National Report of France to the XVIIIth GLOSS Group of Experts 11 to 14 March. 2025

*Coordinated in **February 2025** by*

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1 French context and overview of its contribution to GLOSS

In 2025, **19 tide gauges on French territories** are contributing to the GLOSS core network (Table 1). The spatial coverage of this contribution is shown in Figure 1.

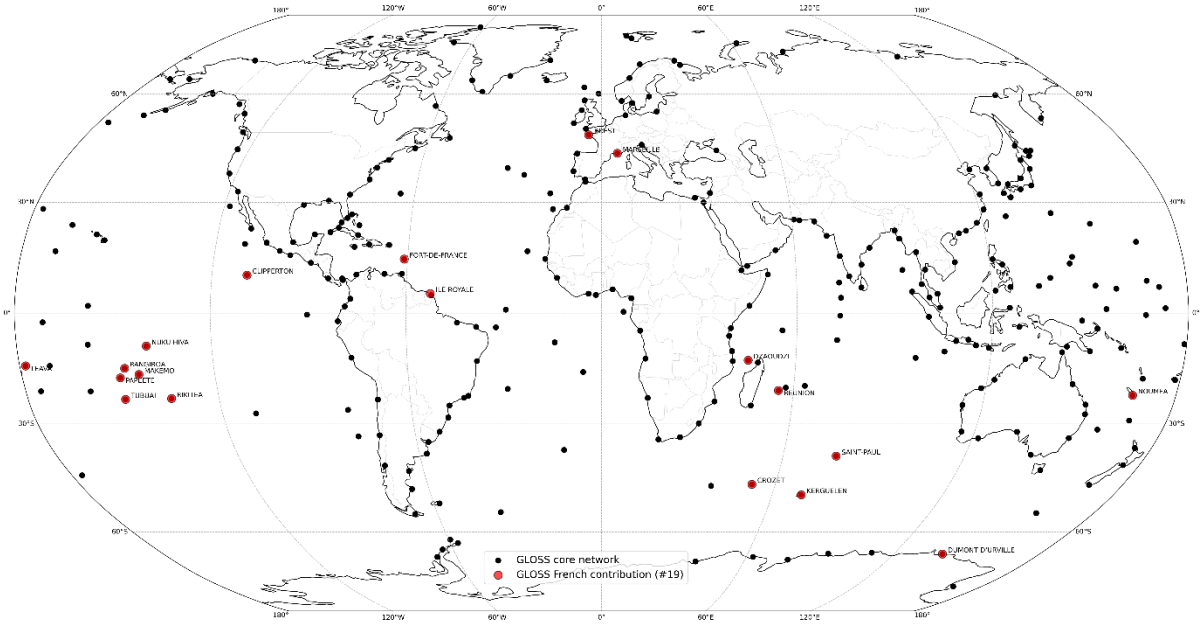


Figure 1: Geographical distribution of the French stations committed to GLOSS

Shom has been designed in 2010 by the French government as coordinator of the national in situ sea level observation. This led to the creation of REFMAR whose main mission is to:

- Collect sea level observations made by French public organizations and services;
- Manage and archive the observations collected as delayed mode data;
- Define the networks and minimum specifications for sea level observations;
- Define and promote appropriate means of operational transmission;
- Coordinate the real-time and delayed mode distribution;
- Control the quality of the observations received;
- Contribute to the definition of national and international standards;

In the past years, REFMAR has been contacting French sea level data producers to draw an inventory of all the French sea level stations operated by Port Authorities, Research institutes, universities, flood warning systems, local authorities, and so on. REFMAR pays particular attention to general data access and data policy conditions.

Through REFMAR website and meetings, Shom also aims to provide guidance and recommendations to producers and to promote state-of-the-art measurement practices. REFMAR has created a set of technical tutorials to describe how to install a tide staff, what a sea level observatory is, etc. Website has been modernized in 2024 and is available at the following link: https://refmar.shom.fr/en.

Technical days, organized every 4 years, help engage the French-speaking community. The next "Refmar days" will take place in 2026.

