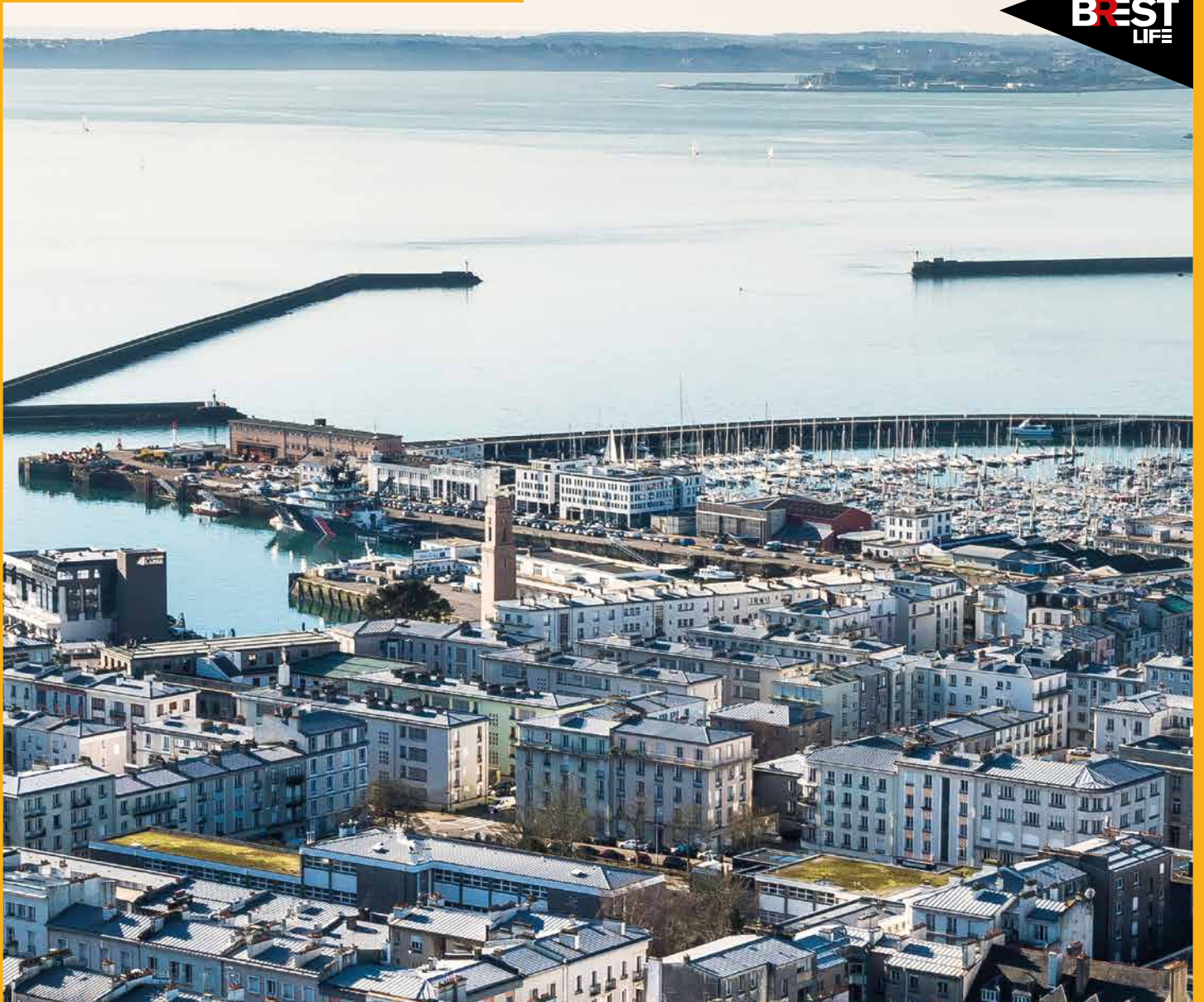


# BREST CAPITAL OF THE OCEANS

**BREST TO HOST THE  
EUROPEAN MARITIME DAY  
FROM 24 TO 25 MAY 2023**

BRETAGNE 

**BREST**  
LIFE



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**THE CAMPUS  
MONDIAL  
DE LA MER IS  
GROWING  
IN STATURE**









**1,850**

Students in campus-wide  
'sea and coastal' sciences  
faculty.

**42,600**

Maritime-related jobs  
across the Campus Mondial  
de la Mer.

### THE CAMPUS MONDIAL DE LA MER AND ITS 42,600 JOBS IN THE MARITIME DOMAIN.

Ifremer (French Research Institute for Exploitation of the Sea), Institut Universitaire Européen de la Mer<sup>1</sup> (European Institute for Marine Studies), Station biologique de Roscoff (French marine biology and oceanography research and teaching centre), grandes écoles<sup>2</sup> (competitive-entrance higher education establishments), French public institutions<sup>3</sup>... With 1,770 people working in marine research here, the north-west tip of Brittany has elevated itself to the top of the European ranking and is the focus of a third of France's training and research complement in the marine science sector.

The Brest employment zone is the primary maritime hub for economic activity in Brittany with nearly 30,000 jobs (Defence, higher education and research, fishing and boating...). Structures like the Technopôle Brest-Iroise (a hub for science and technology) and the Pôle Mer Bretagne Atlantique (a sea innovation cluster), have quickly established themselves as key players in uniting the world of research, education and business in the domain of marine science and technology.

In 2016, in a bid to continue to strengthen their synergies in this domain, this community of economic, academic and institutional protagonists decided to come together within the Campus Mondial de la Mer: a unique and innovative project whose mission is to make Brest and Brittany one of the best venues in the world for the study and valorisation of the oceans and seas, as well as the platform for a strong and sustainable maritime economy.

(1) The IUEM is part of the University of Western Brittany (UBO).

(2) Brest boasts nine competitive-entrance higher education establishments in its region, including the National School of Engineers of Brest (Enib), the National School of Advanced Technologies (Ensta Bretagne), the French Naval Academy as well as the Higher Institute for Electronics and Digital (Isen Brest).

(3) Several French public institutions have their headquarters in Brest, including the French Naval Hydrographic and Oceanographic Service (Shom) and the Institut Mines-Télécom Atlantique (IMT Atlantique).

### **BREST, LEADING THE WORLD IN TOP UNIVERSITIES SPECIALISING IN OCEANOGRAPHY**

In just twenty years, Brest has established international networks and become the spot for marine science and technology. The “Shanghai Ranking” (Academic Ranking of World Universities) ranks the University of Western Brittany as 11th best university in the world in oceanography.

### **THE PÔLE MER BRETAGNE ATLANTIQUE MARINE CLUSTER, A KEY PROTAGONIST OF BLUE GROWTH**

It was in Brest that the Pôle Mer Bretagne Atlantique marine cluster was devised and created. Marine renewable energies, blue biotechnologies, a vessel of the future... Since its creation in 2005, this competitiveness cluster has identified topics that will drive tomorrow's maritime growth. Armed with nearly 450 public and private members (large groups, SME-SMIs, universities, competitive-entrance higher education establishments, research centres and professional organisations), it has already certified over 520 projects, amounting to 1.4 billion € of R&D.

### **FINISTÈRE, A LAND OF MARINE SCIENCE PIONEERS**

For nearly 150 years, the Roscoff Biological Station, – a branch of the Sorbonne University and the CNRS –, has helped to train up elite French and overseas marine biology and ecology researchers, including Nobel Prize winners like André Lwoff and Jacques Monod. Further south, the marine station in Concarneau, built in 1859, is the oldest marine station in the world still in operation. Another pioneer: the Brest tide gauge, built in 1679, is one of the oldest sites in the world for monitoring sea levels.



**2,700**

Kilometres (1,678 miles) of Breton coastal shoreline (1,200 km/ 746 miles in the Finistère alone), which is a third of metropolitan France's coastline.

**8**

Industrialists specialised in sea-related activities with more than 250 employees based in the region. They alone employ over 7,230 people.

**170**

SMEs created since 2016 with sea-related activities. They flesh out the 1,180 SMEs already based in the region, which represent over 12,500 jobs.



# HERE

**MARITIME  
RESEARCH  
EXCELLENCE IS  
CULTIVATED**









In the wake of the 'Royale' (the French Navy), **Brest has been cultivating a thirst for knowledge of the marine environment for over three centuries**, whether it be through ocean-going explorations like that of Bougainville in 1766, the creation of the Marine Academy or the implementation of measuring instruments such as the Brest tide gauge from 1679, which provides the longest continuous time series of measurement in the world. Over the centuries and more specifically since the second half of the 20th century, the marine science and technology community has expanded as much in the defence sector as the civil one to become one of the largest and most productive in the world, rivalling those in Woods Hole, San Diego, Tokyo, Bergen, Hobart, Kiel and Qingdao... Today, surrounded by innovative businesses, this community makes up the Campus Mondial de la Mer.

**1,770 people are tasked with studying the oceans and understanding the physical phenomena and marine ecosystems with a view to their preservation and sustainable use.**

These studies cover a broad spectrum ranging from the geophysics of the oceans to cybersecurity, genomics and even hydrodynamics. In Brest, we're studying the link between oceans and the climate, the potential of services offered through marine biodiversity in the health and food sections, energy production and even a safer and cleaner vessel of the future.

**The excellence of Brest-based research has worldwide acclaim**, the University of Western Brittany placed 13th in the Shanghai Ranking for oceanography (the 2nd best in France, 6th best in Europe), and it is recognised nationally through the provisions of the Programme d'Investissement d'Avenir (Investments for the Future programme). Within this context, Brest boasts the only Graduate School of Research, ISBLUE, an establishment with an international reputation designed to further promote excellence in research and training in the domain of marine science and technology.





**The excellence of Brest-based research has worldwide acclaim**, the University of Western Brittany placed 11<sup>th</sup> in the Shanghai Ranking for oceanography, and it is recognised nationally through the provisions of the Programme d'Investissement d'Avenir (Investments for the Future programme). Within this context, Brest boasts the only Graduate School of Research, ISBLUE, an establishment with an international reputation designed to further promote excellence in research and training in the domain of marine science and technology.

There are 530 students in marine-related training courses of degree/master's/PhD level in Brest métropole, a large proportion of whom are at the University of Western Brittany (IUEM, IUT and the university department of law and economics as well as sciences and techniques). Moreover, Brest métropole also distinguishes itself by the presence of military training courses at the Brest naval training centre: the École des Mousses and the École de Maistrance. The latter trains up future petty officers and accommodated 825 students in 2021. It's also important to count on the action of several (in-house) training-related organisations like the CEDRE, the University of Western Brittany and Shom.

#### **FROM BREST, WE'RE ESTABLISHING THE CONTOURS OF THE FRENCH MARITIME DOMAIN**

Brest is also home to the headquarters of the Shom, heir to the world's first official hydrographic service. For 300 years, this public body under the supervision of the Ministry of Defence, has charted around 10.8-million km<sup>2</sup> (4.1-million miles<sup>2</sup>) of the French maritime domain, the second largest in the world after that of the United States and before that of Australia. The Shom also collaborates with numerous national organisations in France, including the IGN (National Geographic Information Institute), Météo-France, Ifremer and the CNRS.

**1,770**

Marine science and technology researchers who work in Brest.

**7**

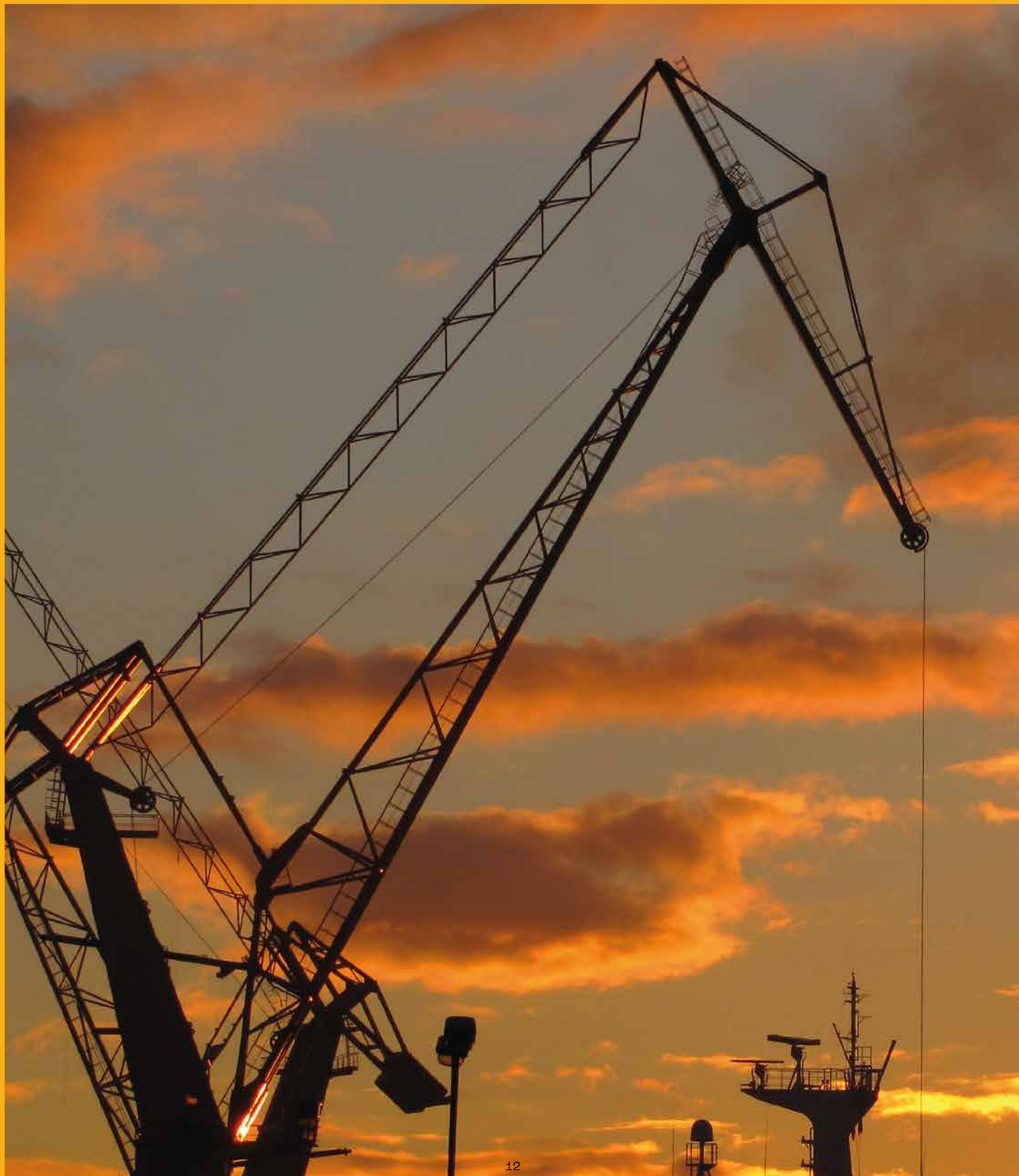
Competitive-entrance higher education establishments in Brest working on marine-based themes.

**RANKED 11<sup>TH</sup> IN 2022**

The University of Western Brittany's position in the Shanghai Ranking in the domain of oceanography.

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**WE DESIGN  
THE ENERGIES  
OF THE FUTURE**

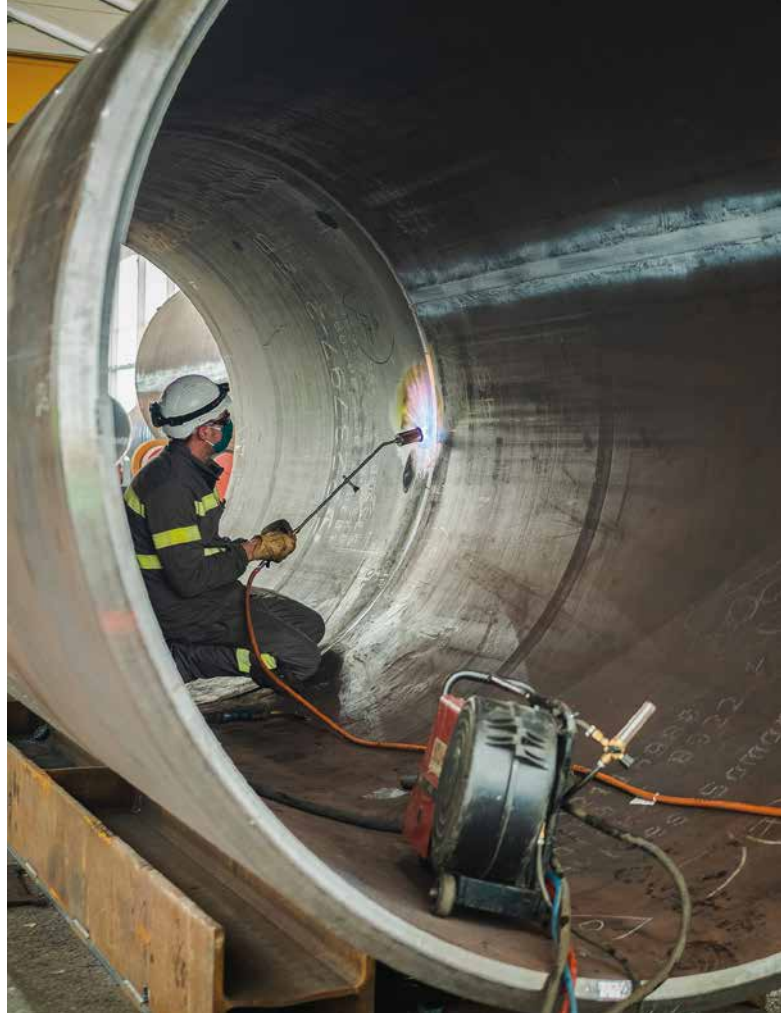




Back in January 2017, an extraordinary project was launched in Brest to create a new terminal site, carry out dredging work and develop new infrastructure, including a dock handling platform. Within this context, the most spectacular element of this work is sure to be the development of a massive 100-acre terminal dedicated to hosting activities associated with marine renewable energies (MRE).

From storage to assembly, it will be sufficient to create 400 to 500 direct jobs in this sector alone, which is already well established in Brest, whether it be bottom-fixed offshore wind turbines, floating wind turbines or tidal turbines.

In a region packed with innovative companies like Sabella, Eolink and Guinard Énergies, organisations like France Énergies Marines, which bring together all the protagonists from France's MRE sector and ultra-modern infrastructure, Brest is now positioning itself as one of France's prime assets in designing future energies. In this way, it is contributing to the global push to reduce our dependence on fossil fuels.



### **FROM BREST, FRANCE ÉNERGIES MARINES IS UNITING THE FRENCH MRE SECTOR**

Based in Brest with branches on all waterfronts, France Énergies Marines is the Institute for the Energy transition of offshore wind power and oceanic energies. The result of a public-private partnership, it currently brings together about thirty members and employs 80 people. Since 2015, the institute has been involved in more than 70 R&D projects, providing significant scientific contributions or ensuring overall coordination.

Objective: to stimulate French competitiveness in the offshore renewable energies (ORE) sector, by providing support to bottom-fixed and floating offshore wind sector, tidal and wave energy sectors and ocean thermal energy conversion sector.

### **BREST MÉTROPOLE, A LAND SYNONYMOUS WITH JOBS IN THE MARITIME DOMAIN**

1,300 people are working in the domain of public research into marine science in Brest métropole, half of which have the status of researchers/teacher-researchers. This represents nearly 75% of Brittany's research staff in this domain and nearly 20% of the national workforce. Across Brest métropole, there are some 21,000 jobs in the maritime domain, which equates to 20% of the total jobs in the city, and these posts represent 10% of the jobs in the maritime domain in metropolitan France outside tourism. According to Insee, the Brest employment zone is the second largest maritime employment zone in metropolitan France, just after Toulon. With the increase in the importance of polder and marine renewable energies, Brest is also betting on future maritime jobs in the transitions sector.

**100 ACRES**

Surface area of the future terminal designed to accommodate activities associated with marine renewable energies.

**€220 M**

Investment required to create this new terminal.

**65**

Companies working on this site.

**10 TONNES/M<sup>2</sup>**

Load-bearing capacity of the quayside designed to accommodate the components for the wind turbines and tidal turbines, compared with 3 to 4 tonnes for normal quaysides.

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**MAJOR  
PROJECTS  
FLOURISH**



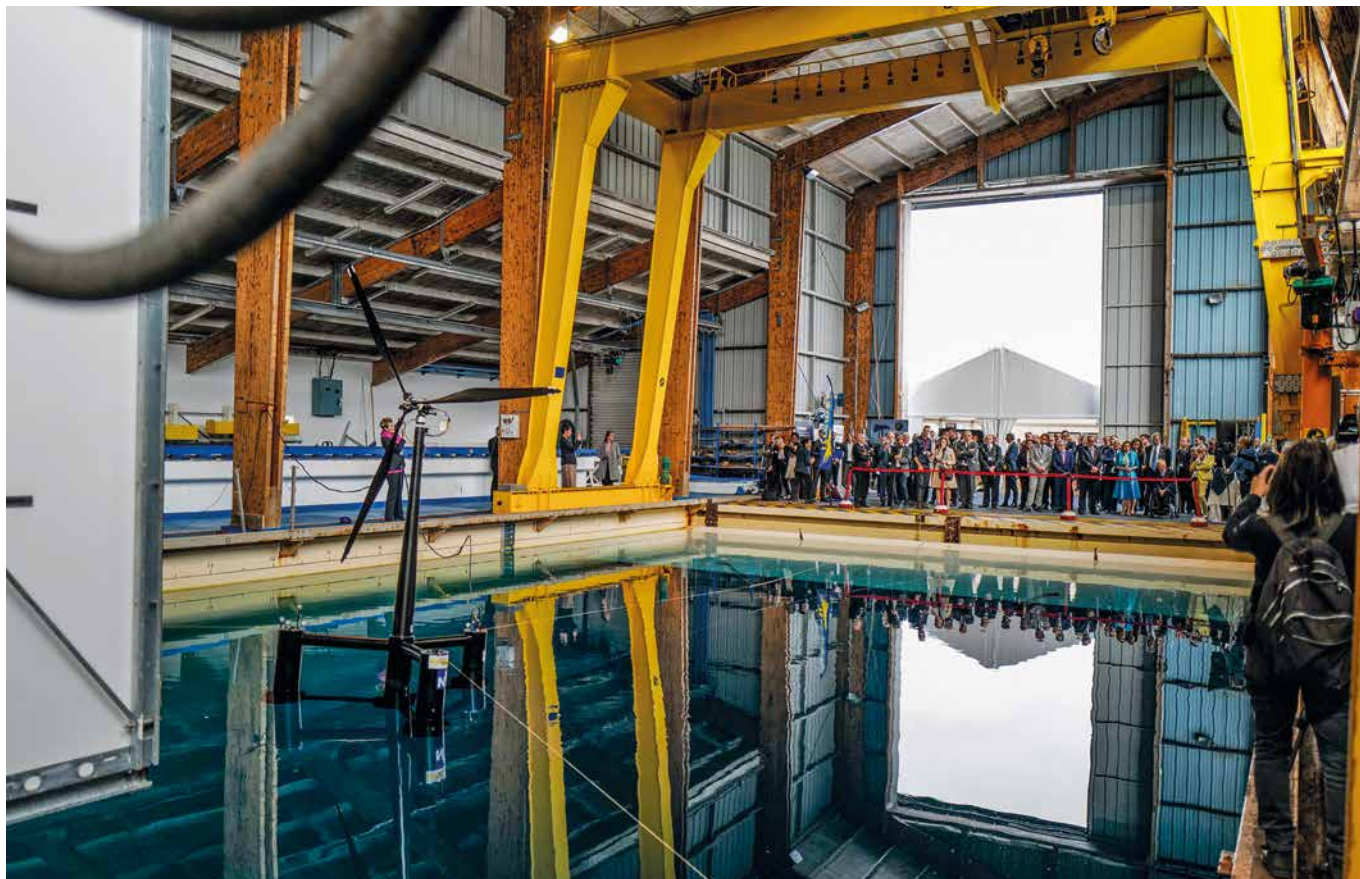




RESCUE ZONE

ABEILLE BOURBON  
BREST





Though the ocean is central to our region and the daily life of its inhabitants, the desire to work on understanding, promoting and protecting the seas also involves major collective projects, whose common denominator is working for the benefit of the community. These major projects to develop transition infrastructure and enhance knowledge make the north-west tip of Brittany a region that is at the forefront of the maritime ecosystem going forward.

