CLEANATLANTIC CONFERENCE

Vigo, 21st June

09.00 – 16.30 h
(UTC+2h00, Madrid, Bruselas)

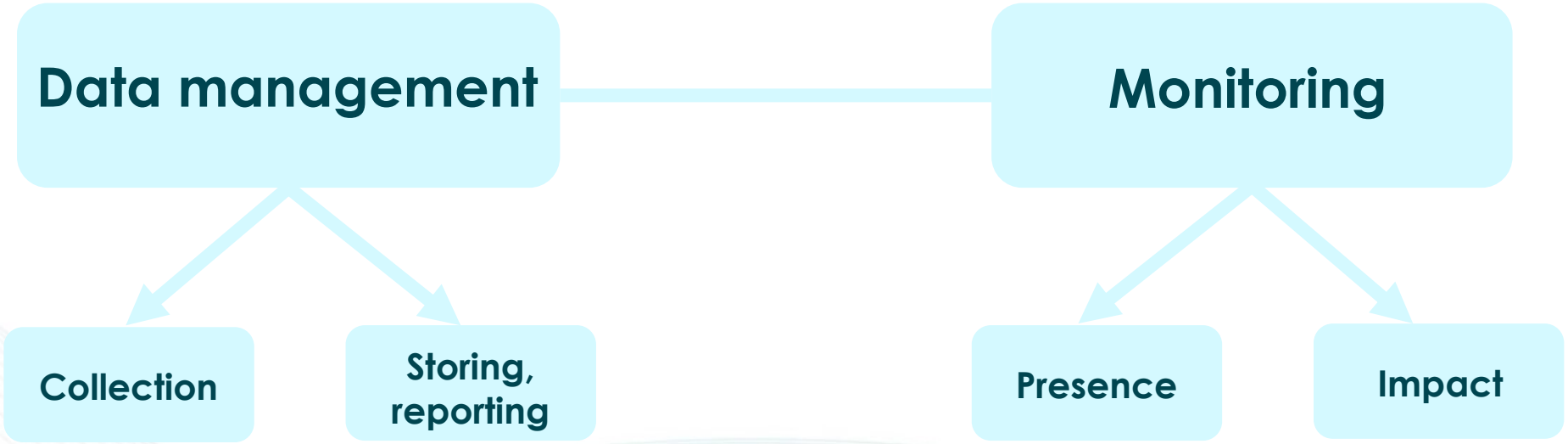
Advances on Marine Litter Data Management and Monitoring Tools

Morgan Le Moigne (Ifremer),
Agueda Cabrero, Pablo Otero (IEO)
Joao Monteiro, Paola Paretti (ARDITI, MARE)
Pedro Sepulveda (DROTA)
Sandra Moutinho (DGRM)
Josie Russel (Cefas)
Garbiñe Ayensa Aguirre (Intecmar)
Olivia Gerigny, Elise Georges (Ifremer)

Interreg Atlantic Area
European Regional Development Fund
EUROPEAN UNION
Clean Atlantic

Objective

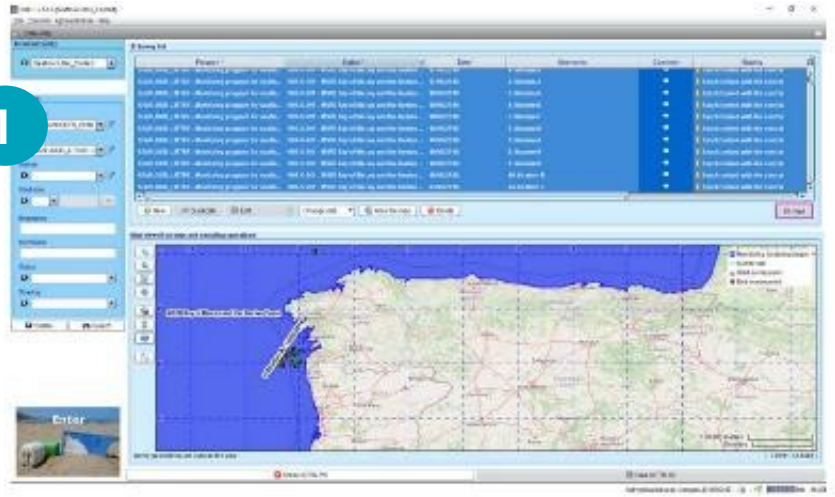
Reinforce harmonized monitoring of marine litter in the framework of the MSFD



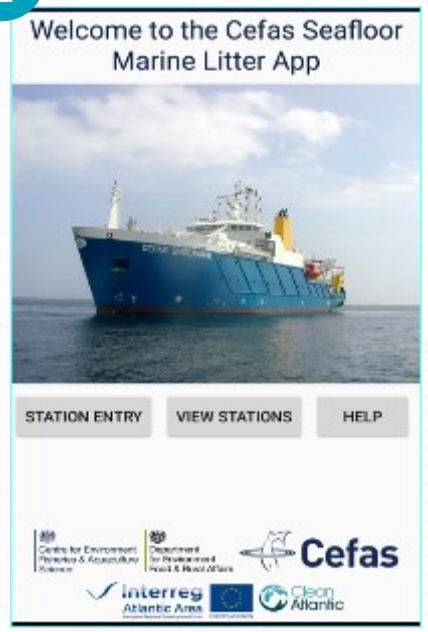
Results – phase 1- Data Management

1. Database and software: Development of sustainable tools for Marine Litter Data management. IFREMER
2. App: App to record data for seafloor litter. CEFAS
3. App: Marine Litter LOC-app. INTECMAR
4. App: Floating Litter Reporter. ARDITI

1

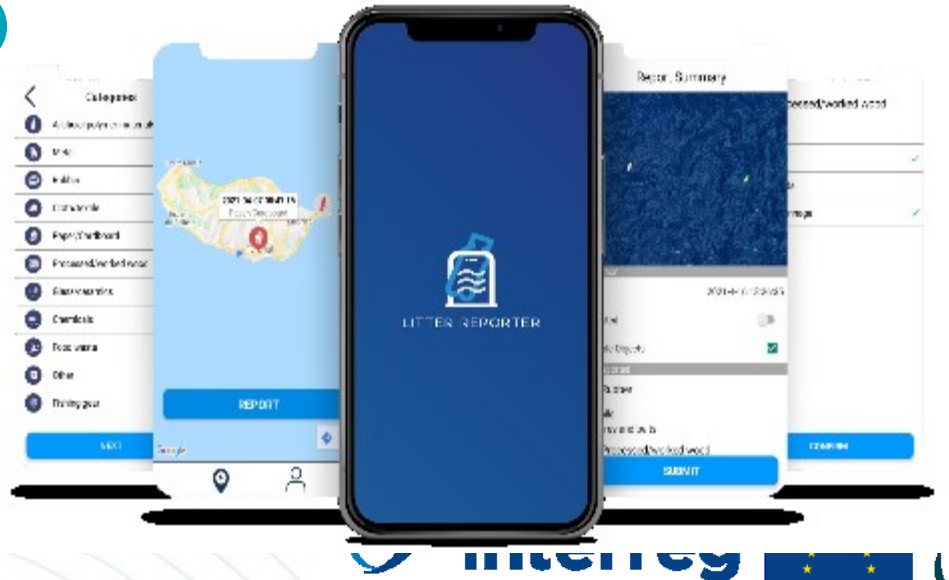


2



3

4

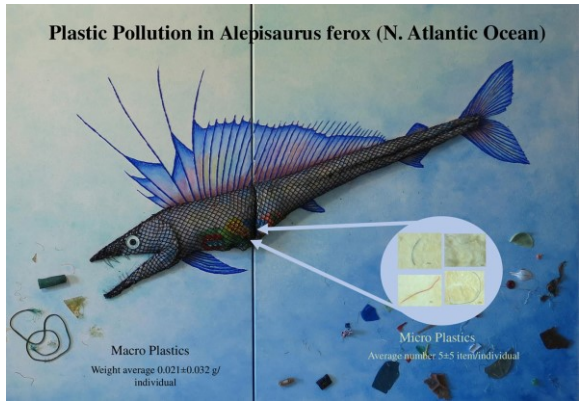


Atlantic Area
European Regional Development Fund
EUROPEAN UNION
Clean Atlantic

Results – phase 1- Monitoring interactions

Reports/scientific papers:

Ingestion:



1. Towards a protocol for the observation of microplastics in biota. CEFAS
2. You Are What You Eat, Microplastics in Porbeagle Sharks From the North East Atlantic: Method Development. CEFAS
3. Ingestion of plastic debris (macro and micro) by longnose lancetfish (*Alepisaurus ferox*) in the North Atlantic Ocean. IEO
4. Microplastic ingestion by pelagic and benthic fish and diet composition: A case study in the NW Iberian shelf. IEO
5. Microplastic occurrence in deep-sea fish species *Alepocephalus bairdii* and *Coryphaenoides rupestris* from the Porcupine Bank (North Atlantic). (Submitted to STOTEN) IEO

Entanglement:

6. Strategy and constraints to support monitoring of Marine Litter Harm: Towards a protocol for the observation of marine organisms entangled/strangled/covered by marine litter during ROV operations. IFREMER

Software & Database

Ifremer

CSIC
Consejo Superior de Investigaciones Científicas
C.N. INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO)
CENTRO OCEANOGRÁFICO DE VIGO

MARE

arditi
agência regional para o desenvolvimento da investigação tecnologia e inovação

Interreg
Atlantic Area
European Regional Development Fund

EUROPEAN UNION

Clean Atlantic

DALI use

- DB deployed
- Data entries
- Referential creation in QUADMIRE (i.e. EMODNET references of size, color and type)

