

**20<sup>TH</sup> MEETING OF THE MESO AMERICAN – CARIBBEAN SEA  
HYDROGRAPHIC COMMISSION (MACHC20)  
Santo Domingo, Dominican Republic – 3-6 December 2019**

**NATIONAL REPORTS FROM BRAZIL TO THE MACHC20**

**Executive summary**

1. Hydrographic Office / Service:
  - a) Name of the institution: Directorate of Hydrography and Navigation (DHN).
  - b) Description: DHN is responsible for hydrographic surveys and its analysis, nautical chart production, nautical publication release, weather forecast broadcast, maritime safety information and navigational warning broadcast, oceanographic data analysis, hydrographic training and capacity building implementation.
  - c) Submitted by: LCdr. (Engineer) Ricardo Ramos Freire, [ricardo.freire@marinha.mil.br](mailto:ricardo.freire@marinha.mil.br).
2. Surveys:
  - a) Coverage of new surveys: during 2019, the Brazilian Navy Hydrographic Vessels carried out surveys in the Amazon Basin, mainly in the Madeira, Solimões, Branco, Tapajós and Amazon rivers and in the northern region of NAVAREA V, contributing to the nautical cartography production of the area.
  - b) New technologies and /or equipment: XXX.
  - c) New ships: XXX.
  - d) Crowdsourced and satellite-derived bathymetry - national policy: under evaluation. They are not recognized as valid chart update sources by now.
  - e) Challenges and achievements: DHN surveyed 1,100 km in Madeira river. It also completed the basic training at its Amazon region branches in hydrographic data processing and nautical charts production using a centralized database. Finally, it was conducted a survey (tidal data acquisition) and it was established a new set of tidal reduction parameters at the mouth of the Amazon River. This affects INT 4196.
3. New charts & updates:
  - a) ENC coverage, gaps and overlaps:  
Brazilian ENCs don't present gaps neither overlaps due to internal and external systematic checks (IC-ENC).  
The new ENC cells produced since last MACHC meeting are:  
BR44023A – Paraná de Santa Rita  
BR304023 – Da Ilha de Patacho à Ilha de Santa Rita  
BR304025 – Da Ilha de Santa Rita ao Paraná do Ramos  
BR44026A – Paraná do Mocambo  
BR304027 – Da Ponta dos Mundurucus à Parintins  
BR304028 – Da Ponta dos Mundurucus à Ilha Panumã

BR44029A – Paraná do Serpa  
 BR44029B – Terminal de Itacoatiara  
 BR504029 – Terminal Graneleiro  
 BR304029 – Da Ilha Panumã a Novo Remanso  
 BR304031 – De Novo Remanso a Manaus  
 BR44032A – Porto de Manaus  
 BR504032 – Plano Porto de Manaus  
 BR54032B – Porto Chibatão  
 BR54032C – Terminais da Reman  
 BR504211 – Da Foz do Rio Jari a Vida Nova  
 BR504215 – De Paga Dívidas à Ilha Marapi

The ENC cells updated since last MACHC meeting are:

BR400011 – Proximidades do Arquipélago de São Pedro e São Paulo  
 BR400202 – Da Ilha Bailique a Ponta do Capinal  
 BR400203 – Da Ponta do Capinal às Ilhas Pedreira  
 BR400204 – Das Ilhas Pedreira à Ilha de Santana  
 BR500206 – Canal de Santana  
 BR404211 – Da Foz do Rio Jari a Vida Nova  
 BR504215 – De Paga Dívidas à Ilha Marapi  
 BR221010 – De Cayenne ao Cabo Gurupi  
 BR321300 – Do Cabo Norte ao Cabo Maguari  
 BR321400 – Do Cabo Maguari à Ponta Boiuçucanga  
 BR44032A – Porto de Manaus  
 BR441021 – De Gurupá a Almeirim  
 BR441022 – De Almeirim à Prainha  
 BR541031 – De Prainha à Costa do Ituqui  
 BR441032 – Da Costa do Ituqui à Ilha do Meio

b) ENC distribution method:

Brazilian ENCs are distributed by IC-ENC. In 2018, the Brazilian company EMGEPRON began working as reseller of VAR PRIMAR (<https://cartasnauticasbrasil.com.br/>).

c) RNCs:

DHN provides Raster Navigational Charts for NAVAREA V.  
 513 RNC (77 in MACHC region) are currently available at no cost for the entire community (<https://www.marinha.mil.br/chm/dados-do-segnav/cartas-raster>).

d) INT charts:

The updated INT charts are:  
 407 – Costa Nordeste da América do Sul  
 4071 – De Cayenne ao Cabo Gurupi  
 4195 – Da Ponta Tucumã à Ponta do Guará  
 4196 – Do Cabo Norte ao Cabo Maguari  
 4197 – Do Cabo Maguari à Ponta Boiuçucanga

e) National paper charts:

The new national paper chart editions are:  
 4217 – Do Paraguai à Fazenda Caiçara  
 4711 – Da Foz do Rio Madeira à Ilha do Capitari

4712 – Da Costa da Fazendinha à Ilha do Urucurituba  
 4713 – Da Ilha Ipiranga à Ilha do Rosarinho  
 4714 – Do Porto Ideal a Nova Olinda do Norte  
 4715 – Da Ilha do Maracá à Enseada do Axinim  
 4716 – De Novo Axinim à Ilha das Guaribas  
 4717 – Da Ilha das Guaribas à Ilha Nova  
 4718 – De Borba à Ilha Guajará  
 4719 – Do Igarapé Arazinho à Ilha do Mandii  
 4720 – Da Ilha do Mandii à Ilha dos Ganchos  
 4721 – Do Porto São Joaquim à Ilha do Jacaré  
 4722 – De Vista Alegre ao Porto de Santo Amaro  
 4723 – Do Porto de Santo Amaro ao Porto Tabocal  
 4724 – De Novo Aripuanã à Ilha das Araras  
 4725 – Da Ilha das Araras a São Miguel do Uruá  
 4726 – Da Ilha Uruá Grande ao Porto Itapenima  
 4727 – Da Vila Belmonte à Ilha do Jenipapo  
 4728 – De Currálinho ao Furo Matupiri  
 4729 – Do Igarapé Jaturana à Enseada do Manivão  
 4730 – De Igarapé-Açú a Manicoré  
 4731 – De Democracia à Ilha da Onça Grande  
 4732 – Da Ilha da Onça Grande ao Porto Curuçá  
 4733 – Do Porto Curuçá à Ilha dos Marmelos  
 4734 – Do Porto Gondomar à Ilha de Santa Cruz  
 4735 – Da Costa de Santa Cruz à Costa Santa Rosa  
 4736 – Da Costa Valparaíso à Ilha da Meditação  
 4737 – Da Ilha da Meditação à Ilha Itapuru  
 4738 – Da Boca do Jurará à Enseada do Lago do Antônio  
 4739 – Da Ilha da Conceição à Ilha do Carará  
 4740 – Da Ilha Carapanatuba à Costa Camuja  
 4741 – Da Ilha das Três Casas ao Porto São Benedito  
 4742 – Da Costa Santa Júlia à Costa São Pedro  
 4743 – Da Costa São Pedro à Ilha das Pupunha  
 4744 – Do Furo do Puruzinho a Humaitá  
 4745 – Da Ilha do Salomão a Mirari  
 4746 – Da Ilha Tambaqui ao Porto Bandeira Branca  
 4747 – De Calama à Ilha Assunção  
 4748 – Da Ilha Assunção ao Estirão dos Papagaio  
 4749 – Da Ilha Tira – Fogo à Ilha dos Periquito  
 4750 – Da Ilha dos Periquitos à Boca do Muriqui  
 4751 – Da Ilha Sobral à Costa Vacurang

f) Other charts, e.g. for pleasure craft:

DHN plans to release 14 Inland ENC's from Madeira River, as soon as possible.

g) Challenges and achievements:

DHN is facing a new challenge: decentralize cartographic production by using Navy local hydrographic branches (Distance to the Amazon region branches; 1,500 km up to 3,000 km) to conduct surveys, analyse hydrographic data, load and validate bathymetric and cartographic databases and produce nautical charts, aiming at timeless update (ping-to-chart). In order to achieve this goal, DHN conducted trainings in those branches and tested a secure connection so they can work directly in

the databases stored at DHN, Niterói. Additionally, Officers (Engineers) and Enlisted (Technicians) specialized in Cartography (all with several years of experience in chart editing) will be transferred to these branches, aiming to improve their production capabilities and to create critical mass. DHN just released the Brazilian portfolio of Madeira River, composed of 43 paper charts.

4. New publications & updates:

- a) New Publications: XXX.
- b) Updated publications:  
Tide Tables DG6 and Nautical Almanac DN5.
- c) Means of delivery, e.g. paper, digital:  
Accessible through paper format (EMGEPRON's website - <https://cartasnauticasbrasil.com.br/>) and digital format (DHN's website - <https://www.marinha.mil.br/chm/dados-do-segnav/publicacoes>).
- d) Challenges and achievements: XXX.

5. MSI

- a) Existing infrastructure for MSI dissemination:  
Brazilian Navy Hydrographic Centre is responsible for the reception, processing and promulgation of MSI for NAVAREA V, on behalf of DHN, in accordance with GMDSS Master Plan. Navigational warnings and meteorological information are broadcast by SafetyNET service at scheduled times (0030 and 1230 UTC) twice a day. Meteorological information is broadcast at scheduled times (0730 and 1930 UTC) twice a day. Bad weather warnings are forwarded any time, whenever it's necessary. MSI is also broadcast in VHF/HF by the Brazilian Navy Radio Station in Rio de Janeiro, at least twice a day. Local navigational warnings are broadcast only by VHF/HF.

