

Direction des missions institutionnelles
et des relations internationales
Division relations extérieures

BREST, le 29 avril 2022

N° 13/Shom/DMI/REX/NP

NATIONAL REPORT

SUBJET : France national report to the 18th meeting of the Southern African and Islands Hydrographic Commission (SAIHC).
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. The current 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 RDML Laurent Kerléguer, French national hydrographer and Shom Director General (laurent.kerleguer@shom.fr).

2. SURVEYS

2.1. COVERAGE OF NEW SURVEYS

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 the Indian Ocean and the current surveys coverage for this area.

In February and March 2021, a survey has been carried out in the Mozambique channel, south of Juan de Nova island (see coverage hereunder) by the oceanographic vessel *Pourquoi Pas?*.

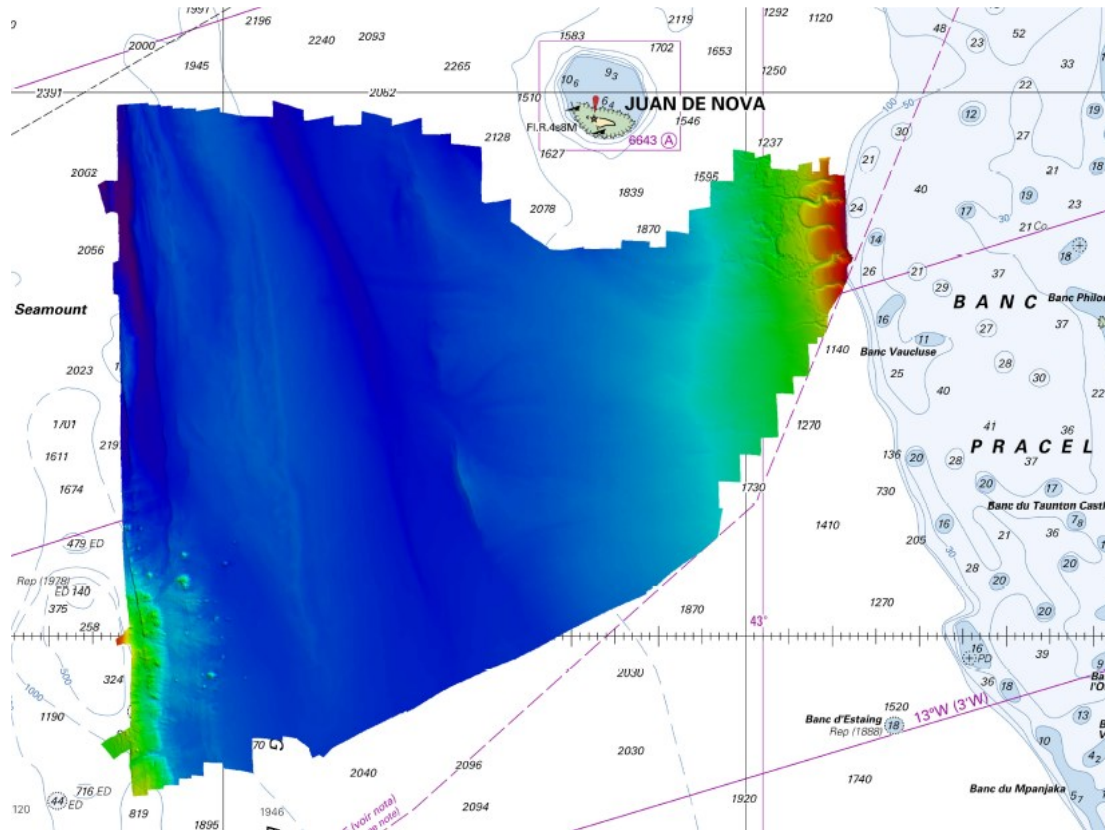


Fig. 1 – Survey coverage off Juan de Nova Island in 2021

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

French hydrographic vessel *Beautemps-Beaupré* will be deployed in the Indian Ocean in 2023, probably off Mayotte Island.

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.

Most of the French overseas coasts in the Indian Ocean within the region have been surveyed: Mayotte Island, Scattered Islands and La Reunion Island.

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/pro/risques/altimetrie-littorale.html): <http://diffusion.shom.fr/pro/risques/altimetrie-littorale.html> ;
 - For Mayotte Island: <http://diffusion.shom.fr/pro/risques/altimetrie-littorale/litto3d-mayot2012.html> ;
 - For the Scattered Islands: <http://diffusion.shom.fr/pro/risques/altimetrie-littorale/litto3d-eparses2012.html> ;

- For La Reunion Island: <http://diffusion.shom.fr/pro/risques/altimetrie-littorale/litto3d-reunion2016.html> ;

- French Government open platform for public data: data.gouv.fr.

2.3. NEW TECHNOLOGIES AND/OR EQUIPMENT

Shom's deployable hydrographic system (for rapid environmental assessment) has been upgraded with a very shallow multibeam echo-sounder (Norbit iWBMSH).

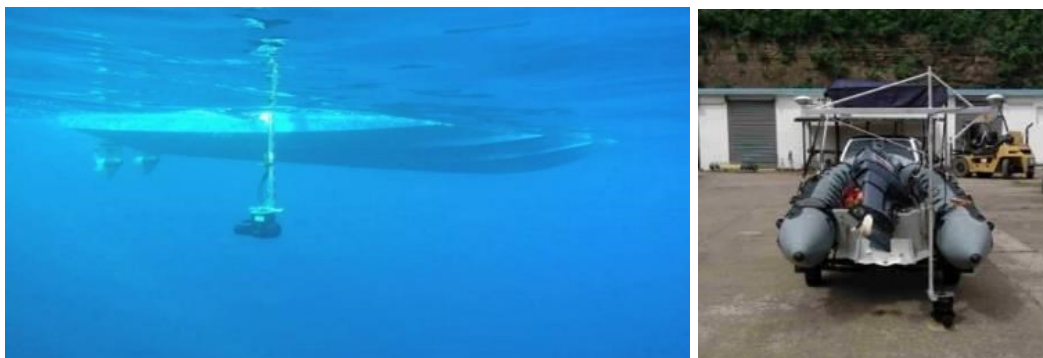


Fig. 2 – MBES Norbit iWBMSH integrated to Shom's deployable hydrographic system

See §10.1 for the preparation of future capacities.