DALI Input Tool

combined

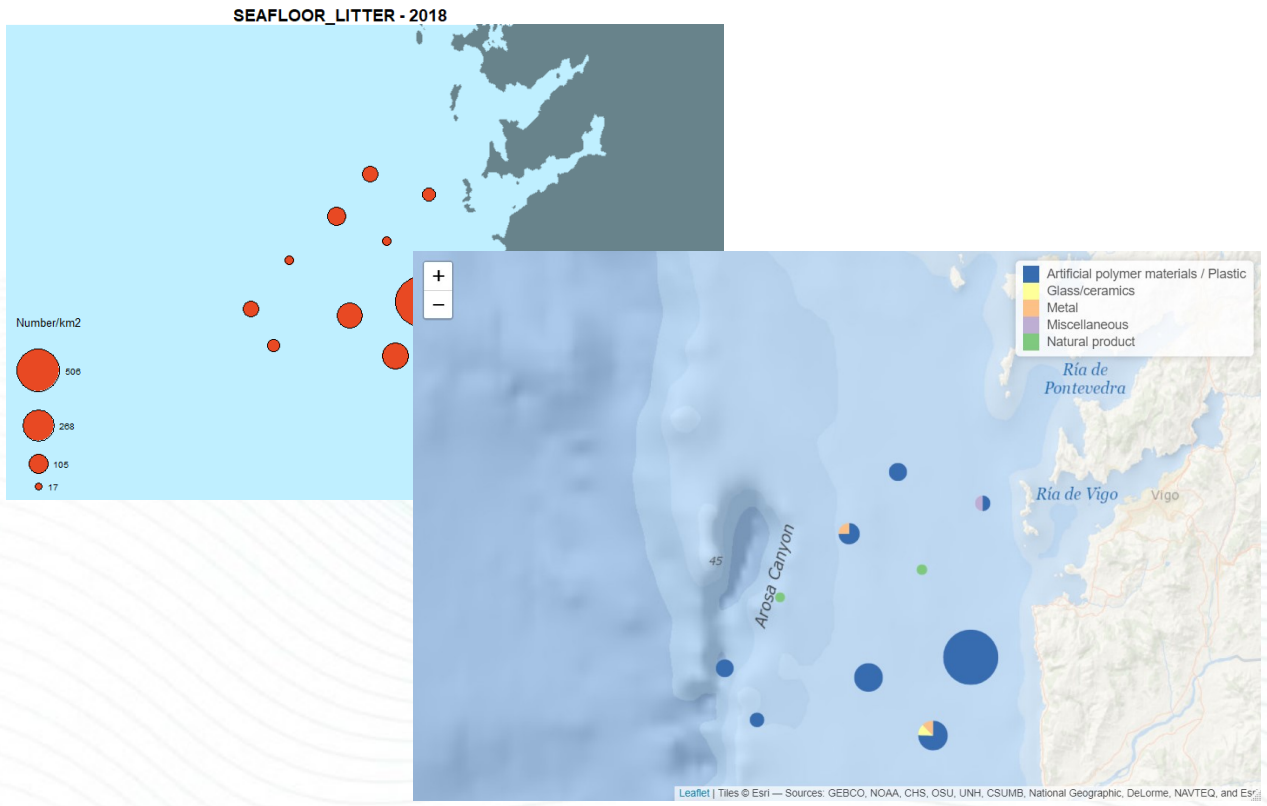
DALI Database

QUADMIRE : Referential Administration Tool

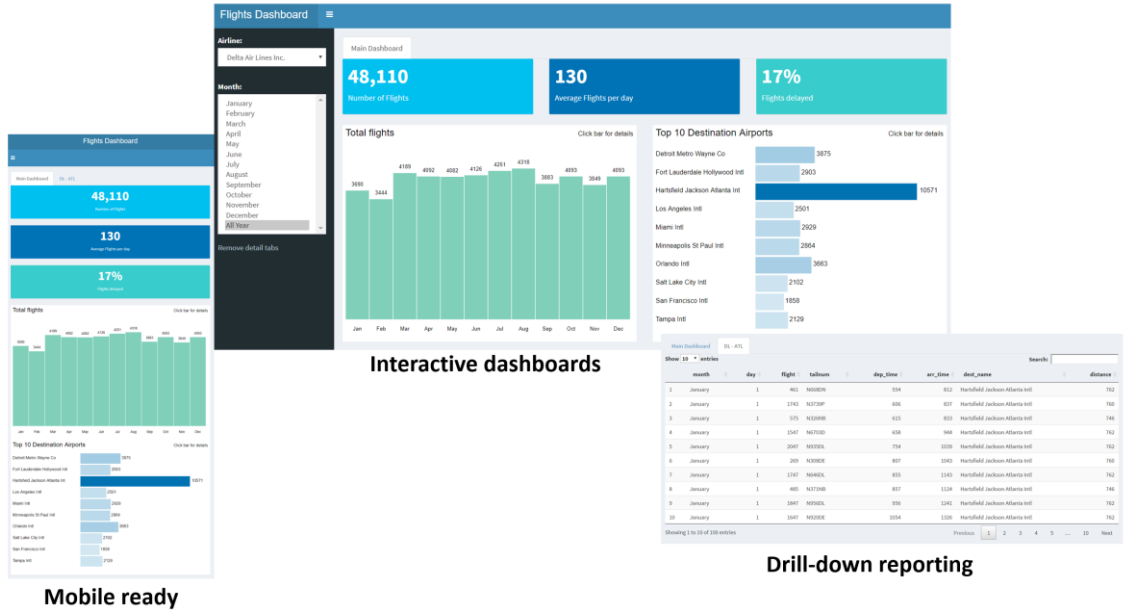
DALI products

R scripts to provide automatic "first & ready" data analysis for reporting

✓ Maps : density (nb items/km2), categories



✓ Graphs



✓ Pdf to download

Interreg Atlantic Area
European Regional Development Fund
EUROPEAN UNION
Clean Atlantic

Apps development

Interreg
Atlantic Area
European Regional Development Fund
EUROPEAN UNION
Clean Atlantic

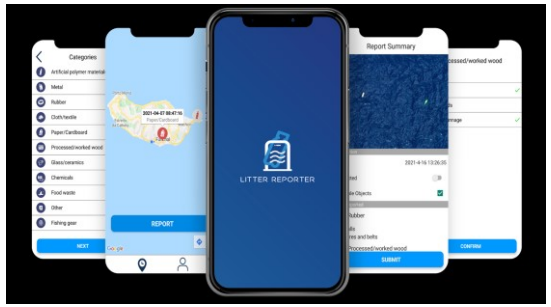
Tools for marine litter monitoring

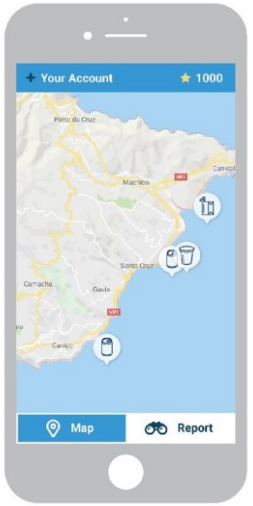
WAVE
INTERACTIVE TECHNOLOGIES FOR DEPICTING THE ANTHROPOGENIC IMPACT ON MARINE BIOSPHERE
HTTP://WAVE-LABS.ORG

Stakeholder engagement

Marine Litter Reporter APP

Leveraging mobile apps to crowdsource litter data





MARE

ARNET

Interreg Atlantic Area
European Regional Development Fund

EUROPEAN UNION

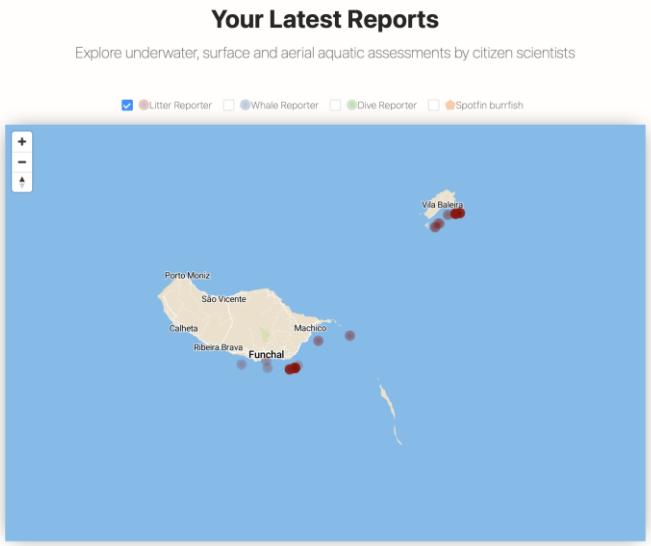
Clean Atlantic

Tools for marine litter monitoring

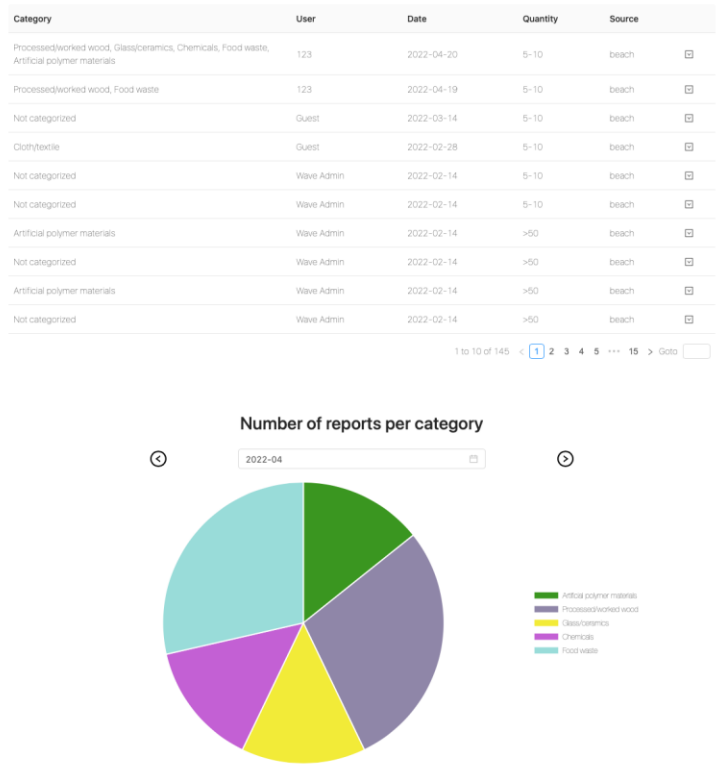
Live on iOS and Android

GET IT ON Google Play

Download on the App Store



Visit us at
http://wave.arditi.pt



MARE

ARNET

Interreg Atlantic Area
European Regional Development Fund

EUROPEAN UNION

Clean Atlantic

Monitoring the presence of marine litter

NEW RELEASE!

New tools

Studies to assess and improve monitoring

DGRM

MARE arditi agência regional para o desenvolvimento da investigação tecnologia e inovação

Região Autónoma da Madeira Governo Regional

Secretaria Regional do Ambiente e Recursos Naturais
Direção Regional de Ordenamento do Território e Ambiente

Interreg Atlantic Area
European Regional Development Fund

EUROPEAN UNION

Clean Atlantic

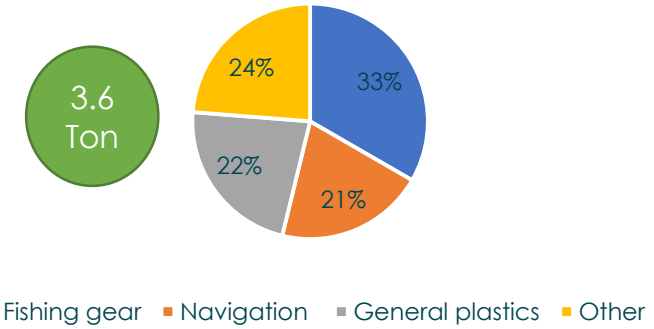
UAS/Drone for monitoring accumulation areas to complement the beach monitoring

DRAAC is responsible for the beach litter monitoring scheme, complementing it with clean-ups in remote accumulation sites, with analysis of quantities and probable activity origin

- 10 monitoring sites
- Since 2020
- OSPAR guidelines

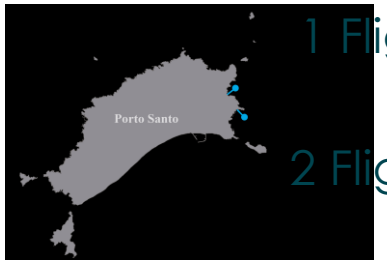
- Remote accumulation sites
- 26 clean-up events
- 3.6Ton removed (since 2021)
- 57% Sea related
- Mostly originated far away

Remote accumulation sites



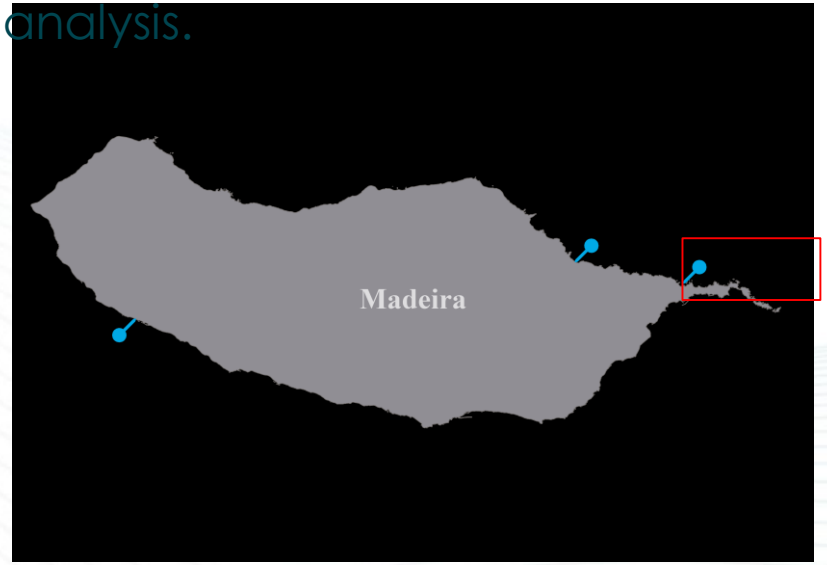
UAS/Drone for monitoring accumulation areas to complement the beach monitoring

