A BOOST FOR SUSTAINABLE SEA AND OCEAN SOLUTIONS

»Sustainable Sea and Ocean Solutions ISSS«
Intelligent Technologies for the Blue Economy

#EMDInMyCountry

September 23, 2021 | 10:00 – 15:00 CEST |
MS Teams

AGENDA

10:00 Welcome

10:05 Key note

Saving life in the ocean – from curiosity to understanding to solutions
Nina Jensen, CEO REV Ocean

10:20 »Sustainable Sea and Ocean Solutions ISSS« Innovation Platform

Memorandum of Understanding signing and greetings from the CEOs of ISSS partners

10:35 Panel Discussion

How can we provide reliable and accurate data and information on the ocean for better-informed decision-making by policy makers, businesses and investors?

11:30 Session I – Project pitches

How can zero-polluted seas and oceans be achieved and their health and productivity restored?

12.15 Break

13:00 Session II – Project pitches

How can the oceans be secured as a food source in harmony with its ecosystem?

13:45 Session III – Project pitches

How can offshore energy be developed and marine resources responsibly harvested?

14:30 Nominate the best ocean project pitch!

14:45 Closing and outlook

KEY NOTE

Nina Jensen, CEO REV Ocean

»Sustainable Sea and Ocean Solutions ISSS«
Intelligent Technologies for the Blue Economy

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- See recording on website -

LAUNCH: »SUSTAINABLE SEA AND OCEAN SOLUTIONS ISSS« INNOVATION PLATFORM

Memorandum of Understanding signing and greetings from the CEOs of ISSS partners

»Sustainable Sea and Ocean Solutions ISSS«
Intelligent Technologies for the Blue Economy

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- See video on website -

PANEL DISCUSSION

How can we provide reliable and accurate data and information on the ocean for better-informed decision-making by policy makers, businesses and investors?

Bård Wathne Tveiten
(Sintef Ocean)

Alexandra Neyts
(EATIP)

Anssi Mikola
(RiverRecycle)

Szilvia Nemeth
(EU-Commission)

Antonio Sarmento
(WavEC Offshore Renewables)

PROJECT PITCHES I – OCEAN CLEANING

1. **Oihane Cabezas** - “Solutions to local challenges on marine litter” LIFE-LEMA & BLUENET_EUproject from **AZTI**
2. **Hans-Christoph Burmeister** - “SEACLEAR – Cleaning the ocean floor with Autonomous Robots” from **FRAUNHOFER**
3. **Damien Sallé** - “MAELSTROM project Marine litter removal” from **TECNALIA**
4. **Julien Legrand** - “Macrocosm - an innovative buoy for ocean health monitoring” from **IFREMER**
5. **Jukka Sassi** - “Multisensor option for floating waste monitoring” from **VTT**
6. **Chiara Lombardi** - “Smart Bay S. Teresa - A platform of cooperation towards carbon neutrality” from **ENEA**
7. **Emily Cowan** - “Paving the road towards a comprehensive global plastic agreement” from **SINTEF**

SOLUTIONS TO LOCAL CHALLENGES ON MARINE LITTER

Oihane C. Basurko, Irene Ruiz, Anna Rubio, Irati Epelde, Pedro Liria, Leire Arantzamendi, Marga Andrés, Matthias Delpey, Julien Mader

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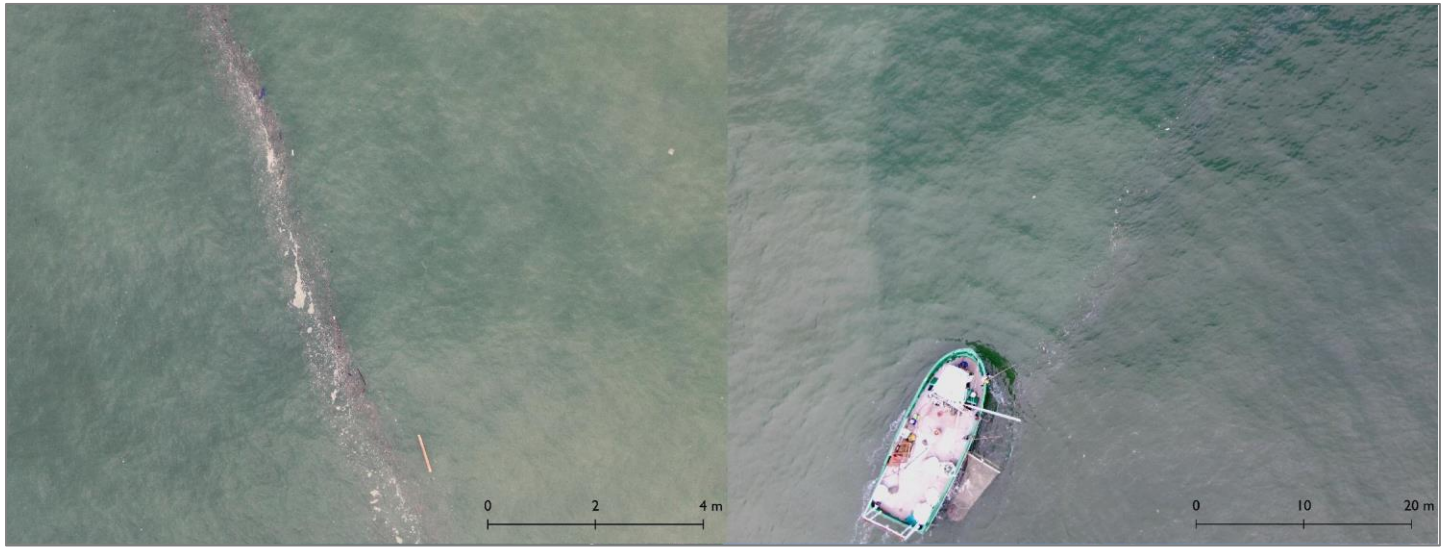
MARINE LITTER IN THE SE BAY OF BISCAY

- SE Bay of Biscay is a dead-end for plastic
- Floating litter tends to accumulate in **‘marine litter windrows‘** in coastal waters of the SE Bay of Biscay
- The **35% of the litter** by number (55% by weight) of floating marine litter **has a sea-based origin** (mainly fishing & aquaculture)



Ruiz et al (2020). Front. Mar. Sc. 7(308).
Cózar et al (2021). Front.Mar. Sc. 8.

SOLUTIONS FOR MARINE LITTER

Videometry system for riverine floating litter detection, monitoring

Collection at sea

Longlin ropes for mussel aquaculture made of recycled old fishing nets

From recycled POLYAMIDE fishing nets

From recycled POLYOLEFIN fishing nets

CONCLUSION & OUTLOOK

- **Stakeholders involved in the solutions need to be identified and engaged from the very beginning; they should be part of the solution.**

- **Ocean literacy should be promoted together with the technical development of the solution**

Funding organizations

LIFE15 ENV/ES/000252

Life LEMA Project
www.lifelema.eu
@Life_LEMA

BLUENET Project
https://www.bluenetproject.eu/
#BLUENET_EUproject

Co-funded by the European Maritime and Fisheries Fund

Industrial partners

CONTACT

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@oihanecb

SEACLEAR – CLEANING THE OCEAN FLOOR WITH AUTONOMOUS ROBOTS

Hans-Christoph Burmeister

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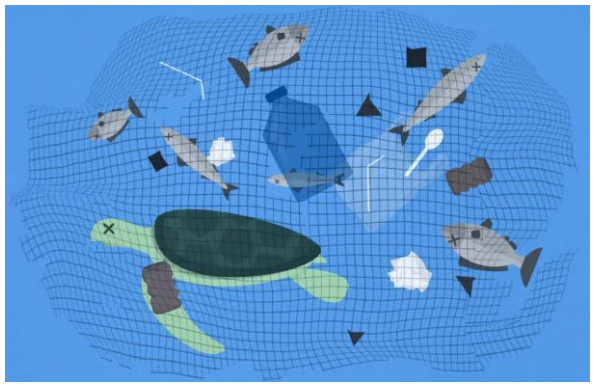
Fraunhofer
TNO innovation for life
SINTEF
RI.SE Research Institutes of Sweden
VTT
CoLAB +ATLANTIC
AZTI MEMBER OF BASQUE RESEARCH & TECHNOLOGY ALLIANCE
tecnalia MEMBER OF BASQUE RESEARCH & TECHNOLOGY ALLIANCE
ENEA Italian National Agency for New Technologies, Energy and Sustainable Economic Development
Ifremer

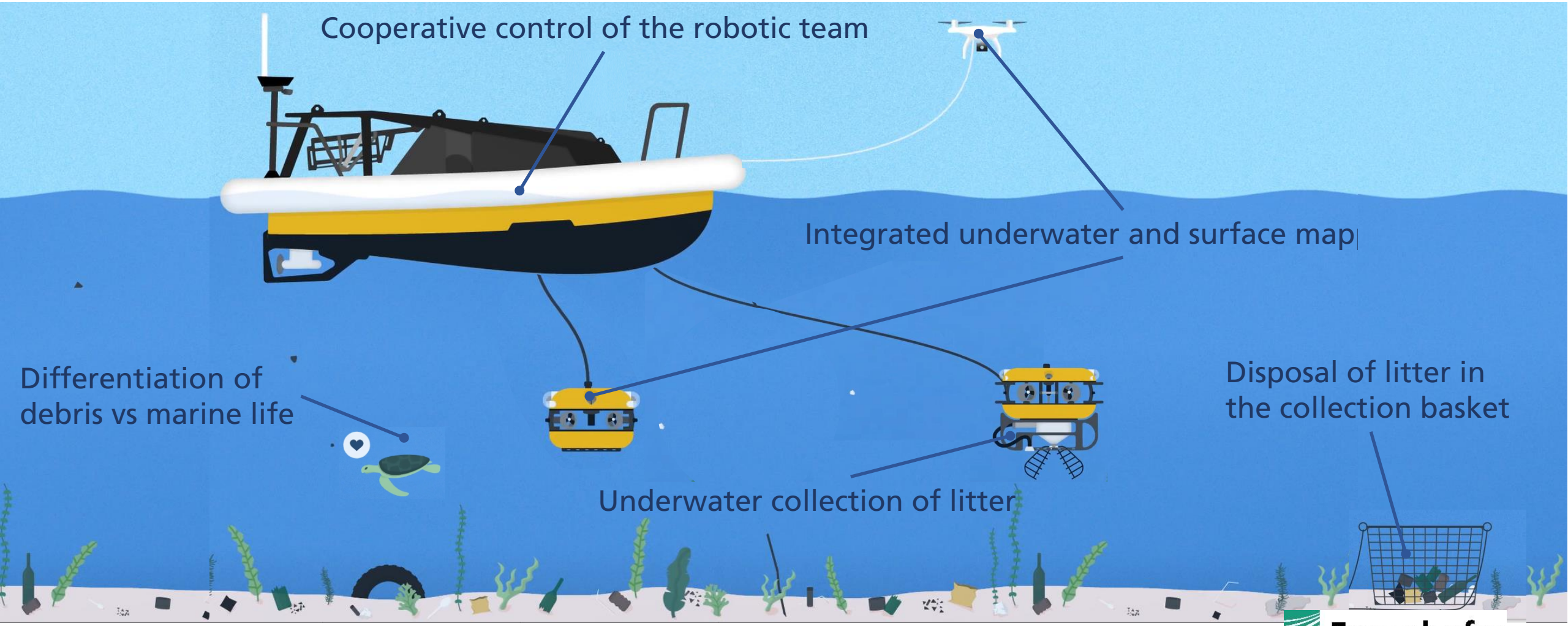
INTRODUCTION

- Past collection efforts have focused mostly on surface waste
- only a few local efforts to gather underwater waste, always using human divers
- Seaclear = SEarch, identificAtion and Collection of marine Litter with Autonomous Robots



Fraunhofer CML

THE SEACLEAR PROJECT



CONCLUSION

When fully operational, the SeaClear system aims to detect and classify underwater litter with 80% success rate, collect it with a 90% success rate; This equals to 70% reduced cost compared to divers

A cost-effective, fast and safe way to clean up seafloors, making our world a cleaner place

Special thanks to the European Union and their Horizon 2020 research and innovative programme, who funded this project under grant agreement No. 871295

Fraunhofer CML

MAELSTROM PROJECT
MARINE LITTER REMOVAL

Damien SALLÉ
Transversal coordinator for Robotics
TECNALIA

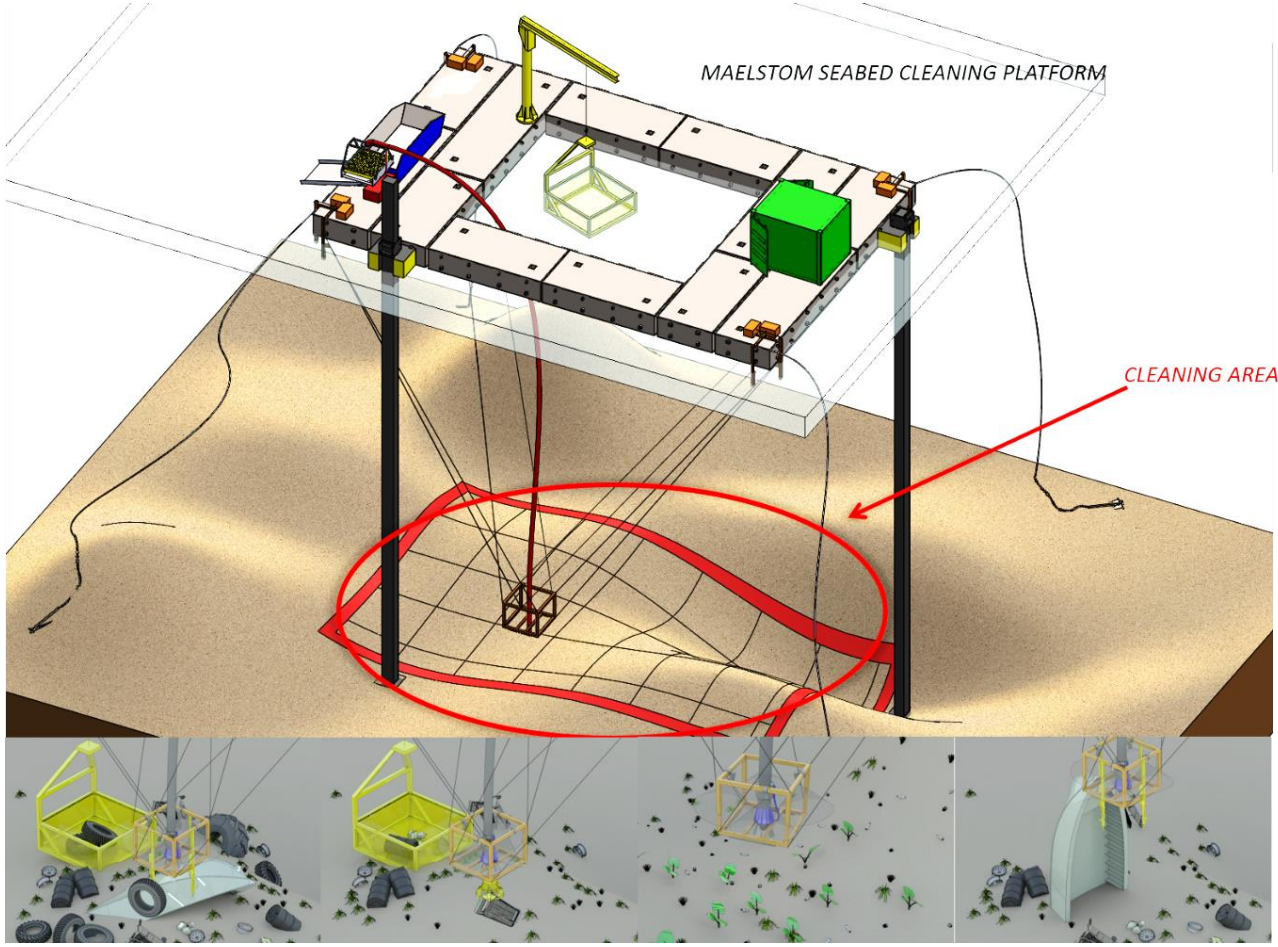
#EMDInMyCountry

MAELSTROM IN A NUTSHELL

Co-funded by
the European Union

A ROBOTIC FLOATING PLATFORM FOR EFFICIENT AND SELECTIVE ML REMOVAL FROM WATER COLUMN & SEABED

=> MAELSTROM Solution: a cable robot suspended from a floating platform with different tools: dredge, grab, hook & gripper



