

PRESENTATION DE LA TECHNOLOGIE GLIDER

**ATELIER DE VALIDATION DE LA PLATEFORME DE DONNEES PAR LES UTILISATEURS ET DE
FORMATION A L'OCEANOGRAPHIE OPERATIONNELLE**

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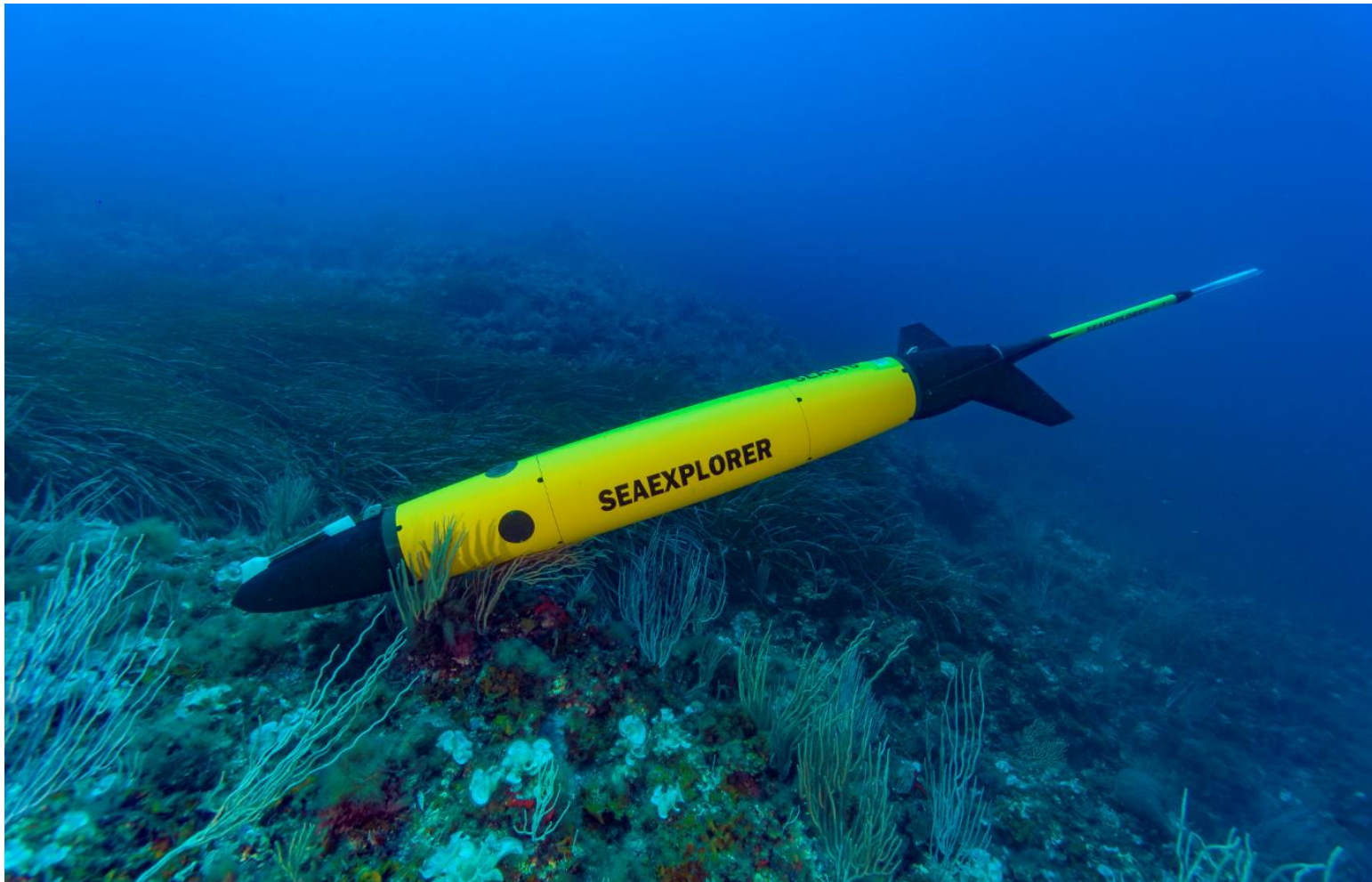


This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 727277

Un planeur sous marin?



