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D5.4 Report and recommendations from International Workshop 2

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V6	28.11.2022	Final release	Valentina Tegas, Paolo Favali

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Executive Summary

EUROFLEETS+ deliverable D5.4 “Report and recommendations from International Workshop 2” collates the expectations and outcomes raised during the workshop entitled "2nd INTERNATIONAL STAKEHOLDER WORKSHOP - Synergies with the Atlantic Mapping program linking with AORA, EMODnet bathymetry and Belém statement".

This workshop was organized in virtual mode by the EUROFLEETS+ project, under the activities of WP5-Stakeholder engagement on September 26th, 2022 (3 hours, 2-5pm CEST).

The workshop aimed at promoting synergies with the Atlantic Mapping program linking with AORA, EMODnet bathymetry and Belém statement.

In particular, the workshop contributed to:

- strengthening synergies with Atlantic Mapping programmes and the research vessel community;
- best connect with Atlantic Programmes such as Mission Atlantic, EMODnet Bathymetry and other Benthic Mapping stakeholders, including industry;
- discuss how to facilitate access to bathymetric data (EMODnet) and support all scientific stakeholders towards a reliable access to an Open Science System (EOSC).

The event was structured over two sessions: the first session consisted of four presentations where the speakers presented the seafloor mapping activities and challenges in which they were involved, while the second session was mainly based on brainstorming exercises to explore better cooperation. The event was preceded by a short introductory presentation of the EUROFLEETS+ project and the expected outcomes of the workshop. At the end of the event the EUROFLEETS+ coordinator summed up the workshop outcomes and conclusions.

In the first session, the invited speakers represented the mapping community, at European and International levels; every speaker brought some specificities and underlined different aspects of seabed mapping activities.

In the second session, the participants had the opportunity to discuss through a creative thinking technique during a brainstorming exercise.

The workshop was announced through the EUROFLEETS+, EurOcean, and EMSO ERIC websites and distributed to all related networks, inviting and requesting registration via a dedicated Eventbrite page.

1. Workshop description

The "2nd INTERNATIONAL STAKEHOLDER WORKSHOP - Synergies with the Atlantic Mapping program linking with AORA, EMODnet bathymetry and Belém statement" was organized online on September 26th, 2022, and lasted 3 hours (2-5pm CEST).

Seas and oceans studies play a key role in developing national and regional economies and have great potential for innovation and growth. Blue Growth is the long-term strategy to support sustainable growth in the marine and maritime sectors as a whole.

Europe favours coordination and synergy in different areas of the Planet, hence a series of initiatives in the Atlantic, such as the mapping of the seabed of AORA, ATLANTOS, or the declaration of Belém to deepen knowledge and sustainable resources.

Within this context, this second workshop aimed at promoting synergies with the Atlantic Mapping program linking with AORA, EMODnet bathymetry and Belém statement.

In particular, the workshop contributed to:

- strengthening synergies with Atlantic Mapping programmes and the research vessel community;
- best connect with Atlantic Programmes such as Mission Atlantic, EMODnet Bathymetry and other Benthic Mapping stakeholders, including industry;
- discuss how to facilitate access to bathymetric data (EMODnet) and support all scientific stakeholders towards a reliable access to an Open Science System (EOSC).

The workshop brought together different stakeholders, together with industry (e.g., marine biotechnology, ocean energy, seabed mining) which have a high potential for sustainable jobs and growth.

Indeed, the participants had the opportunity to contribute to the future of seabed mapping and the European Union's Blue Growth strategy by sharing knowledge and understanding of the challenges and possible solutions with others in the field.

The organizers of the workshop were EMSO ERIC, Marine Institute (MI), Consiglio Nazionale delle Ricerche (CNR), Hellenic Centre for Marine Research (HCMR) and EuroOcean. The event was hosted on the Zoom Platform and a professional moderator/facilitator was engaged to manage the online event (Design, Hosting, Moderation).

TARGET AUDIENCE was identified in the following communities:

- Vessels operators;
- European seabed mapping community;
- Benthic mapping community;
- International seabed mapping community (bathymetry).

The detailed workshop agenda is included in Annex 6.1.

WORKSHOP STRUCTURE: The event was split into two sessions: the first session was structured into four presentations in order to allow speakers present the seafloor mapping activities and challenges in which they are engaged, while the second session was mainly based on brainstorming exercises.

In the first session, the four invited speakers were preceded by a short introduction to the EUROFLEETS+ project and the expected outcomes of the workshop.

The invited speakers represented the mapping community, at European and International levels; every speaker brought some specificities and underlined different aspects of the seabed mapping activities. In

particular, the first three speakers come from public initiatives, organized at National and International levels, while the fourth speaker represented industry, the private component of the mapping community.

At the end of the event the EUROFLEETS+ coordinator summarised the workshop outcomes and conclusions.

The invited speakers are listed below:

- Thomas Furey (INFOMAR/Mission Atlantic). He presented on the H2020 Project Mission Atlantic activities with a particular focus on the work being carried out in Work Package 4 Benthic Mapping: ecosystem resources and pressures.
- Stephen Hall (CMarSci FIMarEST). He spoke about the initiative Seabed 2030.
- Dick Schaap (EMODnet Bathymetry). He presented the EMODnet initiative and its activities
- Ruairhi Strachan (Green Rebel). He spoke about the experience under the EUROFLEETS+ Floating University activities and the benefits of having hands on training when looking for work in the private sector.

A *copy* of the available presentations is enclosed in Annex 6.2.

For the second session, the organizers planned a brainstorming exercise: three main questions had been identified and submitted to the audience, related to how to strengthen synergies with Atlantic Mapping programmes and the research vessel community, how to connect with Atlantic Programmes such as Mission Atlantic, EMODnet Bathymetry and other benthic mapping stakeholders, including industry, and how to facilitate access to bathymetric data (EMODnet) and support all scientific stakeholders towards a reliable access to an Open Science System (EOSC).

A creative thinking technique, called the Disney method, was used to stimulate the discussion. It has been, like many methods around creativity, attributed to someone famous. The participants, split up into three groups, were invited to look at the questions from different perspectives. And at each turn or at each instance to look at it with a new perspective, and to come up with some ideas, and some possible solutions, as it follows:

- **The Spectator**: In this round, participants looked at facts and data, as if they were an external party. The goal was to describe and analyze the issue.
- **The Dreamer:** In this round, participants asked themselves: What IF? Without prejudging the quality or feasibility of the ideas, they brainstormed some solutions with their teammates.
- **The Realiser:** At this stage, participants were asked to select the best ideas, and identify any follow-up actions and dependencies.
- **The Critic**: In this final stage, participants were asked to discuss the critical points, risks and dangers of their plans.

The workshop was very successful with 52 registered participants. The percentages of the stakeholder categories involved in the workshop are shown in Figure 1.

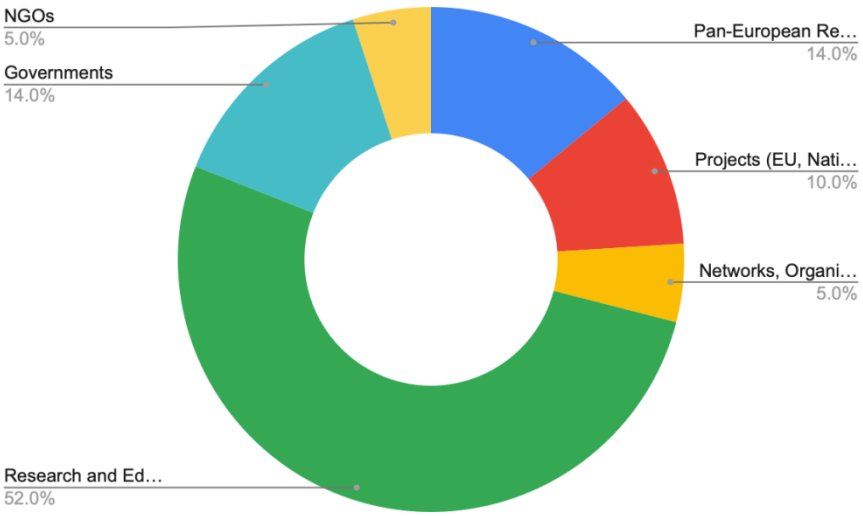


Figure 1. Stakeholder categories involved in the workshop and their percentages

2. Main outcomes from the workshop

The event generated several different outcomes, which were related to the three main questions:

1. How to strengthen synergies with Atlantic Mapping programmes and the research vessel community?
2. How to connect with Atlantic Programmes such as Mission Atlantic, EMODnet Bathymetry and other benthic mapping stakeholders, including industry?
3. How to facilitate access to bathymetric data (EMODnet) and support all scientific stakeholders towards a reliable access to an Open Science System (EOSC)?

1. How to strengthen synergies with Atlantic Mapping programmes and the research vessel community?

- **Facts:**
  - early stage shared cruise planning
  - shared Information on gaps & priorities
  - access to standard operating guidelines
  - routine acquisition of multibeam data
  - access to mapping infrastructure/kit
  - shared staff resources to map.
- **Ideas:**
  - autonomous mapping
  - multiple autonomous vehicles for bottom mapping
  - high-performance ICT infrastructure for onboard processing
  - vast reduction in data delivery/sharing post acquisition
  - seamless automated land to sea data integration
  - multiple vessel shared planning/operations
  - demonstrate cost reduction in operations and processing
  - use of cloud computing to accelerate date processing
  - strengthen synergies between programmes/projects
  - Atlantic data portal/viewer (e.g., for single point access to data/plans).

- **How we could make this happen:**
  - shared vessel planning (e.g., POGO/EUROFLEETS)
  - survey prioritisation
  - GIS metadata with project applications (where/when/research type)
  - sketch style information capture
  - resource sharing and/or equip all vessels with mapping equipment
  - training & capacity build program for operations/technical support
  - funding for people/equipment mobilisation & support - plans presented in Atlantic Atlas.

- **Critical points:**
  - problem with getting access to plans in a way that they can be synthesised
  - funding challenge for equipment purchase/mobilisation/sharing
  - data management challenge underestimated - data sharing
  - water-column data ancillary products - exponentially larger and therefore sometimes not logged
  - lack of common format of data to facilitate automation of data archiving and serving
  - sensitivity of research plan sharing.

2. ***How to connect with Atlantic Programmes such as Mission Atlantic, EMODnet Bathymetry and other Benthic Mapping stakeholders, including industry?***

- **Facts:**
  - partners are partners already in other initiatives and projects (e.g., EMODnet)
  - EARS System developed by EUROFLEETS projects
  - attending project meetings as observers for being partners in programs
  - many PIs in EF+ are often partners/beneficiaries of these programs
  - no organised form of communications
  - linking biological and physical data
  - *ad hoc* bilateral connections
  - lack of connection between stakeholders even in same geographic location
  - industry only connected when you are procuring equipment apart from occasional cases
  - data repositories: International, national and private
  - countries with exiting mapping programs have better connections.

- **Ideas:**
  - INFOMAR model best to realise this dream
  - dedicated cruise shiptime for this purpose (mapping) (e.g., the Irish model)
  - EUROFLEETS-RI as a RESEACRH VESSEL shiptime broker
  - provide nations with standards and formats (e.g., minimum resolution, quality indexes) for being able to provide links from national to the international repos (such as GEBCO, EMODnet)
  - little diplomatic clearance issues for acquisition
  - allow data collection in all the nations
  - backing of international agencies (e.g., UN to allow global data acquisition also EU/US to pitch in)
  - autonomous low energy vessels to allow carbon free cruises.

- **How we could make this happen:**
  - budget funding on a national level for dedicated mapping cruises

- European funding for EUROFLEETS-RI to allow large-scale international mapping cruises on a variety of vessels
- EUROFLEETS-RI has a mission/goal to facilitate large-scale acquisition of seabed mapping inside/outside EEZ
- need a large "Mission call" to address this issue
- EUROFLEETS-RI can contribute as an information and opportunities' platform
- link between European and national funding, EUROFLEETS+ can link between the two
- need a coordinated system to collect data across the fleet, EUROFLEETS+ can play this role of coordination
- connection between hydrographic offices and International agencies to coordinate the fleet to address the challenge on a global basis
- dedicated and sufficient budget
- southern hemisphere winter cruises
- need to use spare shiptime capacity to achieve goals reducing the operation costs.

➢ **Critical points:**

- needs to be made a European and global priority. Institutions need to embrace the mission as resources are scarce
- nations need to embrace the mission as a priority, Research Vessel operators are only service providers so science needs to embrace and set the mandate
- need concrete agreements and actions, backed up by resources
- work with National funding agencies and EC on Priorities and Societal challenges.

3. ***How to facilitate access to bathymetric data (EMODnet) and support all scientific stakeholders towards a reliable access to an Open Science System (EOSC)?***

➢ **Facts:**

- new researchers find it difficult to know where to look for data
- different (meta)data standards
- sustainability
- curation of data
- struggle with the types of data

➢ **Ideas:**

- central portal to access all data: DTO
- better collaboration with industry for the public benefits
- data sharing as a condition of licensing
- map showing all areas mapped including sets not openly available
- provision of low-resolution data sets held by navy and governmental security departments
- agreed metadata terms and reference across industries, i.e. Oil&Gas/offshore wind
- sustained funding at European and National level.

➢ **How we could make this happen:**

- central hub for data and map showing all areas mapped
- propose to policy makers data provision as a condition of licensing
- clarification around metadata expectations for industry
- open discussions with industry about more open sharing of data.

➢ **Critical points:**

- funding for maintaining the curation of data

- what is the benefit to the industry to share data?
- Is there an engagement plan in place to change this?
- National security risk for sharing of sensitive datasets
- who will oversee the agreed metadata ToR?
- possible role for decade collaborative centres as part of Ocean Decade?

3. Workshop assessment: Expectations Vs. Takeaways

During the workshop, the organizers submitted some polls to the participants.
Two important questions were developed to collect the audience's expectations and takeaways.
The first question was related to the participant's expectations for the workshop; the replies can be connected to three main needs:

- Knowledge sharing
- Training activities
- Cooperation enhancing.

While the other question was mainly connected with the takeaways from the workshop. The event highlighted that coordination between vessels and the mapping community could be reached through the promotion of a solid cooperative structure duly endorsed at the government level and properly funded.
The Table 1 lists the expectations vs. takeaways arisen during the workshop-

Table 1. Expectations vs. Takeaways highlighted during the workshop

EXPECTATIONS	TAKEAWAYS
Easy accessibility to (meta-)data (get access to data without struggle)	One hand of getting more bathymetric data is acquiring the multibeam echosounders data itself (which is already challenging). However, the aspect of mass data management on land need also be addressed. This aspect was mentioned several times during the workshop, however needs to be pointed out more directly
Inform about ongoing activity to implement tools to improve development of collaborations and synergies among the ship operators and the global community involved in ocean observation	What can EUROFLEETS do for getting more quality bathymetry data in circulation optimising use of platforms?
To know the main necessities concerning bathymetry campaigns of the major part of the European seas.	The issue of mapping the ocean, in particular International waters, is well understood and the resources and means necessary to get it done is also well understood. The remaining issue is how to organise the work in a cost efficient manner!
To have a stable connection between Research Vessel operators and the seabed community. Having a an organisation for the Research Vessels is a key issue	Knowing the obstacles
To get a better understanding of Atlantic Data gaps and needs	It has been very useful and this workshop make you to know similar problems arisen all Research Vessels, wherever they work at any scale
Information sharing between operators, especially about transit bathymetry	Operational systematic mapping needs to be directly resourced to underpin focused research thereafter

Learn more about EUROFLEETS+ and explore ways of future collaboration	Happy to get the recording so I can share it with Finnish bathymetry experts
Better understanding of the need of Research Vessels support for different stakeholders to better serve them as a distributed infrastructure (EUROFLEETS-RI)	The need of sharing info, having an entry point to establish the links from different communities maintaining them over the time
That bathymetric survey data sets will be shared through EMODnet bathymetry for enriching the EMODnet Digital Terrain Model (DTM) and promoting wider data exchange in a structured way	Better understanding of what the seabed mapping community needs from Research Vessels
Provision of training opportunities	Need solid coordination between vessels and mapping agencies with solid funding
Highlight some challenges and opportunities in leveraging fleet infrastructure to support systematic Atlantic mapping	Need to dialogue with National Funding Agency and EU Offices to identity common priorities and challenges
Enhance collaboration between Research Vessels and other Observing Platforms	
Share request for data to be made available to Seabed 2030/GEBCO	
Share ideas how to better track Research Vessel activities from early planning stage to data publication	
A better understanding to how we as Research Vessel operators can support the Atlantic mapping programs	

4. Next Steps

As a step forward, EUROFLEETS+ consortium is promoting a discussion among the stakeholders through the EUROFLEETS+ web-based discussion forum (https://www.eurofleets.eu/forums/forum/stakeholder-forum/) on the project website in order to enable interested parties to interact with project participants. This aims at gathering all relevant stakeholders and Research Vessel operators in one virtual place, taking advantage of other stakeholder engagement activities, as the previous interview process and the 1st International workshop; the suggestions and outcomes coming from these two workshops will be therefore promoted in the discussion forum.

On the other hand, all European collectors of bathymetry survey data sets are strongly recommended to share their data sets including metadata by populating the CDI Data Discovery & Access service of EMODnet Bathymetry as this will facilitate to update and optimize the EMODnet DTM further, while being acknowledged as data providers and originators.

Moreover, since the consortium is planning to release a *Strategic agenda for future stakeholder engagement* (D5.6), the suggestions and outcomes from the 2nd workshop will be considered for the content of that document.

5. Conclusion

The main and common outcomes can be summarized as follows:

- **Shared vessel planning:**

The problem with that is getting access to the information in the first instance. At the moment indeed, each Country has its own different ship time application process. Moreover, on a larger scale, we know there have been big attempts at trying to look at prioritization of the areas: the mechanism in terms of determining which areas in the Atlantic should be mapped first is still a kind of a smaller level.

- **Central portal:**

The idea of having a central portal to access all of the data that currently exists, although that might be possible, it might be quite difficult to realize considering the limitations of the industry players. Agreements on data provision, metadata definition, terms of reference, licensing, funding at the European and national levels are needed to enhance the current status.

- **Common standards:**

Moreover, there is another need - at that very basic level -to ensure that there are common standards, so that it can facilitate access to systems and support all scientific stakeholders getting their access to an open science system that was repeated again, in that next box, the struggling with the different kinds of data that exist, the need for sustainability and issues around the curation of data.

- **Governmental engagement:**

It would be desirable to get involved more policymakers, like the EU, and the United Nations, those types of entities that must get the countries to be willing to set aside money on one side and spare vessel capacity on the order to actually get this type of work done.

Research vessels can do bathymetric data collection and a huge number of other tasks; bathymetric data are indeed only one small part of the capability of a proper research vessel. To coordinate this bathymetric activity at the level of research vessels operators it is needed a **EUROFLEETS research infrastructure agency legal entity in place** with a common meeting place, marketplace, and coordination unit for the vessel operators on the one side, and the users of the vessels, including those looking for bathymetric data on the other side.

6. Annexes

6.1 Agenda of the workshop

Eurofleets+ 2nd International Workshop

Mon, 26 September 2022, 14:00 – 17:00 CEST

Connecting with Atlantic programmes active in the bathymetry and research vessel communities

Event objectives:

- Strengthen synergies with Atlantic Mapping programmes and the research vessel community
- Connect with Atlantic Programmes such as Mission Atlantic, EMODnet Bathymetry and other Benthic Mapping stakeholders, including industry.
- Facilitate access to bathymetric data (EMODNET) and support all scientific stakeholders towards a reliable access to an Open Science System (EOSC).
- Define the challenges that could be better addressed with an interdisciplinary and integrated approach.
- Map user needs of the seabed mapping community from Research Vessels and specifically from Eurofleets+ and future Eurofleets Research Infrastructure

14:00	Welcome and opening words - Niamh Flavin
14:20	Presentations from: Thomas Furey (INFOMAR / Mission Atlantic), Stephen Hall (CMarSci FIMarEST), Dick Schaap (EMODnet Bathymetry) , and Ruairhi Strachan (Green Rebel)
14:55	Brainstorming exercise: Solving the key remaining questions to strengthen the connection with Atlantic programmes active in the bathymetry and research vessel communities.
16:15	Presenting and discussing the proposals
16:45	Closing - Aodhan Fitzgerald

6.2 Presentations

Eurofleets+
An alliance of European marine research infrastructure to meet the evolving needs of the research and industrial communities

Eurofleets+ 2nd Stakeholder Engagement Workshop

Monday 26th of September, 2022

Foras na Mara
Marine Institute

This project has received funding from the EU H2020 research and innovation programme under Grant Agreement No 824077

Eurofleets+

- 42 Partners
- Budget of 9.9m €
- Access to:
- 27 Research Vessels,
- 7 ROV's &
- 5 AUV's

19.RV G.O. Sars
2.RV Magnus Heinason Replacement
5.RV Skagerak
3.RV Aranda
15.RV Arni Freidrickson
14.RV Sanna
4.RV Simon Stevin
1.Celtic Explorer
16.RV Dana
23.RV Alkor
17.RV Thalassa
21.RV Pelagia
12.RV Ramon Margalef
7.RV Belgica
11.RV Mare Nigrum
10.RV Tubitak Marmara
26.RV Coriolis II
20.RV Sarmiento de Gamboa
6.RV Aegaeo
8.RV Mar Portugal
18.RV L'Europe
9.RV Laura Bassi
27.RV Atlantic Explorer
25.RV Socib
22.RV Alliance
24.RV Tangora

Areas of Operation:
North Sea, Black Sea, North Atlantic, Mediterranean Sea, Baltic Sea, Pacific Southern Ocean and Ross Sea

Call: Integrating and opening existing national and regional research infrastructures of European **interest (INFRAIA Call H2020 2018)**
Topic: Integrating Activities for Advanced Communities

Eurofleets Project Evolution 2009 to 2023

- FP7
- 19 Research Vessels
  - 5 Ocean Vessels
  - 14 Regional Vessels
- 24 Partners
- Funding of €7.2 m

Eurofleets
2009-2013

- FP7
- 22 Research Vessels
  - 8 Ocean Vessels
  - 14 Regional Vessels
- 31 Partners
- Funding of €9m

Eurofleets2
2013-2017

- H2020
- **27 research vessels** (
  - 13 Global/Ocean and
  - 14 Regional),
- **7 ROVs & 5 AUVs**
- 42 Partners
- Funding of €9.9 m

Eurofleets+
2019-2023

- Develop Eurofleets as a Legal Entity
- Established full time central coordination office
- Horizon Europe

Eurofleets RI
2023…

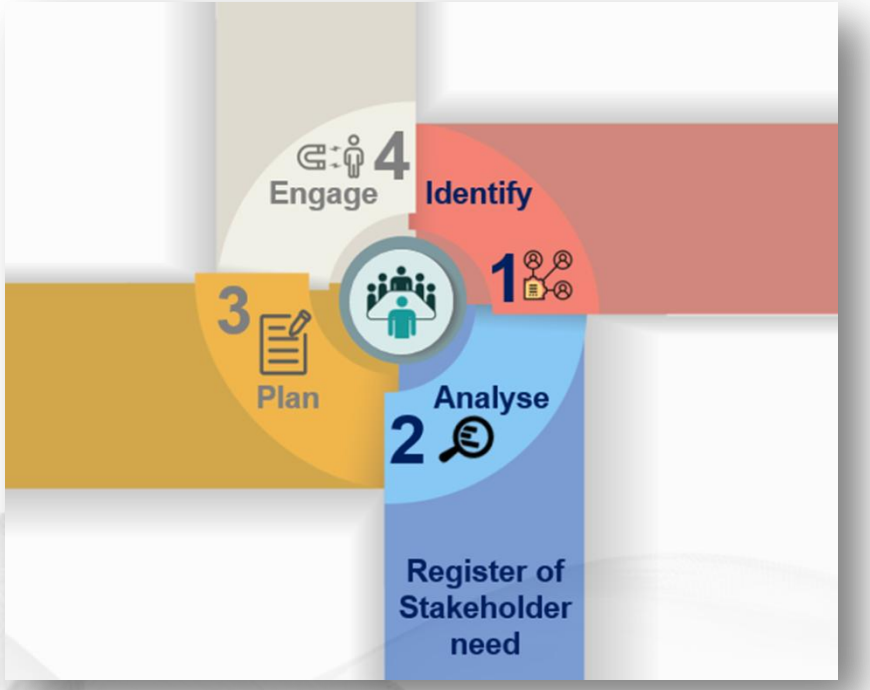
Eurofleets+


Eurofleets+ Mission
Facilitate access to unique marine infrastructure, enable excellent research, increase ocean literacy, and provide a clear road map for the continued integration and advancement of the European research fleet.