Figure 2: Participants at "Refmar Days" -2022, Brest

In February 2025, REFMAR distributed the data of 162 permanent tide gauges, including the 49 stations of the Shom tide gauge network RONIM. That is, 21 additional stations since the last report in 2022.

SONEL originally stands (in French) for Système d'Observation du Niveau des Eaux Littorales. That is, a research observation infrastructure whose basic activities are assembling, quality-controlling, and disseminating (www.sonel.org) high-quality measurements of sea and land levels at the coast from French continuously operating tide gauges and from a global (international) network of space geodetic stations (mainly composed of GNSS stations) at or near tide gauges.
SONEL also acts as the data assembly center for GLOSS regarding observations from GNSS stations co-located with tide gauges. The GNSS at Tide Gauge Activities are described in a dedicated report to this GLOSS Group of Experts.

GLOSS Id.	Station Name	Operator	Network
017	Pointe des Galets (Réunion Is.)	Shom	RONIM
021	Crozet	LEGOS/INSU	ROSAME (Temporarily disabled - 2014)
023	Kerguelen	LEGOS/INSU	ROSAME
024	Amsterdam St Paul	LEGOS/INSU	ROSAME (Temporarily disabled - 2023)
096	Dzaoudzi	Shom	RONIM (Temporarily dismantled - 2024)
123	Nouméa - Numbo	Shom	RONIM
131	Dumont d'Urville	LEGOS/INSU	ROSAME
138	Rikitea	Shom/DPAM	
140	Papeete Fare Ute (Tahiti)	UHSLC	
142	Nuku Hiva (Marquesas Is.)	UHSLC	
165	Clipperton	Shom	Non-permanent
202	Cayenne - Ile Royale (Fr. Guyana)	Shom	RONIM
338	Fort-de-France	Shom	RONIM
205	Marseille	Shom	RONIM
242	Brest	Shom	RONIM
260	Sao Tomé	LEGOS / IRD	Decommissioned
353	Leava - Futuna	Shom/DPAM	
354	Makemo	Shom/DPAM	
355	Rangiroa	Shom/DPAM	

356	Tubuai	Shom/DPAM	

Table 1: GLOSS stations on French territories

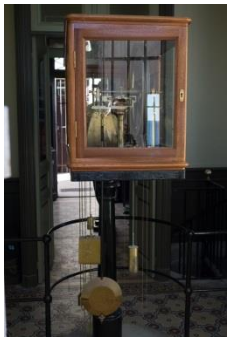
2 Status of French sea level stations committed to GLOSS

In 2021 and 2022, the RONIM network has undergone a major modernization: replacement of the data logger, installation of complete weather sensor (temperature, pressure, humidity), installation of GPRS transmission system. Since 2023, a remote supervision tool has helped improve the reliability of the RONIM network.

2.1 Atlantic Ocean & Mediterranean Sea

GLOSS 205: MARSEILLE

- **Operated by:** **IGN and Shom (RONIM TG Network).**
- **First observation:** **1849**
- **Last observation:** **Ongoing**
- **Contributing to:** **IOC- ICG/NEAMTWS, GLOSS**



- **Sensor:** Krohne Optiflex radar sensor. Legacy floating gauge is still operating.
- **Data transmission:** 1s to NEAMTWS + 1 min. real-time internet.
- **GNSS:** One GNSS station operational since July 1998.
- **Comment:** Manual controls several times a year by IGN. Modernization in February 2022.
- **Contact:** ronim@shom.fr
- **Other:** Creation in January 2021 of the non-profit association "les amis du marégraphe de Marseille" (the friends of the Marseille tide gauge) to promote the history and scientific interest of the observatory (https://amis-maregraphe-marseille.fr/).
  At the 19th Congress of the World Meteorological Organization (May-June 2023), the Marseille sea level station acknowledged as a centennial marine observing station and a long-term observing station (https://wmo.int/activities/centennial-observing-stations/centennial-observing-stations).