ODYSSEA

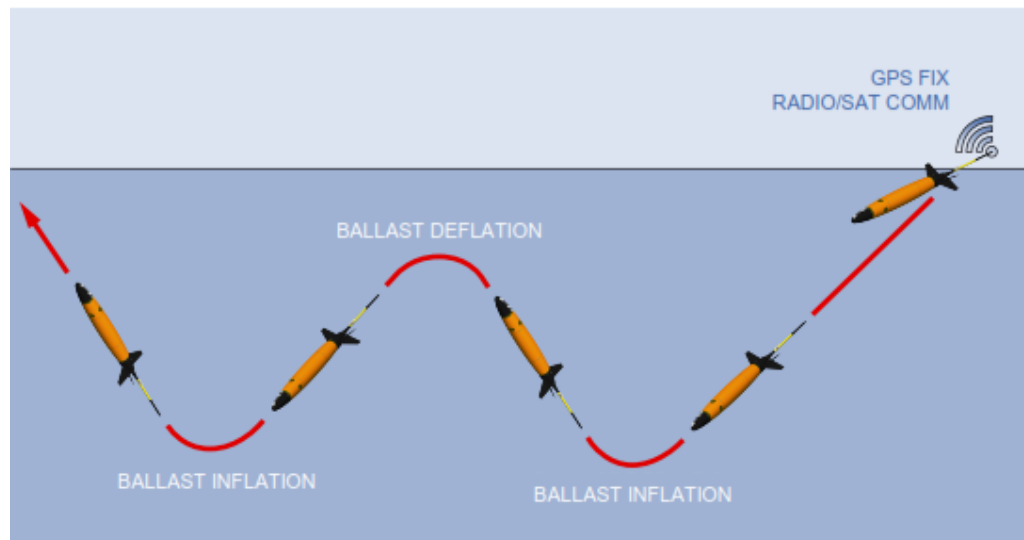




ODYSSEA

3 actionneurs:

- Ballast
- Lineaire (assiette)
- Angulaire (roulis)



Le déplacement du glider est induit par la variation de sa densité:

- Plus dense que l'eau: il plane vers le fond
- Moins dense que l'eau: il plane vers la surface

Quelles performances?



- Vitesse horizontale: 0,5 à 1 nœud (1 à 2 Km/h)
- Endurance: de l'ordre du mois (avec batteries rechargeables)
- Profondeur max: 1000m
- Poids dans l'air: 60 kg

⇒ Véhicule particulièrement adapté pour voir des phénomènes

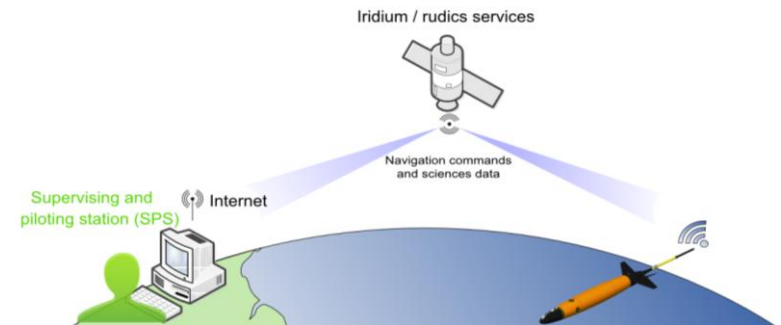
⇒ Spatiaux: de 1 km à 1000 km (meso-échelle)

⇒ Temporels: de plusieurs jours à plusieurs mois

Exemples: gyres, front, dynamique côtière, ...

