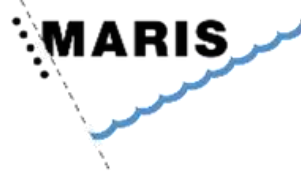


27-29 May 2024 



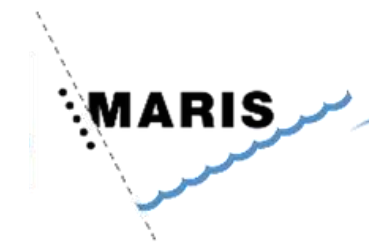
imdis

International conference on Marine Data and Information Systems



SMHI

ETI



A first roadmap for data management solutions of low-cost ocean observing technology

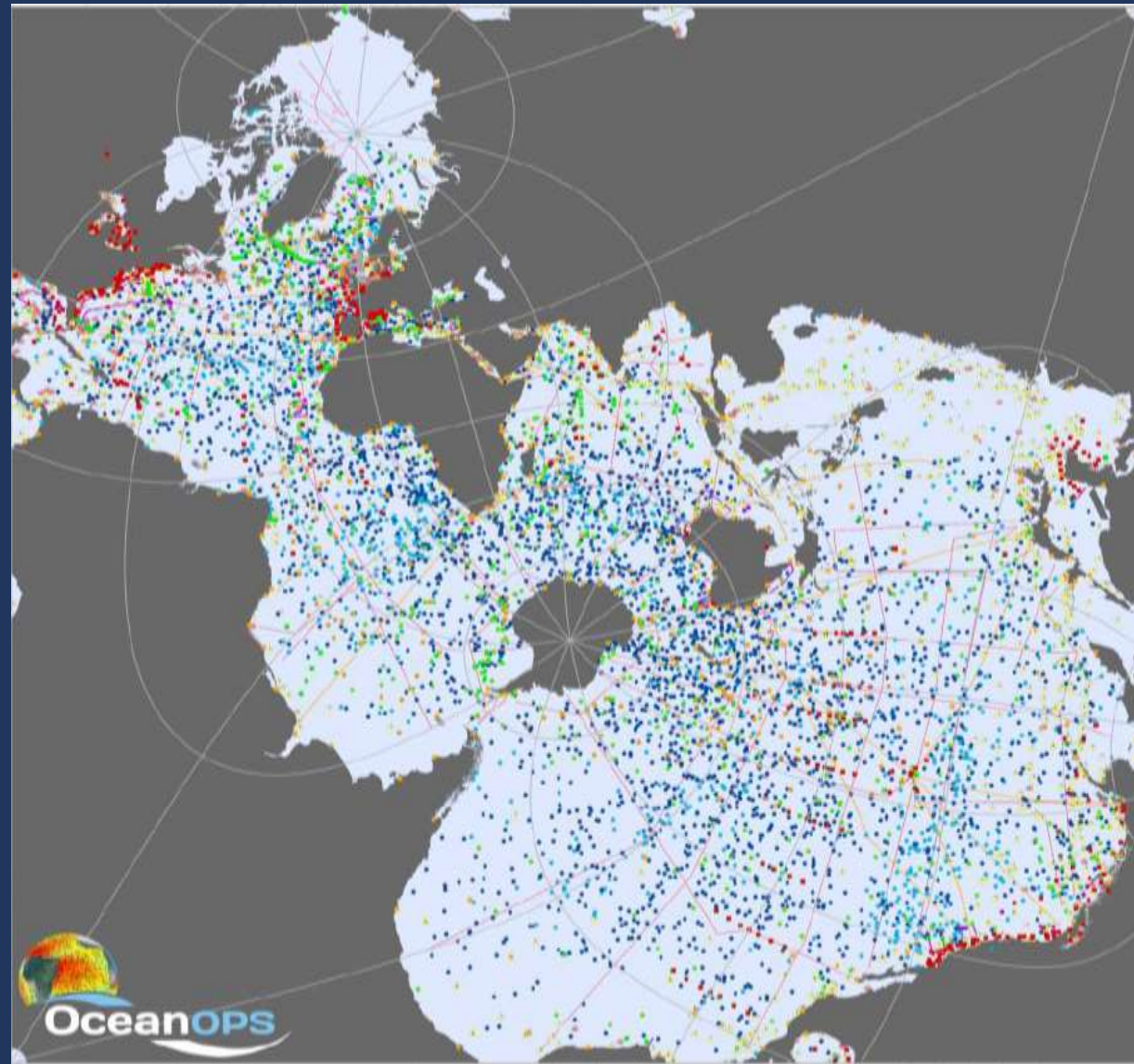
Patrick Gorringer, Antonio Novellino and Peter Thijsse



RAISE



Why observe the ocean?



Sea covers 70% of the Earth's surface.

About **40%** of the world's population lives within 200 km from the coast.

Ocean **regulates climate** absorbing 90% of excess of heats and 26% of anthropogenic carbon every year

Ocean regulates **weather**: ocean and coastal patterns, extreme events

Ocean is a resource in terms of **food, energy, materials, transportation, and tourism.**

Ocean is Global and we have to observe globally!

