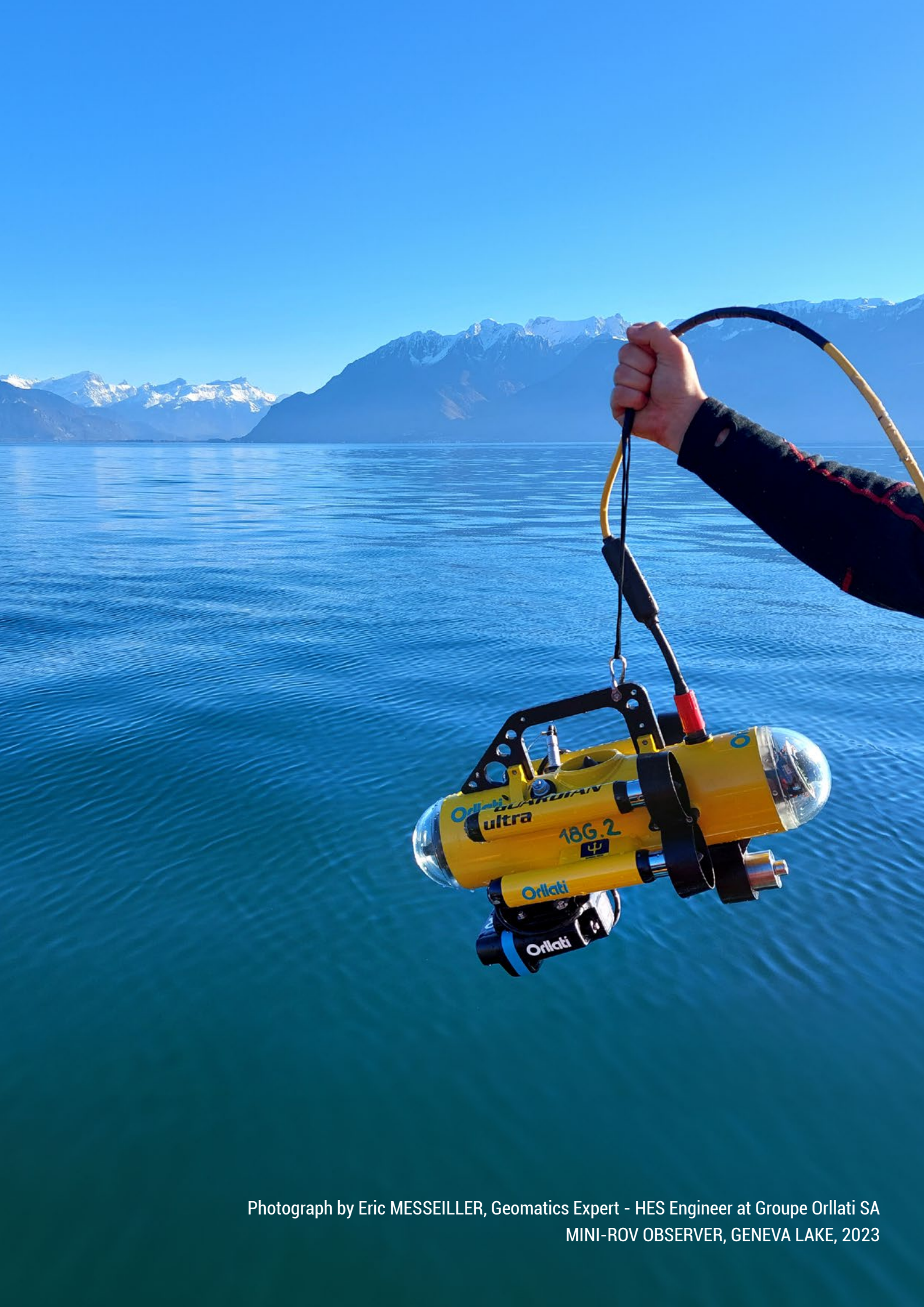


the SUBSEA observer

Subsea Tech Magazine // Issue #23 – January 2024



SUBSEA TECH
Marine and Underwater Technologies



Photograph by Eric MESSEILLER, Geomatics Expert - HES Engineer at Groupe Orllati SA
MINI-ROV OBSERVER, GENEVA LAKE, 2023



Dear customers, partners and friends,

The whole Subsea Tech team joins me in wishing you an excellent year 2024, full of projects and success.

For our part, after a good year 2023, we foresee an even better year 2024, full of new projects, particularly in the field of bathymetric surveys and the inspection of structures in France and Export. No new products in sight but a new and even improved version of our USV SeaCat as part of our European SeaClear 2.0 project and the migration of all our old analog systems, mini ROVs and video cameras to IP versions. We are also accelerating digitalization within the company, particularly for the safer and more efficient management of inspection data.

Hoping to have the pleasure of seeing you again this year in our premises, on site or at trade shows, receive our best wishes again for 2024.

Yves Chardard
CEO of Subsea Tech

Contents

TECHNICAL GUIDE | page 4

The Mini TORTUGA HYDRO

RETURN FROM MISSION | page 6

Wind turbine inspection

Long distance tunnel inspection

Data collection in the Loiret

WORLD TOUR | page 12

A selection of our 2023 exports

FOCUS | page 18

Preserving Marseille's calanques

EVENT | page 20

OFFICE LIFE | page 21

The Mini TORTUGA HYDRO

THE UNDERWATER TECHNOLOGICAL REVOLUTION OF 2023!



The **Mini TORTUGA HYDRO** represents a major step forward in the field of underwater inspection. Specifically designed to operate with [IVM Technologies'](#) HYDRO 300 system, this ultra-compact underwater robot offers sub-millimetre-precision 3D reconstruction capabilities, ideally suited to the exploration of engineering structures, offshore infrastructures and metrology work. Equipped with a pitch and roll control system thanks to its 4 vertical thrusters, it ensures optimal viewing angles for the photogrammetry sensor. Equipped with two adjustable full HD cameras, remote-controlled lighting devices and a multi-beam imaging sonar, this machine enables

very high quality video, acoustic and photogrammetric acquisitions.

