17TH MEETING OF THE SOUTH WEST PACIFIC HYDROGRAPHIC COMMISSION (SWPHC17)
Wollongong, 12-14 February 2020

NATIONAL REPORTS FROM FRANCE TO THE SWPHC17

References:

A. IHO Resolution 2/1997 as amended (sefe doc. C3-04.2A, Appendix to Annex A)
B. IHO Circular Letter 20/2019, The IHO Online Form System for responses to Circular Letters and input to IHO Publications (P-5 and C-55): link
   Online system for P-5 (Yearbook): link
   Online system for C-55 (Status of Surveys and Charting Worldwide): link

Executive summary

1. Hydrographic Office / Service:
   a) Name of the institution: **Shom**.
   b) Description:

      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 years target and performance contract covering the 2017-2020 period, approved by Shom's Board.

      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 is regularly transmitted to IHO secretariat

   c) Submitted by: Ingénieur general (Rear admiral) Laurent Kerleguer, Shom Chief Executive – laurent.kerleguer@shom.fr

   Detailed information to update IHO Publication P-5 (*Yearbook*) have been submitted using the online system (reference B).

2. Surveys:

   a) Coverage of new surveys:

      Acoustic surveys

      Since the previous SWPHC conference in February 2019, Shom's survey unit in the Pacific, GOP, has conducted several surveys to improve and update hydrographic knowledge.

      These surveys scheduled in close relation with local governmental authorities in the frame of a prioritized survey plan, to fulfil requirements expressed by local authorities, pilots, fishermen, mining operators and defence.

      More precisely, the GOP conducted the following surveys depicted hereafter:

In New Caledonia:

Several surveys of ports, bays, recommended tracks and passages have been performed all around New-Caledonia, mainly inside the lagoon, as summarized by figure 1 and illustrated by figures 2 to 10

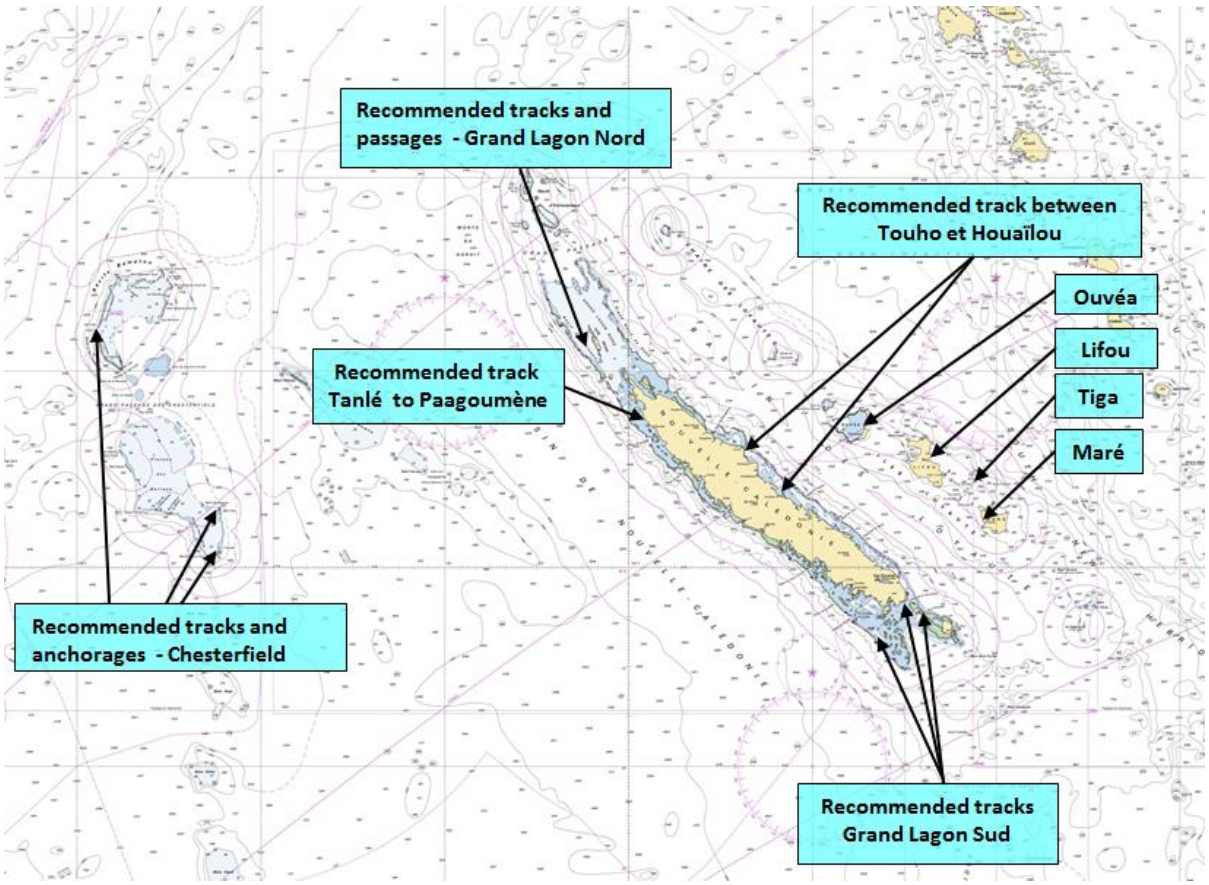

Fig. 1: bathymetric surveys in New Caledonia in 2019

- Surveys:
  - Opening of new recommended tracks and passages in unsurveyed areas: Grand Lagon Nord and Lagon Sud (figures 2 and 3);

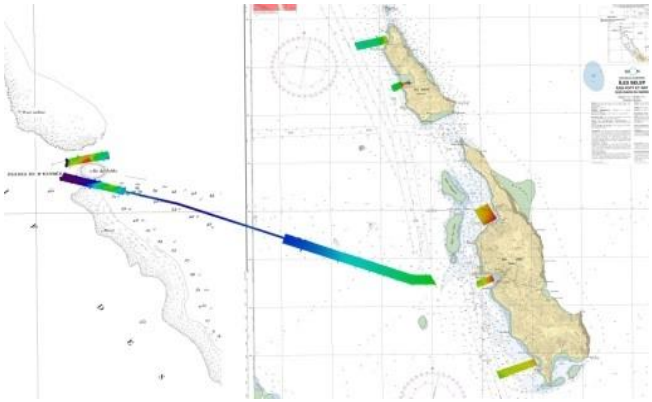

Fig. 2: Grand Lagon Nord

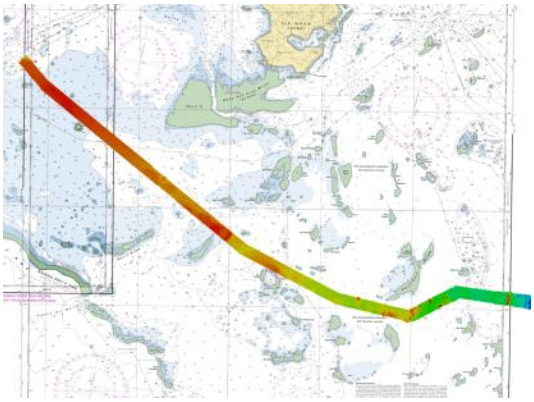

Fig. 3: Grand Lagon Sud

- Control survey of Tanlé to Paagoumène tracks (figure 4);

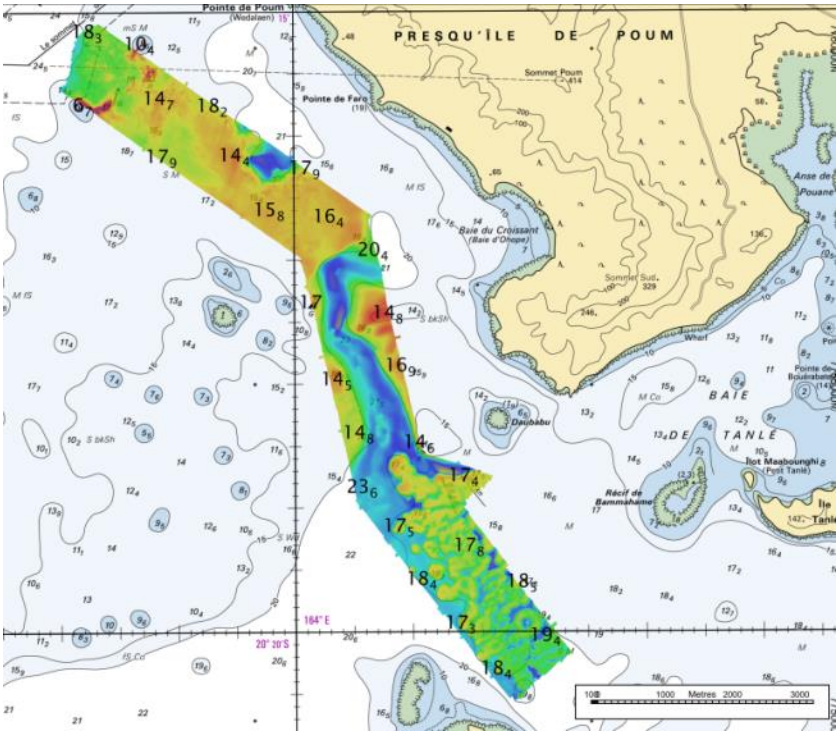

Fig. 4: Tanlé to Paagoumène tracks

- Control survey of a recommended track between Houaïlou and Touho (figure 5);