Le glider, seul en mer

- Une fois déployé, le glider, avec l'aide du pilote à terre, remplit sa mission

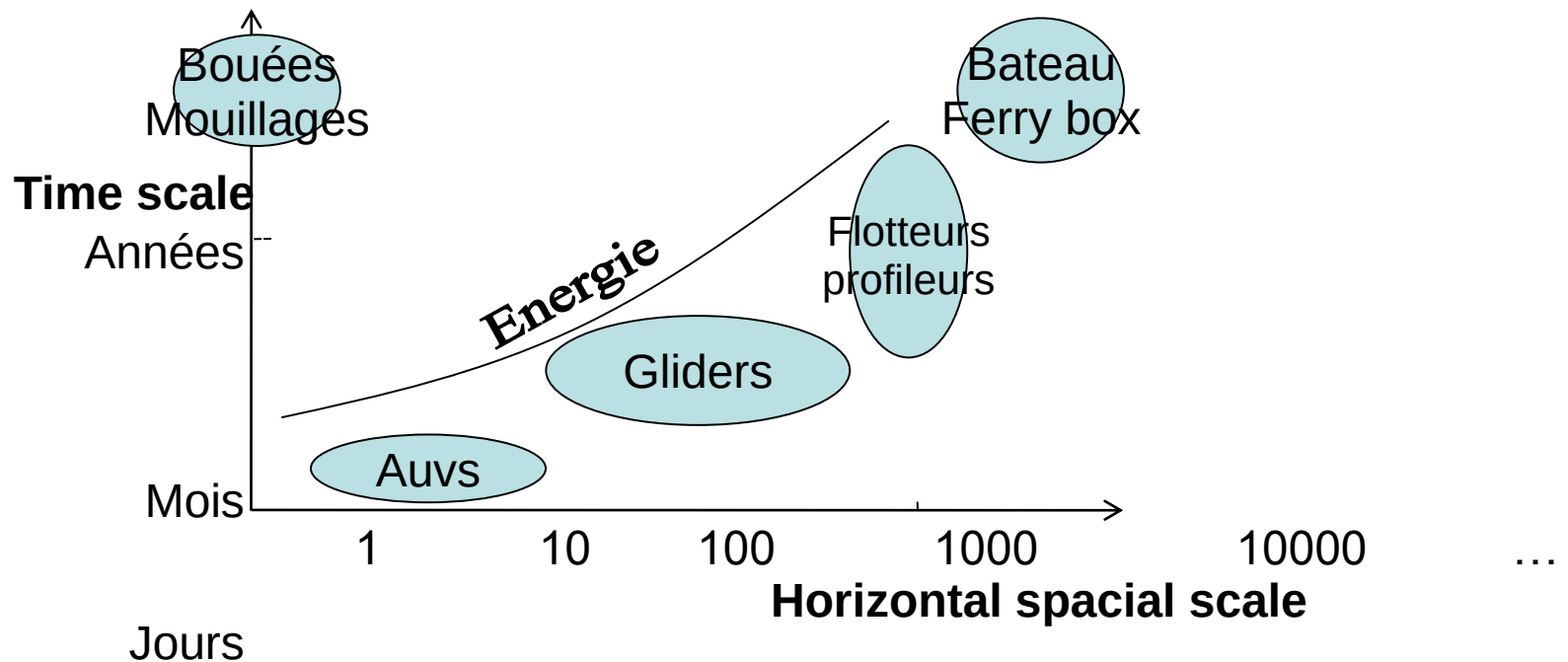


De la place du glider...



ODYSSEA

- Pourvoir effectuer des mission de collectes de données longue endurance ou longue distance à faible coût comparativement aux autres moyens (bateaux, AUV, ...)

