

# SILENCIO PROJECT: Studying the viability of using electric propulsion in small inshore fishing boats to reduce their acoustic impact in the environment

Clara Almécija<sup>1</sup>, Pablo Álvarez<sup>1</sup>, Antonio Cardenal-López<sup>2</sup>, Ignacio González<sup>1</sup>, Enoc Martínez<sup>3</sup>, Joaquín del Río<sup>3</sup>, Cristian Simoes<sup>1</sup>, Soledad Torres-Guijarro<sup>2</sup>, Marta Vazquez<sup>1</sup> and Silvia Torres<sup>1</sup>

1 Unidad de Tecnologías Marinas, Centro Tecnológico del Mar-Fundación CETMAR, Vigo (Pontevedra), storres@cetmar.org  
2 atlantTic, Universidade de Vigo, Escola de Enxeñaría de Telecomunicación, Vigo (Pontevedra), España, soledadt@uvigo.es  
3 SARTI-MAR, Observatorio OBSEA, Universitat Politècnica de Catalunya, Vilanova i la Geltrú (Barcelona), joaquin.del.rio@upc.edu



Silencio develops innovative sustainable solutions to reduce underwater-noise impact of fisheries and shell-fisheries in ecosystems, assessing the use of electric propulsion by small inshore fishing boats. A hydrophone is installed in Cortegada platform (Ría de Arousa, near Marine ZEPA Rías Baixas and Illas Atlánticas National Park), from RAI Observatorio, focused in computing sound pressure levels at the targeted frequencies of the Marine Strategy Framework Directive to characterize the ambient underwater-sound. Records are being treated and studied by the Universidade de Vigo to detect natural and human underwater-sound sources. Besides, OBSEA Observatory-UPC will install another hydrophone to compare the underwater-sound records and to assess the capability of applying Silencio algorithms to other records. Moreover, more usual inshore fishing activities are typified (fishing gear, length, using-time and distance, power and uses of the engine, gas consume, docker facilities, etc.) to assess the capability of performing these fishing activities by electric propulsion attending to autonomy, volume and weight of batteries, price, profitability, etc. Some of these activities will be recreated by the use of some own-developed electric outboard engines and the underwater-noise and carbon-footprint will be quantify. Further, Silencio spreads the idea of an environmentally sustainable, socially responsible and economically viable fishing sector.