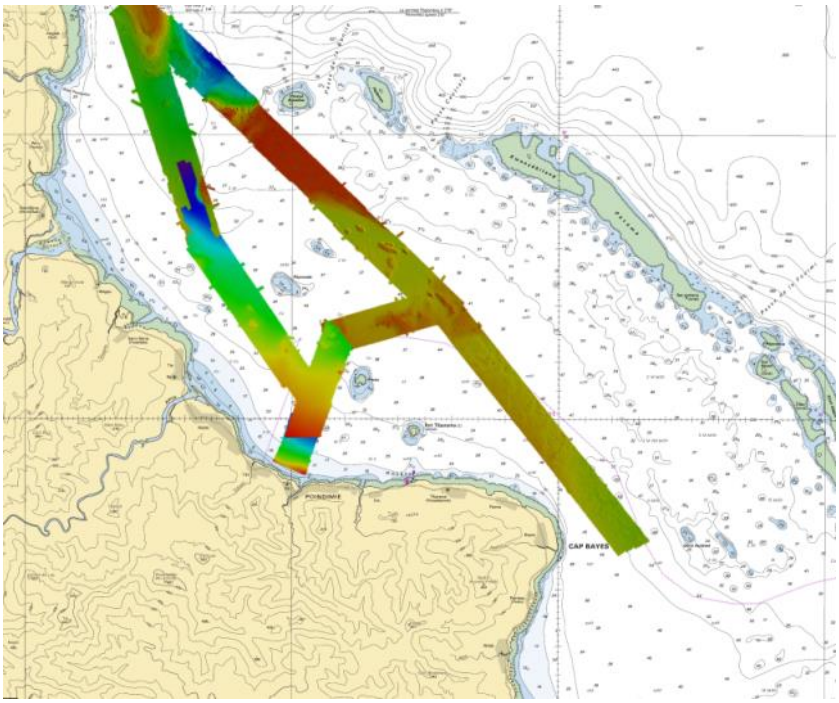

Fig. 5: recommended track between Houaïlou and Touho

- Control survey of Ouvéa, Lifou, Maré and Tiga: recommended tracks and harbours (figures 6, 7, 8 and 9);

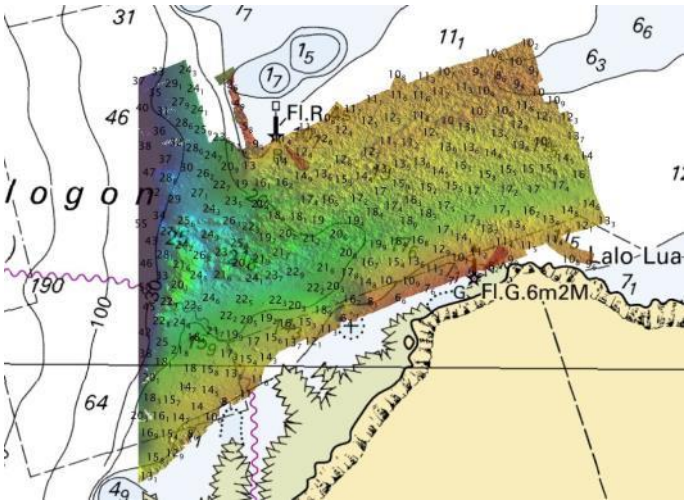

Fig. 6: Ouvéa

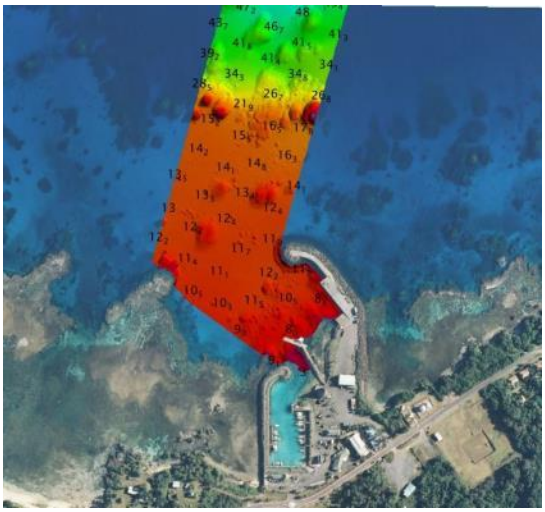

Fig. 7: Lifou

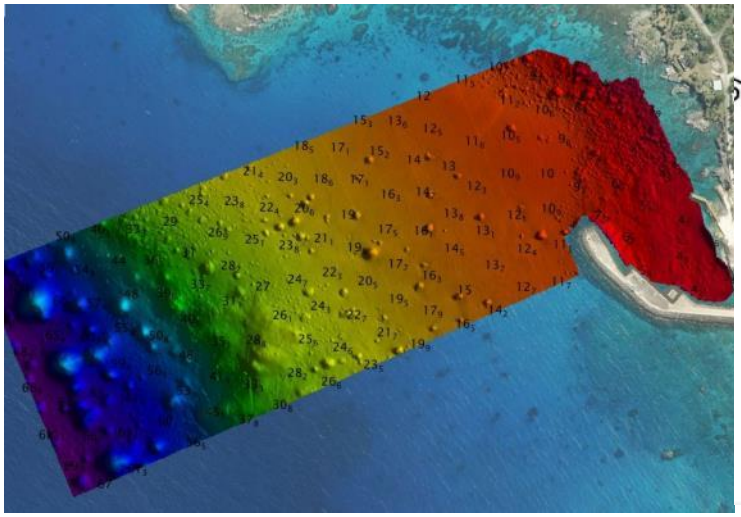

Fig. 8: Maré

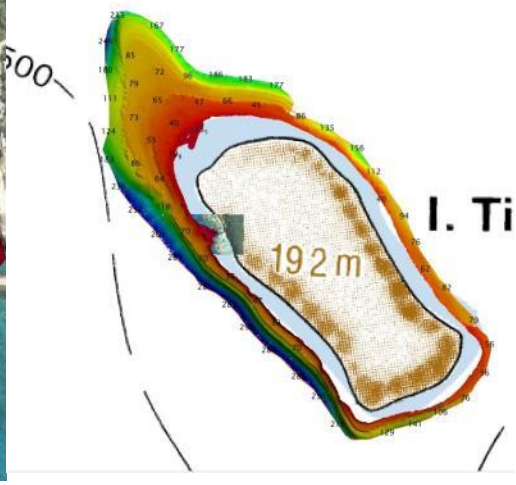

Fig. 9: Tiga

- Survey updates in Nouméa harbor;
- Miscellaneous surveys of anchorage areas in Chesterfield reefs and islands (figures 10, 11 and 12);

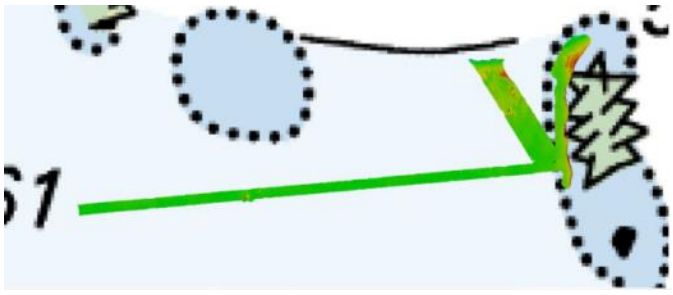

Fig. 10: recommended track to Desmazures reef

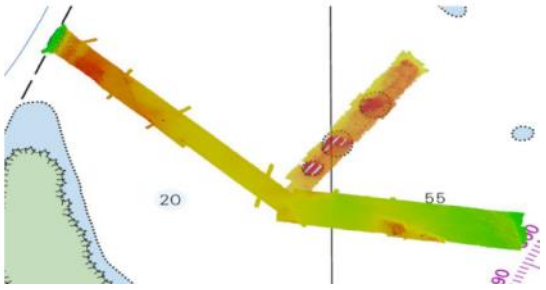

Fig. 11: recommended track to Avon islet

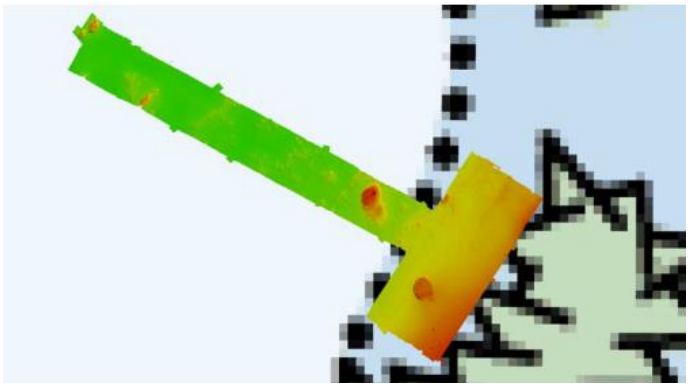

Fig. 12: Anneau anchorage

- Beach and port surveys in support to *Croix du Sud* 2020 multinational exercice (figure 13).

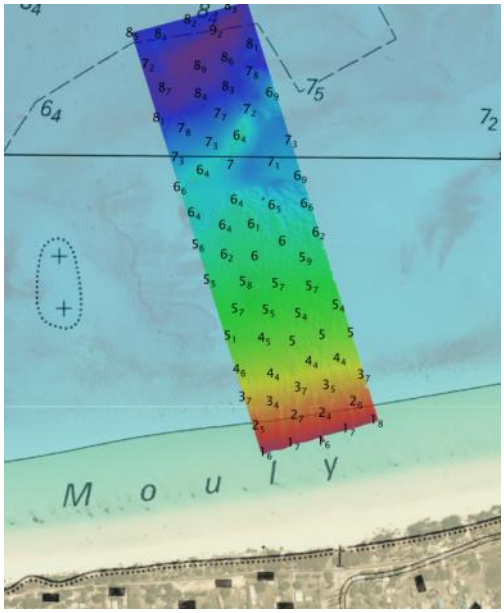

Fig. 13: Mouly beach survey

- Hydrographic support (survey expertise, tide prediction and analysis) after Kea Trader grounding on Durand Reef

- Maintenance of Sea Level Stations (SLS) network dedicated to sea level observation and tsunamis warning system.