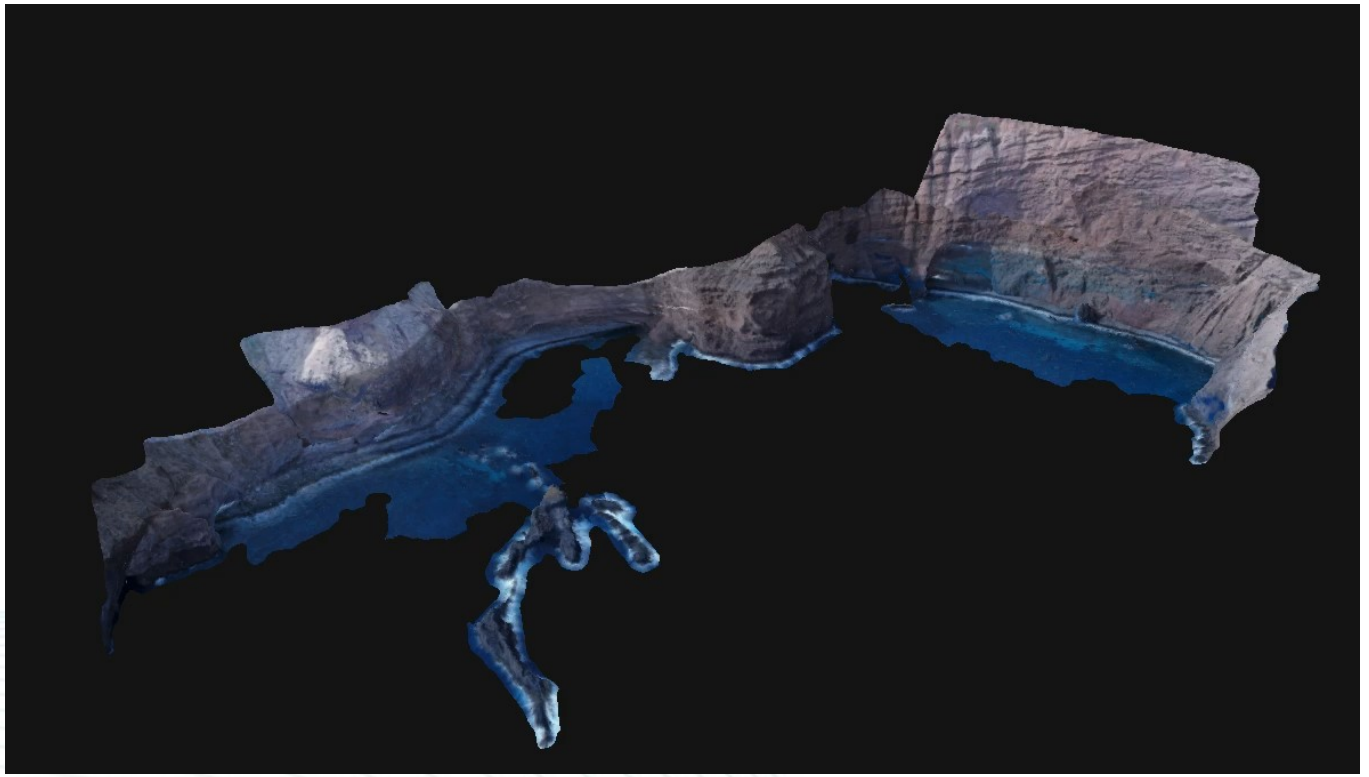
MARE-Madeira coordinated flight prior to DRAAC sampling to estimate ML pollution and assess correlations with *in situ* data.



UAS/Drone for monitoring accumulation areas to complement the beach monitoring

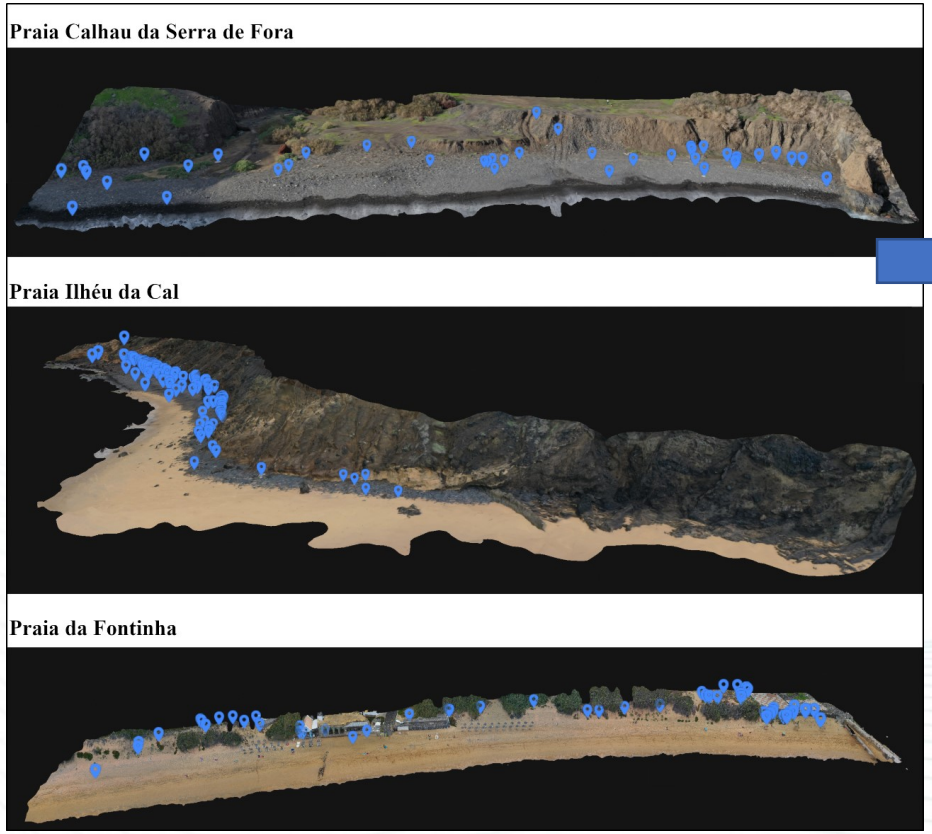
Cliffs and other locations can be surveyed using UAS and structure from motion photogrammetry to generate 3d models for analysis.

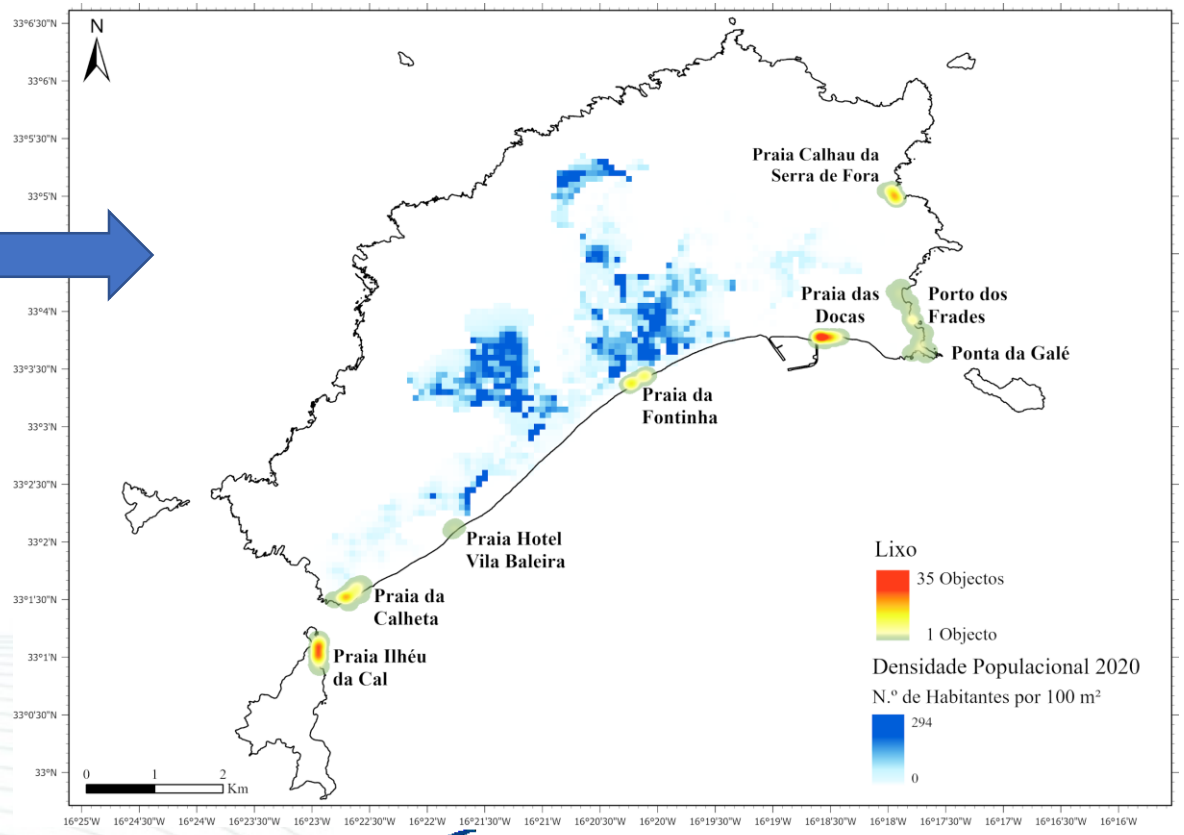




UAS/Drone for monitoring accumulation areas to complement the beach monitoring

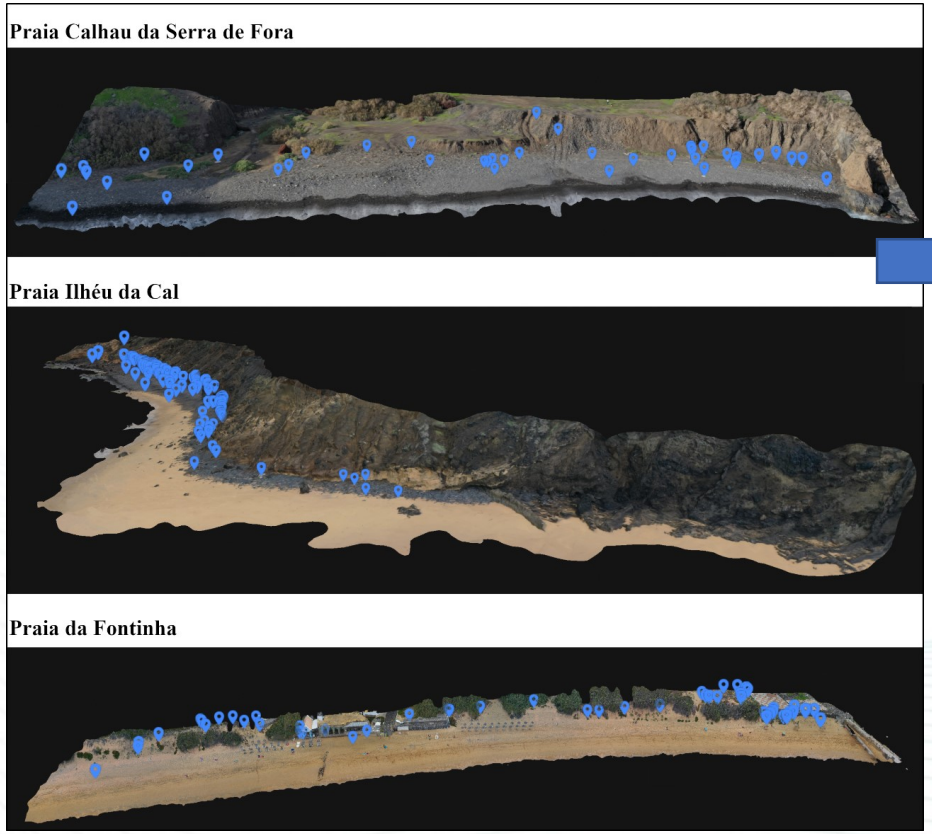
Litter items detection allows to determine litter density and identify accumulation areas

