Brazilian Hydrographic Surveying of Antarctic Waters

Brazilian Hydrographic Surveying of Antarctic Waters

***Summary***

This Information Paper summarizes the recent work done by the Directorate of Hydrography and Navigation (DHN) of the Brazilian Navy, the competent national authority with regard to nautical chart production. DHN represents Brazil at the International Hydrographic Organization (IHO) and is responsible for collecting, processing and distributing information related to safety of navigation. The Directorate also offers hydrographic and oceanographic services in the Antarctic Peninsula region.

***Introduction***

Brazil has been present in Antarctica with a governmental scientific programme since 1982, and DHN operates the ships assigned to the Brazilian Antarctic Program (PROANTAR). PROANTAR is fully supported by Brazilian Navy vessels and Brazilian Air Force aircraft. The first expeditions were conducted with the support of the Oceanographic Support Ship “Barão de Teffé”, which was replaced in 1994 by the Oceanographic Support Ship “Ary Rongel”. Since 2014 also Polar Ship “Almirante Maximiano” supports the Brazilian Antarctic Program.

In 1983, the first Brazilian hydrographic survey was carried out in Antarctica, which resulted in the publication of the first edition of nautical chart 25121 of Admiralty Bay, on King George Island, one year later.

In 2013, DHN developed the Antarctic Hydrographic Data Collection Plan in order to systematize the acquisition of bathymetric and tidal data under responsibility of Brazil for the production and updating of cartographic documents in the Antarctic region, with emphasis on the maritime areas where Brazilian scientific activities are conducted.

Since 2016, the Brazilian Cartographic Plan for Antarctica is part of the Brazilian Nautical Cartographic Plan, and its hydrographic and cartographic production activities are reviewed every four years.

DHN has produced 6 nautical paper charts, 4 international nautical charts (INT charts), and 5 electronic nautical charts (ENC) covering Antarctic waters. The online catalogue of national charts is available at the following link: *https://www.marinha.mil.br/chm/dados-do-segnav/cartas-raster*

Efforts to address the nautical charting challenges in Antarctica require considerable investment, and strong international cooperation and coordination. The hydrographic offices of Argentina, Chile, Peru and the United Kingdom have cooperated closely with the Brazilian Navy in surveys and hydrographic activities in the Antarctic Peninsula region.

**Activities**

Historically, the DHN hydrographic data collection have been conducted in the region close to the Comandante Ferraz Antarctic Station (EACF), in Admiralty Bay, on the Keller Peninsula and in the vicinity of Elephant Island. Most of the Brazilian scientific activities are carried out in these places.

According to IHO reports, there are limitations of hydrographic knowledge in Antarctica and it is known that those unsurveyed waters pose serious risks for maritime incidents. To contribute to the current efforts of hydrographic mapping of Antarctic waters, DHN has been carried out hydrographic surveys on maritime shipping routes as established by the IHO Hydrographic Commission on Antarctica (HCA), which will contribute to the publication of two more INT charts on 1:200.000 scale in cooperation with the Chilean Hydrographic Service.

Geographical limits of interest and Brazilian chart size for Antarctica, according to IHO agreements, are included in The Brazilian Cartographic Plan for Antarctica (see Table 1).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **National Nr.** | **INT Nr.** | **Title** | **Scale** | **1st Edition** | **Last Edition** |
| 25110 | 9150 | Elephant Island and surrounding area - South Shetland Islands | 1:200.000 | 1999 | 2009 |
| 25115 |  | Elephant Island - South Shetland Islands | 1:100.000 | 2005 | - |
| 25119 | 9127 | Sherratt Bay (KGI) | 1:40.000 | 2008 | 2013 |
| 25120 | 9126 | King George Bay (KGI) | 1:40.000 | 2008 | 2013 |
| 25121 | 9125 (\*) | Admiralty Bay (KGI) | 1:40.000 | 1984 (Nat)  2016 (INT) | - |
| 25122 |  | Maxwell Bay (KGI) | 1:40.000 | 1994 | - |

*Table 1 – Brazilian contribution to The International Nautical Charts Porfolio of Antartica.*

(\*) in cooperation with Peru.

The nautical chart scheme of The Brazilian Cartographic Plan for Antarctica is illustrated in Figure 1.