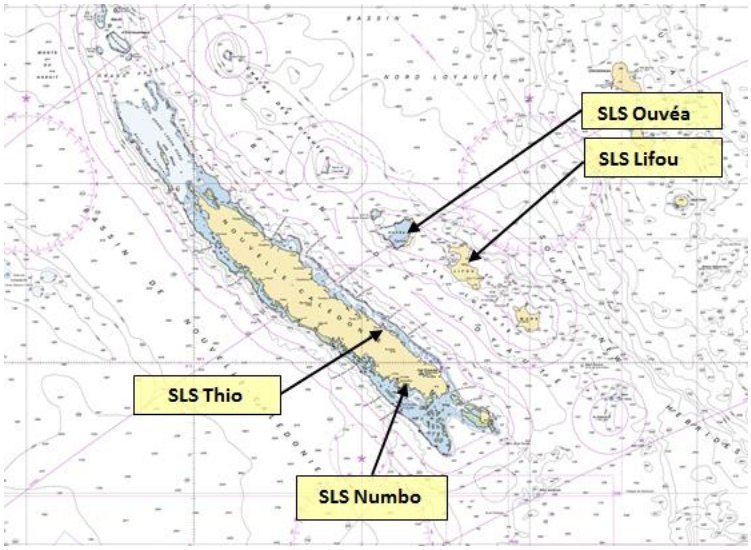

Fig. 14: maintained SLS in New Caledonia in 2019

In French Polynesia:

Surveys and "spatiopreparation" & "stereopreparation" field works (for exploitation of satellite & aerial images) have been conducted since Februrary 2019 in the French Polynesian islands: Fangataufa, Mururoa Rikitea (figure 15), Raivavae (figure 16) and Rangiroa (figure 17).

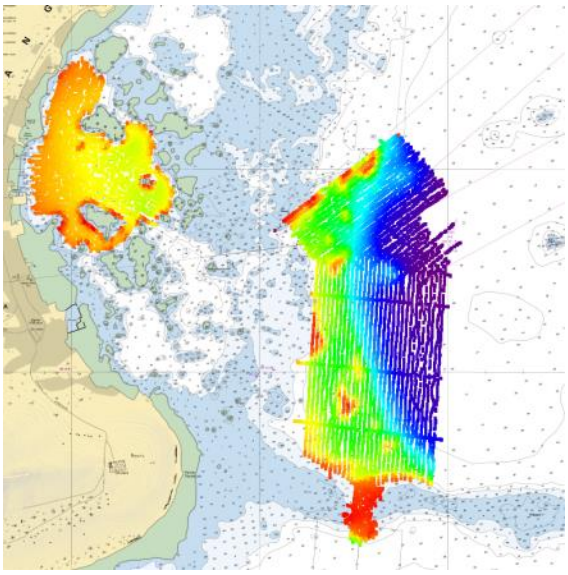

Fig. 15: Rikitea

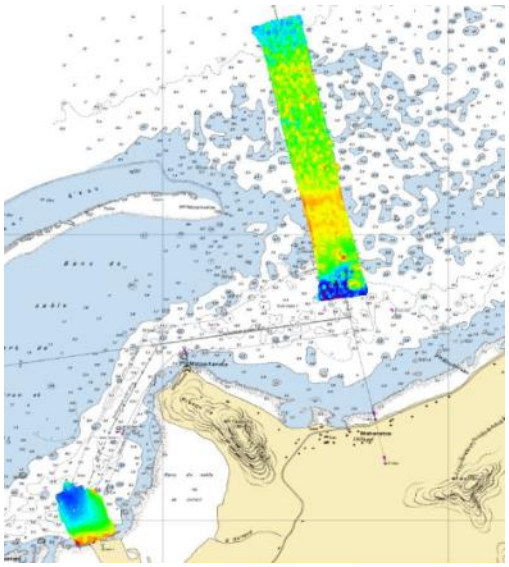

Fig. 16: Raivavae

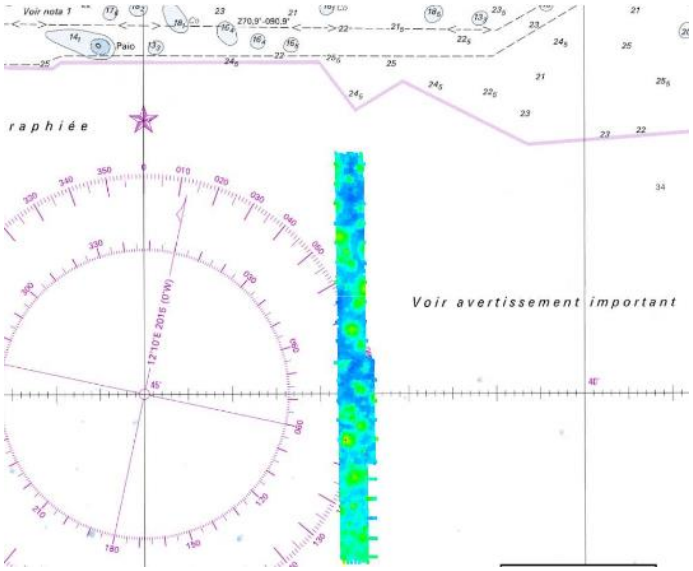

Fig. 17: recommended track to the southern part of Rangiroa

The GOP maintained the Sea Level Stations (SLS) network deployed in French Polynesia.

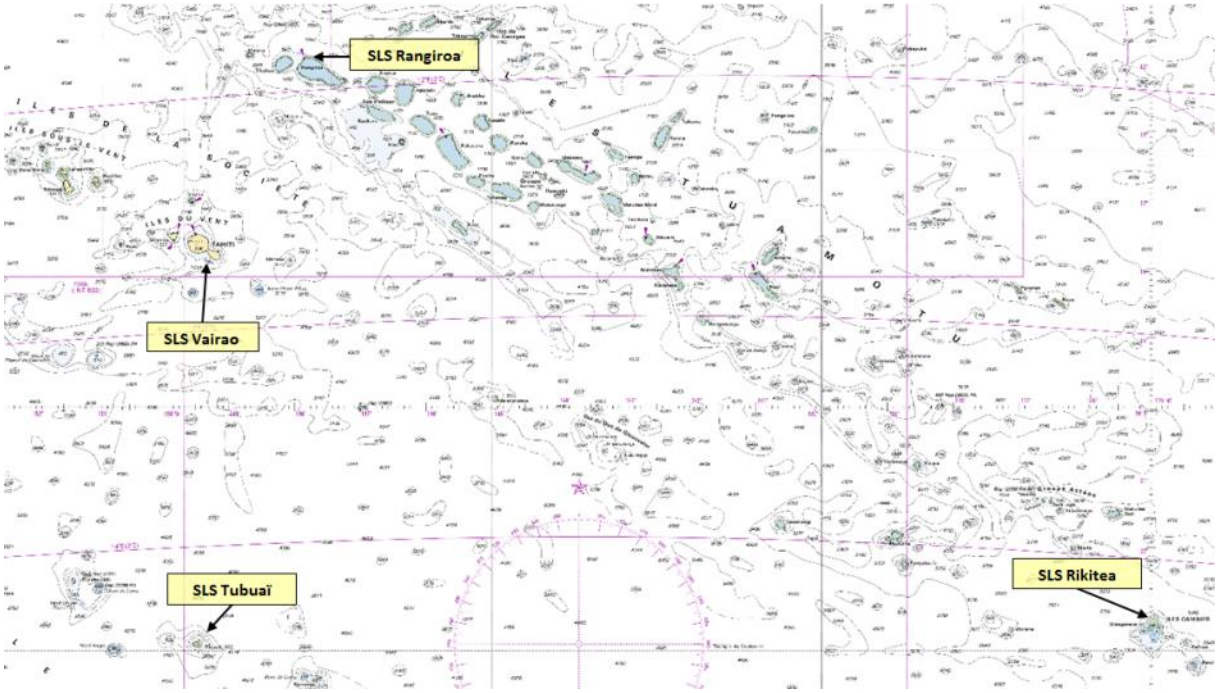

Fig. 18: maintained SLS in French Polynesia 2019

In Wallis & Futuna:

Surveys have been done around Futuna Island (figure 19) and the GOP maintained the Sea Level Stations (SLS) network deployed in Wallis and in Futuna.

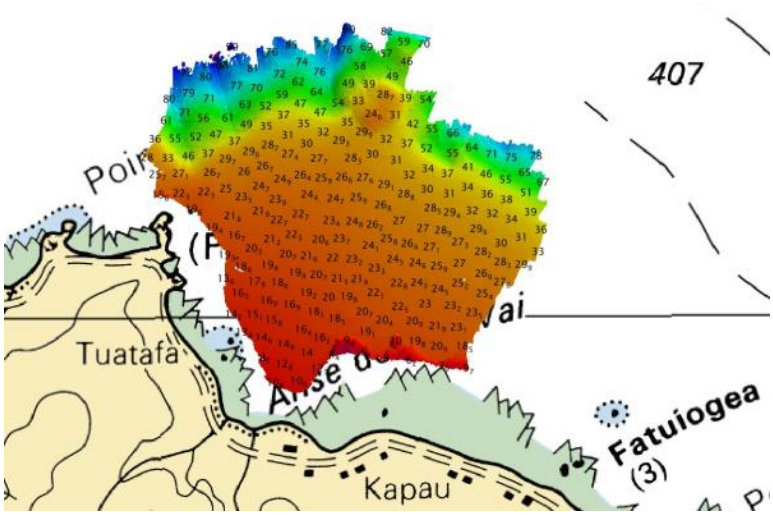

Fig. 19: survey in the northern part of Futuna

Lidar surveys

These data, critical for coastline management and risks prevention, are freely available through Shom's data portals:

- Data.shom.fr (Shom catalog / Master data / Coastal altimetry): data.shom.fr
- Diffusion.shom.fr: http://diffusion.shom.fr/pro/risques/altimetrie-littorale/lidar-polynesie-francaise-2015.html for French Polynesia

and the French Government open platform for public data: data.gouv.fr.

