

Direction des missions institutionnelles  
et des relations internationales  
Division relations extérieures

BREST, le 08 novembre 2023

N° 047/Shom/DMI/REX/NP

## NATIONAL REPORT

- SUBJET** : France national report to the 24<sup>nd</sup> meeting of the Meso-American and Caribbean Sea Hydrographic Commission (MACHC).
- APPENDIX** : one appendix.

### 1. HYDROGRAPHIC OFFICE: GENERAL

Shom is pursuing the achievement of its different commitments based on the National Maritime & Littoral Strategy and the Strategic Review of Defence and National Security according to a 4-year target and performance contract between Shom and the French State. A new target and performance contract came into effect on January 1, 2021 for the period 2021-2024.

In addition to that, survey works are being conducted according to the prioritized 4-years survey plan for waterways under French jurisdiction.

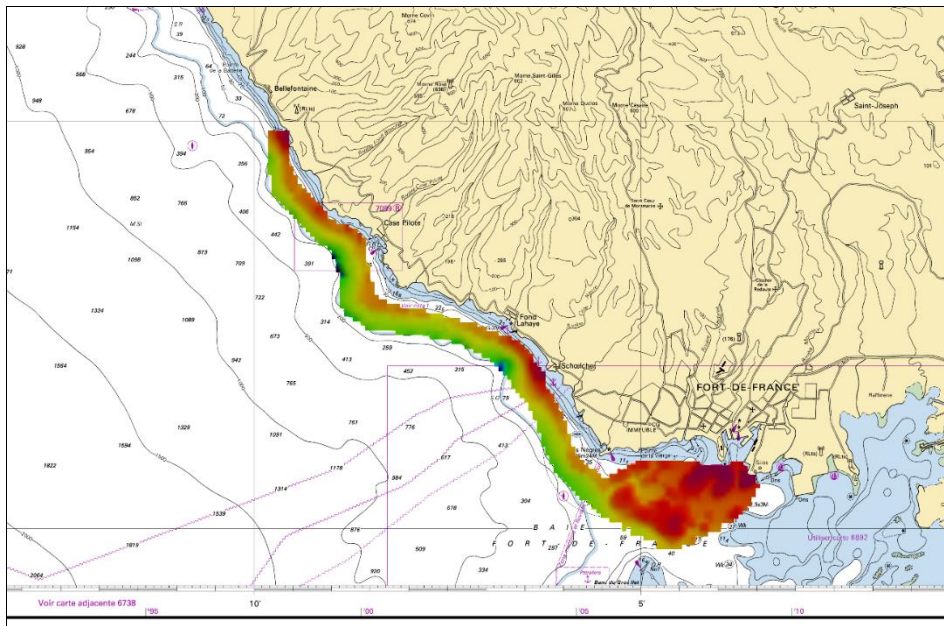
Detailed information to update IHO Publication P-5 (Yearbook) has been submitted using the online system.

This national report is submitted by RADM Laurent Kerléguer, French national hydrographer and Shom Director General ([laurent.kerleguer@shom.fr](mailto:laurent.kerleguer@shom.fr)).

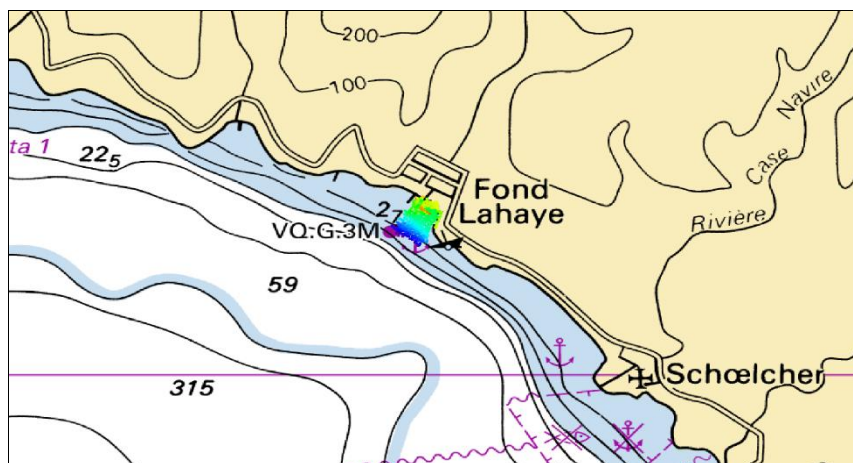
### 2. SURVEYS

#### 2.1. COVERAGE OF NEW SURVEYS

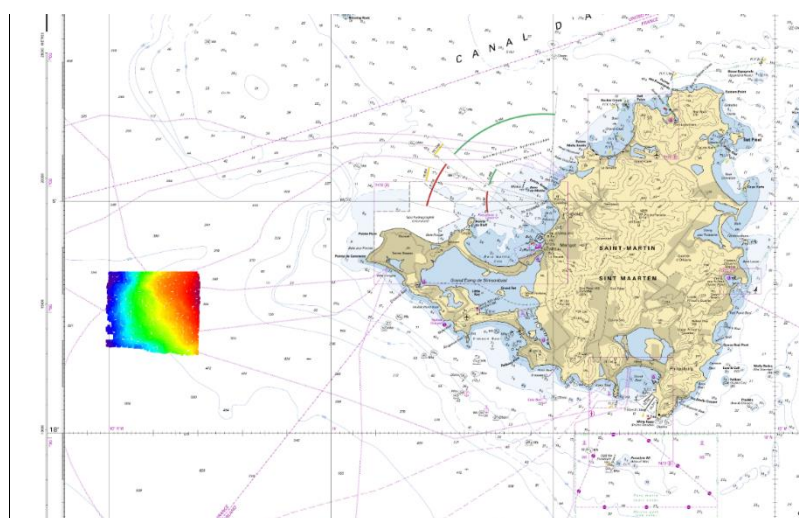
Five third parties surveys covering Martinique, Saint Martin harbours and French Guyana rivers have been communicated to Shom since the last Conference:



*Fig. 1 – Survey coverage in Martinique (2014. RTE)*



*Fig. 2 – Survey coverage in Martinique (2020)*



*Fig. 3 – Survey coverage in Saint Martin (2022)*

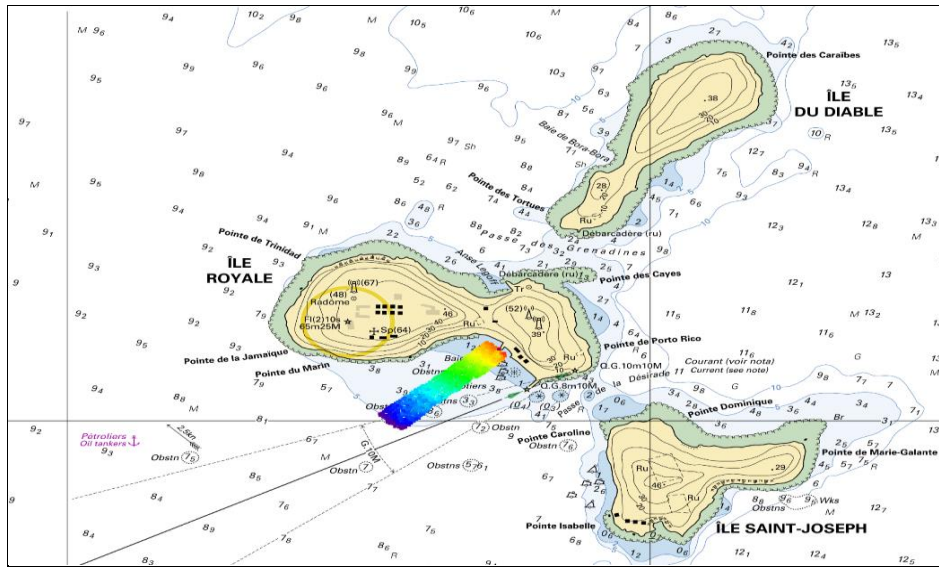


Fig. 4 – Survey coverage in French Guyana (2022)

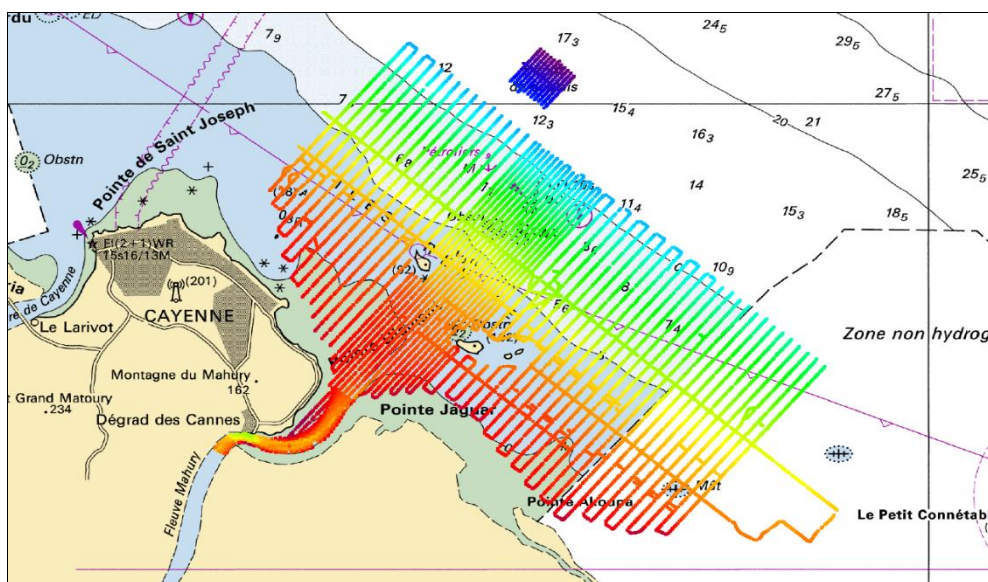


Fig. 5 – Survey coverage in French Guyana (2022)

Survey campaigns are planned by Shom on a regular basis in French overseas territories to update nautical charts.