### **PORT OF BREST DEVELOPMENT PLAN**

**Objective:** To develop current port activities by facilitating access to the docks for very large boats and promoting new sectors for the benefit of the economic future of the region, particularly those associated with marine renewable energies, through the development of new industrial establishments within a port terminal.

**Project developer:** Région Bretagne

**Investment:** €220 M invested of which Brest métropole contributes €20 M

**Schedule:** 2016 – 2020

### **HEADQUARTERS OF IFREMER**

**Objective:** To transfer the national headquarters for IFREMER from Issy-Les-Moulineaux to the Technopôle Brest-Iroise, within the scope of a State agreement. The new headquarters were inaugurated in February 2021 by the Prime Minister Jean Castex.

**Project developer:** State

**Investment:** €10 M of which Brest métropole contributes €4 M

### **70.8, A MUSEUM FOR THE OCEAN**

**Objective:** To strengthen Brest's 'maritime' cultural provision by developing a structure at Ateliers des Capucins to showcase maritime excellence, based on various technical and technological aspects, in addition to Océanopolis' themes of marine environment and biodiversity. 70.8 was inaugurated in July 2021.

**Project developer:** Brest Métropole aménagement (BMa)

**Investment:** €7.7 M (State €3.3 M; Region €1,4 M; Department €0.7 M; Brest métropole €2.3 M)



### OCÉANOPOLIS ENERGY TRANSITION

**Objective:** To engage Océanopolis' energy transition and extend its mediation to 'energy efficiency' as a site with significant energy consumption (21,000 mWh of primary energy/year and 2 T CO<sub>2</sub>/year) and a first-rate educational tool focusing on the marine environment (400,000 visitors/year, 30,000 students/year).

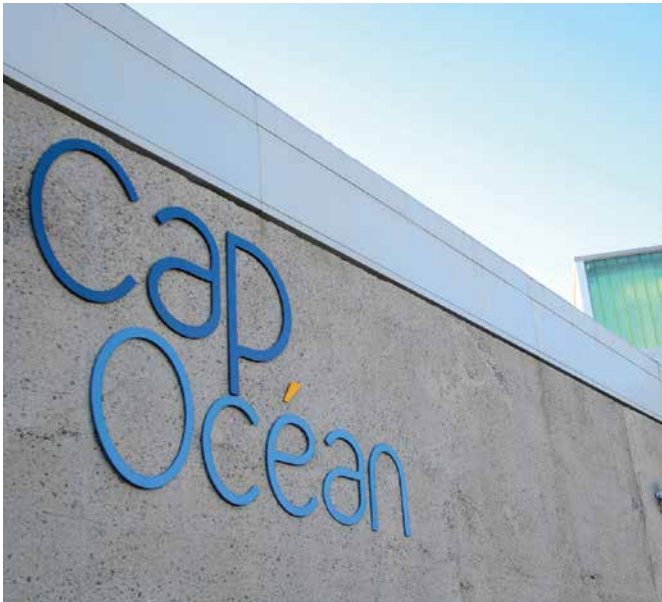


**Project developer:** Brest métropole  
**Investment:** €4 M (State €1.3 M; Region €1.45 M; Department €0.3 M; Brest métropole €0.95 M)  
**Schedule:** Delivered on February 2022

### CAPOCEAN AND 'CŒUR DE CAMPUS'

**Objective:** To create the Campus mondial de la mer totem building in the overall 'cœur de campus' (heart of campus) development

**Project developer:** SEMPI and Brest Métropole aménagement (BMA)



**Investment:** €4.2 M (State €1 M, Region €1.5M, Department €0.3 M, Brest métropole €1.4 M)  
**Schedule:** inaugurated on April 2018

### HARBOUR STATION

**Objective:** To build a new maritime portal on the 1st wharf of the commercial port to serve the islands, for urban connections across the bay, as well as for tourist excursions on boats navigating the bay.

**Project developer:** Région Bretagne

**Schedule:** 2023/2024

### NAVAL INDUSTRIES CAMPUS

**Objective:** To develop premises in the Cap Vert building in the new Capucins district to accommodate the Naval Campus headquarters, a training platform for the marine industry. Inaugurated in November 2019.

**Project developer:** Brest métropole and Région Bretagne

**Investment:** €0.65 M

**Schedule:** inaugurated on November 2020

### BREST FISH MARKET AND AUCTION ROOM

**Objective:** To create a new facility managed by the Brest-based Société de la Criée, geared around the needs of fishing industry professionals. A state-of-the-art facility, spanning 2,900 m<sup>2</sup>, able to process 2,500 tonnes of fish, crustaceans and shellfish a year.



**Project developer:** Région Bretagne  
**Investment:** €5.1 M financed by the Brest CCI and the Société de la Criée de Brest (€1.62 M), Région Bretagne (€1.40 M), the Finistère Department (€0.83 M), Europe via the European Fisheries Fund (€0.83 M), the State (€0.32 M) and France Agrimer (€0.10 M).  
**Schedule:** inaugurated on 20 October 2015

# HERE

**WE'RE TAKING  
ACTION  
FOR SAFER  
AND CLEANER  
SEAS**





MARINE  

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NATIONALE





**France's second largest naval base, Brest is home to the Force Océanique Stratégique (Strategic Oceanic Force) headquarters, which plays host to four nuclear-powered ballistic missile submarines and has authority over France's nuclear submarines.** The Atlantic police port authority, which is responsible for the largest surface area in France, also houses a centre of expertise, the 'MICA Center', which is dedicated to maritime safety with a global remit. Created in 2016, this centre groups together two main structures: the 'Gulf of Guinea' cell, the MSCHOA20, which is the Maritime Safety Centre for the Horn of Africa, which moved from London to Brest in 2019 following Brexit.

Since 2020, the headquarters for the France Cyber Maritime association has had to prepare for the setting up of a National Centre for the Coordination of Maritime Cybersecurity in Brest. Ship maintenance, predominantly nuclear submarines as well as frigates, is the core activity for the city's primary industrial employer, local firm Naval Group, which boasts 2,800 jobs, many of which entail subcontracting work. This sector is fleshed out by Thalès, a leading electronics firm working in the domain of Defence and involved in both the naval and aeronautics sector. This sector now features an attractive and appropriate training provision within the Naval Industries Campus based in Brest.

Located at the gateway to the English Channel, one of the largest shipping lanes in the world, Brest has also made a name for itself as a key site for maritime surveillance and pollution control. The port of registry for one of the most powerful ocean-going tugboats in the world, the Abeille Bourbon, as well as ocean-going anti-pollution support vessels, Brest also houses two world-renowned anti-pollution centres: CEPPOL (1) and CEDRE (2). Brest is also home to one of three French courts authorised to deal with matters related to marine pollution. With this abundant network in its favour, Brest is a key protagonist in the domain of marine protection, one of the major challenges of the 21st century.

(1) The French Navy's Centre of Practical Expertise in Marine Pollution Response

(2) Documentation Centre for Research and Experimentation into Accidental Water Pollution



### **BREST, A PIONEER IN PREVENTION AND THE COMBATTING OF MARINE POLLUTION**

Following the Amoco Cadiz disaster in 1978, the CEDRE was created and it has since established itself as an international expert in accidental water pollution, along with the CEPPOL, which relies on the French Navy and VIGIPOL, the public-private entity for the protection of the Breton coastline. Brest is also home to VIGISAT, the reference station for maritime surveillance services via satellite specialising in the surveillance of pollution, detection of illegal fishing, detection of icebergs, environmental surveillance and support for the offshore industry.

### **THE CROSS-CORSEN, A KEY LINK IN MONITORING VESSELS IN THE ENGLISH CHANNEL-ATLANTIC**

The Maritime Rescue Coordination Centre (MRCC / CROSS in France) on the Corsen headland is one of four of France's national centres of this type along the Atlantic coast and the English Channel. Its primary mission is to control shipping entering and leaving the southern part of the English Channel, whose waters are navigated by more than 110 vessels a day. Using control devices, which notably rely on the powerful radar on the island of Ushant, it is a key component of the French system for monitoring vessels.

**21,180**

Direct jobs attached to the Brest-Lorient Defence base.

**200**

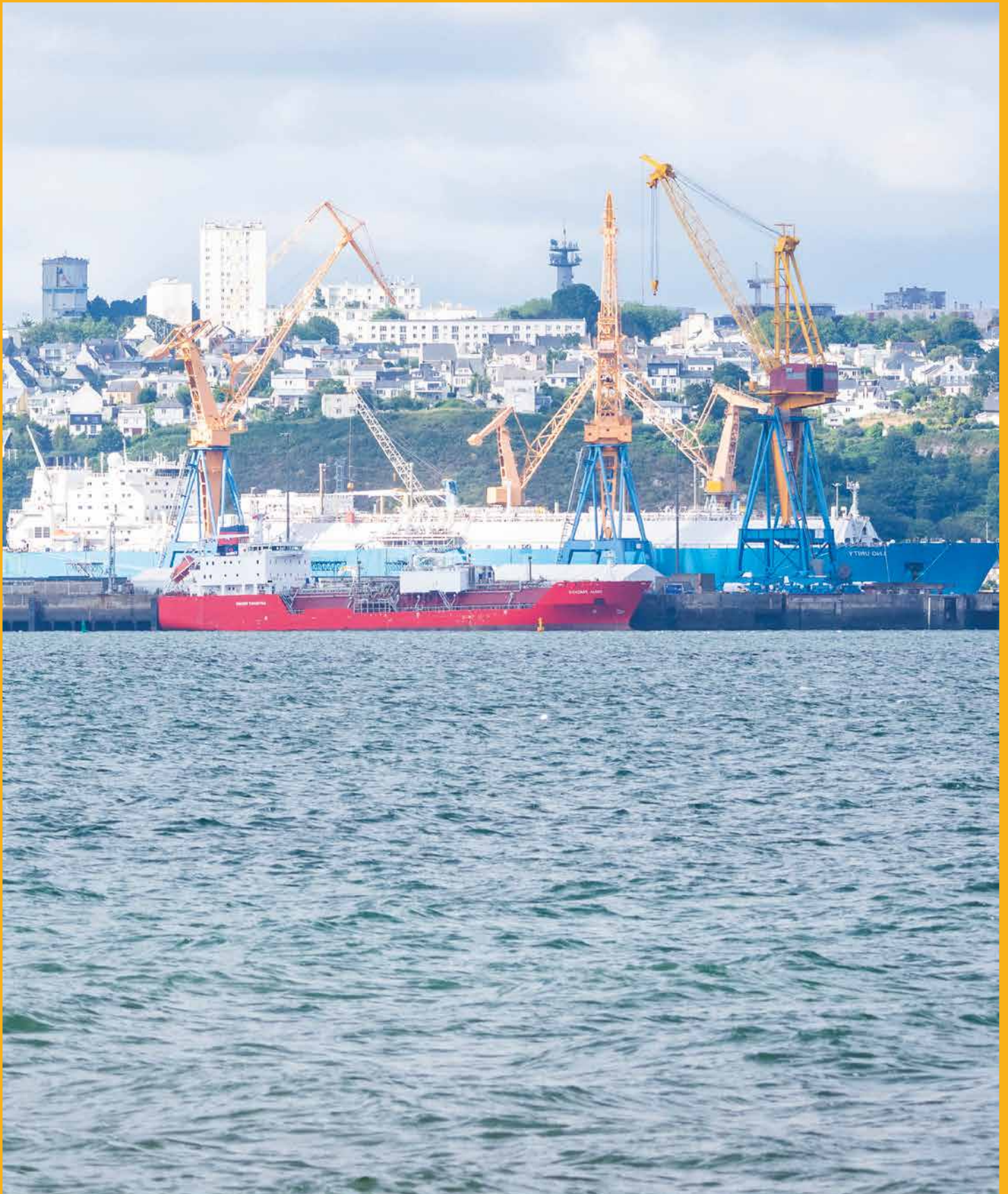
Tonnes is the tractive force of the Abeille Bourbon. Boasting a total of 21,740-horsepower from its engines, she is one of the most powerful high seas tugboats in the world.

**60**

Emergency plans to combat accidental water pollution issued over the past ten years by the CEDRE, which responds to 150 call-outs a year.

# HERE

**WE MAINTAIN,  
WE TRANSFORM,  
WE EXPORT...**





**Defence, trade, ship repair, fishing, boating... Few ports can rival Brest's great range of activities.**

France's number one ship repair centre, the local know-how is recognised by shipowners the world over. High-performance and technically advanced facilities, as well as a special emphasis on meeting deadlines have attracted renowned companies like Damen, the go-to company in civilian ship repair. With regards to defence, Brest's docks play host to several companies, like Naval Group, tasked with meeting the maintenance requirements of the French Navy's boats, which include redesigning the Strategic Maritime Force's submarines.

A genuine maritime gateway into Brittany and its agro-industrial economy, the commercial port and its deep-water docks feature multimodal access and multiple products. It's sizeable linear arrangement of docks makes it ideal for receiving shipments of raw materials for animal feed, hydrocarbons and sand, as well as for outgoing shipments of local products like frozen meat, timber, potato seeds and recycled metal... For its part, the fishing port and its new auction site accommodates a fleet of 70 fishing boats...

**THE NAVAL DOCKYARD, AN ECONOMIC AND SOCIAL MAINSPRING**

The naval dockyard of Brest, on the military port of Brest, is the French Navy's second largest naval base. Built in 1631 by Richelieu and protected by Vauban's fortifications, its history is inextricably linked to that of Brest. A genuine economic and social mainspring, it has modified the urban landscape over the centuries. From its location on the banks of the Penfeld in the 17th century to today's naval base, the naval dockyard has constantly been the beating heart of Brest in the domain of ship construction and repair of military and civilian vessels, with the emphasis on the former. Today, the defence sector is synonymous with an ecosystem of 58,400 jobs with an economic impact of 2.2 billion euros a year.

**A PORT THAT IS CONSTANTLY EVOLVING**

Between 1917 and 1939, the arrival of the American soldiers on French soil transformed the commercial port into a vast transit camp for men, materials and horses. Destroyed during the Second World War, the port was rebuilt from the ground up and expanded in the sixties to attract new activities. Since 2017, it has been undergoing another transformation with the creation of a 100-acre terminal centred on activities related to MRE.



**1**

Brest's ranking in the industrial cluster for civil ship repair and the French military.

**3**

Refit options at the ship repair port of Brest enabling it to handle the repair of ships weighing up to 550,000 tonnes.

**3-MILLION**

Tonnes of goods which pass through Brest's commercial port each year.

# HERE

**WE PRESERVE  
AND PROMOTE  
EXCEPTIONAL  
MARINE  
BIODIVERSITY**





**Boasting a rich and varied abundance of marine biodiversity, Brest Roads and the Iroise Sea play host to a wide range of ecosystems. The former headquarters of the French Marine Protected Area Agency (AAMP), today Brest is the Atlantic outpost for the French Agency for Biodiversity (OFB).**

The freshwater confluence of the Aulne and Elorn rivers together with the salt water of the Iroise Sea, Brest enjoys a succession of varied marine habitats ranging from the oceanic conditions of the narrows to the sheltered environments of the rias and estuaries. Life has naturally organised itself around this mosaic of natural environments, from maerl to large algae, fluorescent anemones, as well as starfish, seahorses, shellfish, crustaceans, fish, grey seals, large dolphins, razorbills and terns... This remarkable profusion led to two areas in the Roads being designated a Natura 2000 zone and saw Brest recognised as a Capital of Marine Biodiversity for its programme to improve water quality and natural environments.

**Both sensitive and complex, this biodiversity is also a source of multiple ecological, social and economic activities** including research (Ifremer, CNRS, etc.), education (sea classes), tourism, fishing, aquaculture and the algae sector (now structured around one and the same cluster). Océanopolis plays a pivotal role in educating and raising awareness about this topic. Its teams are involved in numerous international programmes associated with preserving biodiversity. In this way, Brest itself is helping to stand up to the major environmental challenges of the future at a time when one species of animal or plant is dying out every 20 minutes on a planetary scale.

#### **IN THE ROADS, THE ONLY HATCHERY OF ITS KIND IN EUROPE**

On the shores of Brest Roads, the Arun Island Marine Farm boasts the only hatchery of its kind in France and even Europe. Since 2015, co-managers Mickaël Coquil and Mathieu Hussenot have managed to hatch out and raise black queen scallops and flat oysters in their ponds. It's a major innovation aimed at culturing the shellfish ponds again in a bid to sustain the fishing for shellfish across Brittany and elsewhere.

#### **THE IROISE MARINE RESERVE, AN ABUNDANCE OF MARINE BIODIVERSITY**

The Iroise Marine Reserve is the first marine nature reserve to be created in France. A special tool aimed at protecting the marine environment and promoting its sustainable development, it spans a surface area of 3,500 km<sup>2</sup> (2,175 miles<sup>2</sup>) between the islands of Sein, Ushant and the boundaries of the region's waters. Its vast swathes of algae, the rock formations along the coast and the shallow bays serve as nurseries and sources of food for marine species. Each day, the Reserve's teams break its management down into four key missions: monitoring, supporting, awareness raising and controlling.



**44,480 ACRES**

Make up the surface area of Brest harbour, one of the world's largest bays.

**3,500 KM<sup>2</sup>**

(2,175 miles<sup>2</sup>) make up the surface area of the Iroise Marine Nature Reserve.

**2**

Natura 2000 designated areas within Brest Roads.

**6**

Designated areas of interest for ecology, flora and fauna (ZNIEFF).

**MORE THAN 1.2 MILLION**

Children and students welcomed by Océanopolis within the context of educational workshops about marine ecosystems since it opened.

HERE

**PASSION  
FOR THE SEA  
IS SHARED**





**Brest is brimming with initiatives aimed at sharing its abundance of marine heritage with the widest possible audience.** 70.8, the new facilities for promoting scientific, technical and industrial culture, has opened its doors at Ateliers des Capucins, a recently restored symbol of Brest's shipbuilding industry. Within the exceptional setting of the Castle of Brest, the National Maritime Museum houses a unique heritage, which bears witness to the great naval adventure of Brest's naval dockyard and the French Navy through 17 centuries of history.

### **THE EMPEROR'S ROWBARGE, AN HISTORICAL JEWEL RETURNS TO BREST**

A genuine historical jewel, whose history is inextricably linked to that of Brest, Napoleon I's imperial Rowbarge, better known as the Emperor's Rowbarge, has returned to Brest, its port of registry for nearly 130 years. In 1943, it was moved to Paris, before being housed two years later at the National Maritime Museum at the Palais de Chaillot in Paris. Its return is highly symbolic, in front of the new museum for the ocean 70.8, within what is another powerful metaphor for Brest's rich shipbuilding history: Ateliers de Capucins.

A little further along the coast, at the Moulin Blanc marina, more than 12-million visitors have been welcomed to Océanopolis' pavilions to discover the fascinating collection of marine flora and fauna within what is an accurate reconstruction of their ecosystems. It's a figure that has earned the venue a top spot in Brittany's tourist attractions. Within this vast aquarium, the only one of its kind in Europe, OceanoLab is developing an original approach to the sharing of marine sciences via a space dedicated to scientific experimentation

### **HERE, THE SEA OF YESTERDAY, TODAY AND TOMORROW IS TOLD**

#### **Musée national de la Marine in Brest**

The Musée national de la Marine is a public administrative establishment operating under the auspices of the Ministry of the Armed Forces. It is comprised of six sites in France open to the public, including one in Brest. It is a museum of art and history, science and technology, human adventures and popular traditions. It is also a maritime cultural centre open to all, which seeks to be a showcase and a heritage conservation centre

for all navies. It also aims to raise awareness among the public of the oceans' current and future challenges by showcasing their heritage.

#### **Brest: a castle with seventeen centuries of history**

Located on the tip of the Brittany peninsula, Brest castle bears witness to a destiny closely linked to that of the sea, the story of a city, of a region and of our whole country. The museum's collections trace back the history of the French Navy, exploring its

in marine ecology, coupled with an innovative project aimed at the general public along the theme of scientific culture. This entire ecosystem is helping to bring to life and share this passion for the sea with the widest possible audience with a view to passing this on to future generations.

### **BREST, A FORUM FOR EXCHANGES WITH THE WORLD'S MARITIME COMMUNITY**

Brest regularly hosts major events, which bring together the maritime community from every corner of the globe.

Every two years, Sea Tech Week confirms its ever increasing international dimension with the presence of substantial overseas delegations comprising researchers, manufacturers and other decision-makers. In September 2019, Brest hosted the G7 Parliamentary Speakers' Meeting on the theme "Parliaments committed to the oceans". In 2022, the Ateliers des Capucins hosted the One Ocean Summit, a gathering of heads of states and governmental representatives from all over the world.

In 2023, it is the turn of the European Maritime Day to take place in Brest.

**+ 13-MILLION**

Visitors to Océanopolis since its creation.

**17 CENTURIES**

The period of naval history, in Brest and in France as a whole, recounted in the Maritime Museum's galleries.

#### **PRESS CONTACT**

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# HERE



**THE MAJOR  
MARITIME  
FESTIVALS ARE  
CELEBRATED**











**712,000**

Visitors during the last edition in 2016.

**1,050**

Vessels in attendance.

**9,000**

Seafarers gathered dockside in the commercial port.

**In Brest roadstead, pleasure craft, research vessels, military vessels and raceboats cross tacks year-round in a constant flurry. Every four years, the Brest International Maritime Festival showcases this maritime tradition by welcoming maritime nations and their ambassador vessels from all over the world.** Grands voiliers, Ranging from tall ships to historical replicas, heritage vessels, working boats, raceboats, recreational craft, old or more modern vessels, civilian or military... Every generation has been represented here since 1992, with all the marine world coming together in the docks of Brest to share, discover and exchange. Throughout the week-long festivities, the fleets and giants of the seas put on a magical nautical extravaganza, which is a genuine World Fair of the maritime world in all its glory.

Following the cancellation of the most recent festival as a result of the global pandemic, Brest is preparing to host an exceptional new edition in 2024. In the run-up to this, from the summer of 2022, the city did celebrate the 30<sup>th</sup> anniversary of the International Maritime Festival with entertainment in and around the port for one and all.

The start and finish venue for a series of major offshore races, as well as a port synonymous with record attempts, Brest will also host the next singlehanded round the world race in the Ultim category. These giants of the seas are due to set sail from the city on France's western seaboard in the autumn of 2023.



**8,5 KM**

(5.28 miles) of quayside given over to the festival, which spans a total surface area of nearly 200 acres.

**25**

Heritage boats moored in Brest.



### **LA RECOUVRANCE, BREST'S AMBASSADOR VESSEL**

Launched in 1992, during the Brest International Maritime Festival, La Recouvrance is the city's ambassador vessel. She bears the name of the most celebrated district of Brest, where the sailors' wives prayed to Our Lady and laid offerings in the hope that their son or husband would return home from the sea. Built at the Guip boatyard, this schooner-rigged dispatch boat bears witness to the tradition as well as the modernity of the north-west tip of Brittany's maritime vocation. In this way, she is present at important nautical events, gatherings of heritage boats and the start of major offshore races.

### **THE GUIP YARD PROVIDES THE LINK BETWEEN THE PAST AND THE FUTURE**

For the past 30 years, the Guip yard has specialised in the restoration and construction of wooden boats: heritage boats, working boats and classic yachts. On their two sites on the north-west tip of Brittany, Yann Mauffret in Brest and Paul Bonnel on the Ile aux Moines, have gathered around them passionate shipwrights and cabinetmakers, who have managed to make the link between ancestral know-how and modern-day requirements. Today, it is a passion that has earned them global renown.