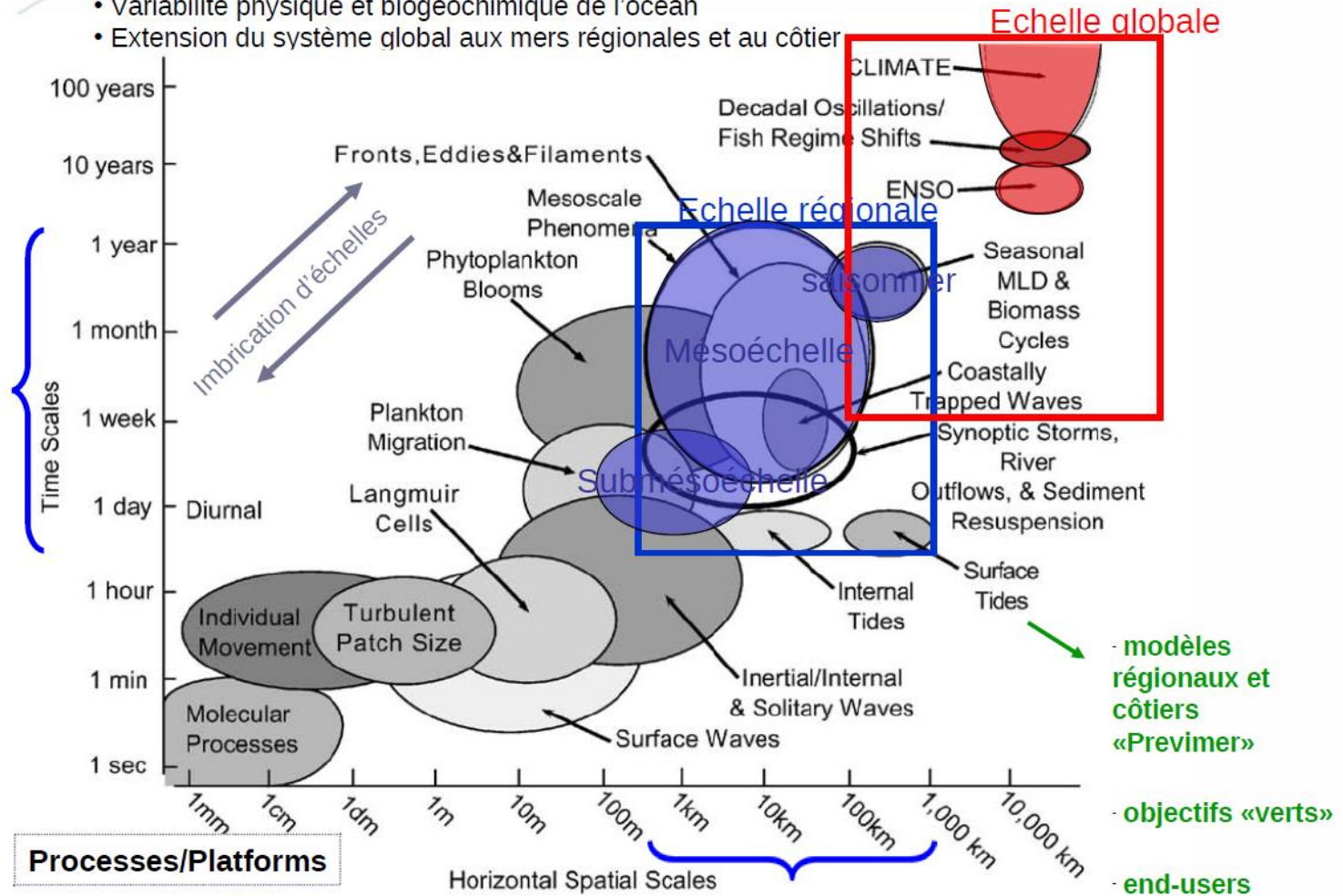


...à l'intérêt du glider



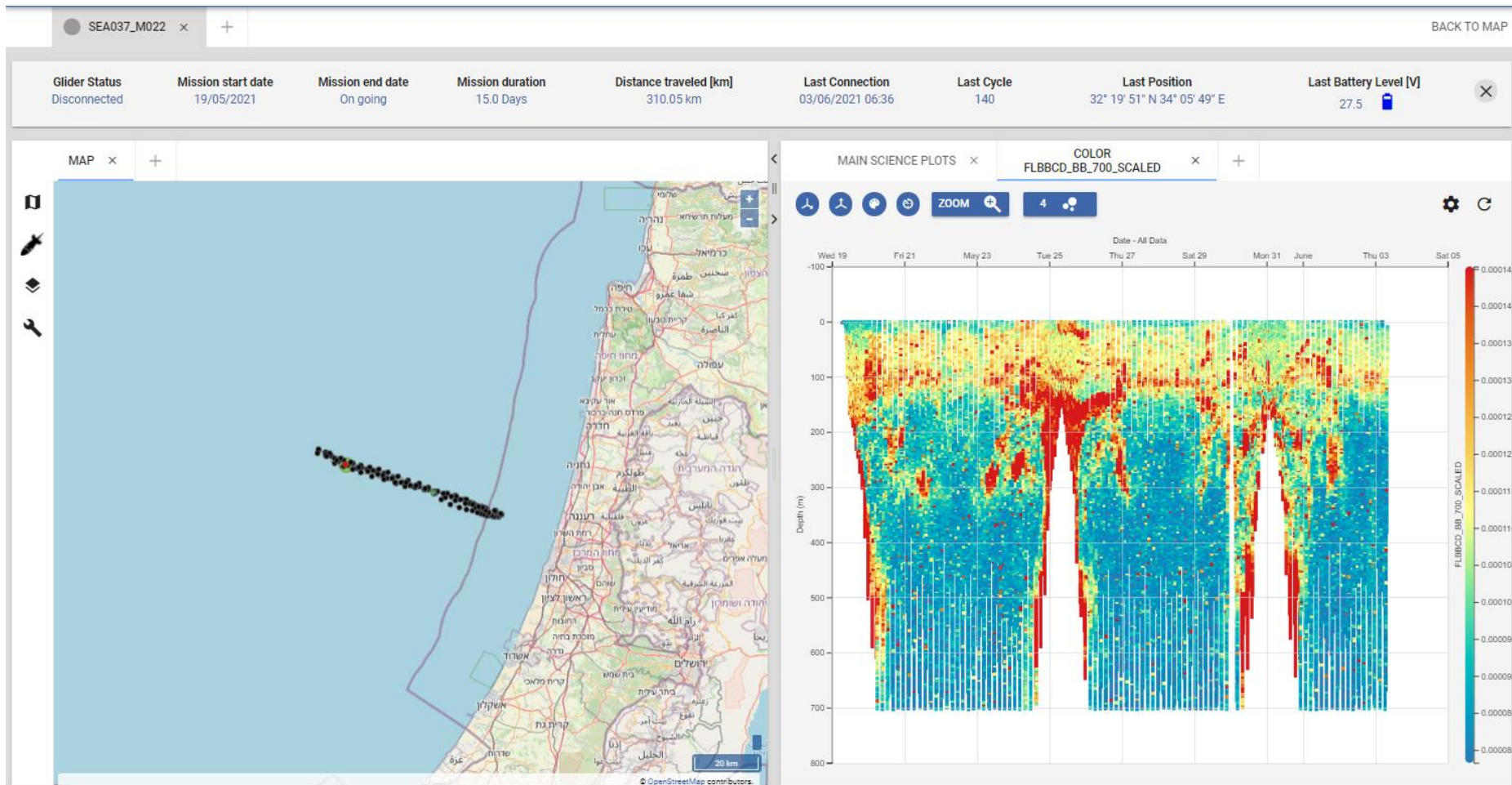
ODYSSEA

- Variabilité physique et biogéochimique de l'océan
- Extension du système global aux mers régionales et au côtier



Exemple de mission

Mission ODYSSEA - Israel



Les capteurs...

Conductivity – Temperature – Depth (CTD)

- Physical oceanography



*Glider Payload CTD
(+ Dissolved Oxygen SBE 43F)*



*CTD SRDL
(+ PAR)*



University of
St Andrews



RBRlegato³ CTD

RBR



Les capteurs.....



ODYSSEA

Fluorescence Sensors / Back Scattering

- Bio-geochemical applications
- Environmental monitoring
- Hydrocarbons



*FLBBCD
(Chla 470 / 695
FDOM 370 / 460
BB 700 nm)*



*SeaOwl-UVA
(Chla 470 / 695
FDOM 370 / 460
BB 700 nm
Oil In Water)*



*FLNTU
(Chla 470 / 695
BB 700 nm)*



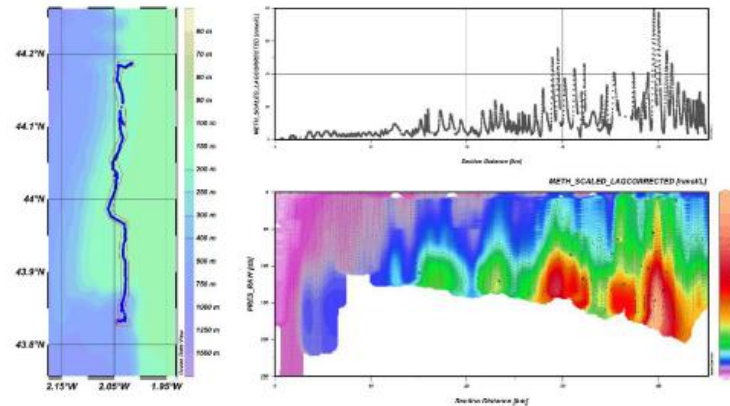
Les capteurs.....