Co-funded by the European Union

CONCLUSION & OUTLOOK

- **The final design of the robot is ongoing before patenting, manufacturing and testing**
- **First cleaning campaign in Venice during the summer of 2022 !**

→ **Keep tuned!**

www.maelstrom-h2020.eu

https://www.linkedin.com/company/71630528/ ; https://twitter.com/H2020Maelstrom
https://www.youtube.com/channel/UCwGpE7VUFUsoiKdgFuZUvUQ ;
https://www.facebook.com/MaelstromH2020

Co-funded by
the European Union

MACROCOSME, AN INNOVATIVE BUOY TO ASSESS MARINE ENVIRONMENT ECOLOGICAL HEALTH

Julien LEGRAND - IFREMER
Fréderic PERIE - Total Energies
Aurore BARBERO – IFREMER
Marc BOUCHOUCHA – IFREMER
Jean-François BOURILLET – IFREMER
Jean-Romain LAGADEC - IFREMER

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Needs

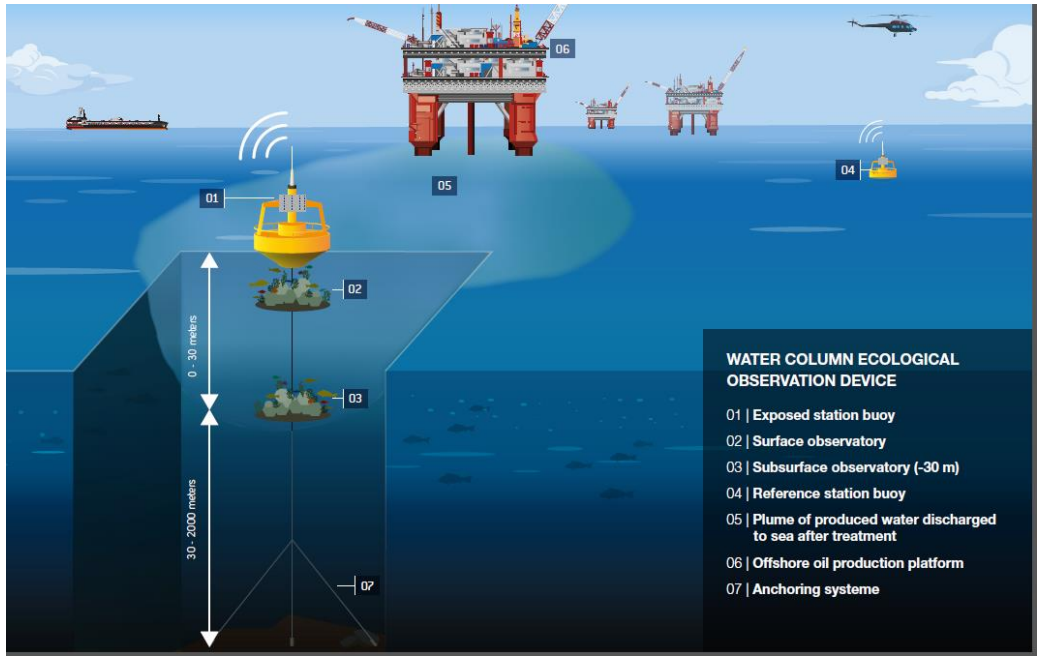
- Determine the true impacts of O&G produced water on the whole marine ecosystems functioning

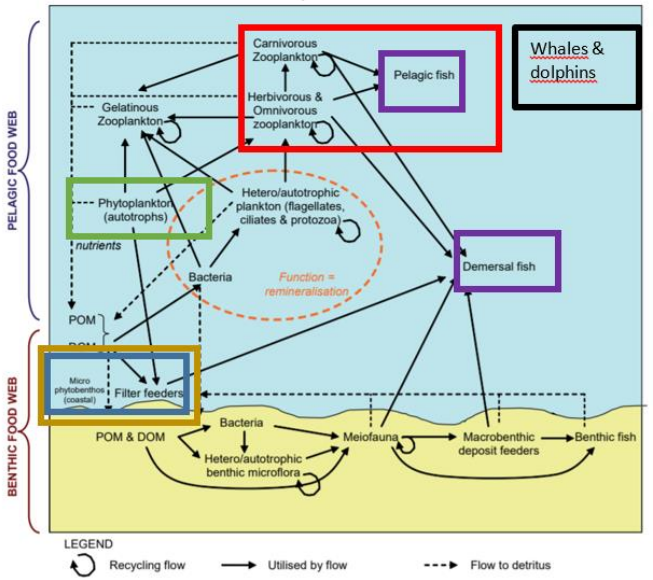
Challenges

- Better control of environmental and societal risks
- Assess a global impact (indicators in terms of physico-chemical parameters, biomass and biodiversity)
- Correlate the responses of organims to environmental changes to assess the functional quality of an environment

Finality

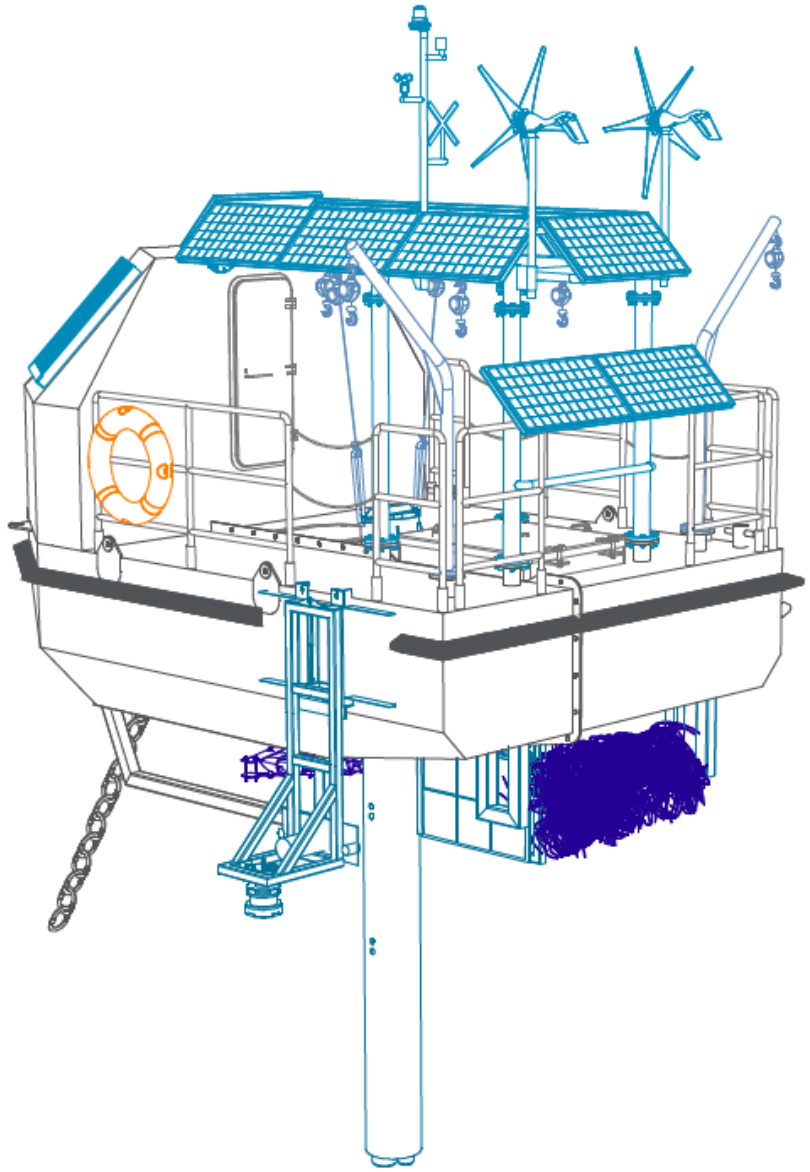
- Optimize the production tool to limit effects on the Ecosystem
- Use this ecosystem health evaluation tool to others sectors





- Exposure of large ecosystems (macrocosm) at the surface and subsurface
- Natural bio-colonization on 1 buoy in the plume and 1 reference buoy outside the plume
- Comparison of the long-term (seasons) evolution of the effects of discharges in surface waters for different trophic levels (plankton, filter feeders, fish, MM), noise, contamination, etc.
- Integration of high TRL bricks
- From sensor data to indicators

Biocolonization
Phytoplankton
Zooplankton-Pelagic fishes biomass
Marine mammals
Filter feeders

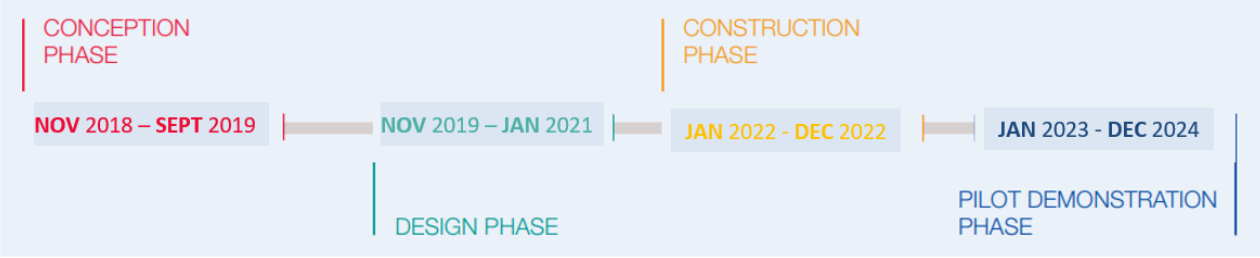


PILOT EXPERIMENT

- To **achieve** the stated targets in terms of :

- sensors integration and acquisition frequency
- energy autonomy
- communication needs
- surface excursion and seafloor footprint diameters
- environmental conditions resistance.

- This pilot phase will **validate** the technical, scientific and economical options and will give exposure to the MACROCOSME



PERSPECTIVES

- To **address** other environmental Monitoring needs

- Marine Renewables
- Aquaculture
- Port Infrastructures

- **Adaptation** of Macrocosme buoy to fit with the requirements of these applications

- Adaptation of the power production unit
- Adaptation of the payload with pertinent sensors (LIDAR, …)

MULTI-SENSOR OPTION FOR FLOATING WASTE MONITORING

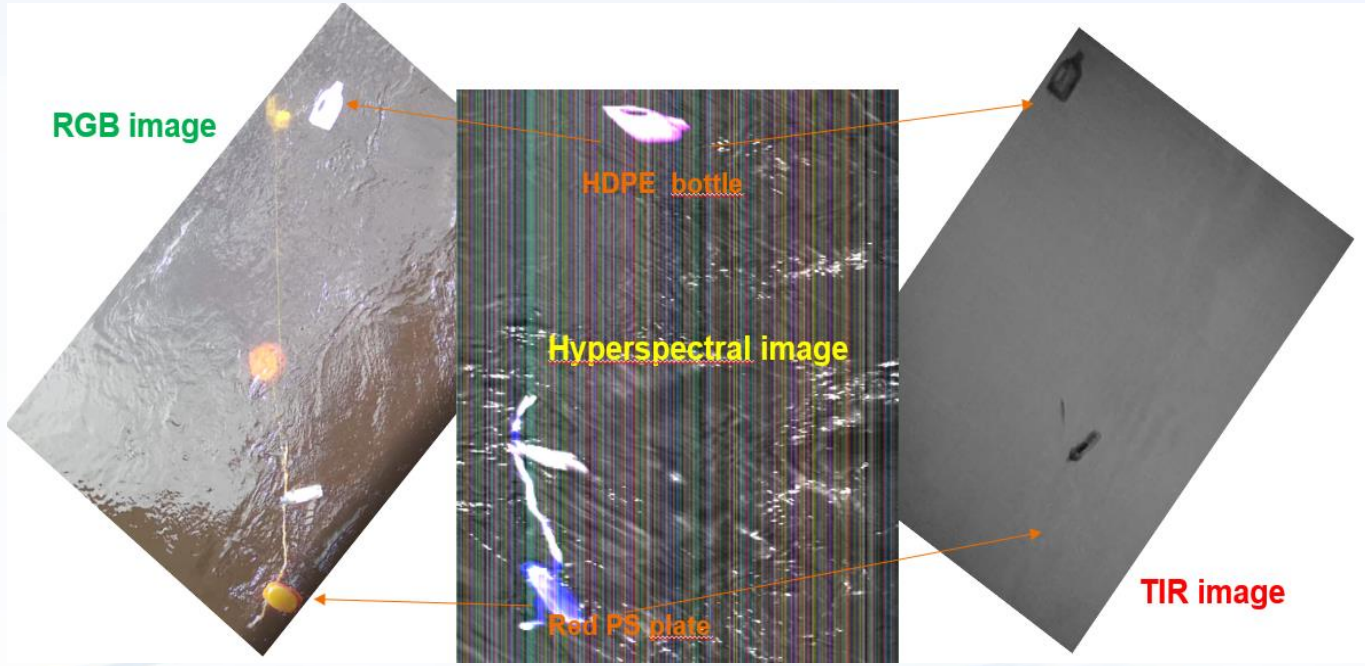
Jukka Sassi
VTT Technical Research Centre of Finland Ltd
23 September 2021