### **FROM BREST, WE DESIGN THE SAILS OF THE FUTURE**

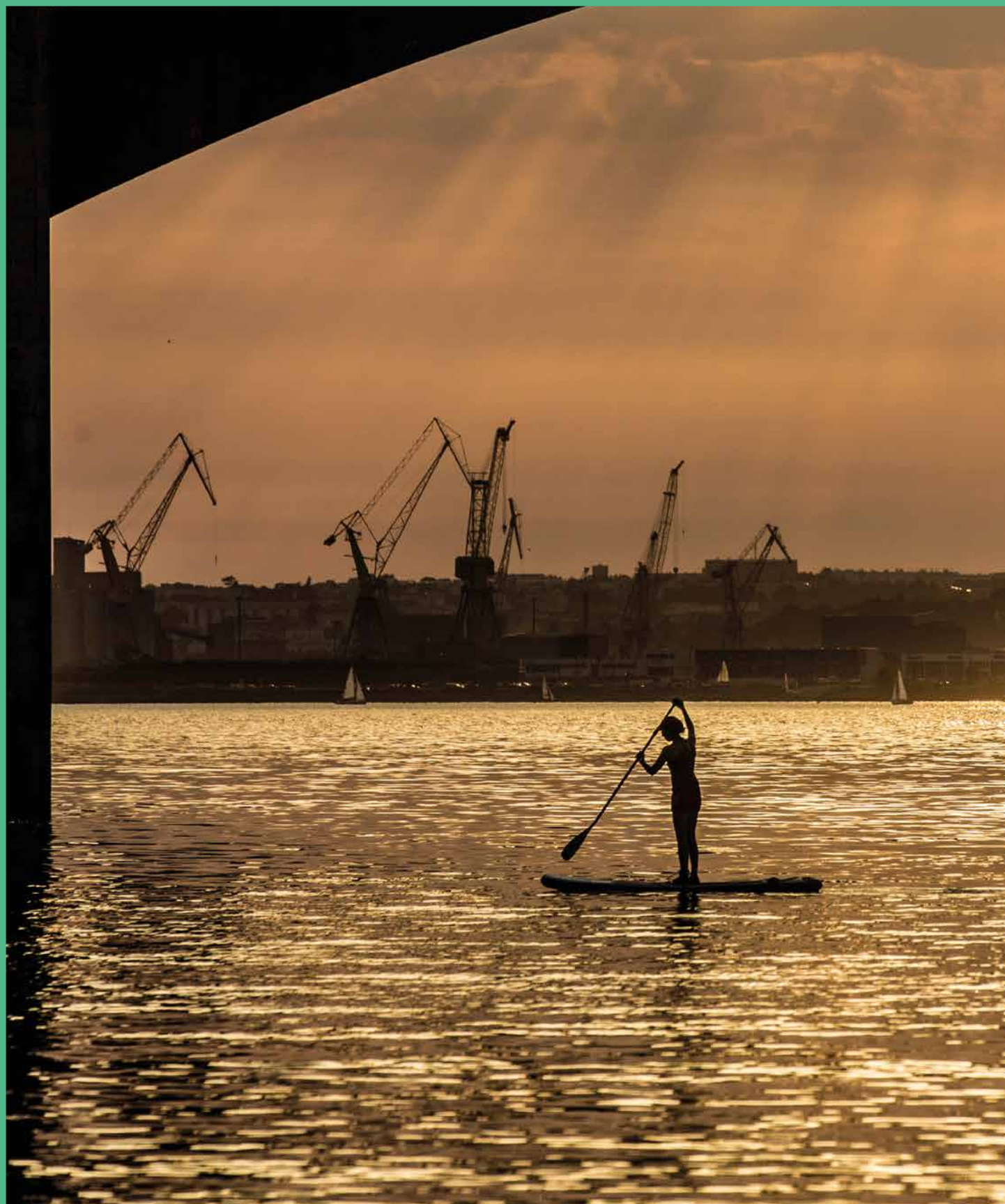
Established in Brest in the early eighties, the sail loft Incidence Sails quickly led the way in France and ranked in the top 5 worldwide. The historical sail loft for racing, cruising and blue-water multihulls, its technical innovations and notably a membrane that appeals to the top skippers are recognised right around the ocean planet. Its master sailmakers and young engineer-designers are on a daily mission to continue creating sails of the future from the north-west tip of Brittany.

### **LA PÉROUSE, ONE OF THE GREATEST MYSTERIES IN MARITIME HISTORY**

In 1785, Jean-François de Galaup, Count of La Pérouse, was selected by Louis XVI to lead a round the world expedition aimed at completing James Cook's journey of discovery in the Pacific Ocean. In 1785, La Boussole and L'Astrolabe set sail from Brest. Three years later, the expedition disappeared with no trace offshore of Vanuatu. It wasn't until 1826 that part of the mystery surrounding its disappearance was uncovered thanks to a search carried out by the explorer Dumont d'Urville and Captain Peter Dillon, which culminated in their discovery of the wreck of L'Astrolabe. That of La Boussole would not be identified until 1964 by Reece Discombe. Today, it is possible for the public to discover the numerous botanical species brought back from these epic expeditions to the four corners of the globe at the Jardins des Explorateurs (Gardens of the Explorers). They can also view the gravestone of the unknown sailor found at Vanikoro and now accommodated at the National Maritime Museum in Brest.

# HERE

**THE SEA IS  
AN ART FORM  
WHICH IS A  
DAILY SOURCE  
OF INSPIRATION**





In Brest, the sea is an art form, which makes its mark in so many aspects of everyday life from the Tour Tanguy (Tanguy Tower) to the Castle, the Recouvrance bridge, the Ateliers des Capucins workshops, Cité des explorateurs (Explorers' city) and the heritage boats... This remarkable setting and the tradition for hospitality and sharing synonymous with this port city have inspired so many artists keen to draw on the power of the sea. *"I've been monitoring this city in its successive reconstructions. To my mind, with the tramway, it has really come back to life and Brest has never been as beautiful as it is today. Cities where the sea and the horizon form part of the street furniture are few and far between"*, Yann Queffelec.

Even today, the programming for its numerous cultural facilities and epic events like the International Maritime Festival, bear witness day in day out to the richness and diversity of its artistic and cultural heritage. Moreover, it is no coincidence that Brest was recently awarded the 'City of art and history' label.

This art form also translates across to gastronomy. Fish, shellfish, crustaceans, algae... From the sea to the plate, artisans and Michelin-starred chefs try to outdo one another creatively by working with produce straight out of the holds of the local fishing vessels landing their catch for the fish market. Its vast Roads, its hinterland with its invaluable heritage, its two marinas and its exquisite setting are also unquestionably an environment that is conducive to the practice of water-based activities.

The start and finish venue for a series of major offshore races, as well as a port synonymous with record attempts, Brest will also host the next singlehanded round the world race in the Ultim category. These giants of the seas are due to set sail from the city on France's western seaboard in the autumn of 2023. Brest is a Mecca for sailing, watersports and boating. The ports of Brest métropole boast 7 scientific research boats, 32 fishing boats, 47 military boats and 1,900 pleasure craft.



### THE ROADSTEAD, THE PERFECT SETTING FOR THOSE WHO ARE PASSIONATE ABOUT THE SEA

Wonderfully situated at the north-west tip of an abundant tourist region and stretching across nearly 44,500 acres, Brest roadstead and its two marinas are Brittany's largest yachting resort and it's the perfect setting for all those wishing to enjoy the gentle life beside the sea. A veritable lung of the city, its sheltered location, the exceptional diversity of its waters and the quality of its facilities make it the destination of choice for both athletes and amateurs involved in watersports.

**1<sup>ST</sup>**

Prize for Brest in the Arthur Loyd barometer for most attractive French metropolises in 2021.

**3<sup>RD</sup> CENTURY**

Period when the original Roman fortress base of the Castle of Brest was built, which is one of the city's oldest visible remains.

**50**

Festivals, which punctuate Brest's cultural event schedule each year.

**2,200**

Pontoon berths available for boat owners. Brest houses Brittany's largest marina.



# WHERE

**THEY ARE  
THE OCEAN'S  
PRIMARY  
PARTNERS**



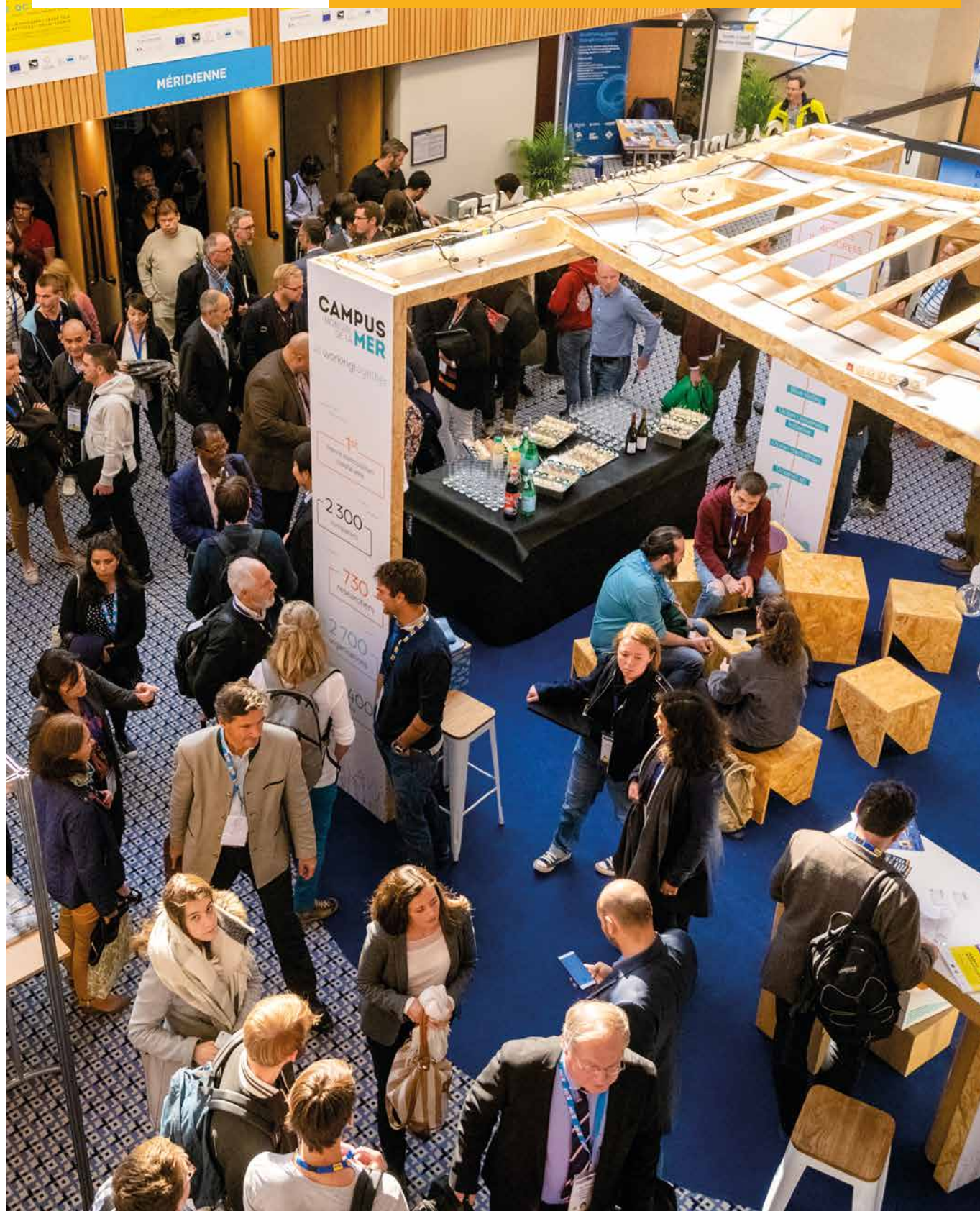






**CAMPUS**  
MONDIAL  
DE LA **MER**

**Campus mondial de la mer**  
The first French maritime innovation community  
open to the world



The Campus mondial de la mer, in addition to bringing together the leading French marine science and technology community at the tip of Brittany (more than 42,000 maritime jobs in nearly 3,000 establishments, more than 8,500 people trained in sea-related courses, an average of 1,000 sea-related publications per year, etc.), has an extremely broad range of expertise, both in living systems and in technological elements, and often at the crossroads of both. In addition to traditional maritime sectors (maritime transport, fishing, shipbuilding, etc.), our region and its community have focused on innovation and developed expertise in high-potential sectors such as maritime cybersecurity, marine biotechnologies, marine renewable energies, decarbonisation of maritime transport, etc., all of which are keeping pace with major European policies and international ambitions for the development of the blue economy.

This diversity of expertise makes it possible today to establish countless scientific, economic, and institutional collaborations between the Campus actors - Ifremer, Shom, the Paul-Emile Victor Polar Institute, Cedre, France Energies Marines, the Pôle Mer Bretagne Atlantique competitiveness cluster, and Océanopolis to name but a few - and their counterparts located around the world: Plymouth, Kiel, Rimouski, Bergen, Qingdao, Goa, Woods-Hole, Cadiz, and even Yokosuka.

### **THE CAMPUS MONDIAL DE LA MER SERVES A DUAL PURPOSE.**

First, to promote the acculturation between research and business with the ambition to create more value: a better knowledge of the ocean, the creation of more businesses, more innovative projects, and therefore more maritime jobs. To achieve this, the Technopôle Brest-Iroise team, which runs the Campus Mondial de la Mer, connects the numerous actors of the Finistère area. The Rencontres Immersion, organised three times a year, create links between researchers and entrepreneurs on subjects such as metrology and marine sciences, biomimicry, naval engineering, mechanical testing, etc. These events lead to meetings that result in better mutual knowledge and, when appropriate, collaborations.

### **PRESS CONTACT**

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Secondly, to highlight the expertise of the actors in its community in France and abroad in order to build bridges with other maritime territories. This is achieved by organising international events such as Sea Tech Week® every two years in Brest, though the deployment of the Ocean Hackathon® in 12 cities in France and abroad in 2022, by making sea-related research infrastructures and equipment accessible to our international partners, and by promoting expertise through our website and our international magazine SONAR which is published every two years. Brest hosting the One Ocean Summit in February 2022 and the European Maritime Day in May 2023 give the city a great recognition at the international level.

The Campus is therefore a network of actors and a sounding board for their actions to make Brest and Brittany, a little more tomorrow than today, an essential global center for marine sciences and technologies. A place that contributes in a dynamic and non-exclusive way to a better knowledge of the ocean and to the development of a sustainable blue economy.





**A pioneer in ocean science, IFREMER's cutting-edge research is grounded in sustainable development and open science. Our vision is to advance science, expertise and innovation to protect and restore the ocean, sustainably use marine resources to benefit society, create and share ocean data, information & knowledge.**

## **AN INTEGRATED SCIENTIFIC APPROACH TO THE OCEAN**

IFREMER promotes an integrated approach to marine science research on the Seven Seas. Our teams are working on the French and overseas coasts, covering the three great oceans: the Indian, Atlantic and Pacific oceans.

Connected to the international scientific community, its 1,500 researchers, engineers and technicians are advancing knowledge on one of the last unexplored frontiers of our planet. They help inform public policy and create new opportunities for a sustainable economy respectful with the marine environment.

## **EXCELLENCE IN RESEARCH AND CUTTING-EDGE TECHNOLOGIES TO EXPLORE, OBSERVE AND UNDERSTAND THE OCEAN**

Every day, IFREMER produces new data and develops new models to better understand the ocean, its ecosystems and the changes that affect them. Thanks to its observation, monitoring and expertise capacities, it provides informed answers to society's questions and concerns.

Marine research is supported by high-level technology in many fields: space observation, aquaculture platforms, instrumental systems, seabed observatories, information systems, etc. IFREMER designs exploration vessels and devices, sensors to explore and observe the ocean, from the coast to the high seas and from the abyss to the water surface.

## MONITORING AND EXPERTISE TO PUBLIC POLICY

The Institute's research supports ocean policy in Europe – such as the Water Framework Directive, the Marine Strategy Framework Directive, or the Common Fisheries Policy, national biodiversity strategies, or health and animal health policies. This expertise is an integral part of the Institute's missions.

## IFREMER INNOVATES AND CREATES SOLUTIONS

Chemical and plastic pollution, climate change, overfishing... To promote the emergence and development of new solutions to fight against these threats to the ocean, but also to benefit from these living or physical resources and create value for our economy, IFREMER supports the new collaborations with businesses in the framework of research contracts, the creation and support of start-ups and SMEs, especially those that use technologies and know-how from the Institute.

## IFREMER OPERATES THE FRENCH OCEANOGRAPHIC FLEET, OPEN TO THE ENTIRE NATIONAL SCIENTIFIC COMMUNITY

For the French government, IFREMER operates the French Oceanographic Fleet (FOF), on behalf of the whole national scientific community, which gathers the national naval oceanographic research resources. From the abyss to the ocean-atmosphere interaction, the FOF contributes to better respond to the major current challenges in marine science and technology. It serves the interests of the French and European scientific community and contributes to research excellence. It responds to monitoring needs and public service missions, and its teams participates in strong partnerships with the socio-economic world.

## SHARING KNOWLEDGE WITH SOCIETY

One of Ifremer's missions is also to raise awareness, inform and train the society on maritime issues and to involve them in participatory scientific approaches.

The ocean concerns us all and must be at the heart of climate negotiations. This is the call that 37 ocean science organizations launched before and during COP26 through the international digital campaign OneOceanScience organized by IFREMER, CNRS and IRD, with the support of the Platform Ocean & Climate (POC), astronaut Thomas Pesquet, ESA and Secretary John Kerry, the US President's Special Envoy for Climate: <https://oneoceanscience.com>

## IFREMER IN A FEW WORDS

- Founded in 1984
- Public establishment of an industrial and commercial nature (EPIC)
- 1500 people
- 25% of french skills in marine science and technology
- Annual budget: about 240 million euros
- Governance: Ministries of Higher Education and Research (MESR), Ecological Transition (MTE), Agriculture and Food (MAA) and of the Secretary of State in charge of the Sea
- 2 subsidiaries: Genavir (arming and management of the French oceanographic fleet), Ifremer Innovation Investissements (management of Ifremer's holdings in start-ups and SMEs)

## PRESS CONTACT

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### UNIVERSITY OF WESTERN BRITTANY (UBO)

Founded in 1971 in the Pointe de Bretagne area, the University of Western Brittany (UBO) is a multidisciplinary university, attuned to the social, economic, political, cultural or environmental changes of our societies and the associated challenges. With a strong local foothold and network, its focus is naturally turned towards the sea (we are ranked 11<sup>th</sup> in the Shanghai Academic Ranking of World Universities for the oceanography category) but its national and international influence also reaps the benefits from its strengths in both the information and technology sciences and the human and social sciences. As a metropolitan university, much of UBO's activity takes place on the Finistère campuses (Brest, Quimper and Morlaix). But its influence spreads across the whole of Brittany, in particular through the Higher National Teacher Training and Education Institutes (INSPés) of the Regional Educational Authority, and from 2020 through the Alliance Universitaire de Bretagne cluster created with Université Bretagne-Sud and the Brest graduate school of engineering (ENIB).

As a multidisciplinary university, it has an ambitious research and training policy that seeks to advance knowledge and improve qualifications for students and professionals in Western Brittany and beyond. With long-standing experience in continuing vocational training, it offers numerous placement-study programmes, mainly through apprenticeships. As an innovative university, it supports local economic development through the inventiveness of its researchers and the creativity of its graduates.

Open-minded and outward looking, UBO enhances and structures its positioning, both through its research-led activities and its quality in teaching, and through its numerous partnerships with universities around the world, notably China, Canada, Australia, South Africa and, of course, all of the EU countries. In this respect, setting up the European University of the Seas (SEA-EU), with the universities of Cadiz (Spain), Kiel (Germany), Gdansk (Poland), Split (Croatia) and Malta will be one of UBO's central activities in the coming years.

## PRESS CONTACT

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### THE SEA-EU EUROPEAN ALLIANCE

SEA-EU is a university cooperation project, launched in 2019, which unites 9 universities from 9 European countries, including the University of Western Brittany (UBO). Together, they form a vast European campus, a venue of education and mobility for all. The entire university community of UBO and the 8 associated universities - all fields of study, all levels, and all scopes combined - revolve around this European campus project: a community of 150,000 European students and 12,000 staff, united around the key values of sustainable development and European citizenship.

SEA-EU is one of 41 European universities, supported since 2019 by the European Commission under the Erasmus framework program, and which aims to strengthen the role of universities in European structure.

The 9 members of SEA-EU:

- University of Western Brittany, France
- University of Cadiz, Spain
- University of Gdansk, Poland
- University of Malta
- University of Kiel, Germany
- University of Split, Croatia
- Parthenope University of Naples, Italy
- University of Algarve, Portugal
- Nord University, Bodø, Norway

SEA-EU is:

- a project that encompasses all university activities: education, research, campus life, and links with society;
- a commitment to two major issues: European citizenship and sustainable development, with the aim of educating the young European generation about these issues;
- a venue for mobility and European training for students, teacher-researchers and faculty (in person or via digital tools)

### ISBLUE: THE INTERDISCIPLINARY UNIVERSITY RESEARCH SCHOOL SPECIALISING IN MARINE SCIENCES AND TECHNOLOGIES

The tip of Brittany is home to the largest concentration of researchers in marine science and technology in France, as well as master's and engineering courses. In this favorable environment, a prestigious partnership of 2 universities (UBO, UBS), 3 national research organisations (CNRS, Ifremer, IRD) and 4 Grandes Ecoles of engineering (IMT-Atlantique, ENSTA Bretagne, ENIB, Naval Academy), founded ISblue, the only University Research School (EUR) dedicated to marine sciences and technologies selected and financed within the framework of the Investments for the Future Program (PIA) at the national level.

ISblue aims to train new generations of researchers, experts, and engineers capable of meeting the multiple challenges facing the ocean and the coastal areas.

### 7 RESEARCH UNITS FULLY DEDICATED TO THE SEA

#### AMURE

Management of Marine and Coastal Resources and Spaces

#### LBCM

Laboratory of Biotechnology and Marine Chemistry

#### LEMAR

Laboratory of Marine Environment Sciences

#### LETG-Brest

Coastal environment, Remote sensing, Geomatics

#### Geo-Ocean

Ocean Geosciences Laboratory

#### BEEP

Biology and Ecology of deep sea Ecosystems

#### LOPS

Physical and Space Oceanography Laboratory

### IUEM IN FIGURES

- 270 Master students
- 200 doctoral students
- 500 scientists, technicians and administrative staff



This requires both the mastery of tools and concepts from different fields at the highest level, and an ability to work in interdisciplinarity. Whether it is the role of the ocean in the climate system, seismic and erosion risks where land and ocean meet, the impact of anthropogenic changes on coastal ecosystems and societies, or the development of artificial intelligence and drones for global ocean observation, these challenges require interdisciplinary approaches and strengthened international collaborations.

Funded since 2018 for 10 years as part of the Investments for the Future Program and France 2030 as a University Research School (EUR), ISblue has benefited from the experience of LabexMER, which joined the EUR in 2018.

ISblue relies on 13 research units that address marine science and technology in every aspect. 11 of these units are focused on the ocean and coastal areas. THE EUROPEAN UNIVERSITY INSTITUTE OF THE SEA (IUEM)

The whole world is now focusing on the ocean and its coastlines. The 21st century will be the century of the sea. Brest is a city at the cutting edge of Europe (both physically and literally!) and IUEM, as a department of the UBO, is a melting pot of marine sciences where the University of western Brittany and national bodies pool their resources and intelligence, developing its research at the forefront of knowledge. Over the years, its team of committed staff has enabled IUEM to build up expertise that is renowned throughout the international marine sciences community.

IUEM's mission is to study the ocean, the coastline and related human activities through observation, experimentation and modeling, and to transmit this knowledge through teaching and communication, in order to achieve the objectives of sustainable development of maritime activities and the preservation of marine and coastal ecosystems.

