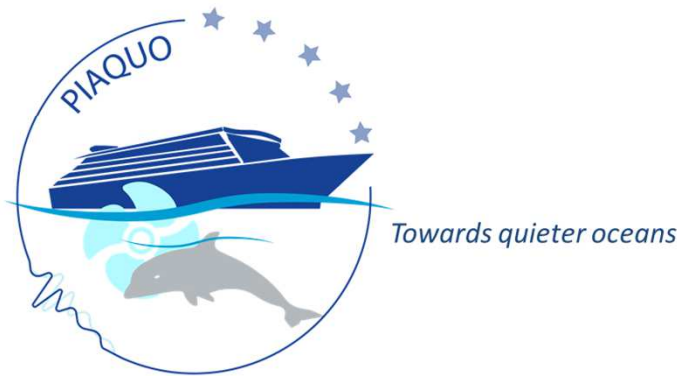


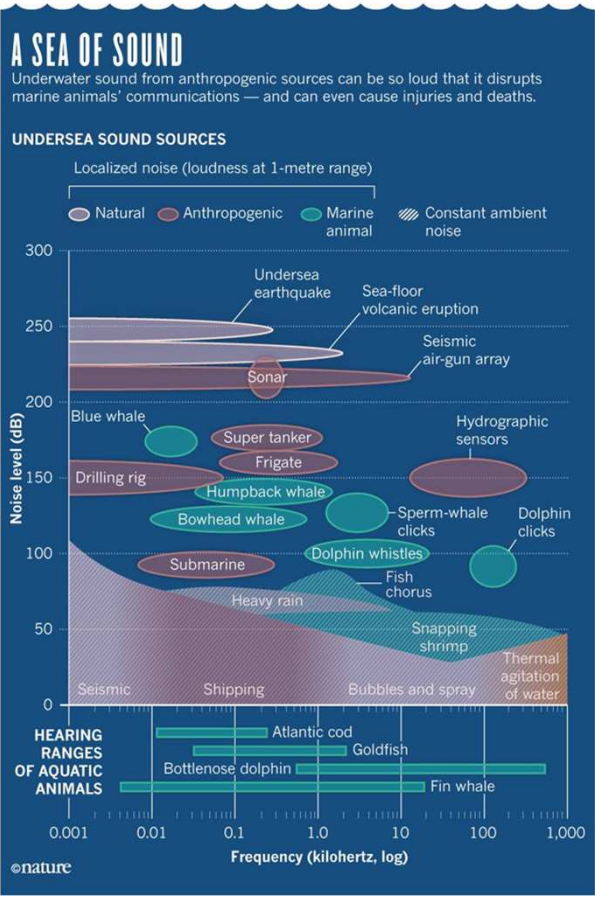


EMD Den Helder
EUROPEAN MARITIME DAY 20-21 May 2021



MARITIME TRAFFIC UNDERWATER NOISE IMPACT REDUCTION AND REAL-TIME ADAPTATION TO ECOSYSTEMS

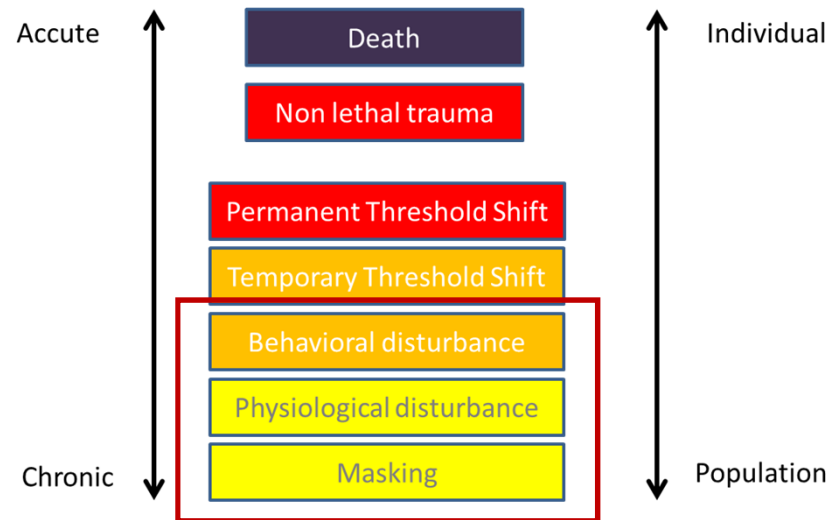




Anthropogenic underwater noise impacts marine biodiversity, such as marine mammals, fishes, turtles, invertebrates and cephalopods.