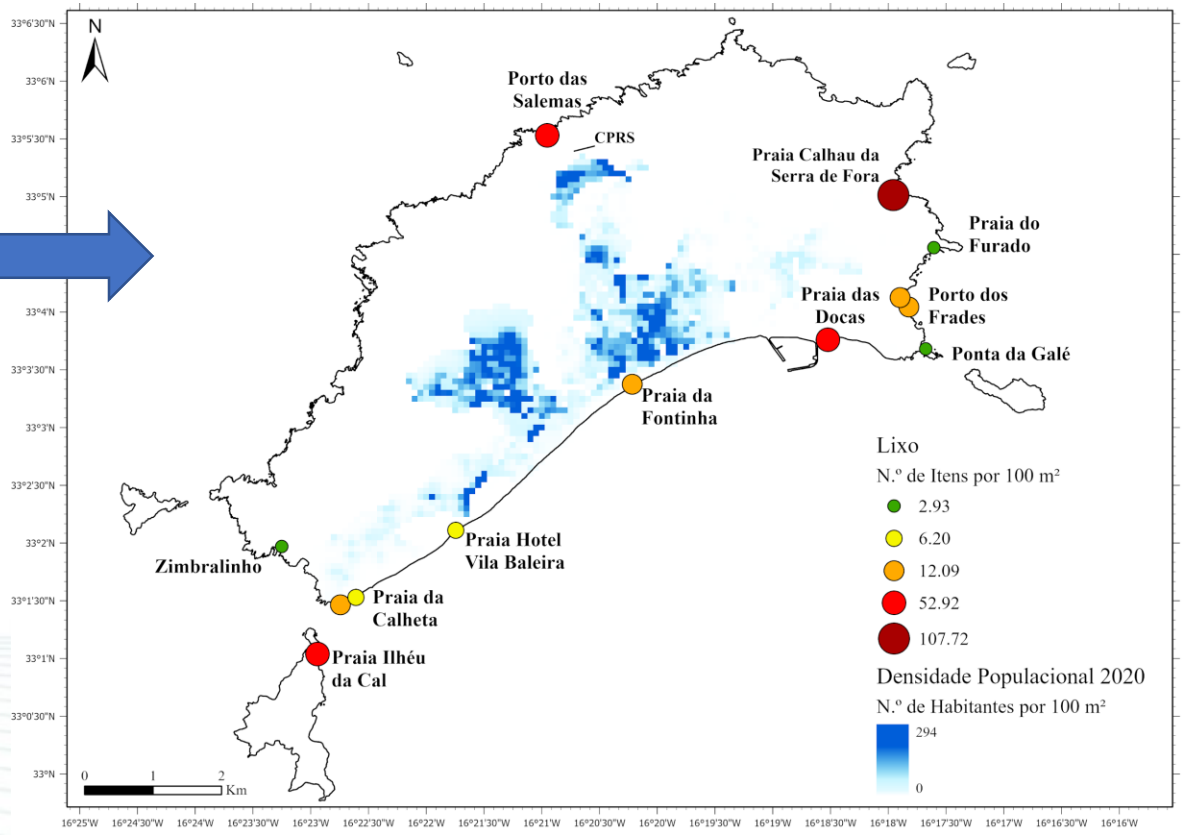




UAS/Drone for monitoring accumulation areas to complement the beach monitoring

Litter items detection allows to determine litter density and identify accumulation areas





Monitoring interactions

Ifremer

MARE

arditi

agência regional para o desenvolvimento da investigação tecnologia e inovação

Interreg Atlantic Area

European Regional Development Fund

EUROPEAN UNION

Clean Atlantic

ROV videos analyses

CleanAtlantic

Tackling Marine Litter
in the Atlantic Area

WP 5.3: Indicators for ingestion and entanglement

DELIVERABLE 5.3. Strategy and constraints to support monitoring of Marine Litter Harm: Towards a protocol for the observation of marine organisms entangled/strangled/covered by marine litter during ROV operations

Ifremer

Authors : O. Gérigny ; F. Claro ; M. Le Moigne ; F. Galgani

Interreg Atlantic Area | Clean Atlantic

Observation Sheet on Entanglement/Strangling/covering of the species by Marine Litter during ROV dives

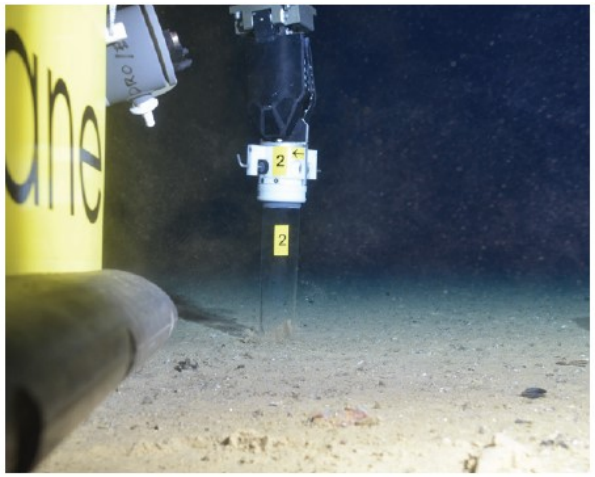
Survey name / Vessel / Gear	
Diving Number	
Diving Area	
Diving duration	

Observation N°	Dive Time	Latitude	Longitude	Entangled species	Recovery %	Litter Material[1]	Litter Types[2]	Comments/Impacts

Interreg Atlantic Area European Regional Development Fund | EUROPEAN UNION | Clean Atlantic

ROV videos analyses

HROV Ariane - Caméras vidéo HD et caméra numérique panoramique et inclinable

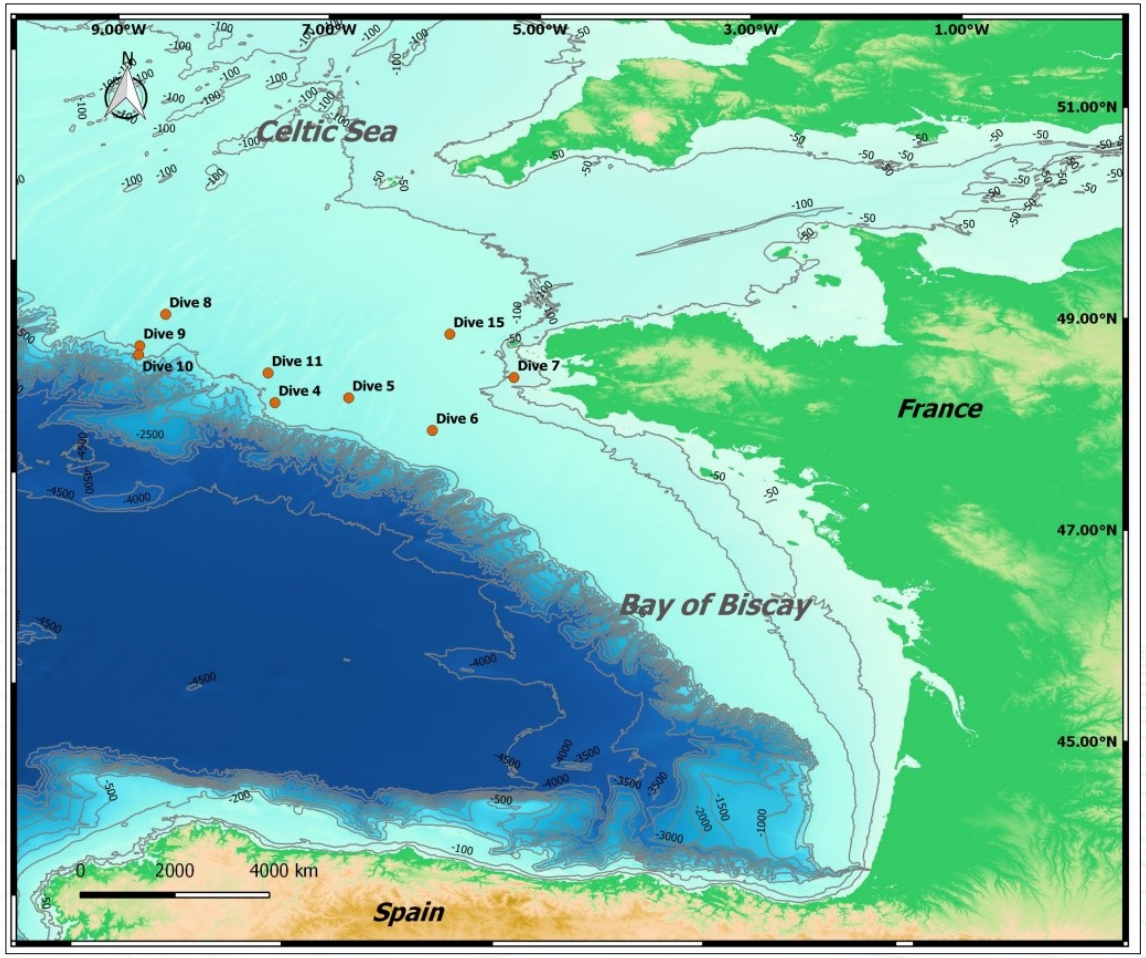


Interreg Atlantic Area European Regional Development Fund
EUROPEAN UNION
Clean Atlantic

ROV videos analyses

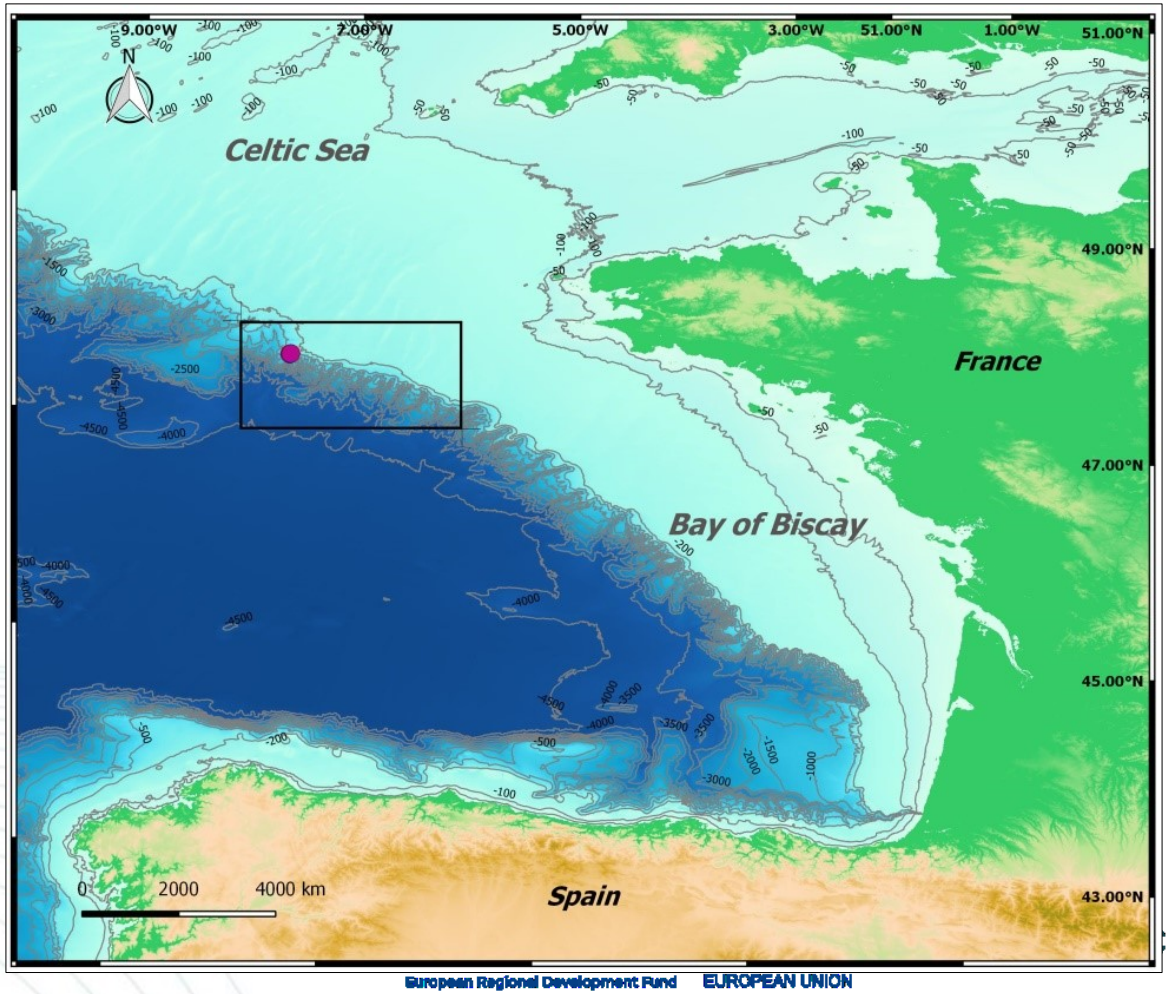
PACMAN 2021

KOPP Dorothée, MEHAULT Sonia (2021) PACMAN cruise, RV Côtes De La Manche, https://doi.org/10.17600/18001472