2.4. NEW SHIPS

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2.5. CROWDSOURCED AND SATELLITE-DERIVED BATHYMETRY - NATIONAL POLICY

Crowdsourced bathymetry – CSB

Shom translated into French the IHO publication B-12 (Edition 2.0.3), Guide on participatory bathymetry.

The document is available on https://iho.int/uploads/user/pubs/bathy/B_12_Ed.2.0.3_2020-FR.pdf . France is participating in the revision of the current document.

The French national policy for crowdsourced bathymetry is currently under review.

Satellite-derived bathymetry – SDB

The satellite-derived bathymetry (SDB) has been used since 1987 by Shom to complement traditional surveys (acoustic sounding surveys) 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).

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 research part of the project has been completed last year. Results performed on different geographic areas (including an area in Pacific Ocean) have enabled to evaluate the capacity of the methods on the following objectives:

- the non-use of bathymetric measurements (to process pure remote SDB analysis) ;

- the accuracy of the solution faced with the seafloor complexity (reliability and limit of the parameterization of seafloor reflectance inside the model) ;
- the automatization and improvement of the calculation processes.

The development part will start in 2022.

2.6. CHALLENGES AND ACHIEVEMENTS

Following abnormal seismic activities since May 2018, scientific surveys, analysis and monitoring have been organized by French authorities and scientific organizations. Shom has contributed to this monitoring with a timely bathymetric survey in July 2019 and will continue to contribute as much as possible, especially in 2023 during the deployment of French hydrographic vessel *Beautemps-Beaupré*.

3. NEW CHARTS & UPDATES

3.1. ENC COVERAGE, GAPS AND OVERLAPS

As of 1st March 2022, Shom has produced 803 ENCs, of which 70 ENCs within region H.

The full collection should eventually reach 900 ENCs.

In line with the WEND recommendations and guidelines, France produces its small scale ENC cells as closely as possible to INT chart schemes.

The current status of ENC production in the region H is detailed in the table below (*changes in red*) :

Usage Band	Produced Cells	Planned Cells	Percentage
1	0	1	0%
2	7	10	70%
3	11	12	92%
4	24	30	80%
5	22	43	51%
6	6	14	43%
Total	70	110	64%

The following figure is extracted from the online PRIMAR catalogue (<http://www.primar.org>) showing Shom ENC coverage within the SAIHC (region H) area :

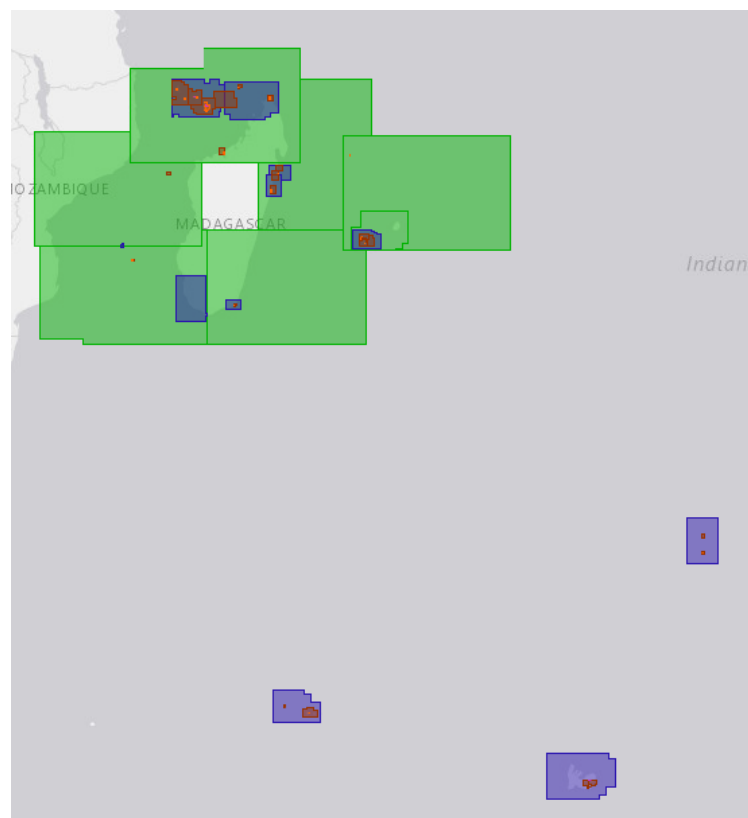


Fig. 3 – Region H - Shom's ENC production

ENC cells produced since the last conference are detailed hereafter :

Number	Scale 1 :	Title
FR359620	180 000	<i>De Tuléar au cap Sainte Marie</i>
FR359760	90 000	<i>Du Cap Andavaka à Sainte Luce</i>
FR361550	90 000	<i>Abords de l'île Sainte-Marie</i>
FR361560	90 000	<i>De l'île Sainte-Marie à Tamatave</i>
FR463130	45 000	<i>Canal de Sainte-Marie - Partie Nord - Baie de Tintingue</i>
FR463150	45 000	<i>Canal de Sainte-Marie - Partie Sud</i>
FR463160	45 000	<i>De L'île Sainte-Marie à Fénériver</i>
FR563072	8 000	<i>Ambodifototra (Port Sainte-Marie)</i>