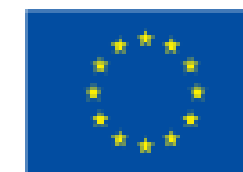
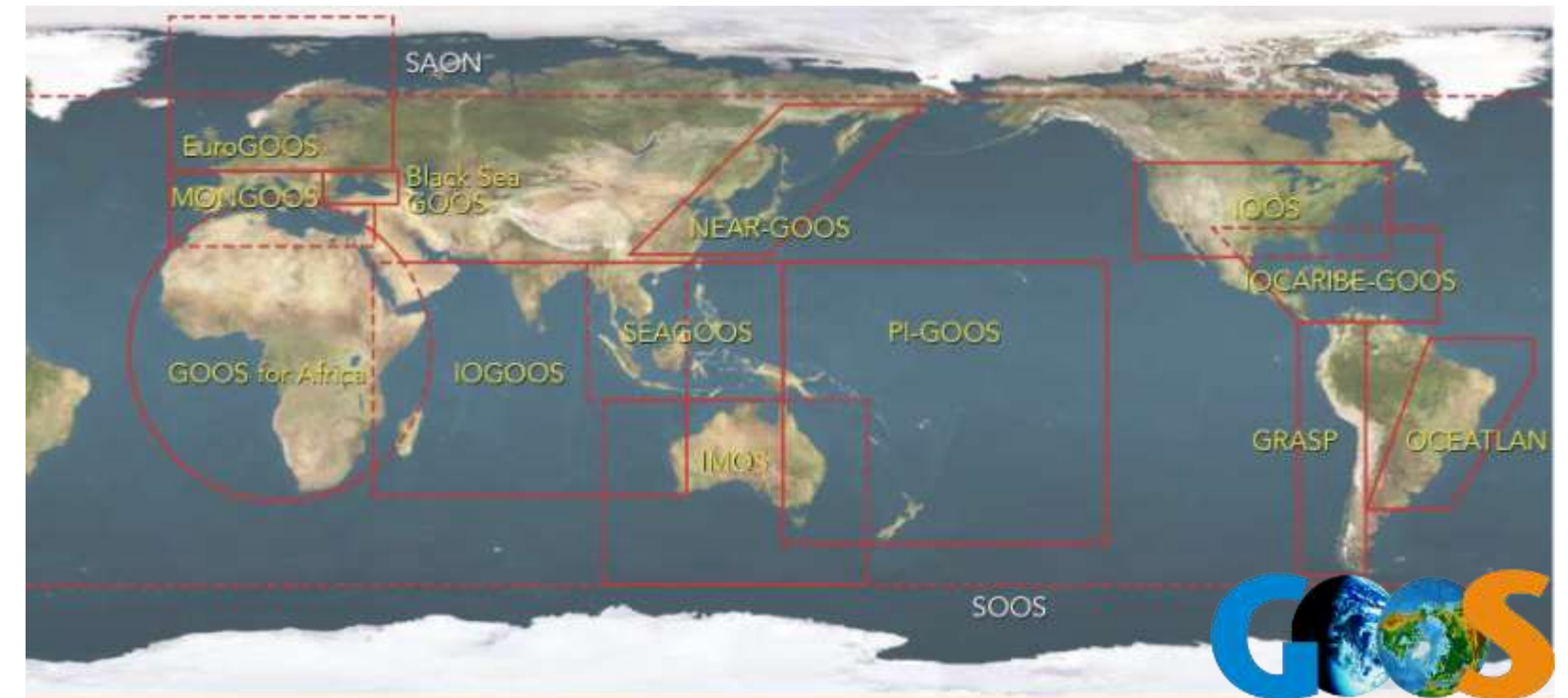
A common challenge



GOOS | **CoastPredict**
with The Global Ocean Observing System



The United Nations
Decade of Ocean Science
for Sustainable Development
(2021-2030)



PROGRAMME OF
THE EUROPEAN UNION



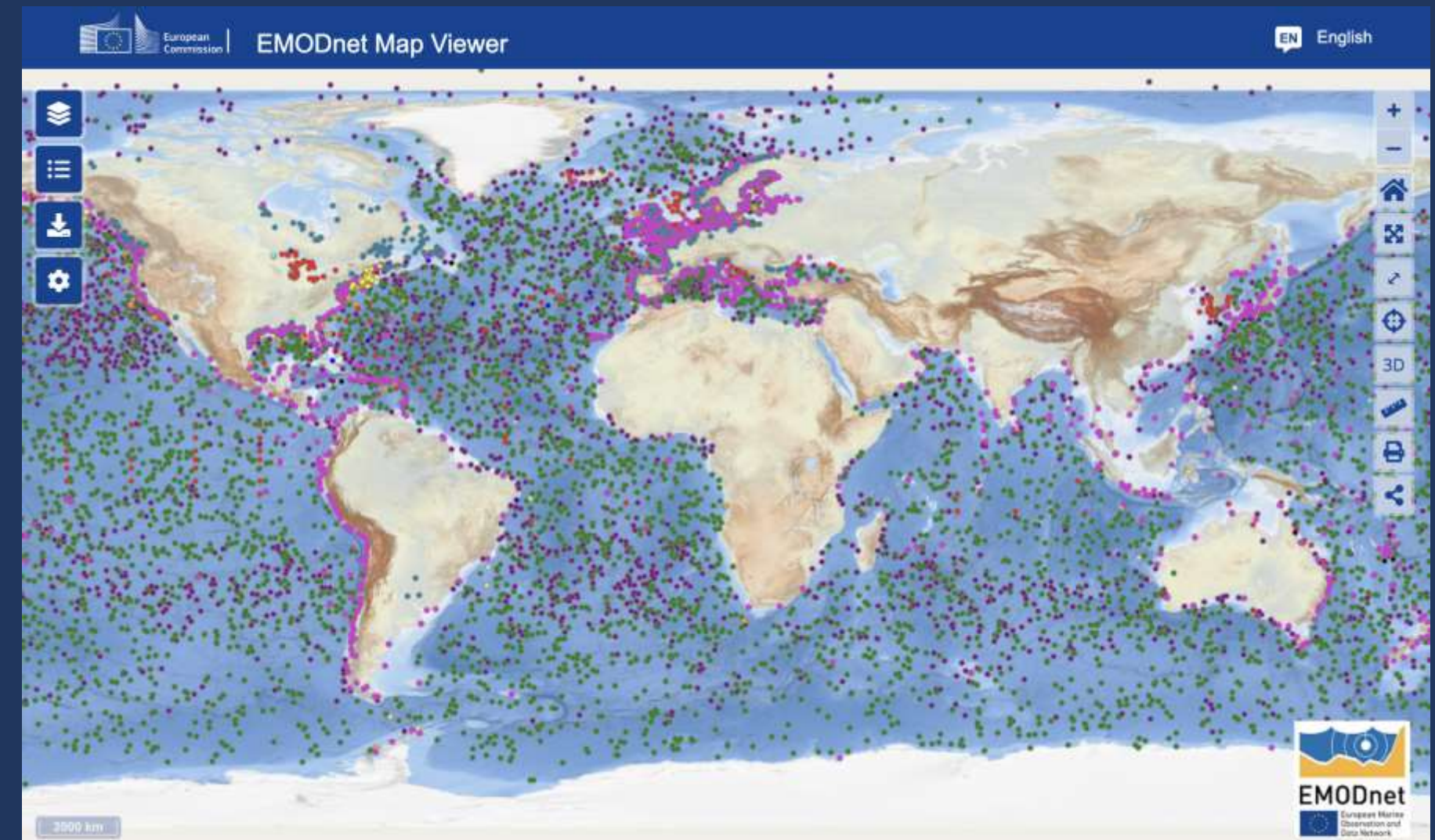
Observations

OCEANOPS report on IN SITU GOOS:

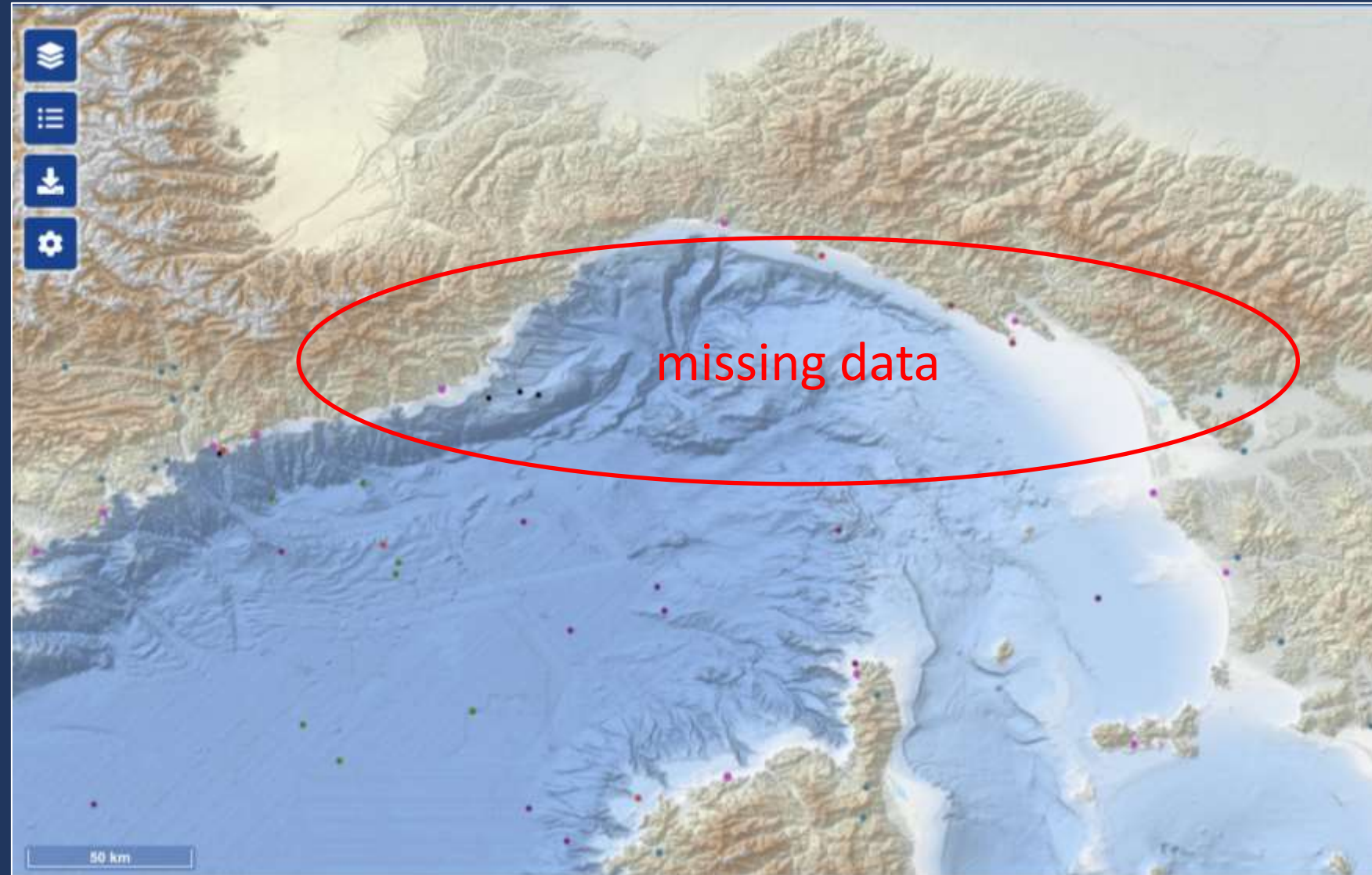
- 9.000 met-ocean observing instruments and ships
- 13 global ocean observing networks
- 84 countries
- >100.000 daily observation (EOVs)

EMODnet study:

In Europe we spend ca. 1.4 billion Euro annually for collecting marine data (1.0 billion Euro in-situ; 0.4 billion Euro remote sensing)