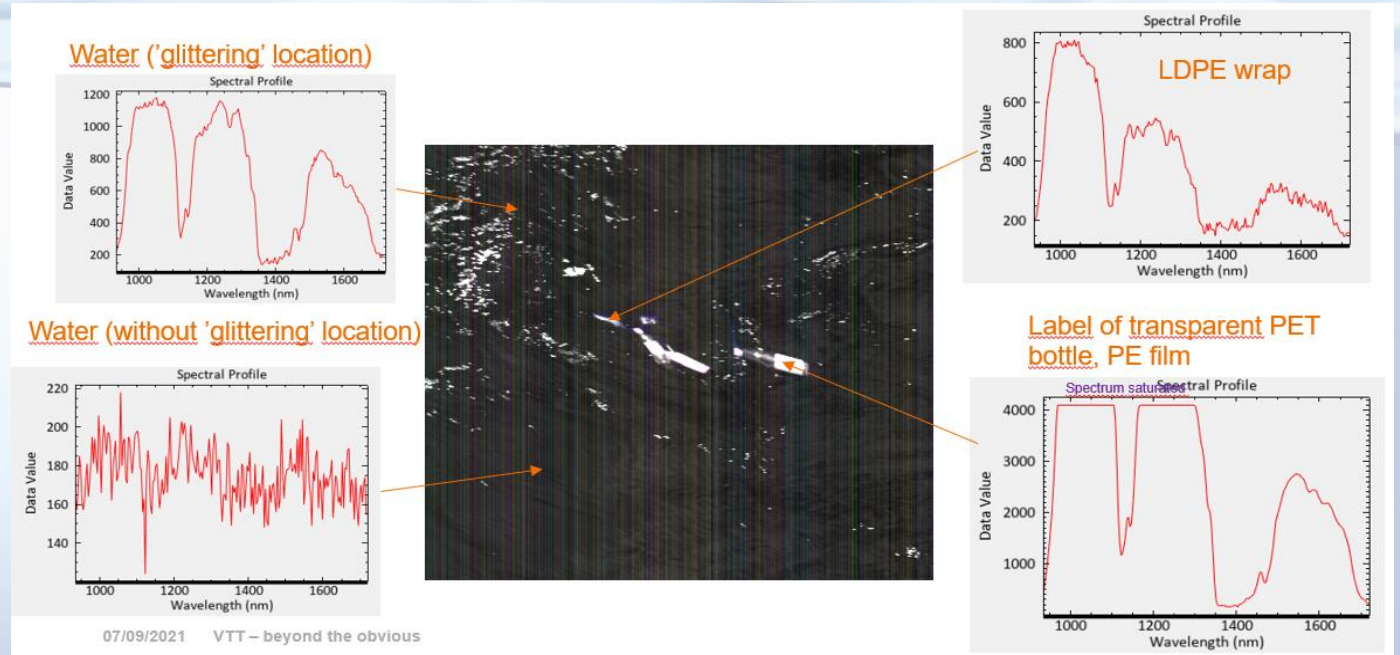
#EMDInMyCountry

WHAT IS MULTI-SENSOR MONITORING?

Combination of selected optical sensors, which collect data simultaneously from the same target area:

- **Data is collected from predefined area (e.g., river or other waters) using drones or from fixed installation.**
- **Data will be analysed to enable detection of floating debris and differentiation of plastic objects from organic material.**
- **Target objects: PET and HDPE bottles, LDPE wrap, PS cans and organic material (pieces of wood and branches)**





CONCLUSION

- Multi-sensor imaging is promising method for separating floating plastic waste from organic material.
- Drones offer excellent platform for sensors in cases where aerial investigation of larger areas is needed.
- Further efforts will be targeted in possibility to distinguish different plastic types from each other and how this process could by applied by utilising machine learning methods.

THANK YOU FOR YOUR INTEREST

Contact: jukka.sassi@vtt.fi

SMART BAY SANTA TERESA- A PLATFORM OF COOPERATION TOWARDS CARBON NEUTRALITY

Chiara Lombardi (ENEA)

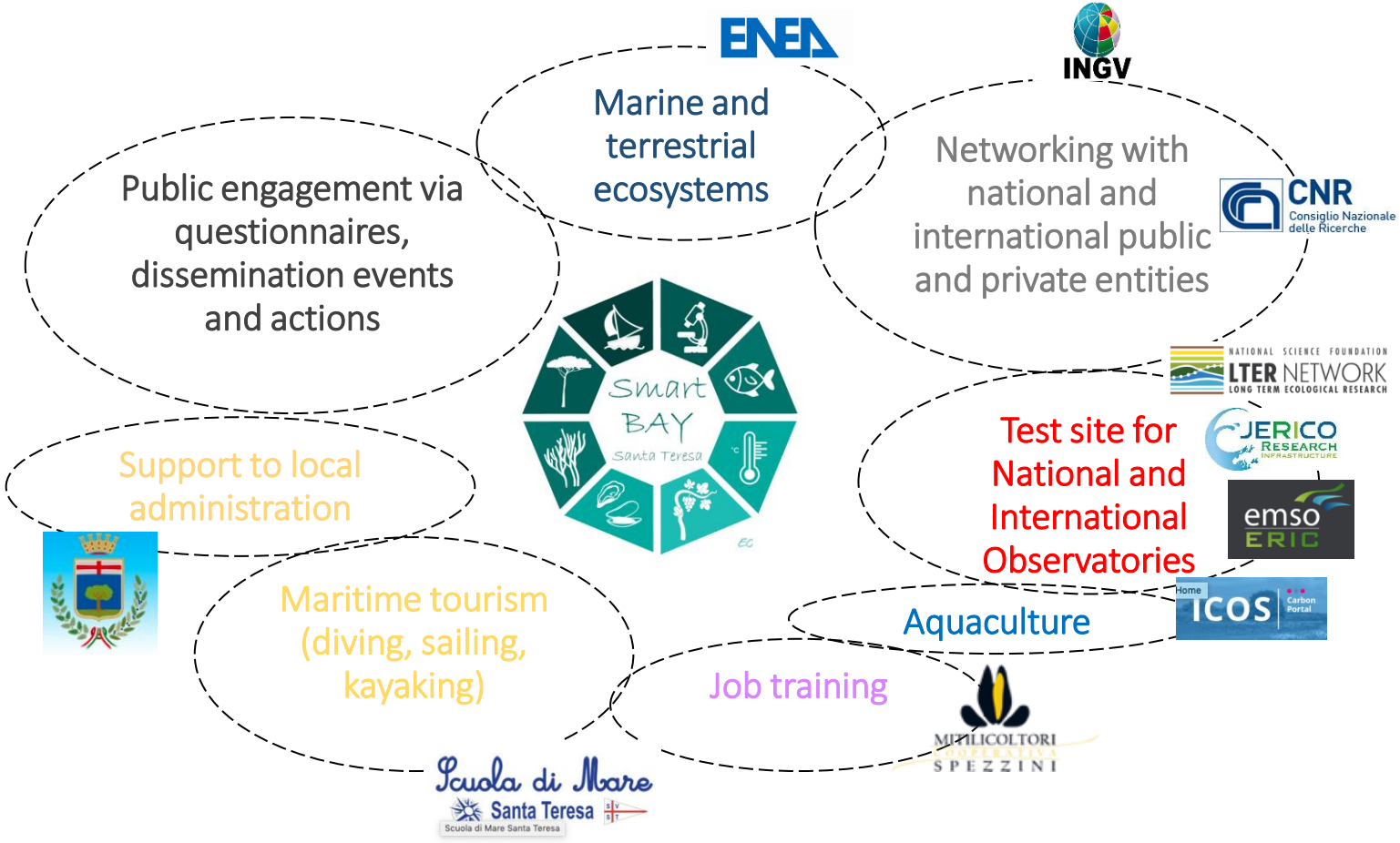
#EMDInMyCountry

BACKGROUND

Over three billion of people depend on marine and coastal biodiversity for their livelihoods. Still, the most of the services provided by ecosystems is poorly known by scientists and accepted by decision makers and stakeholders. To **reduce pollution and preserve health in the ocean** we have to **make people aware of marine ecosystems potential** to integrate them in sustainable and climate-resilient actions.

Smart Bay Santa Teresa: the platform

What is SMART BAY Santa Teresa? A ***cooperation platform***, among public and private entities (research institutes, municipality) and local stakeholders whose aim is to build common projects, **ecosystem-based** for climate change adaptation, mitigation, and water quality improvement



Smart Bay Santa Teresa: the vision

KNOWLED GE

Marine and terrestrial ecosystems, their ecological and economic potential, environmental status *via* in situ observatories

QUESTION

How the Nature Capital of a territory might help the ecological transition of the area?

AIM

Local actors (municipality, stakeholders) have to beceome the drivers of the change: less polluted ocean, more sustainable management

METHODS: UNDERSTANDING AND SHARING NEEDS

Municipality - Scientific support for innovative and sustainable actions for coastal management (e.g. sea level rise, coastal erosion, port area regeneration, biodiversity promotion..)

Aquaculture - Data provisioning and interpretation for production threaten by climate change and direct anthropogenic impacts

Sustainable tourism - Dissemination actions to engage citizens in more sustainable behaviours

Research - The use of marine and terrestrial ecosystems – still neglected- in NBS

Jobs - opportunities for local traditional business; circular economy

ACTIONS: SMALL COOPERATIVE PROJECTS

To calculate the contribution of local aquaculture as blue carbon sink by measuring CO_2 fixation and production (via fuel, energy, plastic pollution) of local activities

To test and validate innovative monitoring network in aquaculture fields to improve environmental monitoring (Internet of Underwater Things-IoUT)

To measure ES (biodiversity promotion, CO_2 storage) by local ecosystems and model their functions under climate change threats for local management interventions

To promote citizen engagement *via* dissemination actions and questionnaires valuating the social perception of the nature capital

FINAL GOAL

The first carbon-neutral bay regenerated on common shared Nature Based Solutions

CONCLUSION & OUTLOOK

A **community led-approach** is the key to drive actions aiming to reduce pollution and preserve the ocean health

To overcome these challenges it is necessary to design solution nature based who are helping the **communities to become resilient**

Research has an extremely important part in this plan by **monitoring the ocean** (big data production) and providing knowledge on the environment and **ecosystems**, with related functions and services

PAVING THE ROAD TOWARDS A COMPREHENSIVE GLOBAL PLASTIC AGREEMENT

Emily Cowan – SINTEF Ocean
Department of Climate and Environment

#EMDInMyCountry

How can zero-polluted seas and oceans be achieved and their health and productivity restored?

PLASTICENE
The role of humans in the life of plastic

Illustration: Adobe Stock photo – Parilov

www.plasticene.no

SINTEF

WWF

Deloitte.

HOUSE OF KNOWLEDGE

Forskningsrådet
Project nr 318730

Norwegian Retailers' Environment Fund

Illustration: Berre AS / Plasticene


Illustration: PowerPoint Stock Images

PROJECT PITCHES I – OCEAN CLEANING

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VTT

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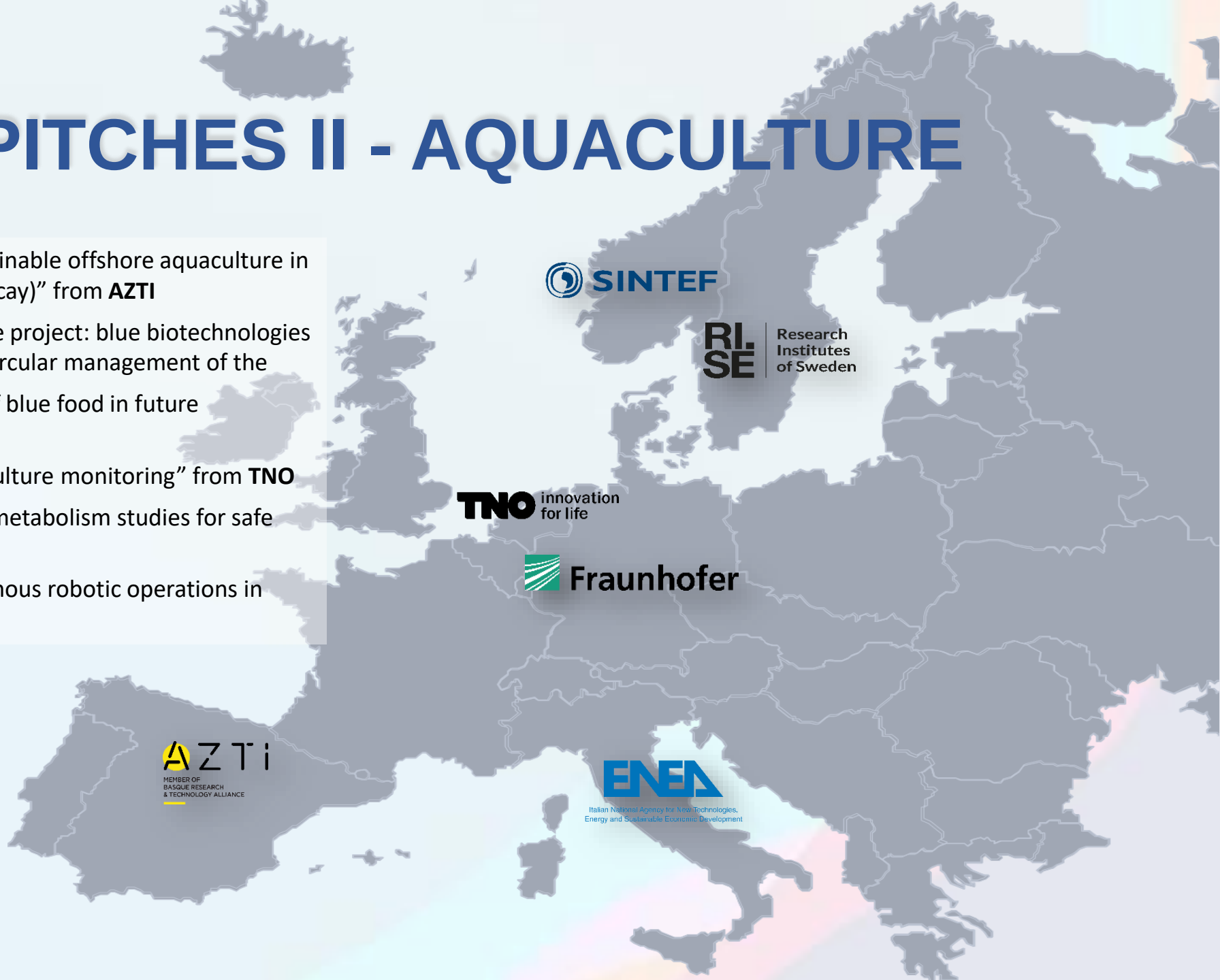
AZTI
MEMBER OF BASQUE RESEARCH & TECHNOLOGY ALLIANCE

tecnalia
MEMBER OF BASQUE RESEARCH & TECHNOLOGY ALLIANCE

ENEA
Italian National Agency for New Technologies, Energy and Sustainable Economic Development

PROJECT PITCHES II - AQUACULTURE

1. **Izaskun Zorita** - “Towards sustainable offshore aquaculture in the Basque coast (SE Bay of Biscay)” from **AZTI**
2. **Cristian Chiavetta** - “The B-Blue project: blue biotechnologies to support the transition to a circular management of the
3. **Friederike Ziegler** - "The role of blue food in future sustainable diets" from **RISE**
4. **Bas Binnerts** - “AUVs for aquaculture monitoring” from **TNO**
5. **Christian Schlechtriem** - “Fish metabolism studies for safe food” from **FRAUNHOFER**
6. **Herman Amundsen** - “Autonomous robotic operations in aquaculture” from **SINTEF**



TOWARDS A SUSTAINABLE OFFSHORE AQUACULTURE IN THE BASQUE COAST (SE BAY OF BISCAY)

Izaskun Zorita, Manuel González, Leire Arantzamendi, Oihana Solaun, J. Germán Rodríguez, Marta Revilla, Joxemi Garmendia, Iñigo Muxika, Oihane Cabezas, Joana Larreta, Yolanda Sagarminaga, Luis Ferrer, Almudena Fontán, Juan Bald.