GLOSS 242: BREST

- **Operated by:** **Shom (RONIM TG Network)**
- **First observation:** **1846**
- **Last observation:** **Ongoing**
- **Contributing to:** **IOC – ICG/NEAMTWS, GLOSS**

- **Sensor:** Krohne Optiflex 1300C radar sensor
- **Data transmission:** 1s to NEAMTWS + 1 min. real-time internet.
- **GNSS:** One GNSS station operating continuously since 1998. The distance between the GNSS and the tide gauge is about 350 meters.
- **Comment:** Manual controls several times a year. Modernization in October 2020 (test site). Last maintenance and new data logger in 2024.
- **Contact:** ronim@shom.fr
- **Other:** The sea level station was opened to the public in July 2016 and July 2024 to coincide with the Brest International Maritime Festival.
  At the 19th Congress of the World Meteorological Organization (May-June 2023), the Marseille's sea level station designated as a centennial marine observing station and a long-term observing station.
  (https://wmo.int/activities/centennial-observing-stations/centennial-observing-stations)

GLOSS 338: FORT-DE-FRANCE, MARTINIQUE

- **Operated by:** **Shom (RONIM TG Network)**
- **First observation:** **1912 (continuous since 2005)**
- **Last observation:** **Ongoing**

- **Contributing to:** **IOC – ICG/CARIBE-EWS, GLOSS**

- **Sensor:** Krohne Optiwave radar since 2011
- **Data transmission:** 1 min. real-time GTS + internet.
- **GNSS:** One permanent GNSS station since 2011
- **Comment:** Routine maintenance by local partners. Modernization in November 2022. Complete control operations in January 2025.
- **Contact:** ronim@shom.fr

GLOSS 202: CAYENNE-ILE ROYALE-ILES DU SALUT, (French Guyana)

- **Operated by:** **Shom (RONIM TG Network)**
- **First observation:** **1896 (continuous since 2006)**
- **Last observation:** **Ongoing – data transmission issues (mission planned for February 2025)**
- **Contributing to:** **IOC – ICG/CARIBE-EWS, GLOSS**

- **Sensor:** Krohne Optiwave IX radar sensor
- **Data transmission:** 1 min. real-time GTS + internet.
- **GNSS:** Permanent GNSS station since 2013
- **Comment:** Routine maintenance by local partners. Modernization in May 2022. Complete control operations are planned for 2025.
- **Contact:** ronim@shom.fr

2.2 Indian Ocean & Antarctica

GLOSS 017: POINTE DES GALETS, LA REUNION

- **Operated by:** **Shom (RONIM TG Network)**
- **First observation:** **1900 (continuous since 2007)**
- **Last observation:** **Ongoing**
- **Contributing to:** **IOC – ICG/IOTWS, GLOSS**

- **Sensor:** Krohne Optiflex radar sensor
- **Data transmission:** 1 min. real-time GTS + internet.
- **GNSS:** No permanent GNSS station (due to the masking of the sky visibility). GNSS measurements performed during leveling operations
- **Comment:** Routine maintenance by local partners. Modernization in March 2022. Complete control in September 2024.
- **Contact:** ronim@shom.fr

GLOSS 096: DZAOUDZI, MAYOTTE

- **Operated by:** **Shom (RONIM TG Network)**
- **First observation:** **1962**
- **Last observation:** **Temporarily dismantled since the passing of Cyclone Chido (2024)**
- **Contributing to:** **IOC – ICG/IOTWS, GLOSS**
- **Sensor:** Krohne Optiflex radar sensor
- **Data transmission:** 1 min. real-time GTS + internet.
- **GNSS:** Permanent GNSS station since 2013
- **Comment:** Routine maintenance by local partners. Modernization in November 2021.
- **Contact:** ronim@shom.fr

2.3 South Indian Ocean

GLOSS-023: KERGUELEN

- **Operated by:** **LEGOS (ROSAME TG Network)**
- **First observation:** **First observation in 1959 continuous since 1993**
- **Last observation:** **Ongoing**
- **Contributing to:** **IOC – ICG/IOTWS, GLOSS**