The HYDRO 300 system enables the creation of submillimeter 3D models for a variety of applications, such as measuring deformation, corrosion or wear of cofferdam rails or mooring chains, spool metrology or corallogenic mass growth measurements. The data collected is post-processed to generate 3D models that can be visualized using open-source software.



3D CORAL RECONSTRUCTION

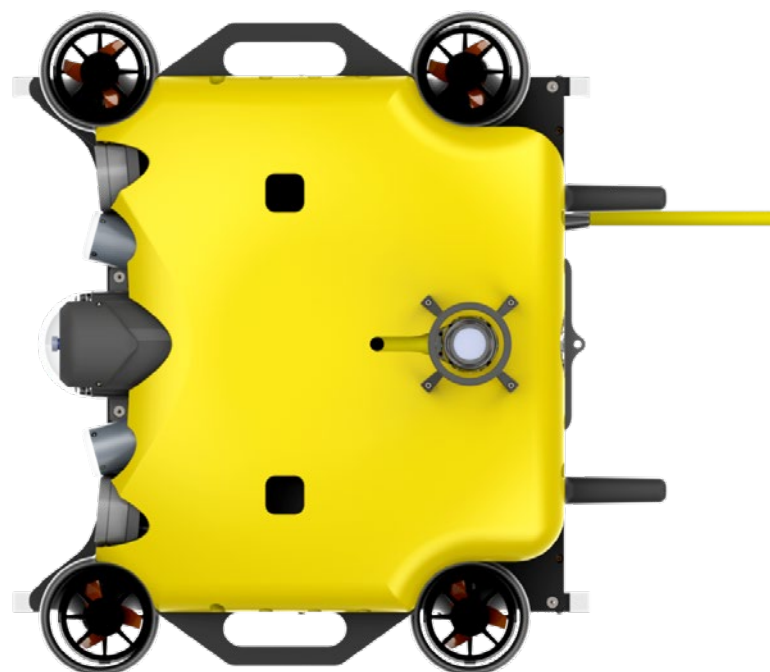


3D CHAIN RECONSTRUCTION

TECHNICAL GUIDE

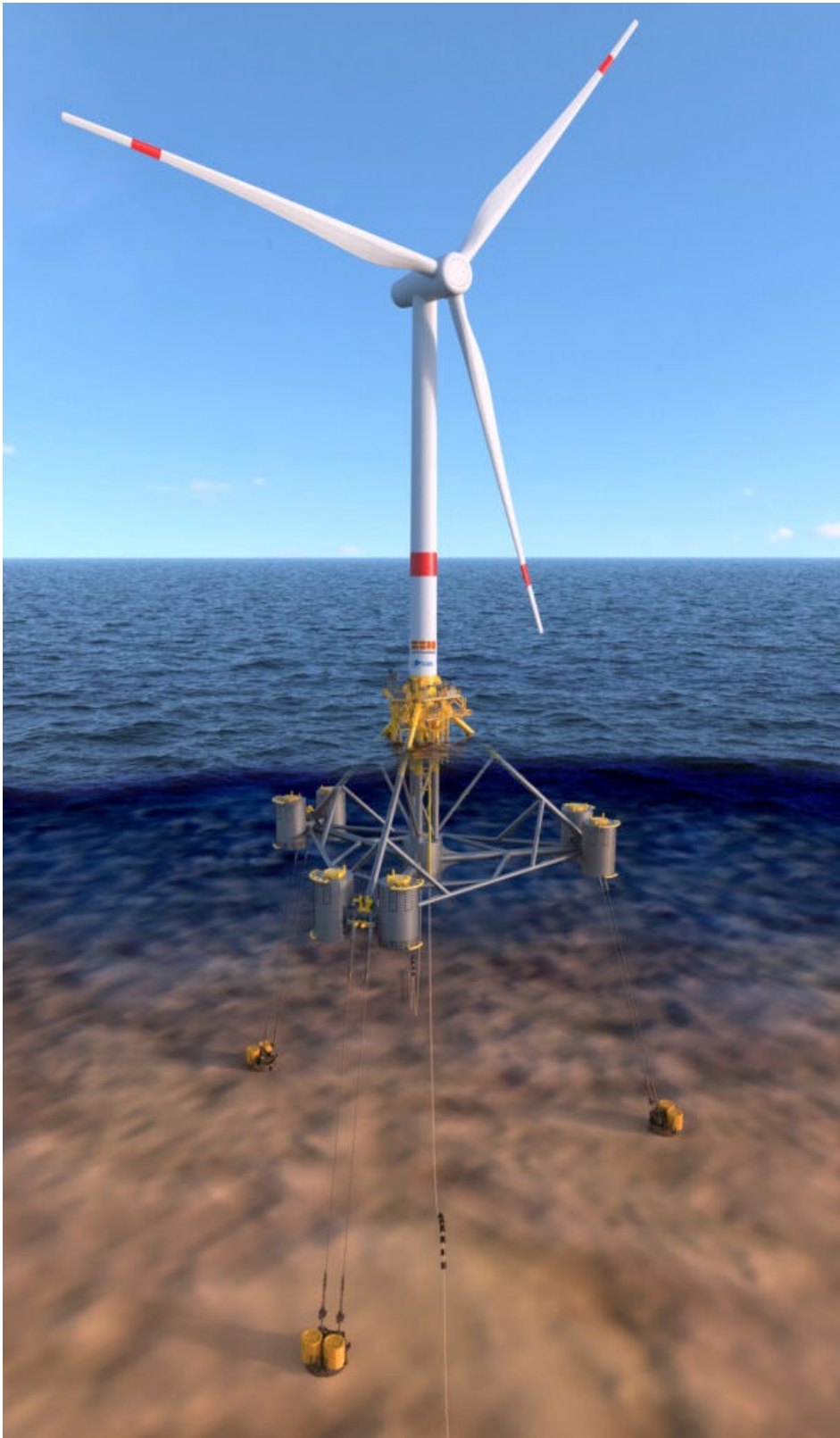
The Mini TORTUGA HYDRO stands out for its ability to recreate large-scale models with extreme precision and without the need for an external positioning system. It features 4 LEDs with an intensity of 100,000 strobe lumens, ensuring optimum lighting of the scene, even in semi-turbid environments. Its high frame rate and wide camera angle guarantee fast, complete coverage of the areas to be modeled.