To achieve these objectives, its activities are based on three complementary missions:

#### **Research:**

IUEM, in association with UBO, UBS, CNRS, IRD and Ifremer, administrates 7 laboratories hosting more than 500 researchers, teachers-researchers, engineers, technicians and administration staff.

#### **PRESS CONTACT**

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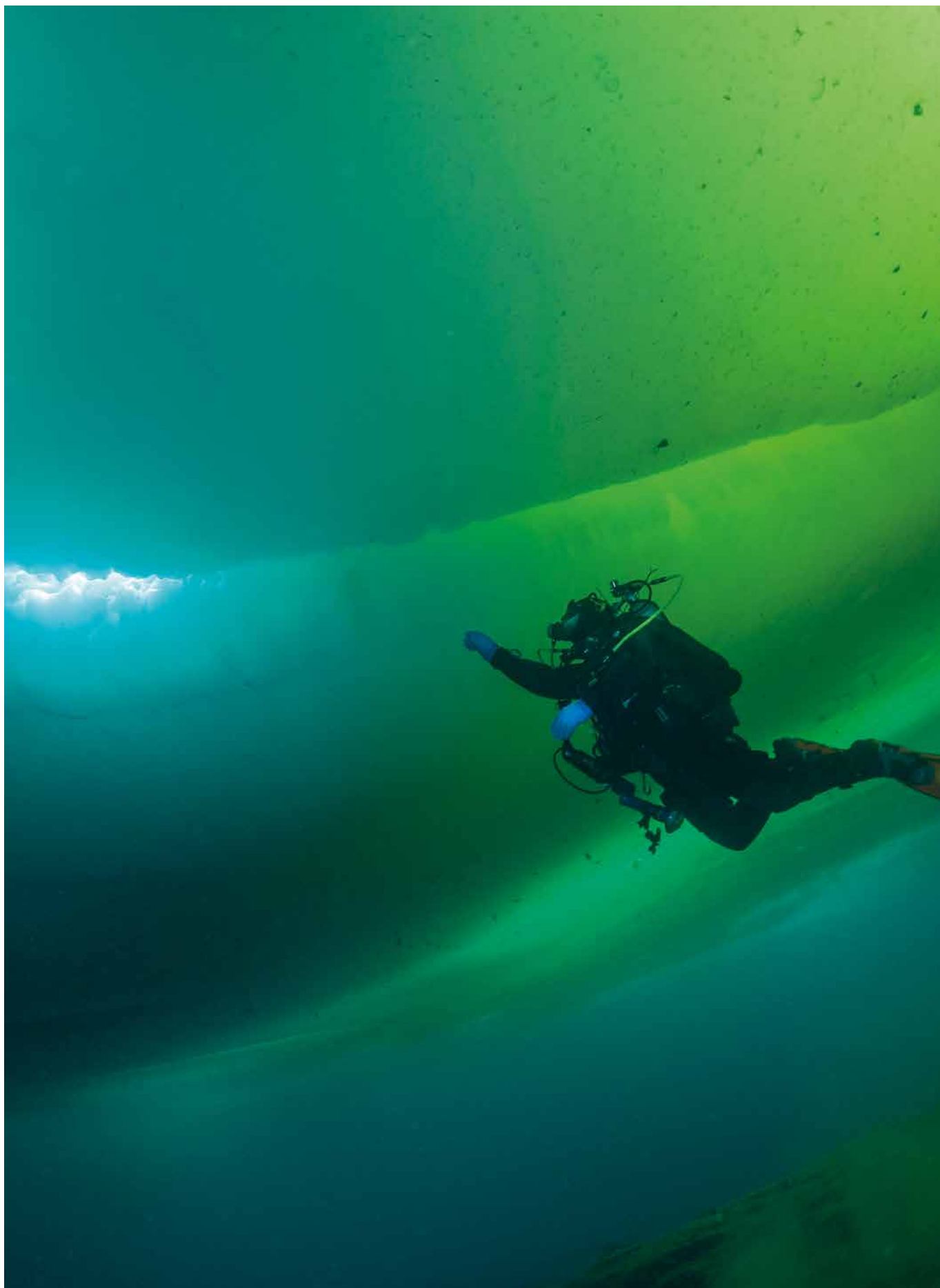
#### **Training:**

as an internal school of the UBO, IUEM offers eight master's degree courses very closely associated with its laboratories and contributes to the training of more than 270 students in master and 200 doctoral students.

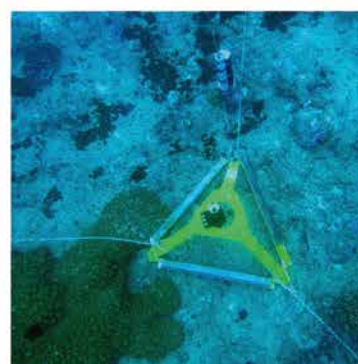
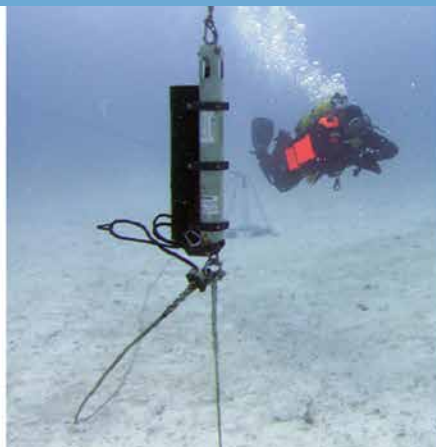
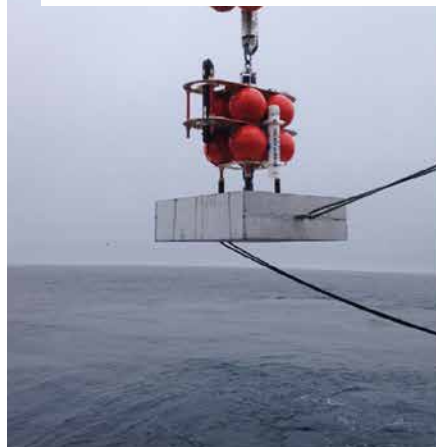
#### **Observation:**

Also an Observatory of the Sciences of the Universe (OSU) of the CNRS/INSU, IUEM contributes to a national observation mission carried out by a dedicated service unit. A place for initiatives that go beyond the national framework, IUEM and UBO convinced the 17 French universities involved in marine sciences to create a «Network of Marine Universities» and, from there, to participate in the construction of a European Research Area by sitting on the European Marine Board.

Directly involved in innovation and economic development, IUEM is a member of the Brittany-Atlantic Sea Cluster. A true melting pot of marine sciences, the IUEM is also a key player in the development of a regional marine policy and plays an important role in preparing a vision for the future of marine sciences.







Shom provides oceanographic and geographic information for maritime and coastal areas. As a national hydrographic service, its role is to understand and describe the physical marine environment in its relations with the atmosphere, the seabed, and coastal areas, to forecast its evolution, and to ensure the distribution of the corresponding information. Shom takes action in all seas and oceans around the world.

Shom represents France at the International Hydrographic Organisation (IHO) - which consists of nearly 100 maritime States - and coordinates the network of European hydrographic services. This network collaborates directly with the European Commission departments in charge of the sea - DG Mare - on maritime safety, planning of maritime zones, e-navigation, production and sharing of marine data (EMODnet, CISE), etc.

### SHOM'S ACTIVITIES ARE AIMED AT 3 PURPOSES:

- Marine cartography and national hydrography for the safety of navigation and the development of activities at sea;
- Operational support to national defense via environmental data for weapon systems and command;
- Support for public policies on the sea and coastline for the sustainable development of human activities at sea.

As a global scientific and technical actor, Shom acquires data, processes it into products and services, and distributes it. In parallel, its experts carry out research activities in partnership with national and international organisations to promote innovation.

### A SPOTLIGHT ON SHOM'S EUROPEAN ACTIVITIES

Highly integrated in European partner networks, Shom cooperates with more than 100 actors involved in more than 20 European projects across all European maritime basins where France is present.

### RESOURCES

- More than 550 people (excluding ships' crews);
- 5 locations: Brest (head office), Toulouse, Saint-Mandé, Nouméa and Papeete;
- 61 M€ annual budget;
- 4 specialized vessels provided by the French Navy, an oceanographic vessel shared with Ifremer, 7 hydrographic launches
- 800 days of activity at sea per year;
- more than 200 hours per year of LIDAR (airborne laser) flying;

### GEOGRAPHICAL COVERAGE

- French maritime areas: 11 million km<sup>2</sup>;
- Areas under the cartographic responsibility of France within the framework of the International Hydrographic Organisation (IHO) or in application of bilateral agreements with several coastal States;
- Areas of Defence interest (60 million km<sup>2</sup>).

### PRODUCTS AND SERVICES

- **739** paper nautical charts and **848** electronic nautical charts;
- **4500** visits per day to data portals and digital services;
- **7d/7** broadcasting of navigation warnings in the international NAVAREA II area and support to military operations.

The dissemination of these products and services is done through dedicated portals.

### DATA.SHOM.FR PORTAL

[data.shom.fr](https://data.shom.fr)

The portal allows to:

- consult geographical information online: oceanographic forecasts, bathymetry, cartography, maritime limits, wrecks, nature of the seabed and tidal observations.
- make your own map by overlaying the data on the portal.

### DISSEMINATION AREA

[diffusion.shom.fr](https://diffusion.shom.fr)

The portal gathers products for the blue economy actors and the mariners.

### MARITIME BOUNDARIES PORTAL

[limitesmaritimes.gouv.fr](https://limitesmaritimes.gouv.fr)

Shom ensures the dissemination of official maritime limits for the French Government.

### PRESS CONTACT

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The Pôle Mer Bretagne Atlantique (PMBA) competitiveness cluster federates and drives the maritime ecosystem and promotes innovation for the blue economy. It promotes the emergence of innovative projects through: networking of academic and industrial skills, fundraising, support for SMEs in their investment in R&D, access to markets for their new products and services, and development in Europe and abroad.

## BRINGING THE MARITIME SECTOR INTO A NEW ERA

With growing geopolitical conflicts and significant climate change, the global economy is undergoing profound upheavals, redistributing national and European priorities towards more sovereignty, urgent and rapid decarbonisation of our industrial

activities, and strengthened capacities for the control and surveillance of our territories. This in mind, the preservation of the ocean and its sustainable use is essential if not vital. This can only be addressed today with a better knowledge of the ocean, technological progress, and a profound change in all current maritime activities for the benefit of a sustainable and more responsible blue economy. **In this equation, innovation is an essential variable that Pôle Mer Bretagne Atlantique, with its network of over 450 members, aims to support.**

The blue economy offers opportunities that Pôle Mer Bretagne Atlantique puts into perspective through the support and accreditation of innovative projects carried out by its members.

From biodiversity to the intersection of digital, space, and maritime technologies, these are all themes that are already shaping the blue economy of tomorrow. The strategic roadmap of Pôle Mer Bretagne Atlantique is broken down into 6 Strategic Action Areas that target global markets and / or strong growth, and where our members have real capabilities and opportunities for development:

- Maritime defense, safety, and security
- Naval and nautical activities
- Marine energy and mineral resources
- Marine biological resources
- Coastal and marine environments
- Ports, infrastructures, and logistics

Since its creation, the Pôle Mer Bretagne Atlantique has supported and accredited **520** innovative projects in the above-mentioned strategic areas of action, for a total of **€1.4 billion** in R&D.

## PRESS CONTACT

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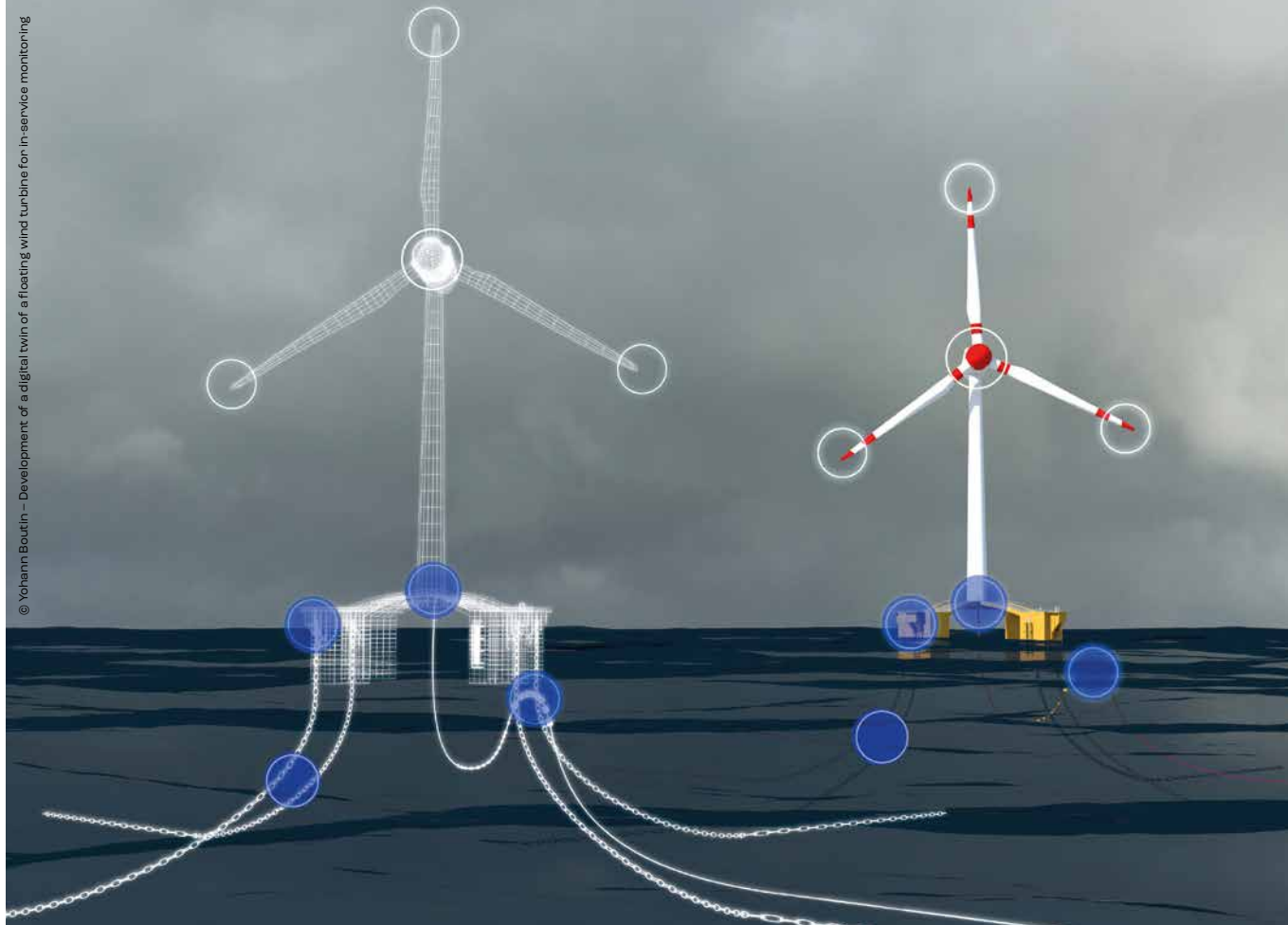
## A STRATEGY BUILT TOWARDS EUROPE AND ABROAD

With a dedicated team and 10 years of work and collaborations on a European scale, the PMBA has built a European network and uses its experience to serve European research and innovation policy.

In this respect since 2010, it has contributed to various expert groups of the Directorate-General for Maritime Affairs and Fisheries (DG-MARE). It also participates in many projects funded by the European Commission on various topics such as the energy transition of island territories, technologies for monitoring the marine environment, sustainable aquaculture, and satellite applications for the maritime environment. The Pôle Mer Bretagne Atlantique is also involved in European coastline strategies, with particular responsibility for coordinating Pillar 4 of the Atlantic Maritime Strategy entitled «Healthy ocean and resilient coasts.» Lastly, the PMBA is an ambassador for the European Union's Copernicus Earth observation program through its role as Copernicus Relay.

**The Pôle Mer Bretagne Atlantique is delighted to host the European Maritime Day in Brest. This is a great opportunity for Brest métropole and the entire maritime ecosystem of Western France to reaffirm their expertise and their involvement in the development of the blue economy.**





## THE REFERENCE INSTITUTE FOR R&D IN OFFSHORE WIND POWER AND OCEANIC ENERGIES

France Energies Marines is the national reference institute for R&D in the offshore wind power and oceanic energies. Its mission is to provide, enhance and nurture the scientific and technical environment needed to remove the barriers to technology development, while ensuring optimal environmental integration. France Energies Marines stands out for its cross-disciplinary approach, which provides the entire sector with the innovative and validated tools needed to reduce the cost of producing energy and financing operational projects. The Institute develops differentiating and holistic approaches to reduce the time needed to build farms. The Institute provides support for various technologies: bottom-fixed and floating wind energy, tidal stream energy, wave energy, ocean thermal energy conversion and osmotic energy.

The Institute's activities are carried out by a simplified joint stock company built around a publicprivate partnership, bringing together 27 members who are key players in the ORE sector in France: industrialists, academic and scientific structures, local authorities and marine competitiveness clusters.

## PROVIDING SOLUTIONS TO TECHNOLOGICAL AND ENVIRONMENTAL CHALLENGES

R&D for the development of the offshore renewable energy sector is the *raison d'être* of France Energies Marines. In this context, its research activities are mainly focused on collaborative work. However, in order to perpetuate its model and transfer its knowledge, the Institute also offers R&D and expertise services.

The Institute's four research programmes aim to remove the obstacles encountered at each stage of a wind farm project: accurate estimation of the resource, accurate sizing to allow full exploitation for 20 years and beyond, optimisation of operation and maintenance strategies at sea, and facilitation of acceptability through a pragmatic approach to potential interactions with the environment and other human activities. The products of this research are original field data for estimating energy resources and monitoring ecosystems, as well as design software, operational control methodologies, recommendation guides and proposals for amendments to standards and regulations. Their scientific value is ensured through peer-reviewed publications and PhD.

### RECOGNISED AND CULTIVATED SCIENTIFIC EXCELLENCE

France Energies Marines has the most extensive multidisciplinary team exclusively dedicated to offshore renewable energy R&D at national level. Thanks to the network formed by its members and partners, this team tackles the challenges of the industrial sector by drawing on the best academic experts. It thus has key skills in complementary disciplines and can support the sector on a range of topics.

As part of its collaborative R&D activity supported by the Investments for the Future programme, the Institute has set up a selection process for new projects promoting excellence. This process is divided into three phases: identification of priority industrial themes, proposal of pre-projects and setting up of projects.

France Energies Marines is actively involved in international networks in the field, which bring together various stakeholders: institutions, scientists, industry and NGOs. The aim is to share information and tools to provide structured support for the sector throughout the value chain.

### POOLING AND EXPANDING INTERNATIONALLY TO POSITION FRANCE ON THE WORLD STAGE

Offshore renewable energies, offshore wind power in particular, have a very significant potential, making them essential in all energy mix scenarios aiming for carbon neutrality by 2050. To achieve these objectives, collaborative R&D and substantial research efforts, as well as international cooperation, are essential. Thus, France Energies Marines is a real asset in this context, placing France at the heart of scientific research on marine renewable energy. The large-scale deployment of offshore wind energy also requires a long-term planning exercise on each coastline. This requires a good knowledge of the maritime environment and appropriate tools to understand the long-term effects of human activities on the ecosystem. It is through mutualised actions carried out in synergy that the sector will provide effective responses to the challenges of the energy transition.



© Thomas Pavy – Study of the effects of offshore renewable energy systems on the ecosystem

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The French Biodiversity Agency (OFB) is a public institution dedicated to the protection of biodiversity. It is responsible for the protection and restoration of biodiversity in France and in its Overseas Territories.

Created January 1, 2020 under the Law No. 2019-773 of July 24, 2019, the French Biodiversity Agency is under the supervision of the Ministry of Ecological Transition and Territorial Cohesion and the Ministry of Agriculture and Food Sovereignty.

The OFB intervenes in the field and supports programs for the preservation and restoration of aquatic, terrestrial and marine ecosystems, and the reconciliation with socio-economic issues.

This public institution works daily by mobilising a community of actors, decision-makers, and citizens around the subject of biodiversity: State and local authorities, associations, companies, scientists, farmers, fishermen, hunters, nature sports enthusiasts, etc. A leveraging role that is essential to reduce the pressures on fauna, flora, and their habitats.

#### **THE OFB IS IN CHARGE OF 5 ADDITIONAL MISSIONS :**

- environmental and wildlife health policing;
- knowledge, research, and expertise on species, environments, and their uses;
- support for the implementation of public policies;
- management and support for managers of natural areas;
- support for stakeholders and mobilisation of society.

#### **THE STRENGTHS OF BIODIVERSITY**

The French Biodiversity Agency relies on the expertise of its 3,000 agents, two-thirds of whom work in the field, including 1,700 environmental inspectors. OFB teams work every day in the heart of the local territories to prevent and fight against attacks on biodiversity, but also to better understand ecosystems, how they function, and their adaptation to stresses.

In 2019, the report of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) mentions the five major causes of biodiversity decline:

- overexploitation of resources
- pollution
- invasive alien species
- land artificialisation
- climate change

Fighting against water pollution, protecting Posidonia in the Mediterranean, sea turtles in French Guiana or octopus in Mayotte, managing drought, preserving hedgerows..., OFB agents act daily in regards to these five factors of biodiversity erosion.

#### **OFB' STRENGTHS**

- 3,000 staff members (including 2,000 on site agents, 1,700 of them being environment inspectors)
- 11 regional directorates and 1 interregional metropolitan directorate
- 1 overseas territories directorate with 5 territorial delegations
- 8 Marine Nature Parks
- 1 «Sea» national hub, 3 waterfronts delegations
- 30 Nature Reserves

#### **PRESS CONTACT**

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Cedre was created on January 25, 1979 as part of the measures taken by the French government following the sinking of the Amoco Cadiz oil tanker in order to improve preparedness in the struggle against accidental water pollution and to reinforce the French response system. It is responsible, at the national level, for documentation, research, and experimentation on pollutants (oil and other chemicals as well as containers and more recently, aquatic waste), their effects, and the specialised methods and means used to combat them. Cedre also provides training and contingency planning for its partners and clients. Its consultancy and expertise efforts cover both marine and inland surface waters. Funding for Cedre is provided by grants and public and private contracts.

#### THE INTERVENTION

As part of its public service mission, Cedre is on-call 24/7 for the French government and local authorities in the event of pollution or risk of accidental pollution in fresh or marine waters. This service is also provided to European Union Member States

and associated countries for pollution and chemical pollution risks at sea, as well as to foreign public authorities or the private sector under certain conditions. At the request of prefectures, Cedre will deploy one or more engineers to the field or to crisis centers in order to provide technical and operational expertise.

Cedre also maintains mapping and modelling tools to provide authorities in charge of pollution response with the best possible assessment and monitoring elements.

In order to maintain and develop its expertise, Cedre puts into practice skills which contribute to the development of its knowledge.

#### THE RESEARCH CENTER AND EXPERIMENTATION

Cedre has remarkable facilities in Brest. Its teams have designed and developed original devices to study the behaviour and fate of pollutants in aquatic environments, as well as to assess the effectiveness and impact of products and techniques used in response.

This research and experimentation work takes place on 2.5-hectares of technical facilities that includes a laboratory, water columns, and an experimentation loop, a facility for conducting ecotoxicology tests, a deep basin, and a basin with an artificial shoreline. Each year, numerous studies and projects are conducted, often within an international framework. Cedre contributes directly to the development of knowledge on accidental water pollution and publishes studies, operational guides, and chemical guides, some of which are the standard in France and abroad.

### THE DOCUMENTATION CENTER

Since its creation, Cedre has capitalised on knowledge in its field of expertise. Nearly 10,000 references are available in French and English, as well as over 12,000 photographs and videos. These references are accessible free of charge, and the library is open to the public by appointment. Cedre's mission also includes the distribution of educational material to better inform the public about accidental water pollution.