Eurofleets+ Goals and Objectives

- **Networking Activities**
  - Provide comprehensive training and exchange programmes for user communities and professional staff, increase ocean literacy, inspire emerging researchers, and attract women to science through targeted educational activities.
  - Establish dialogue with stakeholders from key user communities to inform and integrate the development, operation and strategic direction of the European research fleet.
  - Develop a strategic roadmap and long-term sustainability plan for advanced and user-oriented transnational access.
  - Increase the likelihood of new innovative products, processes or services, important for the optimisation of the European research fleet and for future user needs, through close collaboration with industry.
- **Joint Research Activities**
  - Develop tools and equipment to meet the evolving challenges of marine research, especially for deep ocean research and exploration, data management, and virtual access.
- **Transnational Access**
  - Provide efficient, single-point, transnational access to an impressive fleet of research vessels and specialised infrastructure for European and international research communities.

Stakeholder Engagement



General Objective

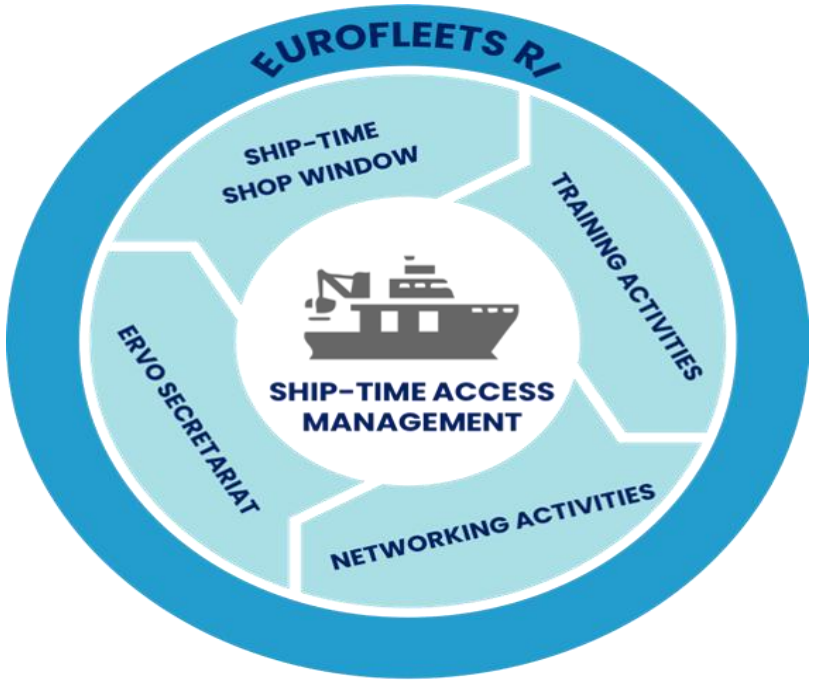
- The aim is to involve **relevant stakeholders** to coordinate efforts and efficiency for **the combined use of different technologies for marine research.** This will involve stakeholders activities and events in from ocean observing systems, research and mapping communities, academia and industry, non-governmental organizations, international organizations, legislators and regulators, policy makers, standards bodies, key marine users, and the general public.

- The ultimate goal is to assess the **dynamic needs and perspectives of stakeholders and user** communities to ensure that the **relevant marine research infrastructures** are coordinated, designed and operated optimally for user's challenging requirements.

EUROFLEETS RI: Goals

- **EUROFLEETS RI** aims at uniting world-class RVs and associated equipment among European partners **to facilitate access to unique marine infrastructure for a wide user community**, **enabling excellent research**, **increased cooperation** in technical development and **sharing of knowledge in RV operations & management**.
- **EUROFLEETS RI** will play a **central role in delivering the European Union Missions by the provision of access to our Seas and Oceans through facilitation of multidisciplinary science teams** tackling changing climate, supporting bio medical research, ocean monitoring, sustainable fisheries and advancing the European Green Deal
- Collaboration in **EUROFLEETS RI** will help **to optimise integration, develop a European approach to address common challenges** through the provision of **single point transnational access to our Seas and Oceans**.

Foto: Julius Nielsen



Networking Activities

Training Activities

ERVO Secretariat

EUROFLEETS RI: long-term sustainability plan for advanced and user-oriented transnational access.

Ship-time access management (SEA, Co-PI and Remote Access Programs)

- On behalf of the EC, to provide researchers with TA to RVs and Large EXchangeable Instruments (LEXIs) not available in their home countries or not supported by national funding already available to the researcher, and to continuously improve the Eurofleets TA proposal-submission system.

Ship-time "shop window"

- To maintain a dedicated "information and opportunity platform":
  - Providing easy access to up-to-date information on the European RV Fleet and LEXIs,
  - Function as a "market-place" for those offering access to RVs and/or LEXIs, and those looking for charter, barter or in-kind contribution to research projects, monitoring activities, logistical functions etc.,
  - Advertising education and training opportunities,
  - Developing new interactive tools to support collaborative activities,
  - Implementing new facilities based on gaps identified,
  - Providing a transparent cost/pricing system for EF+ vessels compatible with EC infrastructure costing rules.

IMPORTANCE OF SEABED MAPPING

1 EXPLORATION Discovery/Knowledge/Understanding

2 PROTECTION Preservation/Conservation/Monitoring

3 RESOURCES Harvesting/Sustainable Exploitation

4 GOVERNANCE Legislation/Rights/Management

Image Credit

An Roinn Comhshaoil, Aeráide agus Cumarsáide
Department of the Environment, Climate and Communications
INFOMAR
Geological Survey
Suirbhéireacht Gheolaíochta
Ireland | Éireann
Foras na Mara
Marine Institute

EXPECTED OUTCOMES OF THE WORKSHOP

Help us shape what research vessels can do for your community, by contributing to an interactive 3-hour online workshop in which we will be exploring questions such as:

- How can we strengthen synergies with Atlantic Mapping programmes and the research vessel community?
- How can we best connect with Atlantic Programmes such as Mission Atlantic, EMODnet Bathymetry and other Benthic Mapping stakeholders, including industry?
- How could we facilitate access to bathymetric data (EMODNET) and support all scientific stakeholders towards a reliable access to an Open Science System (EOSC)?
- The workshop will bring together different stakeholders together with industry (marine biotechnology, ocean energy, seabed mining, etc.) that have a high potential for sustainable jobs and growth.

Image Credit

An Roinn Comhshaoil, Aeráide agus Cumarsáide
Department of the Environment, Climate and Communications
INFOMAR
Geological Survey
Suirbhéireacht Gheolaíochta
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Foras na Mara
Marine Institute

Thank You

Eurofleets+

An alliance of European marine research infrastructure to meet the evolving needs of the research and industrial communities

“A Mission Atlantic framework for All Atlantic Bathymetry and Benthic Habitat Mapping”

EUROFLEETS+ 2nd International Workshop

Sept 26th 2022

Thomas.Furey@marine.ie

Marine Institute INFOMAR Joint Programme Manager

Mission Atlantic WP 4 Co-Lead - Benthic Mapping: ecosystem, resources & pressure

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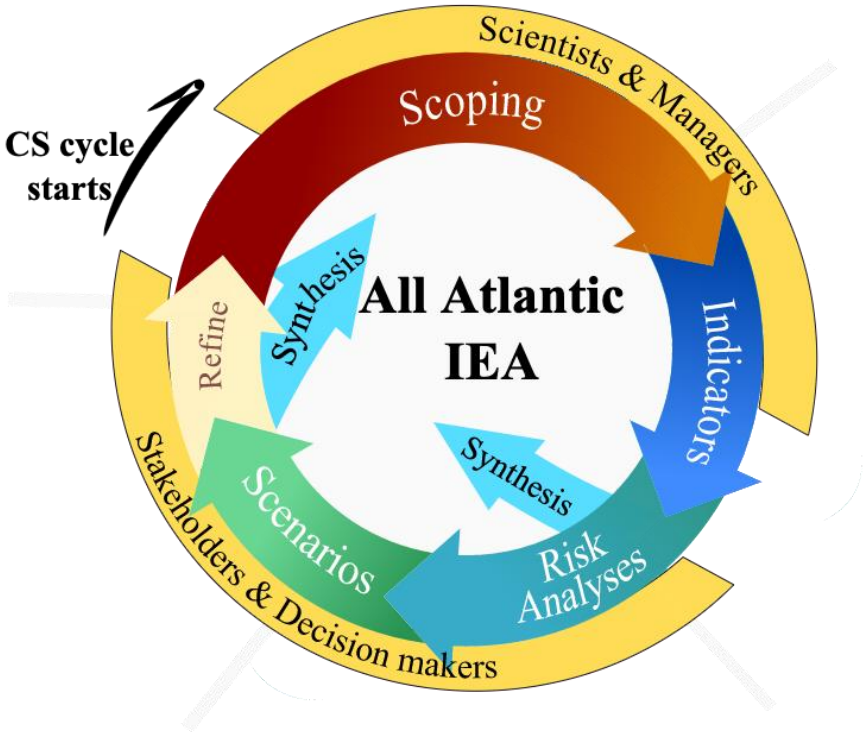
ALL ATLANTIC INTEGRATED ECOSYSTEM ASSESSMENT (IEA)

1. **Scoping:** management objectives, human activities, & ecosystem components affected
2. **Indicators:** assess status, drivers and resilience of ecosystems, & tipping points.
3. **Risk Analyses:** assess vulnerabilities to impacts and changes.
4. **Scenario testing:** Ecosystem modelling to simulate state and dynamics.
5. **Refine:** Evaluate management options for achieving desired outcomes

MISSION ATLANTIC

- Mission Atlantic 2020 - 2025
- 11.5 M€ budget
- 34 Partners
- 38 deliverables and 43 milestones



WP4: Benthic Mapping: ecosystem, resources and pressures

Objectives:

- **Bathymetry and benthic mapping framework**
- Characterise **seafloor and benthic communities**
- ID Environmental **drivers** and anthropogenic **pressures**
- Assess **impact on distribution** of benthic communities & VMEs
- **Model their distribution (present & future** environmental regimes

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 862428 (MISSION ATLANTIC). This output reflects only the author's view and the Research Executive Agency (REA) cannot be held responsible for any use that may be made of the information contained therein.

MISSION ATLANTIC

D4.1 - Framework for future Atlantic cooperation on seafloor mapping efforts & prioritisation of seabed targets for IEA (https://missionatlantic.eu/results/ - soon!)

- improve alignment of seabed **bathymetry and benthic habitat mapping networks**
- encourage, support and accelerate wider and more **systematic Atlantic Mapping** activity
- increase **information sharing** on key initiatives, infrastructure, and **plans**
- facilitate **technology** development and deployment through **future surveys**
- seek to capture, communicate, and address **data and research gaps**
- evolve common approaches, language, and **methodologies**
- leverage **ICT** capabilities in **data analytics and processing** to support future mapping
- continue Atlantic Ocean seabed mapping **data collation and gathering**, through partnership
- **guide seabed mapping effort** to have maximum impact for society

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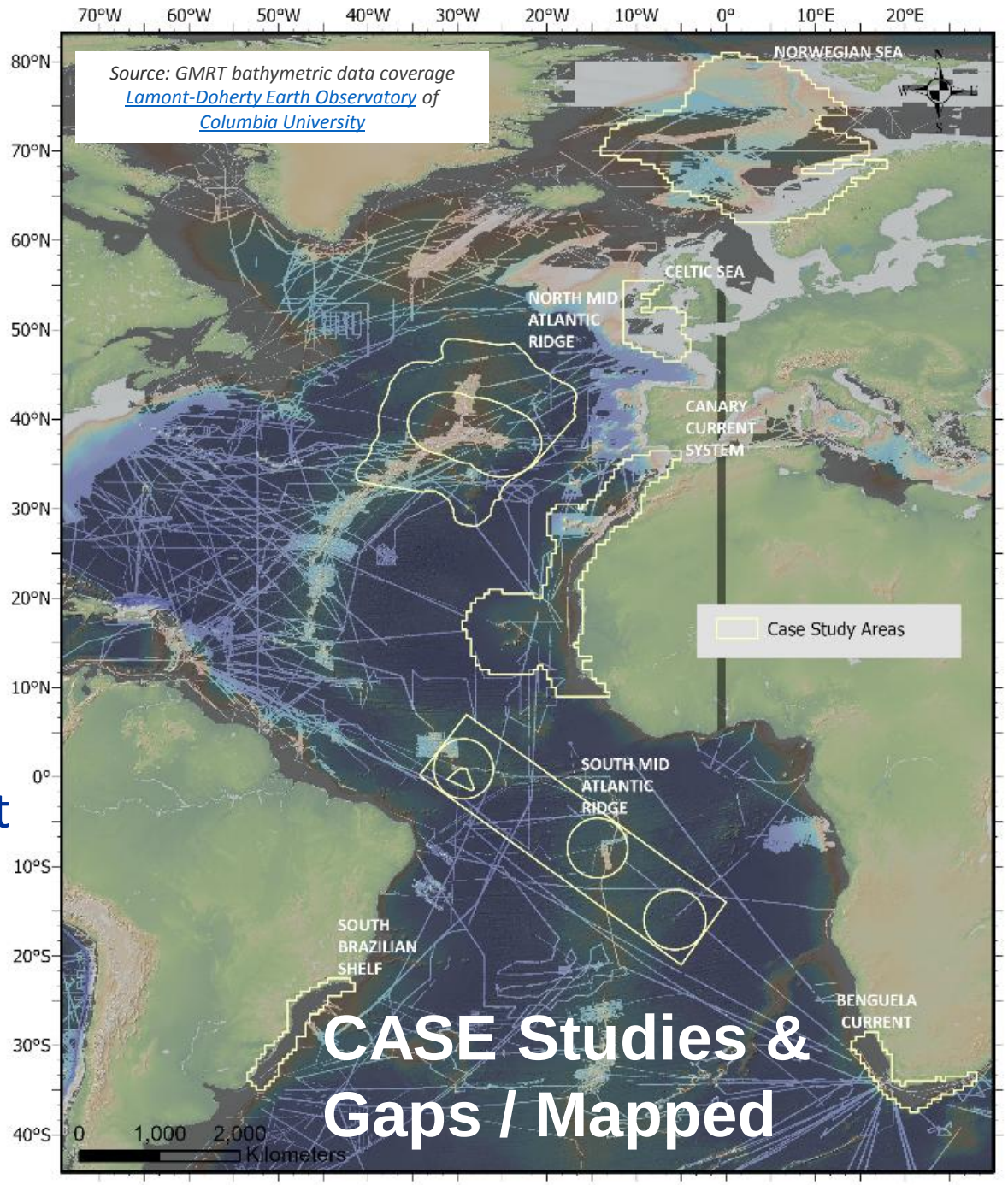
Bathymetry AND Benthic Atlantic Mapping Framework Considerations

Planning Phase

- Policy Drivers
- Legal Constraints
- Socioeconomics
- Priorities
- Methodologies
- Standards
- Infrastructure
- Partnerships
- Effort & Plans

Delivery Phase

- Funding
- R&I Support
- Outreach
- Progress Tracking
- Data Sharing
- Capacity Build
- Societal Engagement



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ALL ATLANTIC INTEGRATED ECOSYSTEM ASSESSMENT (IEA)

EUROFLEETS Underpinning Seabed Bathymetry & Benthic Habitat Mapping

- Building Targets & Priorities To Funding Calls
  - How will a proposal support e.g. Seabed2030 / Challenger 150 initiatives?
- Tracking Progress / Effort / Plans
  - Accessing survey metadata (e.g. ROV bottom deployment locations)
  - PI or Vessel Management to centralise & share survey info/outcome?
- Supporting Capacity Build & Collaboration
  - Digital Training (CPD) - wider audience
  - PI / Researcher Workshops/Database (NOAA Ocean Exploration & Research White Papers)
  - Interdisciplinary Standards & Methodologies
- Moving Towards Systematic Mapping

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ALL ATLANTIC INTEGRATED ECOSYSTEM ASSESSMENT (IEA)

- How can we strengthen synergies with Atlantic Mapping programmes and the research vessel community?
  - PI Workshop on 2023-2030 plans & priorities
  - Promote, reward cross-project & vessel collaboration / joint efforts
  - Map based centralised shared accessible plans
- How can we best connect with Atlantic Programmes such as Mission Atlantic, EMODnet Bathymetry and other Benthic Mapping stakeholders, including industry?
  - Multi-vessel aligned call to investigate e.g. 1 North Atlantic & 1 South Atlantic survey area (Atlantic Pilot Project)
- How could we facilitate access to bathymetric data (EMODNET) and support all scientific stakeholders towards a reliable access to an Open Science System (EOSC)?
  - Centralised access to data standards, SOPs, workflows, to make it clearer to research community where there data needs to reside & when (post - moratorium/publication).
  - Restrict funding/vessel access to researchers that do not share their data or findings
  - Auto-archive priority data-sets

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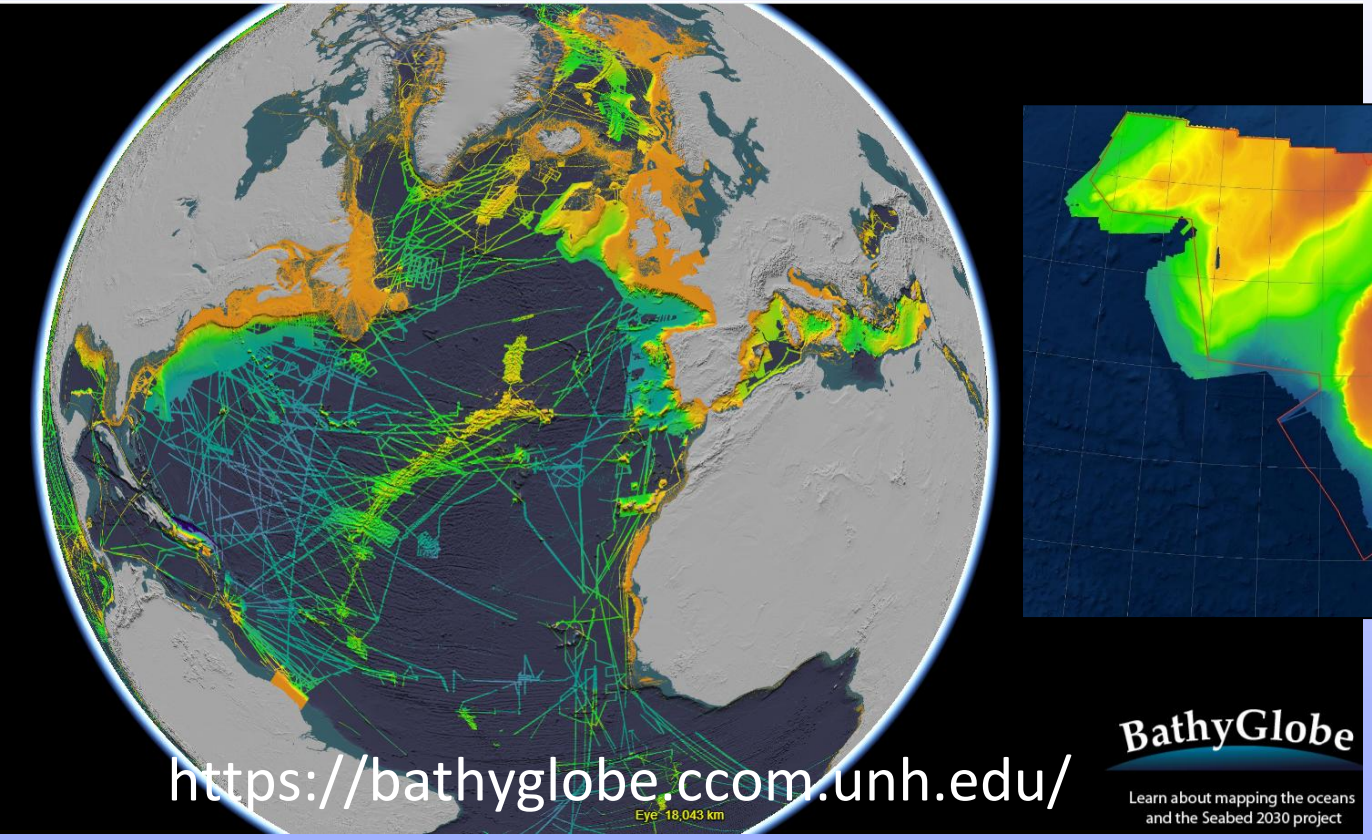
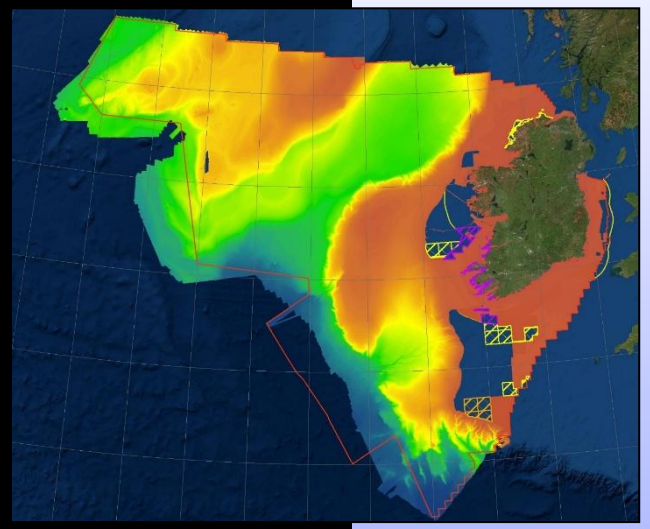
	Scientist	Early Career Researcher	Vessel Operator	Funder
	Knowing Where To Go • Multibeam Coverage • ROV Deployments	Knowing Who To Ask • Key Contacts • Networks	Knowing Capabilities • Infrastructure • People	Knowing Strategy • Science • Policy
	Knowing What To Do • Scientific Priorities • Geographic Priorities	Knowing How It Works • Standards • Methodologies	Knowing Logistics • Scheduling • Requirements (kit / permits)	Knowing Challenges • Capacity Build • Societal Engagement
	Introducing Innovation New Kit New Problems	Knowing What Next • Data • Reports	Knowing Crisis Mgmt • ????	Knowing Outcome • PI Reputation •
Missing	Technical know-how	Mentoring & Guidance	Multi-Vessel Ops	Cross-Project Capacity Build
Opportunity	Open Data & Collaboration	Berth Access	PR & Social Engagement	Cross-funding collaboration / reward exchange