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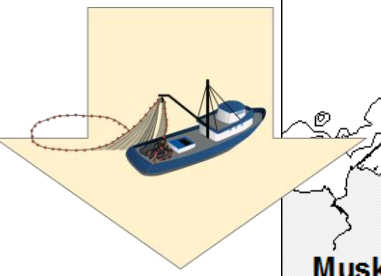
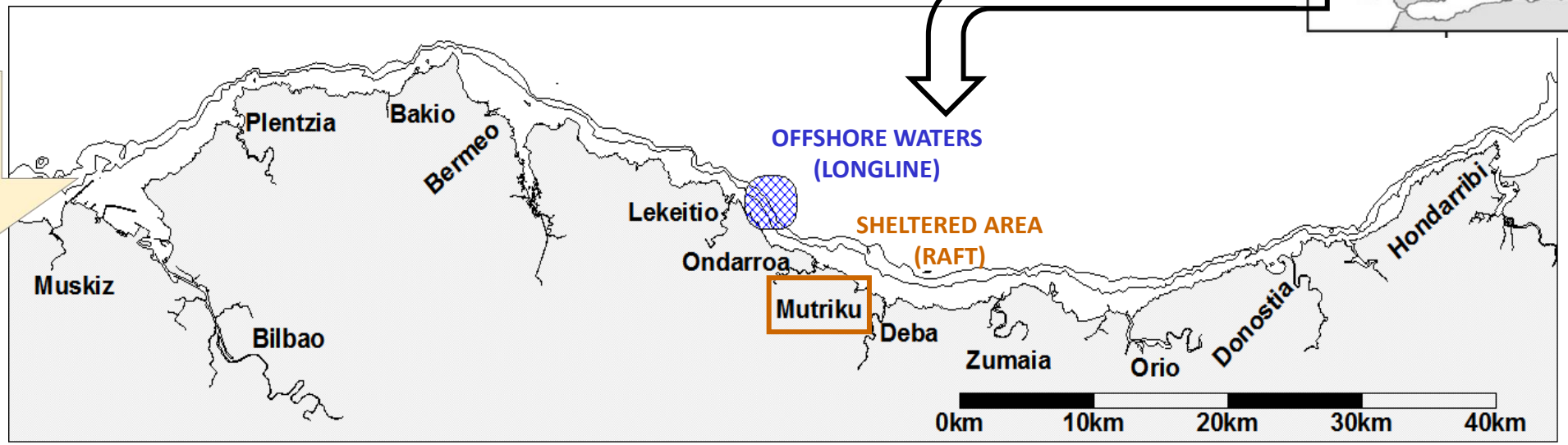
OFFSHORE AQUACULTURE FACILITIES



Decline of fishing activity




Longline in offshore waters


Raft in sheltered waters

Offshore aquaculture: sustainable food system

OFFSHORE AQUACULTURE TRAJECTORY

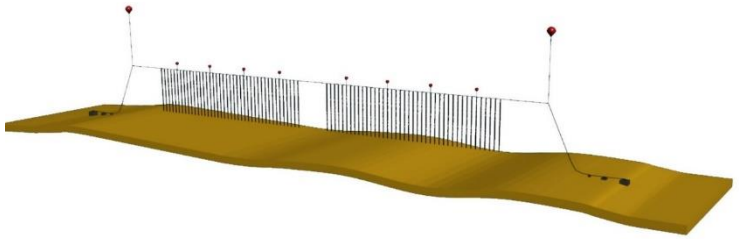
2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | …

Marine Spatial Planning

Environmental Impact Studies

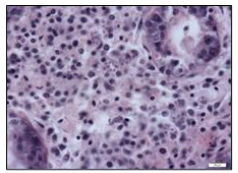
Authorizations

Longline installation



Feasibility of mussel farming

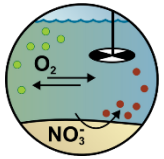
Creation of a mussel company

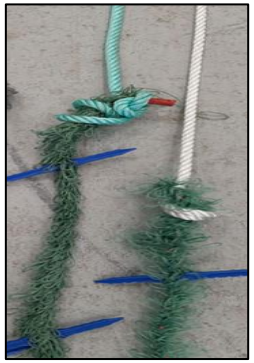


Monitoring: biotoxins, pathogens, microbiological contamination, MPs

Species diversification (IMTA)

Development of environmentally friendly materials





Recycled ropes (marine litter)

Biobased materials

CONCLUSION & OUTLOOK

- **Offshore aquaculture can become an opportunity to obtain sustainable protein in the Basque Country. However, more efforts are needed to consolidate the value chain of aquaculture products.**

- **The declaration of a Mollusc Production Zone in offshore waters by the Basque Government is a key 'push' to attract new investors to bet on the production of low trophic level species.**

- **Funding organizations:**

EUSKO JAURLARITZA GOBIERNO VASCO
EKONOMIAREN GARAPEN, JASANGARRITASUN ETA INGURUMEN SAILA
DEPARTAMENTO DE DESARROLLO ECONÓMICO, SOSTENIBILIDAD Y MEDIO AMBIENTE

Interreg Atlantic Area
European Regional Development Fund
EUROPEAN UNION

Co-funded by the European Union

eit Food

Funded by the European Union

Thank you!!!

European Maritime and Fisheries Funds

Executive Agency for Small and Medium-Sized Enterprises

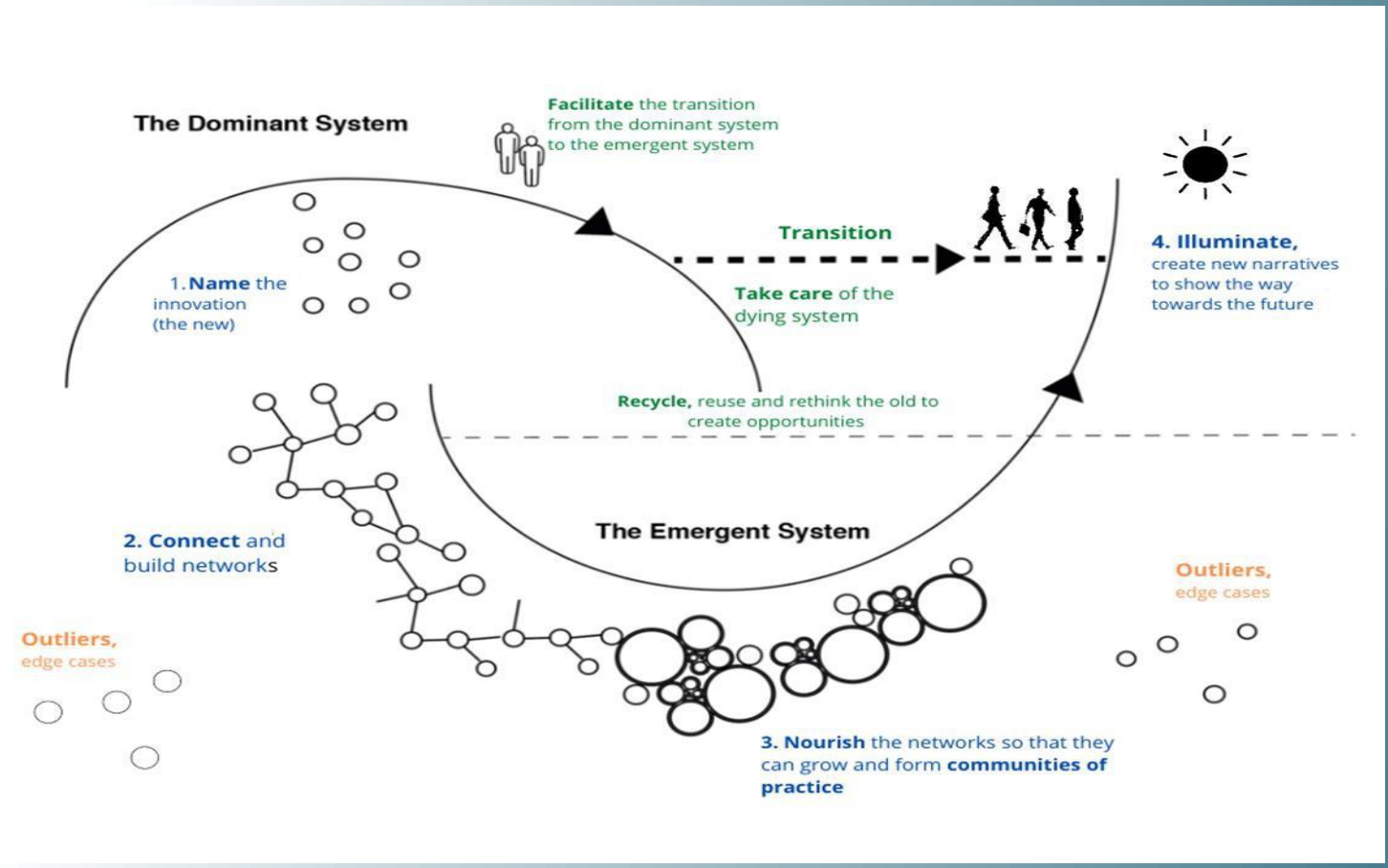
B-BLUE: A STRATEGIC PROJECT

Cristian Chiavetta

#EMDInMyCountry

B-Blue: a Strategic Project

Project co-financed by European Regional Development Fund



Main Project's Goal:

To build the Med Blue Biotechnology community and activate a coordination mechanism in the Blue Biotechnology sector at Mediterranean level (including Med Southern Shore countries)

Innovation to Market. How?

→ the multilayers integrated structure of B-Blue:

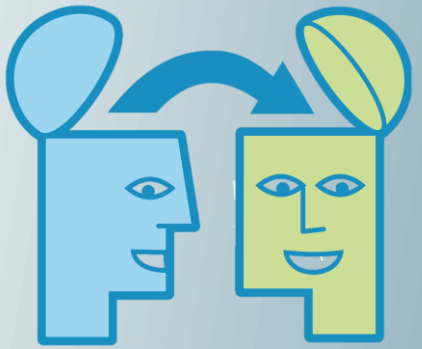
- activation of the digital Blue Biotechnology (BBt) community (exploiting the Marina Platform)
- development and release of a digital matchmaking tool
- activation of 5 BBt Hubs at territorial level on specific value chain and connection with existing network of territorial multistakeholders labs

BBt HUB:
a model to be adapted & replicated

Algae production for high-value compounds

Aquaculture/fisheries discard valorization in added value sectors

Green/blue



KNOWLEDGE DEVELOPMENT and TRANSFERRING

NETWORKING

PROMOTING NEW COLLABORATION

ADVOCACY

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ENEA
Italian National Agency for New Technologies, Energy and Sustainable Economic Development