### THE PROFESSIONAL TRAINING CENTER

With certifications from Qualiopi and Nautical Institute, Cedre provides training courses recognised by the International Maritime Organisation. These theoretical and practical training courses are aimed at both the public and private sectors and can take place around the basins and artificial shoreline of Cedre's technical facilities. Training courses can also be organised based on need, «à la carte», and on-site of an organisation that requests it, in France or abroad. Each year, Cedre provides training to 1,500 people around the world.

### STUDY AND MONITORING OF AQUATIC WASTE

Cedre is in charge nationally of the monitoring of waste on the shoreline and in river basins, and feeds information to international public policies such as the Marine Strategy Framework Directive and the OSPAR and Barcelona Regional Seas Conventions. To fulfil this role, Cedre runs several monitoring networks, participates in knowledge development projects, and is involved as a scientific and technical expert in international working groups.

### STUDIES AND PLANS

Cedre carries out contingency plans throughout the world, taking into account the specificities of its clients, whether they are in the public or private sector. Following audits of sites concerned and running risk analyses, equipment recommendations can be proposed.

### CEDRE SNAPSHOT

- **Skill base:** advice and expertise in the management of accidental water pollution
- **Activities:** response support, contingency planning, training, analysis and testing, research, documentary resource centre
- **Geographical coverage:** France and international
- **Workforce:** 50 engineers, researchers and technicians
- **Annual budget:** €4.5 million
- **Date of creation:** 25 January 1979
- **Location:** 715 rue Alain Colas, Port du Moulin Blanc, Brest, France

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## L'Institut polaire français (IPEV)

The French Polar Institute: French polar research implemented from the city of Brest



The French Polar Institute Paul-Émile Victor is the public agency responsible for implementing French research in the polar regions. From its headquarters in the Technopôle Brest-Iroise, it operates in three areas of activity spread across the planet:

**In the North**, in the Arctic, the Institute operates jointly with the German Alfred Wegener Institute the AWIPEV scientific station, in the Svalbard archipelago, at 79°N. The Franco-German facilities are spread over two sites: The first is the scientific village in Ny-Ålesund. The second is the French station Corbel, located 5 km from the village, at a distance from any man-made pollution. The Polar Institute also provides financial support for research projects in all the lands bordering the Arctic Ocean: Alaska, Nunavik, Labrador in Canada, Amur and Yakutia in Russia, but also Greenland, Iceland, Norway and Sweden.

**On the border between the Indian and Southern Oceans and spread** between 37°S and 49°S, in the Kerguelen and Crozet archipelagos and on the islands of Amsterdam and Saint-Paul, the Institute's staff implements scientific projects in geosciences and life sciences. The Polar Institute is also in charge of installing, maintaining and supplying some forty shelters for researchers who have to reach isolated sites in these sub-Antarctic islands.

**Finally, in the far south, in Antarctica** between 67°S and 75°S, the Institute orchestrates the implementation of scientific projects and the functional management of two permanent stations. The first is the Dumont d'Urville station, established on the coast of Terre Adélie, the second is Concordia, built in the heart of the continent and the only Antarctic station operated jointly by two States, France and Italy.

Because access to and stay in these regions are difficult, the Polar Institute deploys special and substantial means, advanced technologies and uses the specific skills and knowledge of its staff to make excellent scientific research possible in these extreme environments.

### **POLAR AND MARINE WORLDS INTERTWINED IN SCIENTIFIC RESEARCH**

The deep connections between the polar and marine environments are well known. The poles influence the ocean currents of the entire planet, are home to the only terrestrial ice caps that play a major role in the evolution of sea levels, and the fauna and flora that they shelter live for the most part on the ocean floor or draw their food resources from it.

Climatology, meteorology and atmospheric sciences, but also ecology, fauna or flora physiology: within these disciplines interested in the poles, many scientific projects include the ocean as a parameter in their field of study, an observation reinforced by the need to improve knowledge of ongoing climate change.

The polar oceans are of course themselves the subject of research supported by the French Polar Institute, notably thanks to coastal ships in the Arctic and Antarctic, or as part of campaigns to enhance the crossing of the Southern Ocean on board the supply ship L'Astrolabe.

### **THE OCEANS: PRIVILEGED ACCESS ROUTES TO POLAR TERRAIN**

Far from being just a subject of study, the oceans are for the French Polar Institute a real access route to its fields of activity. The world's major shipping routes are used to transport supplies and equipment from the mainland by cargo ship, until it is necessary to take more confidential routes: Institute staff and scientists reach the sub-Antarctic islands on board the Marion Dufresne.

The boat is also the preferred mode of travel for exploring the Svalbard fjords. The Antarctic stations can be supplied by the Astrolabe, a polar vessel owned by the TAAF and equipped by the French Navy, which is used by the Institute to provide services to the French stations from Tasmania, as well as logistical support and coastal marine research in Terre Adélie.

### **PRESS CONTACT**

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## ENSTA Bretagne

French State Graduate, Post-Graduate Engineering School and Research Institute for mobility, defense and maritime innovation helping to shape the companies of tomorrow

Steeped in two centuries' worth of history, ENSTA Bretagne trains civil and military engineers in Brest and conducts multidisciplinary research activities. The school nurtures close ties with the marine engineering sector, which employs 50% of its young graduates and represents more than half of its research programs, in the mechanical sciences or information technologies.

1,000 students are enrolled at ENSTA Bretagne and there are over 300 graduates every year (from the engineering and Master's courses as well as with PhDs) in sea-related fields of excellence: naval architecture, marine renewable energies, systems on observation and knowledge of the marine environment, autonomous maritime drones, etc.

### ACCLAIMED, CUTTING-EDGE AREAS OF EXPERTISE

Hydrography-oceanography, observation systems and Artificial Intelligence, mobile and autonomous robotics, embedded systems, naval architecture, marine renewable energies, maritime project management: these are all examples of ENSTA Bretagne's areas of expertise that have gained renown across France and at global level. They support the development and innovation of the maritime sector and the Brittany region.

Fully involved in the blue economy, ENSTA Bretagne contributes to scores of projects aimed at enhancing environmental knowledge, developing marine renewable energies and improving the durability and eco-design of vessels and naval platforms.

ENSTA Bretagne also plays a role in Europe's strategic autonomy by supporting France's defense sectors, both by training executives in the sector and through its research activities for the benefit of defense stakeholders.

### LONG-STANDING EDUCATION FOR ENGINEERS AND EXPERTS OF THE MARITIME SECTOR

Every year, some 300 engineers and experts (with Master's and Specialized Advanced Master's degrees as well as PhDs) graduate from the school and are immediately snapped up to occupy a variety of roles. With half of these roles in the maritime sector, our graduates thus help the latter to thrive now and in the future.

There is a common purpose uniting their profiles: to contribute to innovation projects, in design, R&D, measurements & tests or program management. In addition to engineering degrees, Master's degrees and Specialized Advanced Masters, the school



organizes courses dedicated to professionals as part of continuing professional development.

The school holds strong appeal. For 20 years, it has been attracting a growing number of students and doctoral students from all over France and abroad. In the space of two decades, the number of graduates per year has increased threefold.

### **ADVANCED RESEARCH ON CIVIL AND MILITARY APPLICATIONS**

ENSTA Bretagne's research teams are part of jointly supervised academic laboratories (IRDL, Lab-STICC, FoAP) and research facilities shared with industry. Their studies focus on broad applications, military and civil alike, including a significant proportion in the maritime technologies.

The research center boasts unprecedented experimental facilities for characterizing phenomena and validating scientific findings, in the mechanical sciences (behavior of materials and assemblies in the marine environment) and information technologies (cyber center, anechoic chamber, robotics pool, hydrographic vehicles, drone systems and more).

A great many partners are involved in the regional, national and international research programs, which are funded by the State, particularly the Ministry for the Armed Forces (ENSTA Bretagne's supervisory authority is the French Government Defense Procurement and Technology Agency (DGA)), Europe, local authorities (Region of Brittany, Département of Finistère, Brest metropole, etc.) as well as the many partner companies.

### **AN «ENSTARTUPS» INCUBATOR PROVIDING INNOVATION SUPPORT AND GUIDANCE**

ENSTARTUPS, ENSTA Bretagne's incubator, hosts a dozen or so entrepreneurs with plans to start up a business, often inspired by sustainable maritime development and protection of the marine environment (upcycling marine sediments and used fishing nets, eco-design of a ship, development of the hydrogen sector, diving instruments). They are given guidance and advice at every stage of their development. New start-ups flourish every year.

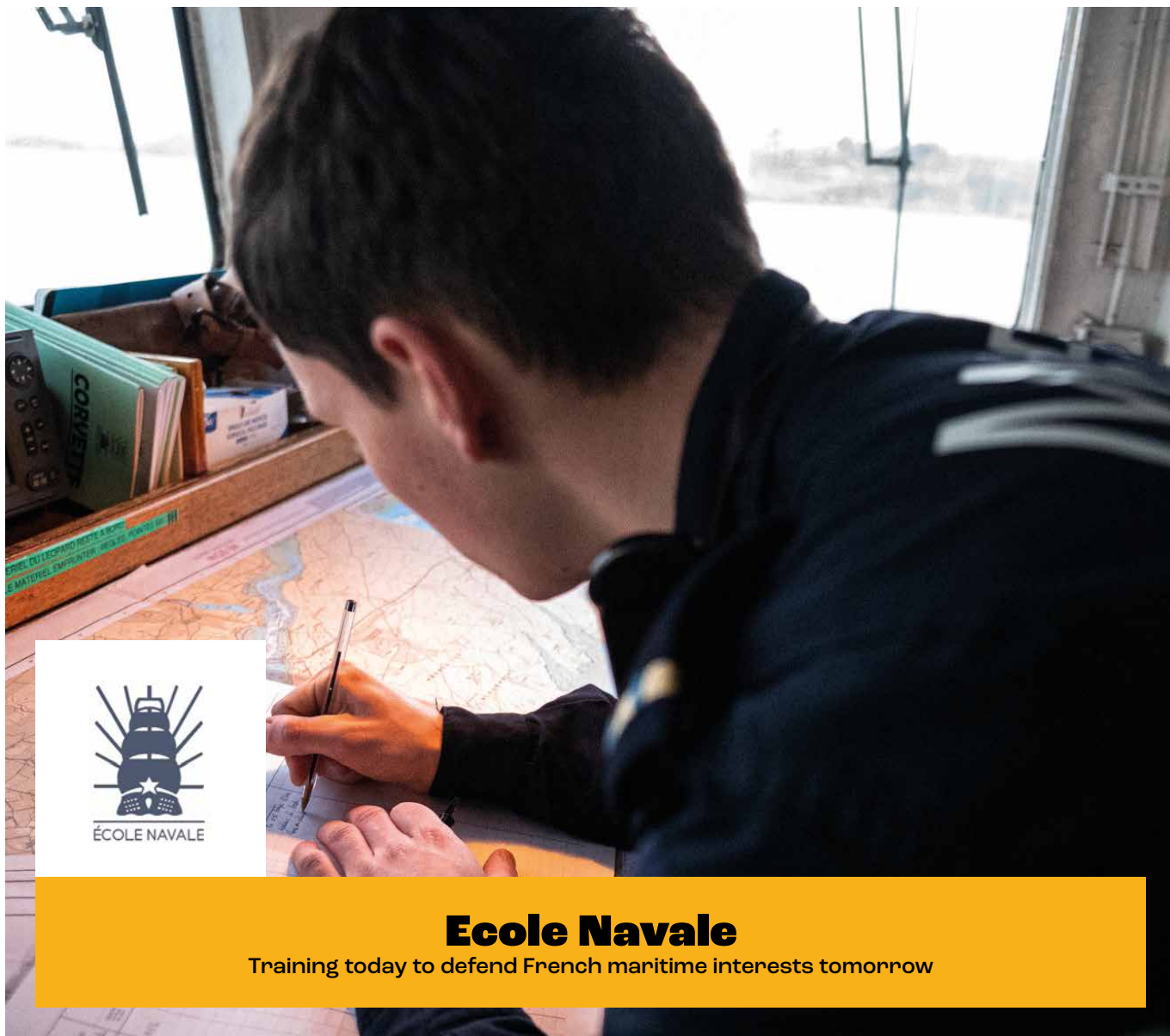
### **A VAST NETWORK OF PARTNERS**

ENSTA Bretagne benefits from a vast network thanks to the countless partnerships it has forged with large corporations, SMEs and start-ups as well as public research organizations, institutions, graduate schools and universities both in France and worldwide. It leads initiatives to federate stakeholders based in Brittany and make an active contribution to the growth of the defense and civil maritime sectors within France and beyond its borders.

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## Ecole Navale

Training today to defend French maritime interests tomorrow

For more than 200 years the École Navale has been training sailors and officers who, from the moment they join the forces, will be responsible for implementing – at sea – systems considered as among the most complex designed by man. The cadets are those who will fight in the future, under the sea, on the sea, and above the sea, to preserve peace and defend France's national interests.

The role of future naval career officers is to carry out the functions of supervision and command within the operational units of the French Navy (combat ships, submarines, fleet air arm, marine commandos). During their training at the École Navale, they will develop the skills that will turn

them into future naval leaders. They will receive an engineering degree awarded by the École Navale. The constant evolution of the world and navy means implies for the cadets to develop their human, military and moral qualities and leads the school to offer proper training answering the major stakes of today – and getting ready to face tomorrow's challenges! Maritime and strategic issues don't detract from the importance of preserving the planet and the awareness of the cadets is raised among energy transition.

The new École navale motto «For France, by the seas, we fight» embodies the engagement values that constitute the backbone of the school.

### **A SCHOOL WILLING TO STAY OPEN TO THE WORLD**

Looking towards the civilian sector, the École navale also provides postgraduate courses in naval engineering. They are incorporated within the framework of today's challenges, such as the advanced master's degrees in «Expert in marine renewable energies» and «ships maintenance». In addition to postgraduate education, the school provides continuing training in leadership and introduction to the maritime stakes aimed at civilian students and executives.

Nearly 2000 students and trainees are trained each year by a multidisciplinary team gathering university lecturers and researchers along with experienced seamen. To make this training a success, the École navale can rely on major assets creating unique skills: a 110 hectare maritime and onshore training center, innovating educational materials and a naval engineering research center.

### **A MULTIDISCIPLINARY RESEARCH POOL DEDICATED TO TRAINING, INNOVATION AND MARITIME SECURITY CHALLENGES.**

Training lean on a research activity organized around two pools (sciences, humanities) and two industrial chairs: the resilience and leadership chair and the naval systems cyberdefence chair. The French Naval Academy Research Institute (IRENav) is a multidisciplinary research centre geared towards topics in the maritime field such as hydrodynamics, energy conversion, geographic information systems or AI.

Working on tandem with the French Navy Military Staff, the École navale research teams take part in developing the next generation battleship both on her technologic and organisational features.

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Since 1990, Océanopolis has been a formidable educational tool, providing a space for sharing and exchanging knowledge, telling the natural history of our oceans through scientific mediation that blends education and creativity. Brittany's leading tourist facility with more than 13 million visitors, Océanopolis has been informing, entertaining and amazing people in order to change their outlook on our oceans for more than 30 years. Océanopolis has been awarded the CCSTI label (Centre for Scientific, Technical and Industrial Culture) and is a member of Brittany's Scientific Culture Hub. These labels are based on the expertise of our teams in the field of scientific mediation and our roots in an area which concentrates more than 80% of France's public and private oceanographic research.

#### **CONTRIBUTING TO OUR KNOWLEDGE OF THE MARINE ENVIRONMENT AND ITS PROTECTION**

Océanopolis offers four complementary marine areas, with an otter trail alongside the Brittany, tropical and polar pavilions. More than 10,000 m<sup>2</sup> of exhibition space allows visitors to discover many species, including sharks, seals, penguins and even

coral, in aquariums that faithfully recreate a multitude of highly diverse ecosystems. Océanopolis owes the high quality of its presentation of living things to the expertise of its teams and its particularly effective technical set-up. These presentations allow Océanopolis to make oceanographic knowledge available to as many people as possible, informing them about how our oceans function, posing questions to our visitors and enabling them to measure the impact of their actions.

Océanopolis also participates in the conservation of species thanks to multiple scientific partnerships and contributions to studies which describe new species thanks to data collected in aquariums.

#### **AN INTERFACE BETWEEN SCIENCE AND SOCIETY**

Throughout the year, Océanopolis offers a rich and diversified programme with new activities for each school holiday, recurring scientific culture meetings and collaborations with scientists, artists and cultural partners. Océanopolis's mission is to help raise awareness among all audiences through its mediation and educational activities, helping to create responsible and committed citizens.

Because of its educational and scientific approach, Océanopolis has been recognised by France's national education service since 1992 and is an essential national educational facility available to teachers and their students.

Each year, more than 35,000 pupils from pre-school through to Masters are welcomed, including guided tours, educational workshops, e-classes, school trips, school conferences and even as part of the support in calls for projects: marine area education projects, Young Reporters of the Arts and Sciences and the Environment, [ECO] advisers of the ocean, School Plastic Hackathon etc.

These educational programmes also include training and resources for teachers so they are able to ensure their students understand how our oceans work and become aware of the richness and fragility of marine biodiversity.

### **A NEW ATTRACTION AND A UNIQUE CONCEPT: OCEANOLAB**

Oceanolab is the new attraction of 2023 at Océanopolis. This new attraction, which opened at the end of March, takes visitors through an original experience at the heart of ocean research.

In this new laboratory, teams of scientists will work for a year on a marine ecology research project in relation to climate change, pollution, and the erosion of marine biodiversity.

Océanolab is a unique concept of «science in the making,» where visitors of Océanopolis have the chance to interact and discuss first-hand with researchers and scientific teams who are outside of their laboratories and closer to the public that interviews them.

Conceived, developed, and implemented by Océanopolis and IUEM/UBO (European Institute for Marine Studies of the University of Western Brittany), the Océanolab program combines the production and sharing of knowledge in a particular moment of time and space, while pursuing the perfection of these two missions.

For its first year, Océanolab welcomes a research project led by a team of scientists from Ifremer and CNRS named «MicroCO2sme - Microplastics in a CO2-Rich Ocean: The Use of Micro-Mesocosms to Assess Impacts on a Temperate Ecosystem.» This project aims to study the vulnerabilities of flat oyster reefs, threatened socio-ecosystems, and plastic pollution in the context of climate change with a focus on ocean acidification and warming. The objective is to assess the long-term impacts of climate change, microplastics, and their interaction on the flat oyster, a reef-building species, and associated communities.

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Oceans cover 70.8% of our planet. 70.8 by Océanopolis, a museum for the ocean, invites the general public to discover the maritime world from an unprecedented perspective of technology and innovation. This new place dedicated to scientific culture, in the Ateliers des Capucins in Brest, is unique and accessible to all, offering an interactive and educational experience. From marine biotechnologies to the exploration of the deep sea, from maritime shipping routes to renewable marine energies, from tomorrow's means of transport to ocean knowledge provided by satellites, 70.8 makes the advancement of knowledge about our oceans accessible to all.

#### **A UNIQUE SPACE FOR AN OCEAN OF SCIENCE AND INNOVATION**

70.8, a museum for the ocean, dropped anchor in the heart of the Ateliers des Capucins in 2021. It's a space that once housed the shipbuilding workshops which were central to shaping the history of Brest. The industrial heritage of the workshops combined with the modernity of the revamped space have made it the perfect setting for this new symbol of a city looking to the future.

In front of the entrance to 70.8 stands the Emperor's canoe, a flagship work in the National Maritime Museum's collection which impresses with its size and history. It symbolises the extremely strong link that exists between the city, awarded the City of Art and History label in 2017, and the Brest site of the National Maritime Museum.

Finally, when visitors push open the doors of 70.8, they discover an irresistible invitation to embark on a voyage around nearly 1,000 m<sup>2</sup> of visitor space. It's a genuine allegory of a sea voyage, with this three-deck ship designed around concrete keels that emphasise both the structure and the identity of the space.

The opening of 70.8 at the Ateliers des Capucins completes a unique path for visitors to explore the oceans. Biodiversity and marine ecosystems at Océanopolis and maritime technology and innovation at 70.8. Two facilities with a single vocation: sharing knowledge and creating emotions to change people's outlooks on our oceans.



## LOOKING AT THE BLUE PLANET OF TODAY AND TOMORROW

Oceans are at the heart of the major economic, environmental and societal challenges of the 21st century. Sustainable use of oceanic resources combined with maintaining a good ecological state of our ocean ecosystems represents an opportunity for 'blue' growth for humanity, whether in the field of energy, food or health. Research and innovation are driving this future development, which requires knowledge built and shared by and with all.

In order to transmit this knowledge to the general public and to provide broad information on the issues raised by the sea, six themes are presented: marine biotechnologies, deep sea exploration, renewable marine energies, the study of the ocean to better understand it, maritime traffic and ships of the future and shipbuilding.

## IMMERSIVE AND INTERACTIVE VIRTUAL EXPERIENCES

Architects, scenographers, museum experts and model makers have imagined the space like a daydream displaying the best of the ocean. So, it offers an unprecedented exploration aboard a scientific vessel, from the deck and its viewpoints, through to a laboratory, each time offering immersive and interactive virtual experiences, where knowledge is mixed with fun.

There are activities to fascinate the young and old alike: an interactive carpet for a walk on the foreshore, a large circular screen some 7 metres in diameter, a hologram, a sound quiz, life-size models and interactive workshops on shipbuilding and the installation of fields of wind and tide turbines etc.

Visitors can also experience life aboard a submarine and the Energy Observer ship through 1/100th scale models and discover that marine biotechnologies are part of our daily lives. Younger children can experiment with their eyes, hands, ears and even their feet.

Over the year, several events will be offered to visitors, including meetings, workshops and thematic tours.

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**IMT Atlantique**  
Bretagne-Pays de la Loire  
École Mines-Télécom

## IMT Atlantique

Chaire ANR AI OCEANIX: Physics-Informed AI  
for Observation-driven Ocean AnalytiX



IMT Atlantique is a leading general engineering school, ranked 5th in the 2023 ranking of engineering schools by L'Étudiant. IMT Atlantique is among the top 400 universities in the world in THE World University Ranking 2023 and 44th in the world under 50 years old. The school is internationally recognised for its research in several disciplines in the Shanghai QS and THE rankings. It is part of the Institut Mines-Télécom and is under the authority of the Ministry of Economy, Industry and Digital.

With three campuses in **Brest, Nantes, and Rennes**, and an **incubator** at all three campuses, IMT Atlantique aims to **combine digital, energy, and environmental technologies** to transform society and industry through training, research, and innovation, and to become, at the international level, the leading French higher education and research institution in this field.

IMT Atlantique offers a general engineering program for which the majority of students are recruited through the Mines-Ponts competitive examination. The school also offers three engineering degrees through apprenticeships, as well as master's degrees, specialised master's degrees, and doctorates. IMT Atlantique's training programs are supported by cutting-edge research in six joint research units (along with the CNRS, INRIA, INSERM, universities and engineering schools), of which it acts as supervisor: GEPEA, IRISA, LATIM, LABSTICC, LS2N and SUBATECH.

IMT Atlantique relies on its excellence in research in the leading areas of its sectors (energy and digital, cybersecurity, environment and digital, industry of the future, nuclear, health and digital, risks and interactions) and by combining scientific fields to **meet the challenges of tomorrow: digital transition, environmental transition, industrial transition, energy transition, health of the future, and fundamental research**, with the support of two institutes; Carnot Télécom & Société Numérique, and Carnot MINES.

#### **THE ANR AI OCEANIX CHAIR: PHYSICS-INFORMED AI FOR OBSERVATION-DRIVEN OCEAN ANALYTIX**

Led by Ronan Fablet, professor at IMT Atlantique, the Oceanix Chair uses methods of artificial intelligence to study ocean dynamics. The aim is to gain a better understanding of oceanographic conditions, with numerous applications in weather forecasting, ship routing, and marine space surveillance.