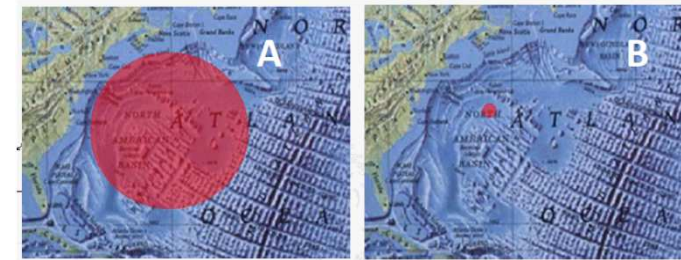
Noise impacts from shipping consist on the reduction of communication and detection ranges.

This leads to increased stress and increasing difficulties for mating, catching preys and territory defense.



Scale of risks of impacts of noise on marine fauna.

Source: Chorus acoustics



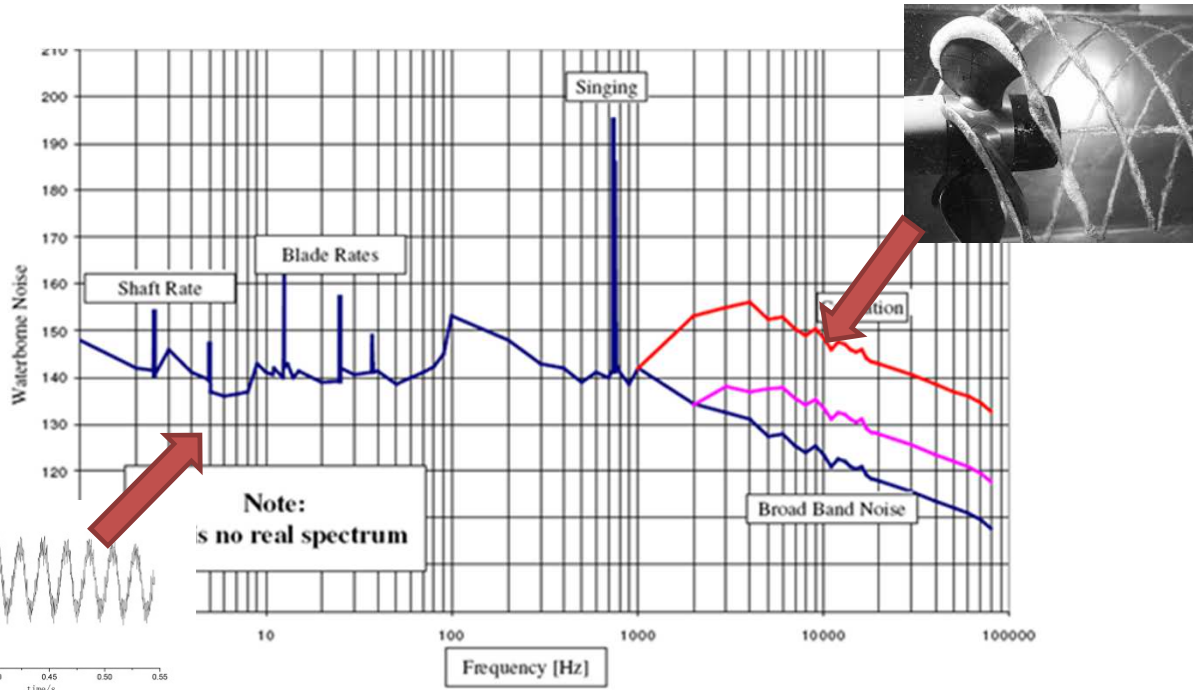
Communication range of whales with and without maritime traffic.