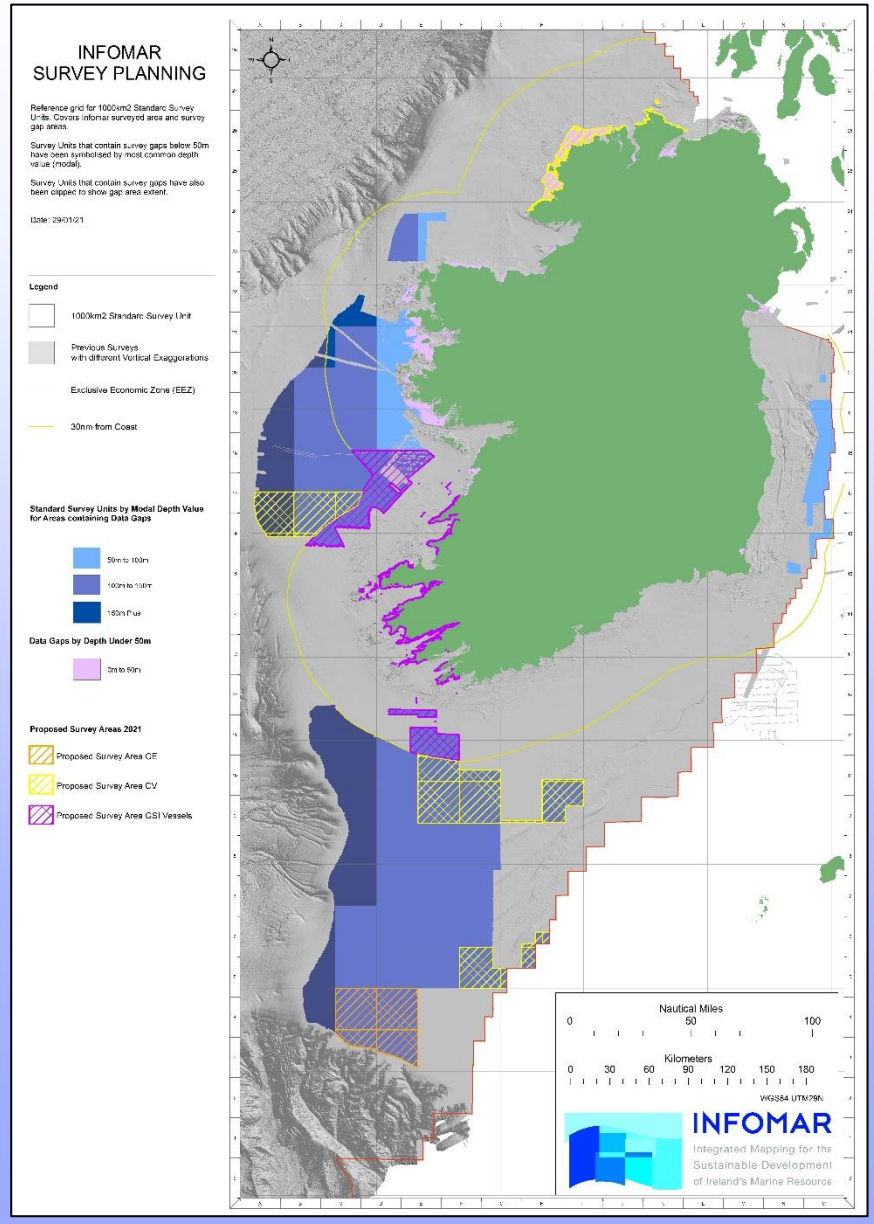
In Business: Plan > Money > People > Infrastructure
In Research: Infrastructure > Money > Plan > People

INFOMAR
Integrated Mapping for the Sustainable Development of Ireland's Marine Resource

Survey Planning / Tracking







THE NIPPON FOUNDATION-GEBCO SEABED 2030

Steve Hall
Head of Partnerships

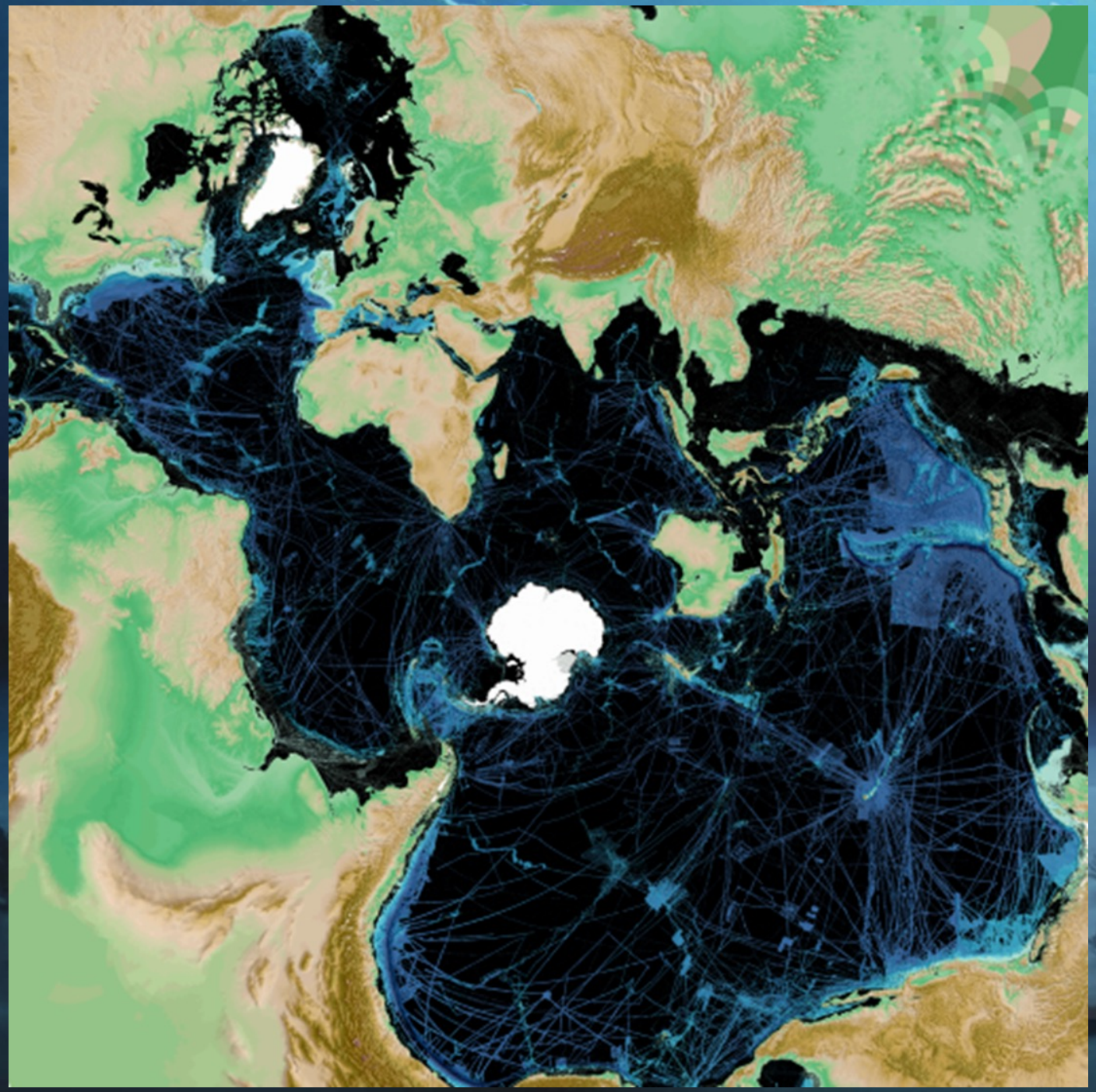
THE NIPPON FOUNDATION

General Bathymetric Chart of the Oceans GEBCO

IHO International Hydrographic Organization

unesco Intergovernmental Oceanographic Commission

2021 2030 United Nations Decade of Ocean Science for Sustainable Development



It really is .....

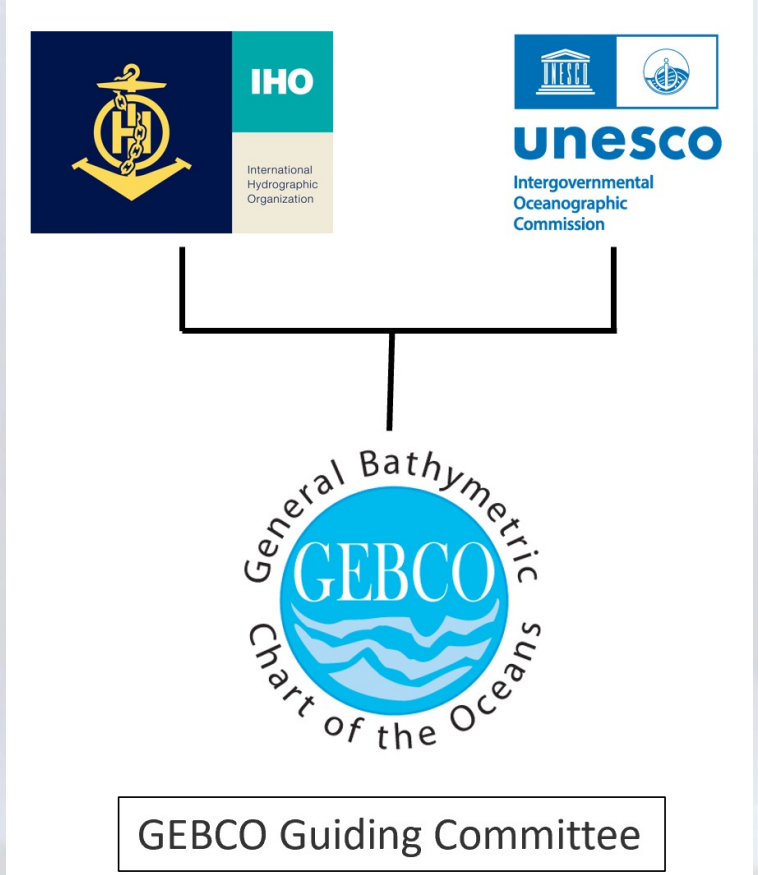
Our One Ocean!

Seabed 2030 Vision:

100% of our Ocean Floor mapped by 2030

THE NIPPON FOUNDATION-GEBCO SEABED 2030

GEBCO



Today the **Ge**neral **B**athymetric **C**hart of the **O**ceans is a joint programme of:

- The **International Hydrographic Organization**

&

- The **Intergovernmental Oceanographic Commission**

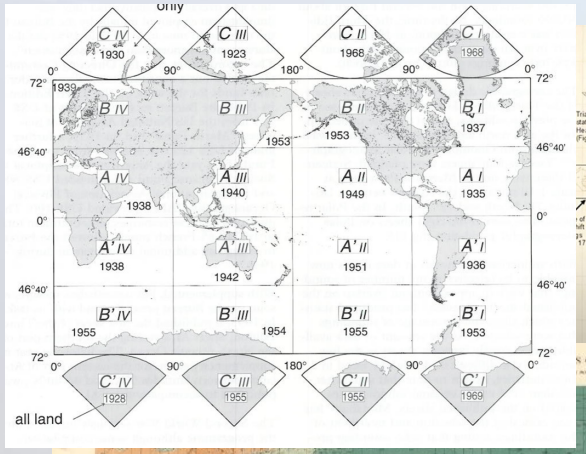
Aim: to provide authoritative, publicly-available bathymetry (depth) data sets of the world's oceans

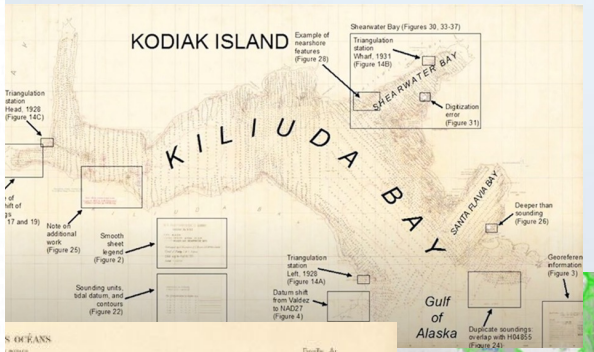
The GEBCO community is largely a voluntary force of international scientists and hydrographers

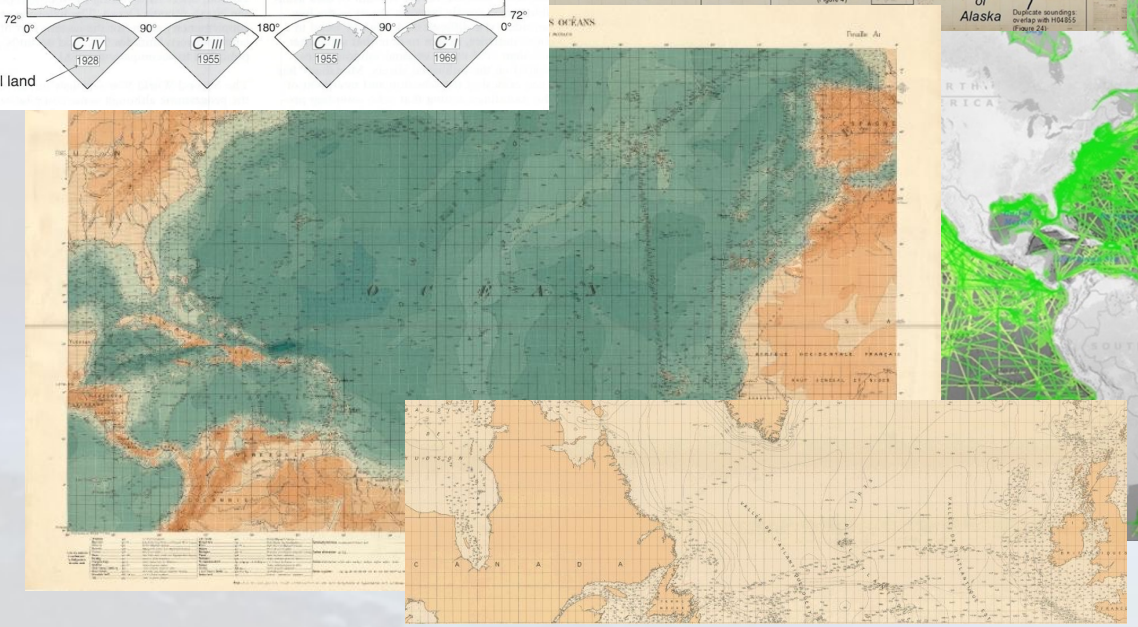
Seabed 2030 is an "accelerator" to fast-track GEBCO's aim