To sum up, the Mini TORTUGA HYDRO is a revolutionary, ultra-compact tool (45 kg) designed for 3D modeling and underwater metrology operations, including in turbid environments and on large-scale structures, but without compromising on the quality and accuracy of the data collected. ■



3D RECONSTRUCTION OF A COFFERDAM RAIL

The Provence Grand Large project: a world first off the coast of Marseille



A pilot project with 3 floating wind turbines installed 17 km off the coast of Port-de-Bouc, near Marseille, the Projet Provence Grand Large (PGL) is the first floating wind farm to use tension line anchors.

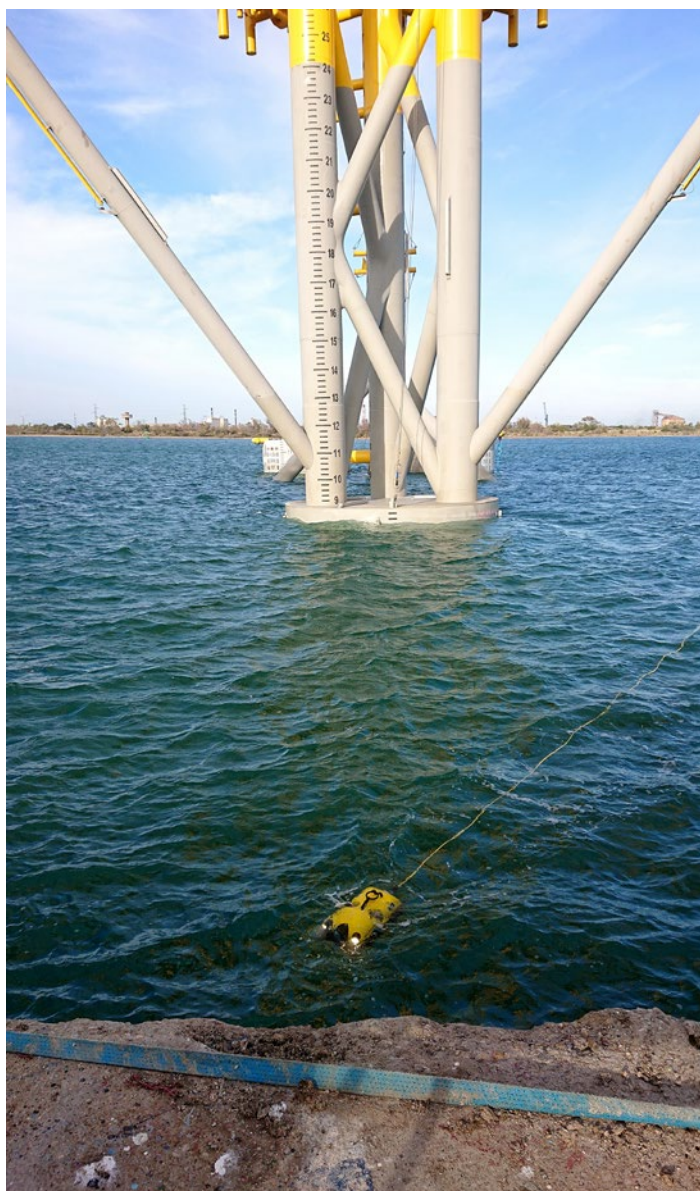
The major innovation of SBM Offshore and IFP Energies Nouvelles' tension line and suction line anchors minimizes the impact on the seabed, while offering the possibility of installing these structures in deep water (already 100 m on PGL), in contrast to so-called «land-based» wind turbines. Furthermore, the concept of submerged floats significantly reduces the impact of swell, compared with solutions using surface floats.

The wind turbines, installed in the third quarter of 2023 by SBM Offshore and operated by EDF Renouvelables, have a capacity of around 25 MW thanks to the 3 8.4 MW, and will satisfy the annual consumption of 45,000 people fully equipped with electricity.

Contracted by SBM Offshore, Subsea Tech carried out successive underwater inspections of the 3 float units, in order to ensure the integrity of the structures and the absence of obstacles and logjams before towing them to the site.

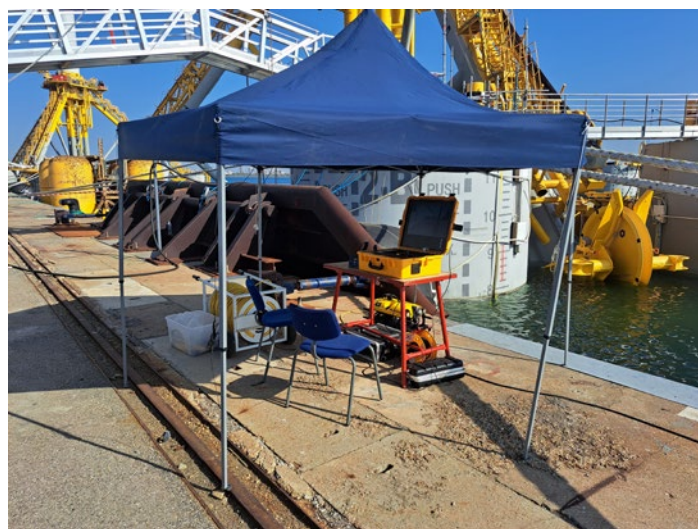
To this end, Subsea Tech mobilized 2 operators and an ultra-compact ROV Mini TORTUGA (< 20 kg) that can be deployed manually by a single person, and is powerful enough to carry out the entire inspection from the quayside.