Source : Okeanos Foundation 2008

Vessels create important noises

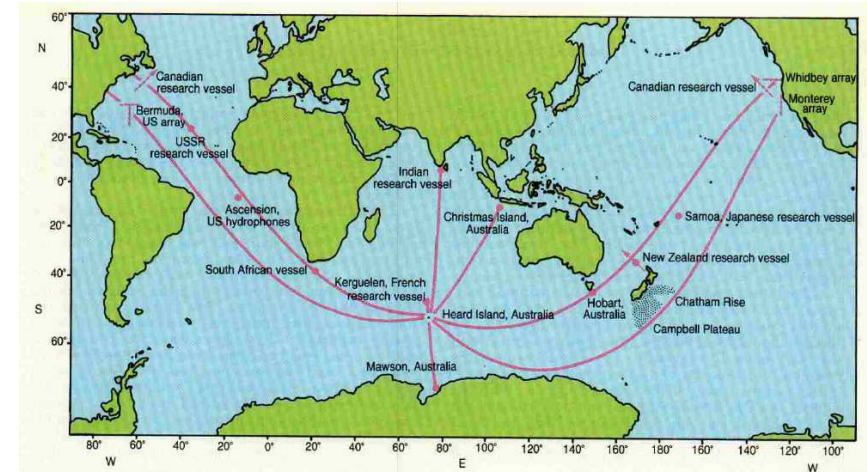
Up to SPL 176-192 dB re 1 μ pa @1m
 → SPL air equivalent : 114-130 dB re 20 μ pa
 (Jackhammer level)

> 50% related to propellers noise



Underwater noise propagation is very quicker and longer than in air

Up to 18000km demonstrated in 1989
 Speed > X4



Source : Munk, W. H., Spindel, R. C., Baggeroer, A., & Birdsall, T. G. (1994). The heard island feasibility test. *The Journal of the Acoustical Society of America*

Background

Average **level of noise** in the most patronized seas has **increased by about 20dB in the last 50 years.**

The **radiated noise of working and pleasure boats** is the **main factor** in this growth of underwater noise.

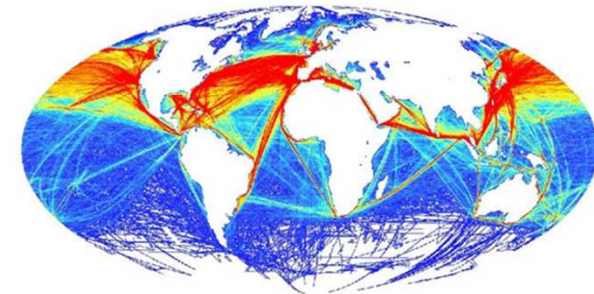
Marine areas with protected species and/or representing zones with **major biological interests** (reproduction, nursery, food...) are located **nearby vessels' routes.**

Recommendations were established to encourage **underwater noise reduction** generated by human activities and **European regulation** is going to oblige the establishment of ambitious actions in this field.

The **European project AQUO (FP7)** has created **tools to estimate the noise generated by maritime traffic and to realize noise cartographies.**

Technological solutions exist but were never deployed as a coherent approach to show their capacity to answer to this issue.

The control of vessels' noise and their adaptation to the ecosystem crossed is going to be an important issue for States, ship-owners and shipyards