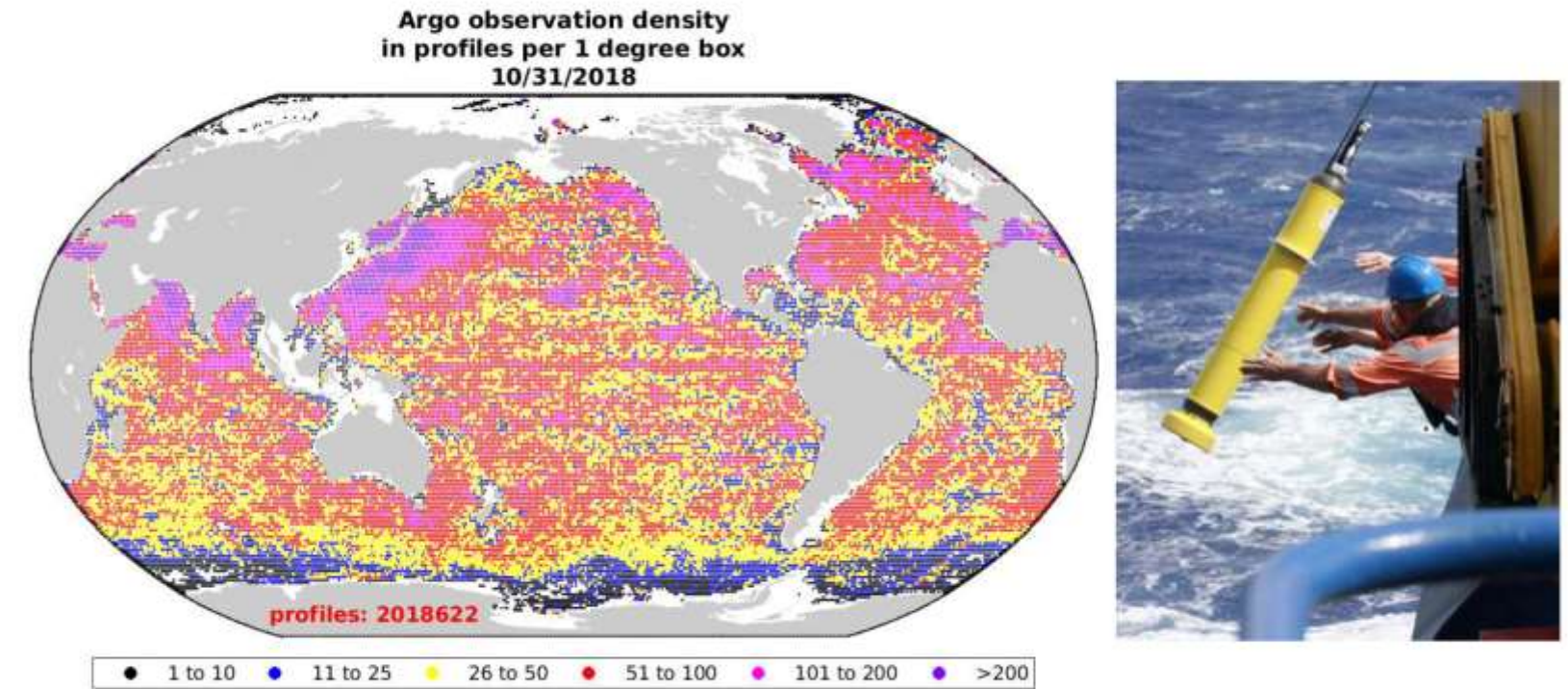


and gaps

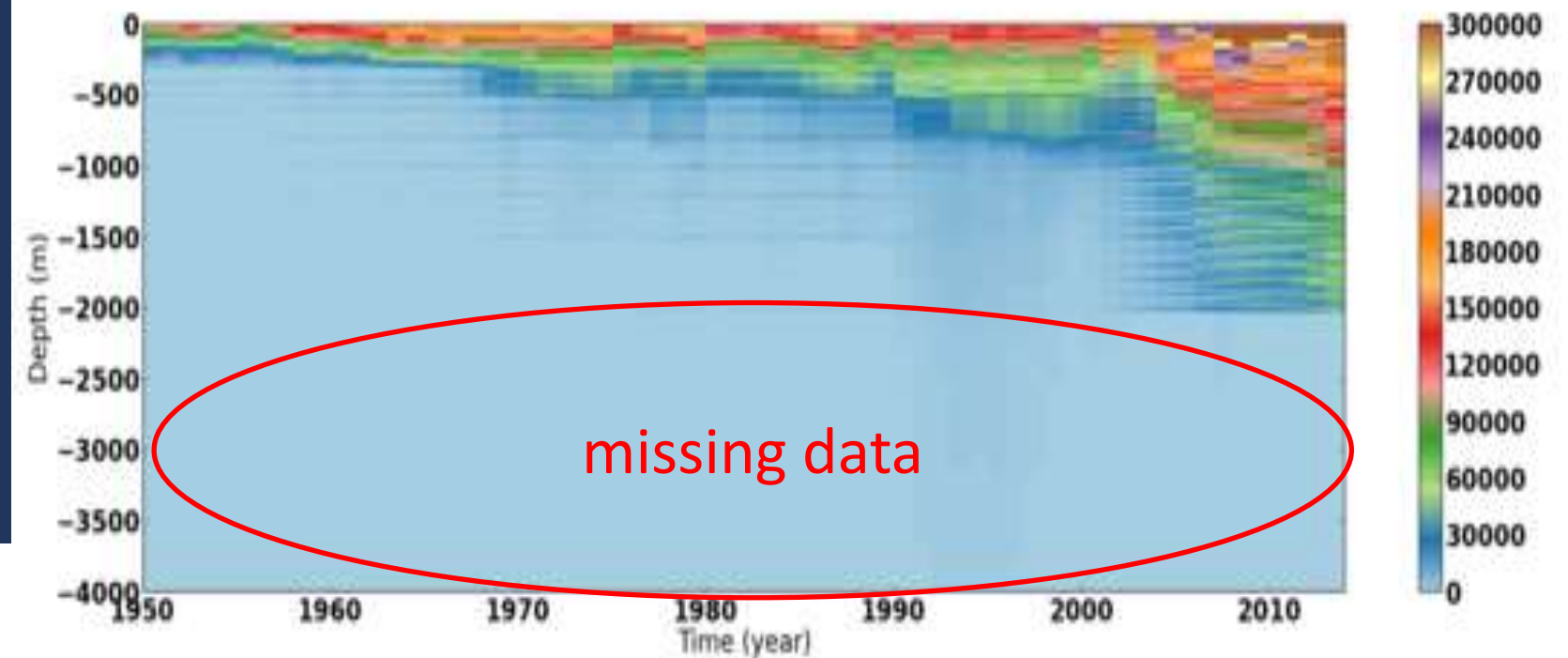


coastal data coverage (EMODnet)

