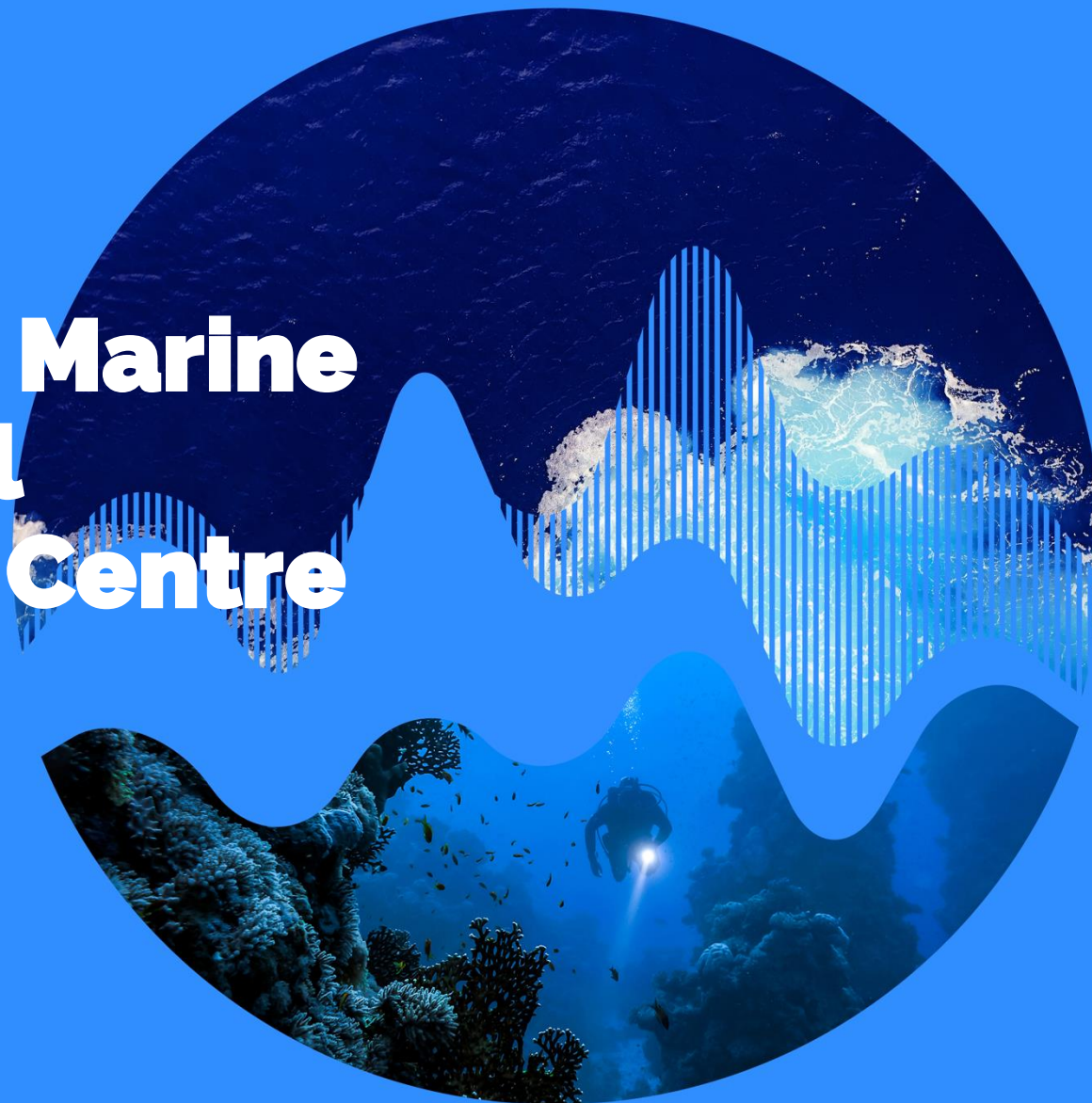


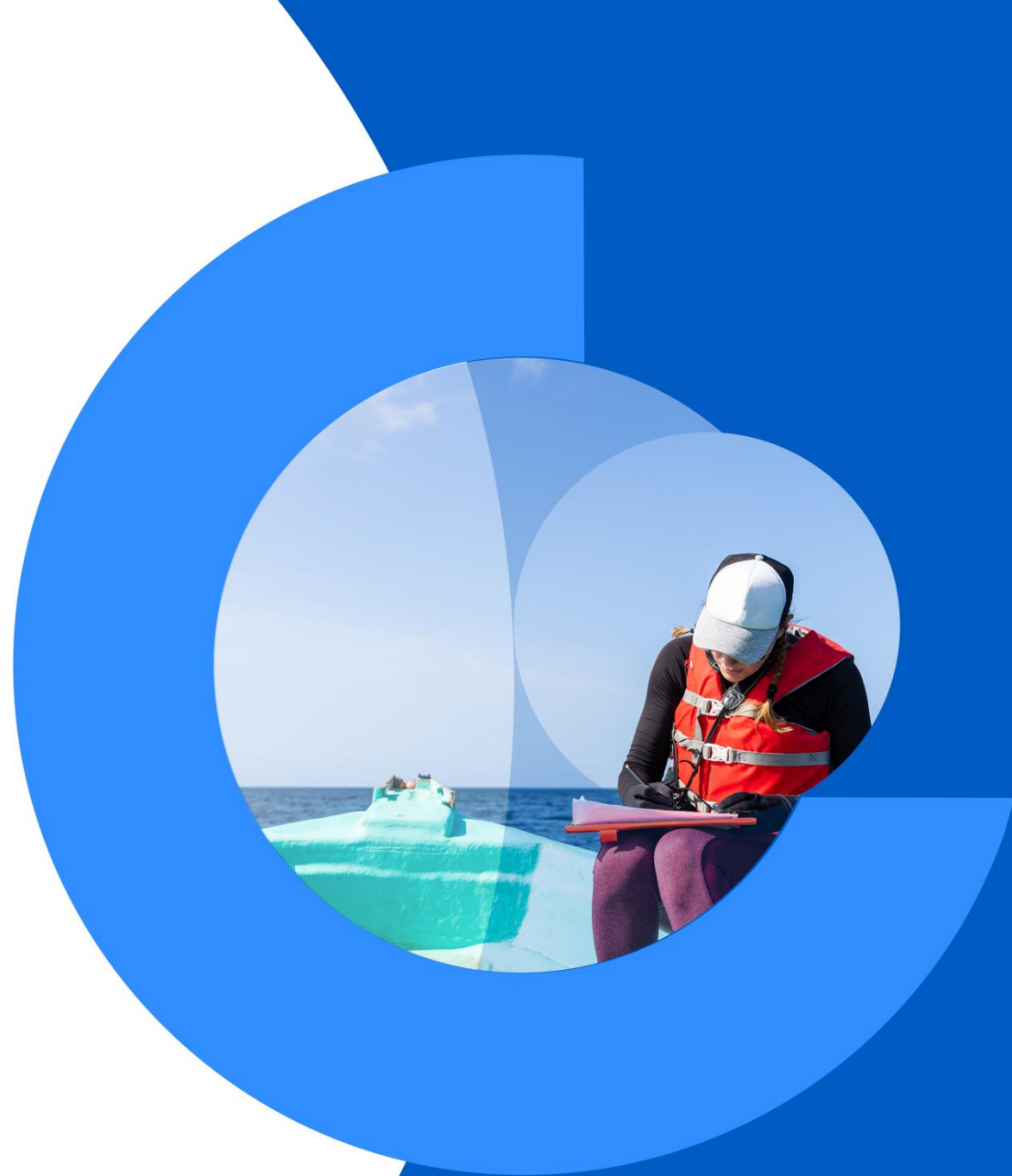
European Marine Biological Resource Centre (EMBRC)

04/04/2025



EMBRC
EUROPEAN
MARINE
BIOLOGICAL
RESOURCE
CENTRE

WHAT IS EMBRC ?



Status

- Research infrastructure (RI) founded in 2013
- The European Commission grants ERIC (European Research Infrastructure Consortium) status in 2018

A research infrastructure *is an organisation that enables researchers to use facilities, resources and services to conduct ground-breaking research and foster innovation for the benefit of society. (European Commission)*

Funded by financial and in-kind contributions from member countries

A European Research Infrastructure Consortium (ERIC) *is a legal framework created by the European Commission to facilitate the establishment and operation of research infrastructures, as key pillars of knowledge and innovation hubs responding to global scientific and societal challenges. (ERIC Forum)*

25 ERICs in total in Europe



Composition

EMBRC aims to meet
the UN Sustainable
Development Goals :