Shom's national hydrographic survey programme (<https://www.shom.fr/fr/qui-sommes-nous/programme-national-dhydrographie-pnh>) details the long-term targeted objectives of CATZOC compliant hydrographic surveying in French Antilles, French Guyana and Clipperton Island waters and the current surveys coverage for those three areas.

Since the last Conference, Shom has not conducted any survey in the MACHC region.

The survey work related to those areas for the next year is detailed hereafter:

- French Antilles: next survey campaign in 2024;
- French Guyana: Next survey campaign in 2024;
- Clipperton Island: no systematic surveys scheduled, only opportunity works.

## 2.2. LIDAR SURVEYS

LIDAR surveys are conducted within the framework of Litto3D® programme. This national programme, based on a partnership between Shom and the National Institute of Geographic and Forest Information (IGN), aims to provide a very high-resolution Sea-Land digital terrain model (DTM) of metropolitan and overseas French coasts.

The products are freely available through Shom's data portals:

- data.shom.fr (Shom catalog / Master data / Coastal altimetry)
- diffusion.shom.fr: <http://diffusion.shom.fr/donnees/altimetrie-littorale.html>
  - - For Guadeloupe: <https://diffusion.shom.fr/donnees/altimetrie-littorale/litto3d-guad2016.html>
  - - For Martinique: <https://diffusion.shom.fr/donnees/altimetrie-littorale/litto3d-mart2016.html>
  - - For Saint-Martin: <https://diffusion.shom.fr/donnees/altimetrie-littorale/litto3d-st-martin2019.html>
  - - For Saint-Barthélemy: <https://diffusion.shom.fr/donnees/altimetrie-littorale/litto3d-st-barth2019.html>
- the open platform for French public data: [data.gouv.fr](http://data.gouv.fr)

## 2.3. NEW TECHNOLOGIES AND/OR EQUIPMENT

### **New frame mooring**

Involving an ecological issue, Shom developed a frame mooring called CATRINE with no loss of deadweight at the sea bottom. Usable until 150 meters depth, the frame mooring includes an acoustic release connected to a 200 meters Dynema rope stored in an aluminium canister during the deployment.

At the end of the deployment (after weeks or months at the bottom of the sea), the acoustic release is activated. The orange buoyancy goes up to the surface unwinding the rope stored in the canister. Arrived at the sea surface, operators need to recover the orange buoyancy and the Dynema rope. Using an electric winch on board, operators wire the 200 meters rope to recover the frame mooring and the instrumentation (ADCP and/or autonomous probe).



*Fig. 6 – CATRINE frame mooring with its orange buoyancy above the canister*



## Deployable Hydrographic System

Taking advantage of the reducing size of multibeam echo sounder, Shom developed a portable Hydrographic system usable with small boats (inflatable).

The system is composed of 5 components: an electronic watertight case, an energy watertight case, a rugged computer powered with Hypack, a sidescan sonar and a multibeam echo sounder with integrated inertial and GNSS receiver.

This efficient system has a maximum range of 160 meters and a resolution of 0.9°\*0.9° at 400 kHz.



Fig. 7 – Deployable Hydrographic System

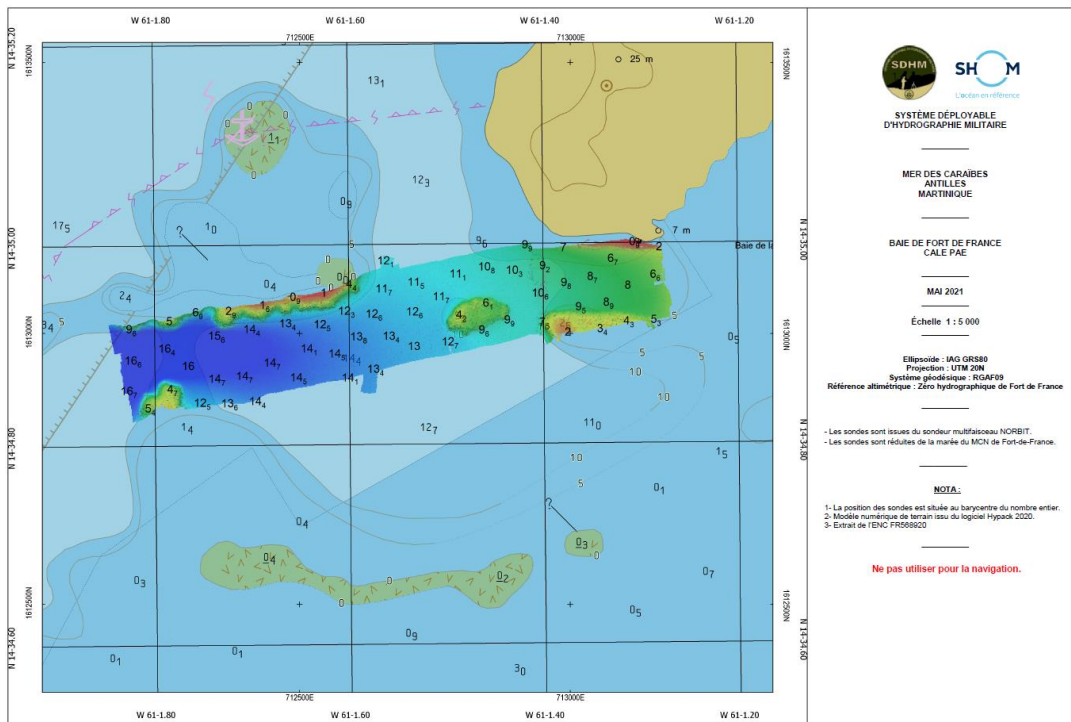


Fig. 8 – Final Product obtained with the Deployable Hydrographic System - Fort de France Bay Martinique

## 2.4. NEW SHIPS

NTR.

## 2.5. CROWDSOURCED AND SATELLITE-DERIVED BATHYMETRY - NATIONAL POLICY

### Crowdsourced bathymetry – CSB

In accordance with the IHO publication B-12, crowdsourced bathymetry is the practice of simultaneously recording the vessel's position and depth measurement, made **with standard navigation instruments, on board a non-specialist vessel during its routine maritime operations**. This recorded data is intended to be provided free of charge to the relevant organisation for consideration and, subject to validation, for public dissemination.

An instruction of the Prime Minister (published 22 November 2022) sets the French national policy regarding crowdsourced bathymetry.

Crowdsourced bathymetry is authorised in the waters under French sovereignty or jurisdiction, subject to the definition and constraints imposed by the instruction. Data from crowdsourced bathymetry in French waters have to be transmitted as a priority to the Shom, or alternatively to one of the following trusted third parties:

- the European Marine Observation and Data Network EMODnet, via its "Data Ingeeneering" portal EMODnet, via its Data Ingestion Portal (<https://submission.emodnetingestion.eu/>);
- the IHO Data Centre for Digital Bathymetry (DCDB - <https://www.ngdc.noaa.gov/iho/>).

The CSB data are licensed under the Attribution 4.0 International (CC BY 4.0) (<https://creativecommons.org/licenses/by/4.0/deed.fr>) or Attribution 3.0 IGO (CC BY 3.0 IGO) (<https://creativecommons.org/licenses/by/3.0/igo/deed.fr>), in accordance with the IHO Guide to Crowdsourced Bathymetry (IHO Publication B-12).

### Satellite-derived bathymetry – SDB

The satellite-derived bathymetry (SDB) has been used since 1987 by Shom to complement traditional surveys (acoustic sounding surveys) initially to produce nautical charts in the Pacific region (available online [https://services.data.shom.fr/geonetwork/srv/eng/catalog.search#/metadata/TRAIEMENT\\_IMAGE\\_SPATIOCARTE\\_MARINE.xml](https://services.data.shom.fr/geonetwork/srv/eng/catalog.search#/metadata/TRAIEMENT_IMAGE_SPATIOCARTE_MARINE.xml)).

Shom is currently conducting a research and development project in the field of SDB, Bathysat project, that will improve performance and quantify vertical uncertainties in accordance with the specifications of the new version of the S-44 (Edition 6.0.0). The results of the study should make it possible to use SDB with no need for calibration with field data.

The development of Bathysat was completed in September 2022. This stage has enabled Shom to acquire a prototype of the future production line with the following operating concepts:

- to develop, on a case-by-case basis, charting products in remote areas (in the absence of conventional hydrographic surveys);
- to generate seabed morphology products (DTMs) useful in particular for hydrodynamic modelling;
- to have a tool for rapid recognition of the coastal environment: estimation of bathymetric characteristics, turbidity, coastline;
- to detect, on a case-by-case basis, possible morphological changes of the seabed in the coastal strip (high revisit rates) in order to prioritise hydrographic surveys (decision support tool).

The industrialisation part will be performed in 2024, for a fully operational solution at the end of 2024.