ENC cells planned for 2022/2023 are listed below :

Number	Scale 1:	Title
FR176040	4 000 000	<i>Les Crozet, Kerguelen, St Paul et Amsterdam</i>
Îles Kerguelen		

FR478240	45 000	<i>Côte Ouest des Kerguelen – Du Cap Poincaré au Cap Marigny</i>
FR57824A	22 000	<i>Port Curieuse</i>
FR57824B	22 000	<i>Baie de Douarnenez</i>
FR478270	45 000	<i>Golfe des Baleiniers – De l'île du Veau Marin au Cap Rouge</i>
FR57827A	22 000	<i>Bras de la Fonderie</i>
FR67827B	12 000	<i>Port Couvreur</i>
FR57827C	22 000	<i>Baie du Hopeful</i>
FR57828A	12 000	<i>Baie de l'Oiseau - Port Christmas</i>
FR57828B	22 000	<i>Port Edmond Perrier et Anse de l'Excursion</i>
FR57828C	22 000	<i>Anse du Jardin</i>
FR57828D	22 000	<i>Baie du Brise-Lames</i>
FR57828E	22 000	<i>Port Matha</i>
FR57828F	22 000	<i>Port Jules Girard</i>
FR57828G	22 000	<i>Ports Fallières et Fuller</i>
FR57828H	22 000	<i>Côte Nord-Est de la Presqu'île Joffre</i>
FR57828I	22 000	<i>Baie du Hopeful - Mouillage Bon-Abri</i>
FR67828J	8 000	<i>Baie du Hopeful - Cascade Lozère</i>
FR67828K	8 000	<i>Baie du Yatch Club</i>
FR57828L	22 000	<i>Baie Doumergue</i>
FR57828M	22 000	<i>Port d'Hiver</i>
FR57828N	12 000	<i>Port Élisabeth</i>
FR57828O	8 000	<i>Port Jeanne d'Arc</i>
FR67828P	12 000	<i>Fjord des Portes Noires</i>
Madagascar		
FR348520	90 000	<i>De la rivière Antsena au Cap Tanjo (Baie de Bombetoka)</i>
FR454760	90 000	<i>De la Baie du Courier à la Baie du Rodo</i>
FR56054B	12 000	<i>Mouillage d'Itapère</i>

3.2. ENC DISTRIBUTION METHOD

All 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 table below contains the INT charts produced since the last conference :

INT	Scale 1:	Title	Comment
7736	60 000	La Réunion - Partie Nord	FR7183 – NE (2021)

Besides, the following INT charts are planned for the 2022-2023 period :

INT	Scale 1:	Title	Comment
/	/	/	/

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

Scale	Produced INT charts	Planned INT charts	Percentage
Small (<1/1 000 000)	6	6	100%
Medium	7	7	100%
Large (>1/100 000)	5	5	100%
Total	18	18	100%

3.5. NATIONAL PAPER CHARTS

Since the last SAIHC conference, the following charts have been edited :

National	Scale 1:	Title	Comment
7677	156 000	Océan Indien - Archipel des Comores	NE (2022)

Following charts are planned to be issued in 2022/2023 :

National	Scale 1:	Title	Comment
7222	60 000	La Réunion - Partie Est	NE (2022)
7240	50 000	Îles Glorieuses	NC (2022)
7328	59 900	La Réunion - Partie Sud	NE (2022)
7492	35 000	Île de Mayotte - Partie Nord	NE (2022)
7493	35 000	Île de Mayotte - Partie Est	NE (2022)

7824	div.	Îles Kerguelen – Du Cap Poincaré au Cap Marigny – Port Curieuse et Baie de Douarnenez	NC (2023)
7827	div.	Îles Kerguelen – Golfe des Baleiniers – De l'île du Veau Marin au Cap Rouge	NC (2022)
7828	div.	Îles Kerguelen (16 cartouches)	NC (2023)

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 licenses¹ according to the purpose of use. These data can be used with GIS or cartographic software for commercial or private purposes.

A S-57 license² allows unlimited download of updated versions for 12 months from the date of purchase.

3.7. CHALLENGES AND ACHIEVEMENTS

NTR.

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 (diffusion.shom.fr). 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>).

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>.

¹ Internal reuse, commercial reuse, documentary use or end user.

² Each license allows internal reuse of the data for up to 5 workstations. For more information, contact bps@shom.fr

MSI Point of contact at Shom :

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 Head of Regional Team
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 Tel : + 33 (0) 256 31 21 90
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5.2. STATISTICS ON WORK OF THE NATIONAL COORDINATOR

See Appendix.

Shom only plays a control and coordination role of 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 coordinates of the French overseas territories POCs for NAVAREA VII and VIII :

AREA	COUNTRY	NAME	TELEPHONE	FACSIMILE	EMAIL
VII & VIII	French Areas (La Reunion, Mayotte, French Southern and Antarctic lands)	Commandant de Zone Maritime Sud Océan Indien	+262 (0)2 62 93 53 54		emia-saint-denis.permanence-ops@intradef.gouv.fr

5.4. CHALLENGES AND ACHIEVEMENTS

NTR.