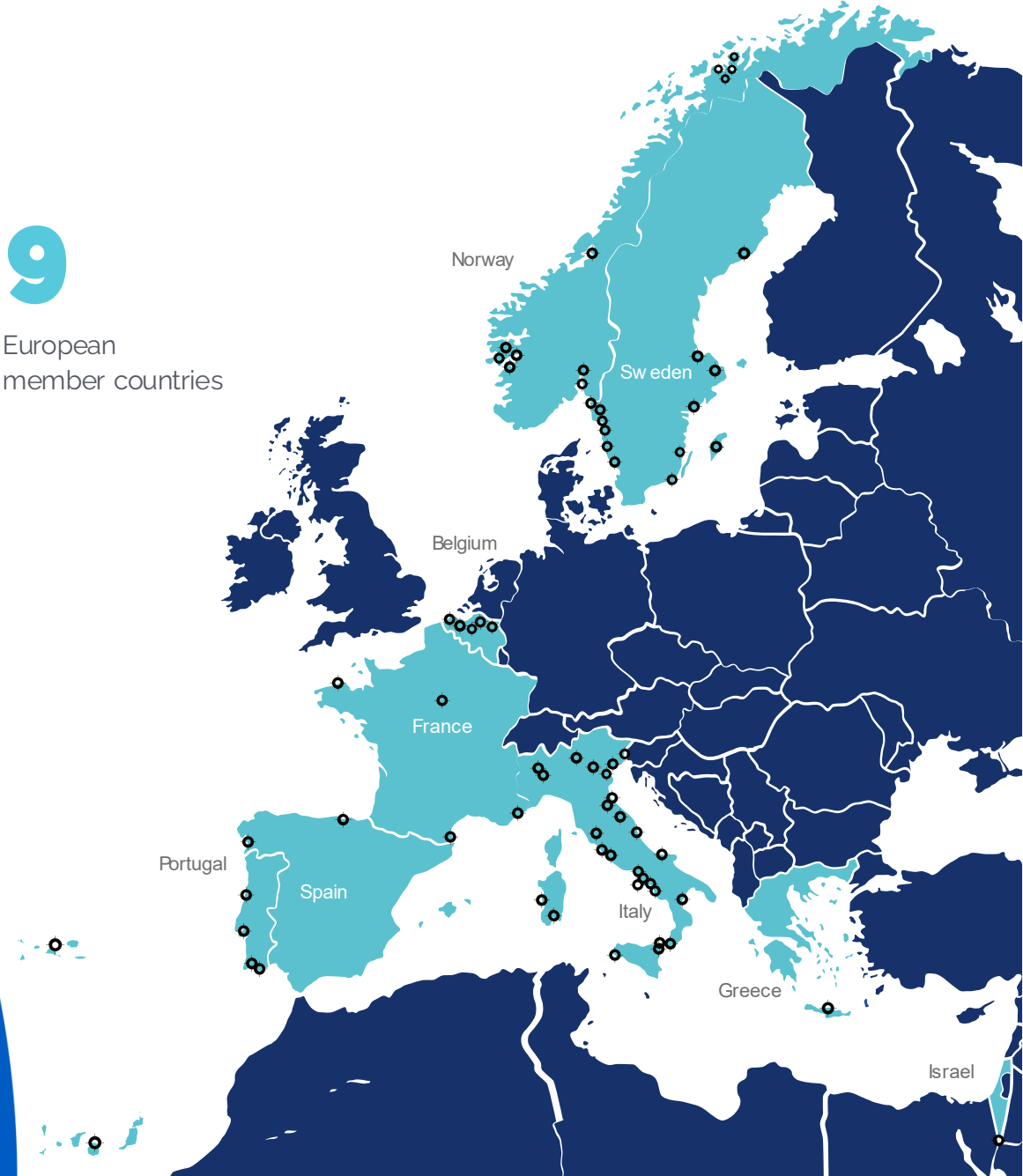
70

EMBRC
marine sites



9

European
member countries



OUR VISION AND MISSIONS





***We advance
the understanding of life
in the oceans and sustainably
harness its potential
for the benefit of humankind***

04/04/2025

We promote open science to support marine research globally

- By providing access to marine ecosystems and its biodiversity as well as research facilities to academic and industrial researchers globally.
- By following inclusive, global standards and sustainable practices.