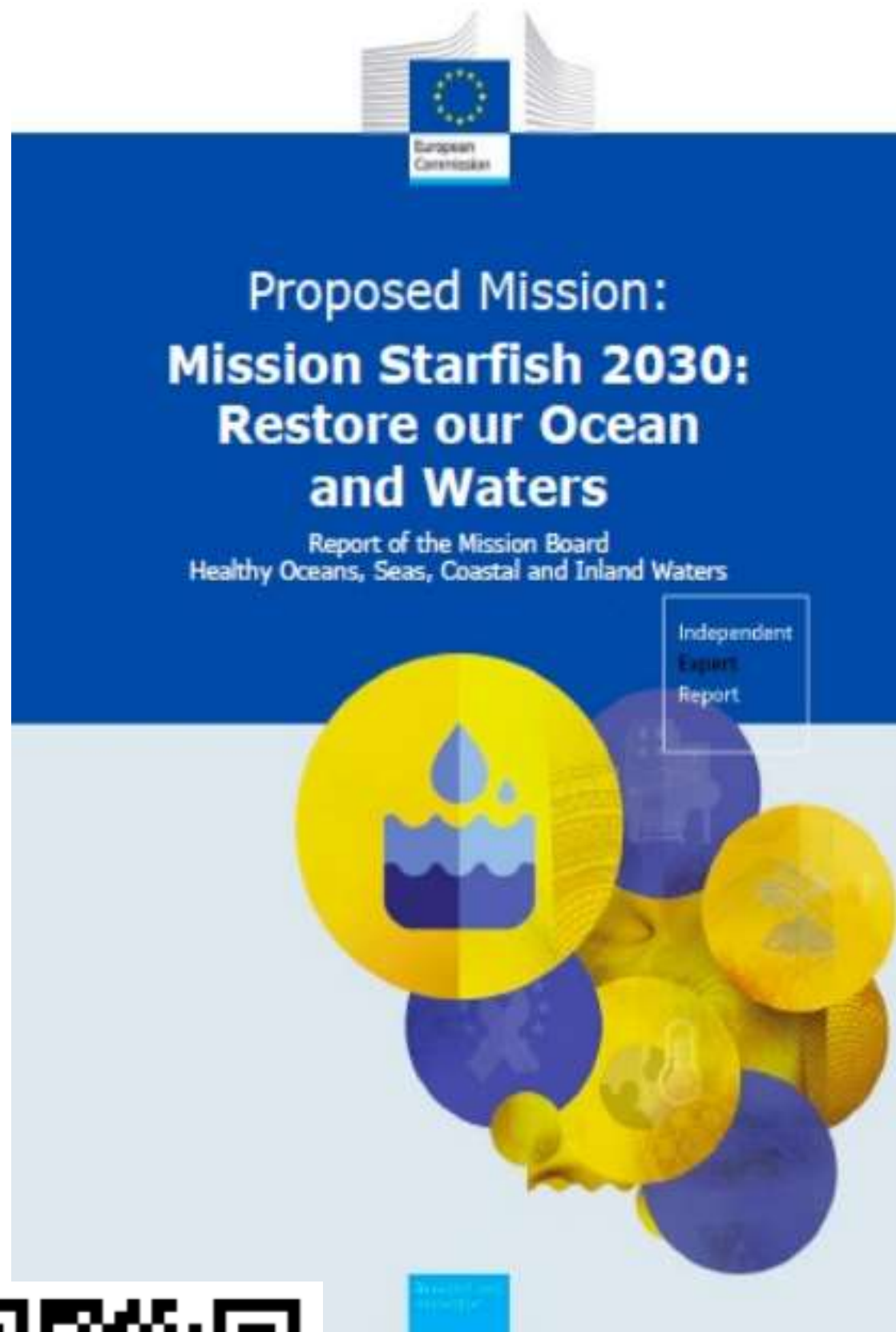
The Southern Ocean is (still) a huge hole in our observing network



Observations of top 2km of ocean by Argo floats since 2004 (>2 million)



Source: CORA: Coriolis Ocean database for ReAnalysis



EU requires 20% of the marine data to come from citizen science by 2025





What's popup first into you mind when you think of Citizen Science?

Wordcloud Poll 32 responses 22 participants



Citizen science

Noun [U]

/ˈsɪt.ɪ.zən ˌsaɪ.əns/ /ˈsɪt̩.ə.zən ˌsaɪ.əns/

i.e.: participatory science

Scientific work, for example collecting information, that is done by ordinary people without special qualifications, in order to help the work of scientists:

- has emerged as a powerful tool and popular activity to enthuse and actively involve citizens in environmental monitoring and restoration, collecting extensive data sets for scientific research, environmental awareness and policymaking
- an active proposal to the European Commission asks for 20% of marine data to come from citizen science by 2025

a growing community of interest

AtlantOS Ocean Hour

PANELISTS

- FERNANDO LIMA**
Marine Ecologist
BIOPOLIS
CCTBON- Temperature, biodiversity observation and citizen science.
- KATY CROFF BELL**
Founder and President
Ocean Discovery League
Deep Sea exploration with easy-to-use low-cost deep-sea camera and sensor system.
- COOPER VAN VRANKEN**
Founder and Director
Bering Data Collective
Temperature and salinity sensor in fishing gear. Results sent in real time to vessel.
- FREDRIK GUSTAVSSON**
Inventor and entrepreneur
Deepod
Temperature, depth, light sensors in paravanes and lures. Results directly in smartphone.

Moderators: Patrick Gorringe, Lucie Cocquempot, Mariana Rocha de Souza

DEMOCRATIZING OCEAN OBSERVATION THROUGH LOW-COST TECHNOLOGIES AND CITIZEN SCIENCE

January 30, 2023
11:00AM - 12:00PM

<https://us06web.zoom.us/j/84411242104>

AtlantOS Ocean Hour

Democratizing ocean observations through low-cost technologies

September 14, 2022
10:00 - 11:00 EST

Join us in a discussion about citizen science and the use of low cost and low-tech ocean observations. The speakers will share projects they are involved in, and address some of the current challenges expected in the coming years.

Register: <https://us06web.zoom.us/j/84411242104>

Moderators: Dr. Lucie Cocquempot and Dr. Mariana Rocha de Souza

MARINE BIODIVERSITY NETWORKING FRIDAY

Low-cost technology practices for ocean observation

April 14th, 2023, 1:00 - 2:30 PM UTC

OCG-14 WORKSHOP

JOIN US

LOW COST TECHNOLOGIES & DATA WORKSHOP

June 2nd, 2023 | 9:00 - 17:30 SAST
Cape Town, South Africa

Agenda

- 9:00 - 12:00 | An overview of Technologies and Opportunities
- 12:00 - 13:00 Lunch Break
- 13:00 - 14:30 | Poster session
- 14:30 - 17:30 | Opportunities for FAIR data practices

Poster or lightning talk **submission by March 31st**

Online participation
Register [here](#)

ORGANIZERS

- Patrick Gorringe
- Lucie Cocquempot
- Juliet Helm
- Kevin O'Brien
- Ann Zinkann

Speakers:

- Ann-Christine Zinkann**
NOAA
- Paul Holthus**
World Ocean Council - Smart Ocean
- Jim Manning**
Environmental Monitors on Lobster Traps
- Cooper Van Vranken**
Ocean Data Network
- Cassie Stymiest**
Educational Passages
- Neil Van Niekerk**
2DegreesC
- Kristin Burkholder**
Student Drifter Program, Stonehill College
- Andrew Thaler**
Oceanography for Everyone - OpenCTD
- Martin Hassellöv**
Sailing4Science

ETT & OCEAN RACE
Live from NEWPORT (Rhode Island)
18.05.2023
time: 14.00 EDT / 18.00 UTC
GENOVA PAVILLION
moderated by
Antonio Novellino (ETT)
Patrick Gorringe (SMHI)

Enabling tools for citizen science in ocean data collection

Coastal sentinels

Nearly 1800 sensors (●) now monitor temperatures at about 160 locations along more than 21,000 kilometers of Atlantic coastline. The Coupled Temperature and Biodiversity Observation Network, which is still expanding, is helping scientists understand how climate change and other factors are influencing the thermal environments of marine organisms in the highly dynamic intertidal zone.