6. C-55 – LATEST UPDATES

The table with the latest information to update IHO Publication C-55 (Status of Hydrographic Surveying and Charting Worldwide) regarding region H area have been provided using the online system on 24 March 2022 :

Survey Status		Depth < 200m			Depth > 200m		
		A	B	C	A	B	C
Updated: December 2021							
H	Illes Éparses - France (Bassas de India, Europa et Juan de Nova)	12.3	83.1	4.6	18.0	0.2	81.8
	Mayotte et Glorieuses - France	24.3	73.0	2.7	54.6	0.5	44.9
	La Réunion et Tromelin - France	55.3	43.0	1.7	27.3	0.0	72.7
	Terres Australes françaises (Crozet, Kerguelen, Amsterdam, Saint-Paul)	10.8	26.5	62.7	23.8	0.5	75.7
	Comores (Union des)	26.1	7.9	66.0	34.9	0.0	65.1

Madagascar (République de)	0.8	8.8	90.4	17.0	0.1	82.9
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Charting Status Updated: March 2022	Small (<1 M)			Medium (1M < / < 100 000)			Large (> 100 000)			Metric	WGS84
	A	B	C	A	B	C	A	B	C		
H Illes Éparses - France (Bassas de India, Europa et Juan de Nova)	100	0	NA	100	0	100	100	0	100	100	100
Mayotte et Glorieuses - France	100	0	100	100	0	100	75	0	75	100	100
La Réunion et Tromelin - France	100	0	NA	100	0	100	100	0	100	100	100
Terres Australes françaises (Crozet, Kerguelen, Amsterdam, Saint-Paul)	100	0	NA	100	0	100	81	0	81	100	100
Comores (Union des)	100	0	100	100	0	100	20	0	20	100	100
Madagascar (République de)	100	0	100	100	0	100	80	0	80	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/2020-10/Offre_formation_2020-2021_Web.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/>).



Fig. 5 – 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 SAIHC 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 portal (<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.

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.

This network is recognized as an important tool for coastal operational oceanography, risk assessment, studies on the evolution of the mean sea level, etc.

The RONIM network is covering the SAIHC region :

- La Reunion Island: Pointe des galets & Sainte-Marie ;
- Mayotte Island : Dzaoudzi ;
- Madagascar: Toamasina (owned by Madagascar Met. Office and operated by Shom) ;
- Kerguelen Islands: Port-aux-français (LEGOS/ROSAME).

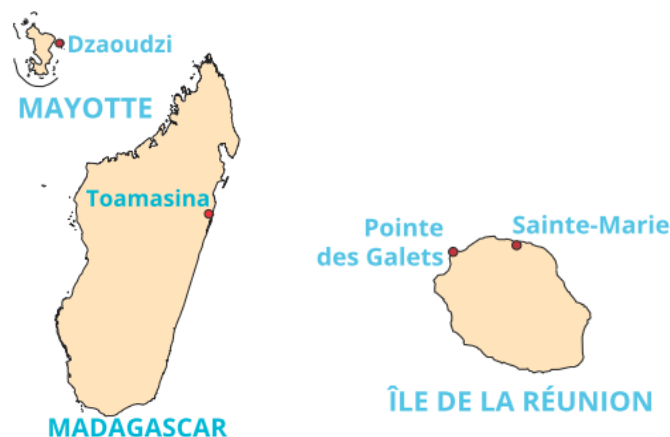


Fig. 6 – Tidal gauges of RONIM network covering the SAIHC region (source: shom.fr)

Shom's tidal predictions are available through a new web/smartphone/tablet-friendly online service named maree.shom.fr. This service provides free access of one year of tidal predictions from over 1,000 harbours worldwide.

8.4. NEW EQUIPMENT

Since 2021, the RONIM tide gauge network is being renovated: data loggers, transmission equipment and supervision software are renewed. The expected results are: better reliability, improved transmission rates and reduced maintenance needs. In the SAIHC region, the tide gauges of Dzaoudzi, Pointe des Galets and Sainte Marie are renewed.

Due to port development work, the tide gauge of Toamasina will be dismantled without any prospect of reinstallation for the moment.

8.5. CHALLENGES AND ACHIEVEMENTS

Since May 2018, the island of Mayotte has been undergoing a "seismic crisis". Several dozen earthquakes, some of which were felt by the population, have been recorded since that date and located in an area about 50 km east of the island. These earthquakes have been associated with the appearance of an underwater volcano in the zone of origin of the seismic activity.

As a consequence of this seismic crisis, a significant subsidence of the island of Mayotte occurred. The surface displacements measured since the beginning of the crisis by the GPS stations of Mayotte indicate: a) an overall displacement of the GPS stations of Mayotte towards the east of about 21 to 25 cm; b) a subsidence of about 10 to 19 cm depending on their location on the island. A slowing of the movements has been observed since April-May 2019.

The phenomenon of subsidence results in a mechanical apparent rise of the mean sea level. Nonetheless, the absolute level (i.e. measured in relation to a fixed reference) does not vary significantly.

In the current state of the phenomenon, which is still ongoing, it is too early for Shom to reassess its tidal predictions. This will have to be done after a sufficiently long stabilisation period and on the basis of new observations.

In the meantime, it is recommended to add the value of sinking to Shom's tidal predictions. In April 2022, this value is estimated to be 18 cm.

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 ;
- diffusion.shom.fr ;
- 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. These data are distributed under a Creative Commons "CC-BY-SA 4.0" license or an open license, depending on the case.