Discussions are ongoing with local governments of New Caledonia and French Polynesia to conduct new surveys, yet to be finalized. In particular, the Shom provided area and cost estimates in anticipation of an extension of the bathymetric lidar survey to the entire island of Tahiti (figure 20). Raiatea, Tahaa and Huahine may also be covered by surveys, which would take place in 2021.

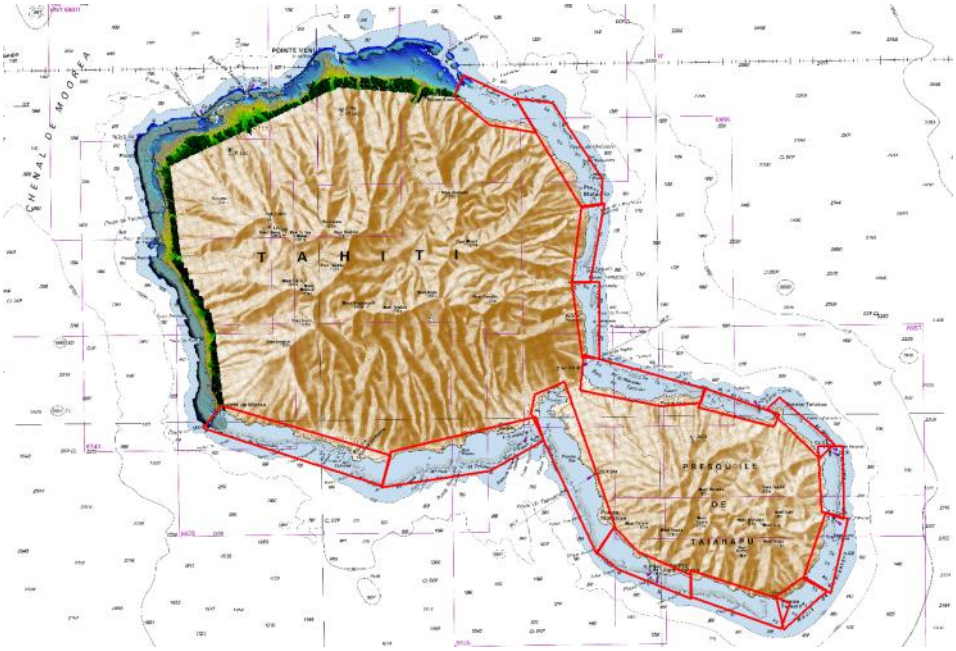

Fig.20: Estimation of the additional lidar survey on Tahiti

b) New technologies and /or equipment

In New Caledonia:

A breakthrough took place in 2019 as *Louis Hénin* vessel was equipped with an EM2040P MBES. The surveys carried out since then have taken advantage of such technology, especially on the recommend tracks (Grand Lagon Sud, between Houaïlou and Touho, between Tanlé and Paagoumène):

- less time spent on data collection (the detection capability offered by high-resolution MBEs, making it possible to dispense with the use of side-scan sonar) and dataprocessing,
- higher density, quality, hence confidence in final bathymetric dataset.

The generalized use of MBES data in GOP/BHNC (on HSL *Chambeyron* and *Louis Hénin* vessel) was also the opportunity to run a few trials of automatic processing with the CUBE algorithm, which are positive so far.

In French Polynesia:

In the second semester of 2020, HSL *BHPF1* will be equipped with a compact shallow water multibeam echosounders. This new capacity should be easily deployable (it is necessary to reach remote survey areas in the vast French Polynesia).

c) New ships: NTR

d) Crowdsourced and satellite-derived bathymetry - national policy

The Shom is currently conducting a research and development project in the field of SDB : Bathysat project.

The objective of the project is to improve performance and quantify vertical uncertainties in accordance with the specifications of the new version of the S-44. The results of the study should make it possible to extend the use of the SDB to areas where no field data are available.

The concepts of operation targeted are:

- 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 for hydrodynamic modelling in particular,
- to have a tool for rapid coastal environment reconnaissance: estimation of bathymetric characteristics, seabed types, turbidity, coastline,
- to detect morphological changes in the seabed in the coastal strip (high revisit rates) in order to prioritize hydrographic surveys (decision support tool).

The SDB has already been used for many years 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/TRAITEMENT_IMAGE_SPATIOCARTE_MARINE.xml).

The improvements expected from the Bathysat project will improve the quality, both in terms of accuracy and qualification, of the bathymetric data from the SDB).

e) Challenges and achievements:
The use of the EM2040P MBES on Louis Hénin was this year's main achivement but BHNC had to face a few failures (which had a minor impact on surveys operations). Technical discussions with Konsberg lead to the release of an upgraded version of this equipment: the three sonar heads are currently being upgraded one after another.

Detailed information about surveys to update IHO Publications P-5 (*Yearbook*) and C-55 (*Status of Hydrographic Surveying and Charting Worldwide*) have been submitted using the online system (reference B).

3. New charts & updates:

a) ENC coverage, gaps and overlaps
As of 1st of January 2020, Shom has produced some 715 ENCs, of which 207 ENCs within region L.

The full collection should eventually reach a figure of the order of 900 ENCs, with an approximate rate of 50 new cells per year.

By the end of 2018, full coverage of New Caledonian waters in ENCs had been achieved.

Concerning French Polynesian waters, the most frequented routes used by passengers and freight vessels are covered by 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 L is detailed in the table below (*changes in red*):

Usage Band	Produced Cells	Planned Cells	Percentage
1	1	1	100%
2	13	13	100%
3	17	23	74%
4	52	68	76%
5	76	150	83%
6	48		
Total	**207**	255	**81%**

The following figures are extracts from the online PRIMAR catalogue http://www.primar.org showing Shom ENC coverage within the SWPHC (region L) area:

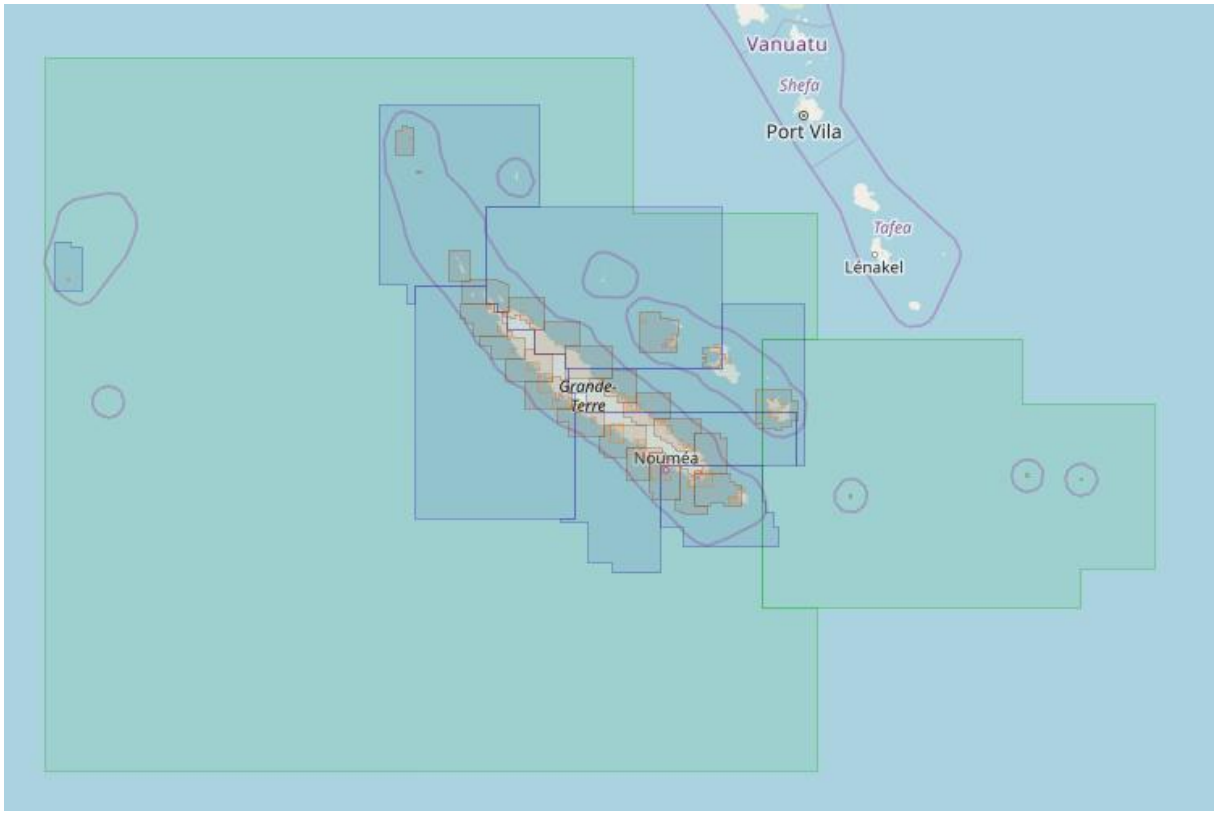

Fig. 21: Region L - Shom's ENC production - New-Caledonia (Nouvelle-Calédonie)