Main maritime traffics

EMD

Den Helder
20-21 May 2021

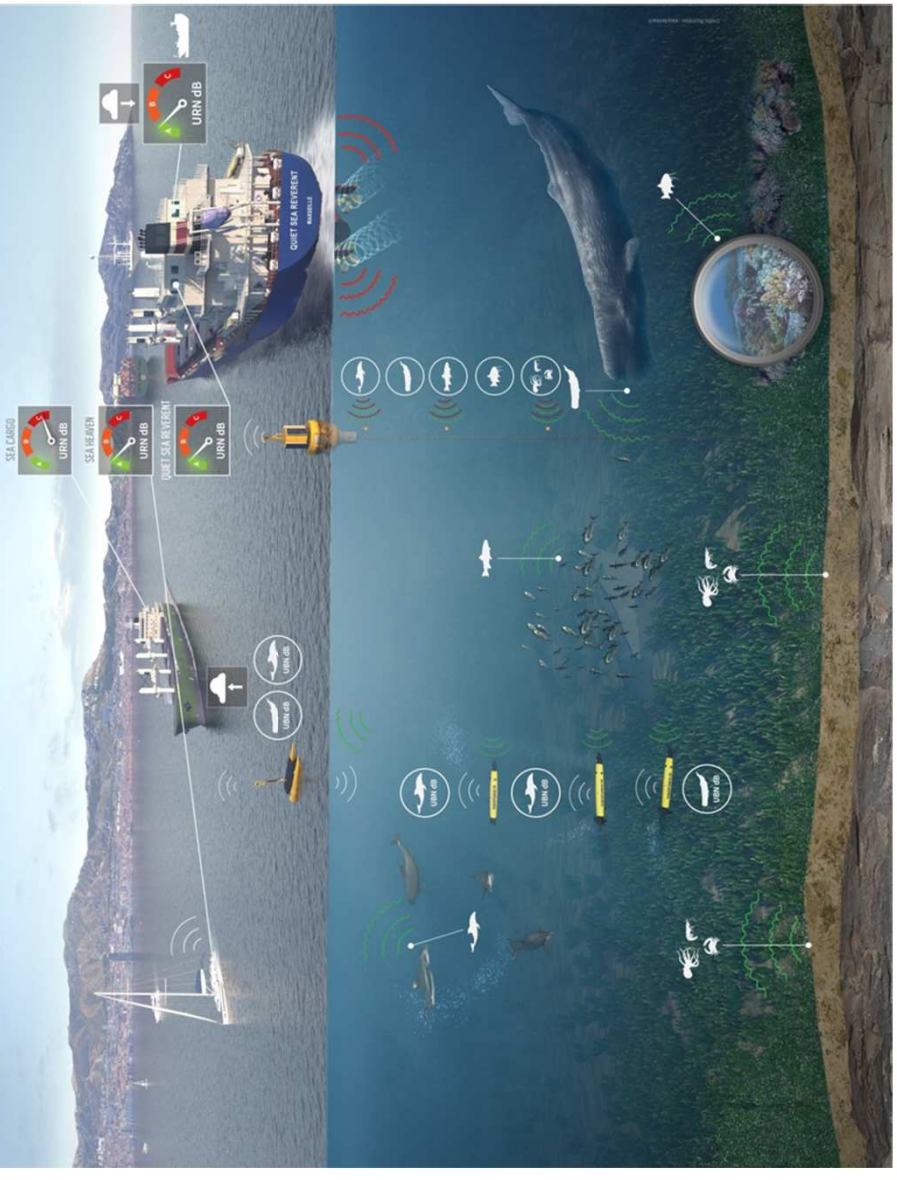




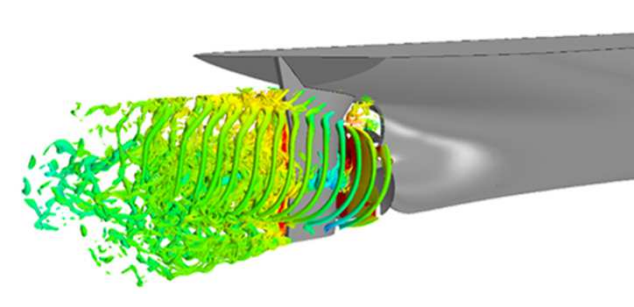
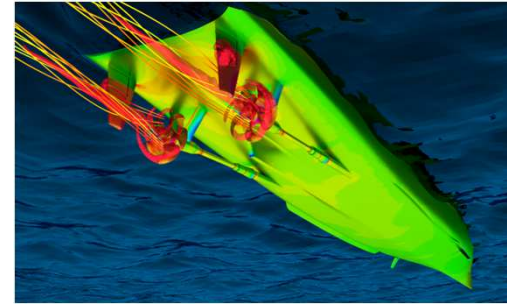
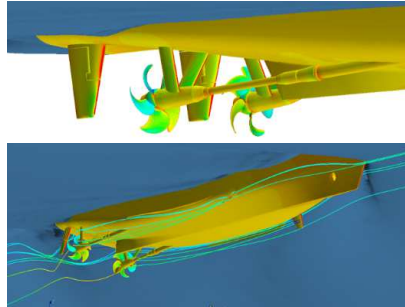
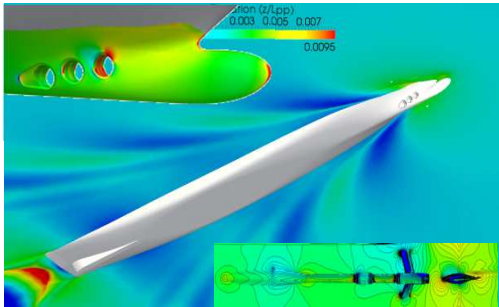