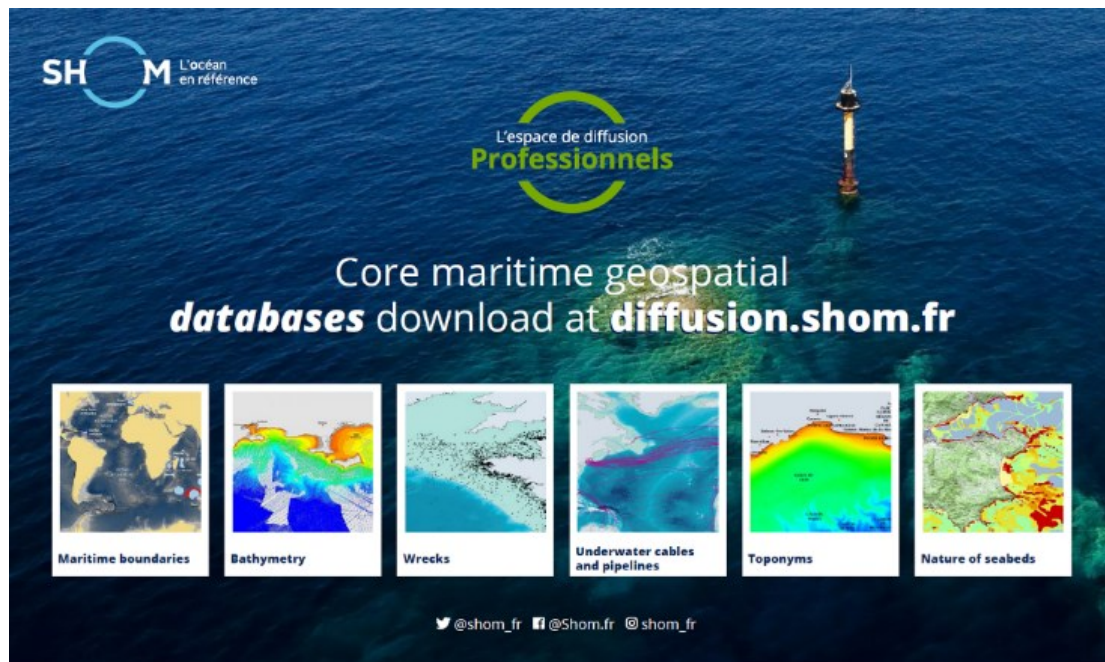


Fig. 7 – Access to Shom’s open data (diffusion.shom.fr)

9.5. MSDI NATIONAL PORTALS

Data 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 the SAIHC region.

Hereafter are listed some of the latest evolutions :

- Wrecks and obstructions (edition) ;
- Port information (new layer) ;
- Regulation – Navigation (new layer) ;
- Search and rescue areas (new layer) ;
- Worldwide sediments map (edition) ;
- Maritime boundaries (edition) ;
- High Resolution Coastline – French subantartic islands (edition) ;
- Bathymetric measurements (edition) ;
- New tools and services (<https://services.data.shom.fr/support/fr>) ;
- New ergonomics of data.shom.fr portal (see next chapter) ;
- Redesigned drawing tool.

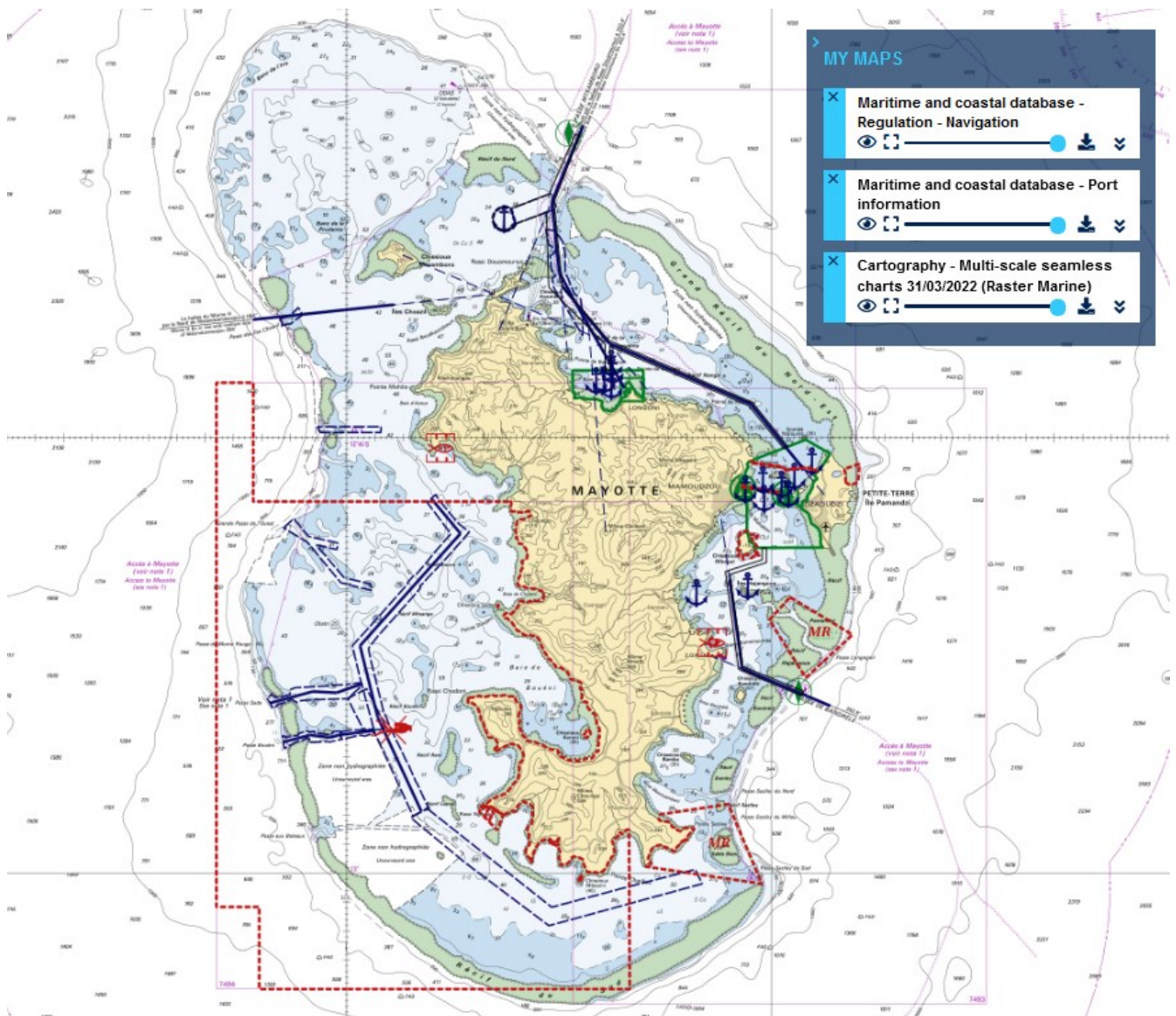


Fig. 8 – New layers: Port information & Regulation - Navigation (data.shom.fr)

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

Between July 2019 and June 2020, a UX designer from the "designers of general interest" (DIG) program supported by the French interdepartmental digital direction (DINUM) was tasked with improving the user experience of dissemination portals including data.shom.fr. Based on feedback from portal users, a new portal ergonomics with, in particular, a more prominent cartography and a redesigned drawing tool has been defined. This new portal was opened in June 2021.