- **Sensor:** KER3 (radar Krohne Optiwave) + KER2 (pressure + Krohne optiflex)
- **Data transmission:** 1 min. real time GTS and internet + 1h ARGOS for KER2
- **GNSS:** 1 co-located GNSS + 3 nearby GNSS + a DORIS station
- **Comment:** Tide pole readings and GNSS buoy sessions are made several times a year. KER2 optiflex sensor has been working properly again since January 2023. A GNSS-R installation was done in April 2024.
- **Contact:** philippe.techine@univ-tlse3.fr

GLOSS-021: CROZET

- **Operated by:** **LEGOS (ROSAME TG Network)**
- **First observation:** **1995**
- **Last observation:** **2013**
- **Contributing to:** **GLOSS**
- **Sensor:** **temporarily disabled** (previously pressure gauge)
- **Data transmission:** ARGOS
- **GNSS:** 1 GNSS nearby since 2014
- **Comment:** Station was lost to a storm in 2015. This site is particularly difficult to maintain and a relocation of the station is under study. A GNSS-R solution is envisaged. Installation is planned during the March-April 2025 field campaign.
- **Contact:** philippe.techine@univ-tlse3.fr

GLOSS-024: SAINT-PAUL

- **Operated by:** **LEGOS (ROSAME TG Network)**
- **First observation:** **1994**
- **Last observation:** **Temporarily disabled - 2023**
- **Contributing to:** **GLOSS**
- **Sensor:** Krohne radar sensor + bottom pressure
- **Data transmission:** ARGOS
- **GNSS:** Permanent GNSS station since 2011

- **Comment:** Bottom pressure gauge is out of order. A mission has been scheduled in March 2023 to remove the bottom pressure gauge to fix it and reinstall in 2025.The radar of the SPA2 station is working correctly
- **Contact:** philippe.techine@univ-tlse3.fr

GLOSS-131: DUMONT D'URVILLE

- **Operated by:** **LEGOS (ROSAME TG Network)**
- **First observation:** **1997**
- **Last observation:** **Ongoing**
- **Contributing to:** **IOC – ICG/IOTWS, GLOSS**
- **Sensor:** Bottom pressure gauge
- **Data transmission:** ARGOS and Ethernet
- **GNSS:** 3 nearby GNSS stations including GNSS-R
- **Comment:** Bottom pressure gauge was reinstalled in January 2022. A GNSS-R installation was done in January 2024.
- **Contact:** philippe.techine@univ-tlse3.fr

2.4 Pacific Ocean

GLOSS 165: CLIPPERTON (non-permanent)

- **First observation:** **2007**
- **Last observation:** **2012**
- **Contributing to:** **GLOSS**
- **Sensor:** None
- **Data transmission:** None
- **GNSS:** Episodic campaigns (2007, 2012 and 2015)
- **Comment:** Non-permanent station. Observation campaigns were carried out between 2007 and 2015.
- **Contact:** ronim@shom.fr

2.5 New Caledonia and Wallis-et- Futuna Islands

GLOSS 123: NOUMEA-NUMBO

- **Operated by:** **Shom (RONIM TG Network)**
- **First observation:** **1967**
- **Last observation:** **Ongoing**
- **Contributing to:** **IOC – ICG/PTWS, GLOSS**

- **Sensor:** Vega vegapuls C22 (since 2022)
- **Data transmission:** 1 min. real-time internet + GTS (since October 2022)
- **GNSS:** Permanent GNSS station since 2015
- **Comment:** Routine maintenance by Shom. Complete control operation in 2021. Modernization in April 2022.
- **Contact:** ronim@shom.fr

GLOSS 353: LEAVA, FUTUNA ISLAND

- **Operated by:** **Shom**
- **First observation:** **1986**
- **Last observation:** **Ongoing**
- **Contributing to:** **IOC – ICG/PTWS, GLOSS**

- **Sensor:** Vaisala QHR-104 radar sensor and Druck pressure sensor
- **Data transmission:** 1 min. real-time GTS.
- **GNSS:** Permanent GNSS station
- **Comment:** Station regularly visited by Shom technicians. Complete control operation in 2019.
- **Contact:** ronim@shom.fr

2.6 French Polynesia

The University of Hawaii maintains three stations in Rikitea, Papeete and Nuku Hiva.