ODYSSEA

Gas sensors

- Environmental monitoring
- Natural Seepages Detection
- Hydrocarbon Complementary



METS
(Dissolved CH₄)

FRANATECH



MiniCO₂
(Dissolved CO₂)



Rinko
(Dissolved Oxygen)



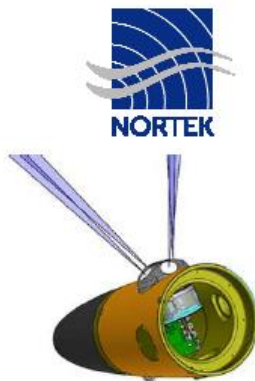
Encore des capteurs?

Other physical properties

- Currents and water velocity
- Turbulence microstructure
- Photosynthetically Active Radiation



AD2CP
(Water velocity)



PAR OCR-504
(Irradiance)



MicroRider-1000-G
(Turbulence microstructure)



Toujours des capteurs...

Other biogeochemical properties

- Nutrients
- Phytoplankton photosynthesis and Gross Primary Productivity (GPP)
- Zooplankton and fish sensor

*Deep SUNA
(Nitrates)*



*FastOcean
(Fast Repetition Rate
Fluorimeter)*



*Imagenex 853
(Echo sounder)*



Toujours des capteurs...

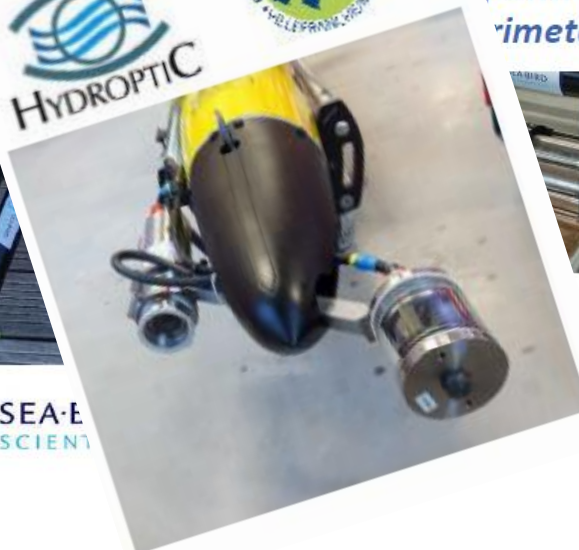


ODYSSEA

Other biogeochemical properties

- Nutrients
- POC
- Chl a

UVP6-LP
(Zooplankton and
suspended solids)



and Gross Primary Productivity (GPP)

1stOcean
Chlorophyll a
Fluorescence Rate
Sensor ()



1stOcean
NY

Imagenex 853
(Echo sounder)



Il en reste encore un petit peu...

Passive acoustics sensors

- Passive acoustics monitoring
- Near real-time detection

TR-Porpoise Recorder (Passive Acoustic Monitoring)



AGLIMMS Project (8 hydrophones for characterization and positioning)

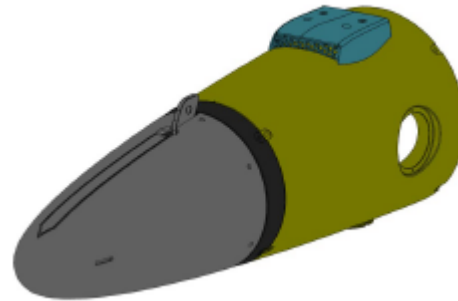
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Un dernier?



ODYSSEA

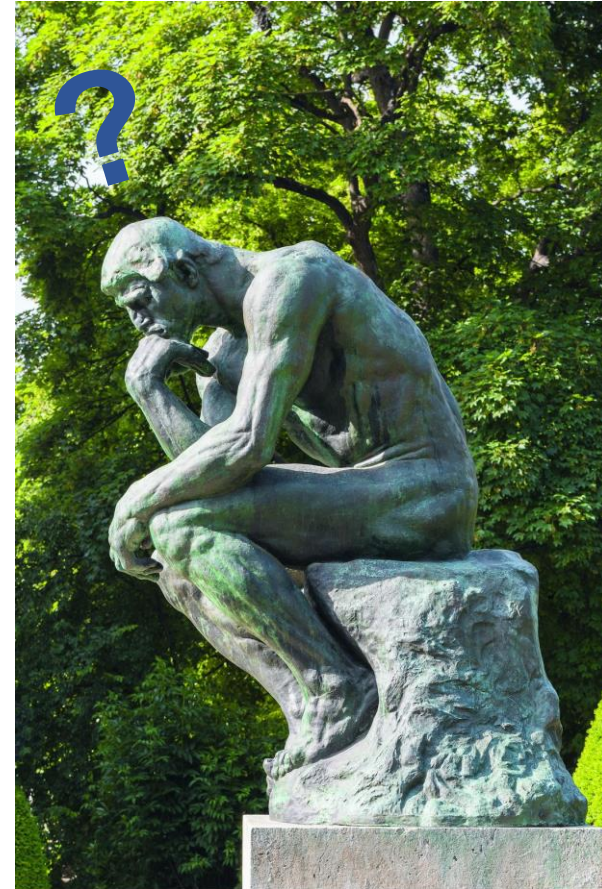


*Microplastic sensor
(μ plastics)*

LEITAT
managing technologies



Que faire avec un glider et des capteurs?