PIAQUO

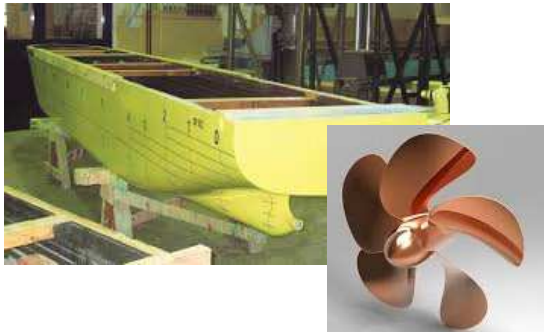
Maritime traffic underwater noises impact reduction and real-time adaptation to ecosystems



Goal 1 : Practical implementation of ship Underwater Radiated Noise reduction based on improved propellers



Numerical modelisation/optimisation

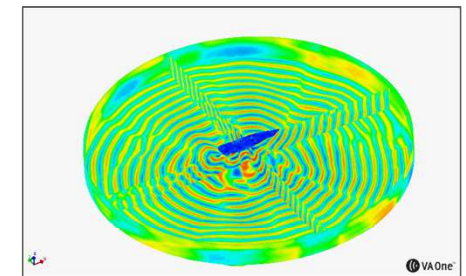
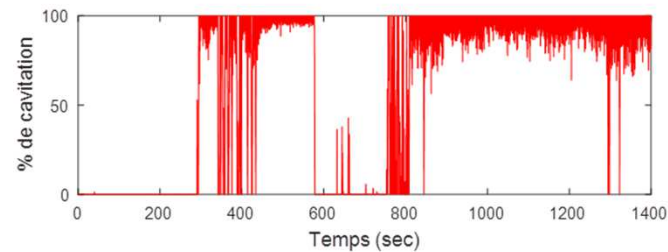
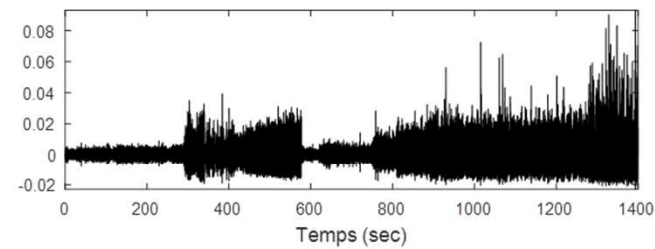
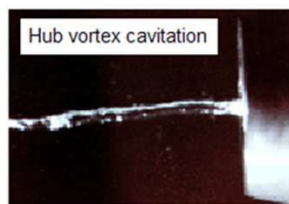
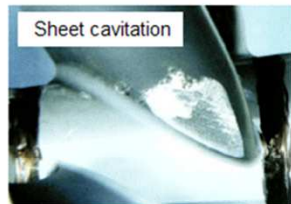


Test with model scales in cavitation tunnel



2 demonstration vessels

Goal 2 : Practical implementation of ship radiated noise real-time self-estimation and control and cavitation detection system