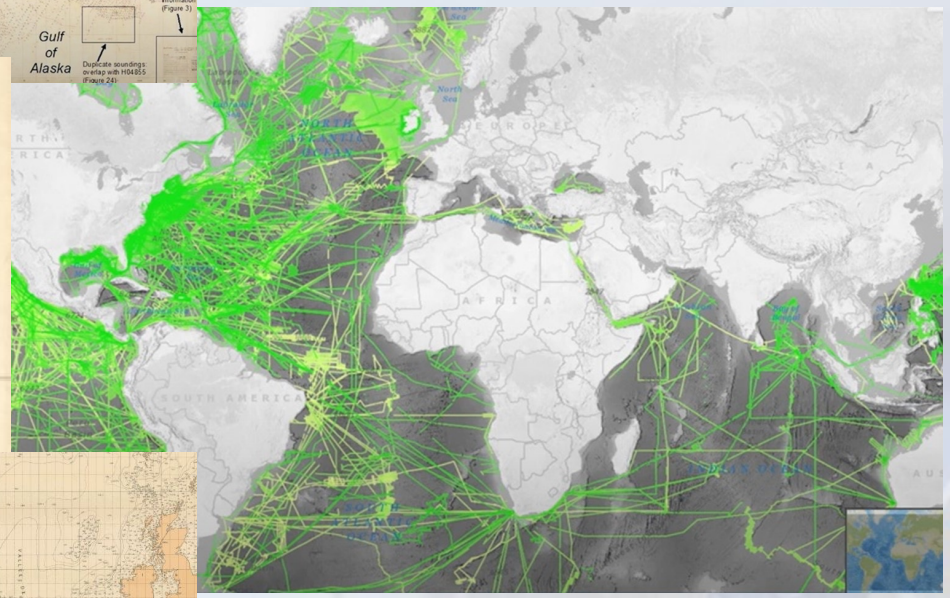
THE NIPPON FOUNDATION-GEBCO SEABED 2030

GEBCO Map Portrayal



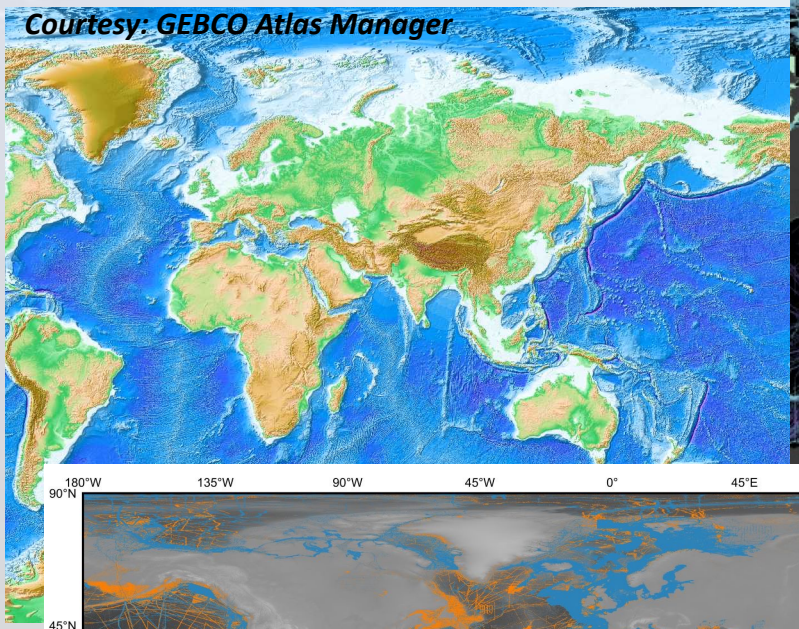


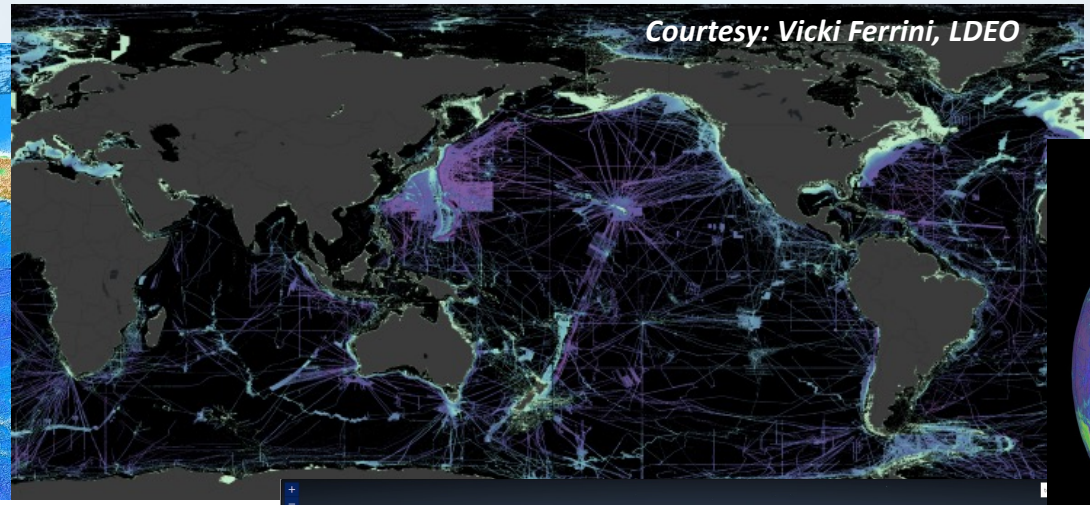


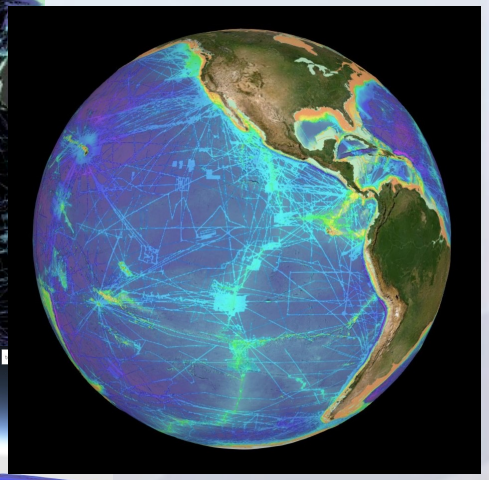


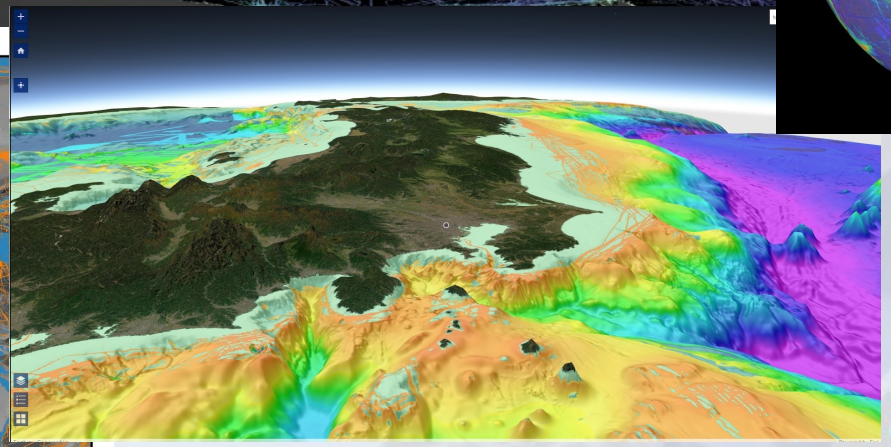
THE NIPPON FOUNDATION-GEBCO SEABED 2030

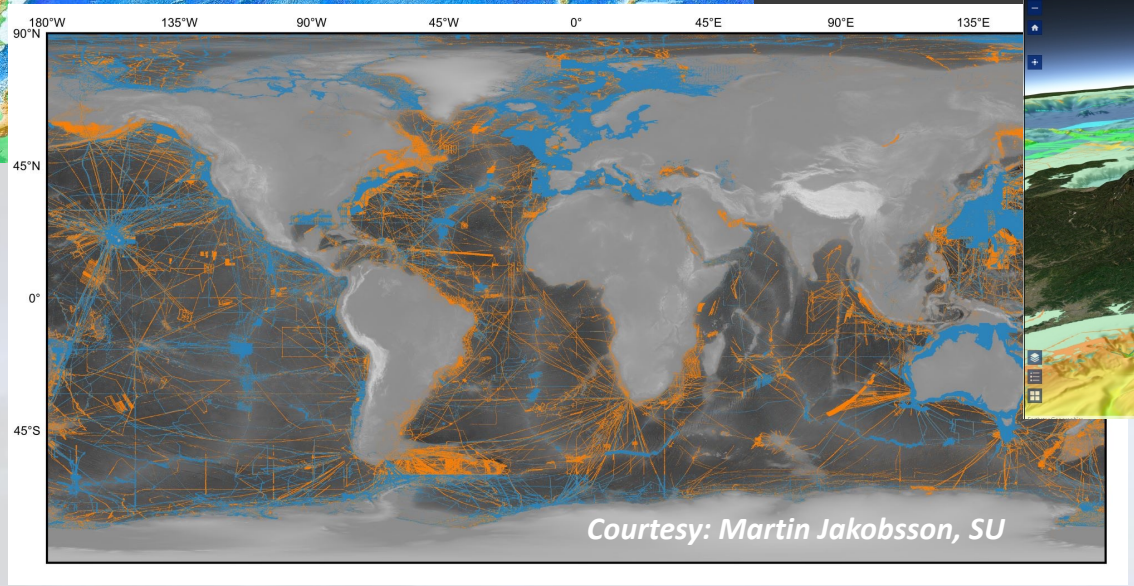
GEBCO Map Portrayal





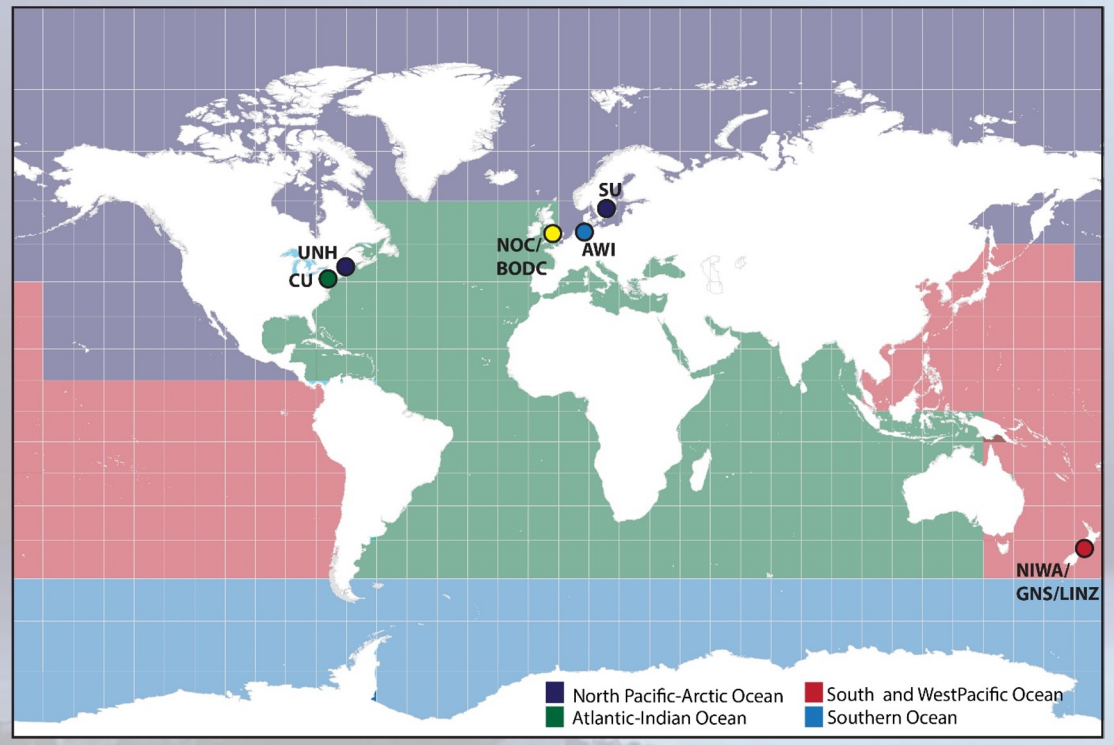






THE NIPPON FOUNDATION-GEBCO SEABED 2030

The Network of Seabed 2030 Centers



North Pacific –Arctic Ocean
Stockholm University & University of New Hampshire
(**SU** & **UNH**)

Southern Ocean
Alfred-Wegener-Institut (**AWI**)

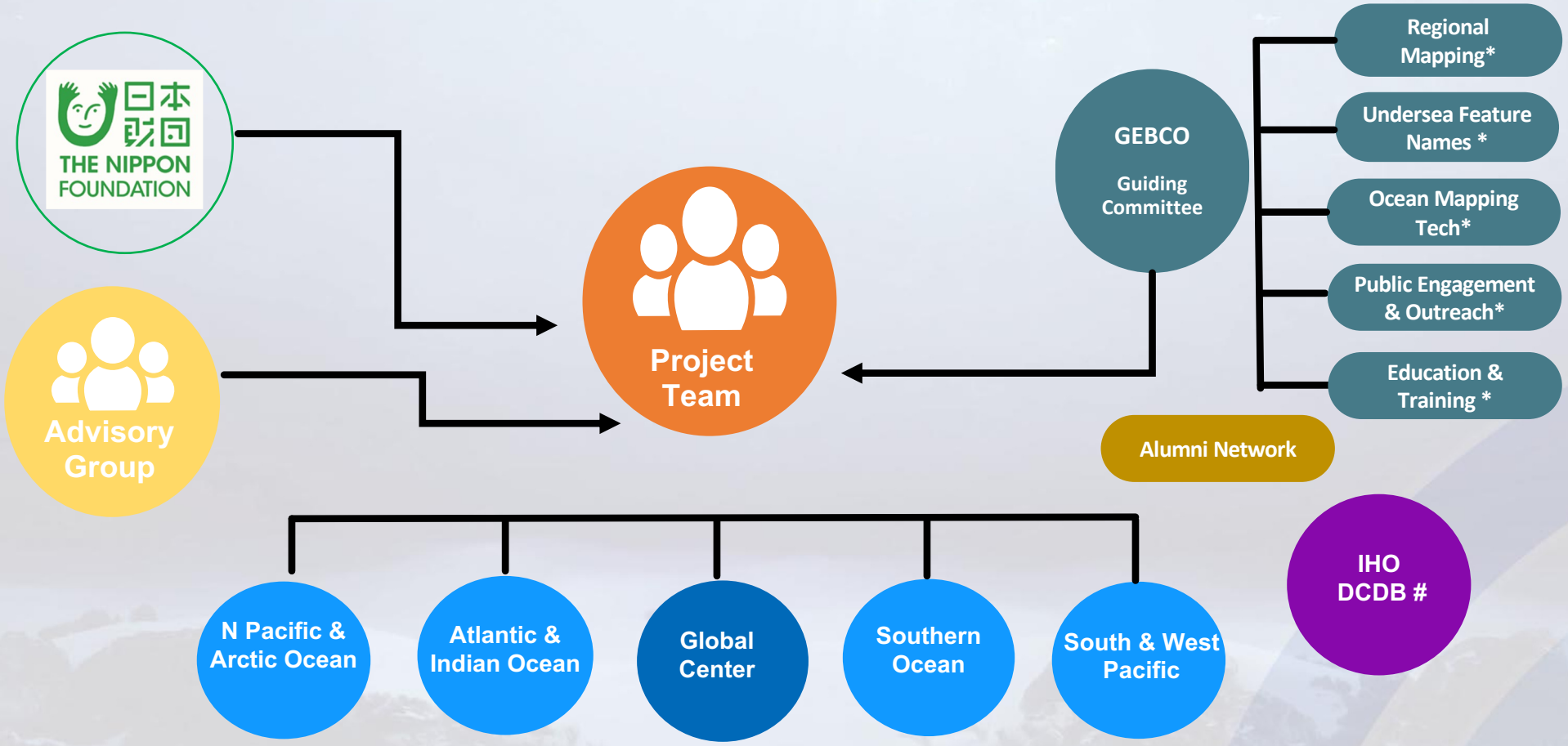
Atlantic-Indian Ocean
Lamont-Doherty Earth Observatory,
Columbia University (**CU**)

South-West Pacific Ocean
National Institute of Water & Atmospheric Research (**NIWA**)
Land Information New Zealand (**LINZ**)
GNS Science (**GNS**)

Global Center
British Oceanographic Data Centre,
National Oceanography Centre (**NOC/BODC**)

THE NIPPON FOUNDATION-GEBCO SEABED 2030

Seabed 2030 Network

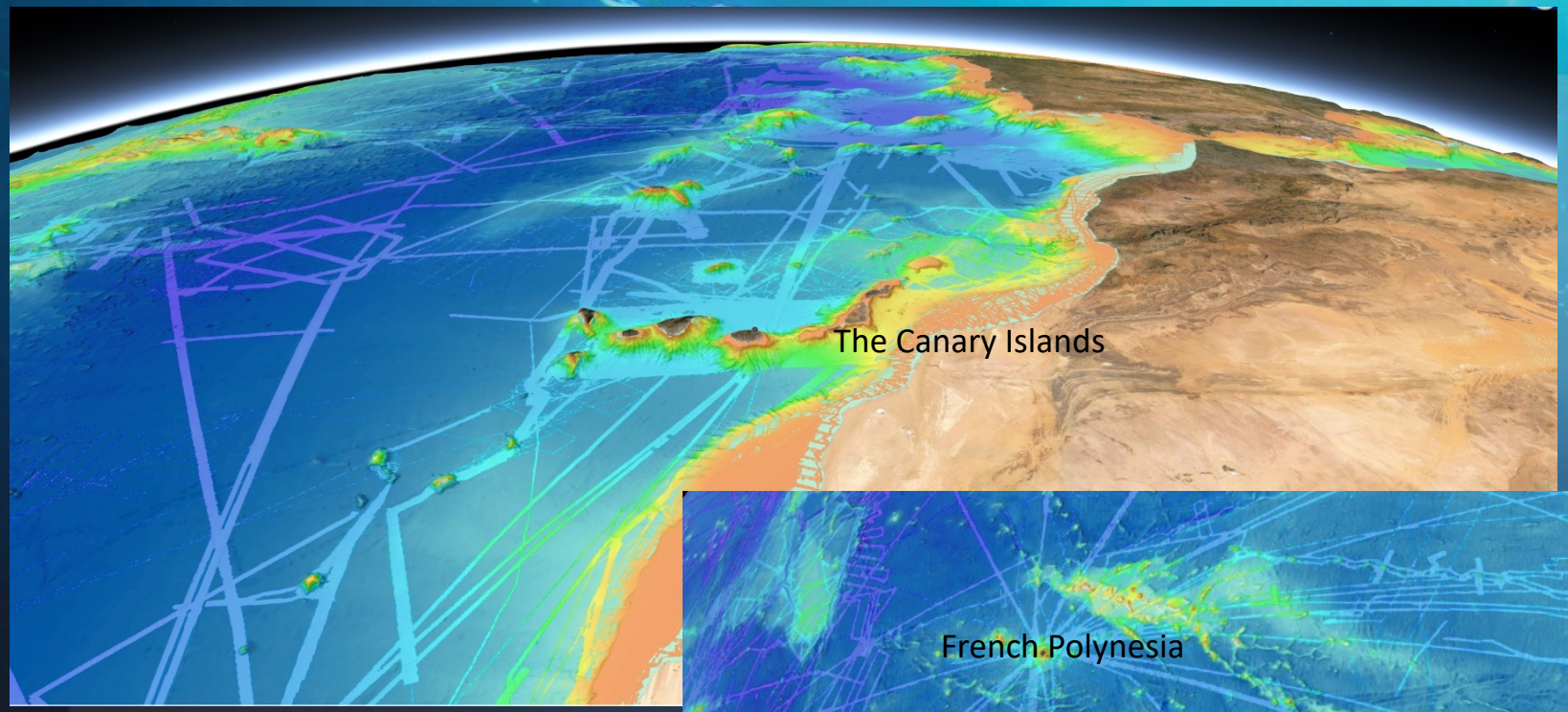


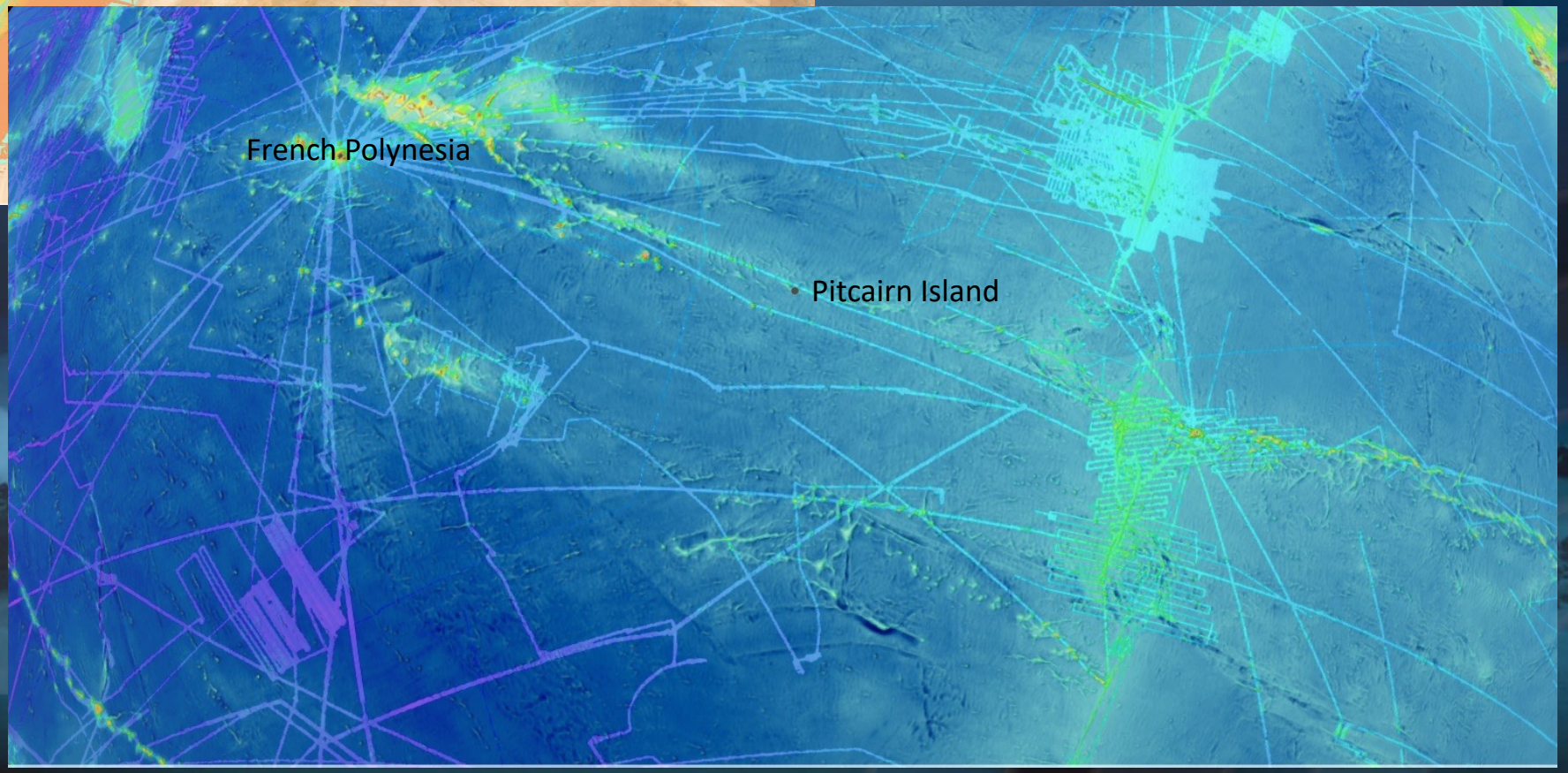
4 "Regional Centers" + 1 "Global Center"

(* GEBCO Sub Committees)

(# Data Centre for Digital Bathymetry)

Paucity of Depth Information

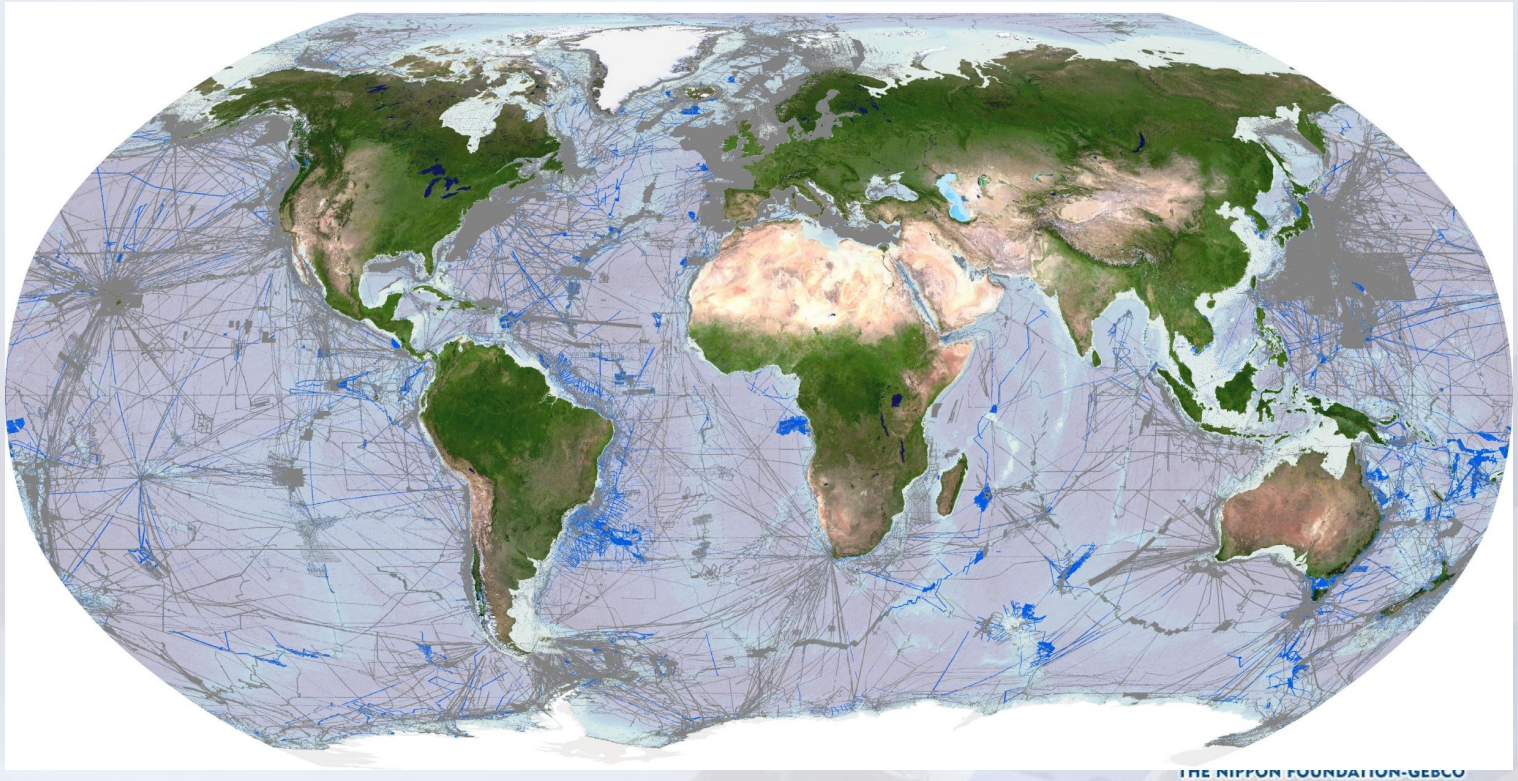




Progress so far…

GEBCO 2022 Grid Delivery

- GEBCO Grid stood at 6% coverage when Seabed 2030 began
- Ocean mapping coverage now stands at **23.4%** (June 2022)
- Still over 3/4 of the ocean floor to be mapped



Data to GEBCO 2021
Data additions to 2022

Courtesy: Pauline Weatherall, NOC

THE NIPPON FOUNDATION-GEBCO SEABED 2030

Thank you

THE NIPPON FOUNDATION

General Bathymetric Chart of the Oceans
GEBCO

IHO
International Hydrographic Organization

unesco
Intergovernmental Oceanographic Commission

University of New Hampshire

Lamont-Doherty Earth Observatory
COLUMBIA UNIVERSITY | EARTH INSTITUTE

National Oceanography Centre
NATURAL ENVIRONMENT RESEARCH COUNCIL

AWI
ALFRED-WEGENER-INSTITUT
HELMHOLTZ-ZENTRUM FÜR POLAR- UND MEERESFORSCHUNG

Stockholm University

NIWA
Taihoro Nukurangi

GNS SCIENCE

Land Information New Zealand
Toitū te whenua

THE NIPPON FOUNDATION-GEBCO
SEABED 2030

EMODnet Bathymetry - your gateway for bathymetry of the European seas and bathymetry data from European providers

Dick M.A. Schaap (MARIS) - Technical Coordinator)

Eurofleets+ Workshop – 26 September 2022

https://emodnet-bathymetry.eu/

The European Marine Observation and Data Network (EMODnet) is financed by the European Union under Regulation (EU) No 508/2014 of the European Parliament and of the Council of 15 May 2014 on the European Maritime and Fisheries Fund.