## 2.6. CHALLENGES AND ACHIEVEMENTS

NTR

## 3. NEW CHARTS & UPDATES

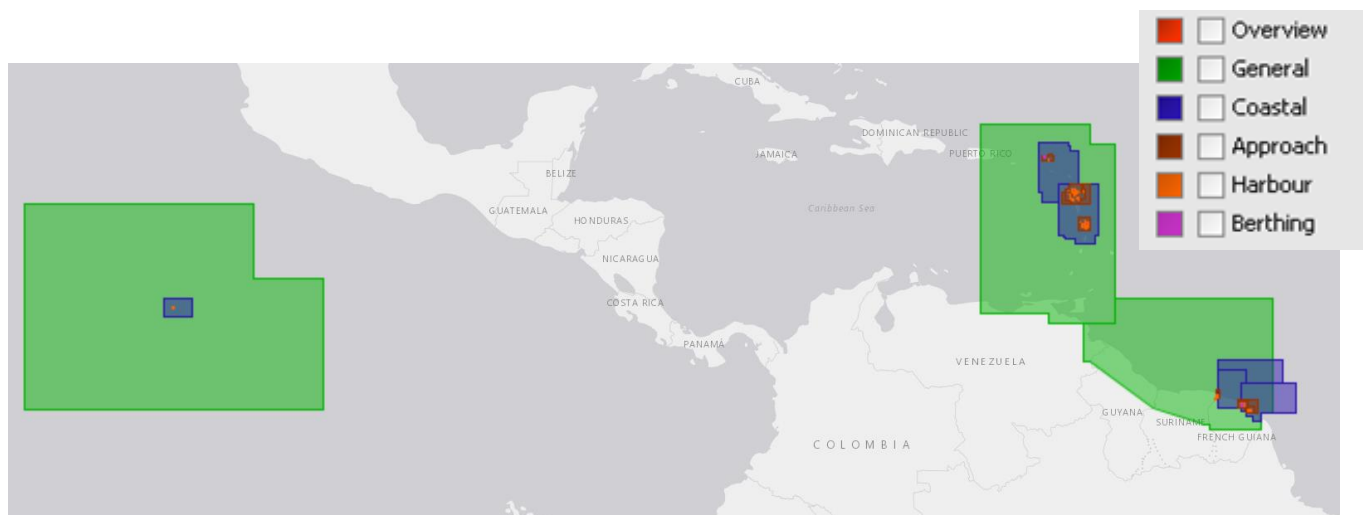
### 3.1. ENC COVERAGE, GAPS AND OVERLAPS

As of 15th October 2023, Shom has produced 836 ENCs, of which 55 ENCs within region B. The full collection should eventually reach around 900 ENCs.

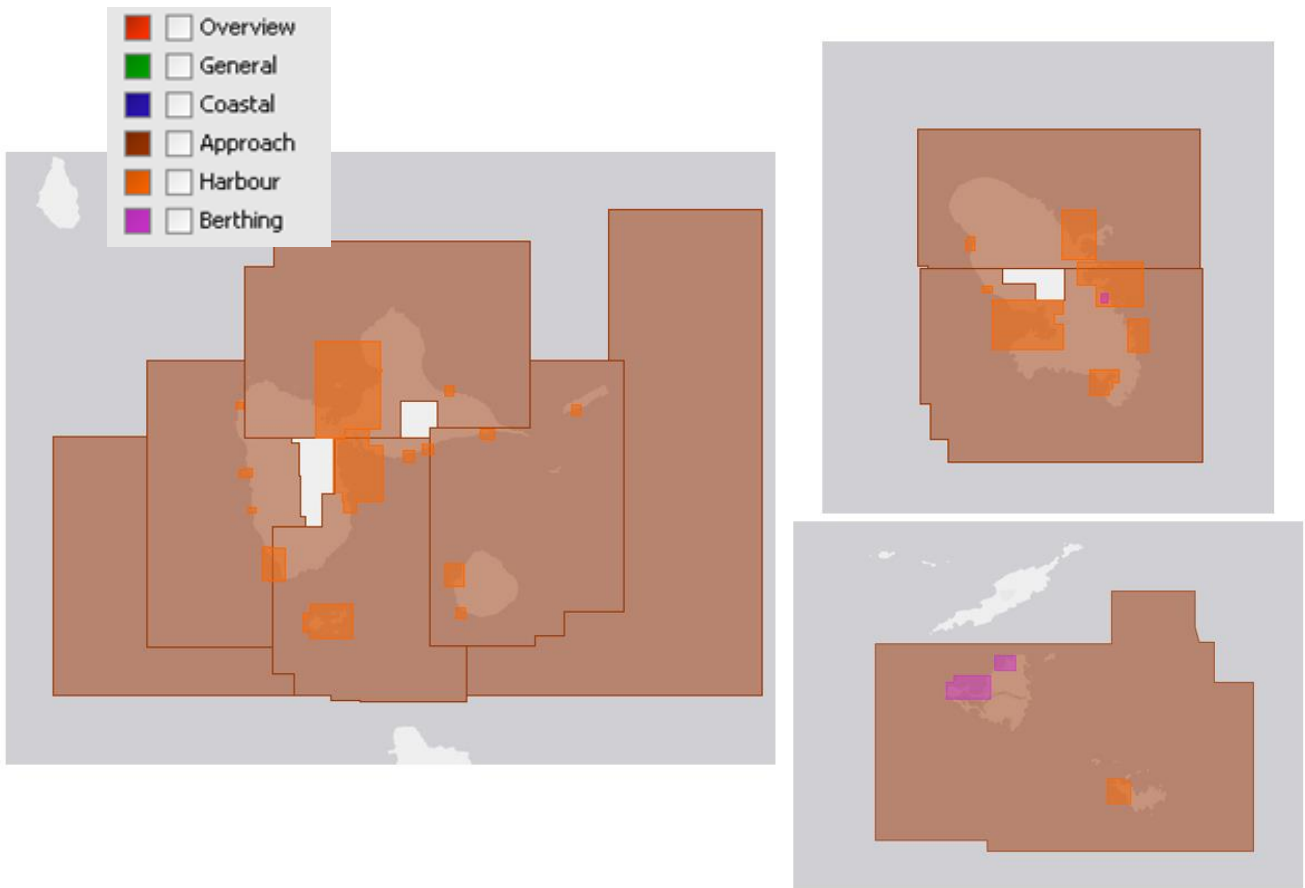
The ENC schema is now complete in region B. Details are provided in the table below:

Usage Band	Produced Cells	Planned Cells	Percentage
1	0	0	N/A
2	3	3	100%
3	6	6	100%
4	13	13	100%
5	28	33	100%
6	5		
<b>Total</b>	55	55	100%

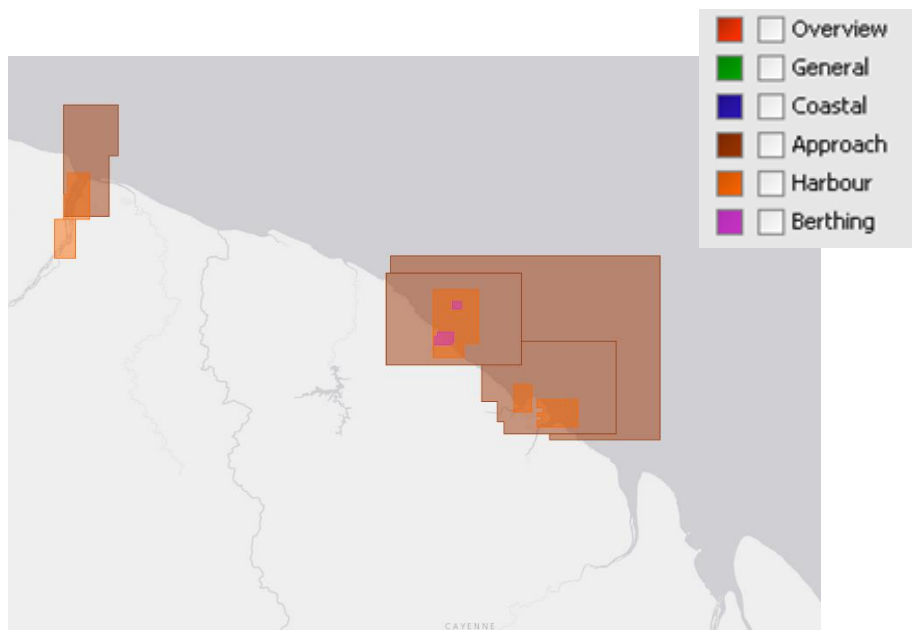
The following figures are extracted from the online PRIMAR catalogue (<http://www.primar.org>) showing Shom ENC coverage within the MACHC (region B) area:



*Fig. 9 - Shom ENC coverage within Region B area*



*Fig. 10 - Shom ENC coverage focus (UB 4-6) in French Antilles (Guadeloupe, left – St Martin & St Barthelemy, bottom right – Martinique, top right)*



*Fig. 11 - Shom ENC coverage focus (UB 3-6) in French Guyana*



ENC cells produced since the last conference are detailed hereafter:

Number	Scale 1 :	Title
FR47345A	90 000	Sud-Ouest de la Guadeloupe
FR47345B	90 000	Est de la Guadeloupe
FR473810	90 000	De Kourou à Cayenne

### 3.2. ENC DISTRIBUTION METHOD

French ENCs (in S-63 encrypted format) are made available to distributors through the PRIMAR RENC. Shom participates, along with other hydrographic services, in the coordination work of the RENC (IC-ENC and PRIMAR).

France supports the work plan of the WEND working group to improve the implementation of the WEND principles.

### 3.3. RNC

NTR.