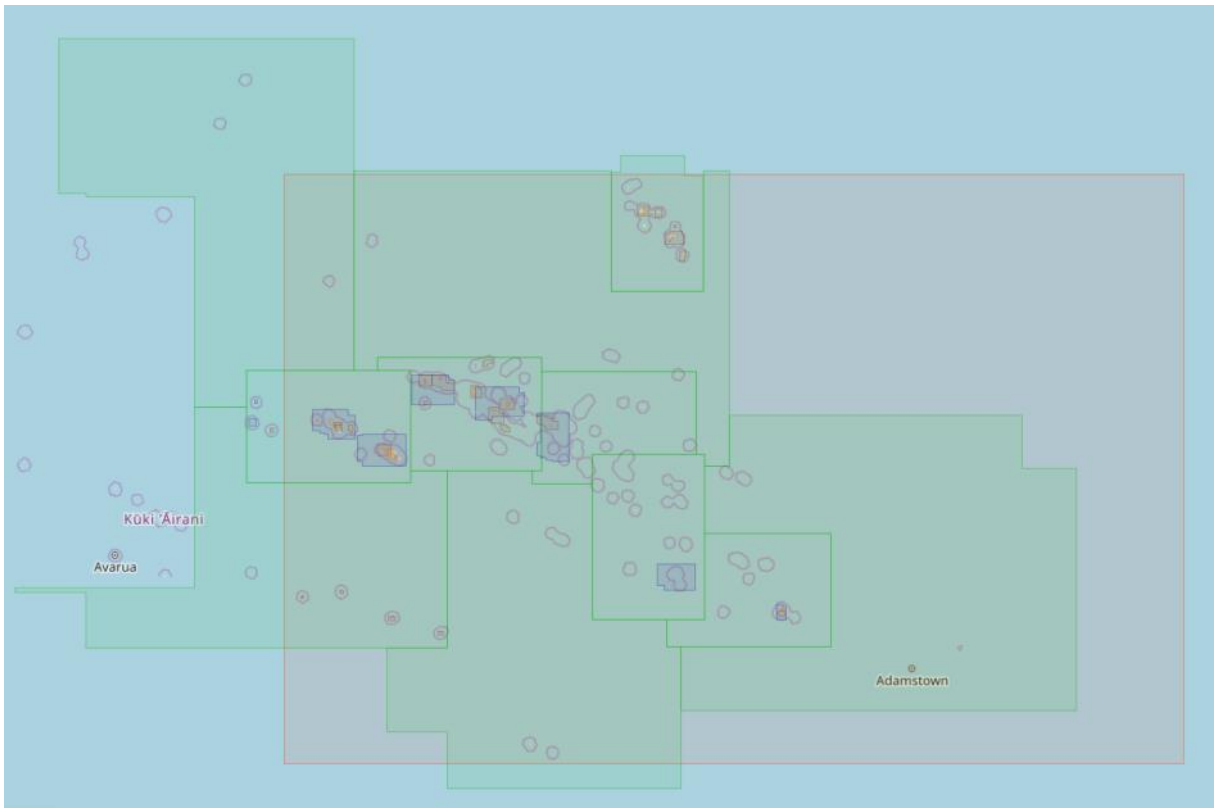

Fig. 22: Region L - Shom's ENC production - French Polynesia (Polynésie française)

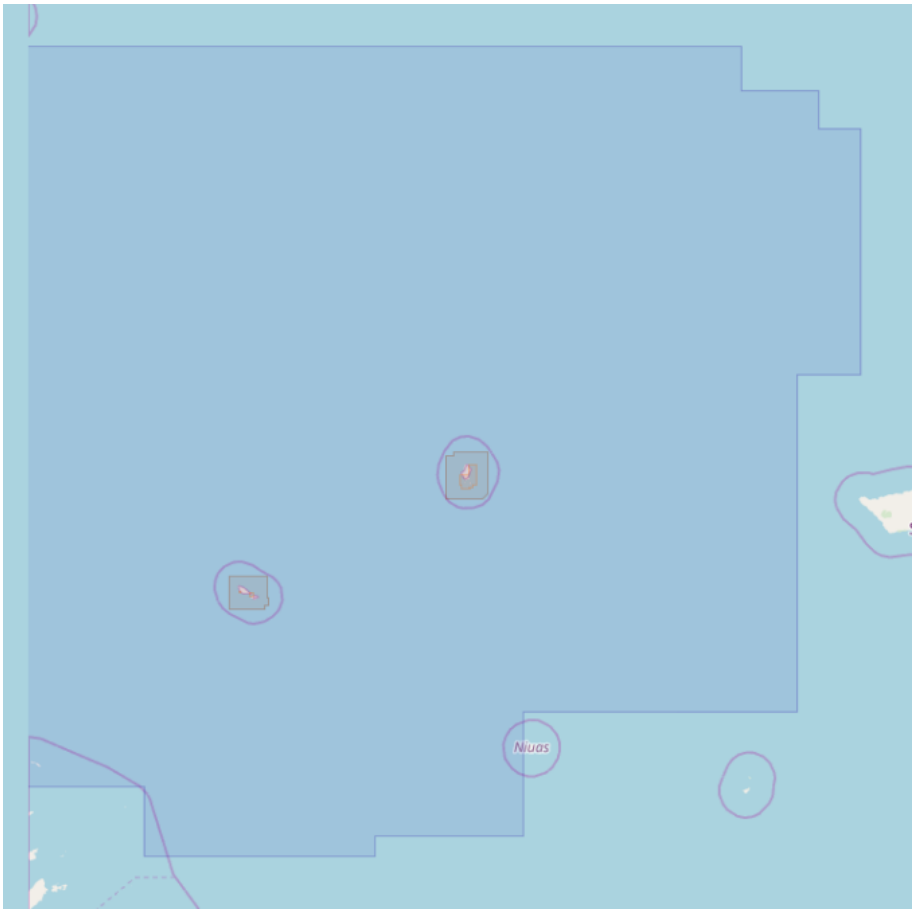

Fig. 23: Region L - Shom's ENC production – Wallis & Futuna

ENC cells produced since the last conference are detailed hereafter:

Number	Scale 1 :	Title
FR364610	45 000	Îles Gambier
FR366040	90 000	De Mururoa à Fangataufa
FR372620	90 000	De Makemo à Marutea Nord
FR372831	700 000	Îles Wallis et Futuna - Partie Ouest
FR372832	700 000	Îles Wallis et Futuna - Partie Est
FR461760	22 000	Maupihaa (Mopelia)
FR464620	22 000	Îles Gambier - Partie Sud
FR473290	45 000	Kauehi
FR474530	45 000	Makemo
FR474540	45 0000	Faaite
FR474590	45 000	Tikehau
FR54232D	8 000	Île de Rapa - Baie Anarua
FR56176A	8 000	Maupihaa (Mopelia) - Entrée du lagon et mouillage

FR564630	12 000	Île Mangareva - Passe de l'Ouest
FR564640	12 000	Totegegie
FR57248D	22 000	Apataki - Lagon Ouest - De la Passe Tehere à la Passe Pakaka
FR57329A	22 000	Kauehi - De la passe Arikitamiro au mouillage de Tearavero
FR57352B	12 000	Nuku-Hiva - Baies d'Aakapa, d'Hatiheu et d'Anaho
FR57352D	12 000	Nuku-Hiva - Baie du Contrôleur
FR57352E	12 000	Nuku-Hiva - Baie de Taioa
FR57459A	22 000	Tikehau - De la passe Tuheiava au mouillage de Tuherahera
FR66176B	3 000	Maupihaa (Mopelia) - Passe Taihaaru Vahine
FR67314A	8 000	Ahe - Passe Tiareroa
FR67314B	8 000	Ahe - Mouillage de Tenukupara
FR67329B	4 000	Passe Arikitamiro
FR67329C	8 000	Mouillage de Tearavero
FR67352A	8 000	Nuku-Hiva - Baie Haahopu
FR67354A	8 000	Hiva-Oa - Baie Hanamenu
FR67354B	8 000	Hiva-Oa - Baie Hanaiapa
FR67354I	8 000	Tahuata - Baies du Nord-Ouest
FR67354J	8 000	Tahuata - Baie Motopu
FR67354K	8 000	Tahuata - Baie Vaitahu
FR67354L	8 000	Tahuata - Baie Hanatetena
FR67354M	8 000	Tahuata - Baie Hapatoni
FR67354N	8 000	Tahuata - Baie Hanateio
FR67372C	8 000	Fakarava - Passe Tumakohua
FR67453A	8 000	Makemo - Passe Tapuhiria
FR67453B	8 000	Makemo - Passe Arikitamiro
FR67454A	4 000	Faaite - Passe Teporioha
FR67459B	4 000	Tikehau - Passe Tuheiava
FR67459C	8 000	Tikehau - Mouillage de Tuherahera

ENC cells planned for 2020 are listed below:

Number	Scale 1:	Title
FR35878B	180 000	Ile Amanu et Passe de Hao
FR36033A	90 000	Manuae (Scilly)
FR36033B	90 000	Maupihaa (Mopélia)
FR36033C	90 000	Motu One (Bellingshausen)
FR364210	180 000	Archipel des Tuamotu - Iles Arutua, Apataki, Kaukura, Niau
FR372610	180 000	De Fakarava à Makemo
FR372830	700 000	Wallis et Futuna
FR44232A	22 000	Ile de Rapa
FR44232B	22 000	Iles Morotiri (Bass)
FR45878G	22 000	Ile Reao - Village Rapuarava
FR462840	22 000	Partie Sud de Raiatea
FR472810	45 000	Hao
FR473140	45 000	Ahe
FR473460	45 000	Takaroa et Takapoto
FR47353A	90 000	Ua-Pou
FR473560	90 000	Eiao, Hatutaa et Motu One
FR474560	90 000	Toau - De Niau à Fakarava
FR474570	90 000	Raroia et Takume
FR474580	45 000	Aratika
FR474620	45 000	Amanu
FR474630	45 000	Katiu
FR55878D	8 000	Ile Amanu - Passes Fafameru et Taikariki - Village Ikitake
FR566050	22 000	De la Pointe Vénus à Mahaena
FR569560	22 000	De la Passe de Mahaena à la Baie de Taravao
FR569570	22 000	De la Baie de Taravao à la Passe d'Aiuroa
FR57281A	22 000	Hao - De la passe Kaki aux mouillages d’Otepa
FR573050	22 000	De la Passe d'Aiurua à la Passe Havae
FR57353I	8 000	Ua-Huka - Baie Haavei
FR57455K	8 000	Arutua - Passe Porofai
FR57456B	22 000	De la Passe Otugi aux mouillages Nord et Sud

FR57457A	8 000	Raroia - De la Passe Ngarue au Mouillage de Ngarumaoa
FR57458A	22 000	Aratika - De la Passe Tamaketa à la Passe Fainukea
FR57462A	8 000	Passes Fafameru et Teikariki - Village Ikitake
FR57462A	8 000	Passe Pakata
FR64232C	8 000	Ile de Rapa - Baie d'Ha'urei (Ahurei)
FR67281B	8 000	Hao - Passe Kaki
FR67281C	8 000	Hao - Zone Portuaire Nord
FR67281D	8 000	Hao - Mouillages d'Otepa
FR67346A	8 000	Takaroa - Passe Teauonae
FR67353B	8 000	Ua-Pou - Baie d'Haakuti
FR67353C	8 000	Ua-Pou - Baie d'Hakahetau
FR67353D	4 000	Ua-Pou - Baie d'Hakahau
FR67353E	8 000	Ua-Pou - Baie de Vaiehu
FR67353F	8 000	Ua-Pou - Baie d'Hakamaii
FR67353G	8 000	Ua-Pou - Baie d'Hakatao
FR67353K	8 000	Ua-Huka - Baie d'Hane
FR67356A	8 000	Eiao - Baie de Vaituha
FR67456A	4 000	Anse Amyot
FR67458B	4 000	Aratika - Passe Fainukea
FR67458C	8 000	Aratika - Passe Tamaketa

b) ENC distribution method
All French ENCs (S-63 encrypted format) are distributed to End User Service Providers by PRIMAR RENC. France supports the WEND working group worplan for improving the implementation of WEND principles.

c) RNCs: NTR

d) INT charts:
Here are the INT charts produced since the last conference:

INT	Scale 1:	Title	Comment
654	1 580 000	De Tahiti aux Îles Marquises	FR7371 – Limited Edition
656	1 500 000	Des Îles Tuamotu aux Îles Australes	FR7347 – Limited Edition
657	1 500 000	Des Southern Cook Islands aux Îes de la Société et Australes	FR7369 – Limited Edition
6883	59 600	Abords de Nouméa - Passes de Boulari et de Dumbéa	FR6687 – New Edition
6955	20 000	Bora-Bora	FR7466 – Limited Edition

Besides, the following INT charts are planned for the 2020-2021 period:

INT	Scale 1:	Title	Comment
654	1 580 000	De Tahiti aux Îles Marquises	FR7371 – New Edition
655	1 500 000	De Mururoa à Ducie Island	FR7370 – New Edition
6843	300 000	Nouvelle-Calédonie (partie Sud-Est) - Iles Loyauté	FR6686
6844	300 000	Nouvelle-Calédonie (partie Sud) - Ile des Pins	FR6768

Concerning New Caledonia's coastal scheme, France is currently producing five 1: 300 000 charts covering the main island and its vicinities. Therefore, France has submitted these five charts under national numbers **FR7760**, **FR7761**, **FR7762**, **FR6686** and **FR6768** to the Region L INT scheme. They have been approved with **INT** numbers **6840**, **6841**, **6842**, **6843** and **6844.** The first three have been published in 2017-18, the other two are scheduled for 2020.

Here is the overall INT chart production status for that region (*changes in red*):

Scale	Produced INT charts	Planned INT charts	%
Small (<1/1 000 000)	7	7	100%
Medium	3	5	60%
Large (>1/100 000)	10	10	100%
Total	**20**	**22**	**91%**

e) National paper charts

Since the last SWPHC meeting, the following national paper charts have been edited:

National	Scale 1 :	Title	Comment
5978	Div	Mer de Corail - Îles et récifs Épars	New Edition
6280	12 000	Partie Nord de Raiatea	New Edition
6281	12 000	Partie Sud de Tahaa	New Edition
6421	175 000	Îles Tuamotu	Limited Edition
6589	20 000	Baie de Canala	New Edition
6688	592 000	Îles de la Société	Limited Edition
6689	595 000	Îles Tuamotu (Partie Ouest)	Limited Edition
6690	592 000	Îles Tuamotu (partie centrale)	Limited Edition
6691	578 000	Îles Tuamotu (partie Est)	Limited Edition
6692	574 000	Des Îles Tuamotu aux Îles Gambier	Limited Edition
6955	173 000	Approches des Îles de Tahiti et de Moorea	Limited Edition

7218	75 000	Atolls d'Ouvéa et de Beautemps-Beaupré	New Edition
7322	25 000	De la Passe de Poya à la Passe de Muéo	Limited Edition
7357	500 000	Îles Marquises (Fenua Enata)	Limited Edition
7459	Mix	Tikehau	New chart

The following charts are planned to be issued in 2020/2021:

National	Scale 1 :	Title	Comment
6282	30 000	Passes entre les Iles Raiatea et Tahaa	New edition
6283	30 000	Île Tahaa	New Edition
6284	30 000	Partie Sud de Raiatea	New Edition
6421	175 000	Îles Tuamotu - Îles Arutua, Apataki, Kaukura, Niau	New Edition
6424	40 000	Île Tubuai	New Edition
7268	850 000	Nouvelle-Calédonie – Îles Loyauté	New Edition
7281	75 000	Hao	New Edition
7462	60 000	Amanu	New Edition
7463	50 000	Katiu	New Edition
7755	60 000	De Ponérihouen au Cap Dumoulin	New Edition
7756	60 000	De Touho à Ponérihouen	New Edition
7757	20 000	Baie de Canala et de Kouaoua	New Chart
7764	25 000	Abords Nord Ouest de l'Île des Pins – Baie de Gadji et mouillage de Uapan	New Chart

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

Shom provides georeferenced marine charts in GeoTiff and S-57 format when produced. These digital marine charts are now available through Shom's online store http://diffusion.shom.fr under various licenses[1] 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[2] allows unlimited download of updated versions for 12 months from the date of purchase.

g) Challenges and achievements

The development of ENC coverage continues with 41 new cells in the Region L to meet the challenges of navigation, particularly the cruise industry, which is developing strongly in the region, seeking new ports of call and an increase in the maximum allowable draughts.

[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*

Detailed information about charting to update IHO Publications P-5 (*Yearbook*) and C-55 (*Status of Hydrographic Surveying and Charting Worldwide*) have been submitted using the online system (reference B).

4. New publications & updates:

   a) New Publications: NTR

   b) Updated publications
   Publications are updated weekly in accordance with the Shom Notices to Mariners.

   c) Means of delivery, e.g. paper, digital
   All nautical publications are available in digital format only (pdf files) on Shom's online shop (diffusion.shom.fr).

   d) Challenges and achievements: NTR

   Detailed information to update IHO Publication P-5 (*Yearbook*) have been submitted using the online system (reference B).

5. MSI

   a) 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.

   In SWPHC area, Shom has delegated its duties of national coordinator to two maritime authorities:

   - in New Caledonia, to the Commandant de la zone maritime for Nouméa, with operating organism: **MRCC NOUMEA** for regions in NAVAREA X and XIV areas,
   - in French Polynesia, to the Commandant de la zone maritime Polynésie française, with operating organism: **JRCC Tahiti**, for regions in NAVAREA XIV area.

   Hereafter are listed the coordinates of those authorities:

Area	**Phone number**	**Fax number**	**Email address**
New Caledonia	+687 292 121	+687 292 303	operations@mrcc.nc
French Polynesia	+689 40 541 615	+689 40 423 915	contact@jrcc.pf

   MSI Point of contact at Shom:

M. Alain PAIRE
Head of Regional Team
French Hydrographic Office
13, rue du Chatellier – CS 92803 - 29228 BREST CEDEX 2 – FRANCE
Tel : + 33 (0) 256 31 23 03
email : na-om@shom.fr

b) Statistics on work of the National Coordinator
See appendix C

The Shom only plays a control and coordination role of local and coastal warnings issued by its national delegated coordinators (MRCC Nouméa and JRCC Tahiti).

c) New infrastructure in accordance with GMDSS Master Plan
There is no NAVTEX station related to French overseas territories in the Pacific, MSI warnings are broadcast through SafetyNet network.

d) Challenges and achievements: NTR.