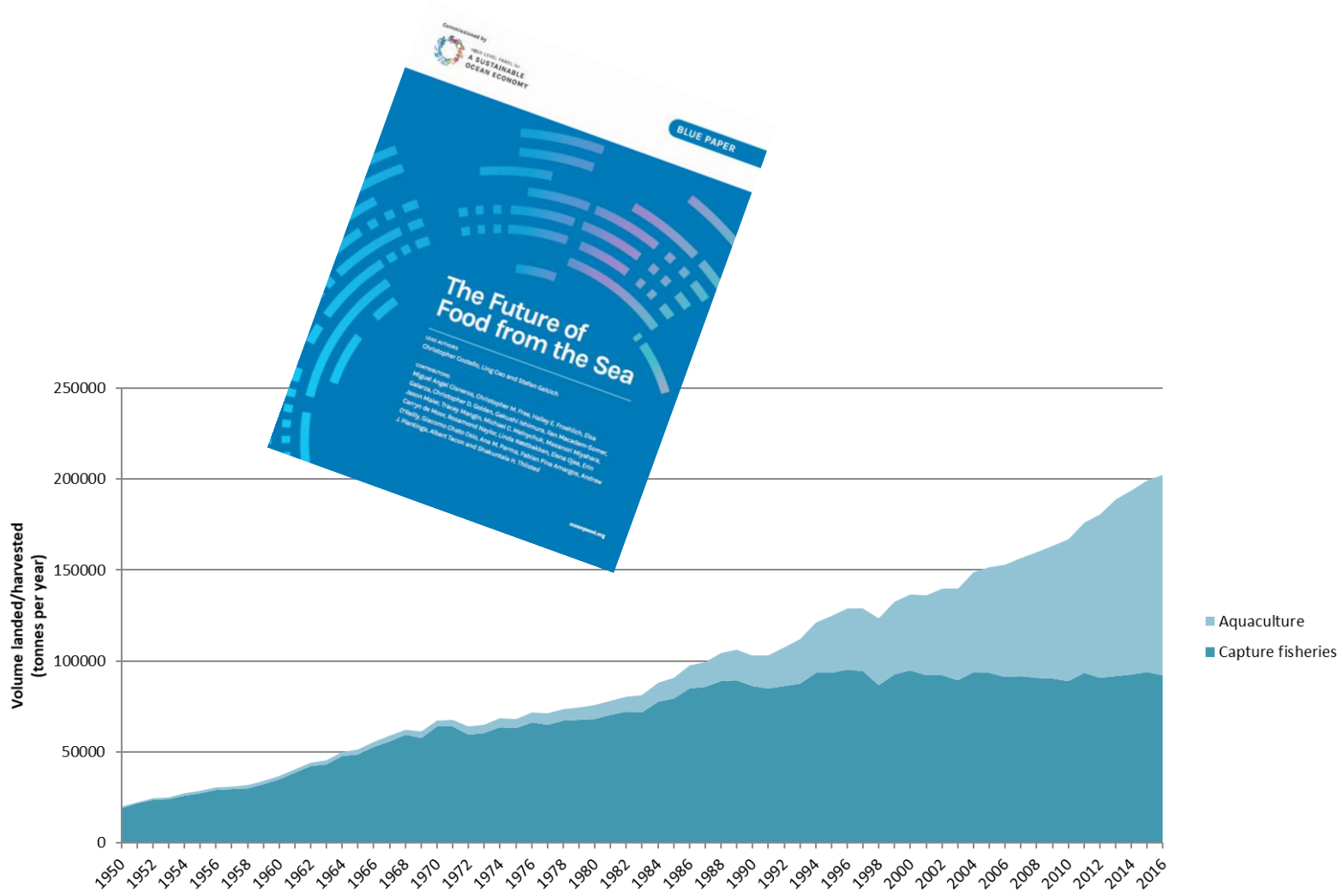
THE ROLE OF BLUE FOODS IN FUTURE SUSTAINABLE DIETS

Friederike Ziegler

#EMDInMyCountry

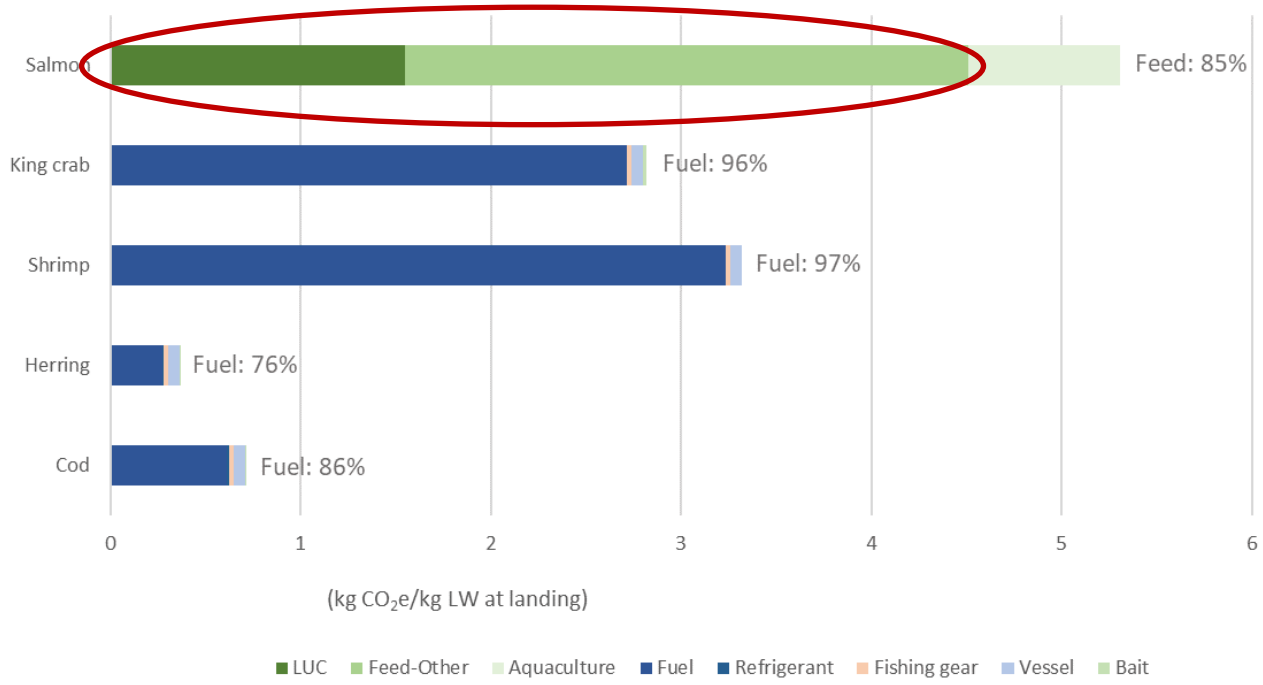
BLUE FOODS

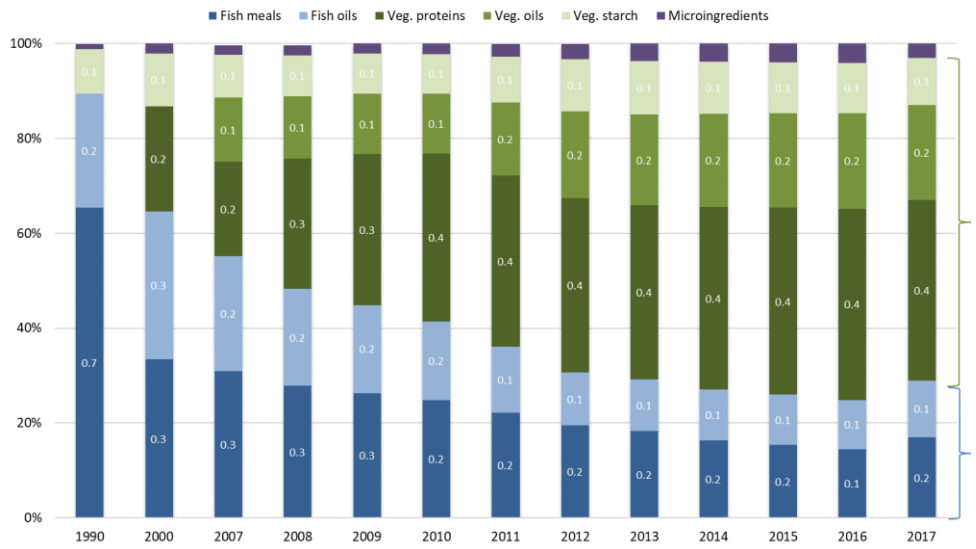
- Are (often) healthy and sustainable - we should eat more, of the right types
- Demand and production is growing rapidly
- Tools, metrics and data needed to assess sustainability- for improvement and communication



Data from FishStatJ
Costello et al. 2019 The future of food from the sea https://oceanpanel.org/blue-papers/future-food-sea
Costello et al. 2020 The future of food from the sea https://www.nature.com/articles/s41586-020-2616-y

FROM CARBON FOOTPRINT OF NORWEGIAN SEAFOOD…
…TO DEVELOPMENT OF NOVEL AQUAFEEDS

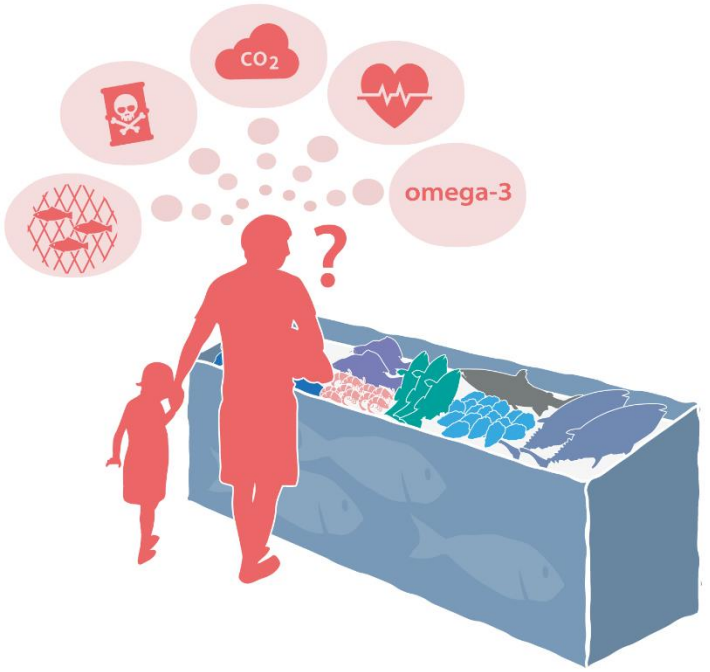




Ziegler et al. 2021 Greenhouse gas emissions of Norwegian seafoods *J Ind Ecol*

CONCLUSION & OUTLOOK

- **Take home: Seafood is a both healthy and sustainable food option, with the right guidance**
- **Challenge mitigation: Standardised databases, motivate industry partners to initiate continuous data collection and contribute their data**
- **Projects funded by: FHF (Norwegian Seafood Research Fund), Mistra and the Norwegian Research Council**
- **Seafood group at RISE spans consumer science, nutrition, processing techniques and product design, we collaborate internally, nationally and internationally**



Swedish interdisciplinary research center for Blue Food: bluefood.se

International collaboration on Blue Food potential: bluefood.earth

Thanks!

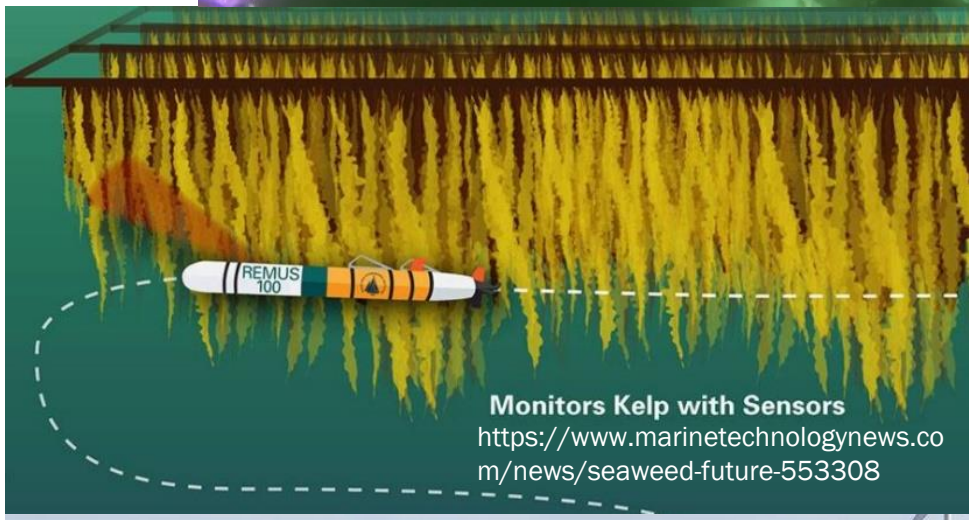
Friederike Ziegler, +46 704 205609, friederike.ziegler@ri.se

AUVS FOR AQUACULTURE MONITORING

WHY AUVS AND OPEN CHALLENGES

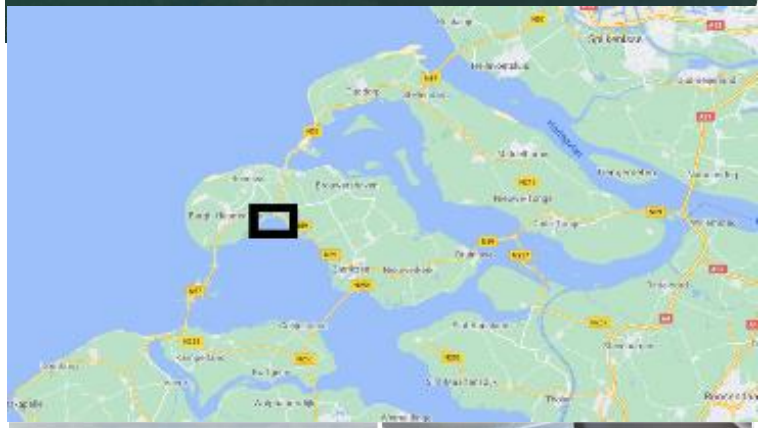
- Why AUVs:
  - 3D remote monitoring of environment (e.g. sampling, and habitat mapping) and seaweed growth + health.
  - Inspect seaweed and seabed at closer distance w.r.t. ASVs and more robust navigation underwater then ROV (supported by ASV).

- Open challenges:
  - **Connectivity:** No radio connectivity
  - **Navigation:** No GPS underwater, waves + currents, dead reckoning, acoustic ranging limited by seaweed
  - **Perception:** poor optical visibility
  - **Endurance:** coop with entanglement/ collision, limited battery life



ALGAEDEMO PROJECT
TNO WORK SCOPE

- **Goal:** Investigate opportunities for Autonomous Underwater Vehicles (AUV) for monitoring the growth of seaweed and the condition of critical structures such as substrates, mooring and anchoring.
- **Approach:** Experimental performance validation of AUV navigation and sensor performance in a seaweed farm in the Schelphoek sanctuary
- **Results:** demonstrations and publication on the value and limitations of using AUVs for aquaculture based on experimental validation



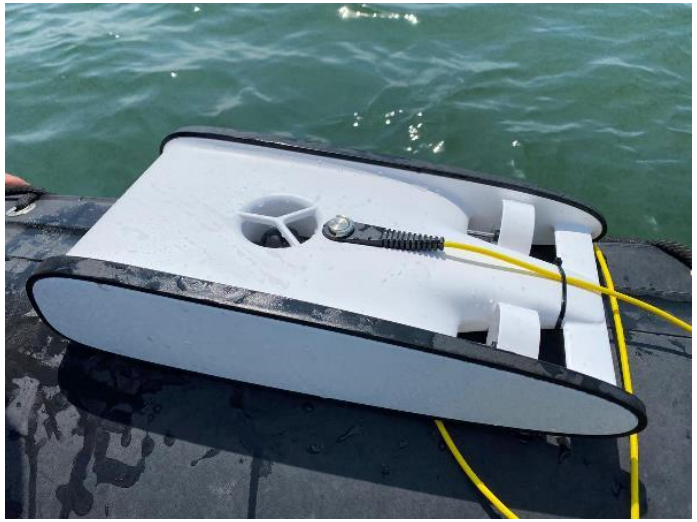
AlgaeDemo

TNO innovation for life

DUTCH SEAWEED GROUP

SIOEN

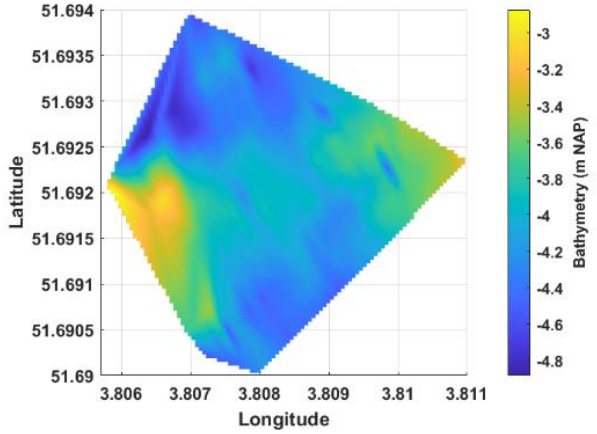
ALGAEDEMO PROJECT
VEHICLES



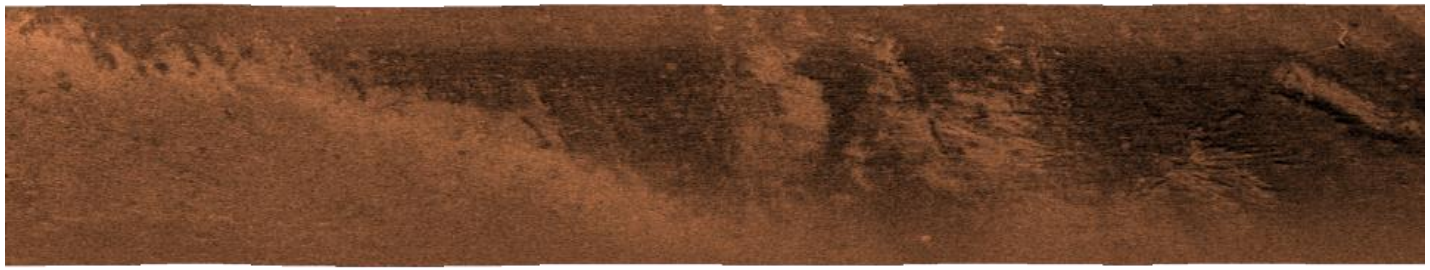
Interferometric SSS
Navigation sensors
Camera(s)
Turbidity sensors
Acoustic communication