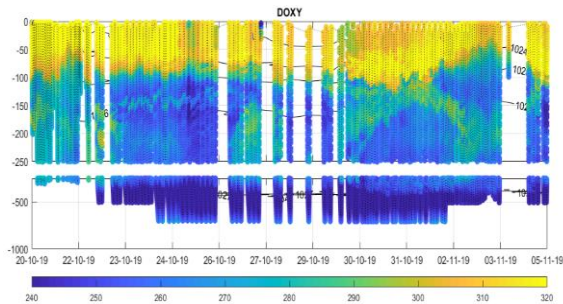
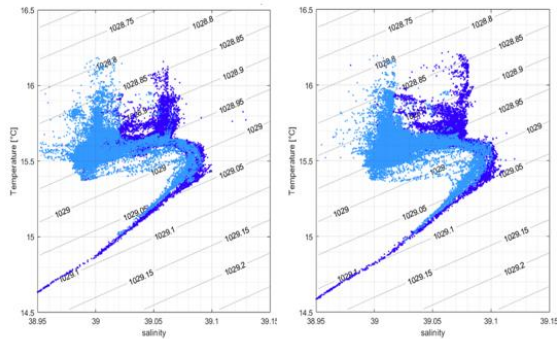
© Belin Éducation/Humensis, 2020 Photographie: Tix générale
© Agence photographique du musée Rodin/Jérôme Merouillon

METOCEAN SURVEY



- Oceanologie

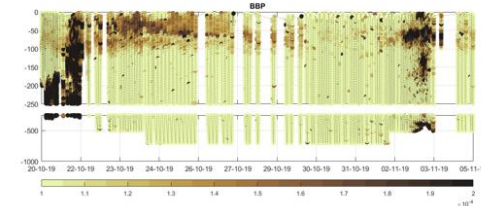
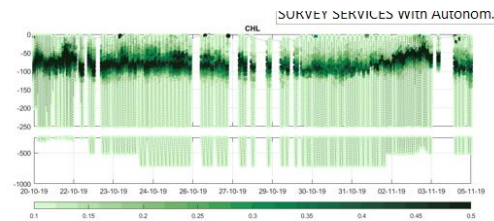
- Conductivity Temperature Depth (CTD)



- Biologie

- Chlorophyll
- Backscattering
- FDOM

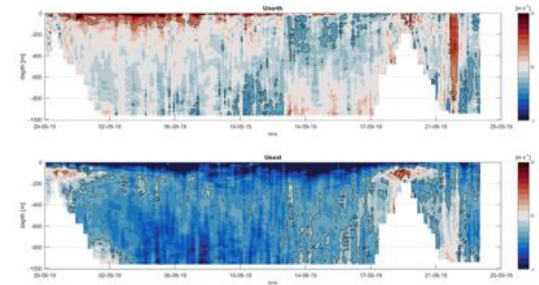
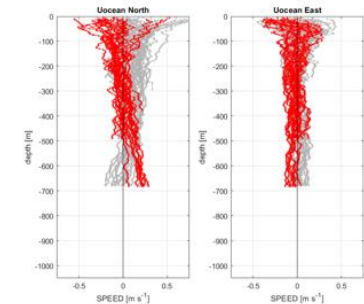
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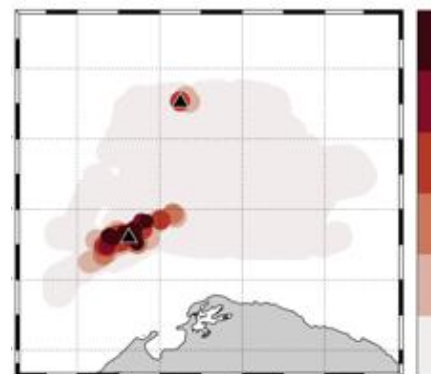
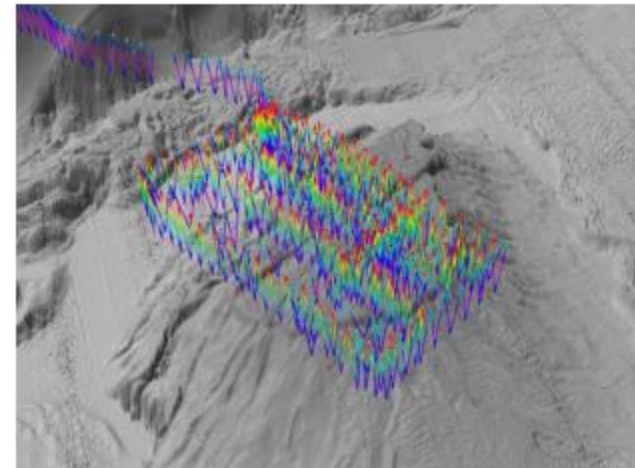
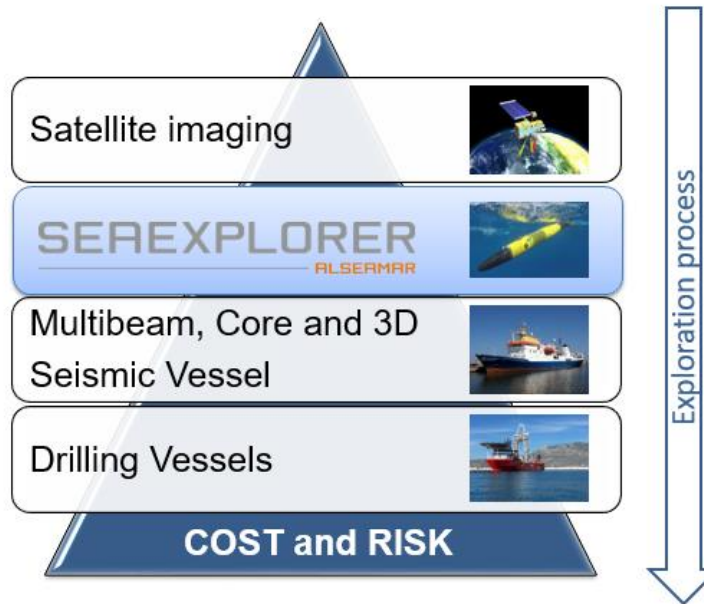
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- Courant