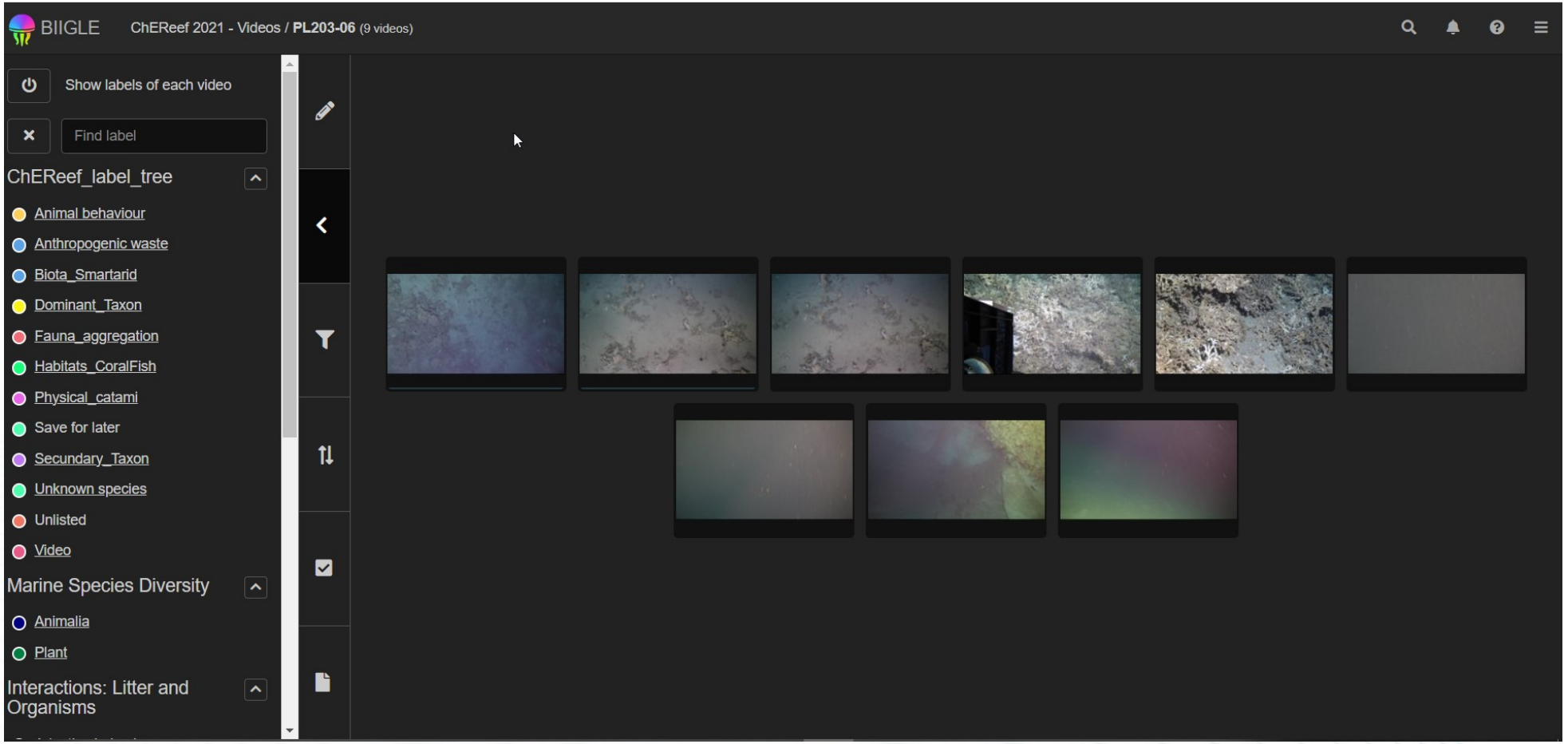
CheReef 2021 – Dive 203-6

MENOT Lenaick, TOUROLLE Julie (2021) ChEReef 2021 cruise, RV Thalassa, https://doi.org/10.17600/18001448



European Regional Development Fund EUROPEAN UNION

BIIGLE videos annotation tool



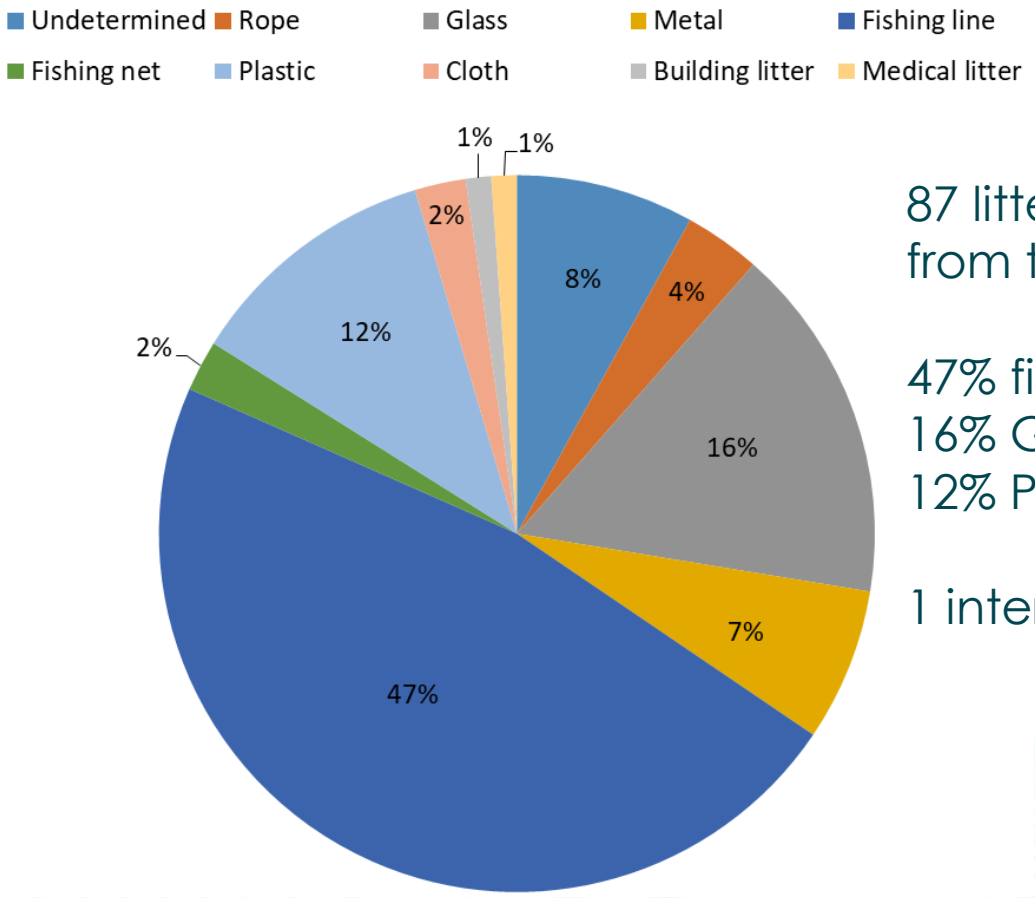
Free online software for annotation of still images and videos developped by the Center for Biotechnology (CeBiTec) and Bielefeld University (Germany) (LangenkämperD, et al, 2017)

Allows to share vidoes, images and common label trees at international level

Atlantic Area
European Regional Development Fund
EUROPEAN UNION
Clean Atlantic

FR Results

PACMAN 2021

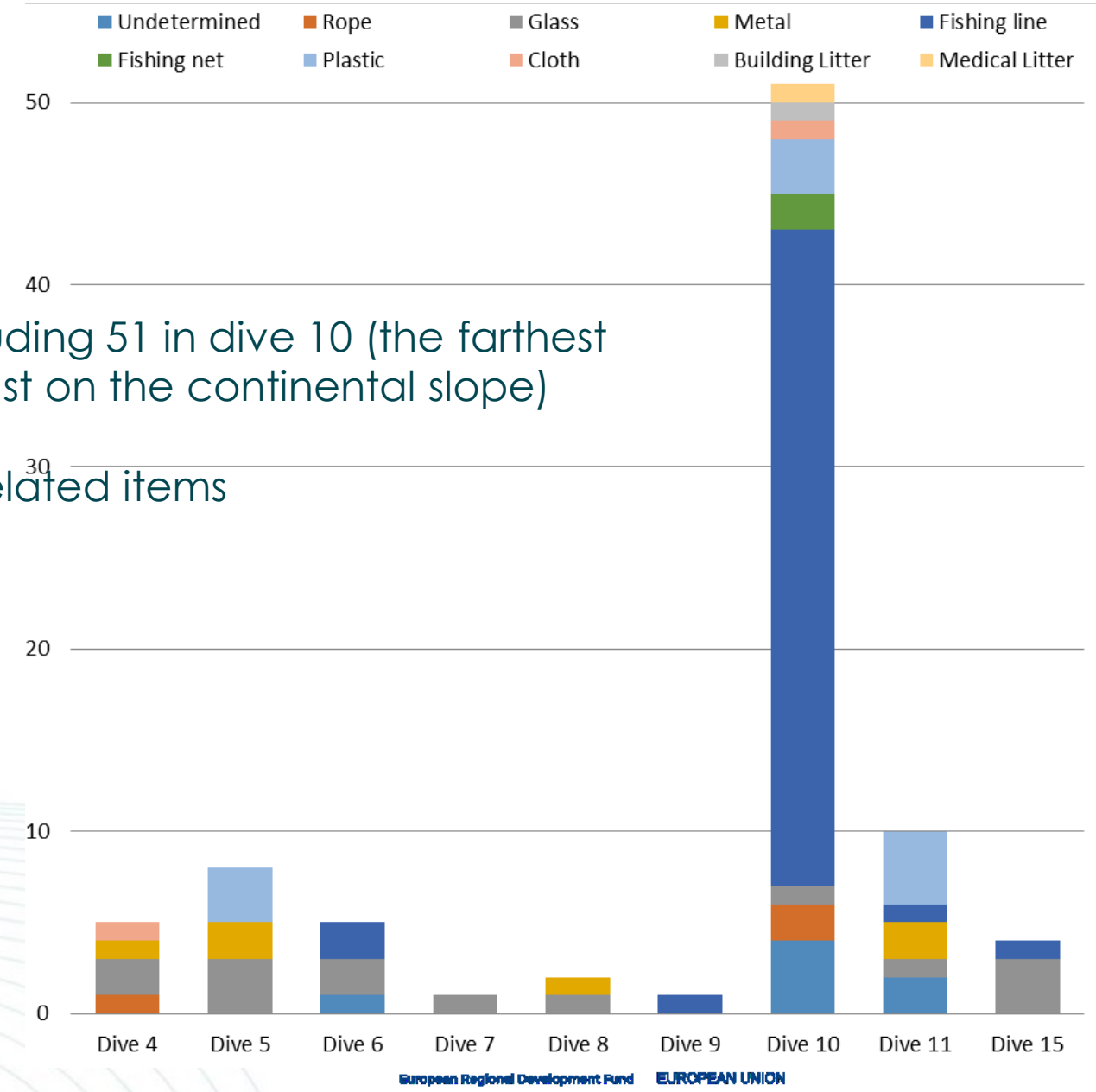


Percentage of Seafloor litter counted in Pacman Dives

87 litters including 51 in dive 10 (the farthest from the coast on the continental slope)