Seascape: the state of our oceans

'It's ridiculously antiquated': could robot boats transform ocean science?

<https://www.theguardian.com/environment/2023/may/29/robot-boats-marine-science-wales-laverack-dowds-oshen>

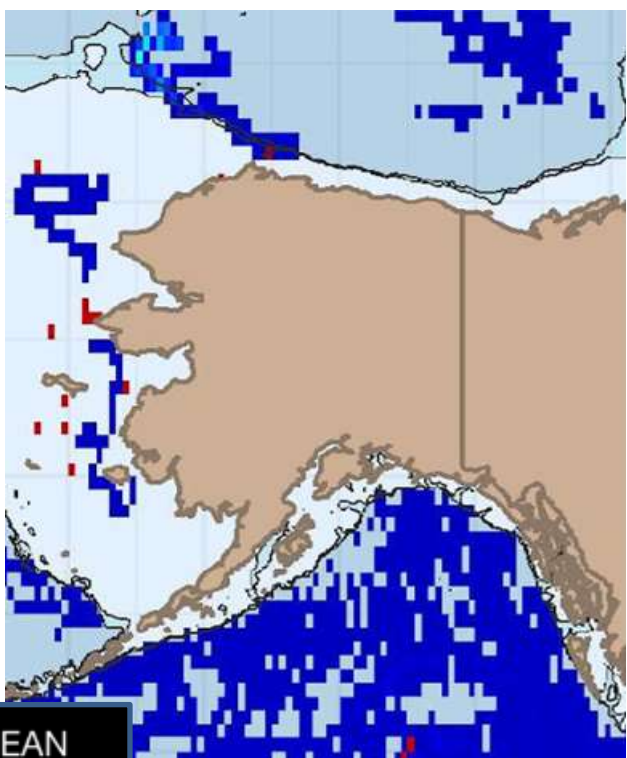
Deutsche Meeresstiftung
German Ocean Foundation

EMODnet
European Marine Observation and Data Network

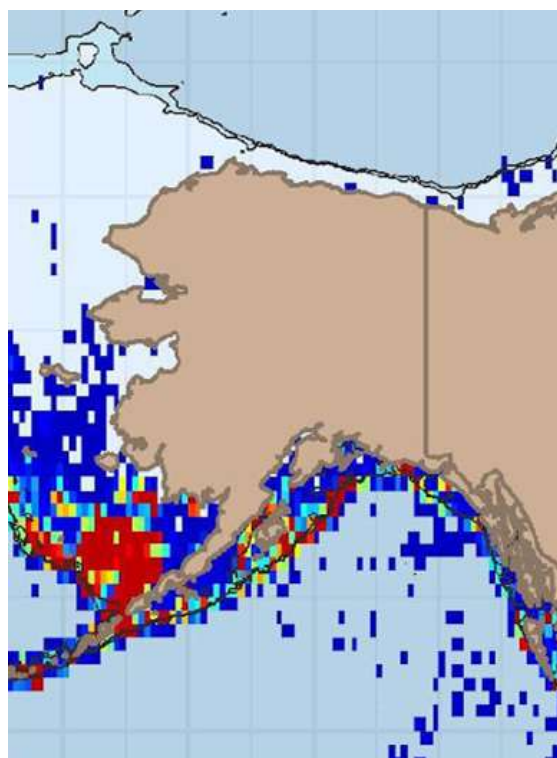
SSI
SCUBA SCHOOLS INTERNATIONAL

EMODnet | examples of Citizen Science projects

EXISTING SUBSURFACE DATA



FISHING ACTIVITY



SAILING ACTIVITY & OPPORTUNITY SHIP



SMART SENSORS & CITIZEN SCIENCE OPPORTUNITY

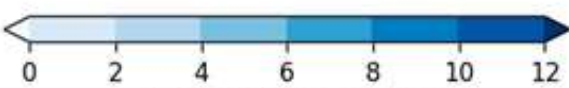
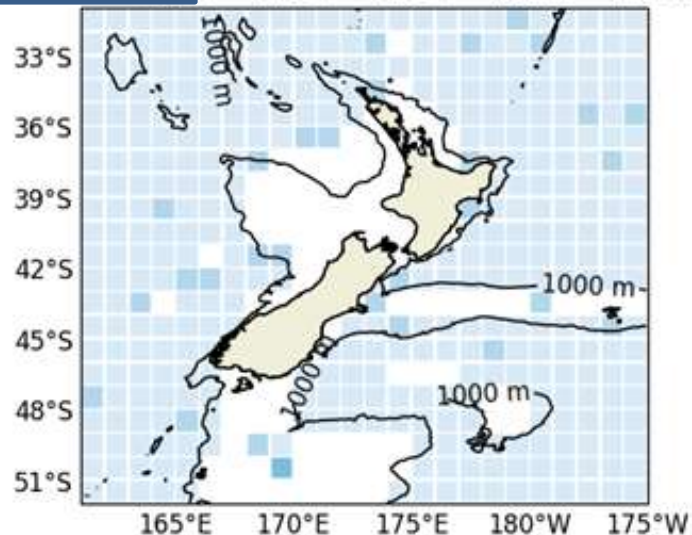
Edu. Passengers