Thanks to its 4 steerable horizontal thrusters and 8 kg payload capacity, it can carry various sensors and tools such as imaging sonar, an acoustic positioning system, thickness measurement and cathodic protection probes, and a cleaning brush, making it a complete tool for inspecting submerged structures at depths of up to 300 m and currents of up to 2 knots.



Equipped with two steerable Full HD cameras with imaging processing, and powerful lighting (4x10,000 lumen), it captures high-quality images, even in turbid or poorly-lit waters. These features make the Mini TORTUGA a practical, high-performance tool, ideal for in-depth inspections in challenging marine environments.

For reference, all the equipment, including tent and table for the control station, could be mobilized in the boot of a commercial Renault Clio.



As for the Tortuga ROV, its big brother weighing 40 kg, with its 47 kg thrust and its ability to withstand up to 3 knots of current, it is a candidate for repeating these inspections in open seas, with its added photogrammetry and high-resolution bathymetry capabilities. ■



Subsea Tech and the SEMM revolutionize long-distance tunnel inspection in Marseille Metropole



For the past three years, Subsea Tech has been carrying out inspection campaigns on behalf of SEMM (Marseille Metropole Water Company) on the Marseille canal's «souterrains» between Lac du Réal and the city of Marseille, 3 galleries each 6 m high by 4 m wide and almost 4 km long.

The objective: to control the integrity of the structures and detect any faults, such as falling rocks, a task made all the more complex by the length and difficulty of access to the tunnels.

An innovative piece of equipment has been developed to carry out these sensitive missions. The NAVIGOH is an autonomous surface robot equipped with a 4K camera with a 180° aperture angle for out-of-water vault inspections, as well as a Blueprint Oculus 750D acoustic camera and an Imagenex 815A profiling sonar for 3D reconstructions of submerged sections.

To maximize the visible part

out of the water, as underwater visibility is almost non-existent, the level of the canal was lowered to less than 1 m, leaving most of the structure uncovered.

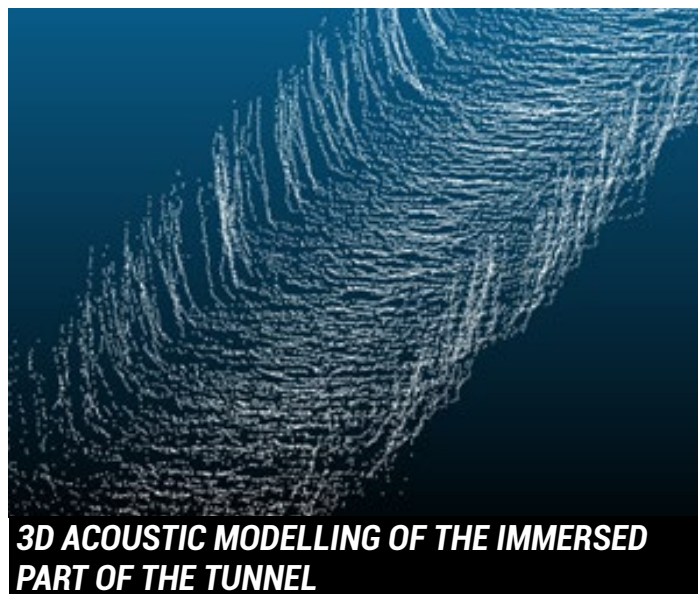
Thanks to its ingenious design, this robot enables simultaneous inspections of the above- and below-water parts of the structure, thus avoiding the need to empty the canal and human intervention in the hostile environment represented by the long lengths of the galleries.

The development of the NAVIGOH is the fruit of a collaboration between Subsea Tech and SEMM, the latter providing both a detailed expression of the need and an excellent knowledge of its structures.

Devoid of any propulsion system, the NAVIGOH is dropped into the current upstream of the tunnel and held in place by a 2 mm diameter Dyneema cable and a motorized winch, enabling inspections up to 5000 m in length. A winch-mounted odometer keeps track of the robot's position at all times, with near-metric precision. The cable and winch also enable the NAVIGOH's descent speed to be controlled at a constant value of around 0.5 m/s, and the machine to be recovered at the end of the mission.

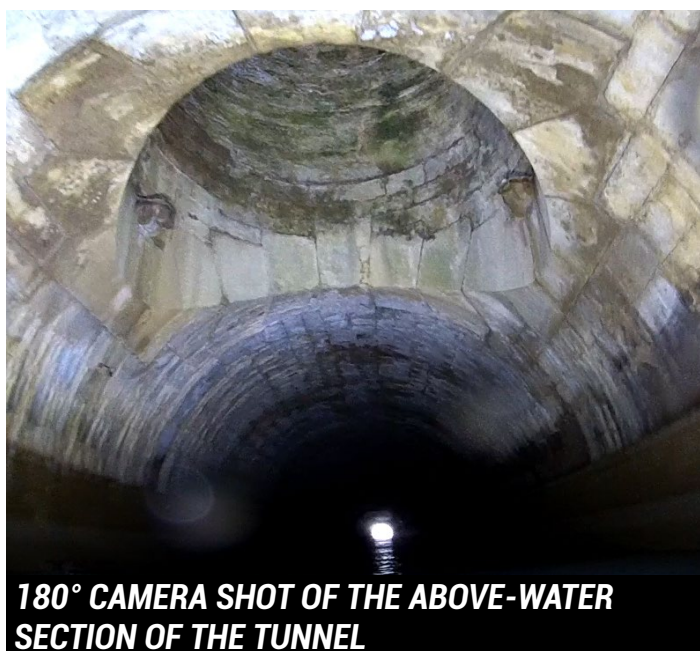
On-board batteries ensure that the NAVIGOH's equipment, including cameras, lighting, sonar and recorders, can operate for up to 4 hours - twice the time needed to inspect 4 km.