### 3.4. INT CHARTS

The overall INT chart production status for the region B (changes in red) is provided below:

Scale	Produced INT charts	Planned INT charts	Percentage
Small (<1/1 000 000)	1	1	100
Medium	4	4	100
Large (>1/100 000)	0	0	/
<b>Total</b>	5	5	100

### 3.5. NATIONAL PAPER CHARTS

Since the last MACHC meeting, the following charts have been edited:

National	INT	Scale 1:	Title
6892	/	15 000	Baie de Fort-de-France
7041	/	59 900	La Martinique
7337	/	80 000	Baie de l'Oyapok
7381	/	100 000	De Kourou à Cayenne

Following charts are planned to be issued in 2023/2024:

National	INT	Scale 1:	Title
6738	/	60 000	La Martinique
7482	/	60 000	De l'Ilet à Kahouanne aux Saintes
7485	4193	300 000	Des Iles du Salut à Cabo Orange

### 3.6. OTHER CHARTS, E.G. FOR PLEASURE CRAFT

Shom provides georeferenced marine charts in GeoTiff and S-57 format. These digital marine charts are available through Shom's online store <http://diffusion.shom.fr> under various licenses<sup>1</sup> according to the purpose of use. These data can be used with GIS or cartographic software for commercial or private purposes.

A S-57 license<sup>2</sup> allows unlimited download of weekly updated versions for 12 months from the date of purchase.

### 3.7. CHALLENGES AND ACHIEVEMENTS

Shom has set up a dedicated team working on the implementation of the S-101 (with the aim of switching all production to this new format by the availability of the first ECDIS S-100). In particular, the "S-100 across the Channel" project, in partnership with the UKHO, from S-101 ENC production to sea trials, is a risk assessment on the dual fuel mode of ECDIS.

The Shom project "Unified Cartographic Source" will review methodology (included automation) to produce French charts with a data-centric approach and the principle of "single charting scale per area". This project will include a homogenisation of chart scales by Usage Band and a review of all the French charts to eliminate discontinuities between products: Shom plans to start its production (by France) with this new method mid-2024.

## 4. NEW PUBLICATIONS & UPDATES

### 4.1. NEW PUBLICATIONS

NTR.

### 4.2. UPDATED PUBLICATIONS

Sailing directions, light and fog signal books and radio signal books are no longer published in print form. They are updated on a weekly basis and distributed via the online Shom distribution space. Mariners who subscribe to these books are alerted of corrections by e-mail and by the Notice to Mariners (GAN).

### 4.3. MEANS OF DELIVERY

Nautical publications are available in digital format only (pdf files) on Shom's online shop (<http://diffusion.shom.fr>).

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<sup>1</sup> Internal reuse, commercial reuse, documentary use or end user.

<sup>2</sup> Each license allows internal reuse of the data for up to 5 workstations. For more information, contact [bps@shom.fr](mailto:bps@shom.fr)

#### 4.4. CHALLENGES AND ACHIEVEMENTS

NTR.

### 5. MSI

#### 5.1. EXISTING INFRASTRUCTURE FOR MSI DISSEMINATION

Shom's notices to mariners (GAN) are exclusively available under digital formats on Shom website: <http://diffusion.shom.fr/gan>.

MSI Point of contact at Shom:

Head of Regional Team - oversea area  
French Hydrographic Office  
13, rue du Chatellier – CS 92803 - 29228 BREST CEDEX 2 – FRANCE  
Tel : + 33 (0) 256 31 21 90  
Email: [infonaut-om@shom.fr](mailto:infonaut-om@shom.fr)

#### 5.2. STATISTICS ON WORK OF THE NATIONAL COORDINATOR

See Appendix.

Shom controls and coordinates local and coastal warnings issued by its national delegated coordinators (maritime zone commands mentioned in Appendix).

#### 5.3. NEW INFRASTRUCTURE IN ACCORDANCE WITH GMDSS MASTER PLAN

There is no NAVTEX station cover for French overseas territories, MSI warnings are broadcast through SafetyNet network.

Hereafter are listed the French overseas territories POCs for NAVAREA IV and XII:

AREA	COUNTRY	NAME	TELEPHONE	FACSIMILE	EMAIL
IV	French Antilles	Commandant de Zone Maritime Antilles	+596 (0)5 96 39 57 76 (HNO) +596 (0)5 96 39 57 20	+596 (0)5 96 39 51 65	<a href="mailto:emia-antilles.ccmoh24.fct@def.gouv.fr">emia-antilles.ccmoh24.fct@def.gouv.fr</a> <a href="mailto:emia-antilles-centops-joc.permanence-ops.fct@intradef.gouv.fr">emia-antilles-centops-joc.permanence-ops.fct@intradef.gouv.fr</a>
IV	French Guyana	Commandant de Zone Maritime Guyane	+594 (0)5 94 39 56 69	+594 (0)5 94 39 57 20	<a href="mailto:info-nautique.charge-com.fct@def.gouv.fr">info-nautique.charge-com.fct@def.gouv.fr</a>
XII	Clipperton Island	JRCC Tahiti	+689 (0) 40 54 16 16 +689 (0) 40 54 16 15	+689 (0) 40 42 39 15	<a href="mailto:contact@jrcc.pf">contact@jrcc.pf</a> <a href="mailto:jrcc-tahiti.cdq.fct@intradef.gouv.fr">jrcc-tahiti.cdq.fct@intradef.gouv.fr</a>

#### 5.4. CHALLENGES AND ACHIEVEMENTS

##### Dissemination of nautical information in NAVAREAS IV and XII

In accordance with the International Maritime Organisation's instructions to States to use SafetyCast Iridium as a satellite operator for the dissemination of their nautical information, the integration of SafetyCast Iridium is underway for NAVAREA II coordinators.

Coordinators in the overseas regions are currently still using the Inmarsat SafetyNet operator. However, the DGAMPA (Directorate General for Maritime Affairs, Fisheries and Aquaculture, Ministry of Transport), which is responsible for the dissemination and implementation of the means of disseminating nautical information, is aware of the need for a general switch to SafetyCast.

### French national nautical information platform - PING

France is developing its national nautical information platform called PING.

This platform aims to digitize nautical information as much as possible to promote wide dissemination and integration into user systems (ship navigation systems, shore services systems, user systems, etc.).

The platform will have a portal for humans and programming interfaces (API) for systems, with 3 functional modules:

- production and distribution of navigational warnings,
- transmission of source information by maritime services and users to contribute to nautical information,
- production and dissemination of maritime geo-regulations in a spatialized form.

A mobile application will also be associated with the platform.

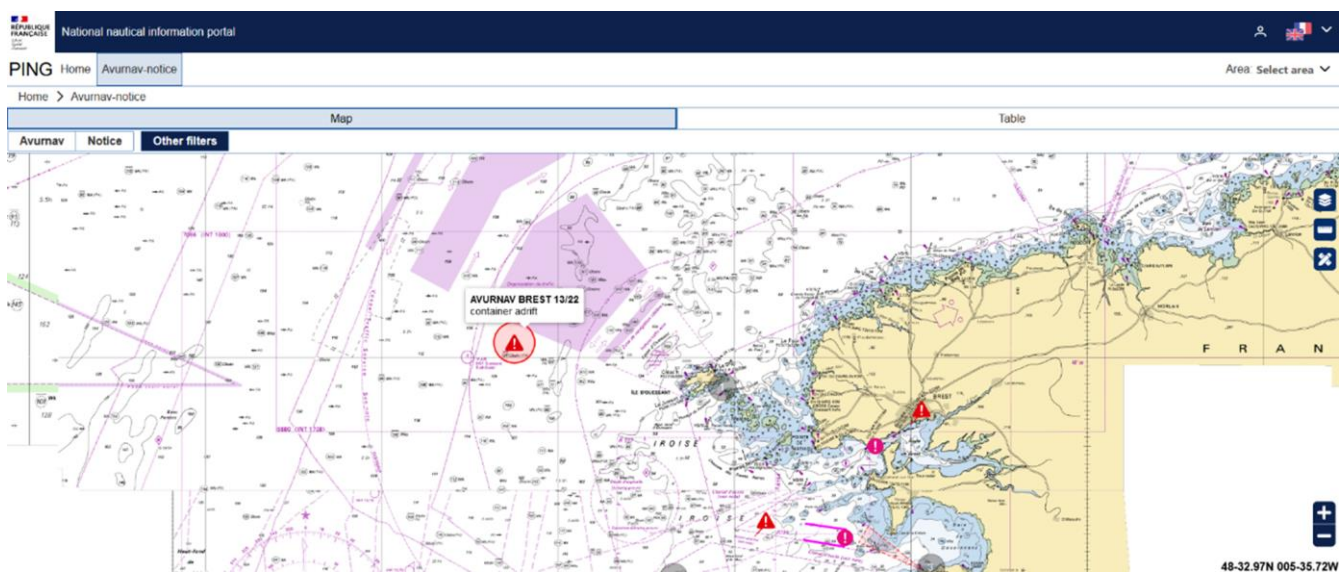
The production and digital dissemination of navigation warnings will use the IHO S-124 Navigational warnings standard under development, while ensuring compatibility with the current NAVTEX and EGC systems.

The project is supported by the European Maritime Affairs and Fisheries Fund and the navigation warnings module has been developed and tested in the framework of the European Interreg MED OSMOSIS project.

For the time being, PING is based on the draft S-124 standard. It will be aligned with the first edition of the S-124 standard when it is published.

PING will be deployed operationally end of 2023 in metropolitan France and end of 2024 in the French overseas territories.