47% fishing related items
16% Glass
12% Plastic

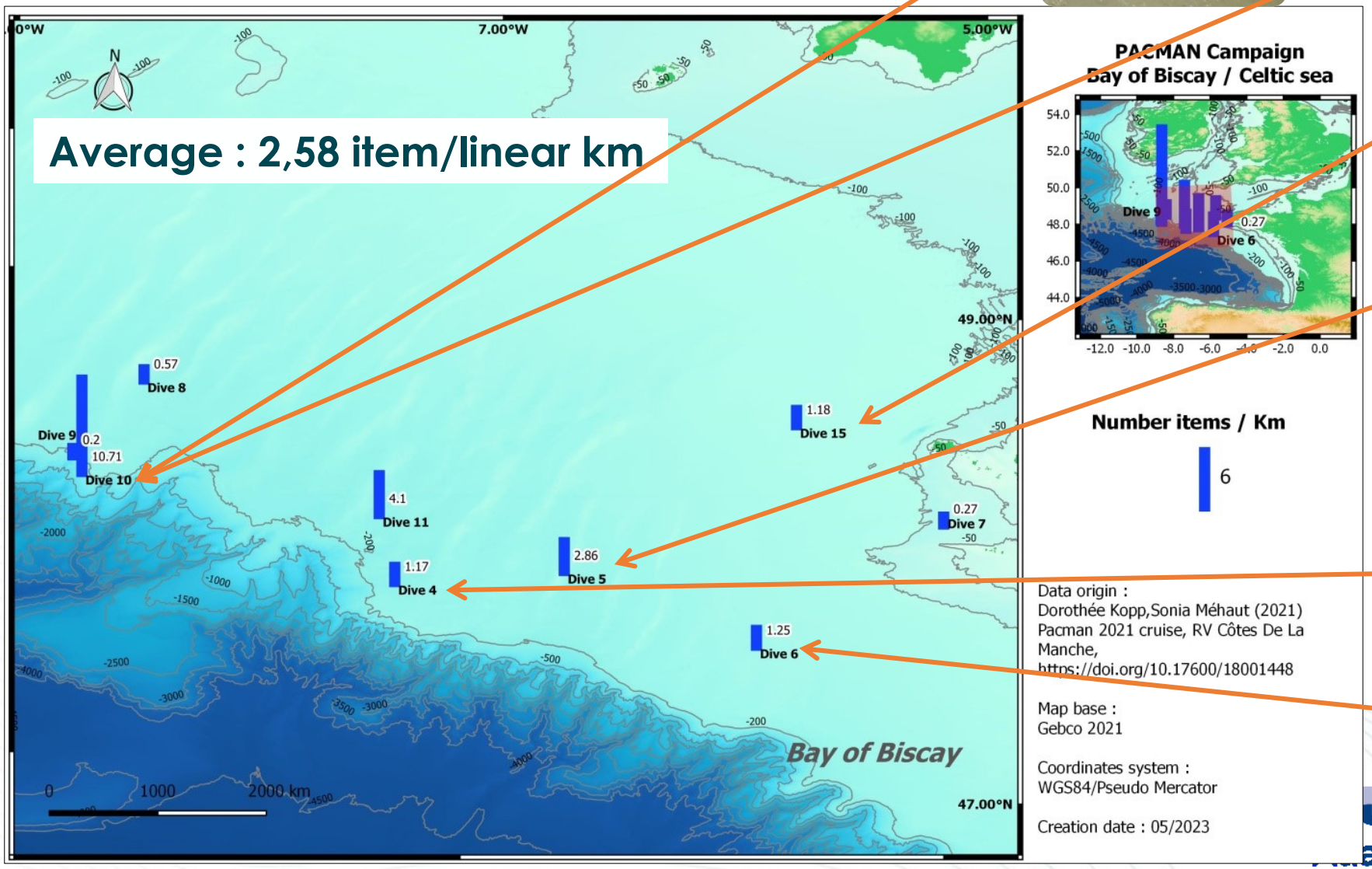
1 interaction

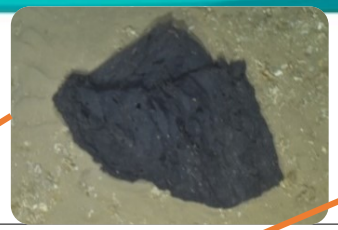


European Regional Development Fund EUROPEAN UNION

FR Results

PACMAN 2021





Plastic bag, depth 305m

Data origin :
Dorothée Kopp,Sonia Méhaut (2021) Pacman 2021 cruise, RV Côtes De La Manche, https://doi.org/10.17600/18001448

Map base :
Gebco 2021

Coordinates system :
WGS84/Pseudo Mercator

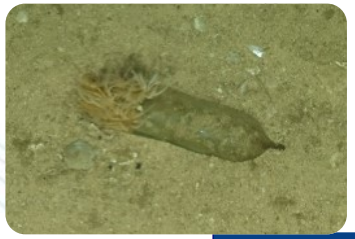
Creation date : 05/2023

Fishing net, depth 428m

Fishing line, depth 118m

Plastic cup, depth 121m

Piece of cloth, depth 176m

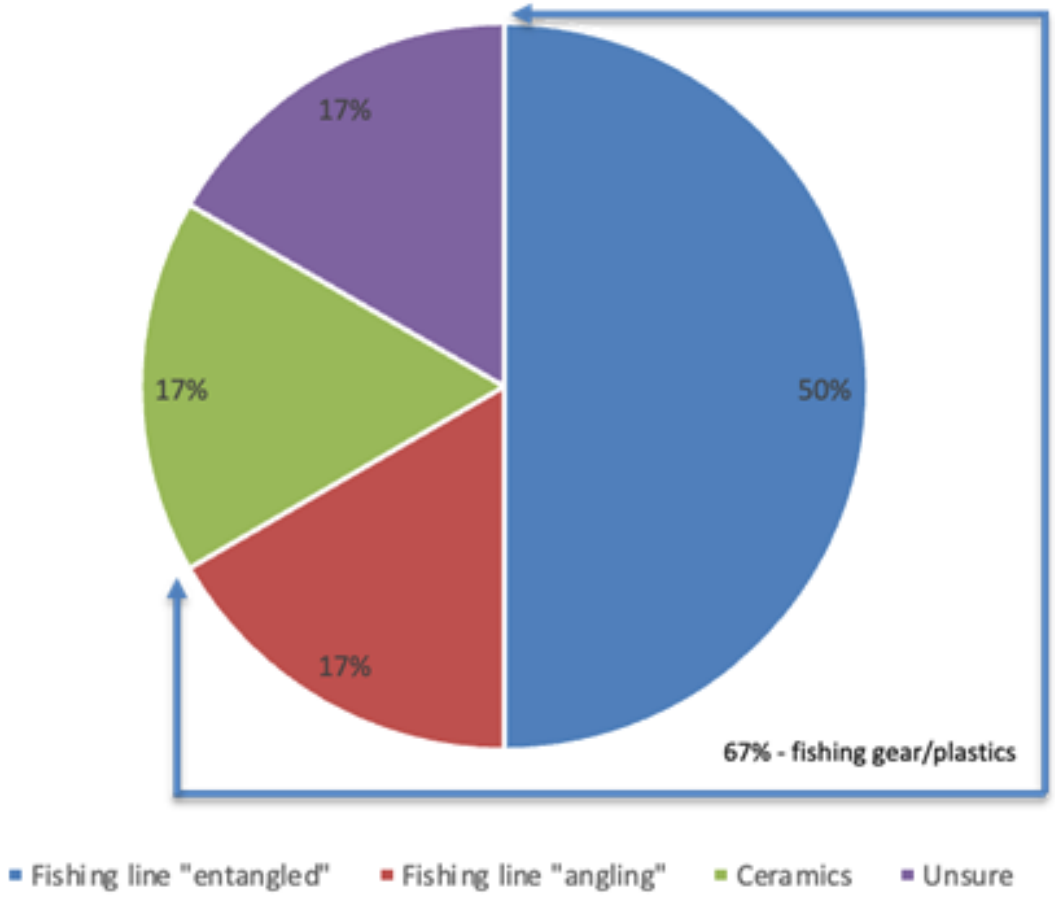


Bottle colonized by crinoids, depth 141m

Interreg Atlantic Area
European Regional Development Fund
EUROPEAN UNION
Clean Atlantic

FR Results

CheReef 2021 = 1 dive(203) to compare potential bias between observers



1 dive analyzed

6 marine litters

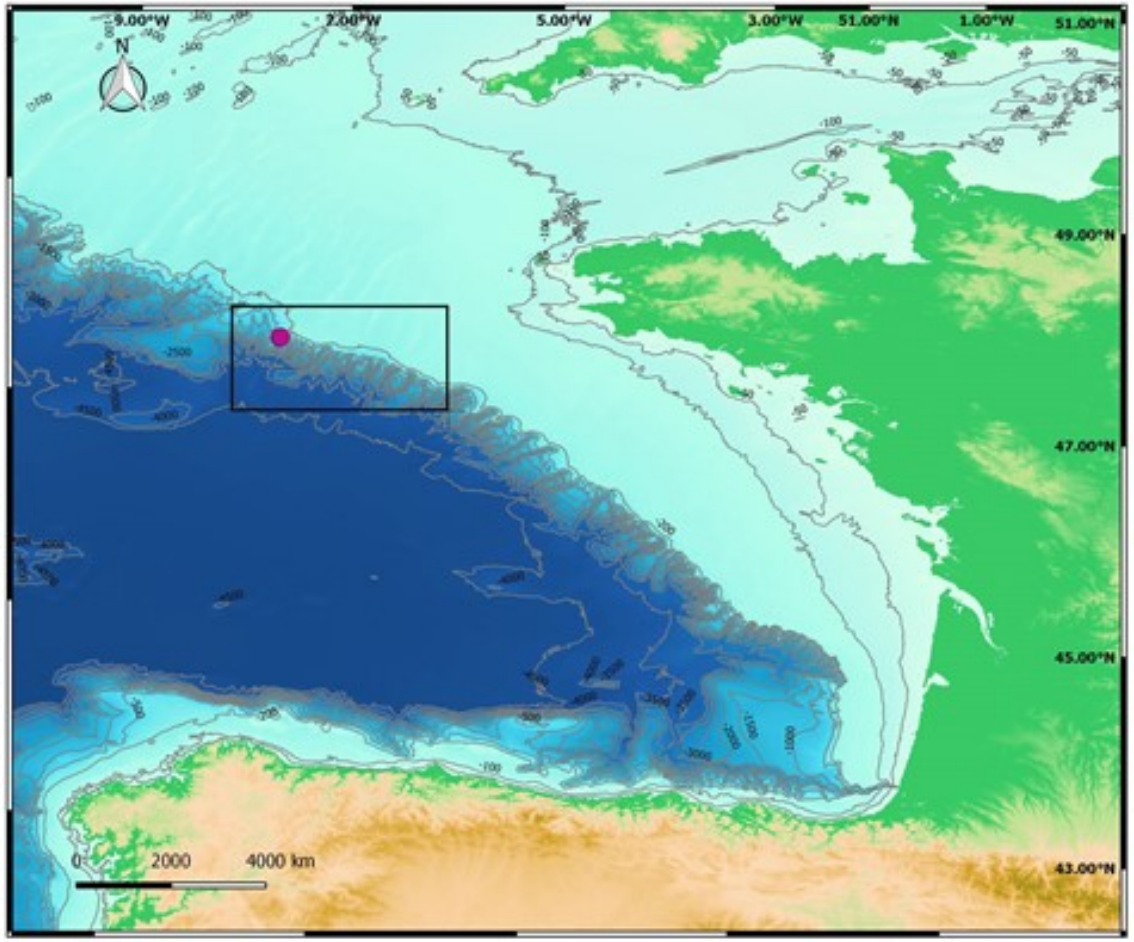
67% fishing related items
16 % ceramics
16% « unsure »

