measured by sounding pole and hand lead line, with positions determined by three-point sextant fixes to mapped reference points. Lead lines were ropes, or lines, with depth markings and lead weights attached, and these lines were lowered and read manually in a labour-intensive and time-consuming process. While the initial depth soundings may have been accurate, they were limited in number, and thus, coverage between single soundings was lacking.

In 1904, weighted wire-drag surveys were introduced into hydrography, wherein a wire attached to two vessels was dragged between two points. If the wire (set at a certain depth by a system of weights and buoys) encountered an obstruction, it would become taut and form a “V,” revealing the depth and position of submerged rocks and other obstructions.

The 1930s saw the development and implementation of single-beam echo sounders that used sound to measure the distance of the sea floor directly below a vessel. By running a series of lines at a specified spacing, single beam echo sounders and fathometers greatly increased the speed of the survey process by allowing more data points to be collected. However, this method still left gaps in quantitative depth information between survey lines.

In the 1950s, 1960s, and 1970s, a number of evolutionary concepts were advanced that fundamentally changed how we look at and map the seafloor. Side scan sonar technology offered a qualitative means of obtaining the sonic equivalent of an aerial photograph and improved the ability to identify submerged wrecks and obstructions. Multi-beam swath systems made it possible to obtain quantitative depth information for 100 percent of the bottom in a survey area.

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Since its establishment in 1955, the South African Navy Hydrographic Office (SANHO) has played an essential role in supporting safe navigation at sea in the South African region. The SANHO is recognized as the Centre of Hydrographic excellence in Africa by the International Hydrographic Community through its proven professional conduct, products, innovation and supreme service.

The SANHO is the national producer of paper charts, electronic navigational charts (ENCs) and publications. The mission of the SANHO is to meet National, Defence and Commercial customers’ needs for navigational charts and other hydrographic information, in support of safe navigation.

SANHO Products are sold nationally and internationally through a network of Distributors. See List of Chart Agents in the Chart Catalogue (SANHO-3) for details of official Agents selling paper charts and publications. Official South African ENC products (in S57 digital format) are available to commercial users through the Value Added Resellers (VARs) of the International Centre for ENCs (IC-ENC).

The SANHO is based at Tokai, Cape Town and comprises of five Sections, namely:

1. Paper Charting;
2. Electronic Navigation Charting;
3. Tidal;
4. Maritime Safety Information and Nautical Publications; and
THE BRIDGE

The ship's Captain or the Officer of the Watch, depending on who has the con, gives navigational orders from the bridge whilst the ship is underway. The bridge is also equipped with survey equipment, as surveys are controlled from the bridge. The ship's officers are qualified surveyors and responsible for the surveys whilst on watch. Not many people are required when surveying is in progress, as the process is largely computerized.

Apart from her survey role, the SAS Protea has proven to be an extremely versatile vessel. She has carried out various assistance operations earning her the nickname 'White Lady'. The vessel is painted white as an indication that it is not a combat ship. "They will paint a red cross on it to assist other navy vessels with medical cases in certain unforeseen circumstances". As the captain pointed out. On average the life span of a ship is 20 years but this beaut has covered twice the amount and still pushing on strong.

The SAS Protea's history dates back to 11 January 1922 when HMS CROZIER arrived in Simon's Town. She was renamed HMSAS PROTEA, the first in the line of four SA Navy hydrographic survey vessels of that name. The present SAS Protea was built by the Yarrows shipyard in Scotland and is based on the British Royal Navy's HECLA Class hydrographic survey vessel. Launched on 4 July 1971 and commissioned on 23 May 1972, she entered Simon's Town for the first time on 14 July 1972.

During her work, she has visited many out of the way places such as the South Shetland Islands, Kergeulen, the Marion and Prince Edward islands and the Antarctic. She has shown the South African flag in many countries and was the first SA Navy vessel to sail around Cape Horn where she called at Ushuaia, the southernmost inhabited town in the world.
SURVEY CHART ROOM

Planning for a survey is done in the Survey Chart Room, where the charts of the survey area are laid out on the chart table. The survey chart table is central to the survey chart room. The SAS PROTEA has submitted more than 100 completed surveys of the South African coastline, thus ensuring safe passage to the thousands of vessels using our waters annually.

Modern hydrographic and oceanographic survey methods are largely computerized. The accurate processing of the survey information can be done whilst at sea. The results of surveys are submitted to the Hydrographer for publication. Much of the software in use has been developed in South Africa specifically for the SAS PROTEA.

Echo sounders provide a digital image of the surveyed area, which is sent to the relevant survey computers. A graphical backup image of the surveyed area is created at the same time.

Data from the survey is sent to computers in the survey chart room and can be displayed in a two-dimensional grid format.

The vessel is equipped with two small survey crafts for inshore work that aid with mapping at depths of 20m and smaller as the vessel is too large to map in shallow waters.

An area of 16km$^2$ can be mapped in 8 weeks. They recently worked on mapping the Durban region and went back to Cape Town before the 2016 Elections took place. They navigate using the UTM system and map according to WGS84.

Even though she is furnished with survey instruments, she can also equip for search and rescue. The vessel also assists countries such as Mozambique and Namibia in mapping as well as training of up and coming hydrographic surveyors.

FLIGHT DECK

The SAS PROTEA has hanger facilities for one Alouette III helicopter and can also receive other helicopters on her flight deck. The safety nets on the flight deck are lowered during helicopter operations and trained members of the crew act as flight deck personnel. A helicopter adds to the ship’s versatility. Specially trained sailors double as the flight deck crew.

The SAS PROTEA has conducted a number of humanitarian and environmental assistance operations in South African waters, and as far south as Marion Island. The helicopter is essential in fulfilling such tasks as search and rescue, transferring people to and from land or evacuating personnel from islands or other vessels for medical attention.
With the 21st of February declared as Armed Forces Day, South Africans can unite behind the SANDF, allow the SANDF to interact with the community, expand public understanding, and showcase latest equipment and technology and to demonstrate military combat readiness against treats.

After the visit I had a sense that not every surveyor is meant to map the land. These men and women that venture of into the seas for months have their hearts in it. The dedication and hard work that they put into charting out waters cannot be taken lightly. Furthermore they have acquired skills of not a surveyor but a true sailor.

The men and women that dedicated their lives to the force and to practice survey have made a lasting impression on the survey community on land. We can safely say that our seas are protected and mapped with accuracy.

REFERENCES


"SOUTH AFRICAN NAVY HYDROGRAPHIC OFFICE." Retrieved 2017/04/26, from http://www.sanho.co.za