GLOSS 138: RIKITEA

- **Operated by:** **Shom and DPAM**
- **First observation:** **1965**
- **Last observation:** **Ongoing**
- **Contributing to:** **IOC – ICG/PTWS, GLOSS**

- **Sensor:** Vaisala QHR-104 radar sensor and Druck pressure sensor
- **Data transmission:** 1 min. real-time GTS.
- **GNSS:** Permanent GNSS station since 2011
- **Comment:** A UHSLC tide gauge is installed nearly. Shom and DPAM station is regularly visited by Shom technicians and was controlled in September 2024.
- **Contact:** ronim@shom.fr

GLOSS 140: PAPEETE FARE UTE

- **Operated by:** **UHSLC**
- **First observation:** **1975**
- **Last observation:** **Ongoing**
- **Contributing to:** **IOC – ICG/PTWS, GLOSS**
- **Sensor**: Several sensors, including a Vegapuls 62 radar
- **Data transmission**: 1 min. real-time GTS.
- **GNSS**: A CNES permanent GNSS station co-located since 2003
- **Comment:** Last known control in January 2025 (UHSLC).

GLOSS 142: NUKU HIVA

- **Operated by:** **UHSLC**
- **First observation:** **1982**
- **Last observation:** **Ongoing**
- **Contributing to:** **IOC – ICG/PTWS, GLOSS**
- **Sensor:** Bubbler sensor, Vegapuls 62 radar and a Sutron RLR radar
- **Data transmission:** 1 min. real-time GTS.
- **GNSS:** Permanent GNSS station since 2011 (installed by Shom and UPF)
- **Comment:** Last known control in January 2025 (UHSLC).

GLOSS 354: MAKEMO

- **Operated by:** **Shom and DPAM**

- **First observation:** **1990 (permanent since 2013)**
- **Last observation:** **Ongoing**
- **Contributing to:** **IOC – ICG/PTWS, GLOSS**

- **Sensor:** Druck pressure sensor and a vegapuls C22 radar sensor
- **Data transmission:** 1 min. real-time GTS.
- **GNSS:** Permanent GNSS station co-located
- **Comment:** Regularly visited by Shom technicians. Last complete control operation in 2023.
- **Contact:** ronim@shom.fr.

GLOSS 355: RANGIROA

- **Operated by:** **Shom and DPAM**
- **First observation:** **1966 (permanent since 2009)**
- **Last observation:** **Ongoing – reinstalled 2023**
- **Contributing to:** **IOC – ICG/PTWS, GLOSS**

- **Sensor:** Druck pressure sensor and a vegapuls C22 radar sensor
- **Data transmission:** 1 min. real-time GTS.
- **GNSS:** Permanent GNSS station co-located
- **Comment:** Reinstalled in 2023. Regularly visited by Shom technicians. Last complete control operation in 2024. Modernization in Mai 2025.
- **Contact:** ronim@shom.fr

GLOSS 356: TUBUAI

- **Operated by:** **Shom and DPAM**
- **First observation:** **2009**
- **Last observation:** **Ongoing**
- **Contributing to:** **IOC – ICG/PTWS**

- **Sensor:** Druck pressure sensor and a vegapuls C22 radar sensor
- **Data transmission:** 1 min. real-time GTS.
- **GNSS:** Permanent GNSS station co-located
- **Comment:** Modernization in 2023.
- **Contact:** ronim@shom.fr

3 GLOSS requirements & the French stations

The table below provides a synthetic overview of the station status regarding the GLOSS requirements for core stations (IOC 2012).