Main aims of EMODnet Bathymetry

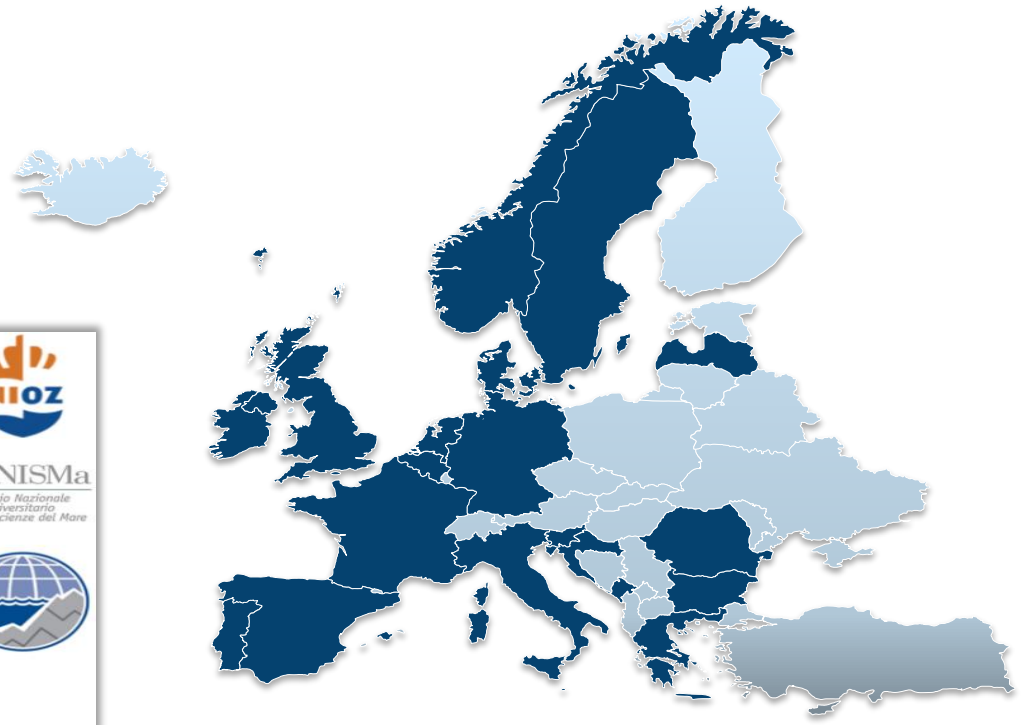
- Providing harmonized discovery and access to bathymetry data
- Publishing a multi-resolution Digital Terrain Model of the European seabed topography
- Publishing a best-estimate European digital coastline at LAT, MSL and MHW
- Publishing an inventory of official European baseline data
- Operating the EMODnet Bathymetry web portal allowing easy access of the data and data products
- Participating in the INSPIRE Directive and Digital Earth processes and ensuring compliance
- Supporting international interoperability
- Being the official EU contribution to SeaBed 2030
- Feeding EMODnet Seabed Habitat Mapping with digital bathymetry including quality indicators

Initiated in 2009 and run without interruption; funding guaranteed till end 2024

EMODnet

Consortium – 43 partners, Coordination by Shom and MARIS

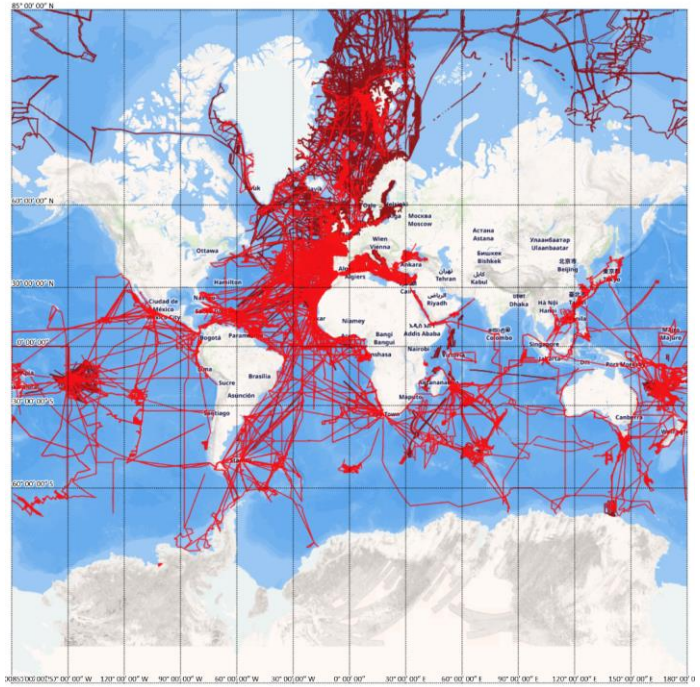
- Hydrographic Offices
- Research Institutes
- Companies

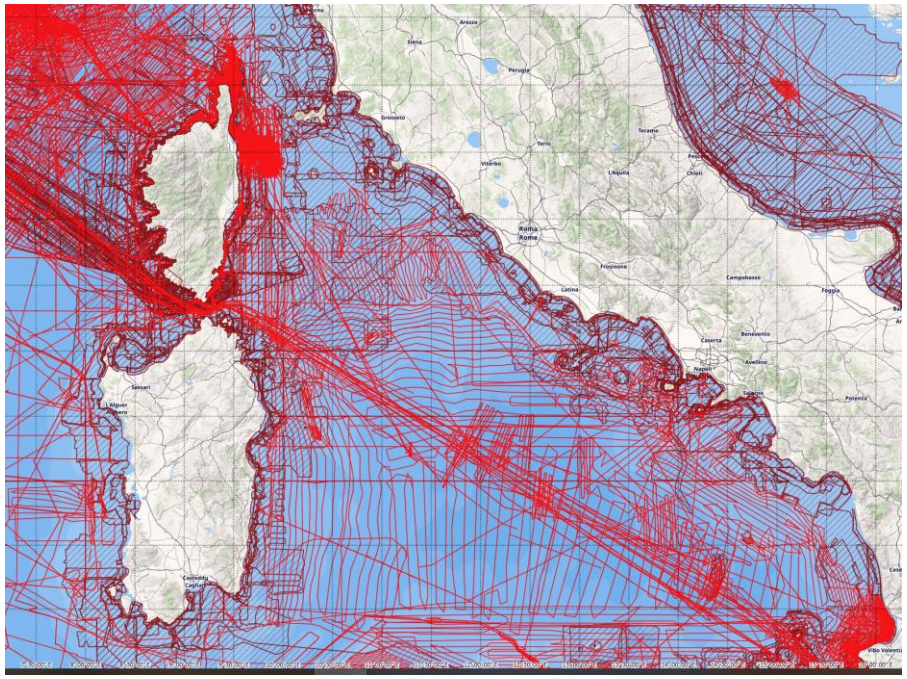


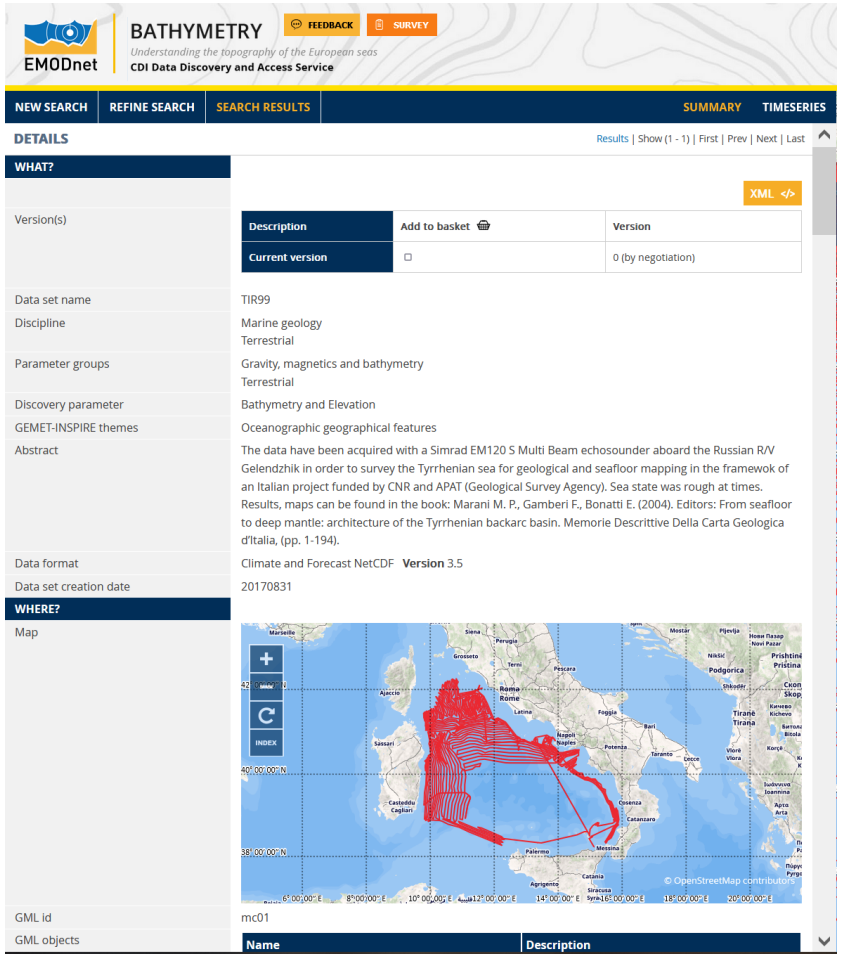
EMODnet

Discovery and Access of survey data sets – adopted SeaDataNet CDI service

- CDI metadata format: INSPIRE compatible, ISO 19115- 19139 based, supported by SeaDataNet Controlled Vocabularies (NOC-BODC host)
- Each polygon/poly-line shows the bathymetric coverage/location
- Source data, open access via data cloud (40%) / by negotiation (60%)
- Currently: >41.000 entries from 45 data providers and >300 data originators





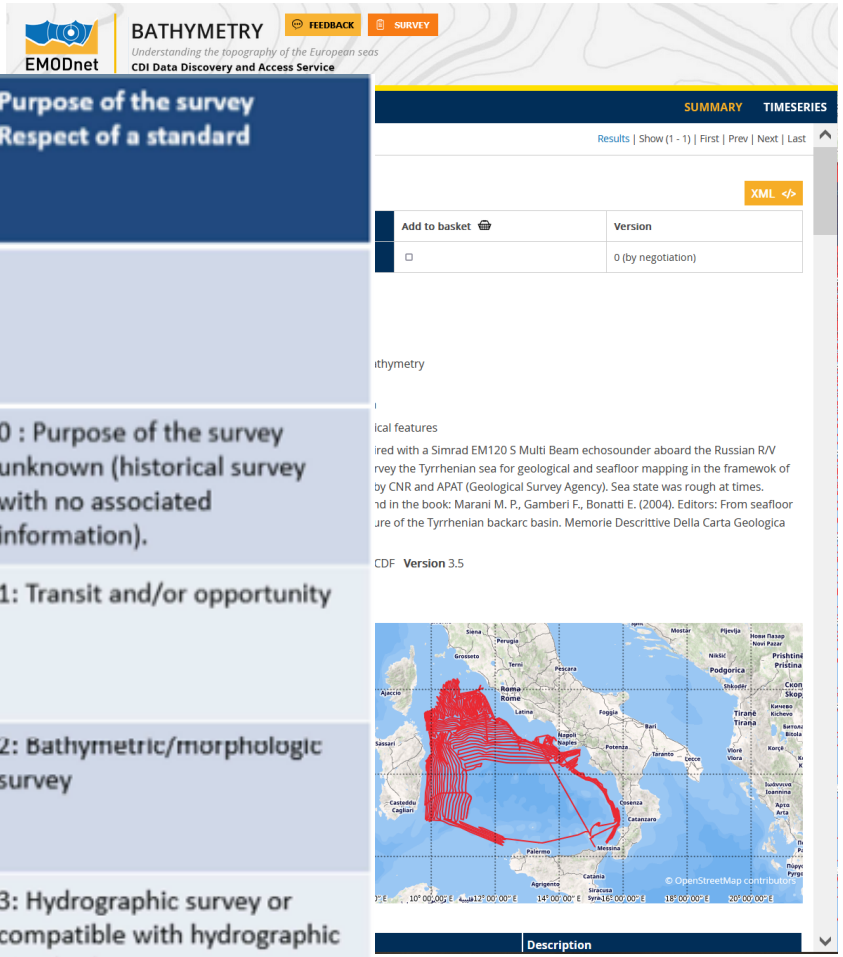


EMODnet

Discovery and Access of survey data sets – adopted SeaDataNet CDI service

- CDI metadata format: INSPIRE compatible, ISO 19115- 19139 based, supported by Sea
- Each polygon/pol
- Source data, oper
- Currently: >41.00 originators

QI_horizontal	QI_vertical	QI_age	Purpose of the survey Respect of a standard
-1 : Multisources – unable to assess	- 1 : Multisources – unable to assess		
0: Unknown or > 500m (That is grossly equivalent to TACAN, OMEGA systems or similar)	0: Unknown, plummet, leadline	0 : > 30 y	0 : Purpose of the survey unknown (historical survey with no associated information).
1: between 500m and 50m (That is grossly equivalent to LORAN, DECCA systems or similar)	1: SBES Low Frequency, SDB (similar than 2+5%d)	1 : 10-30 y	1: Transit and/or opportunity
2: between 50m and 20m (That is grossly equivalent to natural GPS systems)	2: MBES low frequency (lower than 100kHz) (similar than 1+2%d)	2 : 5y -10 y	2: Bathymetric/morphologic survey
3: < 20m (GPS with correction) (That is grossly equivalent to aided GPS system DGPS, RTK ...)	3: Lidar, SBES High Frequency	3 : 0y – 5y	3: Hydrographic survey or compatible with hydrographic standards
	4: MBES High frequency (higher that 100kHz) (1+0.5%d)		



EMODnet

Discovery and Access of survey data sets – adopted SeaDataNet CDI service

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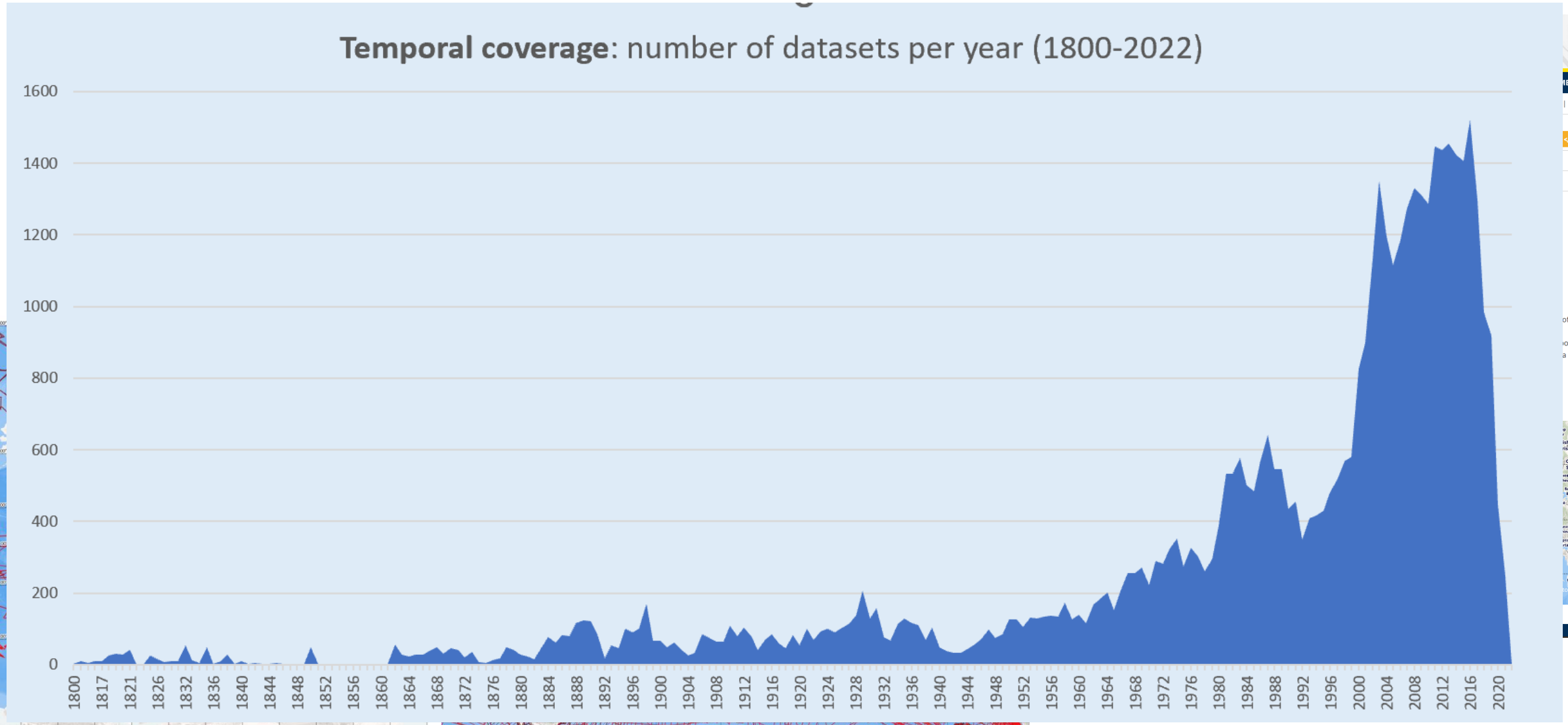
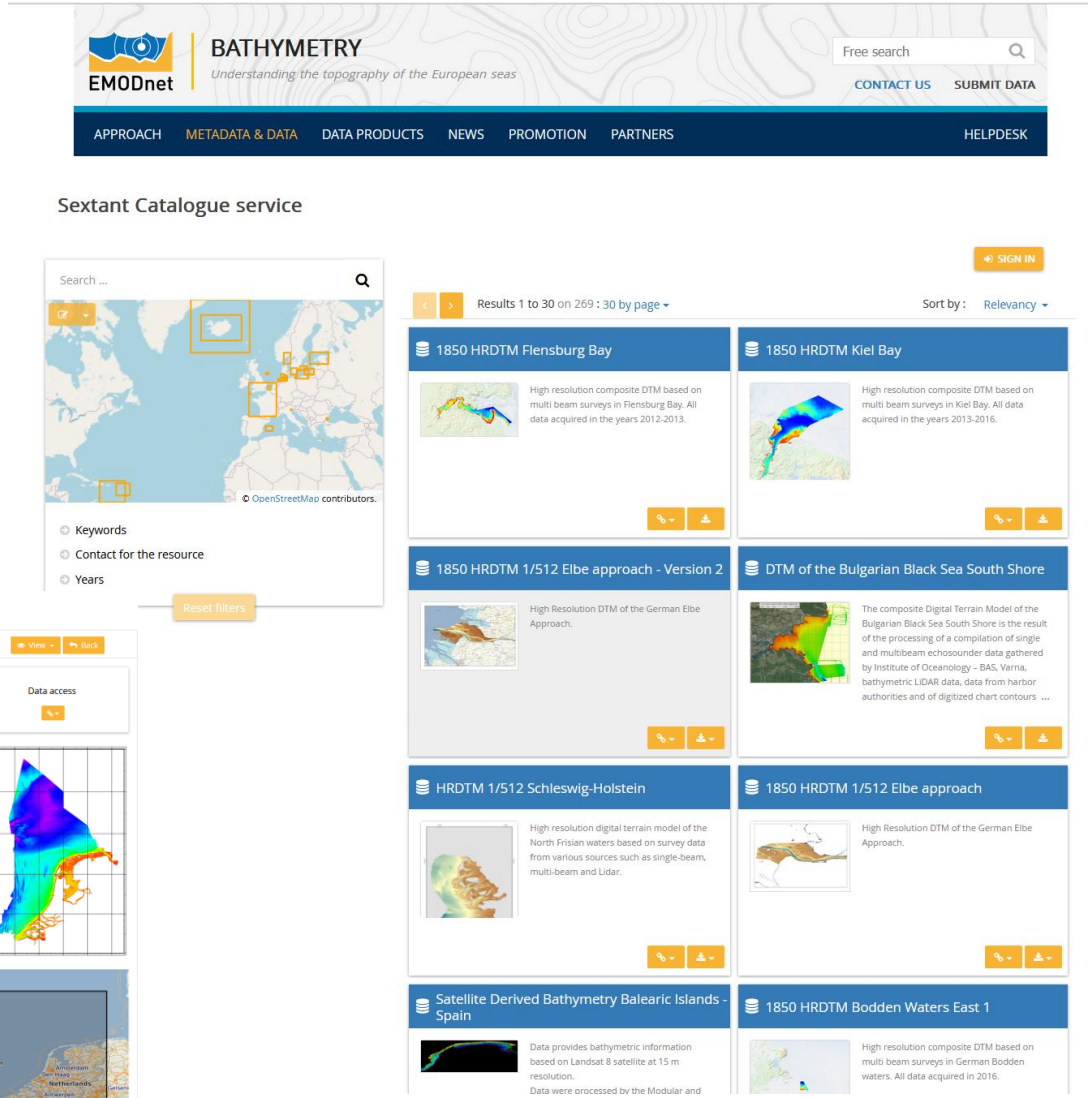
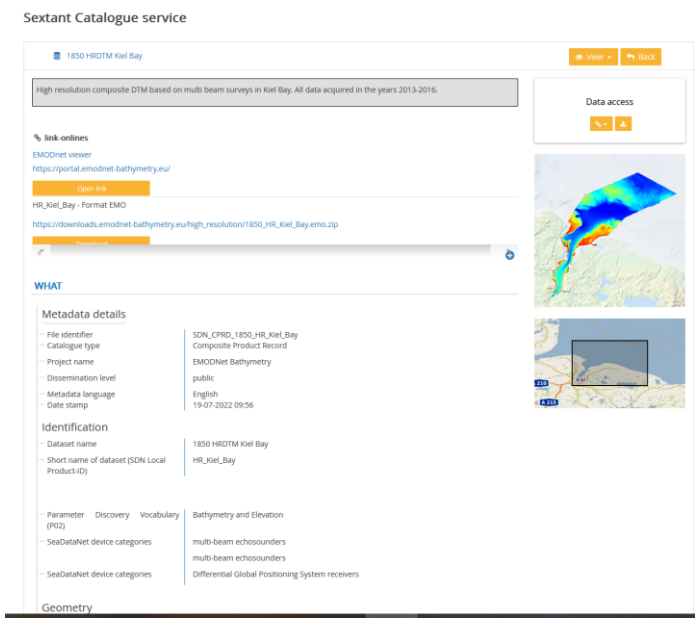