OpenCTD

Student Drifter

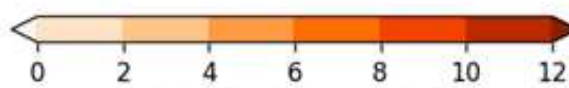
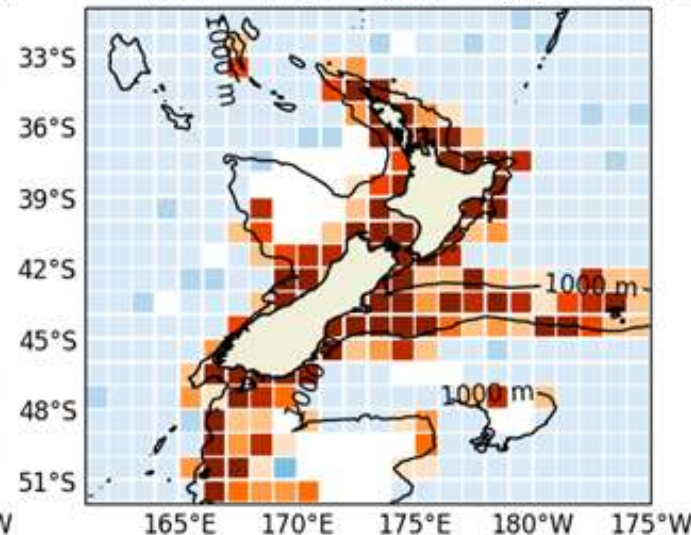


170°E 175°E 180°W 175°W



ARGO profiles

165°E 170°E 175°E 180°W 175°W



vessels using Moana probe system

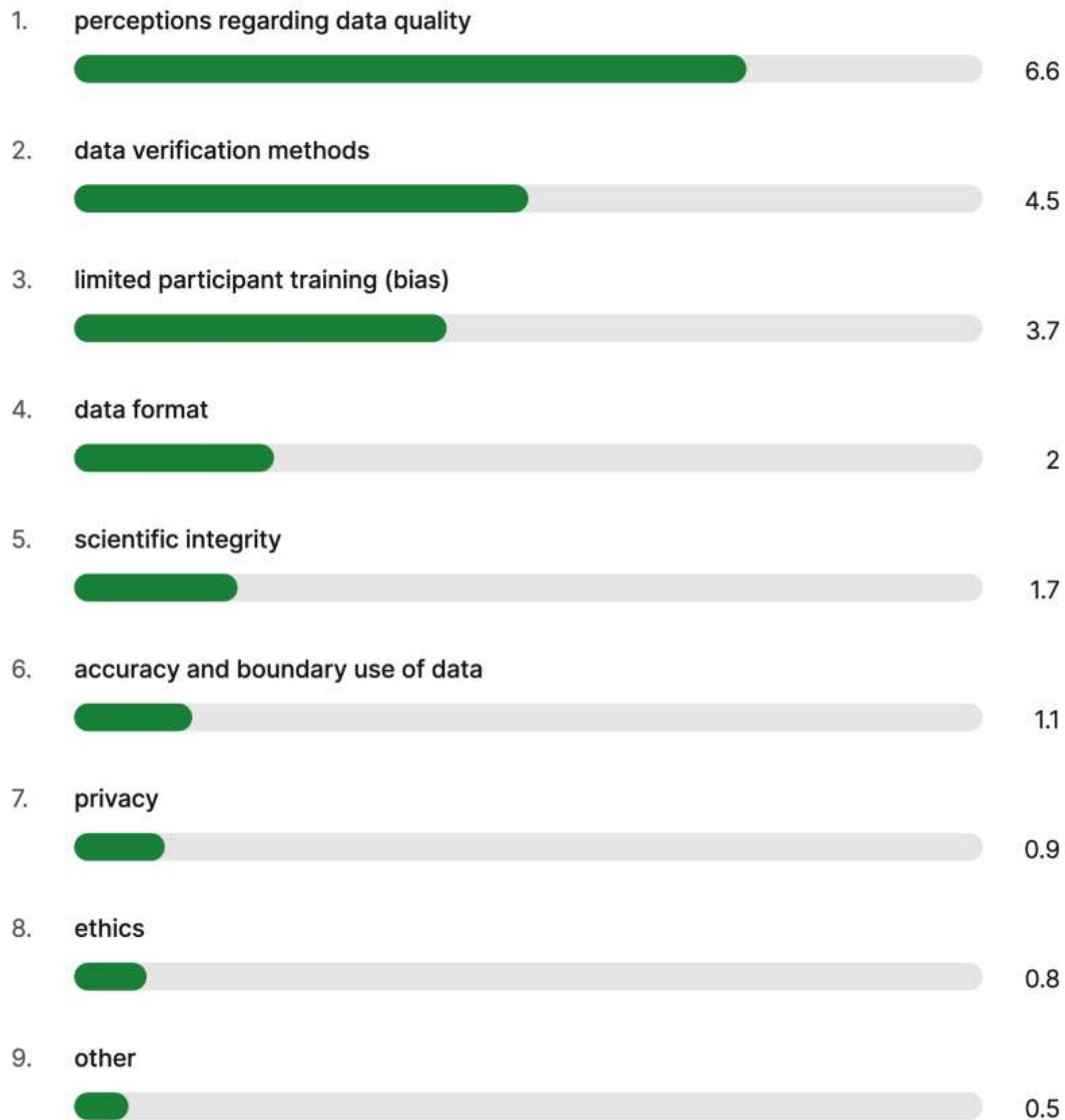


Sailing4Science 2022-2030



what is limiting the use of CS data?

Ranking Poll 29 votes 29 participants



An obstacle facing citizen science is **perceptions** regarding data quality despite several studies demonstrating that the data meets accepted **quality** standards (Cox et al. [2012](#); Forrester et al. [2015](#); Kosmala et al. [2016](#); Schläppy et al. [2017](#)).

These concerns often relate but are not limited to a lack of attention to project design and standardized data verification **methods**, limited participant training and sampling **biases** (Conrad and Hilchey [2011](#); Burgess et al. [2017](#))

The aim is **not necessarily to reach the highest precision** level with Citizen Science measurements, but to provide a **consistent data quality (accuracy)** and description of limitations that define the boundaries of use for applications

Dealing with CS data | legal concerns

When we speak about citizen science data collection we speak about data that are collected by citizens while performing other activities (e.g. outdoor, fishing, ...), projects that are involving communities to collect data cost effective sensors that may need a scientific validation/review different workflows and resolutions (pictures, annotations, cheap sensors ...)