URN level self-estimation

Cavitation self-detection and quantification

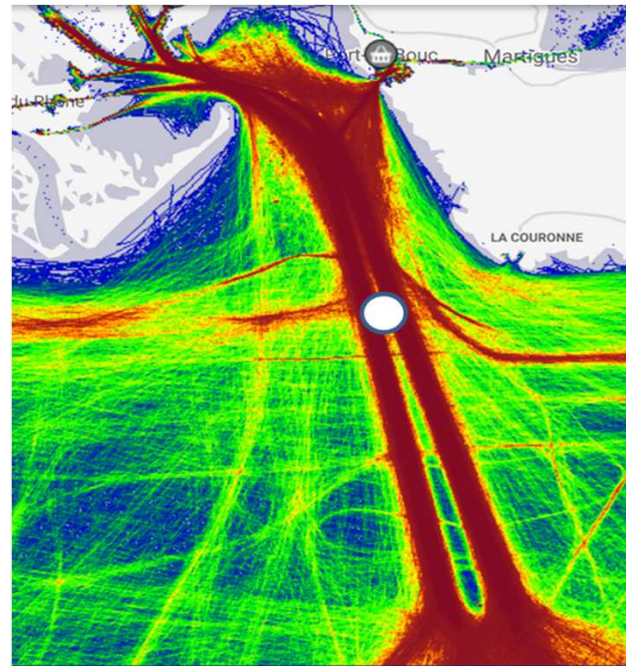
Demonstration vessel



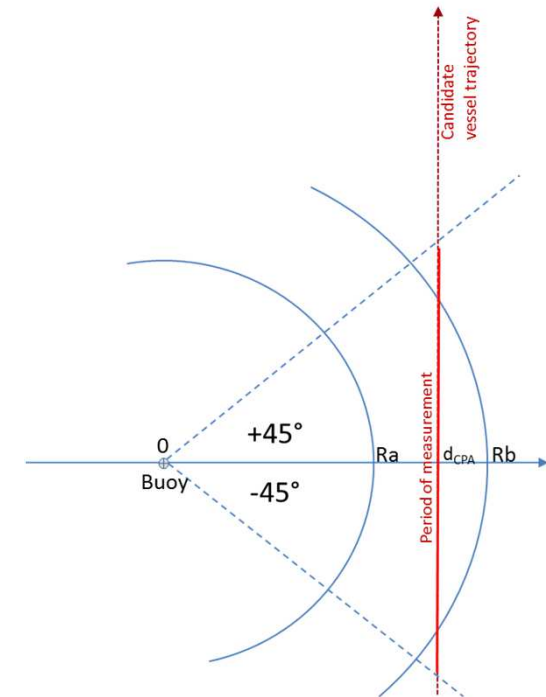
Goal 3 : Inducement of virtuous approaches from ship owners to reduce shipping URN in connection with a database of real measured radiated noises of boats



Noise measurment Buoy

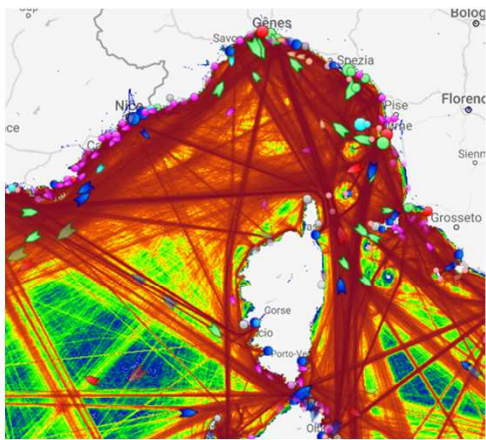


Marseille port buoy position



Measurment conditions

Goal 4 : Adaptation of the maritime traffic according to the real-time state of marine ecosystem mapped by passive acoustic system. REPCET automatic feeding with datas.