The source code of PING is open source and its interoperability has been successfully tested.



*Fig. 12 – Views of the PING portal under test - Viewing navigation warnings*



## 6. C-55 – LATEST UPDATES

The table with the latest information to update IHO Publication C-55 (Status of Hydrographic Surveying and Charting Worldwide) have been provided using the online system on 03 November 2023:

Survey Status <b>Updated: October 2023</b>		Depth < 200m			Depth > 200m		
		A	B	C	A	B	C
A	France – Clipperton Island	77.8	5.5	16.7	3.3	0	96.7
B	France – French Antilles	34.7	47.0	18.3	46.7	9.4	43.9
	France – French Guyana	0.3	43.2	56.5	58.8	0	41.2

Charting Status <b>Updated: October 2023</b>		Small (<1 M)			Medium (1M < / < 100 000)			Large (> 100 000)			Metric	WGS84
		A	B	C	A	B	C	A	B	C		
A	France – Clipperton Island	100	0	100	NA	0	0	NA	0	0	100	100
B	France – French Antilles	100	0	NA	100	0	100	100	0	100	100	100
	France – French Guyana	100	0	100	100	0	100	100	0	100	100	100

*C-55 values for survey status (top table) and charting status (down table). Updated values are highlighted in red*

## 7. CAPACITY BUILDING

### 7.1. OFFER OF CAPACITY BUILDING

Shom school offers FIG-OHI-ACI (category B) courses in hydrography and marine cartography. These courses are given in French and are open to French-speaking foreign candidates (depending on available places). The training offer is presented on the Shom website:

[https://www.shom.fr/sites/default/files/2022-09/Offre\\_formation\\_Externe\\_2022-2023.pdf](https://www.shom.fr/sites/default/files/2022-09/Offre_formation_Externe_2022-2023.pdf)

Some training modules are provided within the framework of the French-speaking hydrography association (AFHy: <http://www.afhy.fr/>) and are open to its members.

A training course in hydrography accredited in category A FIG-OHI-ACI is provided by ENSTA Bretagne (<https://www.ensta-bretagne.fr/index.php?option-hyo-hydrographie-et-oceanographie/>).

## L'école du Shom

Des formations de référence en hydrographie et sciences de la mer

## Formations longues

L3 BS HYDRO	C SYSRES-HOM	CSUP-HYDRO	PRÉPARATEUR CARTO
<p style="font-size: 8px;">Licence / Brevet supérieur d'hydrographe</p>  <p style="font-size: 8px;">15 officiers mariners/civils/étrangers 10 mois pour civils, 14 mois pour officiers mariners Sur dossier Certification internationale de technicien hydrographe</p>	<p style="font-size: 8px;">Certificat d'administrateur Systèmes et réseaux d'Hydrographie, d'Océanographie et de Météorologie</p>  <p style="font-size: 8px;">2 à 5 officiers mariners 9 mois Sur dossier Certificat délivré par la marine nationale</p>	<p style="font-size: 8px;">Certificat Supérieur d'hydrographe</p>  <p style="font-size: 8px;">2 à 5 officiers mariners hydrographes 4 mois Sur dossier Certificat délivré par la marine nationale</p>	<p style="font-size: 8px;">Technicien préparateur en cartographie marine</p>  <p style="font-size: 8px;">2 à 8 civils / étrangers 9 mois Sur concours TSEF (Technicien supérieur études et de fabrication) Certification internationale de cartographie marine</p>

### Homologations et équivalences

Homologations en catégorie B par le comité internationale FIG/OHI/ACI\* :

- BS Hydro
- Technicien préparateur en cartographie marine

Enregistrement au niveau II au RNCP\*\* de la formation CSUP Hydro pour l'obtention du titre de « Superviseur hydrographe ».

\* Fédération internationale des géomètres / Organisation hydrographique internationale / Association cartographique internationale.  
\*\* Répertoire national de la certification professionnelle.

### Plateforme e-learning



FORMATION



### Catalogue de l'offre de formation

Formations courtes  
Cycle de formation Afhy  
Formations longues



www.shom.fr



*Fig. 13 – Courses and training provided at the Shom hydrographic school (source: shom.fr)*

## 7.2. TRAINING RECEIVED, NEEDED, OFFERED

NTR.

## 7.3. PROJECT MANAGEMENT ASSISTANCE FOR THE CONSTRUCTION OF HYDRO-OCEANOGRAPHIC VESSELS

Shom has a recognized know-how in the construction of hydro-oceanographic vessels (from 8m launches to 100m vessels). It masters the entire process from the expression of needs to the implementation of systems. It puts its expertise at the service of shipyards, within the framework of new constructions or modernizations for:

- Studies to define, on the basis of an expression of need, the complete specifications in terms of hydro-oceanographic equipment (including computers), as well as the fitting out of premises and scientific spaces of hydro-oceanographic ships. Shom provides intellectual services such as the drafting of the metrological survey essential to the proper integration and control of the systems, the specification of the batches of spare parts adapted to the ship's missions, the interface plans, the acceptance book and the ship's logbook (in its field of competence).
- Equipment acceptance and integration: supervision of equipment integration (mechanical, interfacing, metrology, etc.), acceptance tests in the factory, in port and at sea.
- Training and assistance: training of personnel who will implement the equipment, but also of personnel who will maintain the systems, transfer of skills, handling of warranty calls after delivery of the vessel to the end customer.



*Fig. 14 – Nigerian hydrographic ship Lana built by the French shipyard OCEA with the support of Shom (Source: OCEA)*

#### 7.4. STATUS OF NATIONAL, BILATERAL, MULTILATERAL OR REGIONAL DEVELOPMENT PROJECTS WITH HYDROGRAPHIC COMPONENT

For the countries benefiting from Shom support to meet their hydrographic services obligations spelled out by the SOLAS convention, France fosters a mechanism of gradual transfer of responsibilities through State-to-State administrative arrangements. This mechanism relies on training at Shom facilities and the formalisation of the respective responsibilities for maritime safety information, hydrographic and charting activities.

#### 7.5. DEFINITION OF PROPOSALS AND REQUESTS TO THE IHO CBSC

NTR.

### 8. OCEANOGRAPHIC ACTIVITIES

#### 8.1. GENERAL

NTR.

#### 8.2. GEBCO/IBC'S ACTIVITIES

In the waters under French jurisdiction of the MACHC region, Shom's bathymetric data are accessible:

- through the *EMODnet Bathymetry* portal (<http://www.emodnet-bathymetry.eu/>)
- in the form of bathymetric DTMs for the coastline and the shoreline on Shom's dissemination space (<http://diffusion.shom.fr/pro/risques/bathymetrie.html?p=1>)
- as bathymetric batches on Shom's dissemination space (<http://diffusion.shom.fr/pro/amenagement/bathymetrie/lots-bathy.html>)

Data on transits in French and international waters were provided to IHO DCDB and for integration into the GEBCO grid in 2018.

The survey coverage and associated metadata available on the IHO DCDB site are provided via the *EMODnet Bathymetry* portal supported by the European Union. The last update of all these bathymetric resources was performed in December 2020.

Note that the current EMODnet Bathymetry phase (2020-2022) will generate a bathymetric DTM in the waters under the jurisdiction of EU countries in the MACHC area (i.e. Martinique, Guadeloupe, Curaçao, St Marteen, Aruba and the Caribbean Netherlands) with the same characteristics as for Europe mainland. Collaboration with GEBCO is sought on this matter ensuring coherence between both DTM and preventing from redundant work.

### 8.3. TIDE GAUGE NETWORK

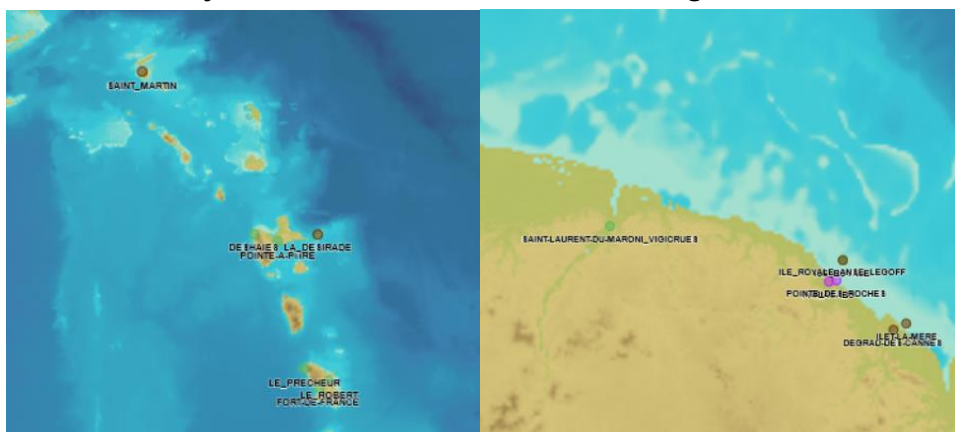
Shom is the national coordinator and reference authority for the observation of the sea level, managing and issuing the resulting data. This mission is carried out under the REFMAR programme. All real time and processed tide gauge measurements collected under that programme are freely accessible on the web <http://data.shom.fr/#donnees/refmar> for all areas under French jurisdiction.

Shom itself operates and maintains a large tidal network reporting in real time, RONIM, which is a major contribution to REFMAR.

RONIM tide gauges are available in the MACHC region in the French Antilles and in French Guyana. This network is recognized as an important tool for coastal operational oceanography, risk assessment, studies on the evolution of the mean sea level, etc.