Station	Type	Digital	Precision	Control	Meteo	Last Levelling	GNSS	Real-time
La Réunion	Radar	Yes	1cm	Semestrial	Pressure, temperature, humidity	2024	No	GPRS + GTS
Crozet	Pressure	Yes	1cm	<Annual	Pressure	2022	Yes	ARGOS (**disabled)**
Kerguelen	Pressure Radar	Yes	<1cm	Monthly	Pressure	2022	Yes	ARGOS ADSL GTS
Amsterdam St Paul	Pressure Radar	Yes	<1cm	Annual	Pressure	2019	Yes	ARGOS
Dzaoudzi	Radar	Yes	1cm	Semestrial	Pressure, temperature, humidity	2024	Yes	GPRS + GTS
Nouméa - Numbo	Radar	Yes	1cm	Semestrial	Pressure, temperature, humidity	2021	Yes	GPRS + GTS
Dumont D'Urville	Pressure	Yes	1cm	Annual	Pressure	2019	Yes	ARGOS ADSL
Rikitea	Radar Pressure	Yes	1cm	SHOM/ DPAM		2023	Yes	GTS
Papeete	Radar Pressure	Yes	1cm	UHSLC		2019 (last known)	Yes	GTS
Nuku Hiva	Radar	Yes	1cm	UHSLC		2016	Yes	GTS
Clipperton	Pressure 2005, 2006-2008, 2011-2012	Yes	5cm	Annual	model	2015	No	No
Ile Royale	Radar	Yes	1cm	Semestrial	Pressure, temperature, humidity	2024	Yes	GPRS + GTS
Fort-de-France	Radar	Yes	1cm	Semestrial	Pressure, temperature, humidity	2015 (planned in 2025)	Yes	GPRS + GTS
Marseille	Radar Float	Yes	1cm	Semestrial	Pressure, temperature, humidity	2023	Yes	GPRS
Brest	Radar	Yes	1cm	Semestrial	Pressure, temperature, humidity	2024	Yes	GPRS
Leava, Futuna Island	Radar Pressure	Yes	1cm	Annual	Pressure	2022	Yes	GTS
Makemo	Radar Pressure	Yes	1cm	Annual	Pressure	2023	Yes	GTS
Rangiroa	Radar Pressure	Yes	1cm	Annual	Pressure	2023	Yes	GTS
Tubuai	Radar Pressure	Yes	1cm	Annual	Pressure	2023	Yes	GTS

4 Access to tide-gauge and GNSS data

The website (www.data.shom.fr) provides a data portal that collects and distributes high frequency tide gauge data from all the different French sea level producers. Different levels of data (raw, real time, validated, etc.) are available on the portal. For GLOSS applications, hourly sea level data from the French stations committed to GLOSS are provided directly to the University of Hawaii Sea Level Centre (UHSLC). Mean sea levels and GNSS data at the tide gauges are available at SONEL (www.sonel.org) which also acts as IGS/TIGA data center and as GLOSS data assembly center for GNSS at tide gauges. Through SONEL (www.sonel.org), mean sea levels are also provided to the PSMSL (www.psmsl.org)

The table below provides links to main data sources of French GLOSS stations.