## CORTEGADA'S SOUND RECORD



**Cortegada Platform (WMO Code: 6201038, Xunta Galicia)**

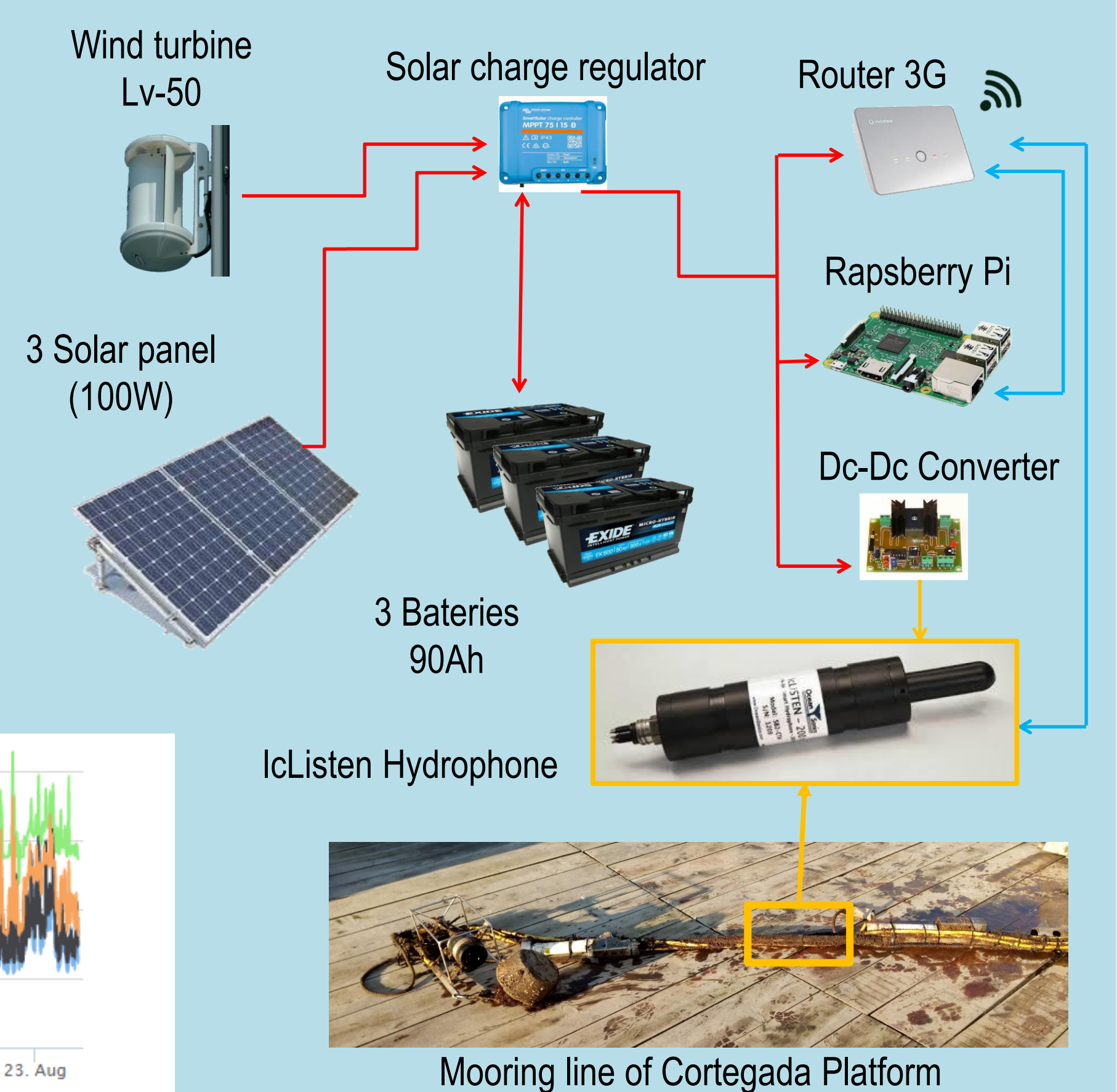
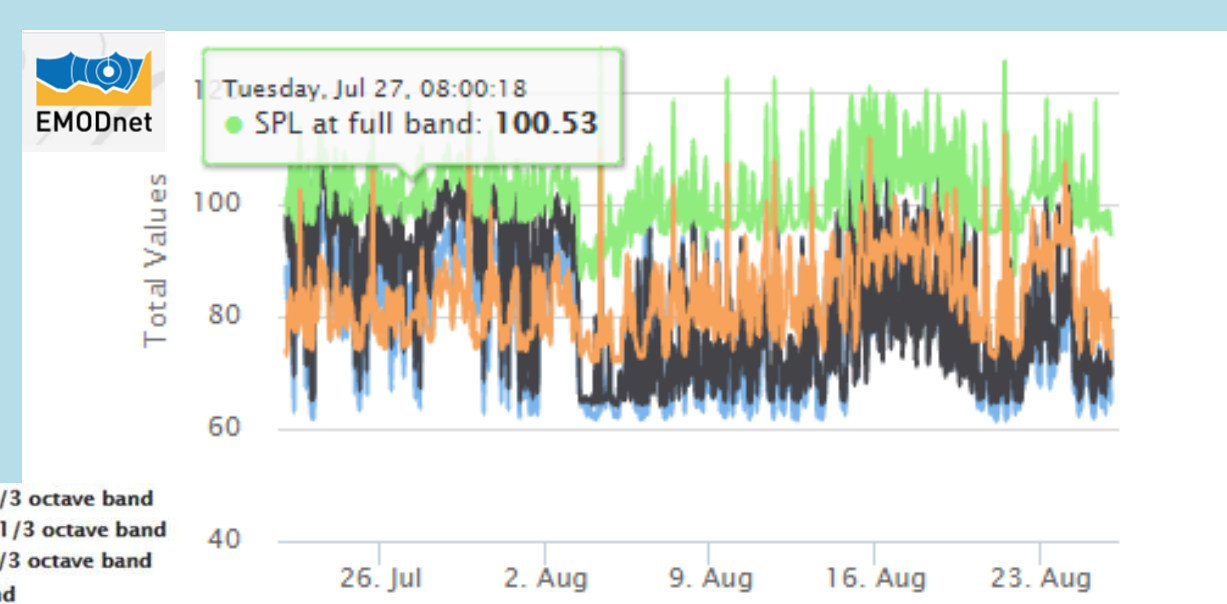
- Located in the Ría de Arousa where an important upwelling system exists (NW Iberian Peninsula)
- Recording oceanic and meteorological data since 2008

