



Oceanology International 2024



Large-scale automated mapping and  
characterization of biodiversity with  
**micro-AUVs fleet.**

London, 12th of March, 24



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# 1. General introduction

# General introduction // SEABER



SEABER at a glance:

- ▶ Only makes micro-AUVs
- ▶ Worldwide leader
- ▶ >70 YUCOs sold
- ▶ >40 distributors worldwide
- ▶ >1200 demos, training and missions





We changed the paradigm:

- ▶ Efficient and rugged
- ▶ One solution by need (embed standard payloads)
- ▶ Affordable and reliable
  
- ▶ Fill the gap in coastal waters monitoring
- ▶ Measure in hard to access areas
- ▶ Launch/recovery by any means (i.e. also no vessel)
- ▶ Make AUV accessible to non-trained users

# General introduction // SEABER



**YUCO**  
Civilian Market



**MARVEL**  
Survey & MCM



**RECALL**  
ASW Training



CONFIDENTIEL

# General introduction // Proof of capabilities



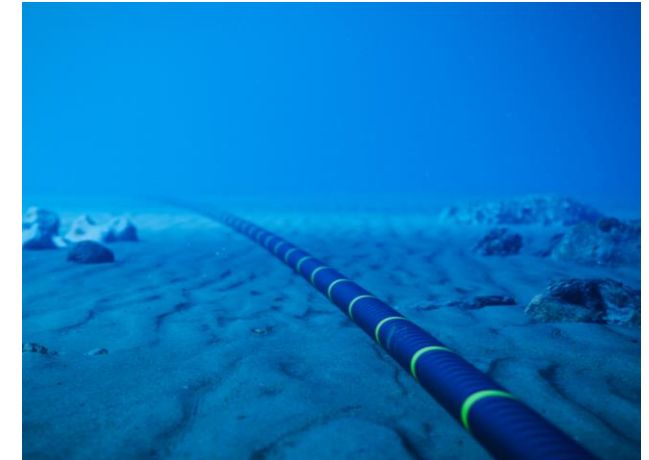
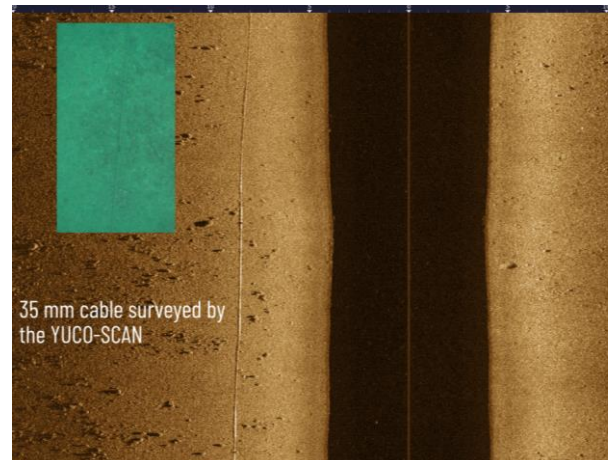
## Cross Channel Autonomous Mission

- ▶ 39km distance from UK to France
- ▶ From shore to shore
- ▶ ~8hours missions (30% battery remaining after mission)
- ▶ 1% navigation accuracy during mission



## Tracking 35mm cable on 1km distance

- ▶ Offshore conditions
- ▶ Great stability and navigation accuracy
- ▶ Excellent side-scan image
- ▶ Substantial cost and time saved





# General introduction // Proof of capabilities



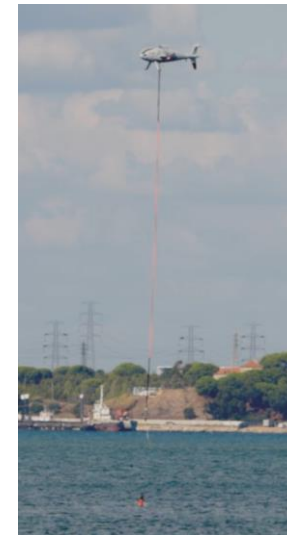
## Deep-water survey in Sicily

- ▶ Archaeology project
- ▶ Fleet of 3 YUCO-SCAN w/ GoPro camera
- ▶ 75km<sup>2</sup> were surveyed and mapped
- ▶ Missions down to 200m depth
- ▶ High quality SSSonar data



## 1st AUV deployed from an Unmanned Air System

- ▶ REPMUS exercise in Portugal
- ▶ Schiebel Camcopter S-100
- ▶ Dropped over the sea and carried out its mission
- ▶ Recovery with a RHIB







## 2.Context



The Deep Seabed 2030 call for projects has been launched against a global backdrop that aims to make a major leap forward in our knowledge of the seabed and its biodiversity:

**ONU – Ocean Decade:** Less than 20% of the planet's seabed has been mapped. The UN has set a target of mapping the seabed within 10 years, as a means of preserving and offsetting the effects of climate change on the planet.