Before developing this solution, SEMM had to drain the canal and carry out manual inspections by walking several kilometers, using flashlights. This method, in addition to being risky for the technicians, caused major interruptions to the water supply for the inhabitants served by these canals.



3D ACOUSTIC MODELLING OF THE IMMERSED PART OF THE TUNNEL

With this innovation, Subsea Tech marks a significant turning point in the maintenance and inspection of long-distance tunnels, offering a compact, highly economical, efficient and safe solution to ensure the long-term survival of underground hydraulic networks. ■



180° CAMERA SHOT OF THE ABOVE-WATER SECTION OF THE TUNNEL

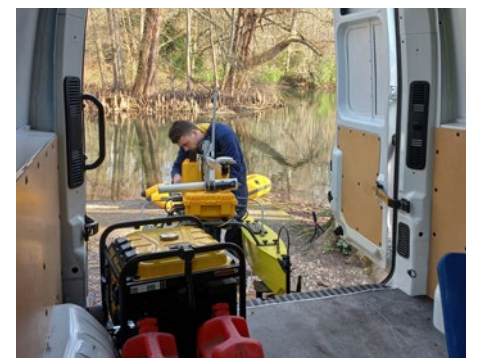
Searching for resurgences in the Loiret river



The french geological and mining research institute (BRGM) recently commissioned Subsea Tech to carry out an original operation: the search for spring water resurgences in the bed of the Loiret river.

This data collection focused on several objectives:

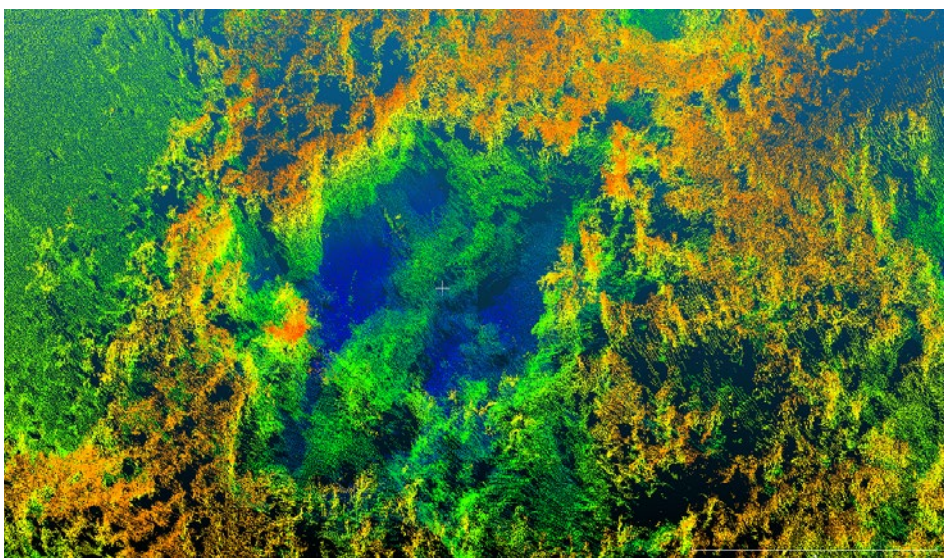
- The detection and precise location of freshwater resurgences, key to understanding local water dynamics.
- Detailed acquisition of bathymetric data to a depth of less than 0.5 m.
- Topographic mapping of riverbanks for reconciliation with the riverbed.
- Measure the physico-chemical characteristics of the water column, a vital component of the river ecosystem.



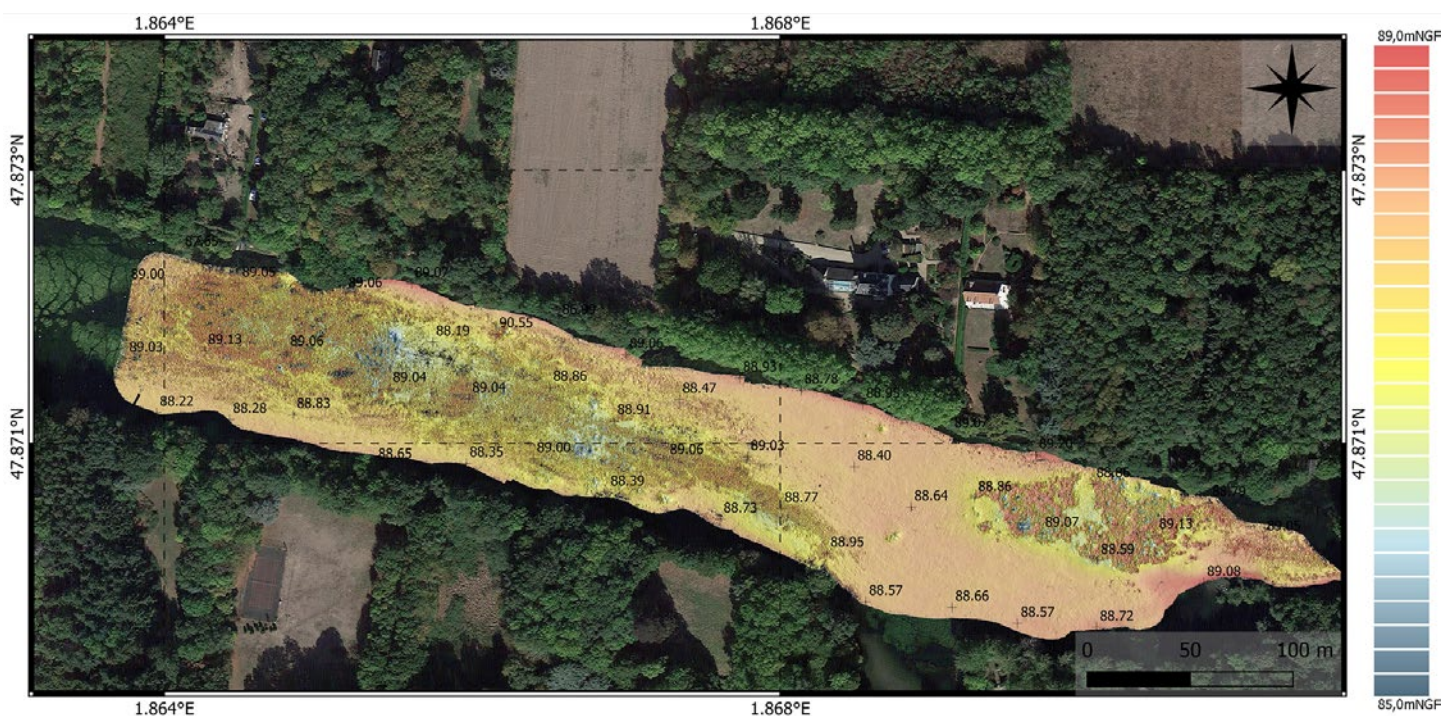
Our equipment deployed in the field for this mission:

- The Catarob USV, Subsea Tech's autonomous aquatic vehicle, with its compact dimensions of 1m80 for 50kg, but equipped with a 15kg payload, was the central element of this operation. Battery-powered, it has an autonomy of up to 4 hours, guaranteeing continuous daytime data collection with a spare battery pack. Designed specifically for inspection missions in inland waters with a draught of less than 0.3 m, it proved ideal for such an environment.
- The NORBIT multibeam echosounder, Blueprint Oculus M750d 2D acoustic camera and Velodyne Puck Lidar were integrated very quickly thanks to Catarob's open architecture.
- Real-time visualization of sensor data by operators and customers on the riverbank enabled the mission to be steered in real time.

This operation took two full days to cover the entire Tacreniers basin, resulting in precision bathymetric surveys. These surveys not only produced a detailed representation of the site, but also revealed the presence of several underwater resurgences, enriching our understanding of this river ecosystem. The combination of high-resolution bathymetric sonar and 2D imaging sonar made it possible to detect and locate these bottom anomalies, which have a volume of less than a soup plate. ■



3D VISUALIZATION OF A DETECTED SOURCE



2D BATHYMETRIC MAP OF THE TACRENIERS BASIN



PORTUGAL

EDP strengthens its expertise in the inspection of its hydraulic infrastructures with the acquisition of the Mini TORTUGA ROV

In its ongoing quest to improve its operations and strengthen its leadership in the energy sector, **EDP** (Energias de Portugal) has taken another step forward by acquiring the Mini TORTUGA ROV this year.

This state-of-the-art equipment will be used to inspect the company's hydraulic infrastructure, marking a strategic investment for the Portuguese energy company.

In partnership with [Casco Antiguo](#), our agents in Spain and Portugal, EDP's team of experts received a 3-day training course on the operation and optimal use of the ROV and its various options.

The Mini TORTUGA can be operated at up to 300 m deep. Its design, closely derived from the Tortuga ROV, gives it remarkable hydrodynamic efficiency while featuring a lighter, more compact structure. Each of the four horizontal thrusters delivers 5.0 kgf of thrust and can be manually steered in specific configurations, such as vector, in-line or sideways. This adaptability allows the ROV to manoeuvre without difficulty in currents of up to 3 knots, regardless of their direction.