**IcListenHF hydrophone**

- An hydrophone was installed in Cortegada for the first time in 2016
- The data series are being continuous since November 2019
- Configuration:
  - Sampling rate: 51.2 kHz
  - Recording: 1 minute of raw data every 3 minutes
  - Processing Data every 36 minutes attending to Marine Strategy Framework Directive (Sound Pressure Levels at 63 Hz, 125 Hz, 2 kHz and Full band)
- Processed data are sent to Emodnet Physics Portal in real-time
- Raw data are downloaded every 2-3 weeks

**Why recording ambient underwater sound here?**

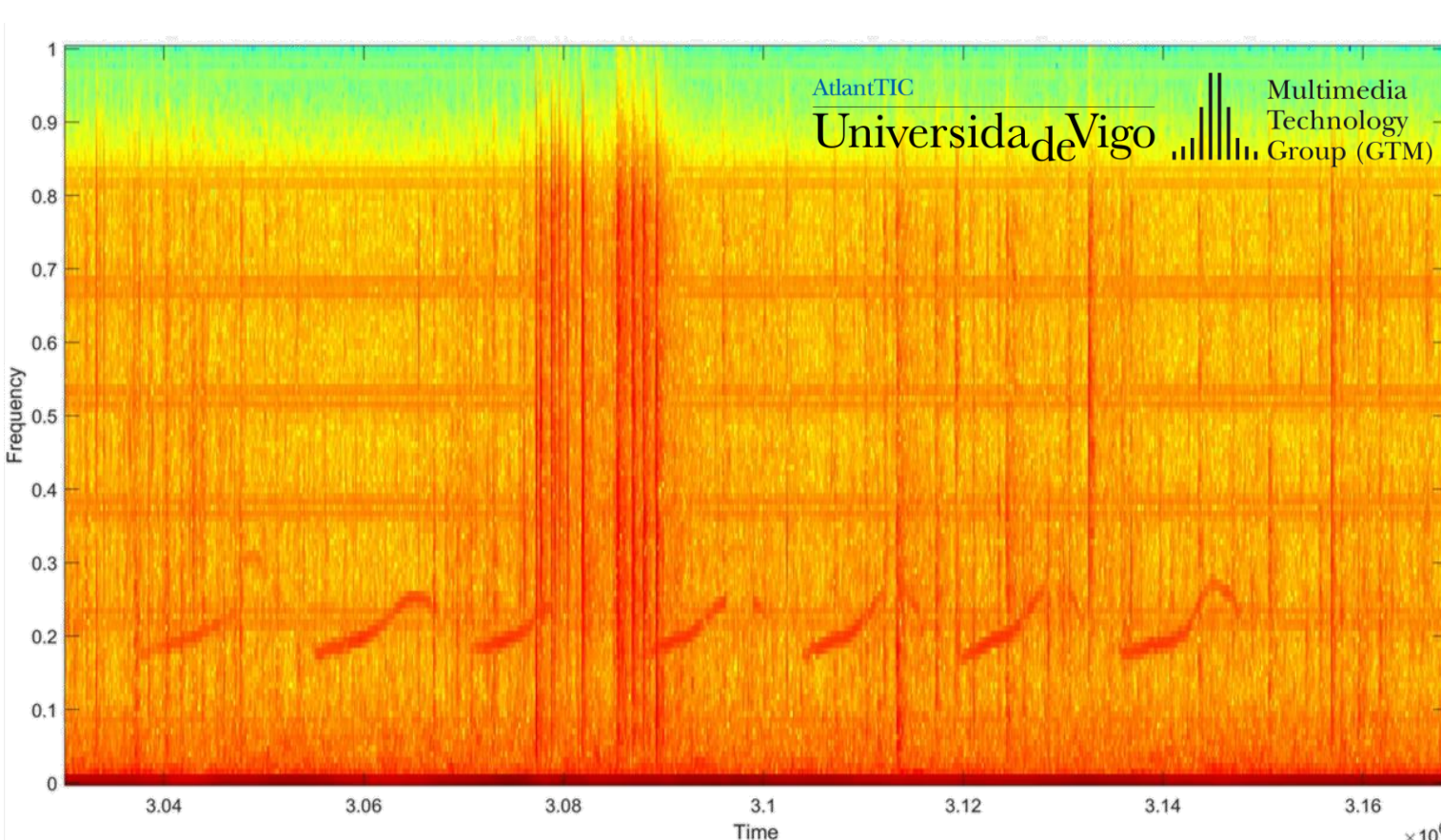
- Higher energy supply
- Close to areas of high fishing and shellfishing exploitation
- Large population of Cetaceans
- High environmental interest (ZEPA, PNMT)