Among the new features of this new version of data.shom.fr :

- A more fluid interface with repositionable windows ;
- A more user-friendly drawing tool ;
- A redesigned catalogue of available layers ;
- New measurement tools: surface calculation and azimuth distance ;
- A complete version in English.

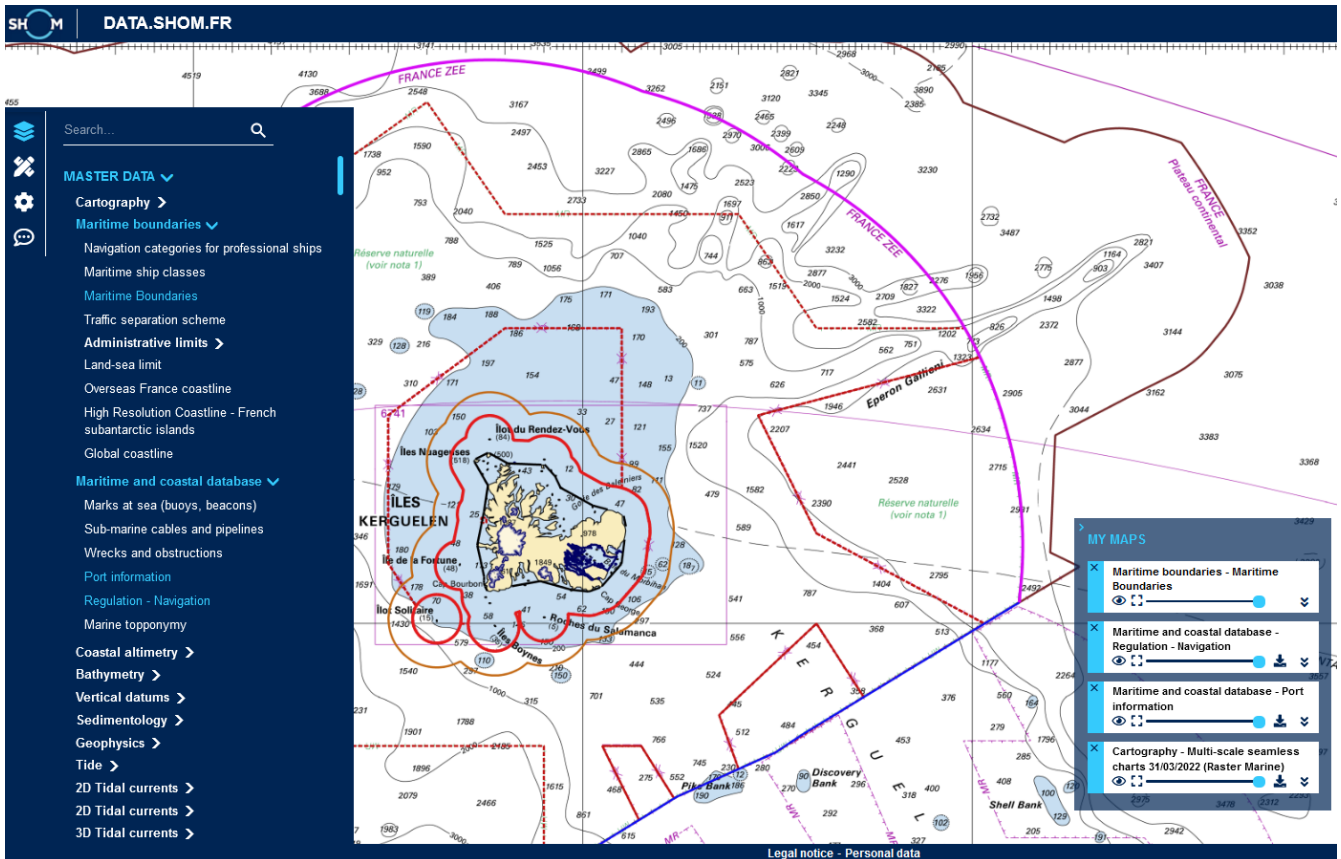


Fig. 9 – New ergonomics of Shom’s maritime geographic information portal (data.shom.fr)

9.7. CHALLENGES AND ACHIEVEMENTS

NTR.

10. INNOVATION

10.1. USE OF NEW TECHNOLOGIES

As part of the preparation phase for the replacement of the hydro-oceanographic fleet (CHOF project), an agreement was signed with the procurement agency of the French DoD (DGA) for a period of three years in order to conduct experiments and modernise hydrographic data processing techniques.

A first experiment was carried out in September 2020 with 2 Unmanned Surface Vehicles DriX from iXblue; many other experiments were carried out in 2021: in January with Autonomous Underwater Vehicle Gavia from Teledyne; in May and June with USV Inspector and AUV A18D from ECA; in August with 2 gliders Sea Explorer from Alseamar and a last one in October with deep sea AUV HUGIN Superior from Kongsberg Maritimes. Other experiments are planned in 2022 and in the coming years. Beyond the evaluation of the hydrographic performance of these new platforms, these experiments should make it possible to adapt the organisation and processes in order to get the best out of these new technologies.