ALGAEDEMO PROJECT

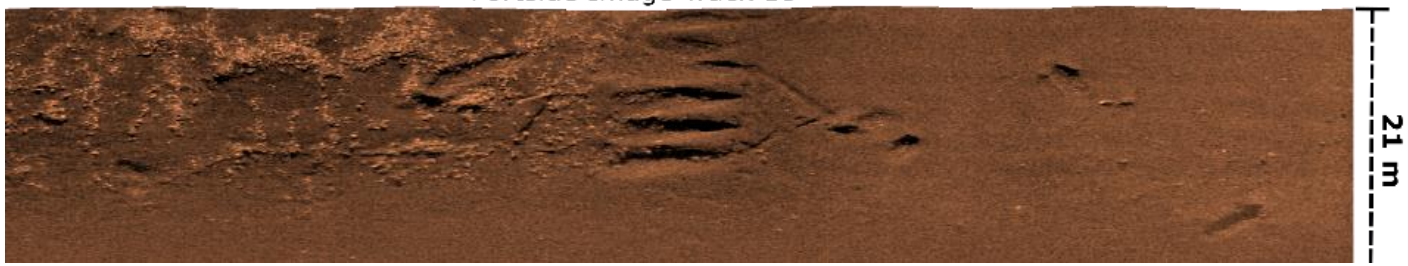
LAUV inspection seabed



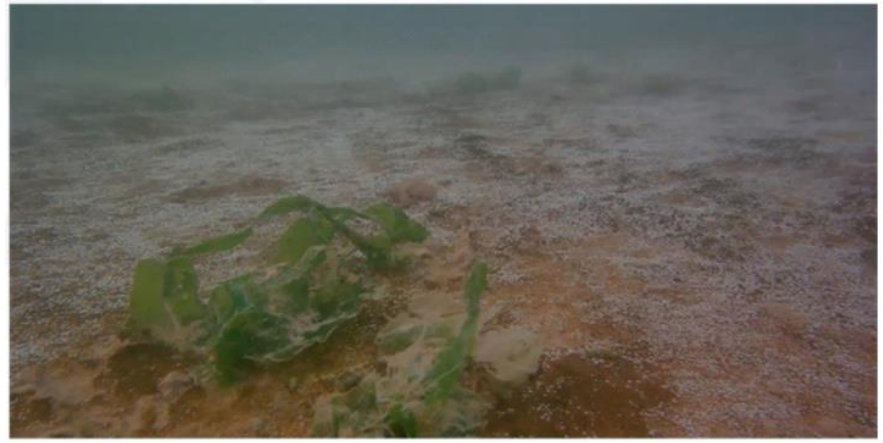
Portside Image Track 3



Portside Image Track 18



ROV inspection seabed



FISH METABOLISM STUDIES FOR SAFE FOOD

Christian Schlechtriem (Fraunhofer IME)

#EMDInMyCountry

BACKGROUND / INTRODUCTION

Residues in fish products

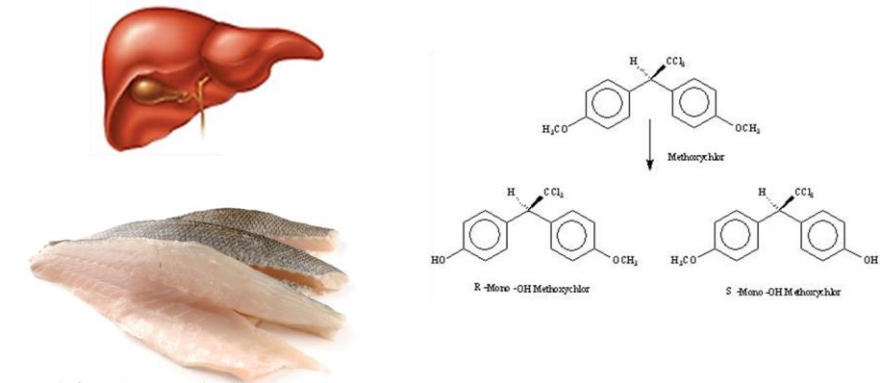
Fraunhofer IME

FISH METABOLISM STUDIES

© Kunststoffe Spranger GmbH | Ronny Schubert

Fraunhofer IME –
Test facility for fish metabolism studies

Metabolite characterization



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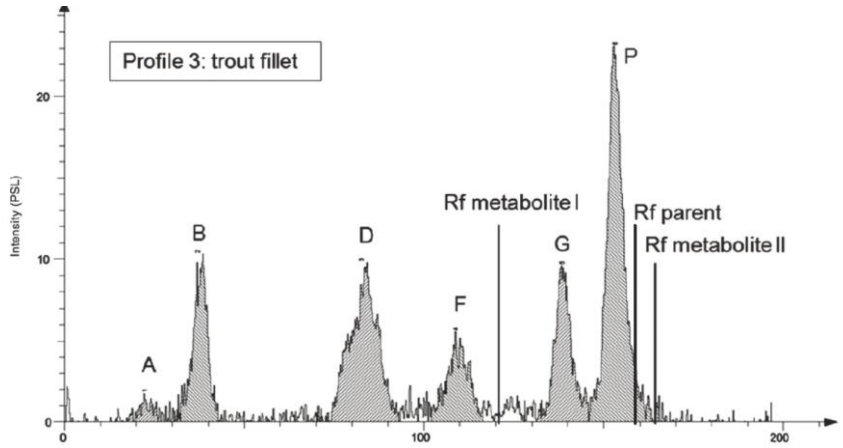
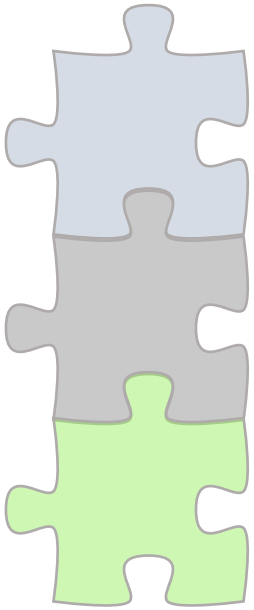
Residue quantification



Fraunhofer IME

CONCLUSION & OUTLOOK

EU Commission Working Documents:



Nature of pesticide residues in fish (fish metabolism)	SANTE/10254/2021
Dietary burden calculations for fish	SANTE/10250/2021
Magnitude of residues in fish	SANTE/10252/2021

What's next?

- Investigations on further fish species
- Establishment of in vitro methods for metabolism studies
- Metabolism studies in recirculated aquaculture systems (RAS)

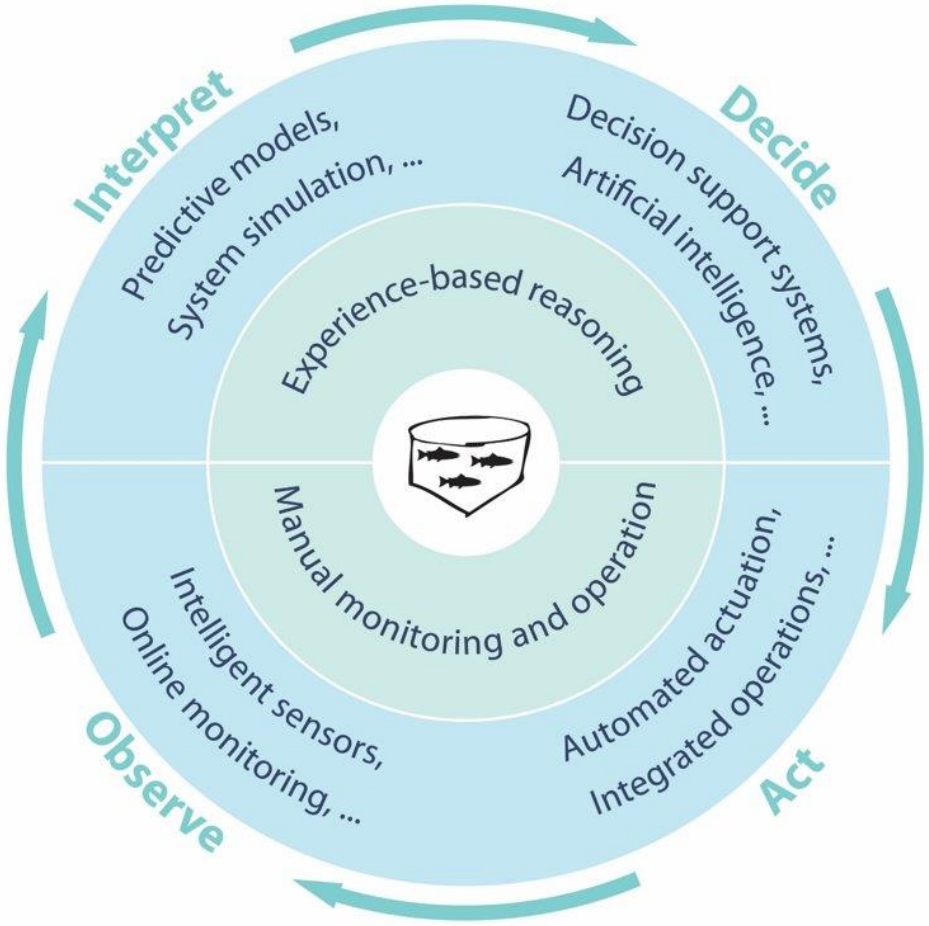
Fraunhofer IME

AUTONOMOUS ROBOTIC OPERATIONS IN AQUACULTURE

Herman Biørn Amundsen,
Dept. of Aquaculture Technology, SINTEF Ocean
PhD candidate, Dept. of Engineering Cybernetics, NTNU
herman.biorn.amundsen@sintef.no

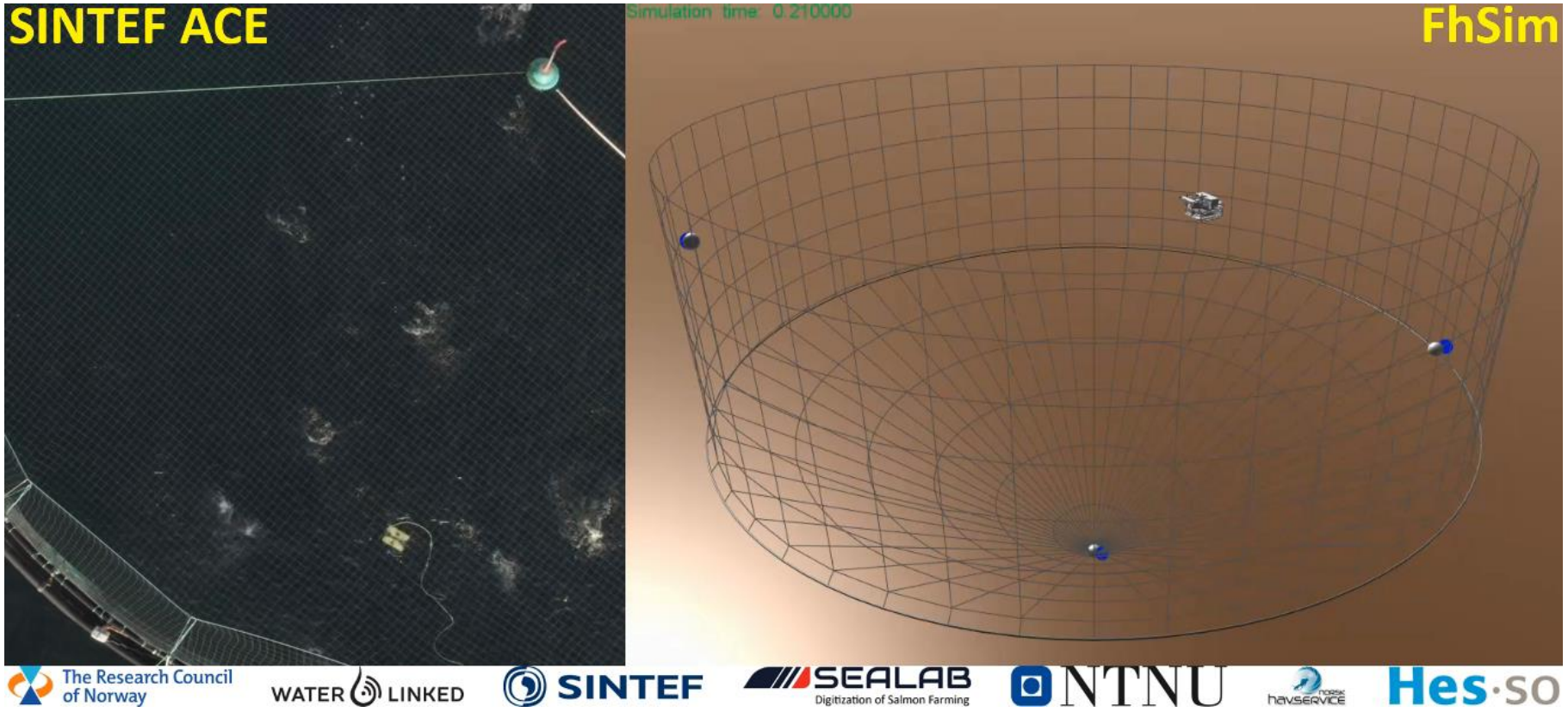
#EMDInMyCountry

Precision fish farming (PFF)



Føre et.al. (2018) Precision fish farming: A new framework to improve production in aquaculture., *Biosystems Engineering.* Vol. 173, pp. 176-193.