## CHARACTERIZATION OF AMBIENT UNDERWATER SOUND OF CORTEGADA

### STUDING AMBIENT UNDERWATER SOUND RECORDS

- Cortegada's sound records are studied to identify different sound events
- Several algorithms are developed to detect natural and anthropogenic sources
- Clicks and whistles of cetaceans are perceived in Cortegada



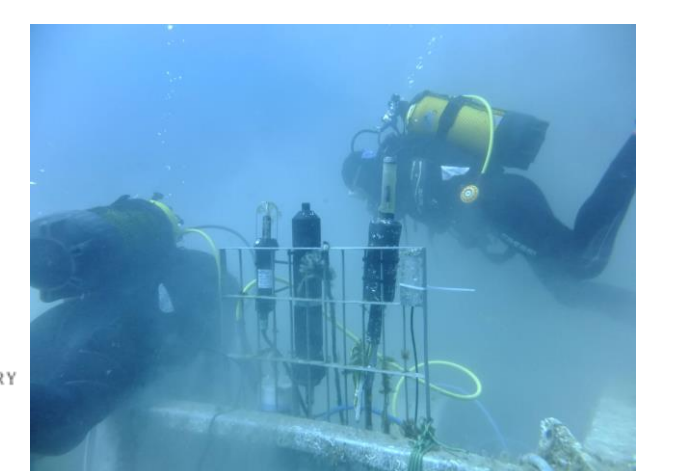
Listen to more videos of SILENCIO on CETMAR Youtube Channel

	SOURCE of NOISE in CORTEGADA	CHALLENGES faced by the PROCESSING OF HYDROPHONE RECORDINGS	STRATEGIES to face CHALLENGES
ANTHROPOG.	Fishing boats and Large ships	High current flow noise dominates at low frequencies and makes automatic vessel detection difficult	Search for <b>robust indicators of vessel presence</b>
NATURAL	Cetaceans	High noise from <b>impacts of sediments</b> carried by the current confused with the echolocation clicks of the dolphins	<b>Whistle detection</b>

### STUDING THE TRASFERIBILITY OF THE SILENCIO'S ALGORITHMS TO OTHER SOUND RECORDS

Another IcListenHF hydrophone was been set up in the cabled seafloor observatory OBSEA to:

- compare the underwater-sound records
- assess the capability of applying Silencio algorithms to other records