Drawing on the cutting-edge expertise of **Ifremer** and the **University of Western Brittany** in marine science and technology, and IMT Atlantique in engineering/data science, the research aims to gain a better understanding of ocean dynamics and to develop high-performance monitoring and surveillance tools to respond to issues such as the impact of extreme climatic events, the monitoring of fishing activities, the surveillance of maritime areas, and renewable marine energy. The Oceanix Chair is positioned at the crux of two disciplines: ocean sciences and artificial intelligence. Its ambition is to use AI methods (data science, deep learning, etc.) to better analyse and predict ocean dynamics. "Until now, we were content to use high-performance computing," explains Ronan Fablet, "But with AI, it is possible to go much further in the exploitation of observation data, to reconstruct certain missing data, and to develop new types of modeling.»

#### **THE EUROSEA PROJECT - AN INTEGRATED OBSERVATION SYSTEM FOR SUSTAINABLE OCEAN MANAGEMENT**

The EU-funded EuroSea project aims to coordinate a wide range of European actors towards national systems integrating an international observation system. This project focuses on the evolution of a data collection system of essential ocean information for blue growth and sustainable ocean management.

Ocean observation is a «complicated science» that cannot be solved by individual nations; there needs to be high-level integration of coordinated ocean observations that can be sustained over the long term. EuroSea strengthens, among others, the European and Global Ocean Observing Systems (EOOS and GOOS) and supports its partners. It aims to demonstrate the value of the European Ocean Observing System through three key activities focused on operational services, ocean health, and climate, where a dialogue between stakeholders of the ocean observing system will guide the development of services, including market replication and innovation, supporting the development of the blue economy.

#### **THE CAPNAV PROJECT - CHARACTERISATION OF PARTICULATE EMISSIONS FROM SHIPS**

The CAPNAV project aims to characterise fine particle emissions from shipping on conventional diesel propulsion and on LNG (liquefied natural gas) engines. The objective is to improve our knowledge of the nature and concentration of fine particles emitted by maritime transport, in particular through precise quantification of fine particle emissions linked to port manoeuvres, using dynamic acquisitions at the source (stack) synchronised with the recording of ship parameters (position, speed, load) and propulsion.

Environmental transition, a strategic axis of ITM Atlantic. This theme is organised into three main areas: engineering, metrology, and observation and ICST for the environment with diversified application sectors covering the oceanic domain, urban, and industrial territories.

For more information: [www.imt-atlantique.fr](http://www.imt-atlantique.fr)

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CNRS • SORBONNE UNIVERSITÉ  
Station Biologique  
de Roscoff

## Roscoff Marine Station

150 years of exploration, discovery, and sharing  
ocean knowledge



Founded in 1872, the Roscoff Marine Station is a marine biology and ecology research and teaching center run by Sorbonne University and the CNRS. It employs nearly 300 people, making it the largest marine station in Europe. It offers scientists and students a uniquely rich scientific and technological environment to study marine organisms and their ecosystems. Roscoff is internationally renowned for its scientific excellence and is a global leader in macro and micro algal research.

The Station is also one of the host sites of the European research infrastructure EMBRC (European Marine Biological Resource Centre). Through EMBRC, Roscoff offers the international scientific community and private sector partners access to world class services and ecosystems including one of the largest collections of cultured marine organisms, state of the art analysis platforms, unique annotated data collections, as well as to a broad spectrum of on-site technological and scientific expertise.

The Station is strongly committed to regional economic development. In partnership with the Morlaix Regional Council it supported the creation and development of a thriving marine biotechnology innovation ecosystem – the Blue Valley science park.

### GEN4BIO

#### **1. Deployment of an Augmented Genomics Observatory: From data to prediction in a changing world.**

There is a deep and growing international consensus that gaining real time understanding of the changing ocean and its biosphere is one of the most important challenges for society, both today and tomorrow. To support the implementation of UN Sustainable Development Goal 14 «Conserve and sustainably use the oceans, seas and marine resources for sustainable development» and in light of the launch of the UN Decade of Ocean Sciences for Sustainable Development (2021-2030), the Station is developing a next generation marine biodiversity genomic observation program to monitor and predict the impact of environmental changes on coastal environments.

The GEN4BIO project was launched this year and will enable the rollout of innovative tools unique in Europe to study environmental DNA and track the evolution of marine ecosystems. This project is supported at both the regional and national levels as part of the CPER 2021-2026 framework. The observatory has also been financed by the

Investissements d'Avenir (PIA3) program to develop an «augmented observatory» strategy, which will integrate and analyze scientific data from diverse sources (imaging data, in situ sensors, social data, etc.) to generate new enriched data sets and flows, models, and indicators for decision makers and social partners. On a wider European level, the EMOBON project will contribute to a much higher degree of knowledge sharing. Its main goal is to deploy common tools and protocols across 15 partner marine stations located on all major European coastlines.

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## **2. Research on the cultivation of macroalgae and supporting the seaweed industry.**

For many years, the Roscoff Marine Station has been a vital player in the algal industry. By coordinating the PIA Idealg project, it played a pivotal role in establishing the scientific basis for seaweed cultivation. The European GEN4BIO project aims to take this work to the next level, by building new infrastructures that will drive future progress in cultivating and exploiting key seaweed species and will contribute to maintaining French leadership in seaweed research.

## **SUPPORTING SOCIAL AWARENESS, DIALOGUE, AND ECONOMIC DEVELOPMENT.**

### **1. Training**

The Blue Train project, «Initial and advanced training to develop the blue bio-economy», is supported by the «Partnerships for vocational training and employment» program of the French government's «Investissements d'Avenir» program and sponsored by the Caisse des dépôts & consignation. Blue Train is coordinated by Sorbonne University, and is developing a new offer of initial and continuing education courses that meet the emerging challenges of the blue economy sector in Brittany linked to marine biotechnologies. Blue Train also promotes social awareness of the challenges in sustainably exploiting and preserving marine resources and in sustainably developing promising economic sectors. It brings together a broad range of partners from different backgrounds: higher education institutions, companies, and part time professional training schemes.

### **2. Biotech serving the algal industry**

On the 17th of March 2021, the Lloyd's Register Foundation, in association with the CNRS and UN Global Compact, launched a global coalition to support industrial development of the seaweed sector, backed by the latest scientific research. Roscoff Marine Station (via the CNRS) is the scientific coordinator of this alliance. Our goal is to raise awareness and establish global standards by bringing together the many stakeholders in the seaweed sector – producers, industry, scientists, research organizations, governance, associations, and citizens. These new international norms and standards will be founded on, and support the global uptake of the United Nations Sustainable Development Goals, particularly relating to «aquatic life» and «zero hunger».





## National Museum of Natural History

More than four centuries of discoveries linked to the Ocean.

The National Museum of Natural History (MNHN), a major scientific institution with rich collections, has been studying nature and transmitting naturalist knowledge since the 17th century, and is one of the world's leading natural history institutions. The MNHN, through its 13 sites including 2 marine stations in Brittany, contributes to the knowledge and conservation of biodiversity through research, conservation of collections, teaching, dissemination and expertise to the French and European public authorities for environmental policies. The MNHN's staff is composed of more than 2,500 people, including 570 researchers.

As a heritage of humanity, its naturalist collections are among the 3 most important on the planet and are used for research by scientists from all over the world. The marine collections of the MNHN are fed by the numerous oceanographic cruises, in connection, in particular, with the programs «La Planète revisitée» or «Tropical Deep Sea Benthos». These collections are the cornerstone of the Bioinspire-Muséum project, which supports and promotes bioinspiration; a marine bioinspiration studio has thus been created at the Concarneau station.



Recognized as a center of excellence thanks to its publications and the international prizes awarded to its scientists, the MNHN works in close partnership with the CNRS (French public scientific research institution) and other French research institutions. The MNHN is involved through its researchers in numerous collaborative projects at the international and European levels. It is involved in the European integrated infrastructure initiative SYNTHESYS, which aims to improve the use of scientific collections by supporting exchanges between researchers working in 20 European natural history museums and national botanical gardens, and in the European research infrastructure DiSSCo (Distributed System of Scientific Collections).

As a recognized institution in the field of biodiversity and geodiversity, MNHN was the coordinator of the European Distributed Institute of Taxonomy (EDIT), a network of excellence in taxonomy that brings together 28 European, North American and Russian institutions dedicated to taxonomy. The MNHN hosts the European Topic Centre on Biological Diversity, an international consortium working with the European Environment Agency. The MNHN also hosts the Pôle National de Données de Biodiversité (PNDB), whose missions are part of a FAIR approach; some of the staff of this pole is based at the Concarneau marine station.

Thanks to its two marine stations in Brittany (Concarneau and Dinard), the MNHN is strongly involved in coastal observation. This activity of observing marine ecosystems, the quality of marine waters and the sanitary state of the resources allows it to be an important actor in the implementation of the various European directives on water.

Aware that more than ever, it is necessary to raise awareness of environmental risks and to alert people to the decline in biodiversity, the MNHN is heavily involved in training and the dissemination of knowledge and thus offers two MOOCs – «The Ocean at the Heart of Humanity» and «Biodiversity» – coordinated by MNHN researchers, as well as two series of podcasts, «Pour que Nature vive» and, for the youngest, «Bestioles». The exhibition «Ocean, an unusual dive», largely supported by the collections, offers visitors an original immersion in this largely unknown universe. This exhibition has given rise to a mobile exhibition that has been a great success, particularly internationally.

Raising citizens' awareness of environmental challenges by making them actors in research is the approach of participatory science. MNHN's strong involvement in this field is reflected in marine programs with BioLit and Plages Vivantes as coordinators and Objectif Plancton as an active participant.

In 2020, MNHN co-founded the Ocean Institute of the SU Alliance with Sorbonne University and in association with the French Navy and the Ecole Navale, which federates a very large scientific community and promotes interdisciplinary research and training on the ocean as well as interactions with society and the public.

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At the service of the French Navy for nearly four centuries, Naval Group, as a European leader, represents now the industrial know-how in naval defence. One of the group's sites located in Brest is currently undergoing modernisation to meet the challenges ahead.

The main activity of the Naval Group site of Brest is Through-Life Support (TLS), along with the upgrade of surface ships and the French navy's four SSBNs (Ship Subsurface Ballistic Nuclear) based at l'Île Longue, on the southern part of the harbour in Brest. In terms of surface ships at the Naval Base of Brest, Naval Group is responsible for the TLS of numerous ships (Fremm multi-mission frigates, F70 type anti-submarine frigate, BSAM – Metropolitan support and assistance vessels – and mine hunters). Technical stops take place throughout the year as per the ships' operational schedule.

The Through-Life Support activity for French surface ships and submarines is the «front office» activity of the site of Brest for the French Navy. Brest also intervenes as a back office on several TLS programs for the group, abroad and in the overseas territories where the French Navy ships are based. This involves work carried out in workshops (parts and ship components inspection) and employees sent on assignment for technical stops to be carried out on site.

Deterrence-related activities account for 60% of the site's activity, which ensures a stable, predictable and sustainable workload. Surface ships' maintenance and modernisation account for about 20% of the activity. The remaining part is dedicated to international activities and providing support to the group's major programs.

Naval Group's through-life support and modernisation activity also involves navigation systems and equipment, ships' weapon systems (software updates, detection, optics, weapons, submarine warfare), communication systems compliant with military standards or simulators (for operating installations, defence, etc.).

In parallel with these activities, Naval Group has a site in the Froustven area of Guipavas, which houses around 300 employees working on the group's support activities: Digital and Information Systems Department (DDSI) and Shared Accounting Services Centre (CSPO).

#### **A SITE UNDERGOING COMPLETE MODERNISATION SINCE 2016**

Since 2016, the site has been working on an ambitious program to modernise its industrial tool. Over the past six years, nearly 80 million euros have already been invested. As part of a total envelope of 21 million euros for the site of Brest in 2019, Naval Group has launched a multi-speciality workshop project. The first phase of project began in June 2021 with the commissioning of a new machining workshop equipped with latest generation digital machines. By 2024, further to renovations of the piping and mechanical workshops, the multi-speciality workshop will allow these three specialities to work under the same roof.

#### **SIGNIFICANT NEW INVESTMENTS OVER FOUR YEARS (2021-2024)**

Confident in the future and in the development capabilities of the business in France and abroad, Naval Group continues to invest in the site of Brest and for its employees. Thus, €64 million will again be invested over the period from 2021 to 2024 in order to continue the site's transformation and modernisation of the industrial tool (infrastructures and tools/equipment). The entire modernisation project is aimed at developing the industrial capabilities of the site of Brest for Naval Group's major programs as well as preparing for future challenges, including accommodating SSBNs 3G whose First Of Class delivery is scheduled for 2035.

#### **STAFF IN INCREASE SINCE 2016**

The site of Brest has experienced a favourable ramp up since 2016. Thus, in 2019, employee number on the site reached 2,830 (working on permanent contracts, fixed-term contracts and work-study programs), 2,931 in 2020 and exceeded 3,000 in the last quarter of 2021 (Ile Longue: 600 people; Froustven: 250; Brest: 2150). The breakdown is about 35% of engineers/managers, 40% of technicians and supervisors and 25% of workers/employees.

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### THALES IS A GLOBAL LEADER IN ADVANCED TECHNOLOGIES

The Group invests in digital and “deep tech” innovations – connectivity, big data, artificial intelligence, cybersecurity and quantum technologies – to build a confident future crucial for the development of our societies. Thales provides its customers – businesses, organisations and governments – in the defence, aeronautics, space, transport, and digital identity and security domains with solutions, services and products that help them fulfil their critical roles, consideration for the individual being the driving force behind all decisions.

Thales is committed to an action plan to address Environmental, Social and Governance (ESG) issues based on three pillars: to make the world safer, more environmentally responsible and more inclusive. Thales has 81,000 employees in 68 countries. In 2020, the Group generated sales of €17 billion.

### THE WORLD'S NAVAL FORCES RELY ON THALES EXPERTISE

For over 50 years, Thales has provided high-tech equipment, systems and services to naval forces, coastguards and maritime agencies around the world. The Group's surface defence, anti-submarine warfare and maritime safety and security systems are now in service on board over 500 vessels operating with more than 50 naval, civil defence and security forces.

Thales's capabilities span the entire naval defence value chain, from electronic equipment (radars, sonars, electronic warfare and communications) to the design, manufacture and integration of the most sophisticated combat systems. Naval and maritime forces rely on Thales expertise for missions ranging from high-intensity blue-water combat to force protection and support in littoral waters, and from maritime surveillance, maritime safety and security to pollution prevention and control.

Thales devotes almost 6% of revenues to R&D and is constantly innovating and developing new solutions to meet the specific requirements of navies and other maritime agencies.

### **CURRENT PROJECTS INCLUDE**

#### **Drone-based mine countermeasures**

Thales technologies will enable naval forces to make the transition from conventional minehunters to new solutions relying extensively on unmanned systems. This strategic mine warfare capability will rely on surface and underwater drones and robotic systems to reduce risks to naval personnel. The Franco-British MMCM programme (Maritime Mine Counter Measures) is the first system designed for autonomous detection and neutralisation of maritime mines and improvised explosive devices under the sea. The first two prototypes of this system of systems have just been handed over to the UK Royal Navy and the French Navy.

#### **BlueGuard**

BlueGuard is a joint project by Thales and the start-up MyDataModels to develop a demonstrator of a smart surveillance system that will monitor the maritime and underwater space around sensitive coastal infrastructure and provide permanent, dependable protection from new and emerging threats such as unmanned underwater vehicles. Supported by the Nice Côte d'Azur metropolitan council, this innovative solution combines Thales's recognised expertise in underwater acoustics with the know-how of MyDataModels in artificial intelligence technologies.

#### **SEANICE**

SEANICE, a Thales-led consortium of 16 partners from six countries, has been selected by the European Commission to prepare European navies to face future underwater threats. The project will study, test, prototype and prepare the next generation of anti-submarine warfare solutions based on manned-unmanned platform teaming. SEANICE is at the leading edge of change and technological disruption, including the integration of drones and artificial intelligence functionality.

### **THALES, A MAJOR PLAYER IN BREST**

The Thales Group employs 1,800 people in Brest, where its operations date back to 1963.

As the region's largest player in terms of R&D, Thales works extensively with local defence organisations, industries, SMEs, research institutes and academic partners (high-tech clusters, engineering schools, the CORMORANT scientific interest group, etc.).

Thales's Brest site provides project management, research and development, integration and support solutions for systems and sensors deployed by air, land and naval forces on missions ranging from surface defence and anti-submarine warfare to satellite-based surveillance.

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**CLS**  
For Earth, from Space



CLS, a subsidiary of CNES and CNP, is an international company that has been a pioneer in providing Earth observation and monitoring solutions since 1986.

Historical operator of the Argos location and data collection system, CLS' vision is to develop and deploy innovative solutions to understand and protect our planet as well as manage its resources sustainably.

CLS employs 900 people, at its headquarters in Toulouse, Brest and at its other 32 sites around the world.

The company provides satellite services based on:

- location and collection of environmental data (100,000 tracked beacons: ocean buoys, beacons for animals, boats, etc.)
- observation of oceans and continental waters (more than 20 satellite instruments deliver information to CLS about our oceans)
- and surveillance of land and maritime activities (radar and optical satellites and 4 drones are used to detect illegal activities).

CLS Group achieved a turnover of more than 150 million in 2021. Committed to a sustainable planet, the company works daily for the Earth, from Space.

#### **CLS – SPACE DATA AND DRONES TO FIGHT ENVIRONMENTAL CRIME**

For 20 years, CLS has been working alongside leading nations to combat environmental crime. By answering the call of the European Maritime Safety Agency (EMSA), the company has contributed to halving the number of oil spills in European waters in 10 years. From CLS's VIGISAT radar acquisition station in Brest, France, CLS analysts, experts in maritime investigation, have issued hundreds of pollution detection reports and assisted member state authorities in the fight against oil spills in our oceans. Reactivity is key, as during a satellite pass over Europe, CLS analysts have only 20 minutes to process the 400 km radar image and detect any pollution resulting from deliberate emptying or accidental pollution resulting from shipwrecks.



Since satellites do not offer permanent coverage, CLS also responded to EMSA's call to provide European maritime authorities with an additional means of surveillance. CLS was chosen for this mission and is thus providing Europe with its four drones along with its operators to complement the space segment. In 2021 alone, more than 250 missions were carried out.

CLS is proud to add its maritime intelligence expertise to this surveillance system. For the «TRIMARAN III» contract recently signed with the French Navy, the company is placing artificial intelligence at the heart of maritime intelligence. **CLS teams can welcome you in Brest for a visit of the VIGISAT station, (Dome, demonstration of the image analysis process, pollution detection).**

### **CLS – MILLIONS OF FISHERMEN DO NOT REPORT THEIR CATCHES IN THE WORLD, HOW CAN THIS BE REMEDIED? SPACE PROVIDES THE SOLUTION**

According to the FAO, 1 in 5 fish are caught illegally. Traditional fisheries represent an important community of the fishing sector. Coastal economies and food security depend on them in many countries. Traditional fisheries capture more than half of the fish caught and provide the vast majority of jobs in the sector. Their importance is undeniable. Until now, they have not been monitored, creating a bias in the knowledge of the sector. How can marine resources be managed sustainably when information on half of the fisheries is lacking?

Climate change and industrial fishing threaten these communities, forcing them to fish farther from the coast, putting their lives at risk. Supporting artisanal fisheries is now a major international priority and the FAO, UN, World Bank and several NGOs are working to protect these communities and their livelihoods.

Until now, artisanal fishing boats have had no monitoring, nor safety and catch reporting systems that have proven effective for industrial fishing – but too costly for artisanal fishers and not suitable for their boats.

CLS has therefore developed a system, NEMO, that is affordable and adapted to traditional boats and sea conditions.

### **MARINE BIODIVERSITY, NEVER SEEN BEFORE: A 2G BEACON TO TRACK MARINE ANIMALS AND A METAMORPHOSED ARGOS CONSTELLATION WITH 25 SMALLER, MORE POWERFUL, MORE NUMEROUS NANOSATELLITES, ANNOUNCED FOR 2023**

CLS, the historical operator of the Argos tracking system, has tracked more than 200,000 animals since the 1980s thanks to the ARGOS tracking and data collection system. Today, miniaturization promises unprecedented discoveries and conservation assistance.

Work to reduce not only the size of beacons but also the satellites themselves could revolutionize our knowledge of biodiversity. For example, 2g beacons to track turtles are now available and a constellation of 25 Argos nanosatellites is in preparation. Every gram we can drop off a beacon means we can track around an additional 1,000 species. By adding 25 nanosatellites to the Argos constellation, CLS and its subsidiary Kinéis will increase the system's capacity to track hundreds of thousands of animals, compared to 8,000 animals per month today.

Thanks to these new «micro-satellite» beacons, scientists can now know where young turtles go and how they use their environment. Such technological advances are possible thanks to the highly sensitive satellites of the Argos system. These satellites are so sensitive that transmitters can reach them using only one-fifth the power usually used but sending 10 times more messages. Collecting such valuable data on hatchlings that have never been tracked before is essential to developing appropriate conservation measures to protect sea turtles throughout their life cycle.

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Exail is a French high-tech company recognized worldwide for the design and manufacturing of high-tech components and systems in the fields of navigation, autonomy, robotics and photonics. Exail's expertise includes innovative systems and solutions for inertial navigation, subsea positioning and underwater imaging, as well as autonomous drones.

### A KEY PLAYER FOR THE FRENCH INDUSTRIAL SOVEREIGNTY

The group, which generates nearly 80% of its revenues internationally, is active in both the civil (ocean and space exploration, autonomous vehicle navigation) and defense (naval and land defense, space) markets. With over 1,500 employees on 21 sites in France, Exail contributes to the country's industrial and technological network and to France's industrial sovereignty. The company, which has experienced sustained growth since its creation, designs and manufactures all of its systems in France and Belgium and has complete control over its value chain.

### A PIONEER IN MARITIME AUTONOMY

Exail's expertise in inertial navigation, subsea positioning and underwater imaging, as well as robotics and artificial intelligence have made the company a pioneer in the field of maritime autonomy. Exail has been building an 8-meter autonomous vessel since 2017, which is already used by several industrial companies and scientific institutes around the world for seabed mapping missions.

This includes the U.S. National Oceanic and Atmospheric Administration (NOAA) or the British Antarctic Survey (BAS), an institute dedicated to the exploration of polar regions.

The DriX autonomous vessel allows sea operations with reduced costs and increased safety due to the absence of a crew. Consuming only 50 liters of fuel per day, it can replace ships of about 60 meters whose daily consumption is about 5000 liters of fuel. This means that the ecological footprint of operations at sea can be reduced by a factor of 100 compared to traditional vessels.

With these proven capabilities, DriX is attracting strong interest from the French Research Institute for Exploitation of the Sea (IFREMER) and the French Navy's Hydrographic and Oceanographic Service (Shom), for which Exail conducted sea trials in September 2020.

#### **UNIQUE SONARS FOR DEEP SEA EXPLORATION**

Leveraging 15 years of experience in the field of acoustic seabed imaging, Exail also designs and produces unique seabed mapping solutions perfectly adapted to deep-sea autonomous vehicles. This technology, already in operation within world-class navies and scientific institutes, including French IFREMER, enables real-time and simultaneous imaging and high-resolution bathymetric sonar mapping of the seabed. It is thus part of an operational objective to significantly reduce the duration of operations at sea and therefore the cost of data acquisition.