GLOSS ID	**Station**	Status (February 2025)	Shom Real-time + Research Quality	IOC	SONEL	GNSS data
17	La Réunion	OK	http://data.shom.fr/donnees/refmar/110	http://www.ioc-sealevelmonitoring.org/station.php?code=reun	https://www.sonel.org/?page=maregraphe&idStation=1827	-
21	Crozet	Temporarily disabled	https://data.shom.fr/donnees/refmar/173	-	https://www.sonel.org/?page=maregraphe&idStation=1752	https://www.sonel.org/?page=gps&idStation=3452
23	Kerguelen	OK	https://data.shom.fr/donnees/refmar/23	http://www.ioc-sealevelmonitoring.org/station.php?code=kerg	https://www.sonel.org/?page=maregraphe&idStation=1780	https://www.sonel.org/spip.php?page=gps&idStation=710
24	Amsterdam St Paul	Temporarily disabled	https://data.shom.fr/donnees/refmar/194	http://www.ioc-sealevelmonitoring.org/station.php?code=stpa	https://www.sonel.org/?page=maregraphe&idStation=1837	https://www.sonel.org/?page=gps&idStation=3093
96	Dzaoudzi	KO	https://data.shom.fr/donnees/refmar/30	http://www.ioc-sealevelmonitoring.org/station.php?code=dzao	https://www.sonel.org/?page=maregraphe&idStation=1903	https://www.sonel.org/?page=gps&idStation=3428
123	Nouméa - Numbo	OK	https://data.shom.fr/donnees/refmar/659	http://www.ioc-sealevelmonitoring.org/station.php?code=numb2	https://www.sonel.org/?page=maregraphe&idStation=1863	https://www.sonel.org/?page=gps&idStation=3551
131	Dumont d'Urville	OK	https://data.shom.fr/donnees/refmar/108	http://www.ioc-sealevelmonitoring.org/station.php?code=dumo	https://www.sonel.org/?page=maregraphe&idStation=1756	https://www.sonel.org/?page=gps&idStation=4169
138	Rikitea	OK	https://data.shom.fr/donnees/refmar/43	http://www.ioc-sealevelmonitoring.org/station.php?code=gamb	https://www.sonel.org/?page=maregraphe&idStation=3410	https://www.sonel.org/?page=gps&idStation=3418
140	Papeete	OK	https://data.shom.fr/donnees/refmar/383	http://www.ioc-sealevelmonitoring.org/station.php?code=pape	https://www.sonel.org/?page=maregraphe&idStation=1820	https://www.sonel.org/?page=gps&idStation=809
142	Nuku Hiva	OK	https://data.shom.fr/donnees/refmar/795	http://www.ioc-sealevelmonitoring.org/station.php?code=nuku	https://www.sonel.org/?page=maregraphe&idStation=2257	https://www.sonel.org/?page=gps&idStation=2267
165	Clipperton	No permanent TG	https://data.shom.fr/donnees/refmar/797	-	https://www.sonel.org/?page=maregraphe&idStation=2853	-
202	Ile Royale	KO	https://data.shom.fr/donnees/refmar/749	http://www.ioc-sealevelmonitoring.org/station.php?code=iler	https://www.sonel.org/?page=maregraphe&idStation=1867	https://www.sonel.org/?page=gps&idStation=3414
338	Fort-de-France	OK	https://data.shom.fr/donnees/refmar/126	http://www.ioc-sealevelmonitoring.org/station.php?code=ftfr	https://www.sonel.org/?page=maregraphe&idStation=1764	https://www.sonel.org/?page=gps&idStation=3220
205	Marseille	OK	https://data.shom.fr/donnees/refmar/524	http://www.ioc-sealevelmonitoring.org/station.php?code=mars	https://www.sonel.org/?page=maregraphe&idStation=1802	https://www.sonel.org/?page=gps&idStation=735
242	Brest	OK	https://data.shom.fr/donnees/refmar/3	http://www.ioc-sealevelmonitoring.org/station.php?code=bres	https://www.sonel.org/?page=maregraphe&idStation=1736	https://www.sonel.org/?page=gps&idStation=642
353	Leava, Futuna Island	OK	https://data.shom.fr/donnees/refmar/501	http://www.ioc-sealevelmonitoring.org/station.php?code=futu	https://www.sonel.org/?page=maregraphe&idStation=3112	https://www.sonel.org/?page=gps&idStation=3385
354	Makemo	OK	https://data.shom.fr/donnees/refmar/586	http://www.ioc-sealevelmonitoring.org/station.php?code=make	https://www.sonel.org/?page=maregraphe&idStation=3416	https://www.sonel.org/?page=gps&idStation=3417
355	Rangiroa	OK	https://data.shom.fr/donnees/refmar/78	http://www.ioc-sealevelmonitoring.org/station.php?code=rangi	https://www.sonel.org/?page=maregraphe&idStation=2259	https://www.sonel.org/?page=gps&idStation=2269
356	Tubuai	OK	https://data.shom.fr/donnees/refmar/113	http://www.ioc-sealevelmonitoring.org/station.php?code=tubua	https://www.sonel.org/?page=maregraphe&idStation=2258	https://www.sonel.org/?page=gps&idStation=2268

In order to help sea level data providers, data aggregators and data users to visualize available tide gauge datasets we have developed an online tool called TGCAT available at www.sonel.org/tgcat. It is aimed to improve data referencing and discoverability in the global tide gauge data centers. The code has been fully developed in Python and is open-source.