Pelagos traffic



Brown meager



Dusky grouper

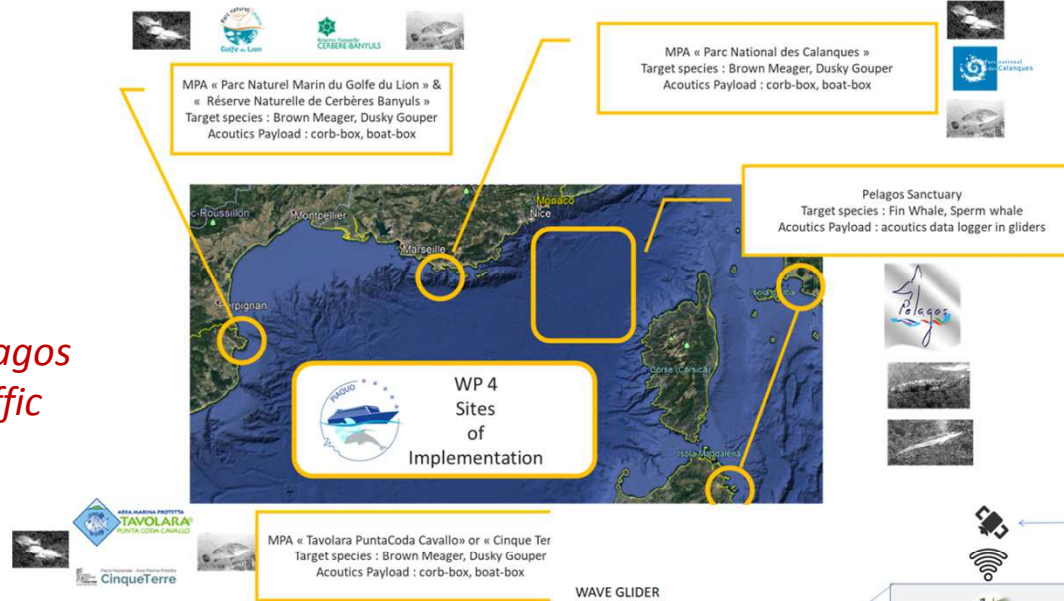


Sperm whale

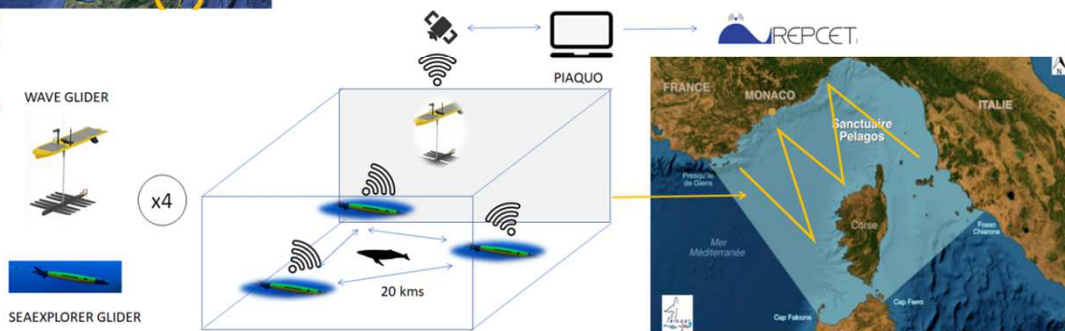


Fin whale

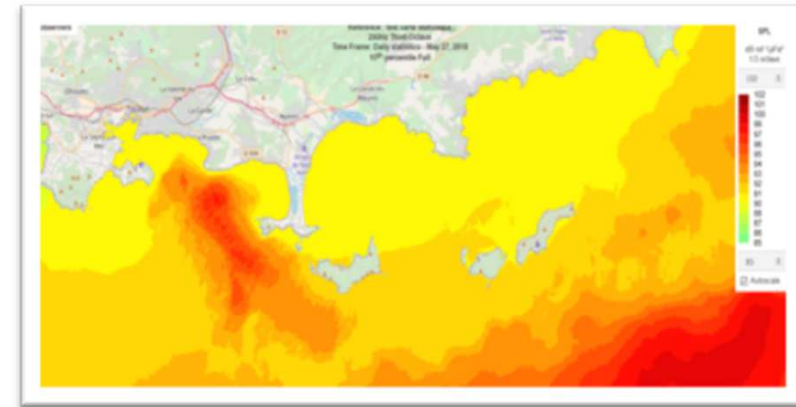
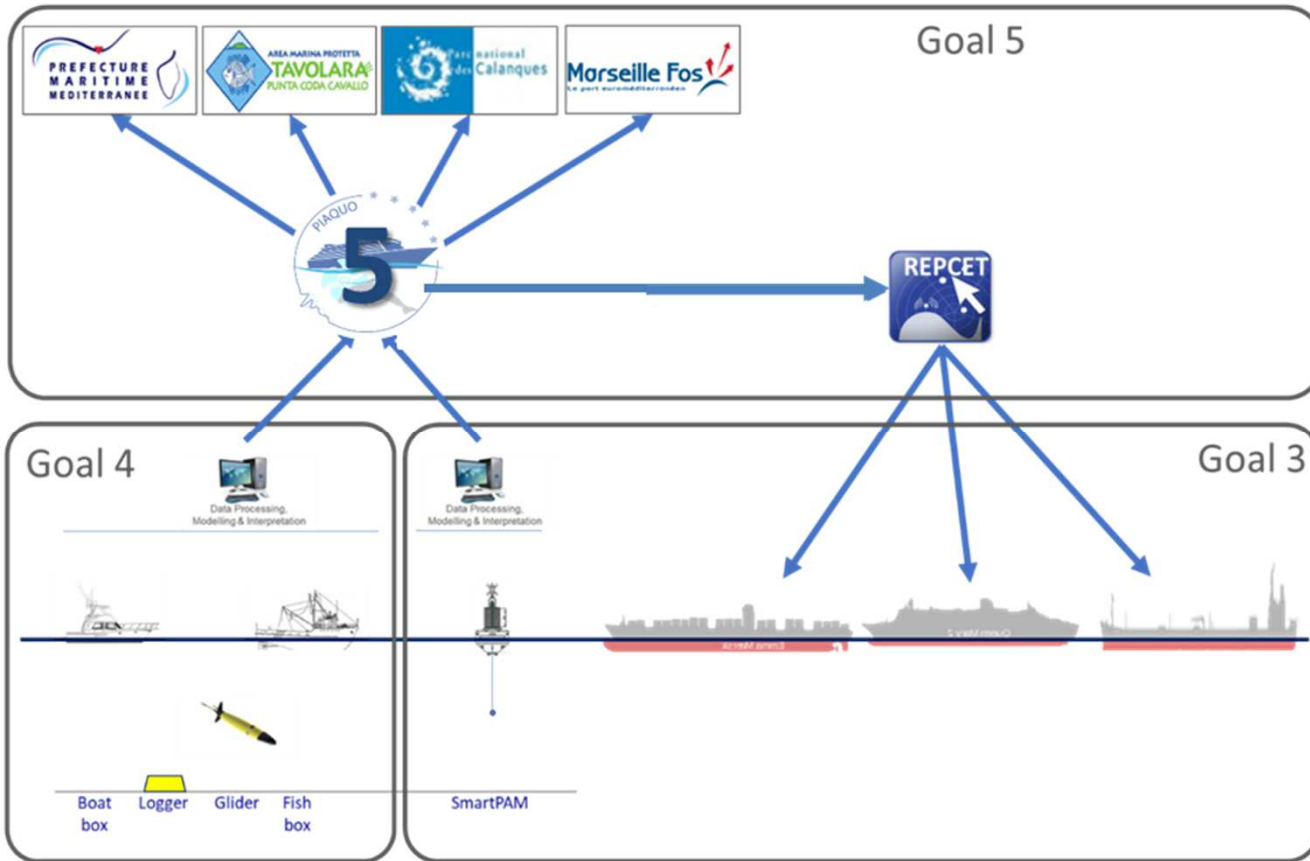
Demonstration species