Examples of autonomous UUV operations

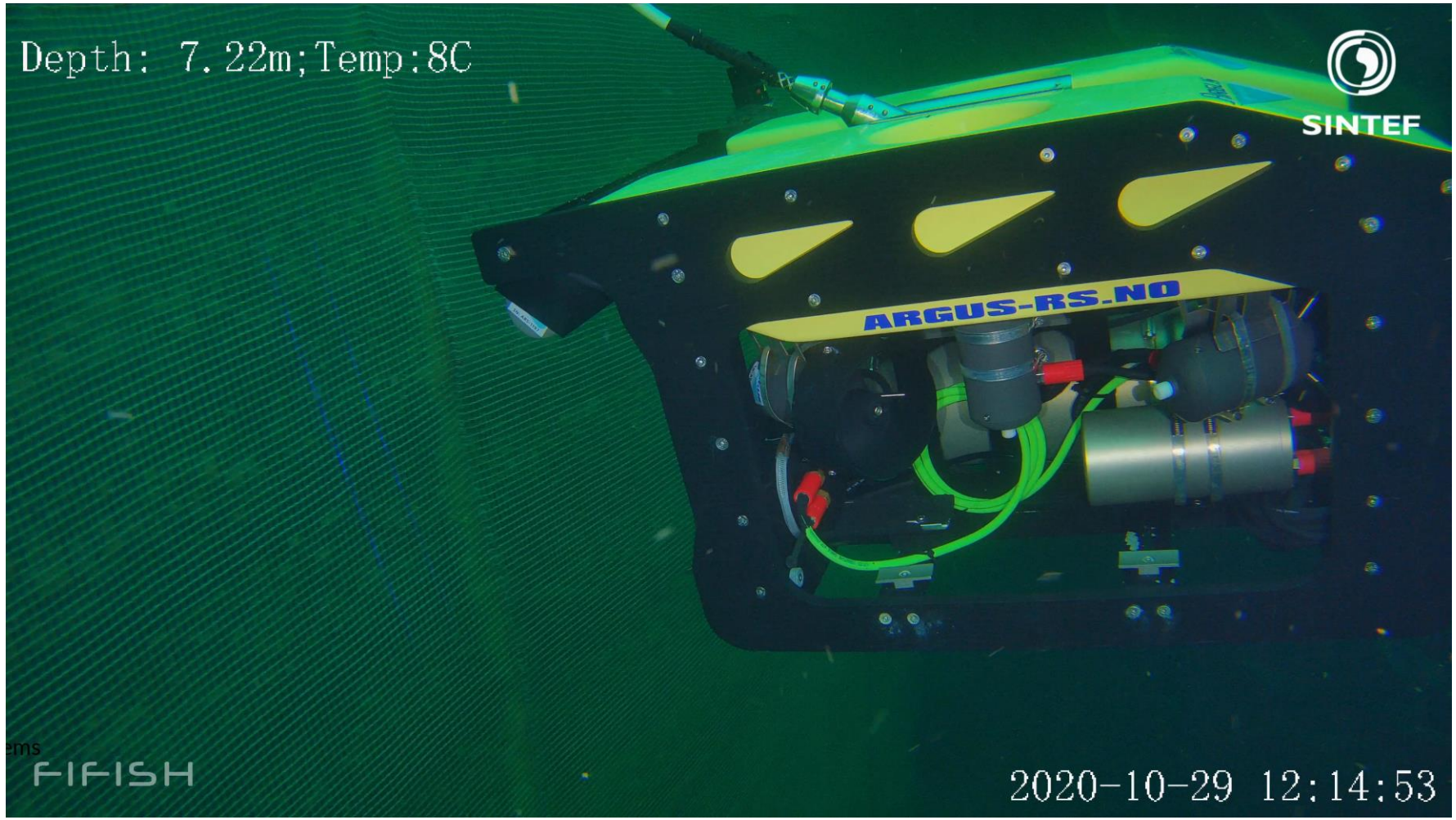


CageReporter (Research Council of Norway project no. 269087)

Su et.al. (2021) An integrated approach for monitoring structural deformation of aquaculture net cages*, Ocean Engineering.* Vol. 219.

SINTEF

Examples of autonomous UUV operations



Amundsen et.al. (2021) Autonomous ROV inspections of aquaculture net pens using DVL*, IEEE Journal of Oceanic Engineering*

SINTEF

Conclusions and outlook

- Closer to realizing automous operations in aquaculture
- Further need for knowledge about how underwater robots impact fish
- We are grateful for the funding from the Research Council of Norway and for the collaborative efforts from our project partners
  - CageReporter: Water Linked, Sealab, NTNU, Norsk Havservice, HES-SO
  - Artifex: Maritime Robotics, Argus Remote Systems, WavEC, NTNU
  - CHANGE: NTNU, MIT

PROJECT PITCHES II - AQUACULTURE

1. **Izaskun Zorita** - “Towards sustainable offshore aquaculture in the Basque coast (SE Bay of Biscay)” from **AZTI**
2. **Cristian Chiavetta** - “The B-Blue project: blue biotechnologies to support the transition to a circular management of the
3. **Friederike Ziegler** - "The role of blue food in future sustainable diets" from **RISE**
4. **Bas Binnerts** - “AUVs for aquaculture monitoring” from **TNO**
5. **Christian Schlechtriem** - “Fish metabolism studies for safe food” from **FRAUNHOFER**
6. **Herman Amundsen** - “Autonomous robotic operations in aquaculture” from **SINTEF**

SINTEF

RI. SE Research Institutes of Sweden

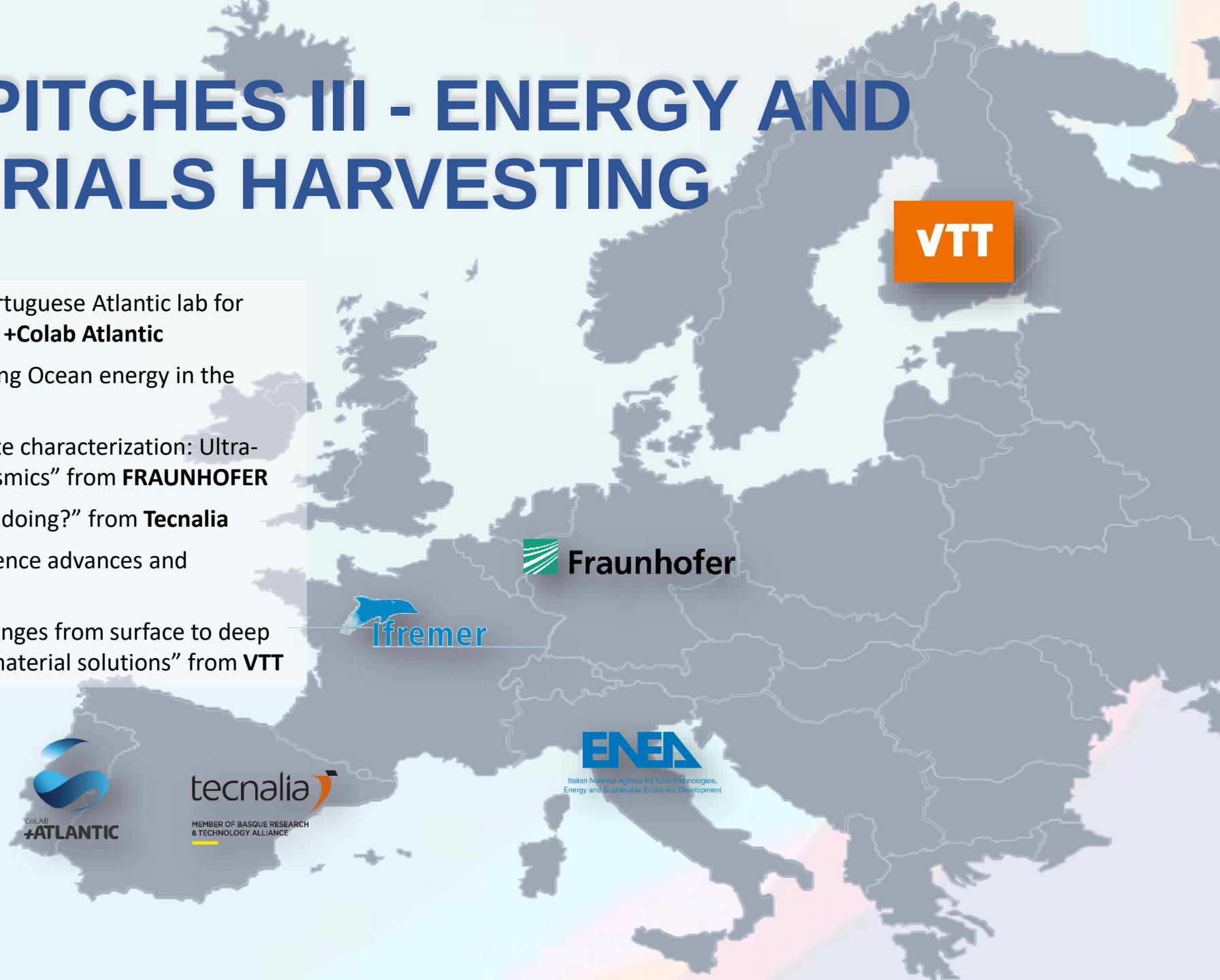
Fraunhofer

AZTI
MEMBER OF BASQUE RESEARCH & TECHNOLOGY ALLIANCE

ENEA
Italian National Agency for New Technologies, Energy and Sustainable Economic Development

PROJECT PITCHES III - ENERGY AND RAW MATERIALS HARVESTING

1. **Mário Vieira** - “OceanACT - A Portuguese Atlantic lab for future ocean technologies” from **+Colab Atlantic**
2. **Massimiliano Palma** - “Forecasting Ocean energy in the Mediterranean Sea” from **ENEA**
3. **Gabriela Sierra** - “Geophysical site characterization: Ultra-high resolution multichannel seismics” from **FRAUNHOFER**
4. **Yago Torre-Enciso** - “Learning by doing?” from **Tecnalia**
5. **Alan Tassin** - “Wave impacts: science advances and applications” from **IFREMER**
6. **Pauliina Rajala -** “Material challenges from surface to deep sea– advanced monitoring and material solutions” from **VTT**



OCEANACT - A Portuguese Atlantic Lab for Future Ocean Technologies

Mário Alberto Vieira

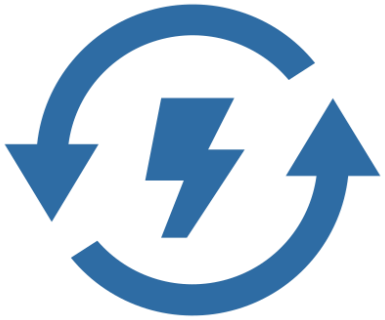
#EMDInMyCountry

oceanact

CoLAB +ATLANTIC · CEiiA · Fórum Oceano · INESCTEC · WavEC Offshore Renewables

Fraunhofer · TNO innovation for life · SINTEF · RI.SE Research Institutes of Sweden · VTT · CoLAB +ATLANTIC · AZTI Member of Basque Research & Technology Alliance · tecnalia Member of Basque Research & Technology Alliance · ENEA Italian National Agency for New Technologies, Energy and Sustainable Economic Development · Ifremer

THE NEED BEHIND OCEANACT



1. The Energy Transition is an unstoppable trend
2. Marine Energy will play a major role in the new energy paradigm
3. There are still challenges for blue economy innovative technologies
4. The latest stages of development require real offshore demonstration

Portugal has been the testbed of several ocean energy devices…

…but lacks entity responsible for the promotion and management of existing infrastructures

OUR VISION

OceanACT aims at fostering the development of innovative offshore technologies by reducing their time to market.

How?

- Providing access to **STATE-OF-ART** offshore testing infrastructure
- Offering **SUPPORT SERVICES** for implementation of devices offshore
- Boosting the maturity of the **SUPPLY CHAIN**

OceanACT is committed to explore synergies with other test sites and R&D entities towards the development of innovative subsea solutions

NEXT STEPS

- Overcome implementation **CHALLENGES** by:
  - **ADAPTING EXISTING INFRASTRUCTURES** to the needs of technology developers
  - Attracting **TECHNOLOGY DEVELOPERS** and **DEMONSTRATION PROJECTS**
  - Cooperating with **NATIONAL, REGIONAL** and **INTERNATIONAL AUTHORITIES** to **SIMPLIFY** the demonstration of innovative offshore technologies
- Support the generation of an **Atlantic R&D Centre** within the Innovation Platform for **Sustainable Subsea Solutions (ISSS)**

Thank you for your attention ☺

mario.vieira@colabatlantic.com

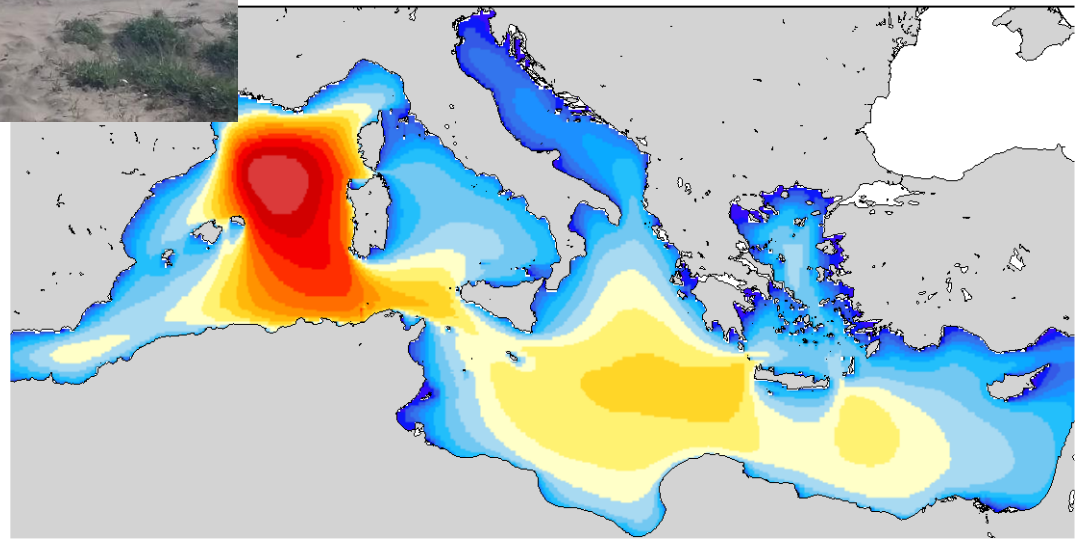
FORECASTING OCEAN ENERGY IN THE MEDITERRANEAN SEA

Massimiliano Palma

#EMDInMyCountry

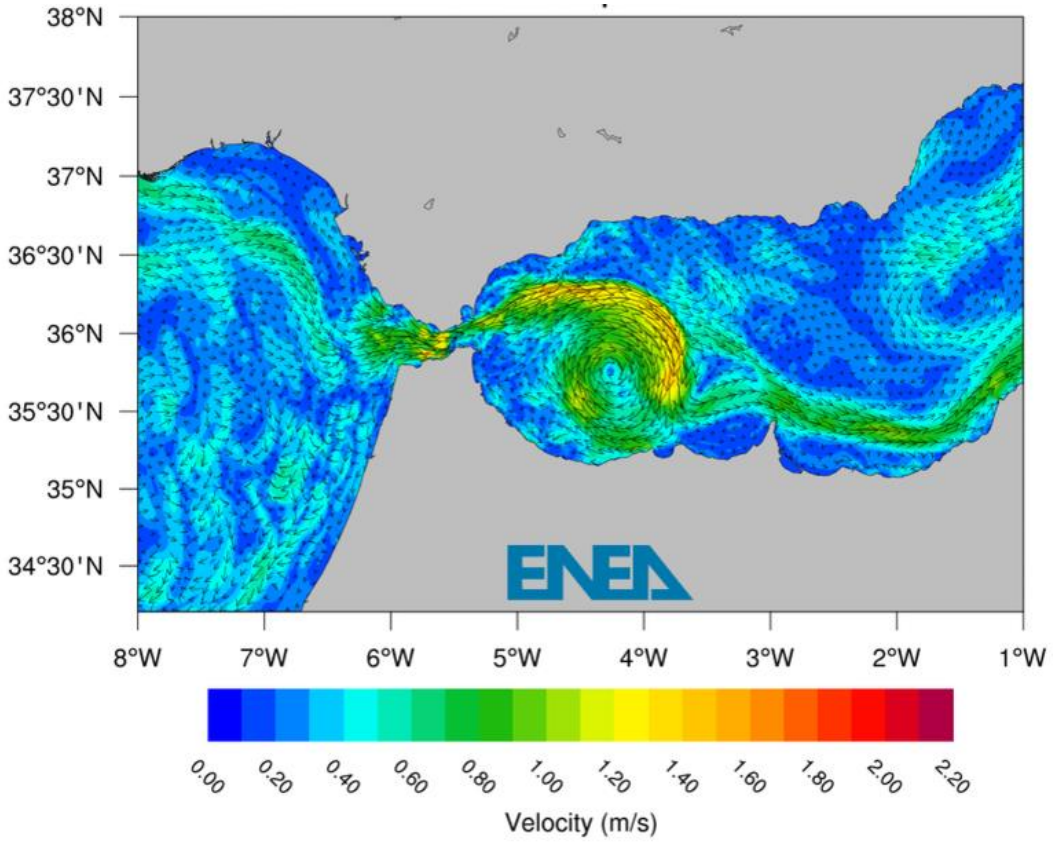
CLIMATE & ENERGY
EU DE-CARBONISATION
GOALS!