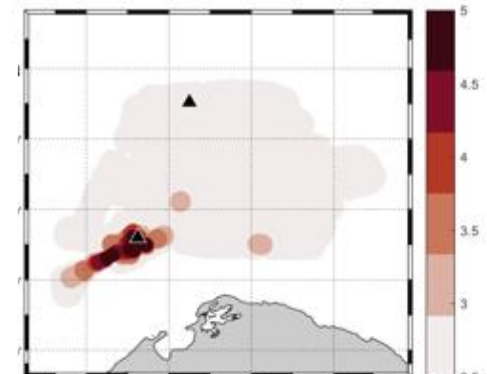
- Acoustic Doppler Current



O&G : seep hunting



Methane detection

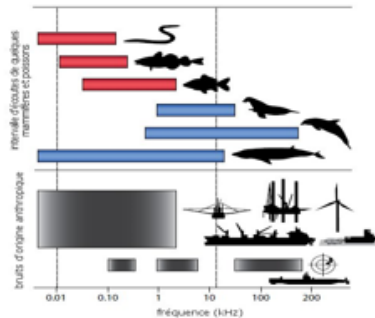


Oil proxies detection

Acoustique Passive

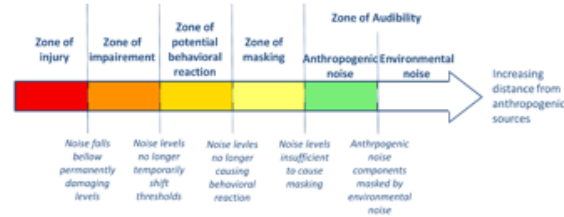


ODYSSEA



Anthropogenic sounds compared to communication of cetaceans and fishes.

Slabbekoorn and al. (2010)



Scale of risks of impacts of noise on marine fauna.