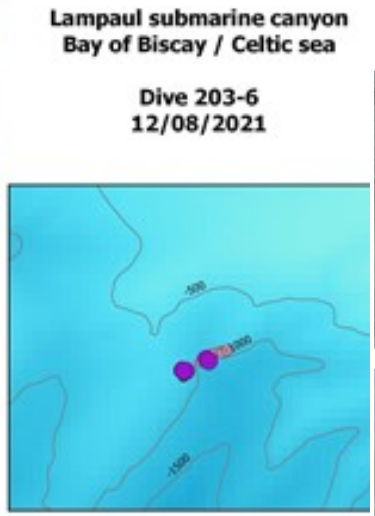
3 interactions with cnidarians

FR Results

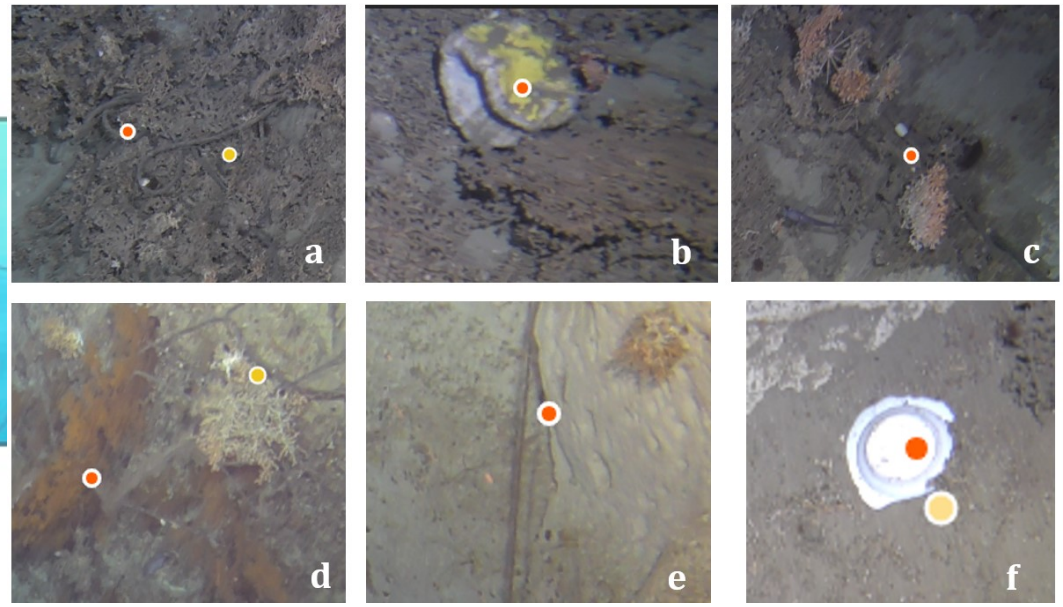
CheReef 2021

1,71 item/linear km – Depth range 820-885 m





Images from BIIGLE annotation tool – a,c,d : fishing line entangled in cnidarians (with interactions) ; b : unsure category ; e : fishing line « angling » ; f : plate (ceramics category)



0.86 interaction/linear kilometer

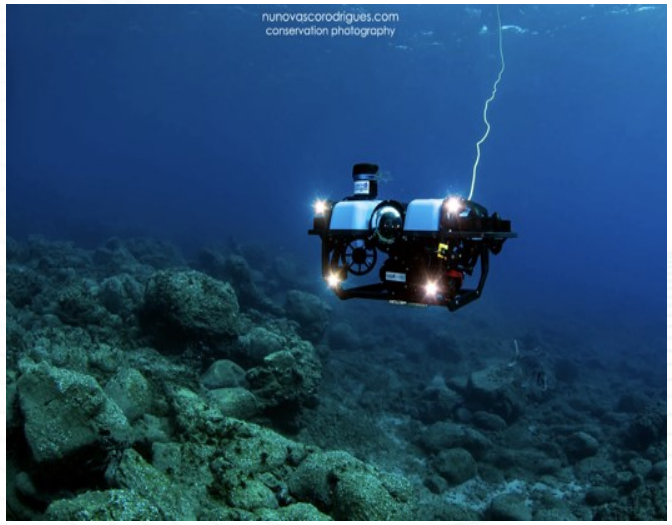
Interreg Atlantic Area
European Regional Development Fund
EUROPEAN UNION
Clean Atlantic

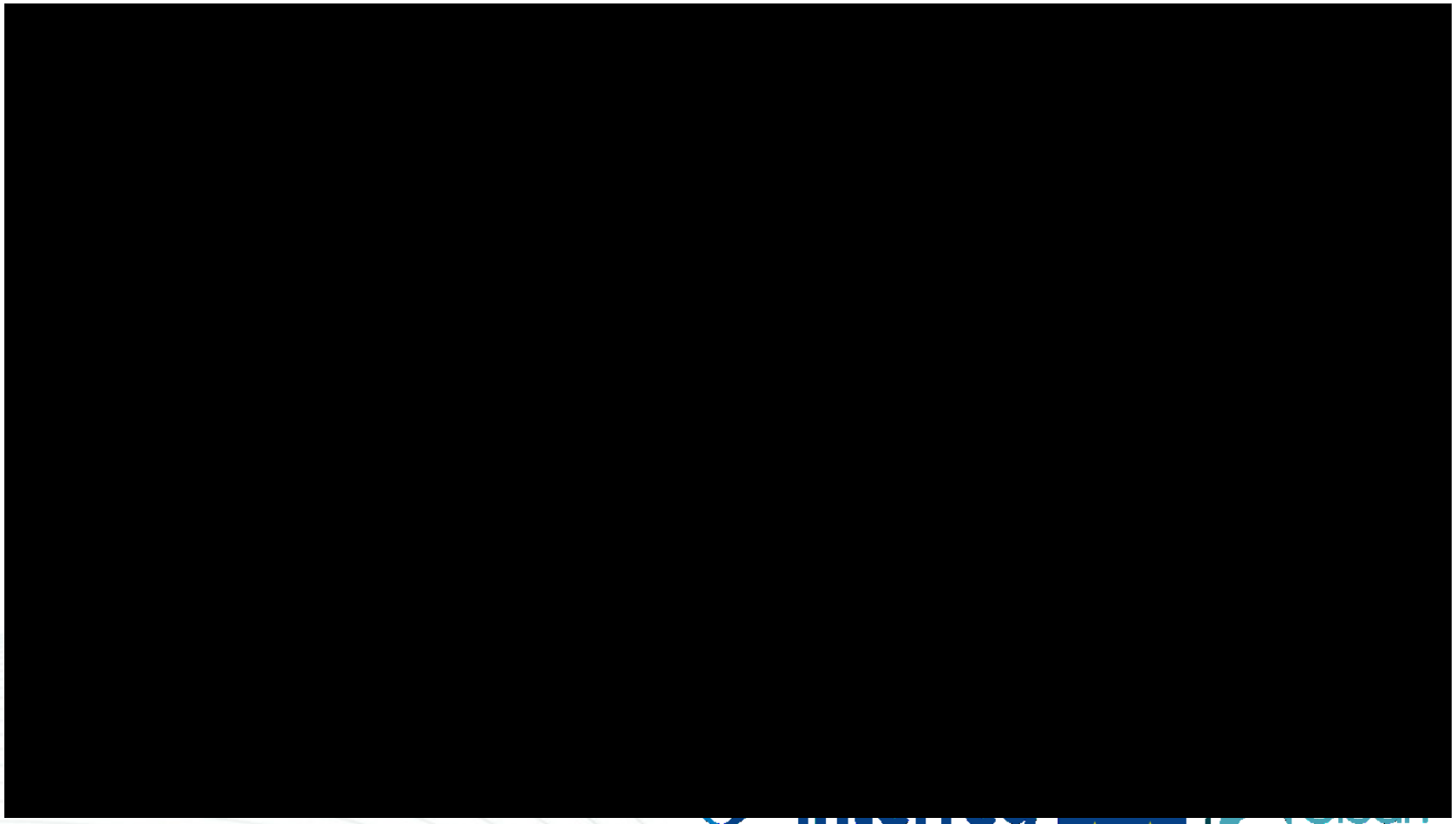
Assessing seafloor litter from ROV & UW video

Technology in seafloor litter monitoring:

Technological solutions:

- Submarines
- ROVs and AUVs
- Video and images
- Side-scanner
- UW Photogrammetry
- AI and Deep Learning



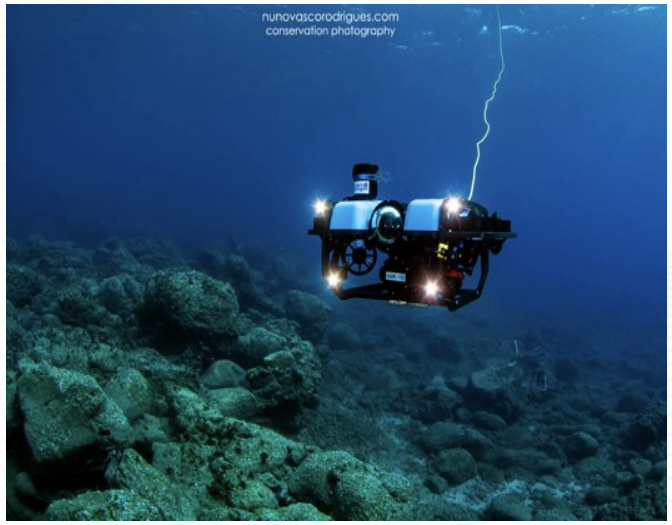


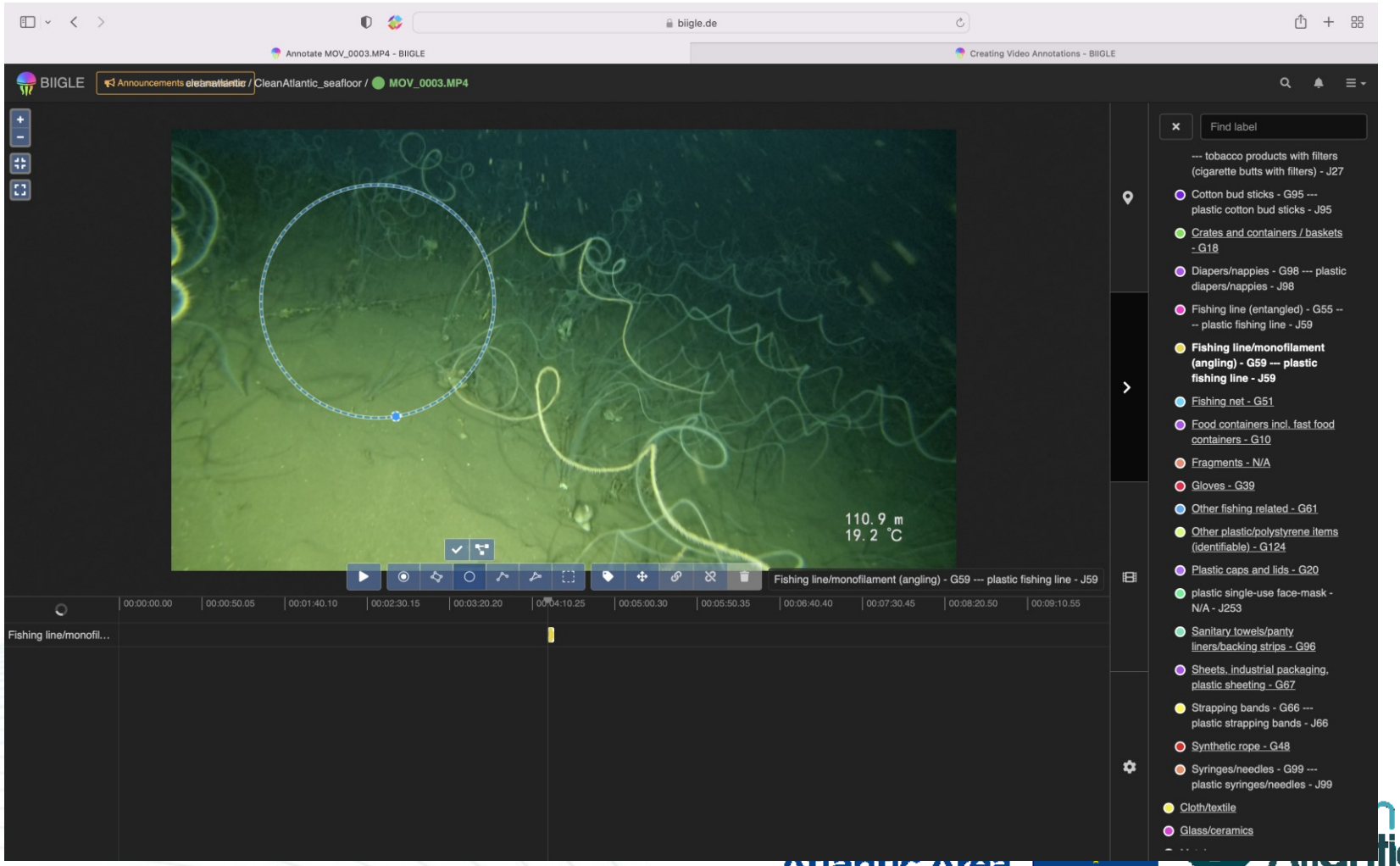
Assessing seafloor litter from ROV & UW video