CAN WE HARVEST ENERGY FROM THE SEA?



OPERATIONAL CIRCULATION MODEL (MITO)

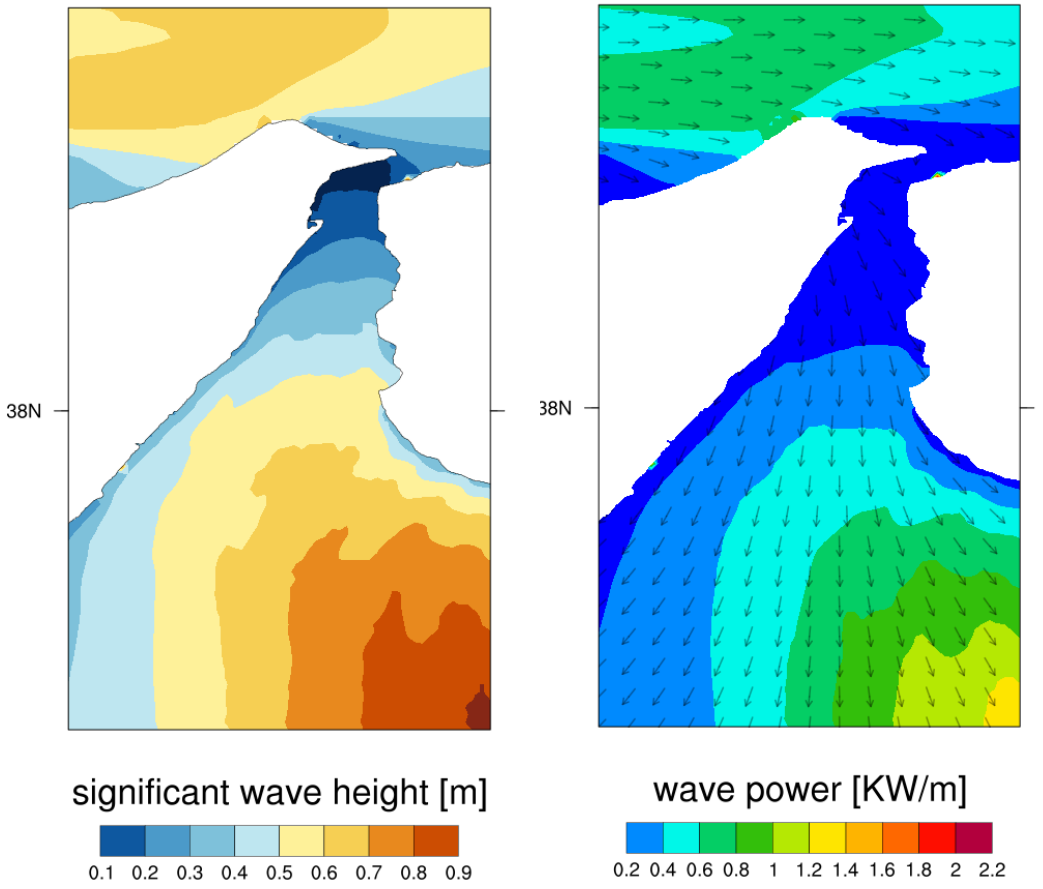
Velocity



Gibraltar Strait

MEDITERRANEAN WAVE ENERGY FORECAST

Significant wave height and wave power



Messina Strait

- Initialized with Copernicus data

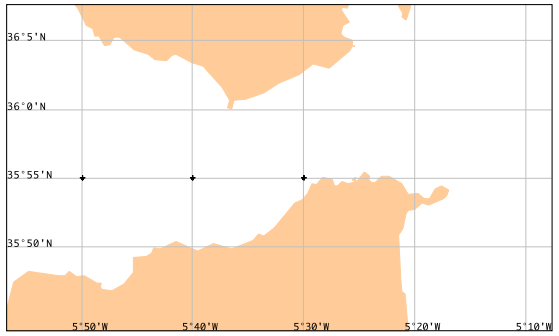
PEWEC (PENDULUM ENERGY CONVERTER)

Designed to exploit to the maximum all the components of the wave motion affecting a hull that contains within it the device that extracts the energy.

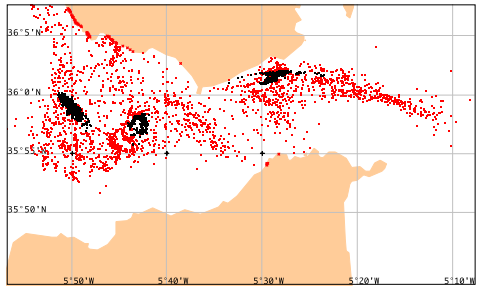
OIL SPILL TRAJECTORY

Example of oil spill released in the Strait of Gibraltar (4 days simulation)
Pollutants type: Non-weathering.
Spill size: 30000 barrels (10000 barrel each point).

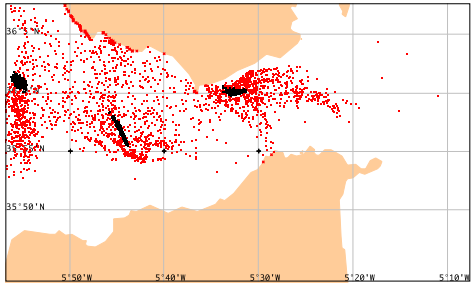
This trajectory has been produced by GNOME (General NOAA Oil Modeling Environment).
The model is driven by velocity field and wind stress provided by MITO.

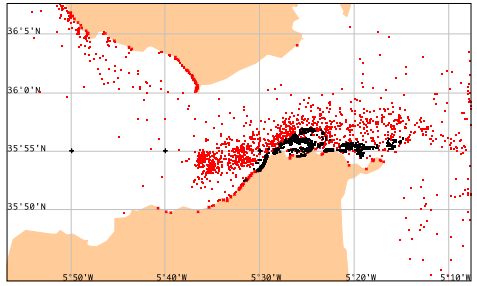


Tides incorporated in the model

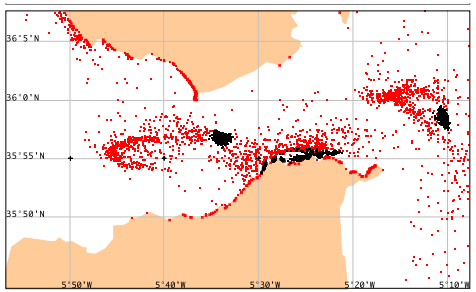


Day - 2





Day - 4



Tides NOT incorporated in the model

References:

Palma et al (2020) : “Short-term, linear, and non-linear effects of the tides on the surface dynamics in a new, high-resolution model of the Mediterranean Sea circulation”.

Pisacane et al (2018): “Marine Energy Exploitation in the Mediterranean Region: Steps Forward and Challenges”.

Carillo et al (2015): “Wave energy potential: A forecasting system for the Mediterranean basin”.

Carillo et al (2013) : “Report di sintesi sulla realizzazione di un sistema operativo per la previsione dell’energia da moto ondoso”.

Liberti et al (2013): “WAM energy assessment in the Mediterranean, the Italian perspective”.

Sannino et al (2011): “Valutazione del potenziale energetico del moto ondoso lungo le coste Italiane”.

Geophysical site characterization: Ultra-high resolution multichannel seismics

Gabriela Sierra Lombera

gabriela.sierra@iwes.fraunhofer.de

If you are interested in this presentation,
please contact Gabriela Sierra Lombera directly

Fraunhofer IWES

BiMEP Biscay Marine Energy Platform

¿LEARNING BY DOING?

Yago Torre-Enciso

#EMDInMyCountry

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ENEA Italian National Agency for New Technologies, Energy and Sustainable Economic Development
Ifremer

INTRODUCTION

Barriers for offshore energy development

- Administrative
- Environmental
- Economic
- Technological
- Social acceptance
- …

Technological Barriers

- Technology diversity
- Technological risks
  - Functionality
  - Survivability
- Site selection
  - Adequacy of sea conditions
  - Seabed characteristics
  - Logistics and accessibility
- Risk management
  - Risk assessment
  - Risk sharing
- Lack of funds

Biscay Marine Energy Platform

BiMEP is an open sea full scale grid connected test centre managing two sites:

Mutriku site

Wave power generation plant upgraded to house tests

- Two chambers ready to host OWC turbines
- Control & measuremet PLC
- Air Valve (Damper)
- Pressure sensor and water level radar
- Incoming waves measurement

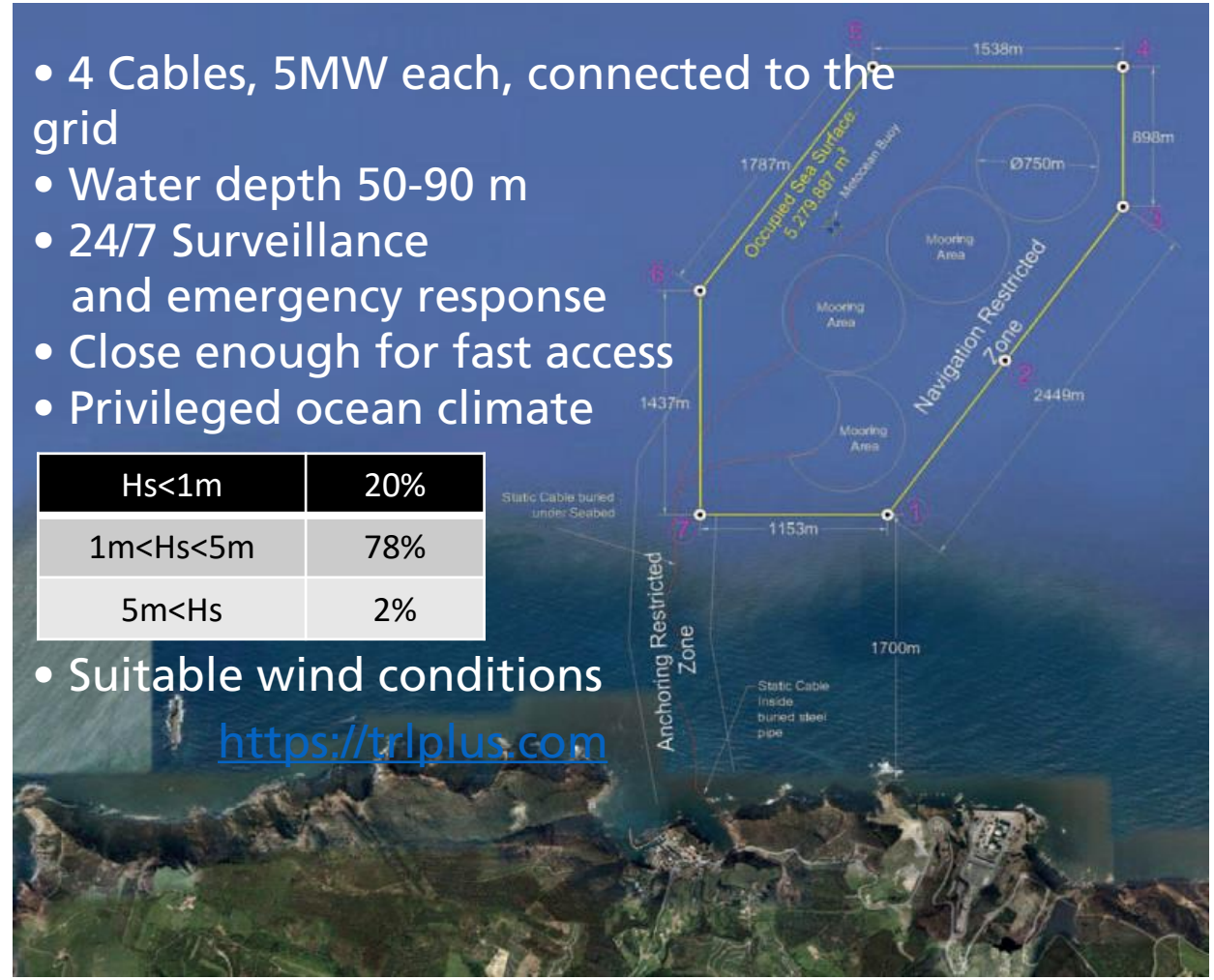
Armintza site

- 4 Cables, 5MW each, connected to the grid
- Water depth 50-90 m
- 24/7 Surveillance and emergency response
- Close enough for fast access
- Privileged ocean climate

Hs<1m	20%
1m<Hs<5m	78%
5m<Hs	2%

- Suitable wind conditions

https://trlplus.com



FINAL STATEMENT

- To boost the technology development it is needed to test and demonstrate the technologies.
-

bu

¿LEARNING BY DOING? YES

AND

LEARNING BY SHARING

money?

- …the sector does not have access to key information explaining what was wrong?

WAVE IMPACTS – SCIENCE ADVANCES AND APPLICATION

Alan Tassin – IFREMER
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#EMDInMyCountry

If you are interested in this presentation,
please contact Alan Tassin directly

MATERIAL CHALLENGES FROM SURFACE TO DEEP SEA – ADVANCED MONITORING AND MATERIAL SOLUTIONS

Dr. Pauliina Rajala
Prof. Elina Huttunen-Saarivirta
Dr. Mikko Vepsäläinen
VTT Technical Research Centre of Finland Ltd.

#EMDInMyCountry

BACKGROUND

- Marine environment is challenging for materials
- Challenging maintenance
- Environmental changes due subsea activities
- Potential for severe consequences

P.Rajala

VTT‘S WORK

Research topics

- **Corrosion & Material performance**
  - Prevention, novel materials
- **Biofouling & Scaling**
  - Mechanisms, anti-founling technologies
- **Sensor technnologies**
  - *In-situ* monitoring
  - Solid state sensors

CONCLUSION & OUTLOOK

- **New material solutions are needed to ensure sustainable sea and ocean infrastructures**
- **Need for *in situ* monitoring of materials performance and environmental parameters**

VTT

ACADEMY OF FINLAND

PROJECT PITCHES III - ENERGY AND RAW MATERIALS HARVESTING

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MEMBER OF BASQUE RESEARCH & TECHNOLOGY ALLIANCE

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Italian National Agency for New Technologies, Energy and Sustainable Economic Development

THANK YOU FOR YOUR INTEREST AND PARTICIPATION!

For more information: s.fhg.de/ISSS

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