- a) Statistics on work of the National Coordinator

Country / Territory	Phase 1 MSI Status	MSI 2017	MSI 2018	MSI 2019	Training Date	Training Date
Brazil (NAVAREA V)	Fulfilling all obligations	178	225	165	Apr 2011	Oct 2018

- b) New infrastructure in accordance with GMDSS Master Plan

SERVICE	YES	NO	PARTIAL	NOTES
MASTER PLAN	X			
A1 AREA	X			
A2 AREA	X			
A3 AREA	X			
NAVTEX		X		
SafetyNET	X			

- c) Challenges and achievements: MSI transmission requirement with the hiring of all IMO-recognized satellite service providers leading to increased costs (equipment, trainings and services).

6. C-55

Brazilian information in C-55 was updated in October 2019.

C-55 Region B was subdivided in 3 regions: Amazon Basin, Brazilian Coast, and São Pedro and São Paulo Archipelago.

Status of Hydrographic Survey:

Survey coverage, where:

A - Percentage which is adequately surveyed.

B - Percentage which requires re-survey at larger scale or to modern standards.

C - Percentage EEZ which has never been systematically surveyed.

1 - Amazon Basin

	<b>A</b>	<b>B</b>	<b>C</b>
0 - 200m	80	20	0
Depths > 200m	---	---	---

2 - Brazilian Coast

	<b>A</b>	<b>B</b>	<b>C</b>
0 - 200m	75	15	10
Depths > 200m	100	0	0

3 - São Pedro and São Paulo Archipelago

	<b>A</b>	<b>B</b>	<b>C</b>
0 - 200m	0	100	0
Depths > 200m	100	0	0

Status of Nautical Charting:

Coverage of charts published by your organization, where:

A - Percentage covered by INT series/paper chart series meeting the standards in S-4.

B - Percentage covered by Raster Navigational Charts (RNCs) meeting the standards in S-61.

C - Percentage covered by ENC's meeting the standards in S-57.

1 - Amazon Basin

<b>Chart Coverage</b>	<b>Passage (%)</b>	<b>Coastal (%)</b>	<b>Port (%)</b>
INT	---	---	---
RNC	---	---	90
ENC	---	---	100
<b>Status of Paper Charts</b>			
Paper charts with depths in meters (%)	100		
Paper charts referenced to a satellite datum (%)	89		

## 2 - Brazilian Coast

Chart coverage	Passage (%)	Coastal (%)	Port (%)
INT	100	100	100
RNC	100	100	100
ENC	100	100	100
Status of Paper Charts			
Paper charts with depths in meters (%)	100		
Paper charts referenced to a satellite datum (%)	100		

## 3 - São Pedro and São Paulo Archipelago

Chart coverage	Passage (%)	Coastal (%)	Port (%)
INT	100	100	---
RNC	100	100	---
ENC	100	100	---
Status of Paper Charts			
Paper charts with depths in meters (%)	100		
Paper charts referenced to a satellite datum (%)	100		

## 7. Capacity Building

Offer of Capacity Building:

COURSE	DESCRIPTION	DURATION
C-Esp-HN Basic Course	Aims to qualify the student to be a technician in Hydrography and Navigation issues.	42 weeks
C-Ap-HN (IHO Cat. "B") Intermediate Course	Aims to increase the capability of the student to be a technician in Hydrography and Navigation.	35 weeks
CAHO (IHO Cat. "A") Advanced Course	Aims to provide the student with the capability to plan, to conduct and to execute the activities related with the Hydrographic Service.	50 weeks

## a) Training received, needed, offered:

In 2019, an officer from the Bolivian Navy is attending the advanced hydrographic training course CAHO in DHN, recognized as IHO Category "A".

In 2020, DHN expects to receive more students from abroad to attend its hydrography programmes (IHO Categories "A" and "B"). Until now, the Republic of Senegal confirmed a student to attend the basic course in hydrography and navigation.

## b) Status of national, bilateral, multilateral or regional development projects with a hydrographic component. (In progress, planned, under evaluation or study):

In addition to DHN's training infrastructure, some Brazilian Federal Universities have expressed interest in creating training courses in Hydrography and Nautical Cartography areas.

The Fluminense Federal University (UFF), through a possible cooperation agreement with DHN, other Brazilian universities and governmental institutions are working on creating a Specialization Course in Hydrography (Cat “B”) which, according to the University Work Plan, is expected to start until 2021.