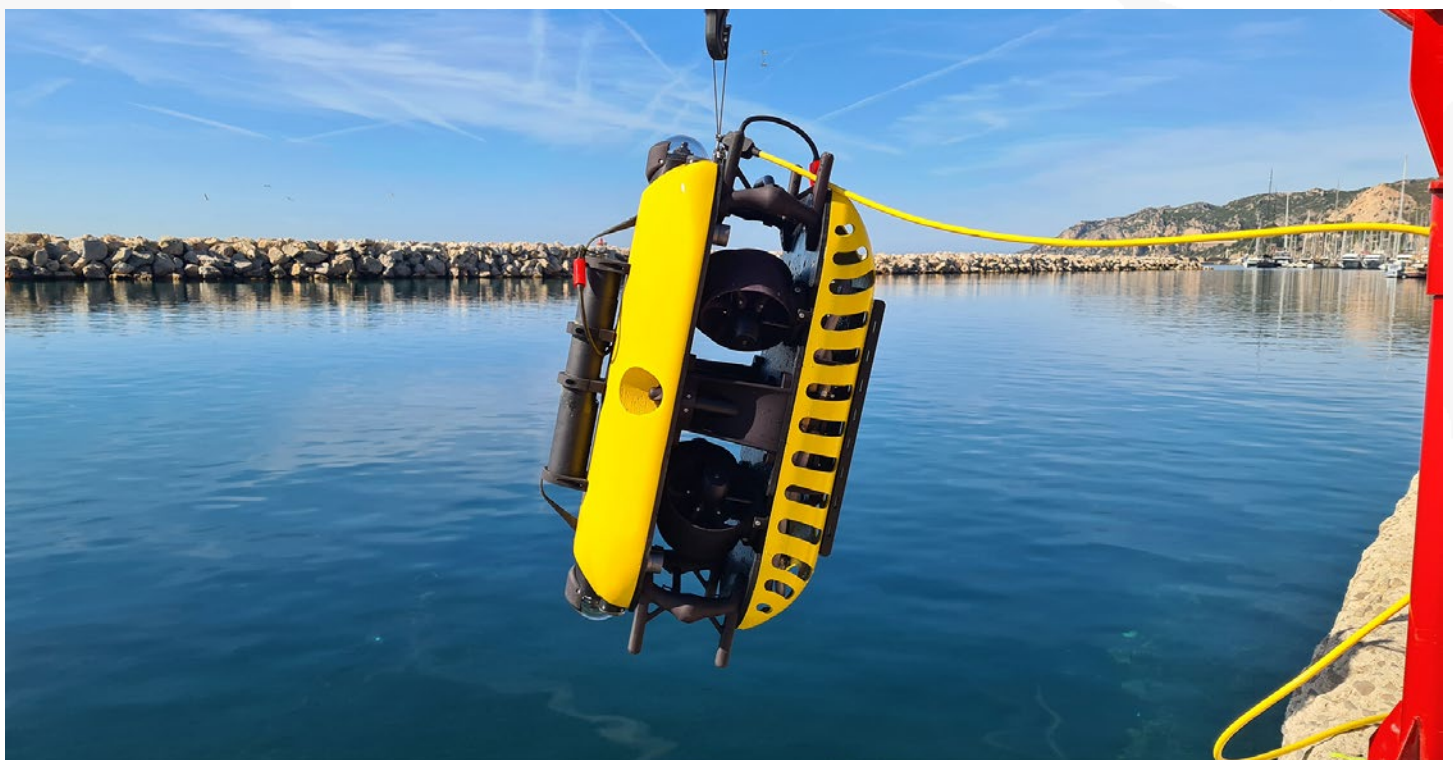
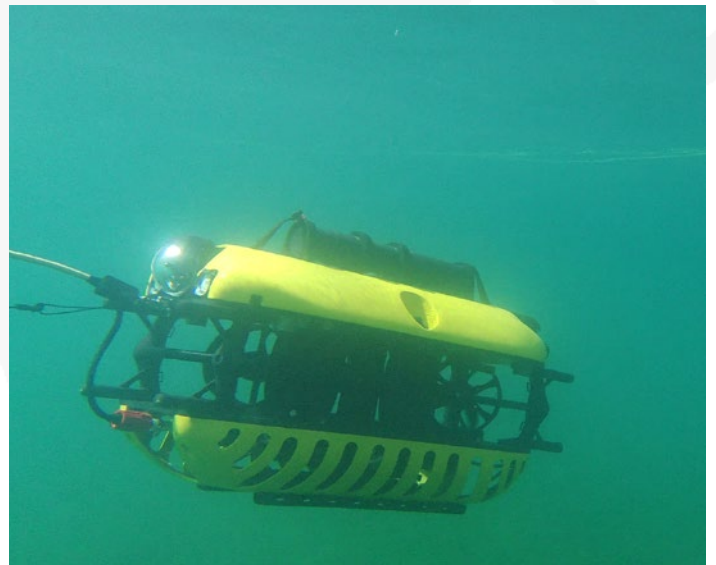


INDONESIA

Hydronav Services, leader in subsea technologies, invests in a Subsea Tech Tortuga ROV for the Indonesian Navy

Jakarta-based **Hydronav Services**, specialized in underwater surveying, mapping and survey solutions, recently acquired a Tortuga ROV for one of its customers, the Indonesian Navy, consolidating its commitment to providing high-performance solutions.

The ROV Tortuga STD, an underwater robot designed for inspections in hostile environments, can operate at depths of up to 500 m and currents of up to 3.5 knots. It is equipped with four horizontal thrusters, each capable of delivering 17 kgf of thrust. This capability enables it to move with agility and precision, even in high-current environments.





SOUTH AFRICA

The University of Cape Town acquires a surface drone for aquatic exploration

The **University of Cape Town** (UCT), renowned for its academic excellence and advances in various fields of research, has recently added a Catarob USV to its scientific arsenal, designed for exploration of shallow aquatic environments, both on the surface and underwater.

Weighing just 50 kg, the Catarob is a versatile drone capable of being remotely operated or operating autonomously. Its open design enables virtually unlimited sensor integration, thanks to high-speed PC-to-PC communication. The university is porting the control software from Linux to Windows, with the support of Subsea Tech.





ROMANIA

Aliant supplies the University of Bacău with an Observer Mini-ROV for underwater research

The **University of Bacău**, via our agent **Aliant**, recently acquired an Observer MAX for its underwater research.

This portable Mini-ROV can dive up to 150 m, equipped with two high-resolution cameras. Self-sufficient in energy for up to 4 hours thanks to its NiMH batteries, which can be transported by air, it can integrate various sensors and tools such as imaging sonars, multi-parameter probes or manipulators.

This ultra-portable equipment is a real asset for underwater research at the University.





UNITED KINGDOM

Franklin Hodge Industries Ltd acquires an AspiROV from Subsea Tech to perform maintenance of its storage tanks without a diver

Franklin Hodge Industries Ltd, a leading UK storage tank manufacturer, recently invested in an innovative AspiROV from Subsea Tech. The device, specially designed for the inspection and cleaning of industrial, fire and drinking water storage tanks, represents a significant advance in the sector.

The AspiROV allows a single operator to manage both the inspection and cleaning of tanks in open water. Equipped with a ballast system, it can overcome potential obstacles, facilitating operations in these complex environments.

An evacuation of sucked deposits via a hose and an external pump enables a complete cleaning process without the need for an intermediate tank outlet.

The AspiROV helps to optimize maintenance operations and improve service quality in the storage tank sector, by carrying out inspection and cleaning in open water, without emptying the tanks.