Detailed information about MSI to update IHO Publication C-55 (*Status of Hydrographic Surveying and Charting Worldwide*) have been submitted using the online system (reference B).

The national self-assessment of MSI is submitted in Annex C.

6. C-55
C-55 charting and surveying status updated values regarding Region L area under Shom responsibility are summed up in the following tables:

Survey Status Updated December 2019		**Depth < 200m**			**Depth > 200m**		
		A	**B**	**C**	**A**	**B**	**C**
L	French Polynesia	**26.2**	**13.0**	**60.8**	**19.1**	**0.2**	**80.7**
	New Caledonia	**13.8**	**20.9**	**65.3**	**16.4**	**3.3**	**80.3**
	Wallis & Futuna	**16.6**	**31.0**	**52.4**	**12.5**	**0.0**	**87.5**

Charting Status Updated January 2020		**Small (<1 M)**			**Medium (1M < / < 100 000)**			**Large (> 100 000)**			**Metric**	**WGS84**
		A	**B**	**C**	**A**	**B**	**C**	**A**	**B**	**C**		
L	French Polynesia	100	0	100	100	0	100	**60**	0	**72**	100	96
	New Caledonia	100	0	100	100	0	100	**92**	0	100	100	100
	Wallis & Futuna	100	0	NA	100	0	NA	75	0	100	100	100

These figures have been provided using the online system (reference B) to update IHO Publication C-55 (*Status of Hydrographic Surveying and Charting Worldwide*).

7. Capacity Building

a) Offer of and/or demand for Capacity Building
Initial training capabilities provided by Shom include the following FIG-OHI-ACI courses: category B for hydrographic surveyors and category B for nautical cartographers. So far, those courses are provided in French and are open to francophone foreign applicants.

Fig. 24: Courses and training provided at the Shom hydrographic school (source: shom.fr)

A category A course for hydrographic surveyors is provided at ENSTA Bretagne.

b) Training received, needed, offered : NTR

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

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

8. Oceanographic activities

a) General : NTR

b) GEBCO/IBC's activities, GEBCO Seabed 2030 activities:
On waters under French jurisdiction in the SWPHC region, Shom's bathymetric data are accessible:

- in the form of regional or coastal bathymetric DTMs:
  http://diffusion.shom.fr/pro/risques/bathymetrie.html?p=1
- in the form of bathymetric datasets (soundings):
  http://diffusion.shom.fr/pro/amenagement/bathymetrie/lots-bathy.html

Along with the DTM mentioned above, all bathymetric datasets (historically held in the Shom's bathymetric database up to end of 2018) in international waters have been provided for integration in the GEBCO 2019 product. This mainly concerns, in the area of interests, bathymetric data acquired in transit.

Note that the distribution of coverage survey polygons along with associated metadata on the IHO DCDB website, is ensured for Shom, trough the EMODnet Bathymetry WFS webservice. An update of all this bathymetric resources is planned for early 2020.

Shom's head of Pacific Survey Unit (GOP) participated (VTC) to the South and West Pacific Oceans Regional Mapping Meeting in March 2019.

c) Tide gauge network

Shom is the national coordinator and reference authority for the observation of the sea level, collection, processing and dissemination resulting data.

Shom's own network RONIM is present in the Pacific with one station in Nouméa (New-Caledonia). 13 other tide gauges are operated and maintained by Shom under agreements with local authorities. These missions are 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.

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

Since the last conference, regular or occasional maintenance interventions have been carried out on the network of tide gauges deployed in the French Pacific territories:

New Caledonia

Tide gauges network in New Caledonia is composed of 6 stations: Hienghène, Numbo (Nouméa), Maré, Lifou, Thio, Ouinné and Ouvéa.

Maintenance operations on the existing gauges are carried on a yearly basis.

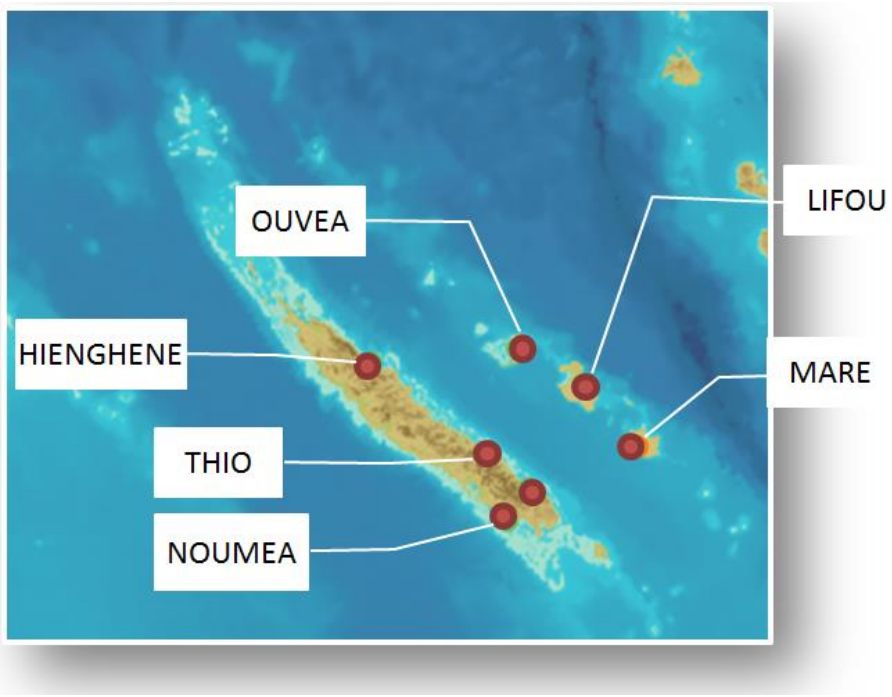

Fig.25: Tidal gauges network covering New Caledonia.

French Polynesia

Shom operates six tide gauges in French Polynesia: Vairao (Tahiti), Huaine, Rangiroa, Makemo, Rikitea and Tubuai. After reduced activities in 2018 due to temporary funding issues, maintenance operations have restarted in 2019.

Fig.26: Tidal gauges network covering French Polynesia waters.

Wallis & Futuna

Futuna Island benefits from a permanent observatory since 2011. In 2014 a permanent tide gauge was also installed on Wallis Island. These stations are fitted with radar sensor, permanent GNSS and satellite real-time transmission. They are maintained on a 2-year basis.

Fig. 27: Tidal gauges in Wallis & Futuna Islands

The third edition of "Journées REFMAR", an international conference on the observation of the sea level, mainly aiming at French-speaking countries, was held from 27 to 29 March 2019 in Paris. This symposium, funded in part by the French Ministry of the Environment was organized in collaboration.

The program of the 3-day event was the following:

- Sea level and coastline
- Sea-level observation for research
- Thematic workshops
- Observation technology.

The event was widely acclaimed for the quality of presentations and the opportunities it gave for multilateral exchanges. Many African representatives expressed their

interest in sea-level issues and their will to accelerate their own national capacities in this area.

The conference was followed by a 3-day course on sea-level observation, including basics in tide gauge operation theory and field station controls activities. 50 participants were involved; the course was free of charge except for travelling and accommodation.

d) New equipment

From 2020 onwards, Shom tide gauge network will be renovated: data loggers, transmission equipments and supervision software will be renewed. The expected results are: a better reliability, improved transmission rates and lower maintenance requirements. It is expected that tide gauges in the Pacific will also benefit from these improvements after 2021.

e) Challenges and achievements

Distances and complex funding issues make difficult the maintenance of the French permanent sea level network in the Pacific. While uncertain in 2017 and 2018, funding for Polynesia and W&F networks have been secured at least until end of 2021.

9. Spatial data infrastructures:

a) Status of MSDI

The 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)
- limitesmaritimes.gouv.fr (https://limitesmaritimes.gouv.fr or https://maritimelimits.gouv.fr)

b) Relationship with the NSDI

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

c) Involvement in regional or global MSDI efforts?

The head of GOP will be the French representative in the newly created SWPHC MSDIWG.

d) National implementation of the Shared Data Principles – including any national data policy and impact on marine data.

Settled in 2019, the Marine Environment Information System – SIMM – (https://www.milieumarinfrance.fr) is a new national portal aiming to facilitate the sharing and dissemination of data on the marine environment. In order to do so, it re-uses existing databases and information systems, and develops new ones when necessary. The SIMM federates the actors of public data on the marine environment (State services, public establishments like Shom, etc.).

At this time, the area of interest concerns only the French mainland but extensions to overseas territories should be implemented in the future.

