Hydrographic and Cartographic Activities of Brazil in the Antarctic Region carried out during the last two campaigns of the Brazilian Antarctic Program (OPERANTAR XXXIX e XL)

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***Summary***

This report presents the recent work of the Directorate of Hydrography and Navigation (DHN), which represents Brazil in the International Hydrographic Organization (IHO), in and for the Antarctic Region during the last two campaigns of the Brazilian Antarctic Program (OPERANTAR XXXIX e XL). This work involves carrying out bathymetric and hydrographic surveys, updating nautical publications, and updating nautical charts.

***Introduction***

Brazil has committed itself as full member of the IHO Hydrographic Commission on Antarctica (HCA) to carry out hydrographic surveys, to produce and update International Nautical Charts (INT Charts), Raster Navigational Charts (RNCs) and Electronic Navigational Charts (ENCs), and to cooperate with other Hydrographic Offices in the Antarctic Region.

DHN has been actively participating in the Brazilian Antarctic Program (PROANTAR), since 1982, with the operation of its polar vessels, used to support the logistics to the Brazilian Antarctic Station and scientific field activities in the Antarctic Region. Polar vessel "Barão de Teffé" was operational until 1994 when it was replaced by polar vessel "Ary Rongel" in 1994. Later, DHN started to count on polar vessel "Almirante Maximiano", from 2014.

The first hydrographic survey of Brazil in Antarctica was carried out in 1983, which led to the publication of the first edition of a nautical chart of the Admiralty Bay on King George Island (South Shetland Islands). Since then, the Brazilian hydrographic office has issued 6 paper nautical charts, 4 of which are INT Charts, 6 RNCs, and 5 ENCs. It is important to emphasize that the III Brazilian Nautical Cartographic Plan integrates Brazil's needs for nautical cartography for the Antarctic Region.

INT Charts produced and updated by Brazil can be obtained via the website of the company EMGEPRON's (<https://cartasnauticasbrasil.com.br/cartas-nauticas-geral/cartas-nauticas-2.html>).

ENCs issued by Brazil are distributed by IC-ENC or by EMGEPRON, working as a reseller of VAR PRIMAR ([www.cartasnauticasbrasil.com.br/geoportal/web/niceindex.html](http://www.cartasnauticasbrasil.com.br/geoportal/web/niceindex.html)).

RNCs published by Brazil are currently available at no cost for the entire maritime community (<https://www.marinha.mil.br/chm/dados-do-segnav/cartas-raster>).

During the campaigns of the Brazilian Antarctic Program from 2020 to 2021 (OPERANTAR XXXIX) and from 2021 to 2022 (OPERANTAR XL) the Brazilian polar vessels collected meteorological and oceanographic data and occasionally carried out bathymetric and hydrographic surveys.

***Cartographic Activities***

Cartographic updates to the nautical charts produced by Brazil in the Antarctic Region have been made from bathymetric and hydrographic surveys carried out by the Brazilian polar vessels during the campaigns of the Brazilian Antarctic Program.

The following nautical charts received updates in the last two years:

INT Chart 9127 - SHERRATT BAY (KING GEORGE ISLAND)

INT Chart 9126 - KING GEORGE BAY (KING GEORGE ISLAND)

INT Chart 9125 - ADMIRALTY BAY (KING GEORGE ISLAND)

ENC BR425119 - SHERRATT BAY (KING GEORGE ISLAND)

ENC BR425120 - KING GEORGE BAY (KING GEORGE ISLAND)

ENC BR425121 - ADMIRALTY BAY (KING GEORGE ISLAND)

RNC 25115 - ELEPHANT ISLAND

RNC 25119 (INT Chart 9127)

RNC 25120 (INT Chart 9126)

RNC 25121 (INT Chart 9125)

RNC 25122 - MAXWELL BAY (KING GEORGE ISLAND)

***Hydrographic Activities***

Last two campaigns of the Brazilian Antarctic Program carried out bathymetric and hydrographic surveys especially in the region of the planned INT Charts 9151 and 9152 (scale 1:200,000).

During OPERANTAR XXXIX (2020/2021), polar vessel “Ary Rongel” collected bathymetric data for GEBCO program in the way to the Antarctic Peninsula. Also surveyed south of Nelson and Robert Islands and in Bransfield Strait, in survey area H4, as shown in Figures 1 and 2.

During OPERANTAR XXXIX, polar vessel “Almirante Maximiano” also collected bathymetric data for GEBCO program in the way to the Antarctic Peninsula and carried out a hydrographic survey in Bransfield Strait, in survey area I4, as shown in Images 1 and 2.

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| *Image 1: Location of survey areas H4 and I4* |

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| *Image 2: Areas surveyed during OPERANTAR XXXIX (2020/2021), including GEBCO bathymetric lines* |

During OPERANTAR XL (2021/2022), polar vessel Almirante Maximiano carried out a hydrographic survey in survey area H4 and polar vessel Ary Rongel has conducted bathymetric surveys in survey areas J4 and J5, as shown in Figure 3.

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| *Image 3: Location of survey areas J4 and J5* |

***Conclusion***

During 40 years of existence of the Brazilian Antarctic Program (PROANTAR), the Directorate of Hydrography and Navigation has collaborated and contributed to the collection of bathymetric data and to the production of nautical cartography for Antarctica, as a consequence of the commitment assumed with the International Hydrographic Organization and the Hydrographic Commission on Antarctica, in favor of the safety of the navigation and the protection of the marine environment in this region.

The Comandante Ferraz Antarctic Station (EACF) was installed in the Admiralty Bay in the summer of 1984, has been continuously occupied since 1986 and had its new facilities inaugurated in January 2020. There are also other structures maintained by Brazil in Antarctica, such as refuges in the Peninsula region and the Cryosphere Module 1, which, together with the temporary camps stablished in the Peninsula region, make it possible to carry out scientific activities in different Antarctic sites. The Brazilian Air Force flights transport material and personnel, from Brazil to Antarctica, as well as airdrop delivery of fresh food and other items to the Ferraz Station staff during the winter period. The Polar Ship Almirante Maximiano and the Oceanographic Support Ship Ary Rongel carry out, during the summer seasons, scientific activities on board, transport for installation of equipment and collection of samples on land, and logistical support for the maintenance of Brazilian infrastructure in the White Continent.