Cetacean mapping by gliders



Goal 5 : Setting broadcasting services for public and private actors decision making support to reduce shipping noise impact



LIFE & PIAQUO share the same environmental ambitions to tackle a major anthropic negative impact

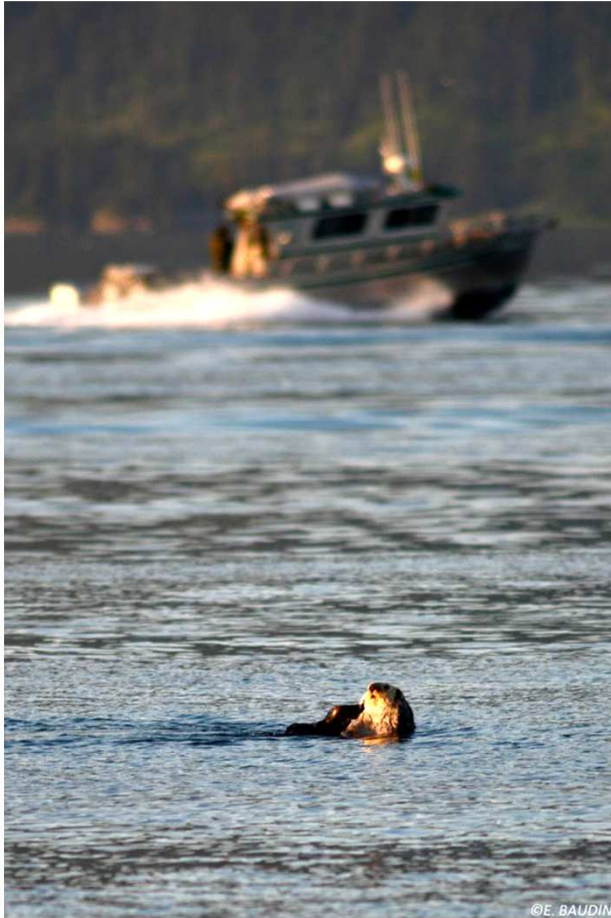
European partners and ambitions → European project

PIAQUO is the last Demonstration step

Europe is the good level to change the common rules



**It is our duty to protect ecosystems
Through LIFE, Europe helps us to act for tomorrow
Let's all play our part**



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