Source: *Quiet-Oceans*

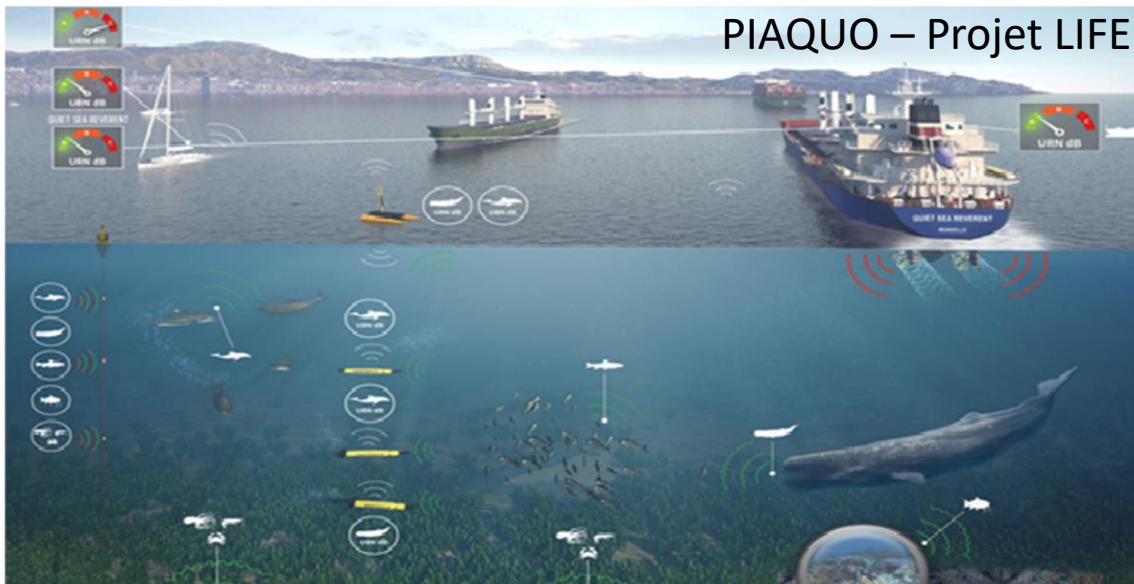
■ Sperm whales



■ Fine whales



PIAQUO – Projet LIFE



Life PIAQUO - ALSEAMAR

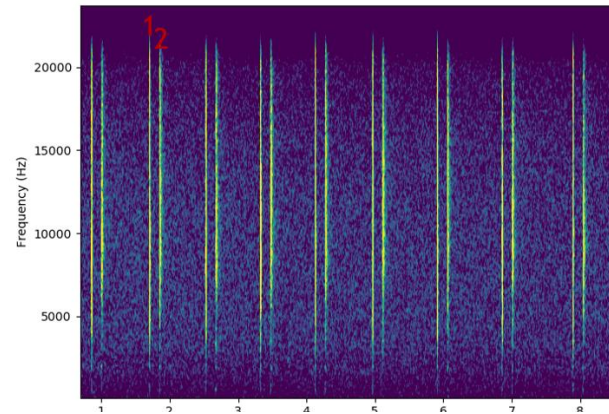


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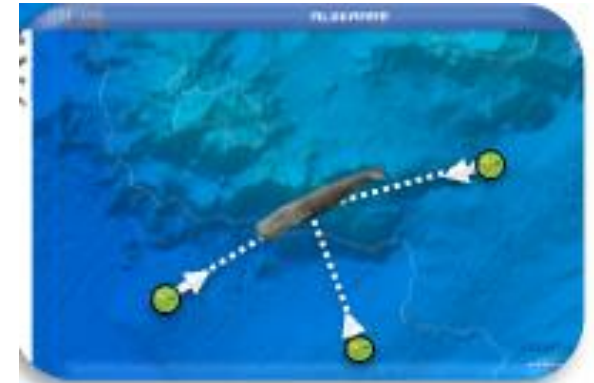
Sperm whale



- Clicks :
 - Codas
 - Regular clicks
- Wideband, max @8kHz, T=5ms



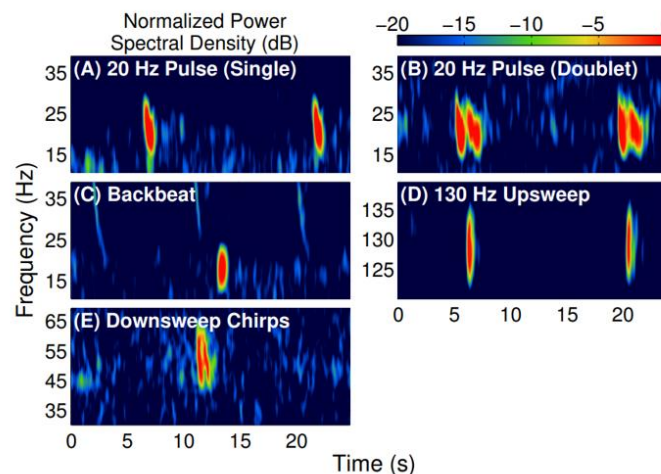
Cross bearing localization



Fin whale



- Vocalizations :
 - 20Hz pulse (single, doublet)
 - Backbeat
- Very low frequency, narrow band



Hyperbolic localization



Image credit : Garcia, H.A.; Couture, T.; Galor, A.; Topple, J.M.; Huang, W.; Tiwari, D.; Ratilal, P. Comparing Performances of Five Distinct Automatic Classifiers for Fin Whale Vocalizations in Beamformed Spectrograms of Coherent Hydrophone Array. Remote Sens. 2020, 12, 326.

■ Performs research activities

■ Designer, Manufacturer & Marine Survey Services Provider

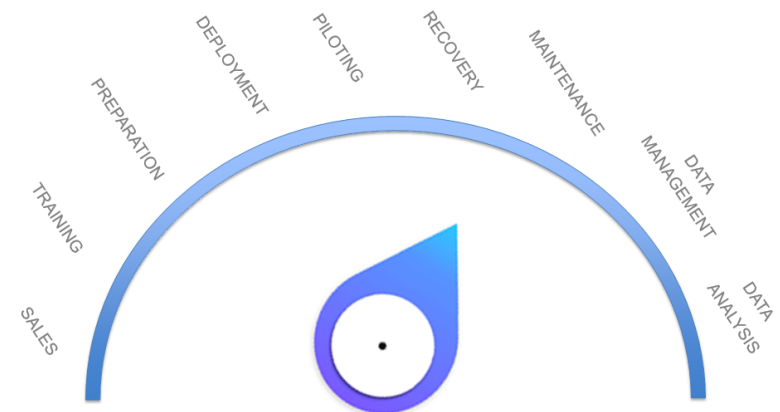
- SeaExplorer glider
- Standard sensors: CTD, O2, Chl, Bbp, CDOM
- New sensors (ADCP, turbulence, hydrocarbons, Methane, PCO_2 , etc,)

■ Different level of involvement

- Sell the glider
- Sell and Pilot the glider
- Sell, Pilot and Analyze the data

■ Meet the needs of very different customers

- Academic Researchers
- Oil & Gas
- Navy





ODYSSEA

Creating products and knowledge
for the Mediterranean

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MERCI DE VOTRE ATTENTION

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