In addition to the tide gauges of the RONIM network, there are other tide gauges installed locally that are included in the REFMAR coordination. In all, there are 14 French permanent tide gauges located in the region:

- Guadeloupe : Pointe-à-Pitre (Shom/Météo-France/DM Guadeloupe), Deshaies (IPGP) and La Désirade Island (IPGP) ;
- Martinique : Fort-de-France (Shom/Météo-France/marine nationale), Le pêcheur (CG Martinique), Le Robert (CG Martinique) ;
- Saint-Martin : Le Marigot (CT Saint-Martin) ;
- French Guyana : Îles du Salut (Shom/DM Guyane), Îlet La Mère (GPM Guyane/DGTM Guyane) and Dégrad des Cannes (GPM Guyane/DGTM Guyane), Pointe des roches (GPM Guyane/DGTM Guyane), Pariacabo (GPM Guyane/DGTM Guyane), Ile Royale anse Legoff (GPM Guyane/DGTM Guyane), Saint-Laurent du Maroni (Vigicrue).



*Fig. 15 - French tide gauges in the MACHC region (source: data.shom.fr)*



## 8.4. NEW EQUIPMENT

From 2021 to 2023, the RONIM tide gauge network has been renovated: data loggers, transmission equipment and supervision software have been renewed. The expected results are: better reliability, improved transmission rates and reduced maintenance needs.

The tide gauges in the MACHC region have all been updated.

## 8.5. CHALLENGES AND ACHIEVEMENTS

### Evolution of the tidal services

The products called "Annuaire des marées", " Horaires de marées (calculés pour 100 ports)" and " Prédications à la carte (disponibles pour 1000 ports) ", which were previously available on the portal [diffusion.shom.fr](https://diffusion.shom.fr), have been merged into a single service called "Marées à la carte". This service, which calculates tide predictions, can be accessed at the following address: <https://diffusion.shom.fr/marees/horaires-des-marees.html>.

The functions available are:

- Calculation of the times and heights of high and low tides, combined with coefficients (Annuaire des marées). The coefficients are calculated for French Channel and Atlantic ports only;
- Calculation of water level at a given time step (1, 5, 10, 30 and 60 minutes);
- Threshold calculation (search for time slots where a water level is above or below a given threshold).

The results are available in two formats:

- XML: standard exchange format, intended for programming or use on the Web. This format is available for calculating the times and heights of high and low water;
- TXT: simple text format in columns. Format available for calculating times and heights of high and low water, water levels at a given time step and thresholds.

A user guide describing the various functions and settings of the service is available on the service's home page by clicking on the "More details" link.

## 9. SPATIAL DATA INFRASTRUCTURES

### 9.1. STATUS OF MSDI

Shom develops and maintains a MSDI covering all maritime areas under French jurisdiction. The information thus compiled is accessible through 3 portals:

- [data.shom.fr](https://data.shom.fr)
- [diffusion.shom.fr](https://diffusion.shom.fr)
- [maritimelimits.gouv.fr](https://maritimelimits.gouv.fr)

### 9.2. RELATIONSHIP WITH THE NSDI

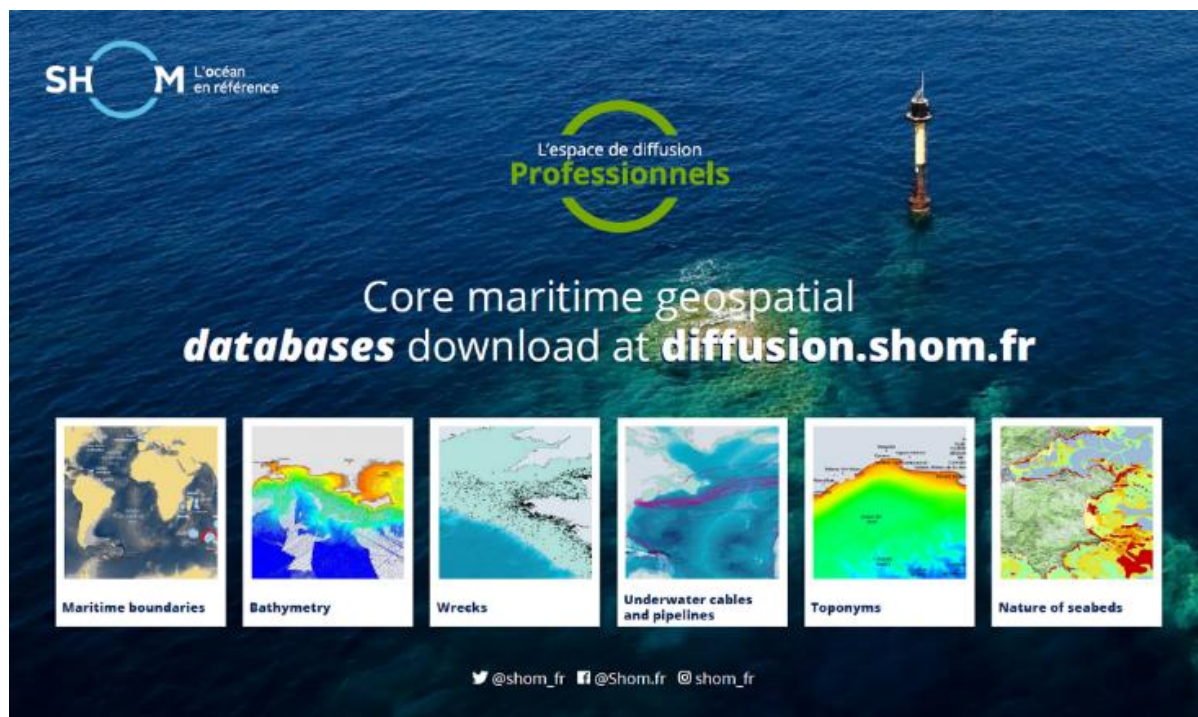
The various maritime geographical information produced by Shom are referenced on the French NSDI (<https://www.data.gouv.fr/>).

### 9.3. INVOLVEMENT IN REGIONAL OR GLOBAL MSDI EFFORTS

Shom contributes to the IHO MSDIWG.

#### 9.4. NATIONAL IMPLEMENTATION OF THE SHARED DATA PRINCIPLES – INCLUDING ANY NATIONAL DATA POLICY AND IMPACT ON MARINE DATA

In accordance with France open data policy, Shom has opened access to its basic data: bathymetric data, wrecks, cables, seabed types, maritime limits & boundaries, toponymic databases, port information, and maritime regulations, etc. are distributed under a Creative Commons "CC-BY-SA 4.0" license or an open license, depending on the case.



*Fig. 16 - Access to Shom's open data (diffusion.shom.fr)*

The project Marine Spatial Planning-Outermost Regions (MSP-OR) started in 2021 supports competent authorities in the establishment and implementation of the EU Maritime Spatial Planning (MSP) Directive (2014/89/UE) in the EU Outermost Regions, including in French Guiana. The main goal is to contribute to promote ocean governance through MSP and applying the Ecosystem-Based Approach in MSP.

In this context Shom has the essential role to develop and bring its expertise on MSP relevant information related to (i) safety of navigation and (ii) maritime surveillance for The Strategic Document of Sea Basin (DSBM) French Guiana.

In order to meet this target, Shom made a mission to meet all stakeholders of maritime surveillance and safety of navigation in French Guiana followed by the delivery of a report and dataset related to the maritime navigation safety stakes in the French Guiana. Shom also provided guidance to the administrations for the preparation of the MSP official plan zones layer related to French Guiana (DSBM vocation zones), including:

- Preparation of reliable coordinates of the limits legally compliant with existing limits;
- Recommend a suitable data model ensuring the layer interoperability among national MSDIs and with EMODnet Human Activities portal (DG MARE).

#### 9.5. MSDI NATIONAL PORTAL

Data available on data.shom.fr portal are organised according to the following topics:

- Master data: cartography, maritime boundaries, maritime and coastal database, coastal altimetry, bathymetry, vertical datums, sedimentology, geophysics, tides, currents and historical data;
  - Oceanographic forecasts: waves, meteorology, water level, hourly surface hydrodynamic, daily mean 3D hydrodynamic and oceanogram;
  - Coastal observations: sea level (REFMAR), sea surface current and sea bottom turbidity.
- Not all this information is available on MACHC region.

Hereafter are listed some of the latest evolutions:

- Wrecks and obstructions (edition);
- Aids to navigation (AToN) (edition);
- Bathymetric measurements (edition);
- Sovereignty or jurisdiction maritime spaces (new);
- Coastal altimetry (Litto3D): Martinique and Saint-Barthelemy: data display improvements;
- Maritime areas – chart 8510CX (edition);
- Maritime Altimetric References (edition);
- Vertical references converter (edition);
- Tidal tables calculation (edition);
- On demand tidal table calculation (update).



*Fig. 17 – Sovereignty or jurisdiction maritime spaces (data.shom.fr)*

Those evolutions can all be followed via Shom’s Twitter account (@shom\_en & @shom\_fr).

A detailed description of the portal functions and contents is available on Shom website (<https://services.data.shom.fr/support/fr>).

## 9.6. BEST PRACTICES AND LESSONS LEARNED

Based on feedback from portal users, new portal ergonomics have been defined.

The new online shop with a more readable offer and a simplified and more intuitive user experience is now available.