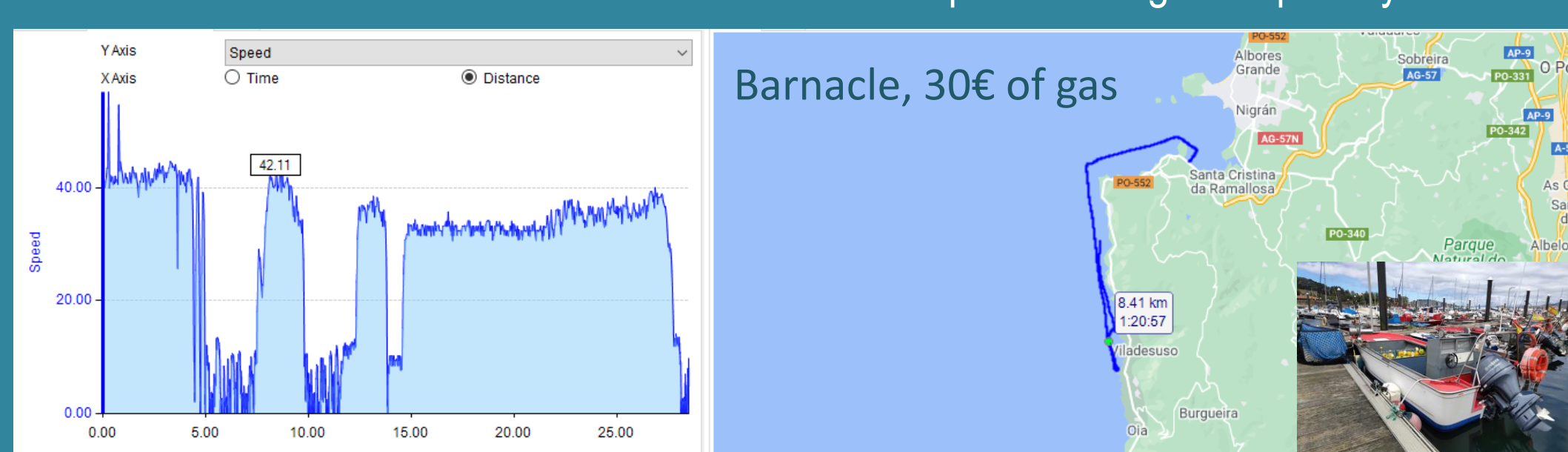
### MAKING UNDERSTABLE AND ACCESSIBLE AMBIENT UNDERWATER SOUND TO EVERYBODY

An Online Repository is being developed to make easily available the interesting sound events of the Cortegada's record.