**ONU – 30x30 Target:** To halt the dangerous decline in biodiversity, 190 nations have agreed to preserve 30% of the oceans by 2030, but where and what should be protected without knowing?

**ATLASea:** The French Ministry of Higher Education and Research has just launched ATLASea, an eight-year project to decipher 4,500 plant and animal species.



## 3.Partners





- ✓ Micro-AUV
- ✓ AUV fleet
- ✓ Sensors' integration



- ✓ Oceanographic methodology
- ✓ Fauna and flora assessment
- ✓ Knowledge of test areas



- ✓ Mapping - GIS
- ✓ Marine biodiversity
- ✓ eDNA



► Project funded by:

The logo for bpi france, with 'bpi' in brown and 'france' in yellow.

► Project supported by:

THE NIPPON FOUNDATION-GEBCO

The logo for SEABED 2030, with 'SEABED' in large blue letters and '2030' in large blue letters below it, preceded by three horizontal blue lines of increasing length.



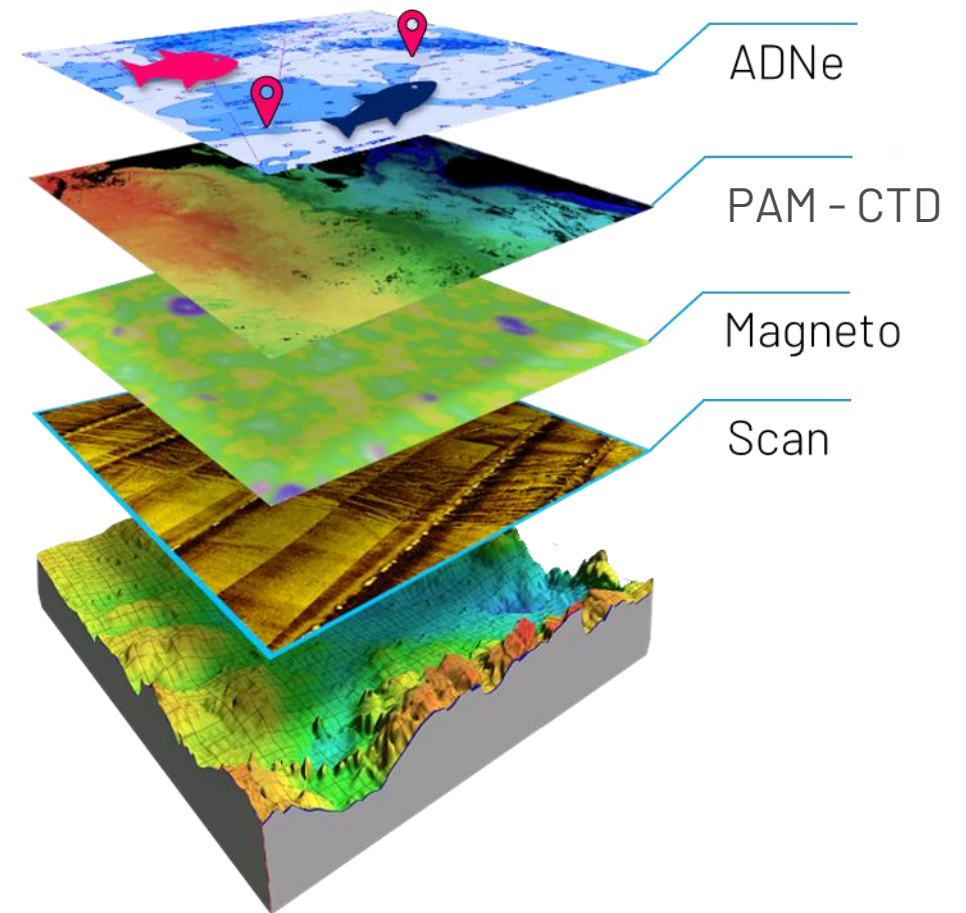
## 4. Technical and general goals



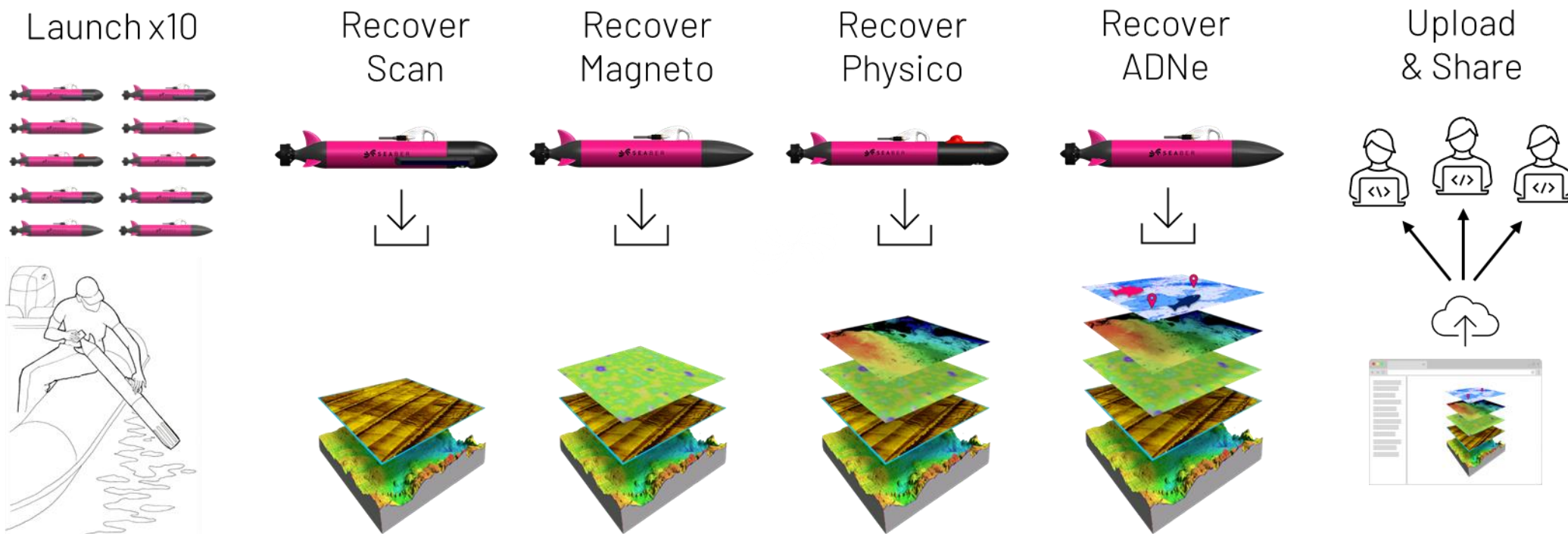


## ► The dual objective embodied in the “SEAMAP 2030” Project

- ✓ Developing instruments for large-scale mapping and characterising biodiversity:
  - A fleet of 10 micro-AUVs
  - Micro-AUVs with innovative sensors (eDNA)
- ✓ Develop CARTHA, an online service with a web interface for pooling and sharing georeferenced oceanographic data from AUVs.



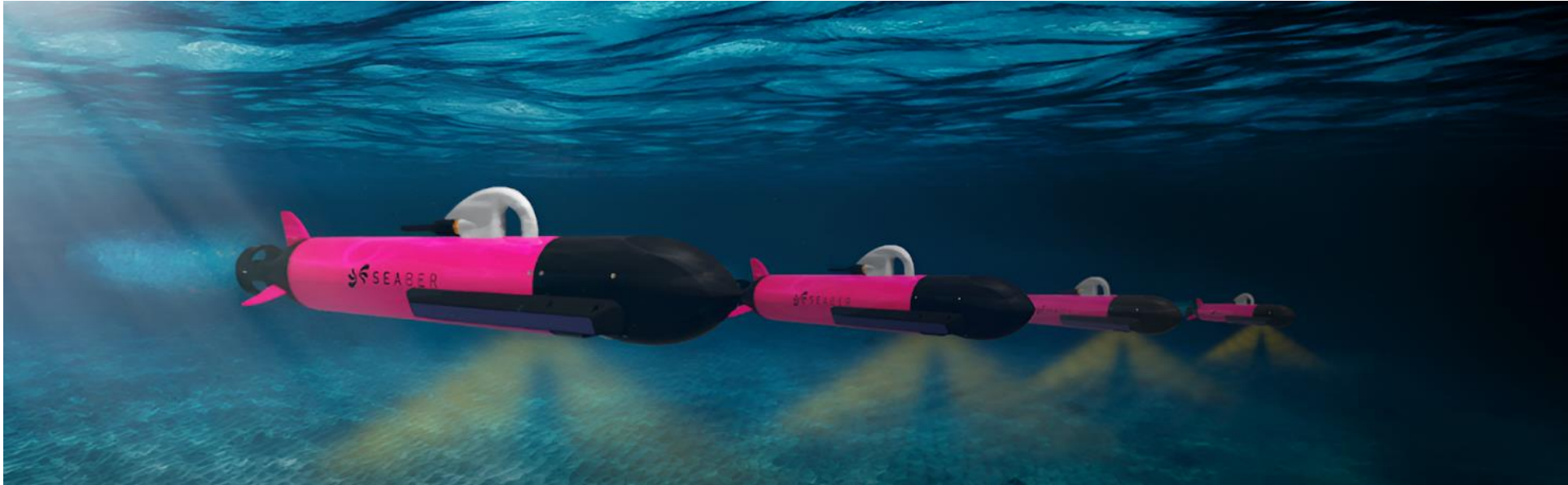
# Technical and general goals // In general