*Fig. 18 – New ergonomics of Shom’s online shop (diffusion.shom.fr)*

## 9.7. CHALLENGES AND ACHIEVEMENTS

The national maritime boundaries portal ([maritimelimits.gouv.fr](http://maritimelimits.gouv.fr)) is based on Article 16 of Order No. 2016-1687 of 8 December 2016, with the aim of consulting and disseminating the official elements used to delimit maritime areas under the sovereignty or jurisdiction of the French Republic, in particular legal references and digital data.

A new version of this portal was released in February 2023. This new version includes new ergonomics and information is now organized into 4 themes:

- French maritime areas;
- Traffic and shipping;
- Limits of competence and reporting;
- Occupation and use of the maritime domain.





*Fig. 19 – New ergonomics of the official French maritime boundaries portal*

### Themes

	<b>French maritime areas</b> This theme brings together information on maritime delimitations: straight baselines ;...
	<b>Traffic and shipping</b> This theme gathers information on the limits that regulate maritime traffic and...
	<b>Limits of competence and reporting</b> This theme gathers information on administrative boundaries establishing jurisdiction or...
	<b>Occupation and use of the maritime domain</b> This theme gathers information relating to the limits regulating occupations (e.g. ports,...
	<b>Environmental protection</b> This theme brings together information on geographical data relating to the protection of...

*Fig. 20 – Themes of the official French maritime boundaries portal*

## 10. INNOVATION

### 10.1. USE OF NEW TECHNOLOGIES

As part of the preparatory phase for the replacement of the hydro-oceanographic fleet (CHOF project), a three-year agreement was signed with the procurement agency of the French DoD (DGA) to conduct experiments and modernize hydrographic data processing techniques.

An initial experiment was carried out in September 2020 with 2 DriX unmanned surface vehicles equipped with an MBES and a sediment echo sounder, and was repeated in October 2023. From 2021 onwards, numerous other experiments were carried out with Exail's AUV A18D and Kongsberg's AUV HUGIN 6000 Superior to acquire the autonomy required for their use and knowledge of high-resolution seabed mapping. At the same time, Alseamar's Seaexplorer gliders were repeatedly tested under operational conditions. In addition, after several years of operational use of airborne Lidar, experiments are planned in the coming years to test UAVs equipped with bathy Lidar in conditional operations.



*Fig. 21 - Experiment of USV DriX deployed from BHO Beautemps-Beaupré (Source: iXblue, 2020)*



*Fig. 22 - Experiment of AUV HUGIN deployed from BHO Beautemps-Beaupré (Source: Marine Nationale, 2021)*

## 10.2. RISK ASSESSMENT

Shom completed in 2020 the development of an experimental tool called "Deseason platform". It is a multi-criteria decision tool for hydrographic risk assessment and cost-benefit analysis. It will be implemented in the future to improve the national hydrographic survey program.

## 10.3. POLICY MATTERS

NTR.

## 11. OTHER ACTIVITIES

### 11.1. PARTICIPATION OF IHO MEETINGS

Because of its overseas territories and primary charting responsibilities, France, represented by Shom, is a member or associate member in 9 regional hydrographic commissions.

The detail of Shom's involvement in other IHO activities is listed in the table hereafter:

Name	Chair / Vice chair	Member	Observations
CBSC		✓	Capacity Building Sub-Committee
NCWG		✓	Nautical Cartography Working Group
ENCWG		✓	ENC Standards Maintenance Working Group
DPSWG		✓	Data Protection Scheme Working Group
DQWG		✓	Data Quality Working Group -Last meeting in 1996
EAtHC	✓	✓	Eastern Atlantic Hydrographic Commission
FC		✓	Vice-chairman of Finance Committee
GEBCO		✓	Joint IOC-IHO Guiding Committee for the General Bathymetric Chart of Oceans (GEBCO)
HCA		✓	Hydrographic Commission on Antarctica
HDWG		✓	Hydrographic Dictionary Working Group
HSSC	✓	✓	Hydrographic Services and Standards Committee
IENWG	✓	✓	IHO-European Union Working group
IRCC		✓	Inter-Regional Coordination Committee
MACHC		✓	MESO American & Caribbean Sea Hydrographic Commission
MBSHC		✓	Mediterranean and Black Seas Hydrographic Commission
MSDIWG		✓	Marine Spatial Data Infrastructure Working Group
NIOHC		✓	North Indian Ocean Hydrographic Commission
NIPWG		✓	Nautical Information Provision Working Group
NSHC		✓	North Sea Hydrographic Commission
RSAHC		✓	ROPME Hydrographic Commission
S100WG		✓	S-100 Working Group
SAIHC		✓	Southern Africa and Islands Hydrographic Commission
HSWG		✓	Hydrographic Surveys Working Group
SWPHC		✓	South-West Pacific Hydrographic Commission
TWCWG		✓	Tidal, Water Level and Currents Working Group
WEND		✓	World-Wide Electronic Navigational Chart Database
WWNWS		✓	World-wide Navigational Warning Service Sub-Committee

### Representation of MACHC at the IENWG

France represents the MACHC at IENWG since its creation. Although the main topic of the IENWG is to deal with European Union policies, activities and processes of HO's interest, the impacts of these activities go beyond Europe. As an illustration, the EMODnet EU initiative, which celebrated its 10th anniversary in 2020, provides a worldwide data index (CDI) and a Bathymetry World Base layer produced in cooperation with the GEBCO.

It should be noted that Shom pilots the bathymetric part of the EMODNET programme. By the end of 2022, Shom will be ready to meet one of the objectives of this programme, which is the

delivery of an EMODnet Digital Bathymetry (DTM) of the Caribbean area, around the European overseas islands.

## 11.2. METEOROLOGICAL DATA COLLECTION

NTR.

## 11.3. GEOSPATIAL STUDIES

NTR.

## 11.4. PREPARATION FOR RESPONSES TO DISASTERS

France may have Navy ships in the SAIHC region ready to provide support in case of an emergency. France also provides technical support and has a rapid response capacity for environmental data in case of a disaster.

The point of contact at Shom in case of a marine disaster is the head of the maritime safety information division. This division can be reached 24/7 by fax +33 298 221 665 or email [coord.navarea2@shom.fr](mailto:coord.navarea2@shom.fr).

- **Tsunami alert**

Shom contributes to tsunami warning for the Caribbean via the Pacific Tsunami Warning Centre (PTWC) which issues, on an interim basis, threat information for the Caribbean. The importance of the development of real-time tide gauges on French coast operated by Shom, IPGP, CG Martinique, is recognised as a key component for the development of a regional tsunami warning system.



*Fig. 23 - Cooperation areas on tsunami warning system (source COI; UNESCO)*

- **Coastal flooding**

Shom is associated with Météo-France in the provision and improvement of the alert systems against storm surges and tides named Vigilance Vagues Submersion (VVS). This allows for a better anticipation of flooding and protection of people living in French domestic and overseas coastal areas.



Shom provides the tidal predictions, development and expertise on coastal hydrodynamic and wave models, real time tide gauge observations as well as information relative to extreme sea levels and bathymetry. Météo-France's marine forecasters perform a comprehensive analysis of observation and model outputs to produce a forecast, summarized on a map depicting the level of awareness to adopt (<https://vigilance.meteofrance.fr/fr>).

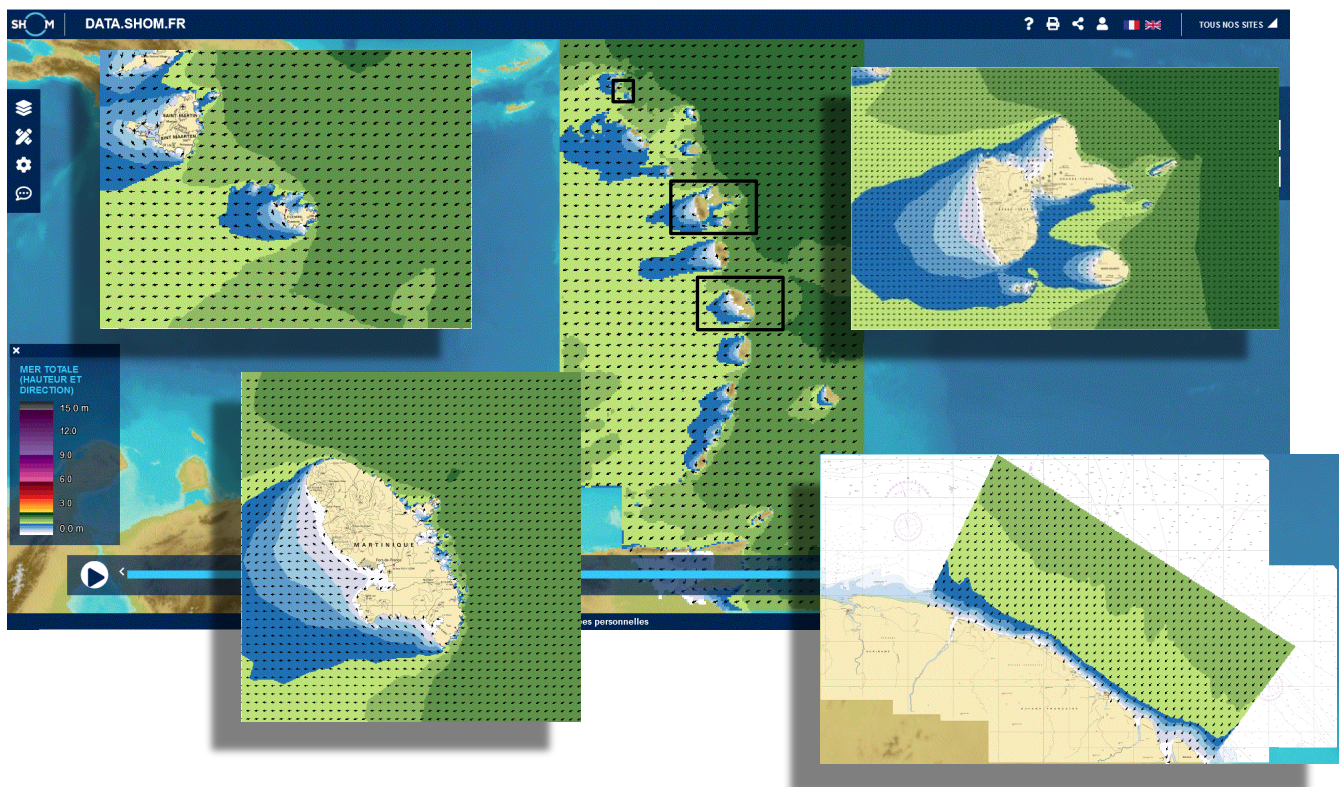
Since 2018, storm surge and coastal waves forecasts rely on multiple runs of state-of-the-art models developed in the framework of the HOMONIM Project, conducted in close partnership with Météo-France:

- the storm surge configurations are based on a 2D shallow water version of the HyCom model, implemented on a curvilinear grid with varying resolution of 2,5 km in French Guyana and 900 m around Caribbean islands;
- the wave configurations are based on the spectral wave model WW3 implemented on unstructured computational grids with roughly 200 m resolution on the shoreline of French Guyana and Martinique, Guadeloupe, St. Barthelemy islands.

The wave models have been upgraded in March 2022:

- over the Caribbean Sea the model domain is slightly extended southward to the coast of Venezuela, and includes an updated bathymetry;
- in French Guyana, the model now includes variable granulometry in bottom friction parameterization.

The public release of the numerical forecasts of the models is effective since March 25 2021 on the Shom's data website ([data.shom.fr](http://data.shom.fr)). 2D-maps of and storm surge (hourly) and waves (3-hourly) can be displayed as well as high frequency time series of observed and forecasted storm surge at the tide gauge locations, where existing in the area.



*Fig. 24 – Display of waves height and direction on data.shom.fr*



## 11.5. ENVIRONMENTAL PROTECTION

Shom is a player in the national implementation of the European Union Marine Strategy Framework Directive (MSFD). Shom is the scientific lead for the descriptors "Hydrographic changes" and "Noise" and coordinates the associated monitoring programs. Shom is also a monitoring operator for these descriptors. It is involved in European projects on this issue, such as the JONAS<sup>3</sup> project on the assessment of noise from maritime traffic on the Atlantic coast. 2019 and 2020 were mainly devoted to the revision of monitoring programs. The years 2021 and 2022 are focused on the calculation of indicators and assessments of Good Ecological Status. These indicators will then be reported to the EU by France, based on the scientific reports delivered by the different institutions in charge.

## 11.6. ENGAGEMENT WITH THE MARITIME ADMINISTRATION

Shom is engaged in the French Antilles and in French Guyana with government services as part of its national hydrographic mission and support to defense.

## 11.7. AIDS TO NAVIGATION MATTERS

NTR.

## 11.8. MAGNETIC AND GRAVITY SURVEYS

NTR.

## 11.9. INTERNATIONAL ENGAGEMENTS

Within the MACHC region, an agreement has been established in 2014 between the Maritime Authority Suriname (MAS) and Shom in the field of hydrographic surveys, exchange of hydrographic information and data, and training in hydrography and cartography.

## 12. CONCLUSIONS

Shom supports any initiative aimed at improving hydrographic knowledge and navigation safety, insofar as the data collected benefit the cartographic authorities and the updating of the nautical documentation of this region.

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<sup>3</sup> Joint Framework for Ocean Noise in the Atlantic Seas <https://www.jonasproject.eu>

# ANNEX I TO THE REPORT N°047/SHOM/DMI/REX/NP DATED 08/11/2023

## NATIONAL MSI SELF-ASSESSMENT

Country: FRANCE - Organization: Shom

### 1 MARITIME AREA

*[Describe maritime area including details of the geographic boundaries]*

The maritime area includes coastal waters (up to 250 NM) of French Guyana, coastal waters of the French West Indies (Martinique, Guadeloupe, St Martin et St Barthelemy), as well as Clipperton Island in Pacific.

### 2 OPERATIONAL POINTS OF CONTACT FOR THE NATIONAL COORDINATOR

INSTITUTION	TELEPHONE	FACSIMILE	EMAIL
Shom, overseas office (dops-psm-na-om@shom.fr) of the "Information and Nautical publication" department of the "Maritime Products and services" division: <a href="mailto:infonaut-all@shom.fr">infonaut-all@shom.fr</a>	+33 2 56 312 192 +33 2 56 312 278 +33 2 56 312 273 +33 2 56 312 439	/	<a href="mailto:infonaut-all@shom.fr">infonaut-all@shom.fr</a>

### 3 GMDSS MASTER PLAN

*[Report on the status of the GMDSS Master Plan: Is it up to date? When was the last update?]*

The French GMDSS Master Plan is compiled in the Shom publication "Maritime radiocommunications" reference n°924-RNC available on-line : <https://diffusion.shom.fr/pro/rsx-92-4-radiocommunications-maritimes-systeme-mondial-de-detresse-et-de-securite-en-mer-smdsm.html>

The publication is regularly updated (last version September 15<sup>th</sup> 2021, last update September 6<sup>th</sup> 2023).

*[Specifics of equipment used and software version with date up-dated]*

Equipment Type for Ports and Local Area	Software Version	Date of Up-date
No NAVTEX station in French overseas territories within the MACHC region. Coastal warnings broadcasted through SAFETYNET		
Terrestrial radiocommunications HF, MF and VHF means		

*[Detail the number of warnings identified as immediate priority (requiring transmission within 30 minutes) and the average elapsed time for passing to NAVAREA coordinator, as reported to the last RHC meeting]:*

Year Y-2		Year Y-1		Year Y	
Total	Average elapsed time	Total	Average elapsed time	Total	Average elapsed time
NTR	NTR	NTR	NTR	NTR	NTR

#### 4 NAVTEX COVERAGE:

[Diagram of NAVTEX stations and service areas within maritime area; Contact details for NAVTEX Stations; Confirm operational status has been validated.]

Not applicable.

Coastal warnings broadcasted by SafetyNET in French overseas territories.

#### 5 OPERATIONAL ISSUES:

[New infrastructure in accordance with GMDSS Master Plan; Problems encountered?]

NTR.

#### 6 CONTINGENCY PLANNING

[Provide information regarding contingency plans that have been established and future plans where appropriate. Also report on any testing of the plan that has been conducted]

NTR.

#### 7 CAPACITY BUILDING

[Demands for Capacity Building, Training requested or received, any offered, status of national, bilateral, multilateral or regional development projects with MSI component]

Not applicable.

#### 8 OTHER ACTIVITIES

[Participation in other IHO or IMO Working Groups, Regional Hydrographic Commissions, regional conferences related to MSI over past year]

Shom participates to IHO and IMO Working Groups, Regional Hydrographic Commissions and the regional conferences related to MSI over past year (WWNWS15, NCSR10, DRWG22).

#### 9 NATIONAL MARITIME WEBSITE

[(Address, statistics (if permitted by national legislation; how often is the information on your web site updated? Do you display the date and time of the last update on your web site?)]

French overseas territories POCs for NAVAREA IV and XII:

AREA	COUNTRY	NAME	TELEPHONE	FACSIMILE
IV	French Antilles	Commandant de Zone Maritime Antilles	+596 (0)5 96 39 57 76 +596 (0)5 96 39 57 20	+596 (0)5 96 39 51 65
		EMAIL	<a href="mailto:emia-antilles.ccmoh24.fct@def.gouv.fr">emia-antilles.ccmoh24.fct@def.gouv.fr</a> <a href="mailto:emia-antilles-centops-joc.permanence-ops.fct@intradef.gouv.fr">emia-antilles-centops-joc.permanence-ops.fct@intradef.gouv.fr</a>	
IV	French Guyana	Commandant de Zone Maritime Guyane	+594 (0)5 94 39 56 69	+594 (0)5 94 39 57 20
		EMAIL	<a href="mailto:info-nautique.charge-com.fct@def.gouv.fr">info-nautique.charge-com.fct@def.gouv.fr</a>	
XII	Clipperton (Île)	JRCC Tahiti	+689 (0) 40 54 16 16 +689 (0) 40 54 16 15	+689 (0) 40 42 39 15
		EMAIL	<a href="mailto:contact@jrcc.pf">contact@jrcc.pf</a> <a href="mailto:jrcc-tahiti.cdq.fct@intradef.gouv.fr">jrcc-tahiti.cdq.fct@intradef.gouv.fr</a>	

## **10 RECOMMENDATIONS**

*[If any]*

## **11 SUMMARY**

*[Please provide a short summary of this paper which will be included in the final report of the meeting.]*

## LISTE DE DIFFUSION

### DESTINATAIRES EXTÉRIEURS :

- MACHC CHAIR
- MACHC SECRETARY
- IHO SECRETARIAT

### COPIES INTÉRIEURES :

- DG
- DMI (D - REX – PL)
- DOPS/STM (AL – BATHY – DTO – REC – MAC – GEOPHY)
- DOPS/PSM (NA – CA – GEO – IES)
- CHOF
- DRIP/LAB
- DRH/FOR
- ARCHIVES (DMIDSD 2.033)