Gráfico

Descrição gerada automaticamente

*Figure 1 - Scheme of The Brazilian Cartographic Plan for Antarctica.*

Cartographic updates for the Antarctic region are carried out after the hydrographic activities conducted during the annual Antarctic Operations (OPERANTAR).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **National Nr.** | **INT Nr.** | **Title** | **Notice to Mariners** | |
| 25120 | 9126 | King George Bay (KGI) | 1/18 | Gráfico, Diagrama  Descrição gerada automaticamente |
| 25121 | 9125 | Admiralty Bay (KGI) | 185/19 | Diagrama, Mapa  Descrição gerada automaticamente |
| 25122 | - | Maxwell Bay (KGI) | 109/17 | Mapa  Descrição gerada automaticamente |

*Table 2 - Cartographic updates made by DHN in the last 3 years.*

During OPERANTAR XXXVI (2018), the Oceanographic Support Ship "Ary Rongel" DHN has conducted hydrographic surveys in the Maxwell Bay (picture on the left below) and the Admiralty Bay (picture on the right). These hydrographic surveys were used to update 25122 and 25121 (INT 9125) charts, respectively.

Diagrama

Descrição gerada automaticamente

*Figure 2 - Hydrographic survey -Maxwell Bay - OPERANTAR XXXVI*

In 2019 (OPERANTAR XXXVII), the Polar Ship "Almirante Maximiano" completed the hydrographic data acquisition in King George Bay (KGI) for the update of the nautical chart 25120 (INT 9126).

Uma imagem contendo Mapa

Descrição gerada automaticamente

*Figure 3 - Hydrographic survey - King George Bay - OPERANTAR XXXVII.*

The Polar Ship “Almirante Maximiano” conducted hydrographic surveys during OPERANTAR XXXVIII in the vicinity of Maxwell Bay, southeast of Nelson Island, as illustrated in the figures below, being part of the work that will enable the updating of nautical chart 25122.

Diagrama

Descrição gerada automaticamente

*Figure 4 - Hydrographic survey - Maxwell Bay - OPERANTAR XXXVIII*

In the same period (2020) the Polar Ship “Almirante Maximiano” carried out two shoal investigations in the Admiralty Bay, as shown in the images below.

Mapa

Descrição gerada automaticamente

*Figure 5 - Hydrographic survey - Admiralty Bay - OPERANTAR XXXVIII*

In December 2020, a Spotter-V2 buoy was anchored in the vicinity of the Comandante Ferraz Antarctic Station (EACF), at coordinates 62° 12' 34.258" S and 58° 16' 48.180" W. Launched by the Polar Ship “Almirante Maximiano”, the Antarctic buoy is part of an experiment made by the Navy Hydrography Center in partnership with Petrobras, the Brazilian energy company, within the scope of the REMO observational Project, to perform remote monitoring of the waves, wind and surface temperature of the sea. The meteoceanographic data collected is available in real time, thus providing vital information to support the Brazilian Navy operations in that region. The information is free and available to other national Antarctic programs and the scientific community through the Marine Meteorological Service: [*www.marinha.mil.br/chm/dados-do-goos-brasil/pnboia-mapa*](http://www.marinha.mil.br/chm/dados-do-goos-brasil/pnboia-mapa)

Brazil also offers a contribution to IHO on the production and updating of Electronic Navigational Chart (ENC) in the Antarctic region. These Brazilian ENCs can be obtained through the IC-ENC (*www.ic-enc.org*), which is one of the Regional ENCs Coordination Centers (RENC), or through the company EMGEPRON (*https://cartasnauticasbrasil.com.br/geoportal/web/niceindex.html*), which acts as a value added reseller (VAR) for RENC PRIMAR.

|  |  |  |  |
| --- | --- | --- | --- |
| **Nr.** | **Title** | **Scale** | **Usage Band** |
| BR325110 | Elephant Island and surrounding area | 1:180.000 | 3 (Coastal) |
| BR425119 | Sherratt Bay (KGI) | 1:45.000 | 4 (Approach) |
| BR425120 | King George Bay (KGI) | 1:45.000 | 4 (Approach) |
| BR425121 | Admiralty Bay (KGI) | 1:22.000 | 4 (Approach) |
| BR525121 | Admiralty Bay (KGI) | 1:12.000 | 5 (Harbour) |

*Table3 - The status of Brazilian ENCs production.*

**Final Observations**

During the 39 years of collaboration with the Brazilian Antarctic Program, the Directorate of Hydrography and Navigation of the Brazilian Navy has sought to contribute to the collection of bathymetric and cartographic data of Antarctic waters, as established by the International Hydrographic Organization, improving navigation security, scientific and logistical support, safeguarding life at sea and protection of the marine environment of that region.