# Technical and general goals // Fleet



- Deveopment of a 10 micro-AUVs fleet for deep sea applications



- YUCO: 1 micro-AUV – 1 mission
- Intuitive mission programming
- An industrial approach. Mass production.
- A cost 4 times lower than current AUVs

- Fleet of 10 micro-AUVs & new scientific methodology
- A swarm of 10 micro-AUV
- Precise geolocation with USBL
- 500 km distance per mission





## ► CARTHA: Oceanographic data sharing platform

- ✓ SEAMAP wishes to actively contribute to the creation of an international oceanographic data sharing platform with CARTHA, which will enable:
  - Big Data to be processed
  - Banking
- ✓ Development and hosting of CARTHA by a public and scientific player – MARBEC, which facilitates the Open Data business model:
  - Free for scientists
  - Paying for private players



Our choice will be the QGIS ecosystem mastered by the MARBEC engineers involved in the project. QGIS is a **Free and Open Source Geographic** Information System that allows you to create, store, view, analyse and publish geospatial data on Windows, Mac, Linux, BSD and mobile devices.



## ► Trials and technical validations



Saint-Pierre et Miquelon



Antarctica

It aims to:

- ✓ Develop the methodology using these new resources.
- ✓ Demonstrate the feasibility of collecting data associated with large-scale eDNA sampling at very affordable cost.
- ✓ The areas selected feature benthic species whose habitats are poorly described in terms of their composition and geography.



## ► Biodiversity and eDNA



**ADNe**

A new non-destructive, non-invasive method based on the filtration and analysis of DNA fragments released by all organisms in water and which persist in the environment for a certain period of time (12-24 hours). eDNA provides a new generation of indicators of the state of health of marine waters.



Current means of extraction are limited:

- Surface sampling
- Or with divers – limited to 50 meters



Setting up and using indicators requires a new generation of field and modelling tools.



## 5.Innovation



## ► Innovative sensors on micro-AUV

- Mapping & geo-referenced data
- A new way to discover species: eDNA
- Sensors: eDNA, Side-Scan, Magneto, CTD, PAM



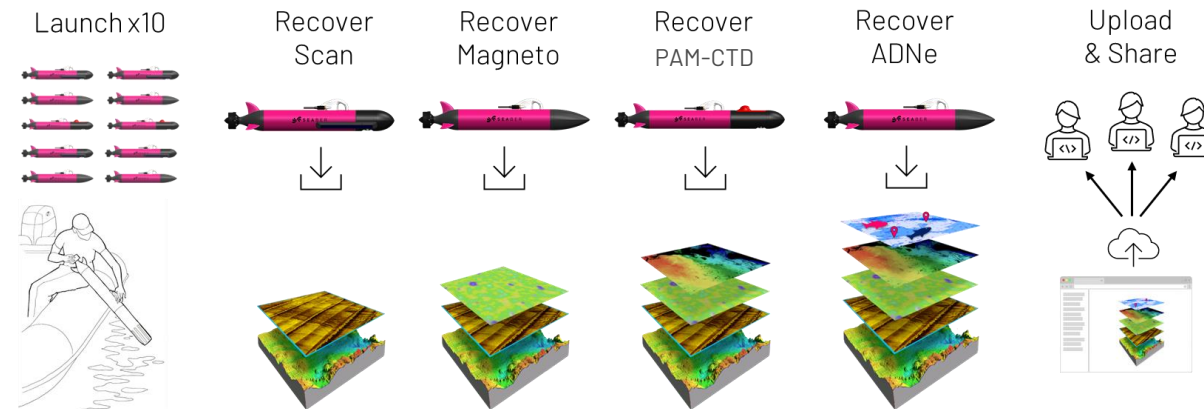
Mapping with USBL



Measures for biodiversity

## ► CARTHA: Shared data collection

- Pool on CARTHA in the cloud cartographic, physical and biological data
- Open data: A free model for scientists, paying model for the private sector







7.Q&A

*Meet us Booth F351 for more information!* 



[www.seaber.fr](http://www.seaber.fr)