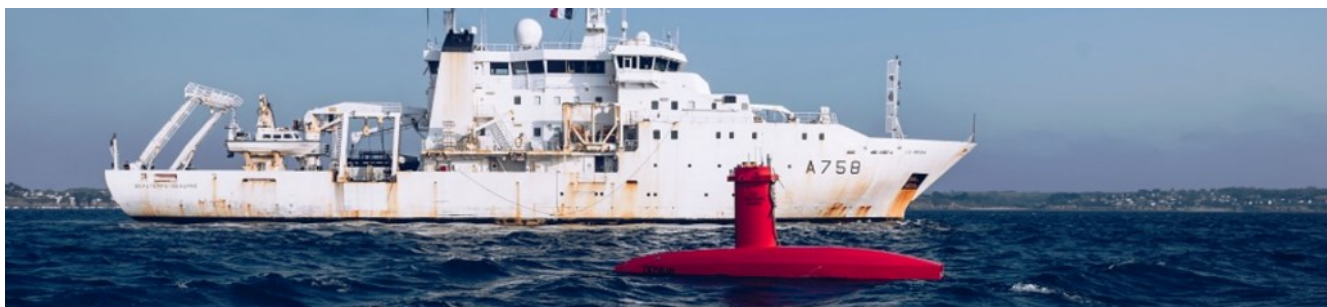


Fig. 10 – Experiment of USV DriX deployed from BHO Beautemps-Beaupré (Source: iXblue, 2020)



Fig. 11 – 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 used in the coming years to improve the national hydrographic survey program.

10.3. POLICY MATTERS

NTR.

11. OTHER ACTIVITIES

11.1. PARTICIPATION OF IHO MEETINGS

Due to 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 SAIHC at IENWG:**

France represents the SAIHC 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.

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.

- **Tsunami alert**

Shom is maintaining a large real time tide gauge network RONIM, an important tool for coastal operational oceanography, risk assessment, studies on the evolution of the mean sea level, etc. By having tide gauges in Europe and in the French overseas territories, Shom is contributing to Tsunami warning in Pacific Ocean, Indian Ocean, Caribbean Sea and Mediterranean Sea.

Some of these sea-level observatories are part of the IOC GLOSS system for a global monitoring of sea level change.

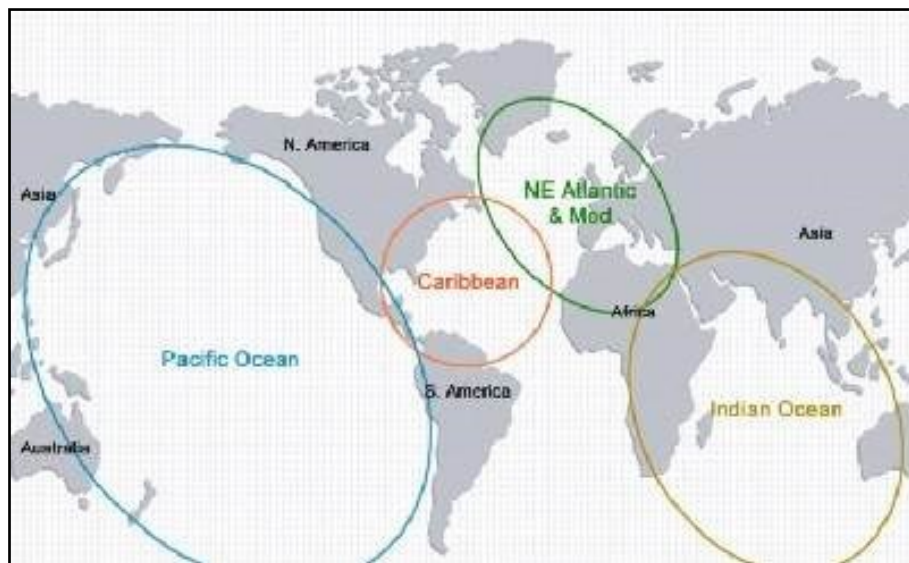


Fig. 12 – Cooperation areas on tsunami warning system (source COI; UNESCO)

- **Coastal flooding**

Shom is associated with Météo-France in the provision and improvement of an alert system to prevent from storm surges and tides named Vigilance Vagues Submersion (VVS). This allows for a better anticipation of flooding and protection of the populations living in the littoral area of Metropolitan France. An extension of that alert system towards French overseas departments is currently under work.

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 along French metropolitan department.

As an outcome of the HOMONIM Project conducted in partnership with Météo-France, a full capacity for coastal flooding forecast is implemented at Météo-France. This capacity was recently upgraded (April 2021) for sea state forecasts, by forcing the wave model with sea level outputs from the surge model, which largely improved the wave forecast inside the Mayotte lagoon, in accounting for changes in amplitude and period induced by the tidal cycle and the actual sea level.

The capacity is now defined as :

- two nearshore wave forecast chains (based on WaveWatch-III model), with a 200m-resolution unstructured grid around La Réunion and Mayotte islands, forced at open boundaries with outputs from the regional wave model MFWAM of Météo-France, and with sea level and barotropic currents from the highest resolution storm surge model ;
- a downscaling suite of 3 nested configurations (based on Shom’s Hycom 2D barotropic model) with a 3km-resolution grid at regional scale down to 800m and 200m resolution around La Reunion and Mayotte islands respectively, including specific updated bathymetric DTM, to forecast storm surges and nearshore currents.