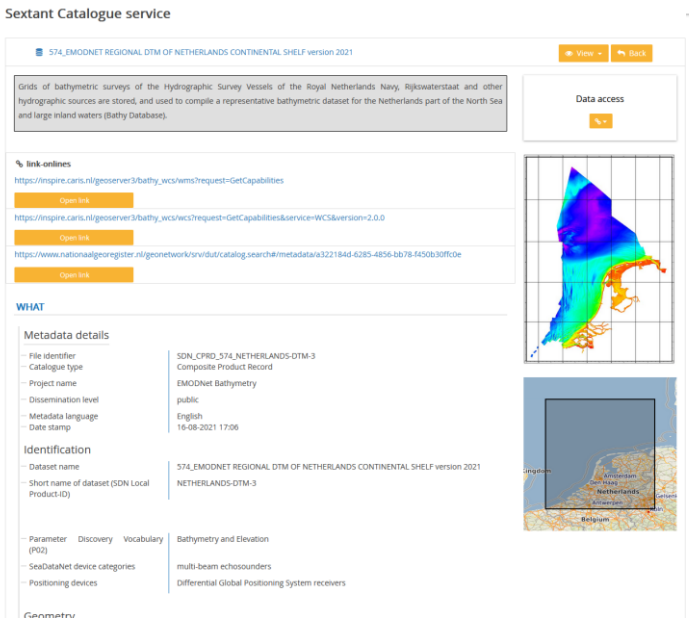
EMODnet

Discovery of Composite DTMs and High-Resolution DTMs – adopted SeaDataNet Sextant product catalogue

- > 250 Composite DTM (CPRD – eg MAREANO, Israel NBS, IBCAO, Satellite Derived Bathymetry, …)
- > 200 High Resolution DTMs (HR-DTMs)
- Sextant metadata format: INSPIRE compatible, ISO 19115- 19139 based, supported by SeaDataNet Controlled Vocabularies

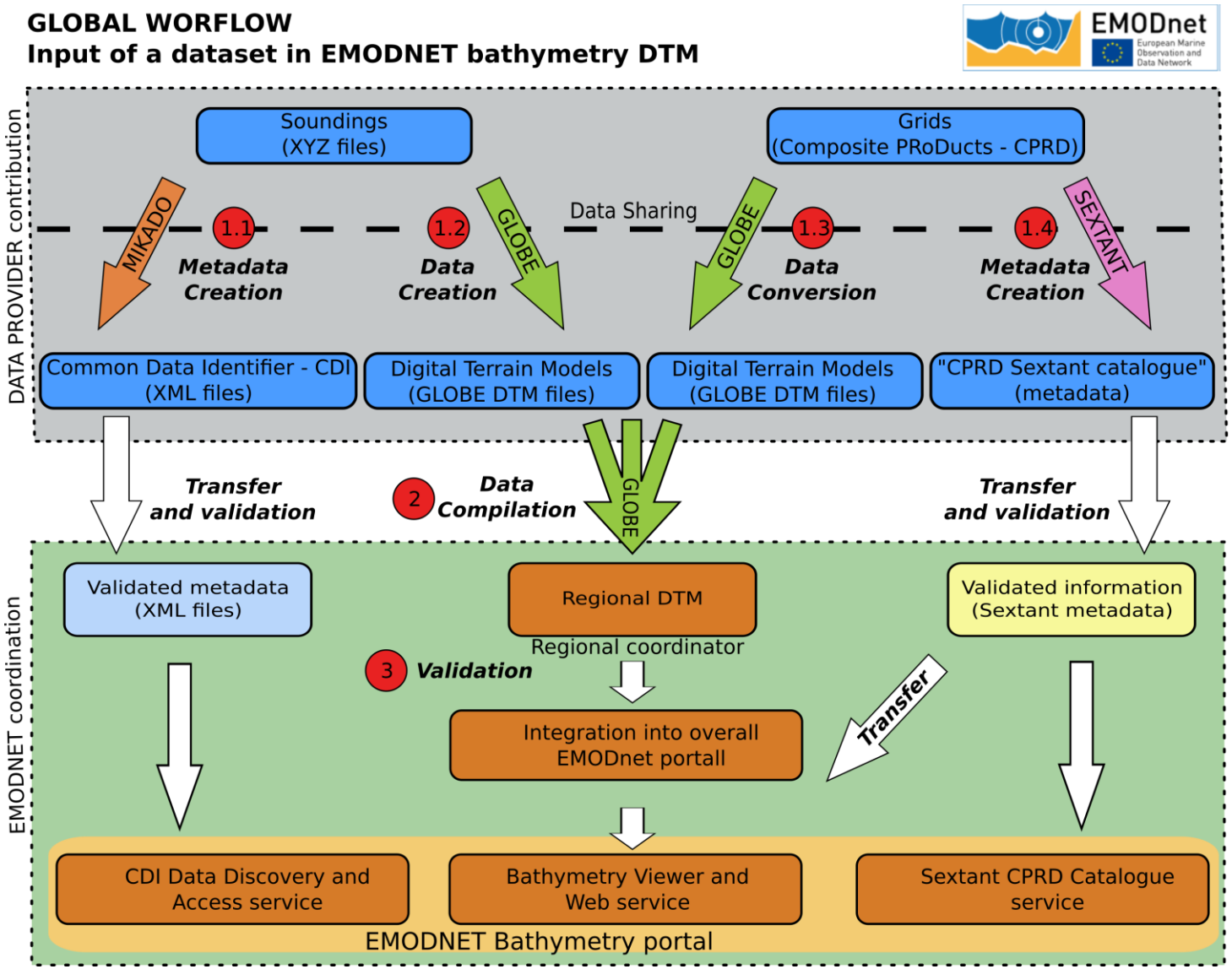






EMODnet

Common Methodology for generating European Digital Terrain Model

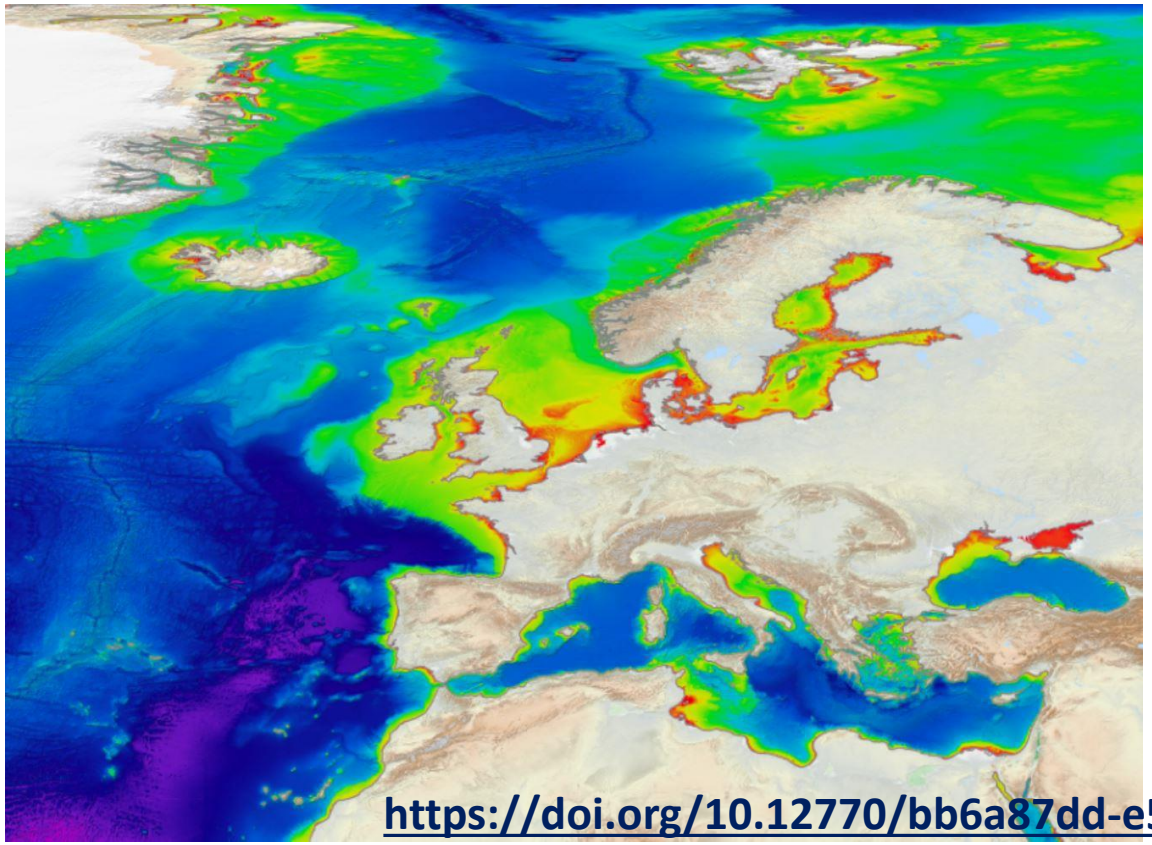


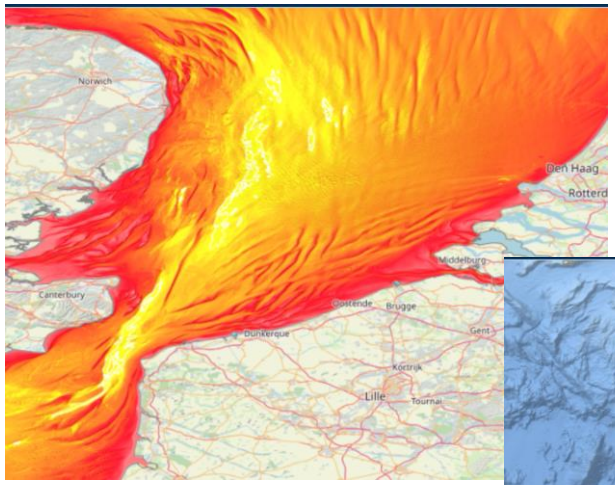
Regional coordinators

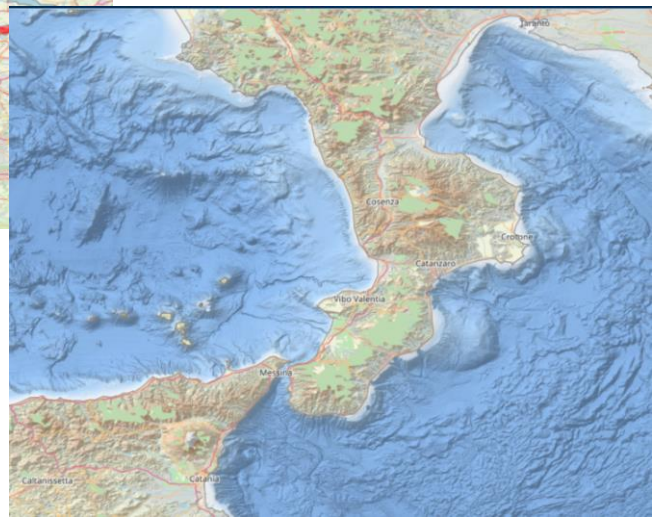
EMODnet

EMODnet Bathymetry DTM – 2020 version

- Available at MSL and LAT
- Released end December 2020
- Based on 16.300 survey and composite data sets from 48 data providers; Satellite Derived Bathymetry (SDB) datasets for coastal zones in Spain, Cyprus, Croatia, and Denmark.
- Resolution grid of 1/16 * 1/16 arc minutes (circa 115 * 115 meters)
- Use of GEBCO 2020 and IBCAO V4 for covering areas without available surveys or composite DTMs.



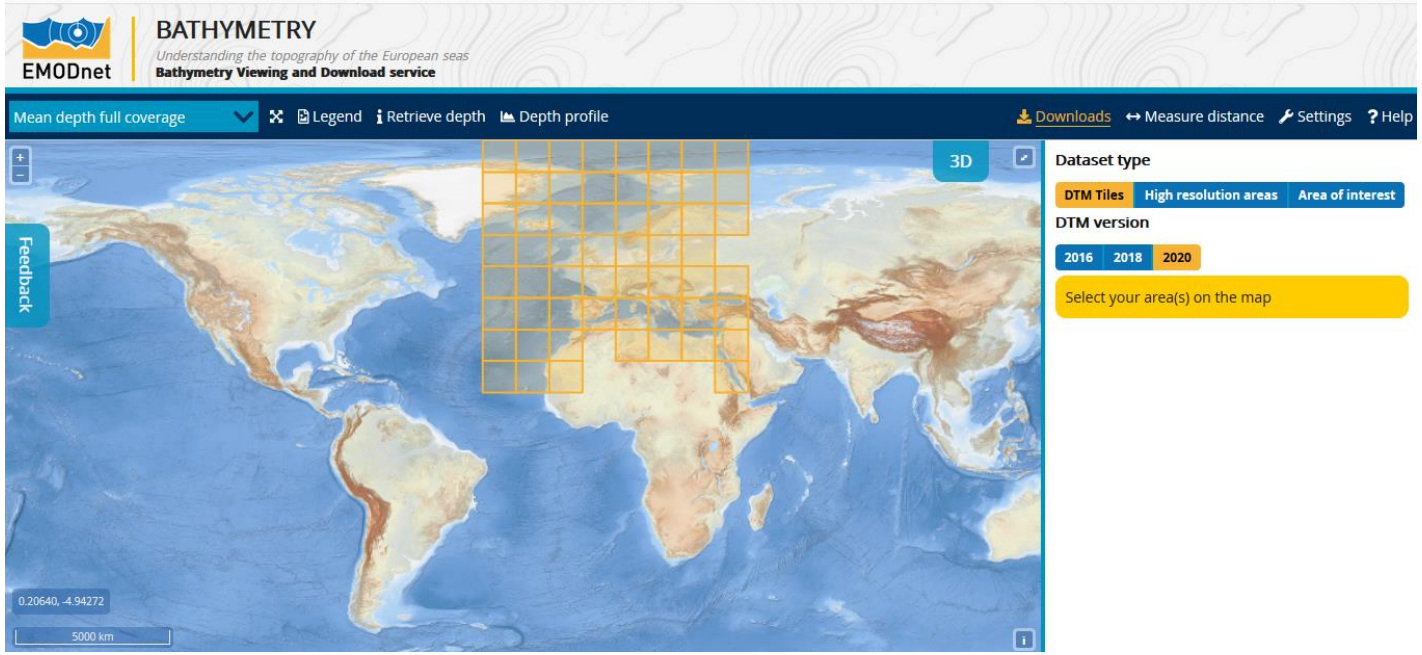


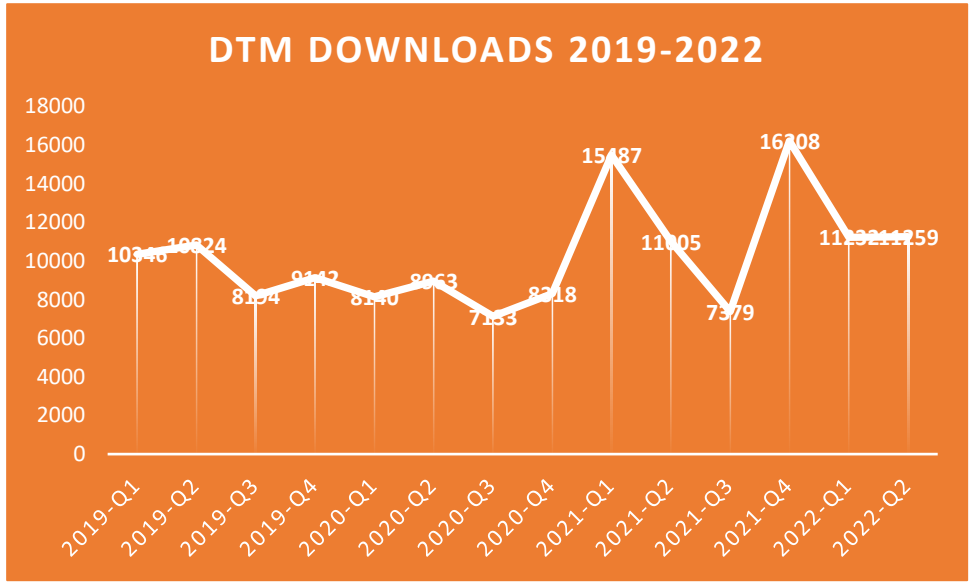


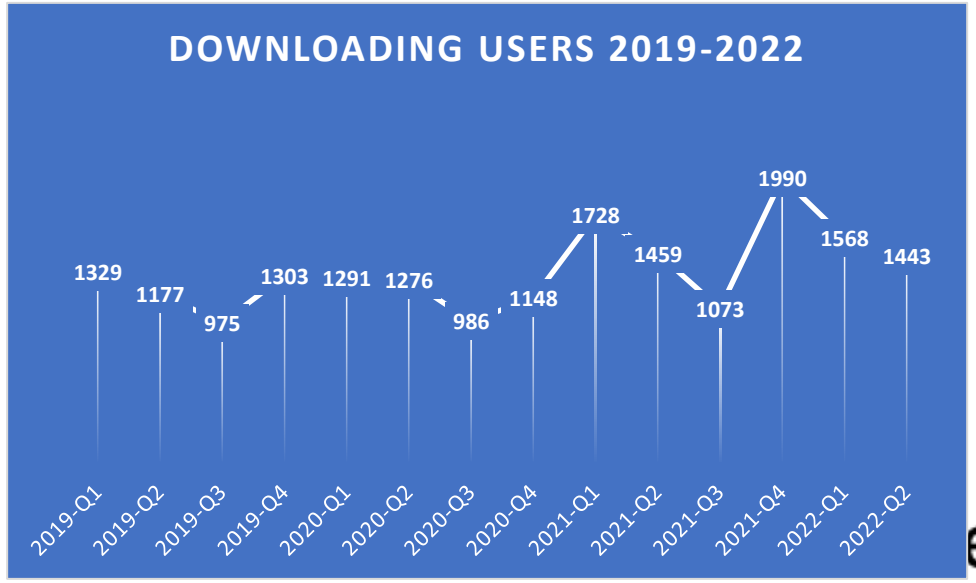
https://doi.org/10.12770/bb6a87dd-e579-4036-abe1-e649cea9881a

EMODnet

EMODnet Bathymetry DTM – Free downloading by DTM Tiles







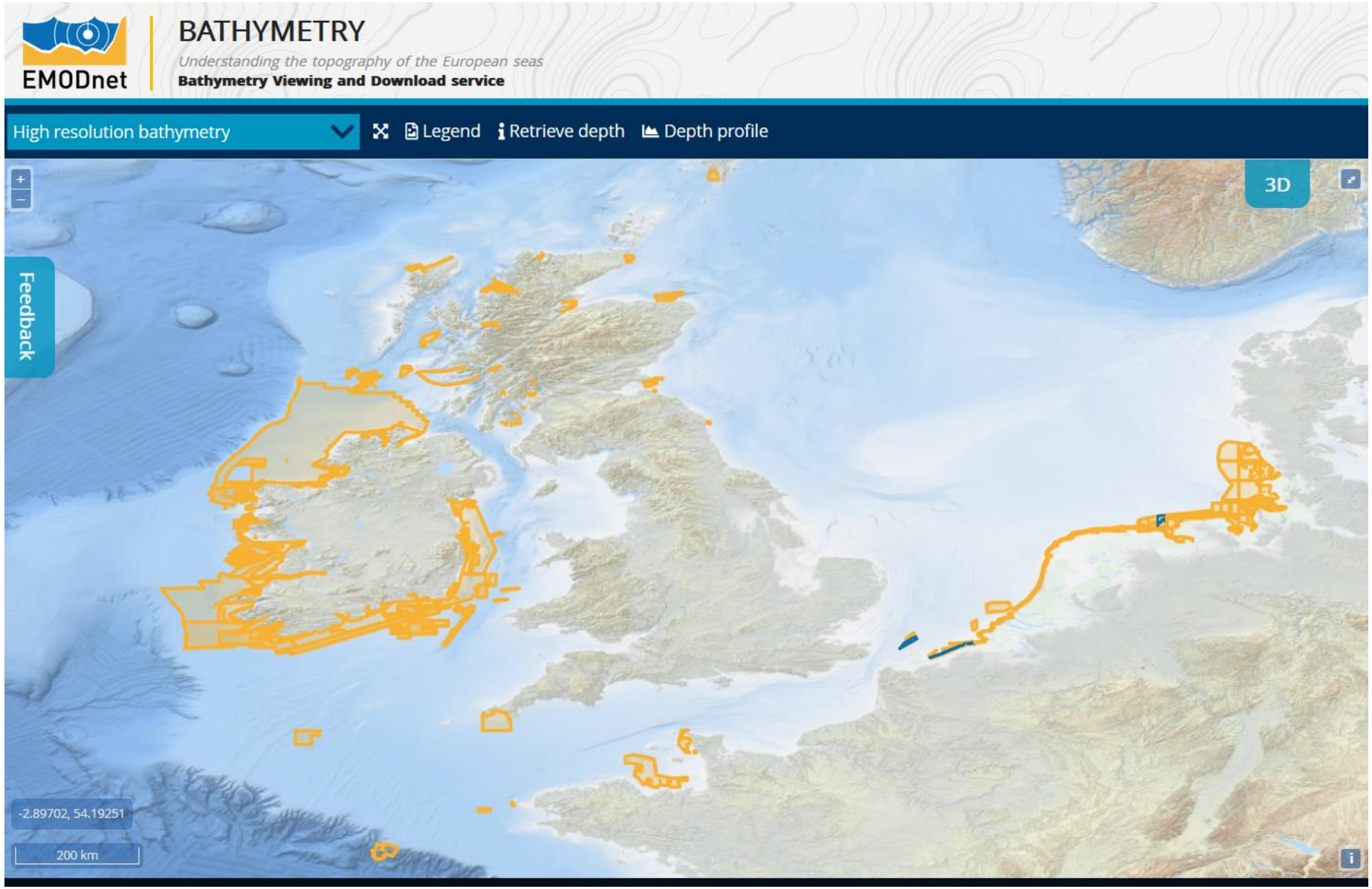
Best European DTM on the market

Highly successful since the 1st release in 2011

Users from government, research, and industry

Adoption in many numerical models

HR-DTMs



- > 200 High Resolution DTM (resolution up to the m)

EMODnet

HR-DTMs

- > 200 High Resolution DTM (resolution up to the m)