Ideal for: hull inspection, marine structures and offshore platforms

Smart Underwater Inspection

Cygnus Underwater Ultrasonic Thickness Gauge is designed for divers undertaking ultrasonic thickness measurement of underwater structures

- 3 measuring modes for levels of corrosion, various materials and through-coat measurements
- Depth sensor - live depth display providing the diver with an accurate depth indicator
- Live A-Scans aid visual measurement verification
- Extremely Simple-to-Use with 3 function keys and up to 4 screens
- Comprehensive data-logging: linear and grid
- Deep Coat function ignores thick coatings

Coming soon



JOIN OUR PRIORITY LIST

Visit cygnus-instruments.com



TRANSFORM YOUR CAPABILITY

REAL-TIME IMAGING IN ALL CONDITIONS

Oculus Multibeam Imaging Sonars

High resolution imaging in turbid water for improved situational awareness and target identification. Available in 375kHz to 3.0MHz. Depth rated to 500m, 1000m, or 4000m.



www.blueprintsubsea.com
enquiries@blueprintsubsea.com

FOCUS :

MARINE AND UNDERWATER DRONES TO PRESERVE MARSEILLE'S CALANQUES

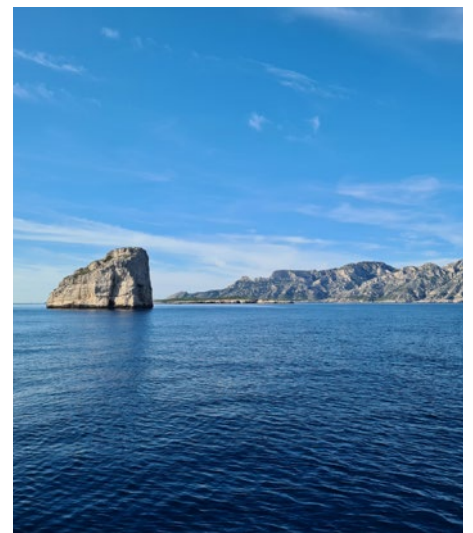
These unique natural formations, stretching along the Mediterranean coast between Marseille and Cassis, are renowned for their exceptional biodiversity...



A major initiative has been launched in Marseille to support the preservation of the calanques, internationally-renowned coastal treasures, through the innovative use of marine and underwater drones.

A national park since 2012, Marseille's calanques represent a fragile ecosystem, requiring constant monitoring and preservation in the face of multiple anthropic pressures and climate change.

It is against this threatening backdrop that the Call for Expressions of Interest (AMI) organized by the Pôle Mer Méditerranée and Optitec competitiveness clusters, and financially supported by the Région Sud and the Aix Marseille Metropole, sought to identify marine and underwater drone solutions to better understand and protect this precious habitat.



Marine and underwater drones are invaluable tools for this task. Their versatility enables a variety of actions such as ecosystem observation and mapping, automated species identification, measurement of physico-chemical water parameters, as well as exploration of the seabed to depths that are difficult for divers to access.

In response to this call, Subsea Tech proposed its SeaCAT USV, an integrated solution for monitoring and exploring the seabed, which can be operated without the presence of operators at sea. The vehicle, measuring 6.8 m by 3.2 m, offers a seven-day autonomy and a payload capacity of up to 250 kg. The SeaCAT is capable of deploying an ROV, such as the Mini TORTUGA XP4, equipped with the Hydro 300 photogrammetry system developed by Marseille-based IVM Technologies. This technological combination represents a compact yet high-performance piece of underwater equipment, capable of modeling habitats with millimetric precision at depths of up to 300 m.

Thanks to the support of the Région Sud and the Métropole, a full-scale demonstration day was held last September in the Parc des Calanques, with all the above-mentioned equipment, demonstrating the speed of implementation and performance of the robotic resources.

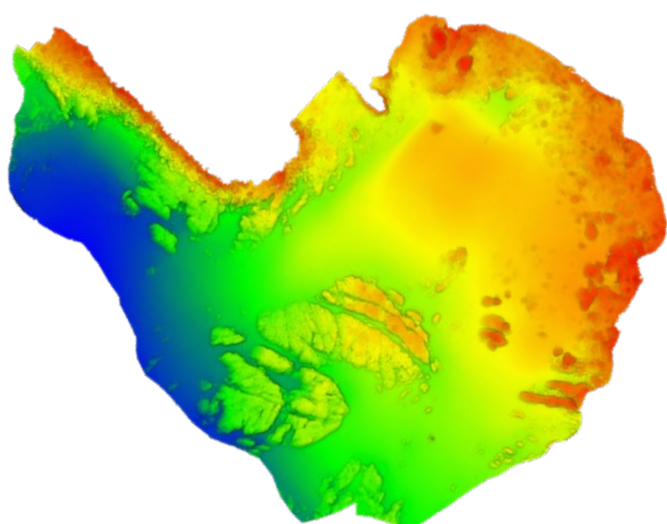
Onboard equipment, such as HD video sensors, imaging sonars and photogrammetry devices, enable exhaustive and accurate data collection. The information gathered is processed to produce 2D/3D bathymetric maps, geolocated video/sonar files, 3D photogrammetric models and detailed data on benthic populations.



The expected results of this approach are to provide park authorities with the high-quality data and in-depth analyses they need to develop conservation strategies tailored to these fragile ecosystems.

This innovative approach, using marine and underwater drone technology, promises to be a major step forward in strengthening the protection of Marseille's calanques and other marine parks, offering efficient and cost-effective solutions for the preservation of these sensitive sites. ■

BATHYMETRIC MAP



WHERE TO MEET US THIS YEAR

30 JANUARY - 1 FEBRUARY 2024 | MARSEILLE (FR)



12 - 14 MARCH 2024 | LONDON (UK)



24 - 26 APRIL 2024 | MARSEILLE (FR)



26 - 28 JUNE 2024 | NANTES (FR)



FOLLOW US



THEY JOINED US IN 2023



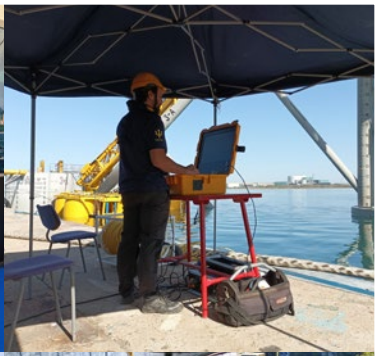
Quentin BOUZAT
Operations Technician



François RIVIÈRE
Hydrographic Engineer

THE (ALMOST) FULL TEAM





Album

SUBSEA TECH