#### **PRESS CONTACT**

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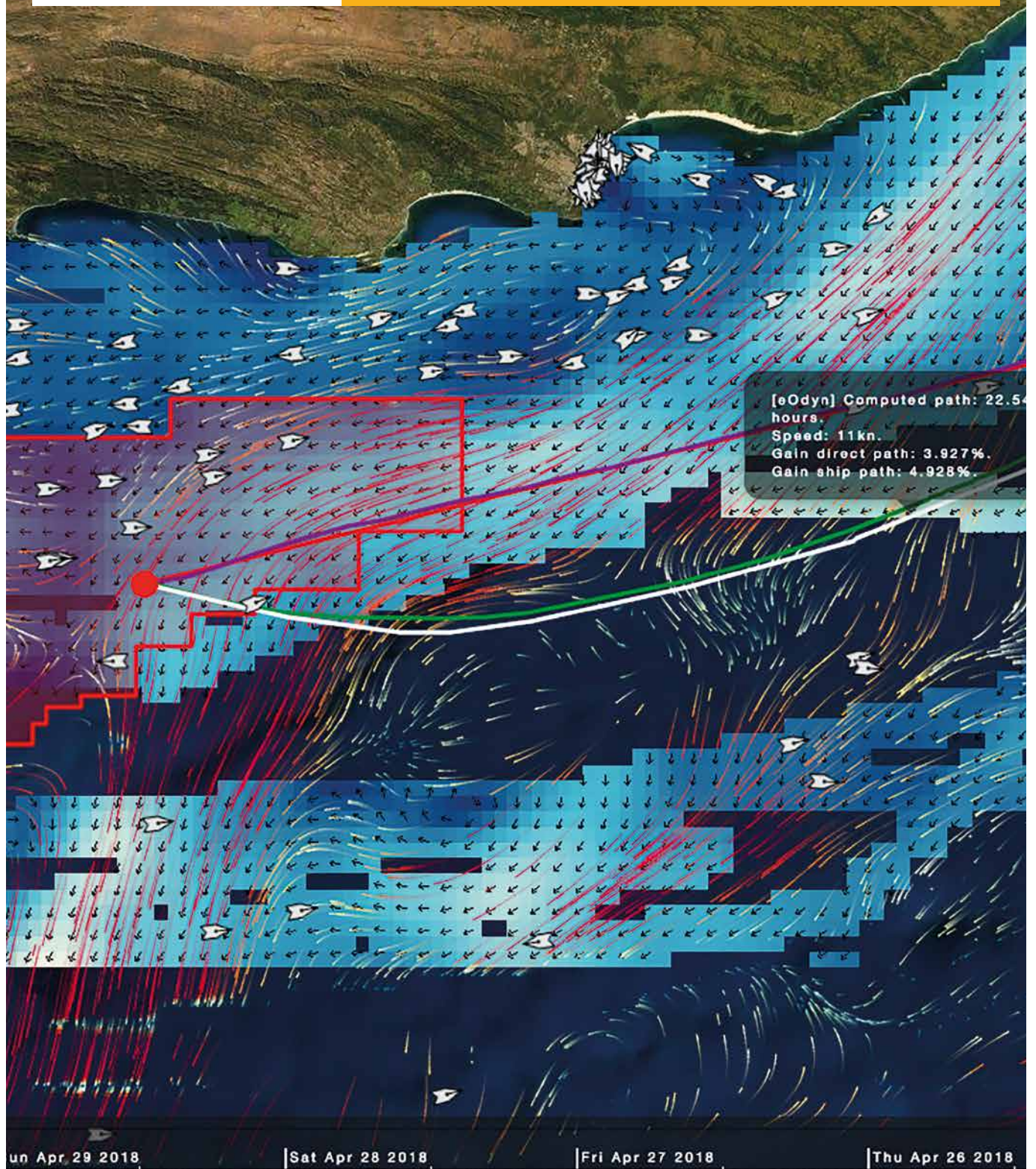
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**eOdyn**



eOdyn, a company based in Brest, has been developing since 2016 a breakthrough technology called «omni-situ» to observe ocean surface currents by analyzing the movement of ships. This technology, a world premiere, based on the smart use of maritime traffic data (AIS-Automatic Identification System) and proprietary algorithms, provides for the very first time access to information on ocean dynamics at high spatio-temporal resolution on all oceans and simultaneously, in particular thanks to the use of satellites. This technology can be used in many fields (knowledge of the oceans and analysis of climate change, maritime shipping, offshore energies, etc.).

eOdyn has collaborated since its creation with world-renowned expert organizations based in Brest such as Shom and IFREMER, and carries out projects on behalf of the European Space Agency and CNES.

The company uses its technology to develop innovative services for the maritime community. Among these value-added services, the maritime routing service called Seawaze, the very first collaborative routing service in the world, makes it possible to select the best routes with favorable sea currents in order to reduce the emissions of vessels and reduce their fuel consumption. Benefits? 5% savings on average for a sector of activity emitting nearly 1.47 Giga tonnes of CO2 each year; operated on a massive scale and brought back to the world's commercial fleet, SeaWaze would reduce maritime transport emissions by 71 million tonnes of CO2 per year.

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## **DIATEAM**

Military & Civil cybersecurity solutions

© Unsplash - Jacques Expedition

Founded in 2002, DIATEAM is an independent French R&D company specialized in computer security and innovative information systems.

### **DIATEAM OFFERS ITS EXPERTISE IN EUROPE AND WORLDWIDE**

As a pioneer in cyber combat simulation through a Hybrid Cyber Range, DIATEAM is the partner of choice for large companies, government entities, universities and industry, in particular for Operators of Vital Importance. The range of solutions developed by DIATEAM meets all the challenges of cyber security: analyze, practice and understand. Recognized for its expertise, DIATEAM is today a key player in the market of training platforms and prototyping of cyber infrastructures.

Thanks to the partnership with Thales, DIATEAM addresses the European market and the great export.

### **CYBERSECURITY IN THE MARITIME SECTOR**

This sector is strategic for France and Europe and it has specific information systems, and there are not many cyber security experts. Therefore, it is crucial to confront crews with cyber crisis scenarios and evaluate their reactions to ensure that they are appropriate and in line with incident response plans.

As a member of the «solutions» college of the France Cyber Maritime association based in Brest, DIATEAM is continuing to develop hybrid cyber ranges combined with cyber exercises in order to better protect the supply chain by training and raising the awareness of the men and women in the maritime industry.



## HOW DO WE ADDRESS THE CYBER SECURITY SKILLS SHORTAGE?

To close the cybersecurity skills shortage, education as an institution must make a concrete investment in hands-on cyber security training. The difference will be made at the level of educational, scientific and university systems that will manage to develop their offer of continuous training, or even professional retraining, through practice to allow the increase in cyber skills of a larger number of citizens and thus gain in resilience.

France and Europe must continue their efforts to guarantee their sovereignty on these strategic issues. In this respect, Europe has multiplied the number of H2020 programs on this field.

These programs aim to stimulate cooperation between European organizations to improve the effectiveness of cyber training offers for industry and academia.

This dynamic concerns in particular the maritime sector, whose cyber challenges deserve increased attention and mobilization.

The combination of the Cyber range solution and the exercises conducted by DIATEAM is truly the best way to meet the essential and urgent need for cyber security training.

## A HYBRID CYBER RANGE

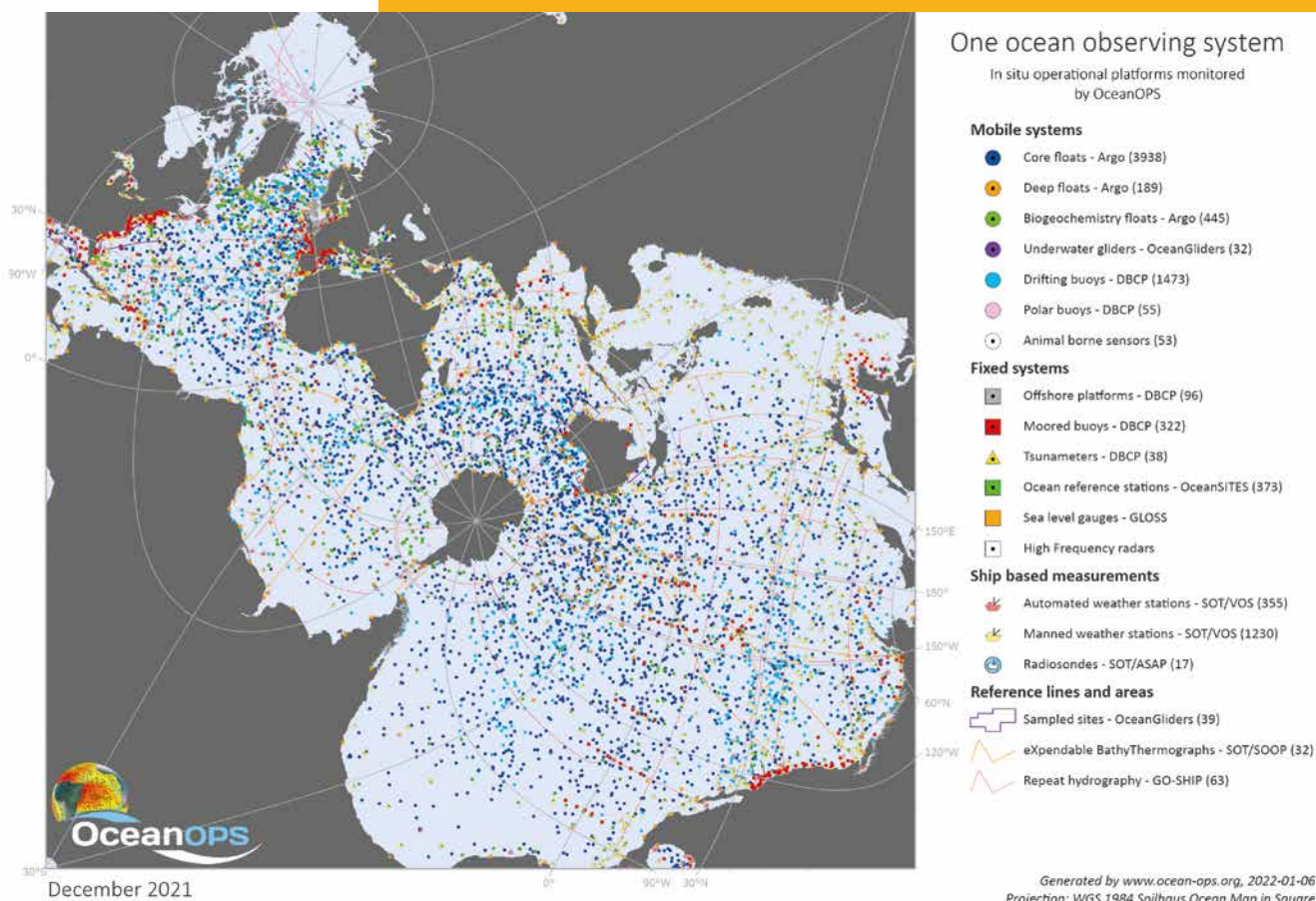
The Cyber Range we have been developing is «hybrid». It is a platform that enables replication of classical IT and industrial OT systems.

By design, this platform covers multiple use-cases such as Red Team vs Blue Team cyber training, prototyping of infrastructures, testing of technical components, and even creation of digital twins, eg. for security maintenance/testing.



## PRESS CONTACT

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During the One Ocean Summit in Brest, OceanOPS, jointly centre of the World Meteorological Organization and the Intergovernmental Oceanographic Commission of UNESCO, will launch the Odyssey project endorsed by the UN Ocean Decade in support of the Global Ocean Observing System (GOOS).

Since 2000, OceanOPS has been the international hub and centre of excellence that provides vital services in monitoring and coordinating an expanding network of global oceanographic and marine meteorological observing communities, under GOOS.

Based in Brest, the centre oversees the coordination, monitoring and harmonization of 10,000 in situ marine meteorological platforms, including the Argo network – with nearly 4,000 autonomous underwater

profilers launched since its inception – as well as the network of fixed and drifting buoys, the piloted profilers, and the research and voluntary vessels dedicated to met-oceanographic observations. Its 8-person team also develop web-based tools to monitor the status of the GOOS and its evolution.

During the last 10 years, OceanOPS has developed innovative partnerships with civil society, particularly with NGOs and racing yachts to deploy observing instruments in hard-to-reach locations, contributing to the real-time observation and stewardship of the Ocean with low carbon footprints. These partnerships and activities were even more strengthened during the pandemic, when deployment of oceanographic instruments by research vessels was deeply impacted by Covid-19 restrictions.

«Other partnerships or initiatives are being developed to generalize metocean observations from merchant ships, fishing fleets, and other marine operators or ship users from the coast to the open ocean, but they have not yet unleashed their full potential» explains Mathieu Belbeoch, OceanOPS manager. «The Odyssey project will provide the framework for the co-development of an operational contribution of civil society to the GOOS infrastructure» adds Belbeoch.

### **CONTRIBUTING TO THE GOOS AND THE UN DECADE THROUGH THE ODYSSEY PROJECT**

Conscious of the importance of civil society engagement to support ocean observations and that the development and sustainability of the GOOS urgently need targeted increases in observations, OceanOPS will coordinate the Odyssey Project. With this project, OceanOPS aims at enhancing the GOOS, in all its components, by cooperating with new ocean-going vessel types from ocean races, NGOs, citizens, and private sectors.

The Odyssey project embodies the level of response we need to face climate issues and will help strengthen international collaborations within and outside the ocean observing community. These collaborations, based on the observations' collection, data sharing and analyses, scientific and technological developments, will be essential to develop such a project.

Through all its partners and a vast range of communication channels, the project will be also a powerful platform to promote all contributions and the benefits of the GOOS to a larger public and the importance of ocean observations to deliver the essential information needed for many societal applications, such as climate change and weather forecast.

The Odyssey Project will also help developing educational programmes through the Ocean Observers international initiative ([www.oceanobservers.org](http://www.oceanobservers.org)), as well as capacity development programmes with the involvement of local and indigenous populations in ocean observations.

By taking advantage of the One Ocean Summit, OceanOPS wishes to launch a call for collaboration to the civil society, private sectors and all people who are interested in contributing to the ocean observations for the ocean and planet health.

The Odyssey project will contribute to all GOOS projects and programmes such as the OneArgo project recently endorsed by the UN Decade, aiming at transforming the revolutionary Argo array to one that is truly global, including polar regions and marginal seas, extending to the full ocean depth, and including ocean biogeochemical measurements.

### **PRESS CONTACT**

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SEDISOR is small business company specialised in elemental and isotopic analytical geochemistry. In a simple way, if you seek to decipher the precise chemical composition of a solid or liquid material down to its atomic characteristics then SEDISOR is your partner. Indeed, our main skill is to decrypt a DNA-like composition via atomic and isotope compositions of materials. We perform analyses on any kind of inorganic or organic material, solids or fluids. We operate both as a service company or as research collaborators on various projects such as geological, mining or oil and gas fundamental projects but also, pollution and environmental assessments or quality control and forensic studies. Our clients are either industrials or technical offices, analytical laboratories or academic public or private research institutes worldwide.

#### VALORISING OUR TERRITORY ANALYTICAL TOOLS

We perform all our analyses by mass spectrometry either with thermo-ionization, optical emission or plasma techniques. A mass spectrometer allow measuring ultra-low concentrations as well as radiogenic or stable isotope compositions. SEDISOR specificity is that the company can access a very high performance suite of mass spectrometer thanks to a close collaboration with the Pôle de Spectrométrie Océan. This analytical pole in which the University of Brest, the French CNRS, IFREMER and IRD participate, is a structuration tool that also highlight the scientific excellence of the Brest community in oceanic sciences domains. These means but also the underlying investment politic are also designed to contribute to the territory economic development and innovation.

## ACADEMIC EXCELLENCE SERVING INDUSTRY

Beyond cutting edge instruments, SEDISOR's added value is an exceptional skill in analyses and interpretation. This is a concrete example of a knowledge-based economy. Indeed, the company and Dr Sidonie REVILLON, its CEO and founder, still have very close relationships with academic research departments and specifically the Geo-ocean department from the IUEM (Institut Universitaire Européen de la Mer) and IFREMER which is the main marine geosciences academic department in Brittany. This is a win-win partnership: a guarantee for the company to offer the most recent and relevant knowledge and techniques to its clients; for the academic department it is a financial contribution via the instrument use but also additional research collaboration opportunities.

## AN ALTERNATIVE MODEL FOR YOUNG RESEARCHER EMPLOYMENT?

One ambition at SEDISOR is also to demonstrate a non-exclusive relationship between enterprise and fundamental research. Indeed, full academic research positions are rare but a business model such as SEDISOR's one allow creating one's own employment pursuing academic research activities at the same time. Certainly, SEDISOR's best marketing argument is today its academic renown, allowing us to be recognised as top of the line experts in our domains.

## SEDISOR IN PRACTICAL: FROM NAUTILE DIVES TO VANILLA PODS, LEAD INGOTS TO OCEANIC MINERAL RESOURCES

Every day at SEDISOR we analyse food samples to verify their geographical origin, we study archaeological objects to better understand commercial exchanges and mining practices at various time periods. We develop analytical methods with the aim of valorising or remediating highly saline solutions created through saline cavities digging for energy storage or we date carbonates for oil exploration purposes. As far as fundamental research is concerned, we participate to oceanographic cruises and dive with the French Nautille Submersible to study mega transform faults in the Equatorial Atlantic Ocean or hydrothermal deposits associated to volcanic episodes within Mayotte island and Comoros Archipelago.

## SOME FIGURES

- SEDISOR was created in 2014 and supported by the Technopole Brest Iroise team
- We measure several hundreds of samples every year
- The team is composed by 2 full time permanent positions, 1 master-level engineer, 2 post-doctoral students and two master students.

## PRESS CONTACT

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### **A POWERFUL AND SIMPLE UNDERWATER NOISE MODELLING TOOL: QUONOPS**

Quonops, one of the most validated underwater noise modelling platforms, offers both the knowledge of ambient (shipping and natural) noise everywhere at sea and any time – past, present and forecast – and the prediction of the noise level and acoustic impact on marine species of anthropogenic activities. This platform, used by a large number of governmental agencies and industry players in the World, is easily accessible and useable on the internet by stakeholders needing to deal with underwater noise.

### **SMART-PAM REAL-TIME BUOYS TO AVOID ACOUSTIC INJURIES AND COLLISIONS**

Smart-PAM is a real-time buoy enabling to monitor anthropogenic activities and if necessary alert on certain activities or noise levels. It also offers to detect marine species, locate individuals and characterise their use of an area. This capability not only provides knowledge on marine species presence and activities but it allows as well to avoid injuring marine species by not starting a noisy activity if an individual is detected in the acoustic risk area. In addition, detecting and locating a whale in real-time enable to mitigate the risk of collision with vessels, which is another high threat on large marine mammals.

### **PRESS CONTACT**

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## **Tinctura**

Tailor-made liquid extracts from marine and terrestrial plants



Founded in July 2018 by Eric Barreau and Florentin Donot, Tinctura specializes in the design and custom packaging of liquid food supplements made from algae and plants. Defined as two complementary spirits with a synergy of skills, industrial for Eric and scientific for Florentin, the company aims to make the health benefits of marine and terrestrial plants accessible to all.

Tinctura offers its liquid and functional drinks receipts, tailor-made, to various French and European laboratories, players in the nutraceutical, sports nutrition, health nutrition and nutri-cosmetics markets.

The company designs, on a white label basis, the finished products of major companies in these different markets. It is accessible to consumers in pharmacies and specialized supermarkets. The company also supplies its extracts as an ingredient to companies in the food-processing industry.

In order to meet the needs of most, Tinctura recently created its own brand, Sea Simple, sold in pharmacies, in drugstores, in organic food retails and directly on its website ([www.sea-simple.fr](http://www.sea-simple.fr)). The innovative and fresh brand aims at solving daily life hardships, from immunity to angst issues, by supplying natural extracts free of preservatives and without thermal treatment, to preserve the efficiency of vegetal active molecules.

Tinctura relies on a workforce of 10 employees, devises more than twenty references for its shaping activity and close to ten references for its own brand Sea Simple.

#### **PRESS CONTACT**

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SeaBeLife is a biotechnology company specialized in the development of drug candidates that block cellular necrosis in order to protect or regenerate organs affected by severe pathologies – for which there are no alternative, effective treatments. The company primarily targets acute pathologies of the liver, whilst leading other research activities in ocular and degenerative conditions.

SeaBeLife's technology centers around a portfolio of more than 100 biologically-active relevant molecules, which have the unique characteristic of inhibiting two forms of regulated and programmed cell death – necroptosis and ferroptosis – in pathological conditions. The company has filed five patents to protect the applications of these molecules. Several in vivo proofs of concept were achieved. Mandatory preclinical development started for acute liver pathologies and another molecule is going through preclinical development for ocular diseases. SeaBeLife also obtained promising preliminary results with other molecules in in vitro models for neurodegenerative pathologies.

Founded in March 2019 and based in Brittany, France, SeaBeLife is led by CEO and co-founder Morgane Rousselot, who holds a PhD in biochemistry. The company is based on the research works of Stéphane Bach PhD, CNRS research engineer, Marie-Thérèse Dimanche-Boitrel, research director at IRSET (the French institute for research in environmental and occupational health) and Claire Delehouzé, a biotechnology engineer, co-founder and CTO at SeaBeLife.

SeaBeLife currently employs seven people and has raised €5 million (\$5.4M) since its creation.

#### **PRESS CONTACT**

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**FROM THE BEGINNING TO TODAY.**

The story of Fil & Fab was born from the meeting of three young Breton designers. Fil & Fab is a young company which aims to be the value chain for fishing nets, from collect to the production of pellets. From an association exploring various possibilities in 2015, 2019 is a milestone with the creation of the company Fil & Fab and the marketing of Nylo®, the first Polyamide 6 granulate 100% made from fishing nets.

Yann Louboutin, Communication and Sales Manager, is working on marketing Nylo® and demonstrating its performances.

He supports our customers in the use of a new material, from the feasibility study to the start of production.

Georges Canal, Industrial Director, coordinates internal and external recycling operations aimed at producing Nylo®. Our operators ensure the quality of the sorting, in order to avoid an inappropriate mixing of polyamide 6 with other plastics, which would adversely affect the quality of Nylo®. Grinding allows the transformation of the nets into fibers. These are stored before being granulated by our partners. Nylo® has an anti-oxidant compound aimed at stabilizing the quality of the granules.



Théo Desprez, President and Sector Coordinator, ensures the quantification qualification and sustainability of our collects. He meets with harbors decision-makers to organize partnerships and collection actions. Work that is carried out according to the specifics of each harbors. A collection system is in place at Le Conquet, in Lorient and Batz, and in studies in other Breton and French Harbors.

#### **NYLO®, WHAT DOING WITH?**

The using potential of Nylo® are varied. In view of its characteristics, Nylo® is injected like a conventional polyamide 6 and due to its performances it meets the technical requirements of our customers.

Among our most beautiful partnerships: Armor Lux glasses, an object that is both aesthetic and ethic. Nylo® entered the watchmaking industry with the creation of Ulysse Nardin's Concept Watch Diver Net, which combines aesthetics, performance and eco-responsible material, all linked to the ocean universe. One way to demonstrate that recycled materials can find their place in the manufacture of luxury pieces without depriving them of their nobility. In addition, within the framework of the Recypech project of the French Maritime Cooperation, our partner Nanovia produced 3D printing filaments entirely designed with Nylo®.

#### **FIGURES AND PARTNERS.**

The Pêchpropre Project Study reports a potential of 800 tonnes of recyclable nets per year in France. Our company targets a volume of 150 to 200 tonnes recycled in 2022 and a strong increase in capacity in 2023, in order to process the national volume in the medium term. For the past year, we have been working with Guyot Environnement to carry out our net collections, as well as various industrial partners for granulation and laboratories such as ID-Composite for the production of technical data sheets.

#### **AN AMBITIOUS FUTUR.**

Our ambition is to give a second life to the fishing nets of the French waterfront. To achieve that, we schedule the internalisation of the whole production process in order to be fully self-sufficient. We expect to rely on the support of public stakeholders to help us invest in the equipment needed to optimize the rate of nets recycling. Recycling fishing nets will contribute to the fulfillment of our ambition to positively change habits in terms of materials use. To achieve this, we aim for maximum collaborations with plastics specialists, in order to make Nylo® a benchmark product for companies wishing to strengthen their circular economy strategy. We are also targeting geographic expansion with the aim of sticking to our production ambitions and benefiting from many ports of our skills.

#### **PRESS CONTACT**

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The mission of Polymaris is to explore the infinite abundance and harness the invisible resources of ocean ecosystems through pioneering research and development work in the field of marine microorganisms.