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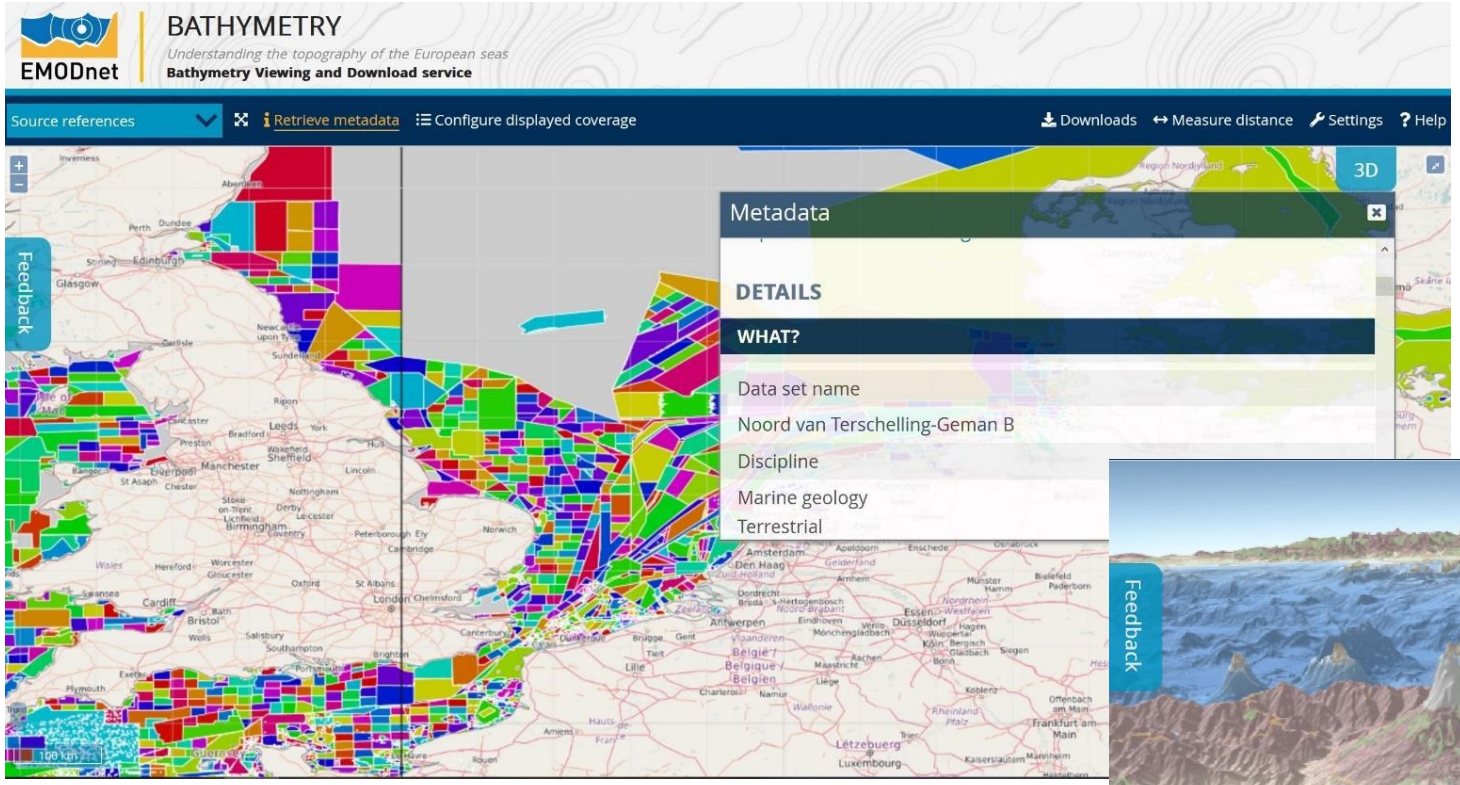
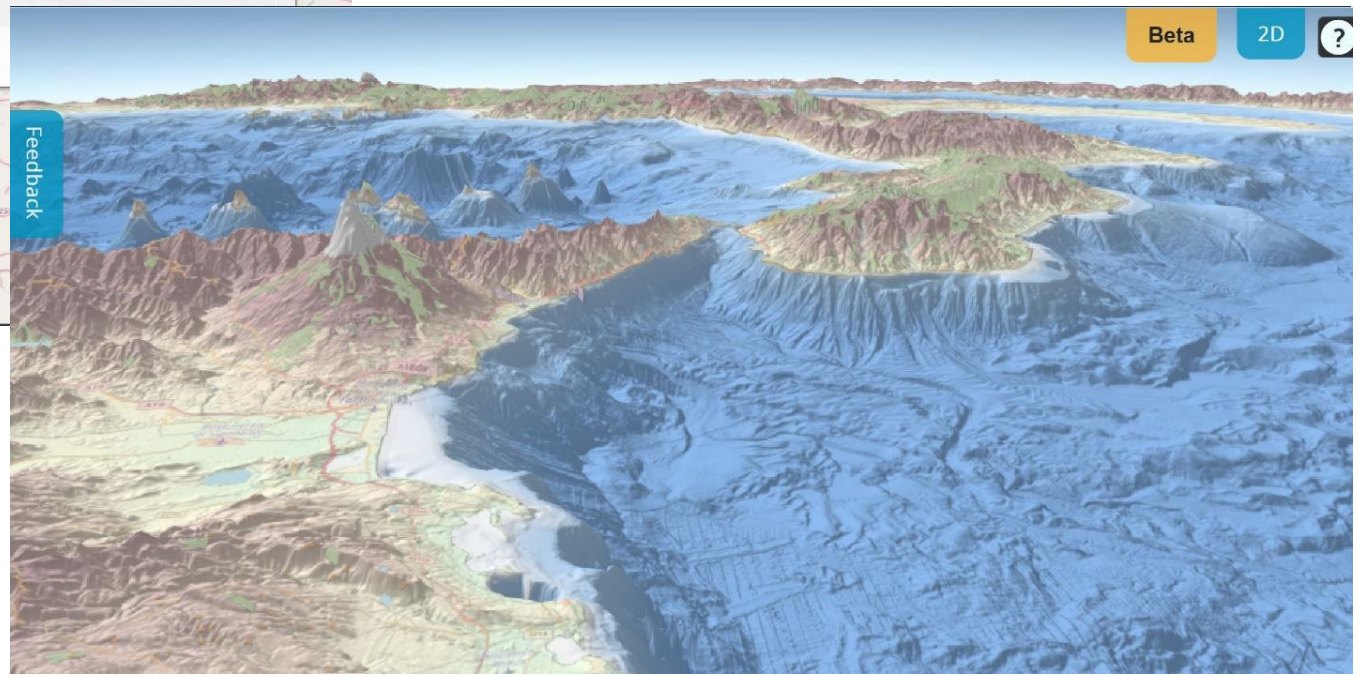
Source Reference map and 3D viewer





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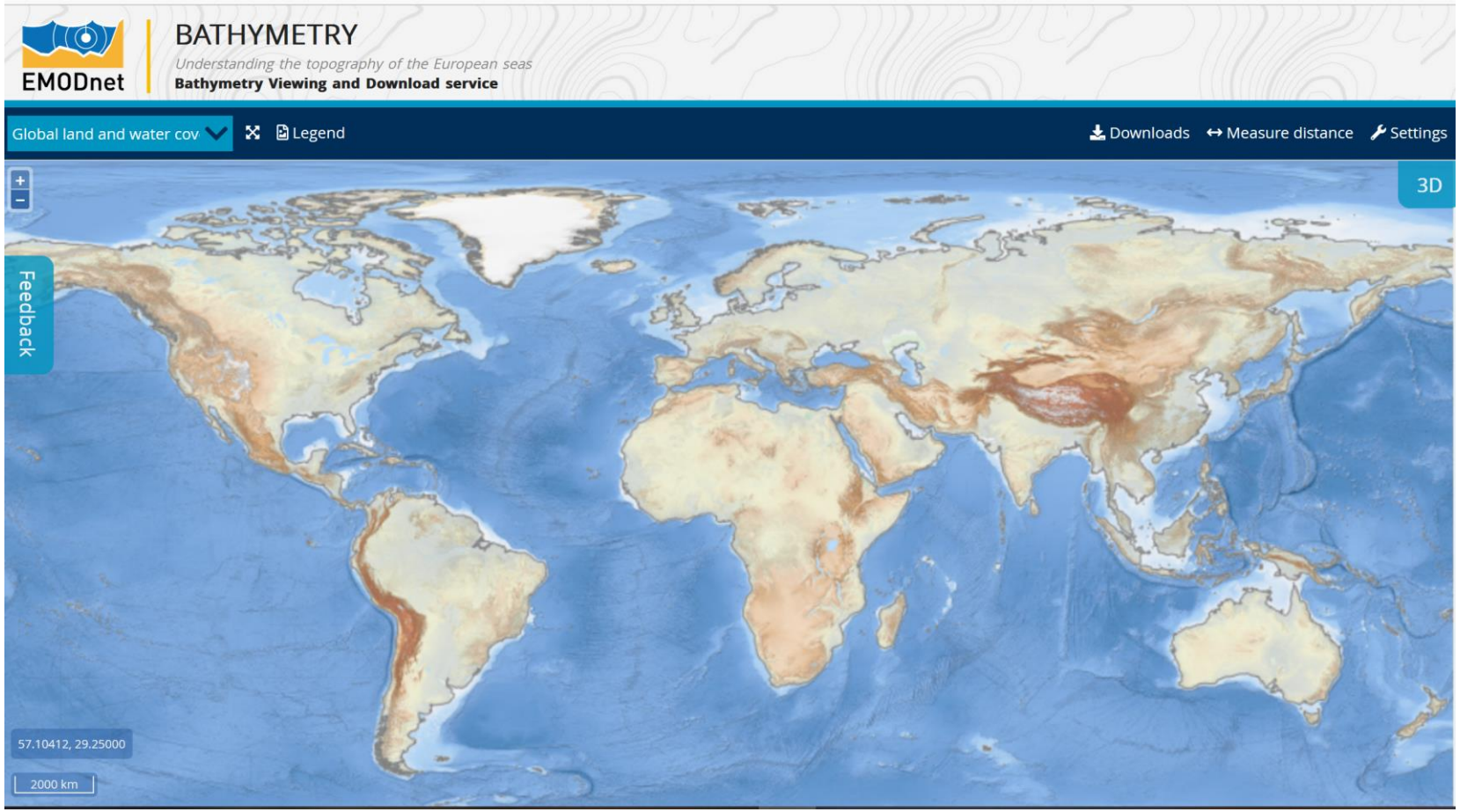
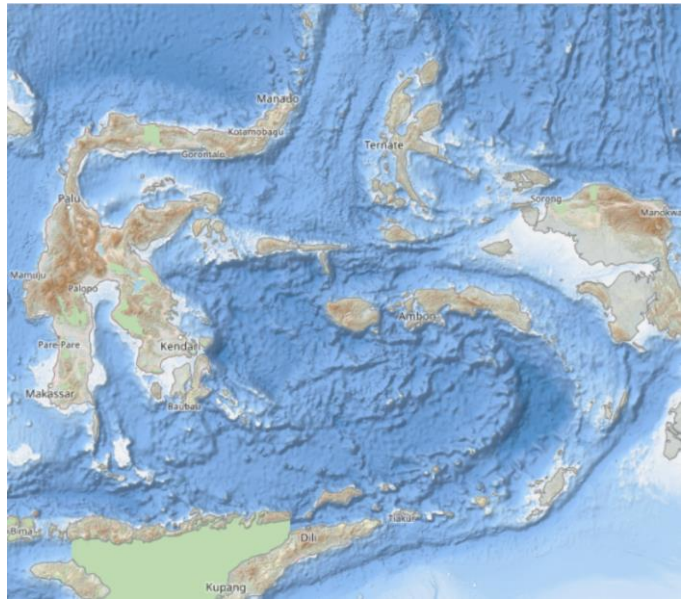
EMODnet Bathymetry World Base Layer (EBWBL)





A gridded representation of worldwide bathymetric and topographic coverage
Based on EMODnet DTM, GEBCO grid and for land ASTER GDEM, SRTM3, and EU-DEM.

Available as WMTS: https://tiles.emodnet-bathymetry.eu/wmts/1.0.0/WMTSCapabilities.xml

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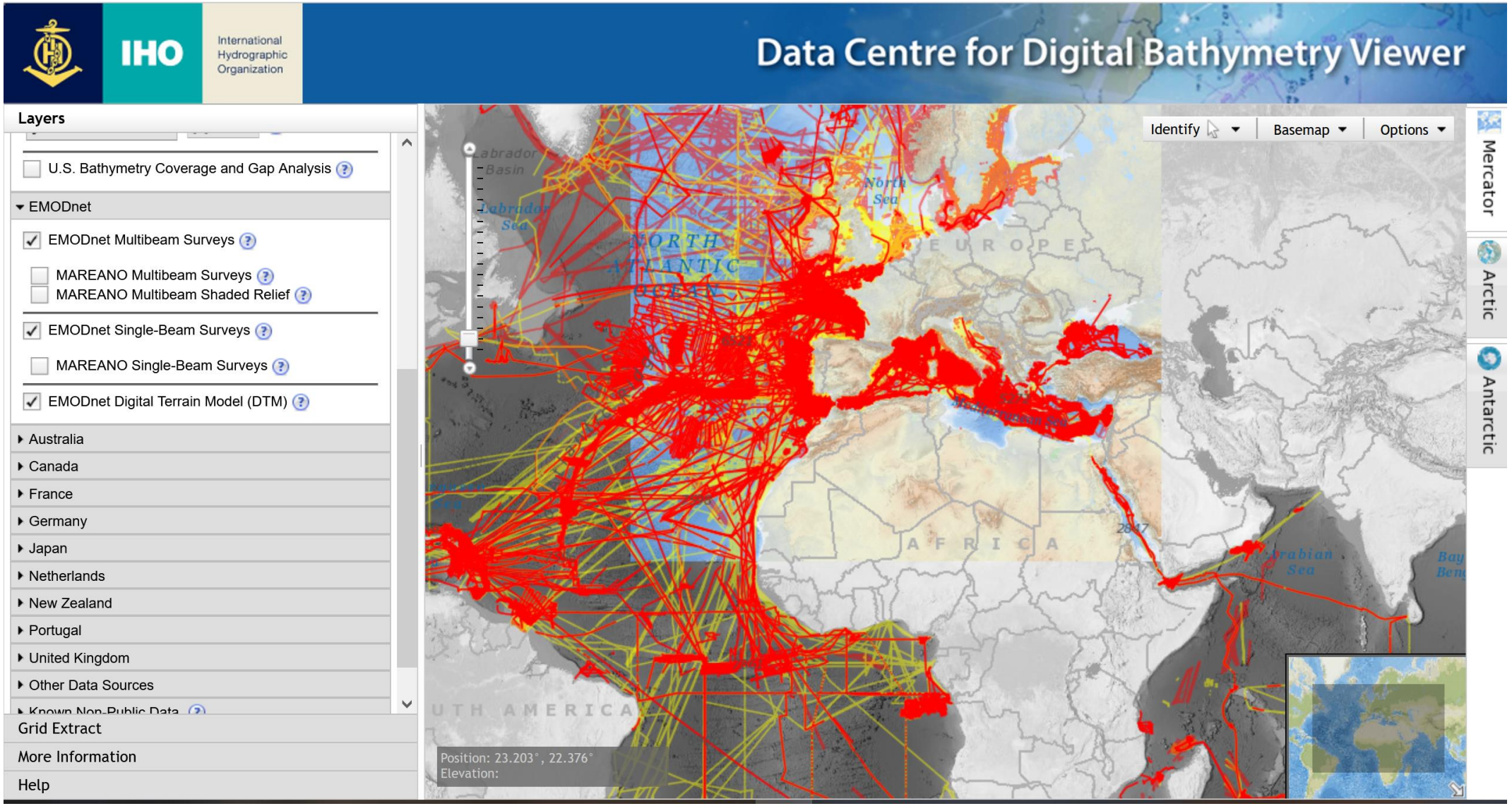
International collaboration with IHO, GEBCO, and Seabed 2030



https://www.ncei.noaa.gov/maps/iho_dcdb/

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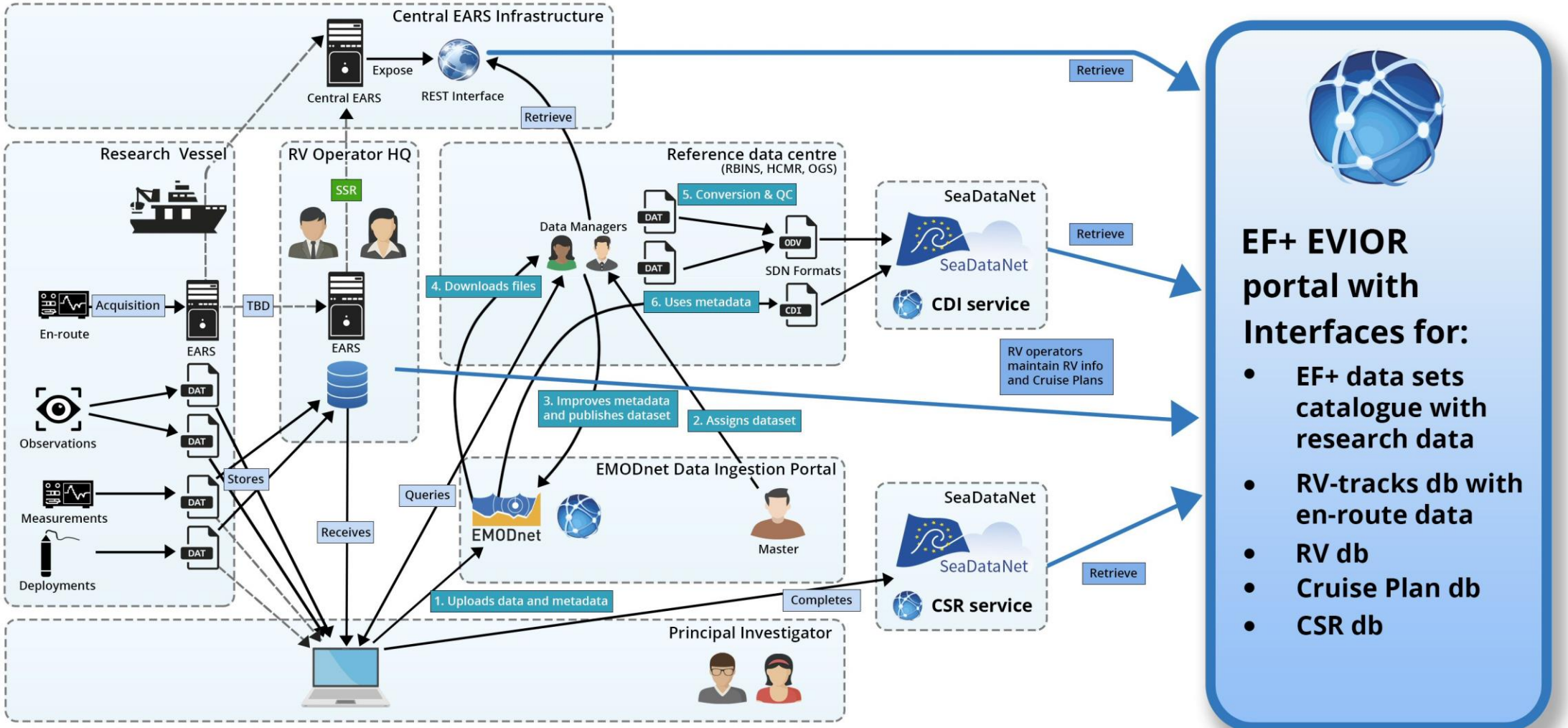
Conclusions and recommendations

BATHYMETRY

- EMODnet Bathymetry is the leading project in Europe for bathymetry and active cooperator with global GEBCO and Seabed 2030 initiatives
- EMODnet Bathymetry generates and publishes every 2 year a new release of the highly popular EMODnet DTM and associated data products
- The EMODnet DTM has thousands of regular users from government, research, education, and industry with circa 40.000 DTM tiles downloaded every year and millions of OGC web services requests
- EMODnet Bathymetry World Base Layer OGC WMTS service is used as base layer for many portals worldwide
- EMODnet Bathymetry maintains the leading Discovery and Access service for bathymetry data sets from European data providers

All European collectors of bathymetry survey data sets are strongly recommended to share their data sets including metadata by populating the CDI Data Discovery & Access service as this will facilitate to update and optimize the EMODnet DTM further, while being acknowledged as data providers and originators

Implementation in Eurofleets+ of Data Management policy and scheme



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Ireland's *hydrospatial* impact -
a conversation about a resource, pushing boundaries and enabling industry

Ruaihri Strachan

Geophysical Surveyor – Green Rebel Marine

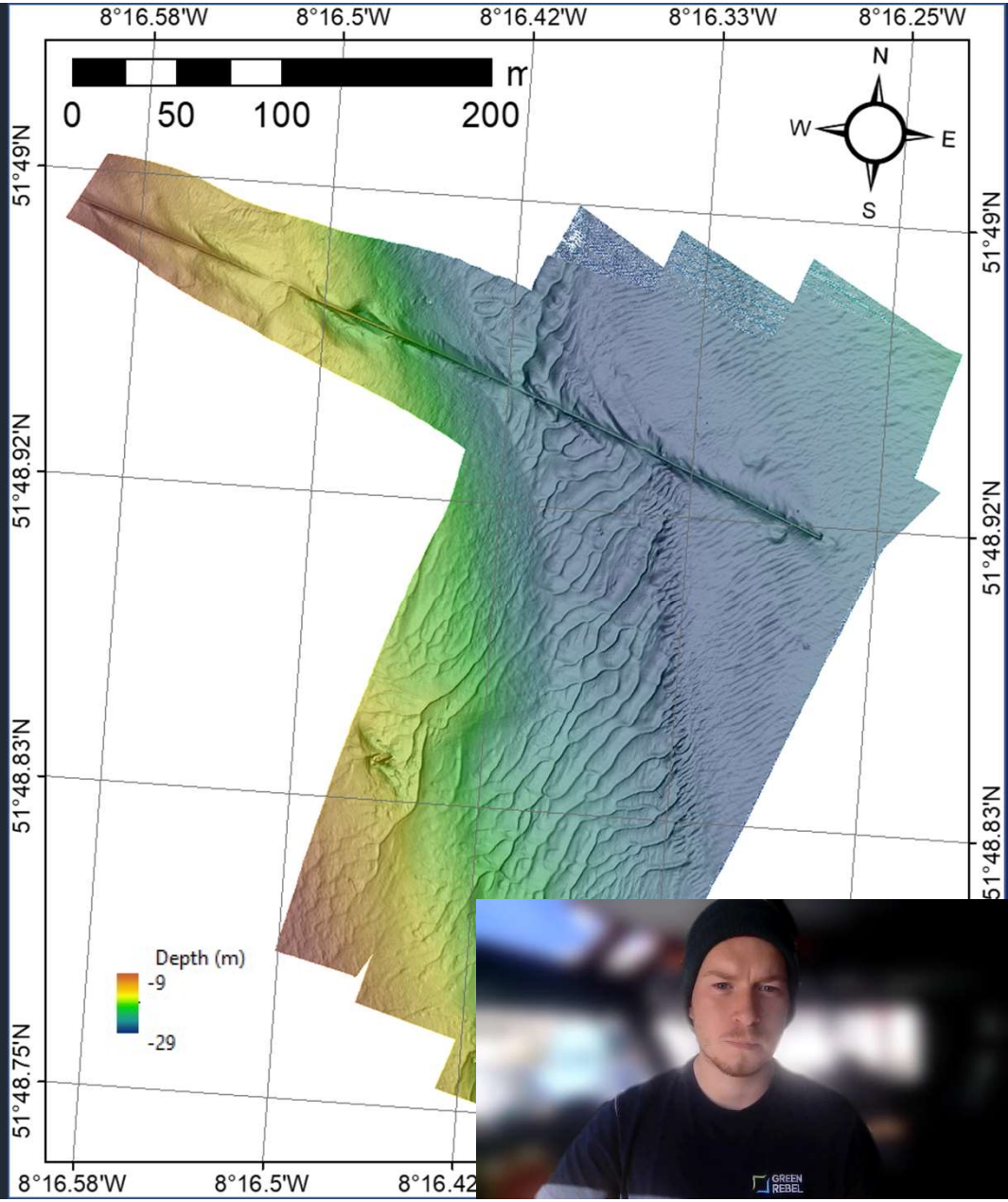
Outline:

1. Synergies in mapping programmes
2. Connecting users
3. Facilitating access to data

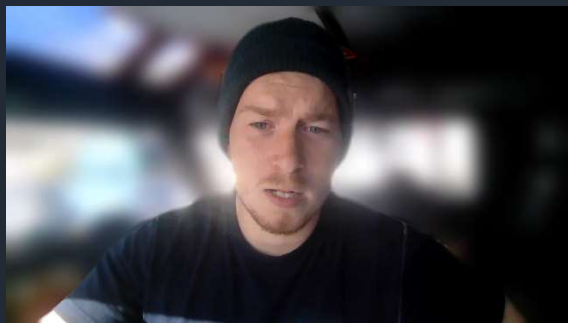
Eurofleets+ – Monday 26th September 2022

/ruaihri-strachan

GREEN REBEL



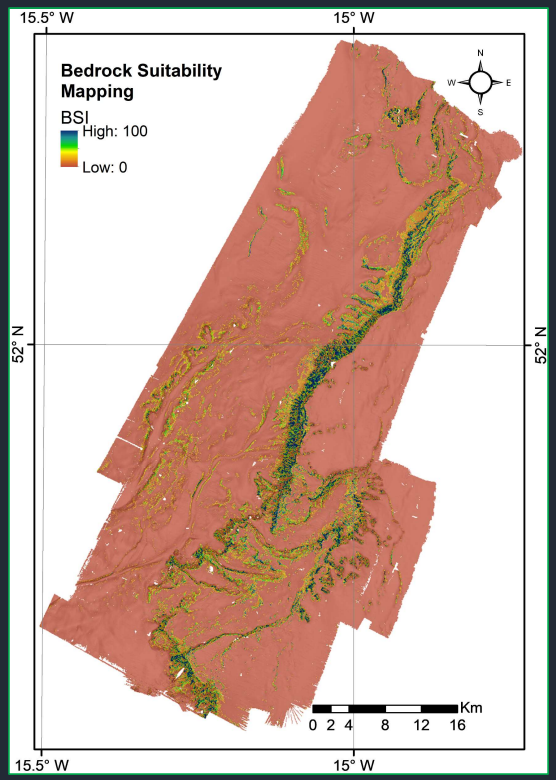
Synergies

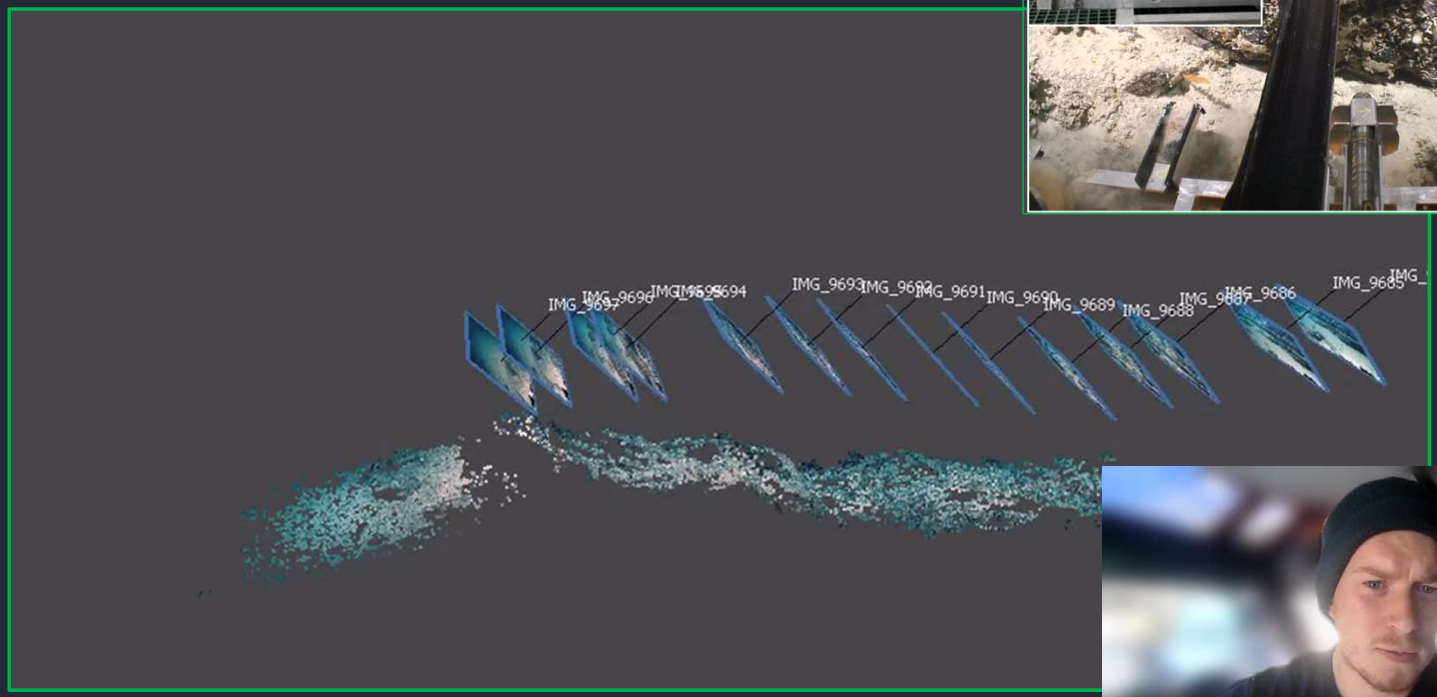


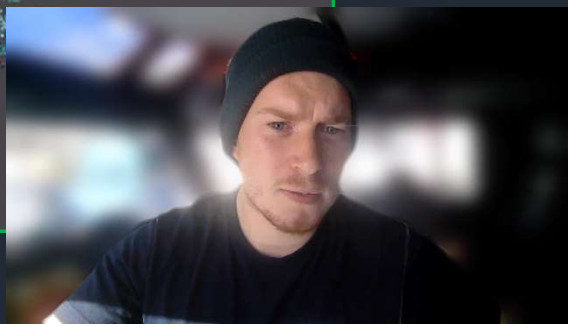
MSc Project – BeTar_drill

Bedrock Target analysis for ROV Rockdrill sampling and existing sample stratigraphic and mineralogical verification

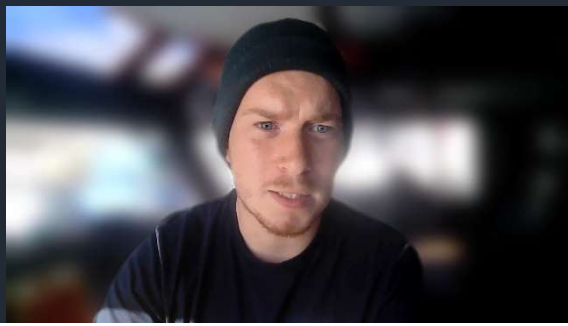
- Supervisory Team: **Dr. Aaron Lim,** Dr. Pat Meere, Dr. Richard Unitt and Prof. Andy Wheeler







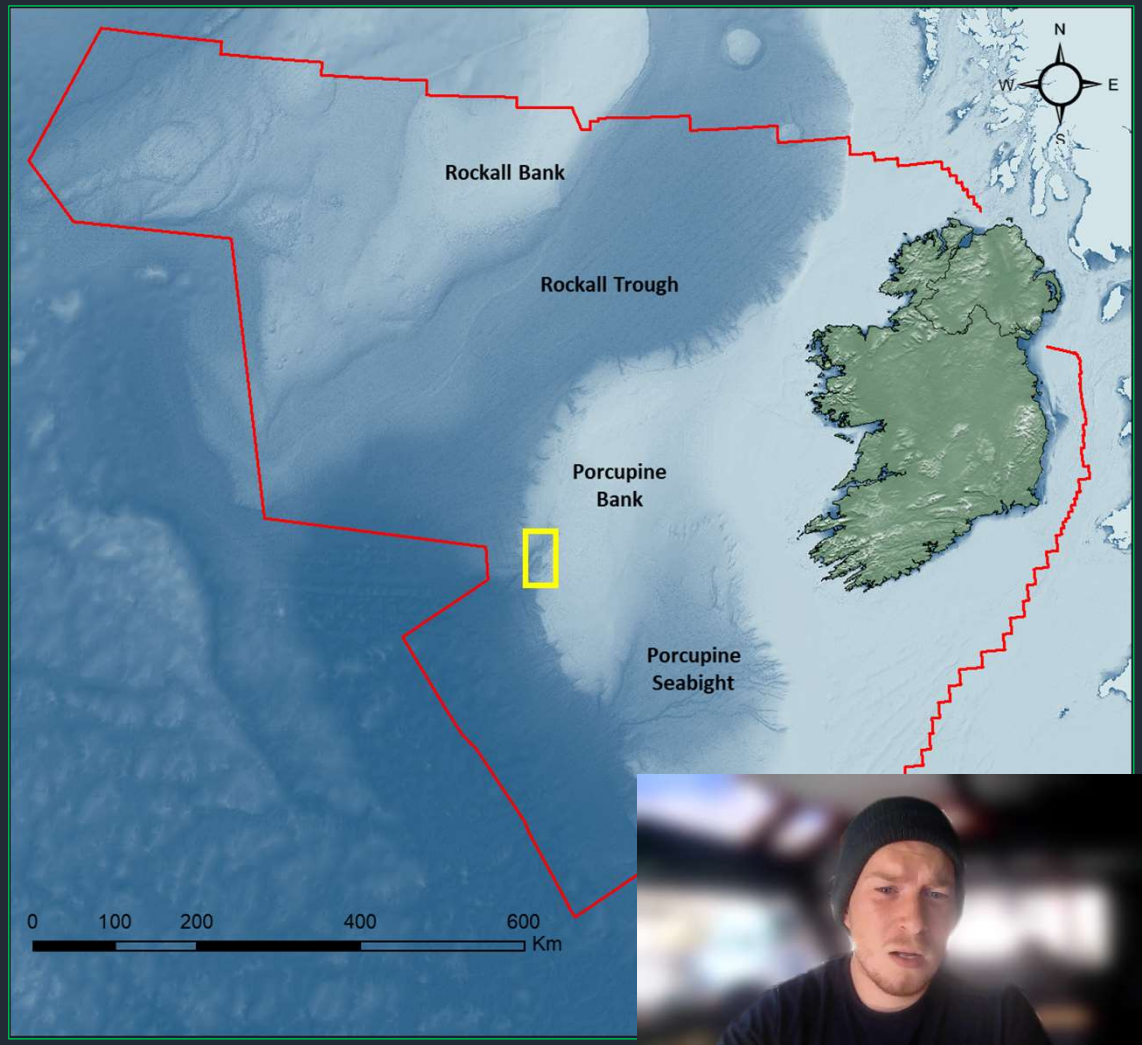
Connecting

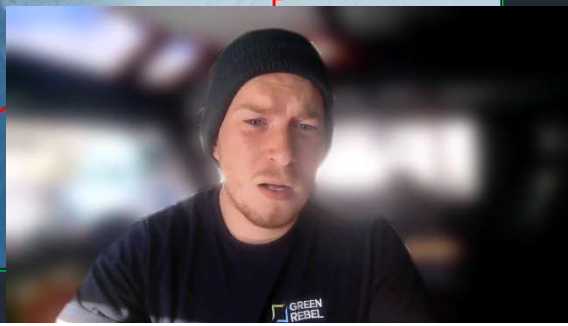


My research vessel journey:

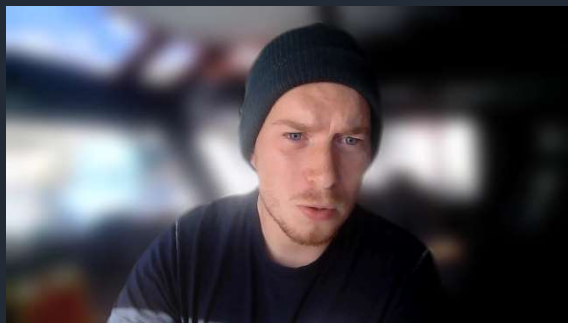
- *RV Celtic Voyager*
  - SMART Shiptime (CV18025)*
  - **Eurofleets+: Floating University (CV20003)**
  - MOVE 2 (CV21034)
- *RV Celtic Explorer*
  - Ocean Climate (CE19009)
  - MoCha_SCan II (CE19014)
  - SeaRover 2019 (CE19015)
  - SyMonS_MoM (CE20011)
- *GSI Inshore Fleet (INFOMAR)*
  - *RV Mallet*
  - *RV Lir*
  - *RV Geo*
- ***Green Rebel***
  - ***MV Roman Rebel***
  - ***MV Lady Kathleen***

EMODNET



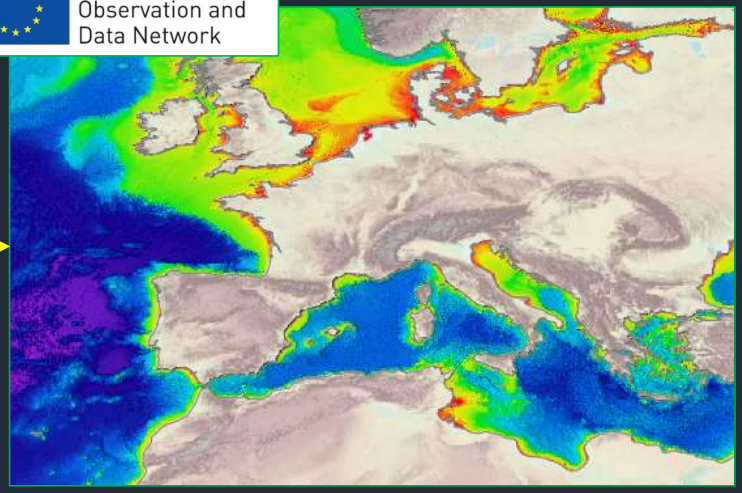


Facilitating



EMODnet

European Marine Observation and Data Network



THE NIPPON FOUNDATION-GEBCO SEABED 2030

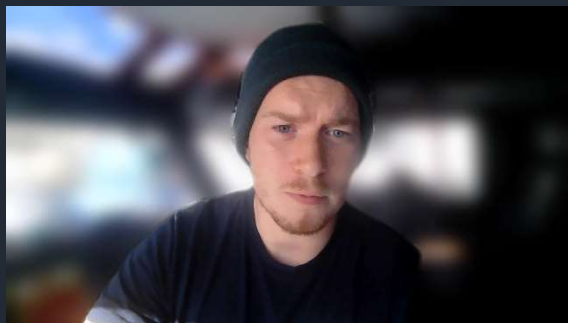
NEANIAS

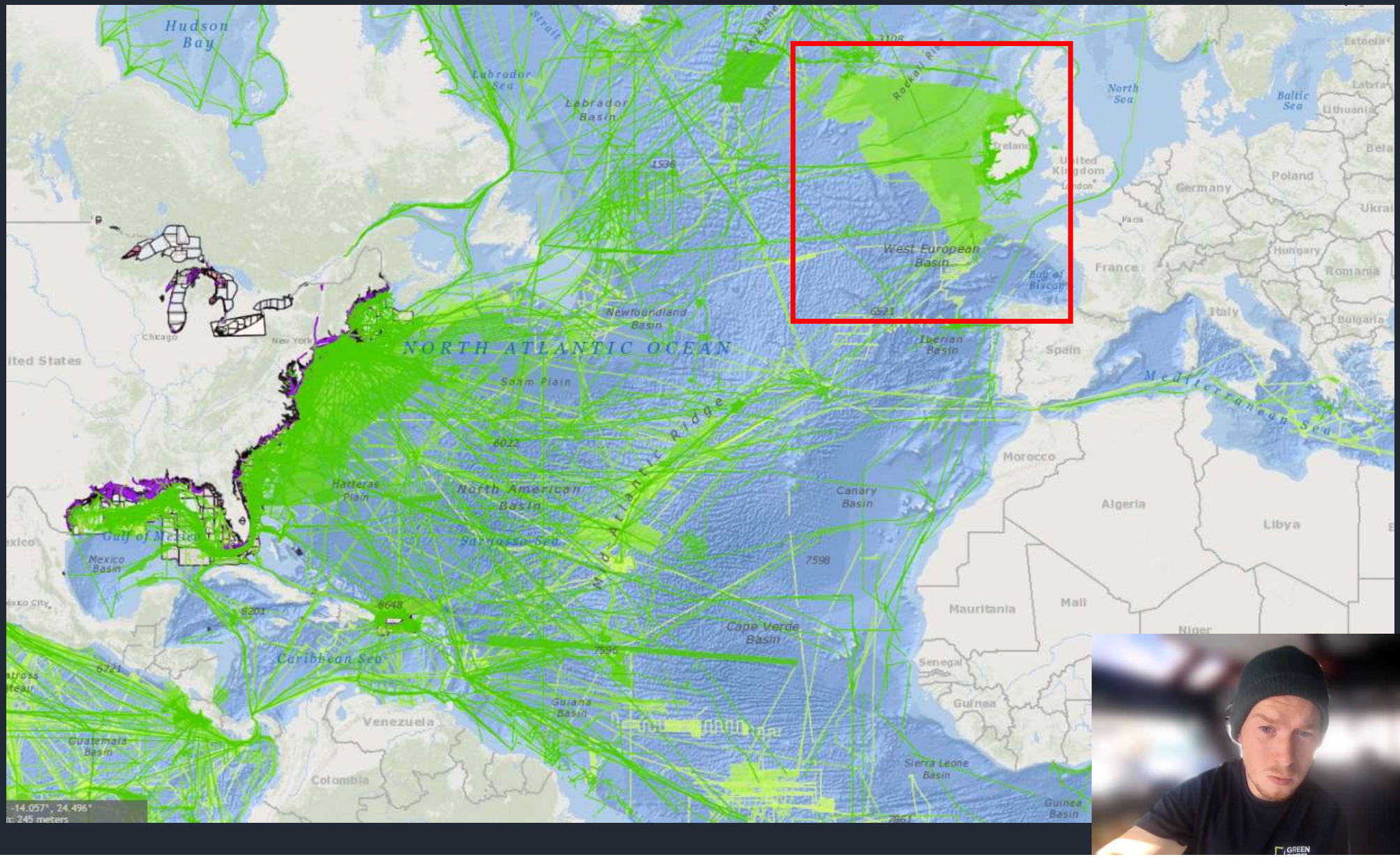
UW-BAT

NOAA

National Centers for Environmental Information

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION




Hudson Bay
Labrador Sea
Labrador Basin
1536
Newfoundland Basin
NORTH ATLANTIC OCEAN
Sohm Plain
6022
Hatteras Plain
North American Basin
Sargasso Sea
Mid-Atlantic Ridge
Gulf of Mexico
Mexico Basin
8201
8648
Caribbean Sea
6721
Guatemala Basin
Venezuela
Colombia
Guiana Basin
7596
Cape Verde Basin
Canary Basin
7598
Iberian Basin
West European Basin
6521
Bay of Biscay
Rockall Plateau
Ireland
United Kingdom
London
North Sea
Baltic Sea
Estonia
Latvia
Lithuania
Germany
Poland
Paris
France
Hungary
Romania
Italy
Spain
Morocco
Algeria
Libya
Mauritania
Mali
Niger
Senegal
Guinea
Sierra Leone Basin
Guinea Basin
Chicago
New York
Mexico City
-14.057°, 24.496°
245 meters

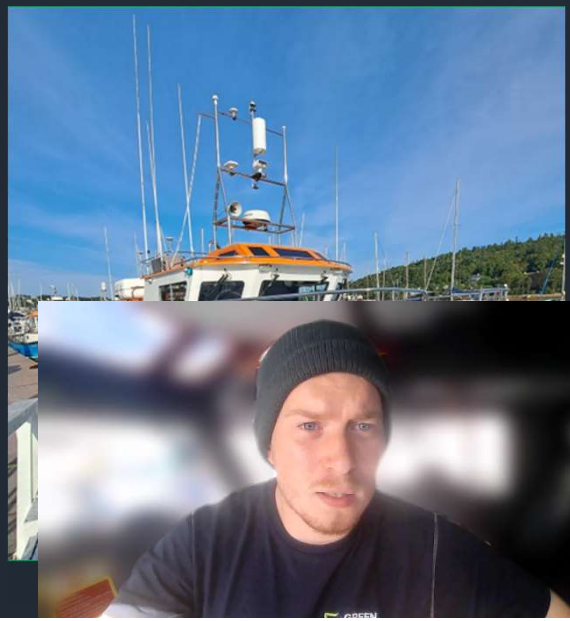
Thank You

- RV *Celtic Voyager* and RV *Celtic Explorer*
- *Holland 1* ROV
- RV Mallet, RV Lir and RV Geo
- RV Roman Rebel and RV *Lady Kathleen*
- UCC (Aaron and MGRG)
- Eurofleets+

ruaihri.strachan@greenrebel.ie

GREEN REBEL

Dream Team – SyMonS_MoM



@Luke O'Reilly