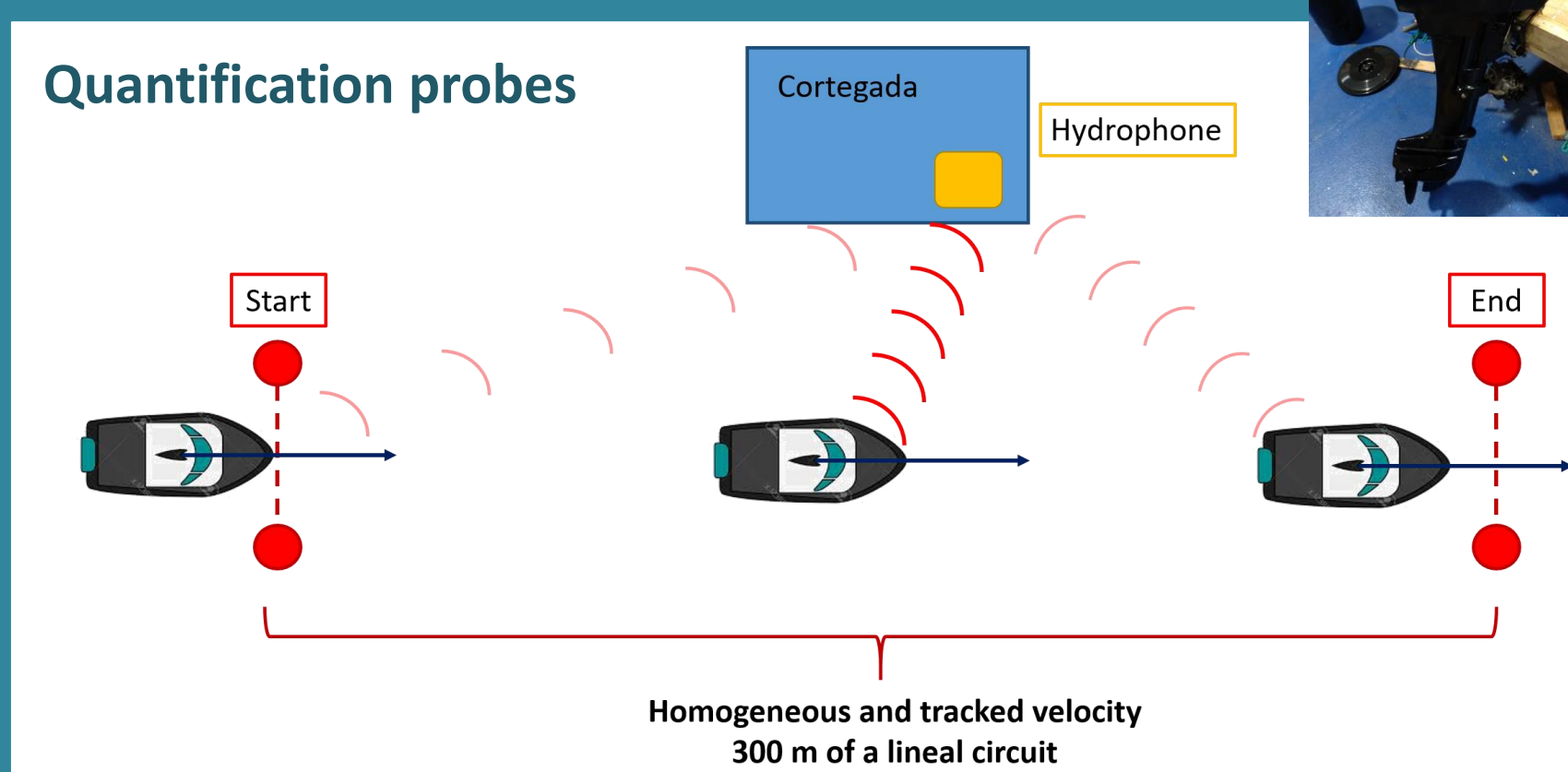
## COULD ELECTRIC ENGINES DECREASE AMBIENT UNDERWATER SOUND?

Silencio works to apply innovative sustainable solutions to reduce underwater noise impact of fisheries and shell-fisheries in ecosystems by the assessment of the capability of using electric propulsion by small inshore fishing boats attending to autonomy, volume and weight of batteries, price, profitability, etc.

- More usual types of inshore fishing-activity from small boats (<7m of length) have been characterized and typified (time, distance, uses of engine, gas consume, docker facilities, etc.) and some of them have been tracked by a GPS device
- Two outboard electric engines have been developed to check the electrification of engines of the small fishing boats
- Some of these activities will be recreated using these engines
- Reduction of the underwater sound and carbon-footprint is being also quantify.



Information of the engine use and geographical position of a tracked shellfishing boat



### FOLLOW US

@SILENCIO\_CETMAR

<https://www.programapleamar.es/>

SILENCIO workshop: Novembre 17th 2021



### ACKNOWLEDGEMENTS

Silencio Project is performed by Unidad de Tecnologías Marinas from Centro Tecnológico del Mar, in collaboration with Fundación Biodiversidad, from Ministerio para la Transición Ecológica y el Reto Demográfico of Spain, by the programa Pleamar, cofounded by EMFF. Silencio is possible thanks to the participation of Universidade de Vigo and Universidad Politècnica de Catalunya and the collaboration of several Galician Fishing Guilds (Baiona, Bueu, Cangas, Lira, Muros, Portonovo, Vigo), Coastal Observatories (Ocaso, SOCIB), pt-Proteoma, Instituto Español de Oceanografía and Parque Nacional Marítimo Terrestre das Illas Atlánticas de Galicia (PNMT Illas Atlánticas). Further, Silencio spreads the idea of an environmentally sustainable, socially responsible and economically viable fishing sector.

Opinions provided in this publication are exclusive authors' responsibility, and they do not necessarily reflect the points of view of the institutions that fund the project.