**AT POLYMARIS BIOTECHNOLOGY, OUR CORE BUSINESS IS THE CULTURE OF MICRO-ORGANISMS BY FERMENTATION**

#### EXPERTS IN MARINE BIOPOLYMERS

Polymaris has been a respected expert in the field of marine biotechnology for over ten years. We own a unique collection of micro-organisms sampled from the exceptionally rich biodiversity of the Breton coastline. We have developed biotechnological fermentation procedures which can be applied to all types of micro-organisms. These organisms are a potent source of innovative biomolecules, a source

which we harness to produce unique, complex molecules, unable to be reproduced synthetically, that are totally natural, biobased and biodegradable.

Polymaris specialises in the development of two main families of biomolecules: exopolysaccharides (EPS) and polyhydroxyalcanoates (PHA).

EPS are the building blocks of life. These glucose polymers are secreted by micro-organisms to protect them in unfavourable conditions using different mechanisms: they are secreted in the form of natural glues or protective films, to retain moisture or nutrients or to pass information between cells. PHA are completely broken down in the natural environment (bioassimilable) they have no negative impact on the ecosystem. Polymaris has developed cutting edge technology capable of synthesising a custom-made bioplastic for specific applications.

## A WIDE RANGE OF APPLICATIONS

Polymaris Biotechnology draws inspiration from the natural environment, borrowing from the realms of biomimicry which nurtures innovative ideas based on the shapes, properties and functionalities present in the living world and favouring the use of natural selection rather than genetic modification.

We have harnessed the diverse physical, chemical and biological properties of these biopolymers to develop products for the cosmetics industry (notably brands such as Phytomer, Chanel, Clarins etc....). More recently, Polymaris has worked closely with ENGIE Group to develop a patented application which exploits the protective properties of polysaccharides (ie. preventing biofilm formation) for the protection and maintenance of water pipes.

We are also working on developing innovative molecules for new markets.

With an expert team and cutting-edge techniques and equipment, Polymaris has been providing high quality analyses since 2008. We have the means and the know-how to identify and assess the molecules in a sample. We have the capability to carry out detailed analyses of molecules and obtain fast, reliable results. Our equipment enables us to carry out a range of different analyses. In this way we can identify the characteristics of different families of molecules: monosaccharides and polysaccharides.

Polymaris has teamed up with Corail Artefact in a project to regenerate the Coral Reef. We share the same goal: to be creative and innovative while safeguarding marine biodiversity. Corail Artefact aims to replace the plastic currently used (to support the coral) with other innovative, more environmentally friendly materials. Our solution: Biosealite®, which acts as a supporting stake to allow corals to regenerate and produce new colonies. It's the perfect example of biomimicry.

## A PILOT LINE FOR BIOPLASTICS PRODUCTION

Several laboratories are currently able to produce a few grammes of bioplastic material, but at Polymaris, our strength lies in our production capacity of up to 30 000 litres. Polymaris has been investing in a range of equipment (fermenters, bioreactors, purifiers) specifically for the purpose of developing a pilot production line for Biosealite® biopolyesters. Polymaris has now become the only laboratory involved in the industrial scale-up of biodegradable plastics in France.

Polymaris Biotechnology aims to expand our capabilities while maintaining an eco-friendly and sustainable approach. For this reason, Polymaris Biotechnology has teamed up with a variety of local and international players. We have joined the INN-PRESSME network; a European programme which promotes a cleaner, more competitive Europe of the future. In order to ensure that our PHA meet the requirements of the programme, Polymaris is upgrading production by developing packaging made from biomaterials.

Biosealite® is a registered trademark of Polymaris.

## POLYMARIS SOME FIGURES

- **Year founded:** 2008
- **Staff:** 10
- **Turnover:** 2 million euros
- **Premises:** 1200 m<sup>2</sup> situated in the Technopôle Brest Iroise Science Park (Pointe du Vernis, Brest)
- **Key words:** biofilm, biopolymers, bioplastics, fermentation, polysaccharides, exopolysaccharides, PHA, EPS, bacteria, Polymaris Biotechnology

## PRESS CONTACT

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France Cyber Maritime is a non-profit organization created in November 2020. Its main purposes are to increase the resilience of maritime and port operations to cyber threats and to develop a network of expertise in maritime cyber security.

To complete these tasks, France Cyber Maritime operates the M-CERT (Maritime Computer Emergency Response Team), a national centre which provides information and assistance to all maritime and port operators, and fosters the creation of cyber security solutions tailored for them.

With almost 70 members, France Cyber Maritime brings together within three membership boards public sector players and regional coastal authorities,

maritime operators and cyber security solution providers. It is supported by the Secretary General for the Sea (SGMer), ANSSI (the French Information Security Agency), France Relance, Brest métropole and the Brittany Region.

## **DIGITIZATION OF MARITIME AND PORT OPERATIONS: WHAT IS AT STAKE?**

Worldwide maritime and port operations are currently involved in an unprecedented digital transformation. While digitization improves the sector's performance, security and competitiveness, it also makes the sector more vulnerable to attacks carried out by criminal organizations, state organizations, terrorists or activists.

In fact, cyber attacks on maritime and port industries have multiplied in recent years, resulting in operating losses on maritime operations. According to the M-CERT, 87 public incidents were reported in 2022 compared to 59 in 2021. Consequences are also devastating for the world trade 90% of which depends on maritime transport. There is no operator today in this critical sector for the French economy who is safe from the threat of cybercrime.

However, when it comes to cybersecurity, maritime and port industries, as well as the naval, nautical, offshore and marine renewable energy industries, have specific characteristics that differentiate them from other industries. Therefore, securing the digital maritime world requires a targeted approach.

### **FRANCE CYBER MARITIME MISSIONS**

The complexity of maritime and port sectors requires a sectoral approach to cybersecurity. This is why, with the support of its members, France Cyber Maritime analyzes the needs of maritime operators and advises them in order to identify the most suitable and efficient solutions: insurance, audits and mapping, Bug Bounty, intrusion detection, training, awareness, incident response, R&D...

Through its missions and beyond its range of solutions offered, France Cyber Maritime contributes to the resilience of the maritime sector and to reducing threats by setting up learning and awareness sessions, by sharing good practices, through an information watch, by the organisation of Bug Bounty or the coordination of thematic webinars.

Furthermore, the non-profit organization aims to develop and promote French excellence in cyber security by publicizing its work in France and internationally.

### **M-CERT: ANTICIPATING, ANALYSING AND SHARING**

Greater resilience in maritime and port operations also depends upon the ability to anticipate threats and assist victims of cyberattacks. This is the mission of the M-CERT. This national centre, based in Brest (France), is in charge of monitoring and analysing cyber threats as well as sharing information to alert maritime and port operators.

The M-CERT joined the InterCERT France association in 2022, in order to integrate itself seamlessly in the leading French CSIRTs and CERT network and counter more efficiently the cyber threat.

### **PRESS CONTACT**

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## Celadon

CELADON SEA TEST BASE prepares, organises, and conducts your sea trials



CELADON is a non-profit association, based in Brest, whose members come from the ecosystem of the Pôle Mer Bretagne Atlantique: large industrial groups, SMEs, research and training actors, and professional organisations.

### FOUR MAIN MISSIONS

- Organise and conduct tests and experiments at sea, using its own or chartered vessels;
- To promote the development of research
- To contribute to training activities
- To constitute a regional showcase with the objective of integrating into a European network

### THE MAIN FIELDS OF ACTIVITY COVERED BY THESE TESTS AND EXPERIMENTS

- Defense and mine warfare
- Drone conversion of the maritime area and, in particular, the autonomisation of ships
- Cybersecurity of ships
- Observation and measurement of the ocean, in every aspect (oceanography, underwater detection and communication, underwater fauna, seabed), to better understand and gain knowledge
- Offshore activities
- Renewable marine energies and in particular the development of offshore wind energy.



## EXAMPLES OF TESTED EQUIPMENT

- Sensors
- USV, surface drones
- UUV, AUV, underwater drones
- ROV, underwater robots
- UAV, aerial drones
- Ship autonomy systems
- Connected underwater objects

## MATERIAL RESOURCES MADE AVAILABLE BY CELADON, FOR THE TESTS AND EXPERIMENTS OF ITS MEMBERS

- A coastal research vessel dedicated to sea trials
- An underwater robot
- An underwater acoustic positioning system (GAPS)
- Aerial drones
- A multibeam echosounder
- An autonomous and instrumented pontoon at sea, linked to the Naval Academy
- Technical premises located at the Naval Academy, including a maintenance workshop and training facilities
- A zodiac

Skills provided by professional staff: all our sailors are STCW certified, come from a background in the merchant navy, and are experienced in sea trials; UAV (aerial UAV and surface USV) and underwater robot pilots.



## WEBSITE

<https://celadon.blue/>

## CONTACTS

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With over 200 years of history and expertise in the fields of maritime transport safety, port and inland waterway infrastructures, Cerema works with the French government, local authorities, and companies to help them meet the challenge of ecological transition and adaptation to climate change. As the leading public institution at both the national and local levels, Cerema is a distinctive actor that covers coastal, maritime, and inland waterway issues as a whole.

#### **INNOVATING FOR MARITIME AND INLAND WATERWAY SAFETY TECHNOLOGIES AND SYSTEMS**

Cerema carries out national and international maritime and inland waterway safety activities on behalf of the French government, particularly

through innovation: support for maritime and inland waterway navigation aids (traditional, physical, or digital), modernisation and optimisation of navigation monitoring tools and structures (renewable energies, cybersecurity), observation of maritime and inland waterway transport activities (traffic data) for safety, and digital and ecological transition needs.

#### **SUPPORTING MARITIME AND INLAND WATERWAY TRANSPORT AND ITS ECOLOGICAL TRANSITION**

Cerema supports the improvement of maritime and inland waterway transport performance and its ecological transition in the context of climate change: inclusive management of a historical heritage of civil (State and local authorities) and military maritime

and inland waterway structures, optimised maintenance support for local authorities and ports (climate changes, new uses), of port and waterway structures (trajectography, port and inland waterway information systems), improvement of knowledge of the impacts and efficiency of maritime and inland waterway transport and logistics (loss of freight loads, digital solutions).

### **IMPROVING KNOWLEDGE OF THE IMPACTS OF ACTIVITIES AND DEVELOPMENTS ON THE COASTLINE AND THE MARINE ENVIRONMENT**

Cerema contributes to a better understanding and control of the impacts of activities and developments on the coastline and the marine environment in conjunction with maritime planning; better understanding, prevention, and reduction of environmental impacts - accidental or chronic land-based, port, and maritime pollution such as dredging, dumping of plastics, pollution...

### **SUPPORTING COASTAL AREAS IN THEIR ADAPTATION TO CLIMATE CHANGE**

Cerema assists coastal territories in their transformations, and in particular in adapting to climate change: better knowledge of the evolution of the coastline for its management and adaptation to the effects of climate change (massive historical data, sea state, innovations: drone surveys, modeling), analysis of the issues across a large area of coastline (risks, cross-sectoral risks of climate change, environment, socio-economic developments), assistance in integrating this issue into local urban planning and development policies, protection strategies (adaptation/withdrawal, nature-based solutions, protective structures, etc.); and within the European framework of maritime planning, assisting coastal territories in the integrated management of different maritime uses, limiting conflicts between activities, with rationale on blue growth and environmental preservation.

### **OUR WEBSITES**

**Cerema, Centre d'études et d'expertise sur les risques, l'environnement, la mobilité et l'aménagement**

<https://www.cerema.fr/fr>

**Géolittoral, for the planification of the sea and of the waterfront**

<https://www.geolittoral.developpement-durable.gouv.fr/>

**Eoliennes en mer en France, to monitor the development of offshore wind farms in France**

<https://www.eoliennesenmer.fr/>

**Port du futur, for the port community**

<https://www.portdufutur.fr/>

**CANDHIS, National archives on in-situ swell data**

<https://candhis.cerema.fr/>

### **PRESS CONTACT**

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### **CEREMA IN FIGURES**

**26**

locations

**12**

research teams

**2500**

employees

**3000**

free-access references available

**250 M€**

budget

**50**

European projects in progress





# ÉOLIEN OFFSHORE

Services et Solutions  
Météo-Océano



**Météo-France**  
Marine & Offshore Centre

Météo-France, a public establishment, contributes to the safety of people and property. Météo France delivers forecasts and data, and participates in the progress of research in meteorology and climate sciences, providing its expertise to respond to climate challenges.

The missions of Météo-France are varied. The primary being to observe and forecast the weather. Forecasting relies in particular on the production of ever more efficient weather models thanks to the power of supercomputers.

The safety of property and people is the secondary, essential mission of the establishment. In particular, Météo-France implements its Vigilance system, informing citizens and public authorities in case of dangerous weather phenomena. It also contributes to national defense, safety at sea, and environmental protection by monitoring air quality. More recently, Météo-France has integrated forest fires into the Vigilance system.

The study of the climate is also an essential mission, to document the history of the climate, and also to observe its current trends, and to predict the future climate.

In conclusion, Météo-France constantly strives to improve its knowledge. The diverse work carried out at the National Centre for Meteorological Research (CNRM) and its associated laboratories help to better understand the climate, based on both its own scientific strategy as well as in close relation with the scientific community.

The establishment also delivers meteorological data and services to public and private actors, as well as to citizens, particularly to help them make decisions on their actions in the short (daily operations or planning) and long term (in the context of climate change).

### **IN BREST, A DISTINCTIVELY MARITIME ACTIVITY**

The Marine & Offshore Centre of Météo-France in Brest carries out expert forecasts (validated by an expert forecaster) on the coastal and offshore maritime domain concerning wind, waves, currents, as well as flooding.

Current clients range from offshore wind farms, industrial activities, and coastal cities in France to offshore racing and general maritime operations worldwide.

Typical products are, for example:

- Oceanograms presenting wind and sea state forecasts for one or several sites
- Threshold alert bulletins (Meteo Surveillance Bulletin (MSB))
- Site studies for offshore wind (decennial wind and wave risk, extreme phenomena, atmospheric turbulence impacts, risks associated with fog, corrosion, icing, lightning, analysis of wind energy potential in extreme cold)
- Assistance to offshore wind operations (planning, organisation, and monitoring of operations, access to the best Météo-Océano forecast models, mobilisation of a dedicated offshore team from Météo-France)

### **PRESS CONTACT**

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## Sercel

Underwater acoustic solutions



Buoy for automatic and real-time detection of cetaceans, deployed in Wales in 2023

Sercel is a French company specialising in the design of subsurface imaging and infrastructure monitoring solutions. Established in 1956, its industrial know-how is recognised worldwide, particularly in the oil industry.

### INNOVATION FOR CIVIL AND MILITARY MARKETS

Sercel employs more than 1,500 people at 21 sites in 8 countries, and generates 95% of its revenues internationally.

Approximately 15% of this revenue is reinvested each year in Research & Development in order to offer an exceptional technological portfolio that meets the needs of various markets such as Natural Resources, Energy Transition, Land and Ocean Monitoring, Infrastructure Monitoring, Maritime and Port Logistics, and Defense.



## ENERGY TRANSITION

Sercel provides subsurface imaging, infrastructure monitoring, environmental protection, and logistics solutions for the offshore energy, mining, CO2 capture and storage, and geothermal sectors.

## LAND AND OCEAN MONITORING

Based on its experience in the geophysical field, Sercel has unique solutions for onshore and offshore seismic monitoring to a depth of up to 6,000 meters.

Solutions for water column monitoring are also offered for environmental protection purposes. These can be connected to the surface by means of underwater acoustic communication.

## INFRASTRUCTURE MONITORING

Thanks to its expertise in vibration measurement, Sercel develops one-time or continuous monitoring solutions for large structures (such as bridges, dams and dykes, and construction sites) and railway networks.

## MARITIME AND PORT LOGISTICS

Sercel designs and manufactures autonomous robots for the maintenance of large ship hulls (stripping and painting) and has custom-made solutions for the logistical management of port flows.

## DEFENSE

For more than 30 years, Sercel has been contributing to France's sovereignty by designing and manufacturing custom equipment and systems for surveillance, positioning, and acoustic connectivity.

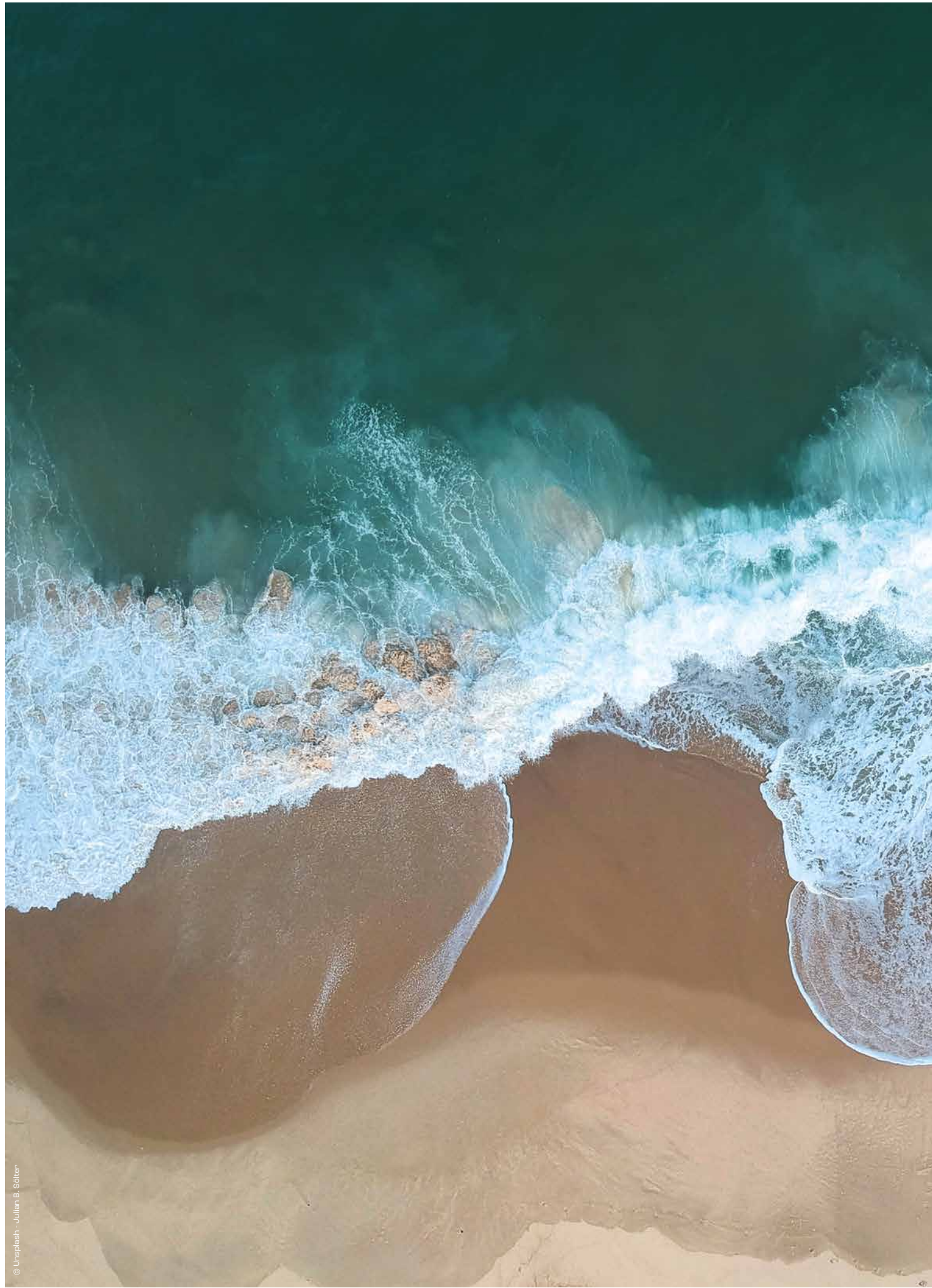
## BREST, A SPECIALISED INSTITUTION IN THE FIELD OF UNDERWATER ACOUSTICS

Brest is the developmental center of all the acoustic solutions for the aforementioned markets. A team of 16 engineers and technicians have been designing and manufacturing underwater connectivity, positioning, and acoustic monitoring systems since 1988, in particular for the protection of marine mammals.

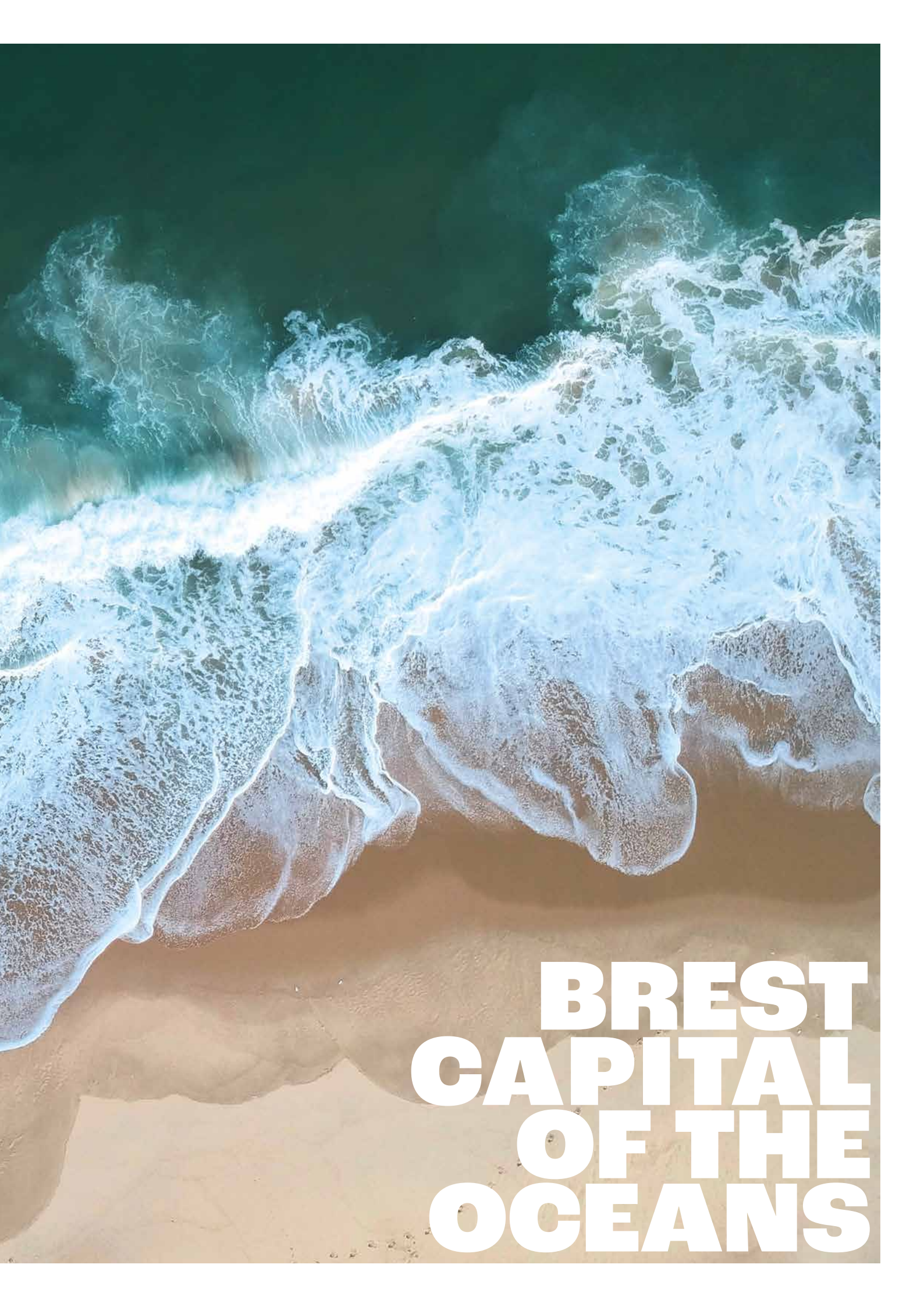
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# **BREST CAPITAL OF THE OCEANS**



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