Legal concerns may raise on:

privacy, security, quality, use... ethics

Research ethics is based on a clear distinction between a researcher and a research participant. Research ethics has as its main focus the protection of research participants from risks of harm, and charges the researcher with providing these protections.

The citizen science research can take a number of configurations, ranging from absolutely centralized to absolutely de-centralized, and the many degrees of de-centralization in between

Dealing with CS data | General Status and Next Steps

- most of the projects are dealing with census/presence, abundance, assessments, ...
- snap and share approach is an easy recruiter
- “zero-reporting” approach very well received
- sensor based approach still very limited
- SCUBA divers, fishers, sailors, students, biggest contributors for “marine” CS
- Need to understand the full **landscape** and needs
 - What low-cost sensors exist?
 - Developers?
- More **widespread acceptance** of cost-effective tech and data collected by Citizen Scientist
- Need for a **centralized marketplace website** to distribute information
 - Create a **website/database/directory** of low-cost tech, providers, & testbeds
- Need for a set of **best practices and standards** to be readily available
- **Move away** from the term “**cheap**” and “**low-cost**” as it conjures sense of low quality

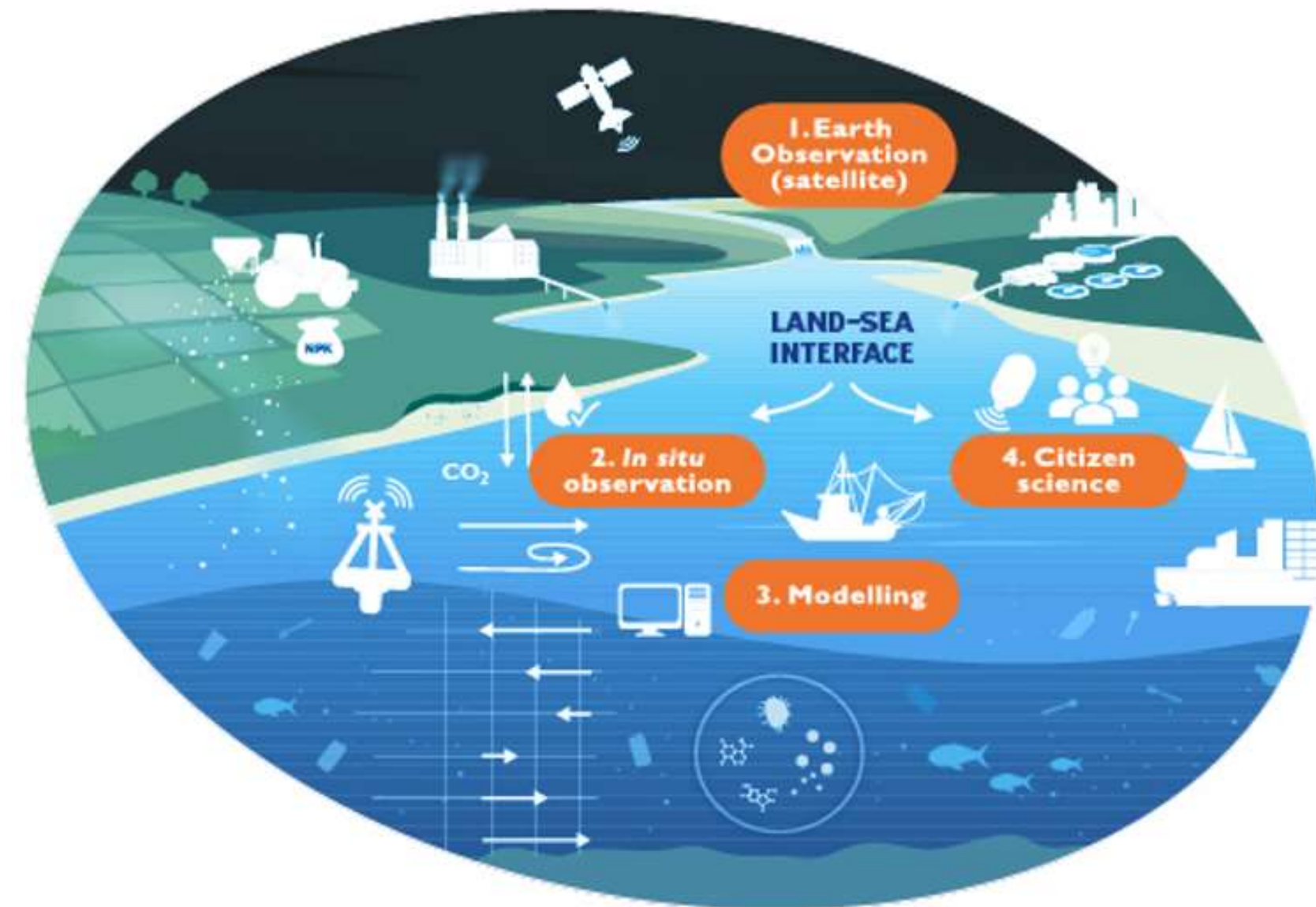


HORIZON-CL6-2023-GOVERNANCE-01-11: Reducing observation gaps in the land-sea interface area

LandSeaLot: Land-Sea interface: Let's observe together!

Aim:

- **better integration and collaboration** between communities working in the LSI: *in situ* observations and **citizen science** with **satellite observations** and **models**.
- to provide **technical solutions** to collect new in situ observations to **close coastal observation gaps**
- The technical solutions are composed of **low-cost/cost-efficient technologies** and/or **citizen science** activities to collect the data and expand the number of *in situ* observations
- make an **inventory** of sensors and sensor developers to create a “**market place**”
- observational data and integrated information products **FAIR** through **EMODnet**, **Copernicus** and **DTO**



Next steps:

- Provide a **focal point for coordination** and alignment of initiatives to identify synergies
- End-user engagement to inform co-design of cost-effective ocean observing solutions
 - **User/stakeholder engagement** is critical in design of systems
- Create **communication** between **users and providers**
- Network building
- Develop a **framework** to enhance and enable **data interoperability**.
 - development of standards
 - Support connections to existing data ingestion platforms e.g. EMODnet
 - Support FAIR access to data and link to the modelling community so that in-situ data can be readily used in models



Task Team 22-01: Coastal Observations in Under-Resourced Countries



Sailing4Science



2021-2030 United Nations Decade of Ocean Science for Sustainable Development

27-29 May 2024 



imdis

International conference on Marine Data and Information Systems