5 Data rescue / Data Archaelogy activities

In France, systematic sea level observations by mechanical tide gauge started in the mid-1800s. Within SONEL framework, an extensive work is undertaken at Shom, aiming at recovering the French scientific and cultural heritage on sea level observations. This initiative fulfills the recommendations of GLOSS on the recovery of forgotten sea level measurements.

Data rescue performed at Shom firstly implies to inventory documents related to water level measurement (marigrams, ledgers): more than **70.000 documents** have been identified and inventoried, and about 70% have already been scanned, but thousands of documents still remain to inventory and scan. These old tide gauge measurements are mainly related to French ports (about 300 sites with a total of about 1,000 years of cumulated sea level measurements) but also to locations around the world (about 240 sites with a total of about 470 years of cumulated sea level measurements). Time-series duration may vary from days/weeks/months (observations for hydrographic purpose) to several decades. Longest time series can be used to assess long-term sea-level evolution and shorter datasets could be used to quantify historical storm surges if occurred during measurements, allowing the improvement of estimation and prediction of extreme coastal water levels.

Shom updates the results of the inventories on the following link: https://refmar.shom.fr/data-archaeology/liste-inventaire.

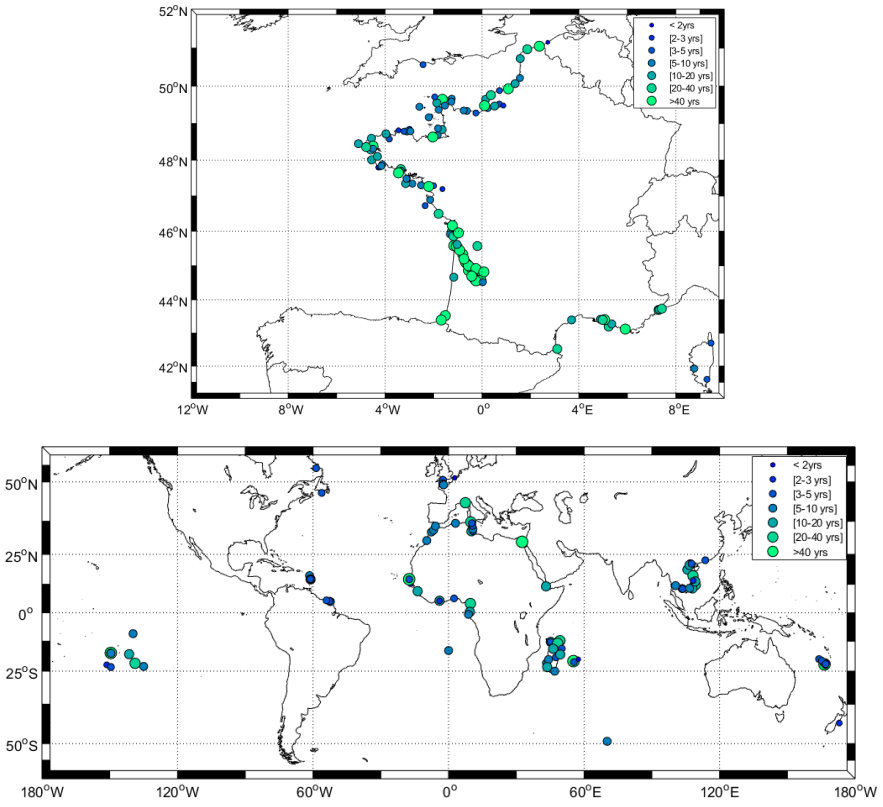


Figure 3: State of the inventory of Shom archives

To date, approximately ten sea-level time series reconstructions have been completed, five are currently in progress (Port-Bloc, Pauillac, Bordeaux, Cherbourg and Le Havre) and work is set to continue until 2028.