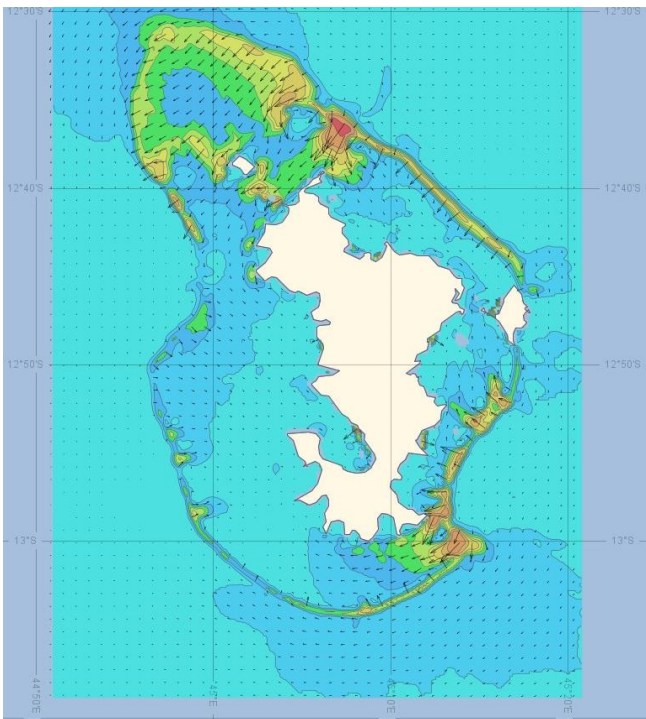


Fig. 13 – Example of 24-hour forecast of 2D-barotropic currents on Sept. 10th 2019 00UTC around Mayotte Island

(source HOMONIM project. © Météo-France).

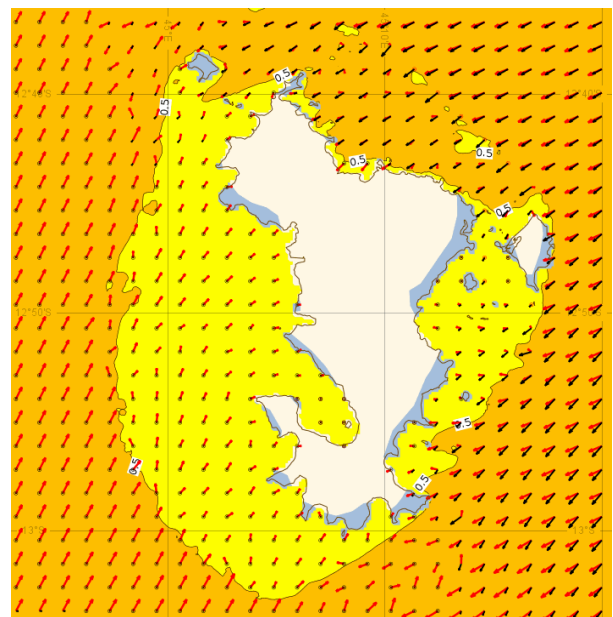


Fig. 14 – Example of 36-hour forecast of full sea state height (shading) and direction (black arrows), and wind-driven waves direction (red arrows), on Nov 23rd 2017 00UTC around Mayotte Island (source HOMONIM project. © Météo-France).

• Oil spills

Shom is an active member of the inter-agency drifting committee which is activated by the maritime authorities every time there is an oil spill. The POLMAR safety plan for the sea was signed on 23rd November 2004 and aims at enabling France to face in a reactive manor a

potential wide spread of marine pollution, by ensuring the efficient coordination of national operations and support from public services.

11.5. ENVIRONMENTAL PROTECTION

NTR.

11.6. ENGAGEMENT WITH THE MARITIME ADMINISTRATION

NTR.

11.7. AIDS TO NAVIGATION MATTERS

NTR.

11.8. MAGNETIC AND GRAVITY SURVEYS

NTR.

11.9. INTERNATIONAL ENGAGEMENTS

Within the SAIHC area, a bilateral arrangement of cooperation regarding hydrography, oceanography and nautical charting is concluded between France and the Union of Comoros (updated on November 11th 2019), and one is under discussion with the Republic of Madagascar.

An arrangement for the exchange and reproduction of nautical products, in accordance with IHO Resolution 7/1919 as amended (former A3.4) has been concluded with the National Hydrographic Office of India (INHO) on March 8th 2018 (updated on June 3rd 2021).

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.

ANNEXE I À LA NOTE N° 13/SHOM/DMI/REX/NP DU 29/04/2022

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 La Reunion Island, Mayotte Island, Scattered Islands, Saint Paul and Amsterdam Islands, Crozet archipelago and Kerguelen Islands.

2 OPERATIONAL POINTS OF CONTACT FOR THE NATIONAL COORDINATOR

INSTITUTION	TELEPHONE	FACSIMILE	EMAIL
Shom, overseas office of the "Information and Nautical publication" department of the "Maritime Products and services" division	+33 2 56 312 190 +33 2 56 312 439 +33 2 56 312 273	/	na-om@shom.fr

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 April 6th 2022).

[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	NTR	NTR
Terrestrial radiocommunications HF, MF and VHF means	NTR	NTR

[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]

The mutual support process between NAVAREA II and VII coordinators was successfully tested in June 2018.

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 (SMAN12, NCSR7, DRWG19).

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 X and XIV :

AREA	COUNTRY	NAME	TELEPHONE	FACSIMILE
VII and VIII	French Areas (La Reunion, Mayotte, French Southern and Antarctic lands)	Commandant de Zone Maritime Sud Océan Indien	+262 (0)2 62 93 53 54	
		EMAIL	emia-saint-denis.permanence-ops@intradef.gouv.fr	

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.]

Shom, as French national MSI coordinator, do not transmit MSI within the SAIHC region.

Shom controls and coordinates the warnings issued by its national delegated coordinators.

LISTE DE DIFFUSION

DESTINATAIRES :

- SAIHC CHAIR (UKHO)
- IHO SECRETARIAT

COPIES INTÉRIEURES :

- DG
- DMI
- DMI/REX
- ARCHIVES (DMIDSD/2.009)