Technology in seafloor litter monitoring:

Technological solutions:

- Image annotation interfaces (BIIGLE, …)
- Collaborative
- Hierarchical structure
- Remote Access
- Size and speed limitations

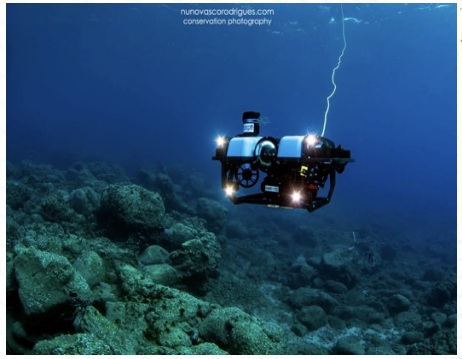




Assessing seafloor litter from ROV & UW video

Mapping with no positioning:

- Directed for target area or habitat
- Lacks transect distance and density estimation



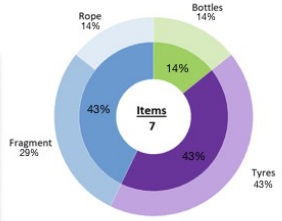
5 Dives per habitat

N

Target Habitat:
Ridge (approx. 90-120 m)

Litter Characterisation

Target Habitat:
Sandy Plateau (approx. 50-90 m)



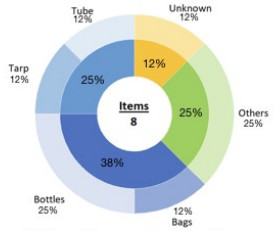
Litter Characterisation

50
Sandy Plateau
90
Ridge
120
Slope

Legend:
Litter items material

- Cloth & Textile
- Glass & Ceramics
- Metal
- Others
- Plastic
- Rubber
- Unknown

Target Habitat:
Slope (approx. 120-170 m)



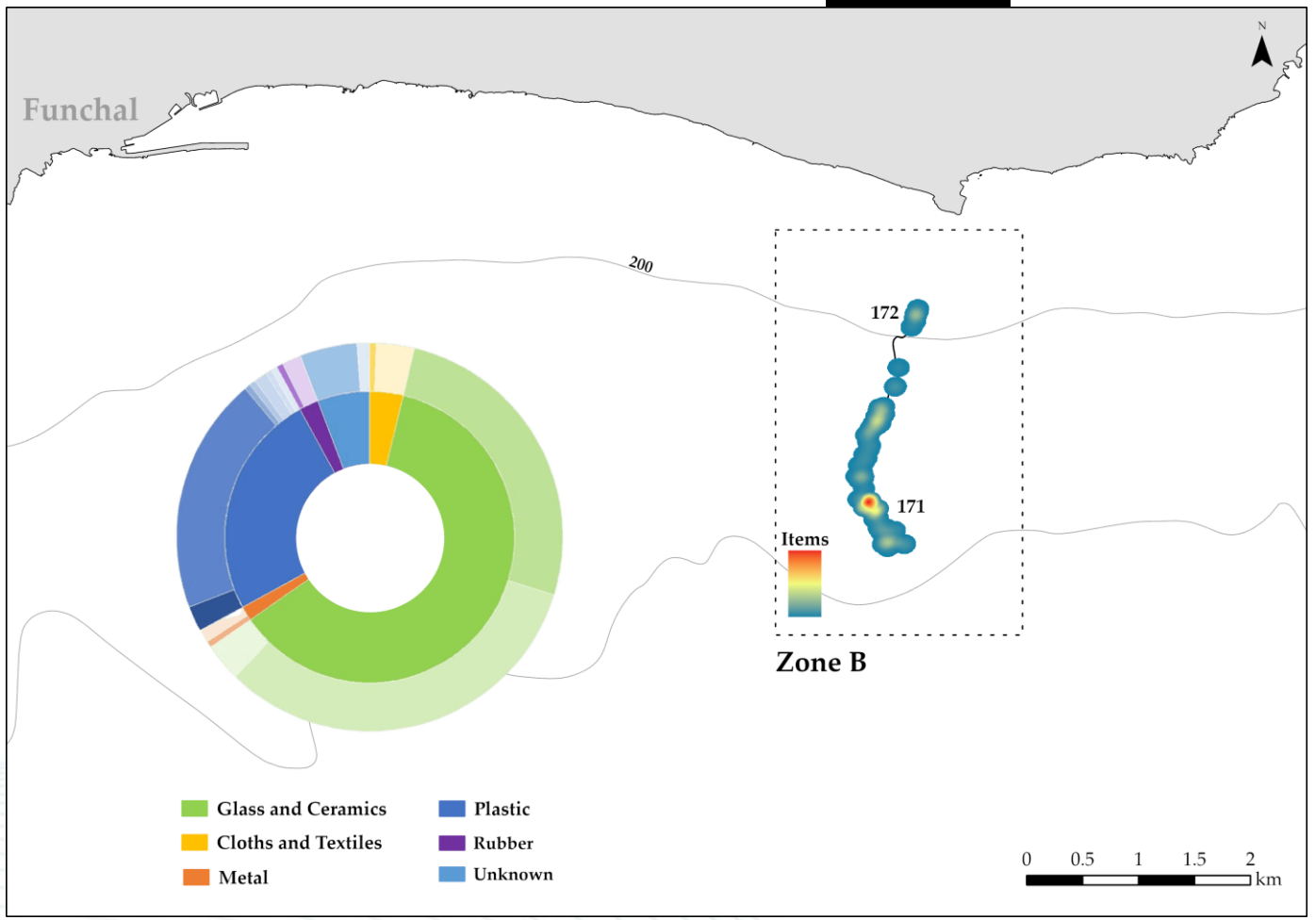
Litter Characterisation

0 0.3 0.7 1 km

Assessing seafloor litter from ROV & UW video

Technological solutions:
- Litter characterization
- Density map
- Interactions with biota

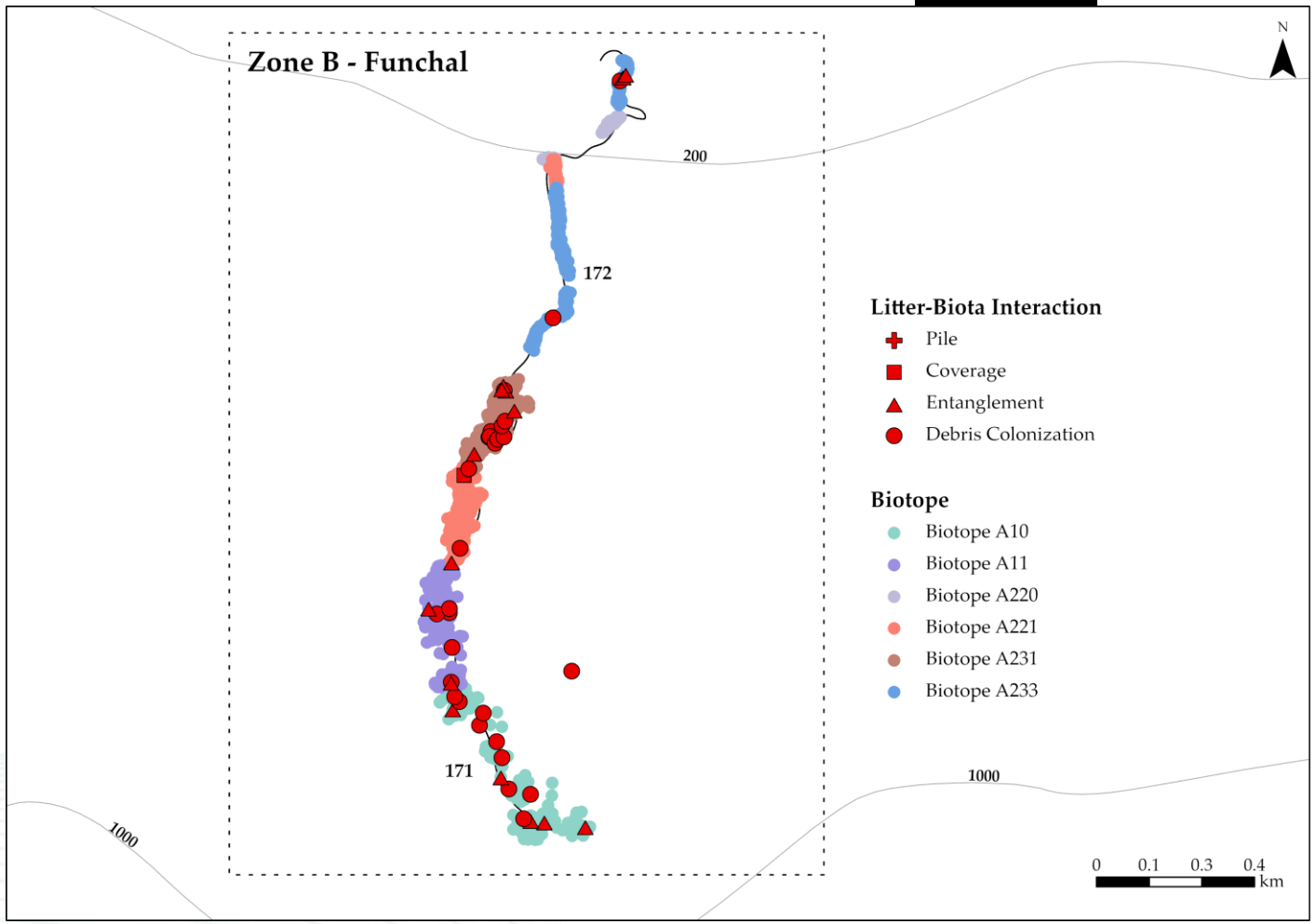
Challenges
- Positioning
- Navigation
- Image quality
- Autonomy



Assessing seafloor litter from ROV & UW video

Technological solutions:
- Litter characterization
- Density map
- Interactions with biota

Challenges
- Positioning
- Navigation
- Image quality
- Autonomy



Discussion

- Comparison videos annotation between the 2 institutes
- Feedback from the use of BIIGLE
- Other opportunistic campaigns to explore?

Publication next year?

Interreg Atlantic Area European Regional Development Fund
EUROPEAN UNION
Clean Atlantic

Thank you for listening

Interreg Atlantic Area
European Regional Development Fund
EUROPEAN UNION
Clean Atlantic