Fig. 28: Marine Environment Information System – SIMM

e) MSDI national portal

Since the launch of Shom's maritime and coastal geographic information portal data.shom.fr, further developments have been implemented with new online services data layers on a regular basis. Hereafter are listed some of the latest evolutions:

- New layer or update layers:
  - Search and Rescue (SAR): new
  - Wrecks and obstructions (EPAVES 2020): update
  - Maritime altimetric references (Références Altimétriques Maritimes 2019 - RAM): update
  - Maritime limits : update
    - Wallis-and-Futuna : outer limit of the territorial sea (Decree 2019-320 of 12 April 2019)
    - French Polynesia: baselines(Decree 2019-319 of 12 April 2019)
- Improvements on the portal's core structure (eg. data query on the fly, search engine…)

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 at https://services.data.shom.fr/static/help/Aide-en-ligne_DATA-SHOM-FR.pdf

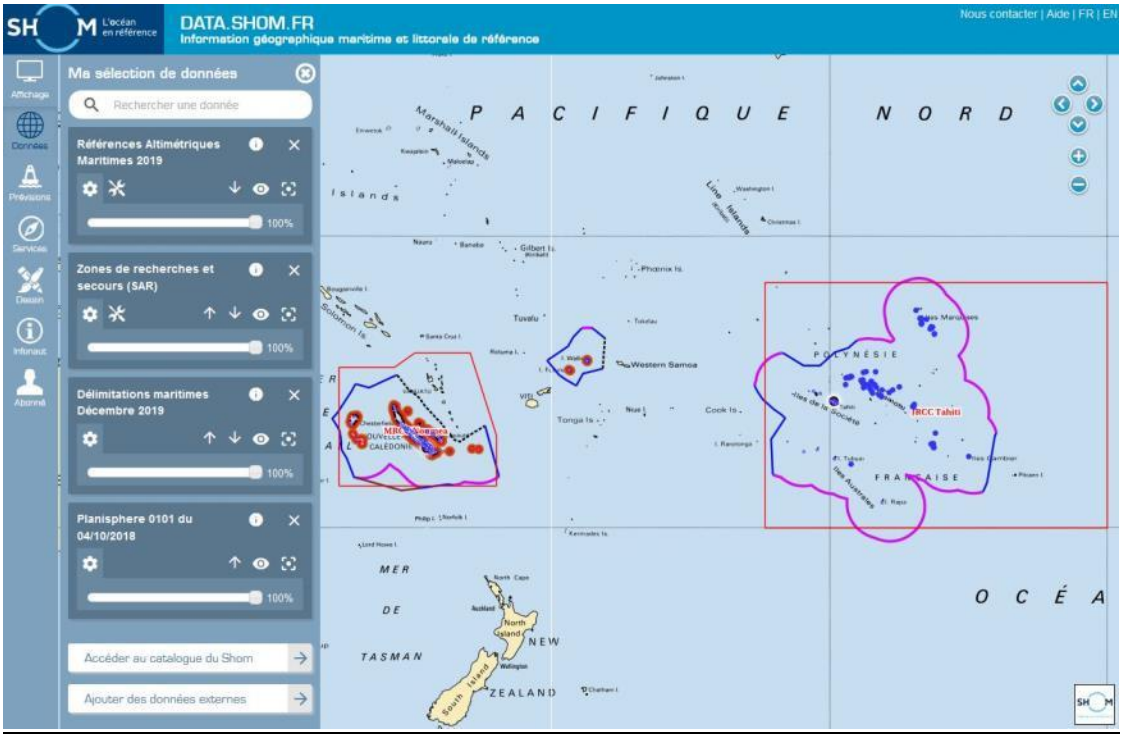

Fig. 29: New or update data (2019) on data.shom.fr

Regarding maritime limits, the French national portal (https://limitesmaritimes.gouv.fr or https://maritimelimits.gouv.fr) has been updated accordingly to 2 new decrees (Wallis-and-Futuna and French Polynesia).

f) Best practices and lessons learned: NTR.

g) Challenges and achievements: NTR.

10. Innovation

a) Use of new technologies :
See 2) a) Use of LIDAR technology and 2) d) SDB.

b) Risk assessment
A first study on the "expiration" of bathymetric information on nautical charts was carried out, using SDB to compare an up-to-date estimation of the bathymetry (derived from satellite imagery) to the soundings plotted on the chart. This type of analysis (concept of "chart adequacy") is a decision support tool for defining and prioritizing new bathymetric surveys.

Shom develops also the "*Deseasion* platform", a multicriteria decision tool, for hydrographic risk assessment and cost-benefit analysis. The tool is currently under-development.

A workshop to raise awareness on hydrographic risk analysis, as well as a discovery of the *Deseasion* tool (prototype) was conducted as part of the IHO capacity building programme for the EAtHC region (Rabat, October 2019).

On this occasion, a bibliographical inventory of risk analyses was carried out by Shom. This bibliography and the presentation materials of the joint IHO-IALA

workshop in Rabat are available online on the IHO website: https://iho.int/uploads/user/Inter-Regional%20Coordination/RHC/EAtHC/MISC/IHO-IALA%20Workshop.pdf

c) Policy matters : NTR

11. Other activities

a) Participation in 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
HSPT	✓		S-44 Hydrographic surveys Project Team
SWPHC		✓	South-West Pacific Hydrographic Commission
TWCWG	✓	✓	Tidal, Water Level and Currents Working Group

WEND		✓	Wold-Wide Electronic Navigational Chart Database
WWNWS		✓	World-wide Navigational Warning Service Sub-Committee

b) Meteorological data collection: NTR

c) Geospatial studies : NTR

d) Preparation for responses to disasters
France may have Navy ships in the SWPHC 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.

Tsunamis
Shom contributes to the deployment and maintenance of most of the French sea-level stations in the Pacific. These observatories contribute to the tsunami warning system
Some of these sea-level observatories are part of the IOC GLOSS system for a global monitoring of sea level change.
Futuna (Wallis&Futuna), Papeete, Rikitea, Rangiroa, Makemo, Tubuai, Nuku Hiva (French Polynesia), and Noumea (Numbo – New Caledonia) observatories are already included in the so-called "GLOSS Core Network".

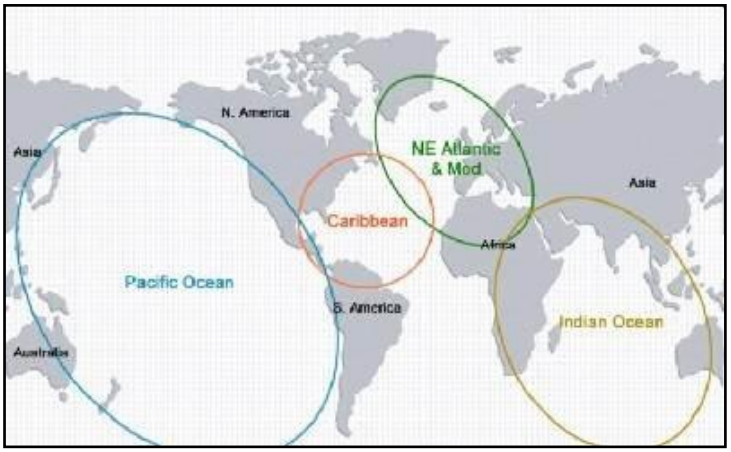

Fig.30 : Cooperation areas on tsunami warning system (source COI; UNESCO).

Coastal flooding
Shom is not currently working on any development of storm surge or wave forecasting capabilities in the coastal areas of the French Pacific territories.

e) Environmental protection : NTR

f) Engagement with the Maritime Administration: NTR

g) Aids to Navigation matters: NTR

h) Magnetic and gravity surveys: NTR

i) International engagements: NTR

j) Others: NTR

12. Conclusions

[*Provide a short summary statement that highlights any of the following:*

a) Areas of significant achievement

The commissioning of multibeam echosounders at the New Caledonia hydrographic base has made it possible to significantly increase survey capacity by reducing acquisition times, while at the same time improving the quality of bathymetric data (detection capacity, reduction of uncertainties making it possible to extend navigational capabilities).

b) Areas of particular concern

The means of acquisition at sea in French Polynesia remain limited in view of the size of the area and of the logistical constraints linked to the projection of teams and equipment.

The funding of the maintenance in operational conditions of the French tide gauge network in the Pacific, which is essential for the tsunami warning system and the study of sea level evolution, remains uncertain for French Polynesia and Wallis & Futuna, which raises questions about the very sustainability of the network.

c) *Any other matters of interest to the SWPHC*

Shom supports any initiatives aiming at improving the maritime knowledge and the navigation safety, as far as the data collected benefits the charting authorities and the update of nautical documentation of that region.

Since November 19th 2019, Shom has started to celebrate 300 years of French hydrography. Various events will mark this commemoration, culminating in a Study Day at the musée du quai Branly - Jacques Chirac scheduled for November 19th 2020, under the patronage of the Minister of the French Armed Forces, Mrs Florence Parly, to which the directors of hydrographic services in the SWPHC region have been invited.

More information : https://www.shom.fr/fr/300_ans.

https://agora.shom.fr/fileadmin/data/DMI/COMM/Supports/300_ans/video/300_ans_anglais.mp4

Annex A

Input to the IHO Publication P-5 (*Yearbook*)

Country: France
Organization: Shom

Online system used to update P-5

Annex B

Input to the IHO Publication C-55 (*Status of Hydrographic Surveying and Charting Worldwide*)

Country: France
Organization: Shom

Online system used to update P-5

National MSI Self-Assessment

Country: FRANCE
Organization: Shom

1. Maritime area

[Describe maritime area including details of the geographic boundaries]
The maritime area includes all maritime areas under French juridiction within the South West Pacific: it includes coastal waters (up to 250 NM) of French Polynesia, New Caledonia and Wallis and Futuna.

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 : na-om-all@shom.fr	+33 2 56 312 312 +33 2 56 312 273 +33 2 56 312 303	/	na-om-all@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 October 30th 2019).

[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 ovserseas territoritories within the SWPHC region. Coastal warnings broadcasted through SAFETYNET		
Terrestrial rediocommunications 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
xx	xx.x Mins	xx	xx.x Mins	xx	xx.x Mins

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]

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

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	**Phone number**	**Fax number**	**Email address**
New Caledonia NAVAREA X and XIV	+687 292 121	+687 292 303	operations@mrcc.nc
	https://www.mrcc.nc/		
French Polynesia NAVAREA XIV	+689 40 541 615	+689 40 423 915	contact@jrcc.pf
	http://www.jrcc.pf/		

10. Recommendations
[If any]
NTR

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 SWPHC region.

The role of the Shom is limited to the control and coordination of the warning issued by its national delegated coordinators.