UFF is about to launch a hydrographic vessel to support the programme practice, supported by the Ministry of Education.

c) Description of proposals and requests to the IHO/CBSC:

In 2019, the proposed trainings for IHO/CBSC were not approved for funding. Nevertheless, DHN performed a Workshop on MBES Processing in Caris HIPS & SIPS, conducted by the hydrographers who attended this same training at Argentina in 2018. This workshop was directed to other hydrographers of DHN's research vessels in order to promote the dissemination of the knowledge received.

Within the 2020 CB Work Programme, DHN will promote a Seminar on Raising Awareness of Hydrography, in March, and intends to host a Seabed Classification Workshop that will likely be, if approved by the IHO/CBSC, in October 2020. Although both events are within the SWAtHC Capacity Building Work Plan, DHN will invite MACHC members to participate, especially the latter, if approved.

In addition, DHN intends to participate in the Tides Workshop for Spanish Speakers, proposed by MACHC (and already approved by CBSC) as a co-sponsorship with SWAtHC.

## 8. Oceanographic activities

a) General:

Deployment of XBTs by Brazilian Navy Ships in international waters and maintenance of 8 (eight) moored buoys of the PIRATA Moored Array Project by Brazilian Navy Survey Ships.

b) GEBCO/IBC’s activities, GEBCO Seabed 2030 activities:

GEBCO soundings are performed by the Brazilian Navy Survey Ships during all hydrographic and oceanographic surveys. DHN continues its effort to provide reliable data to Seabed 2030 initiative.

c) Tide gauge network:

431 tide gauges are distributed throughout the Brazilian territory (October 2019).

43 tide gauges are placed in the MACHC region.

d) New equipment:

XXX.

e) Challenges and achievements:

XXX.

## 9. Spatial data infrastructures

a) Status of MSDI:

DHN is creating metadata and testing commercial and open source solutions.

- b) Relationship with the NSDI:  
DHN provides raster version of its nautical charts, as well as complimentary data according to its Data Access Policy (NAD-DHN).
- c) Involvement in regional or global MSDI efforts:  
DHN attended meetings of IHO MSDIWG, UN-GGIM WGMGI and OGC Marine DWG.
- d) National implementation of the Shared Data Principles:  
All DHN data is shared according to its Data Access Policy (NAD-DHN).
- e) MSDI national portal: XXX.
- f) Best practices and lessons learned:  
Metadata extraction can be a challenging effort, especially when not using proper spatial ETL tools or when data lacks coherent structure.
- g) Challenges and achievements: XXX.

#### 10. Innovation

- a) Use of new technologies: XXX.
- b) Risk assessment: XXX.
- c) Policy matters: XXX.

#### 11. Other activities

- a) Participation in IHO meetings:  
DHN attended meetings of IHO Council, MACHC, SWAtHC, HSSC, S-100WG, S-101PT, ENCWG, NCWG, NIPWG, DQWG, TWCWG, ABLOS, WWNWS-SC, WENDWG, MSDIWG, GGC and SCUFN.
- b) Meteorological data collection:  
Meteorological data are collected by fixed meteorological stations placed all over Brazil, by ships and are also received from other institutions through internet links. All data are used for the Marine Meteorological Service products, broadcast at no cost along and offshore the Brazilian coast and by internet.
- c) Geospatial studies:  
DHN released a shallow water current prediction system which extrapolates current velocities and directions in shallow waters from the astronomical tides. The second version is constrained to the Guanabara Bay and to the Sepetiba Bay, in the State of Rio de Janeiro (<https://www.marinha.mil.br/chm/dados-do-smm/corrente-de-mare>).
- d) Preparation for responses to disasters:  
DHN maintains a 24/7 service with telephone and e-mail.



- e) Environmental protection:  
DHN created a segregated Marine Protected Area layer in its cartographic database where all informed protected areas are coded. It's been prepared for future S-100 needs. This information is represented on paper charts and ENC's.
- f) Engagement with the Maritime Administration:  
The Maritime Administration is under the Brazilian Navy structure.
- g) Aids to Navigation matters:  
DHN is responsible for the publication of all AtoN products, as well as actively represent Brazil's interests at IALA.
- h) Magnetic and gravity surveys:  
DHN conducted magnetometry and gravimetry surveys related to the Brazilian Proposal of the External Limit of the Brazilian Continental Shelf (LEPLAC) being submitted to the United Nations' Commission on the Limits of the Continental Shelf (CLCS).
- i) International engagements:  
DHN actively participates of workgroups and commissions at IHO, IMO, IALA, IOC and WMO. It also contributes with smaller organizations that discusses adjacent topics to the previously mentioned ones (e.g. IEHG).
- j) Others: XXX.

## 12. Conclusions

DHN reassures its commitment with MACHC and plans continuous hydrographic activities so as to keep its nautical charts updated, as stated in Regulations V and IX of the SOLAS Convention.