We deepen scientific knowledge

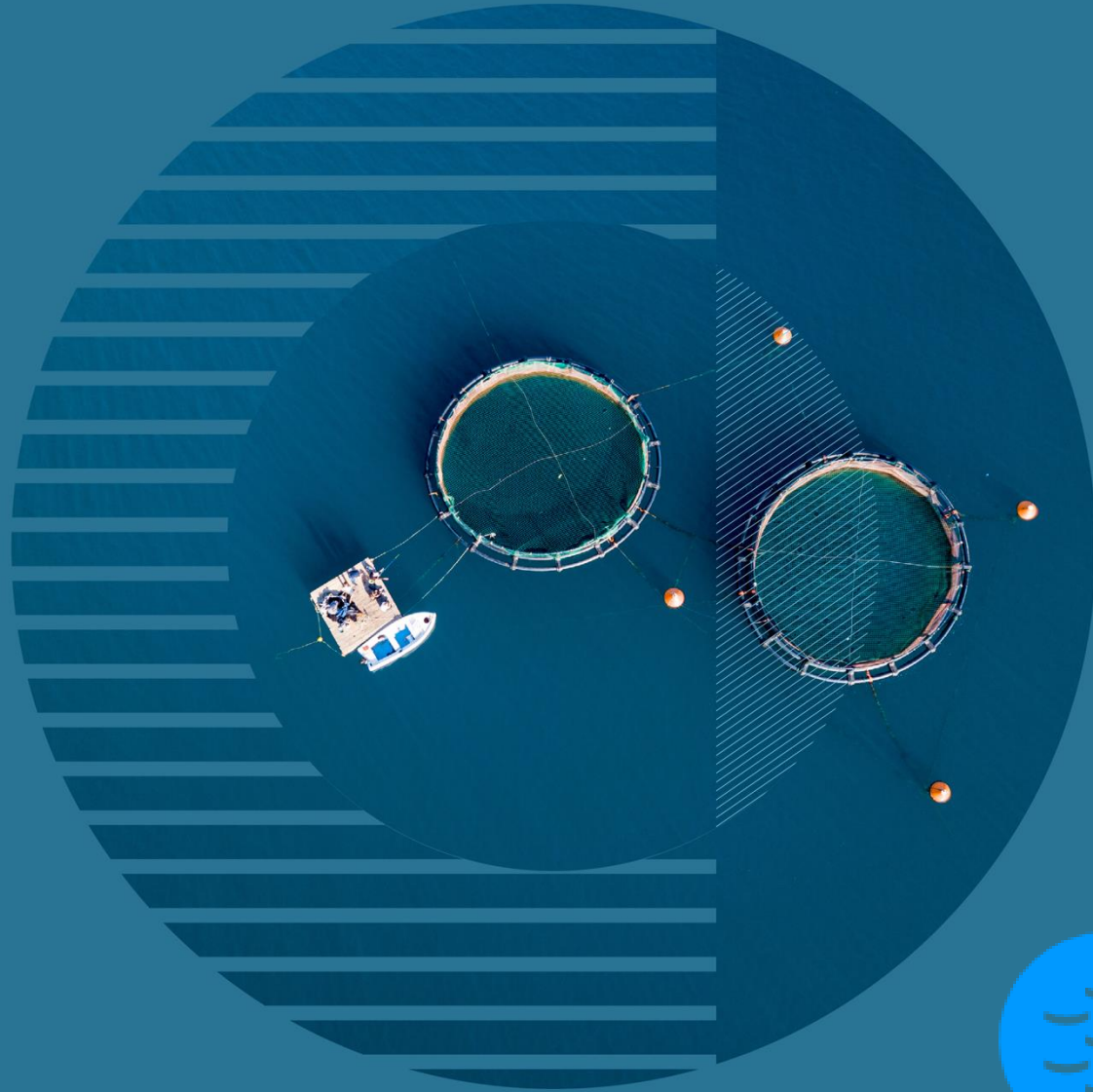
- By exploring marine biodiversity and ecosystems.
- By enhancing global marine observation.
- By developing genomics (based on DNA methods) for exploring marine biodiversity.

We support a sustainable blue economy

- By fostering a sustainable use of life in the oceans.
- By interacting with European and international policymakers.
- By promoting interaction between academic researchers and industries.

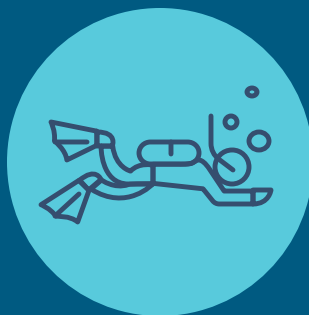


OUR SERVICES



EMBRC
EUROPEAN
MARINE
BIOLOGICAL
RESOURCE
CENTRE

EMBRC advances research in marine biology and ecology by providing cutting-edge services for scientists (academia and industries) through its network of marine stations.



**Ecosystem
access**



**Experimental
facilities**



**Biological
resources**



**Technology
platforms**

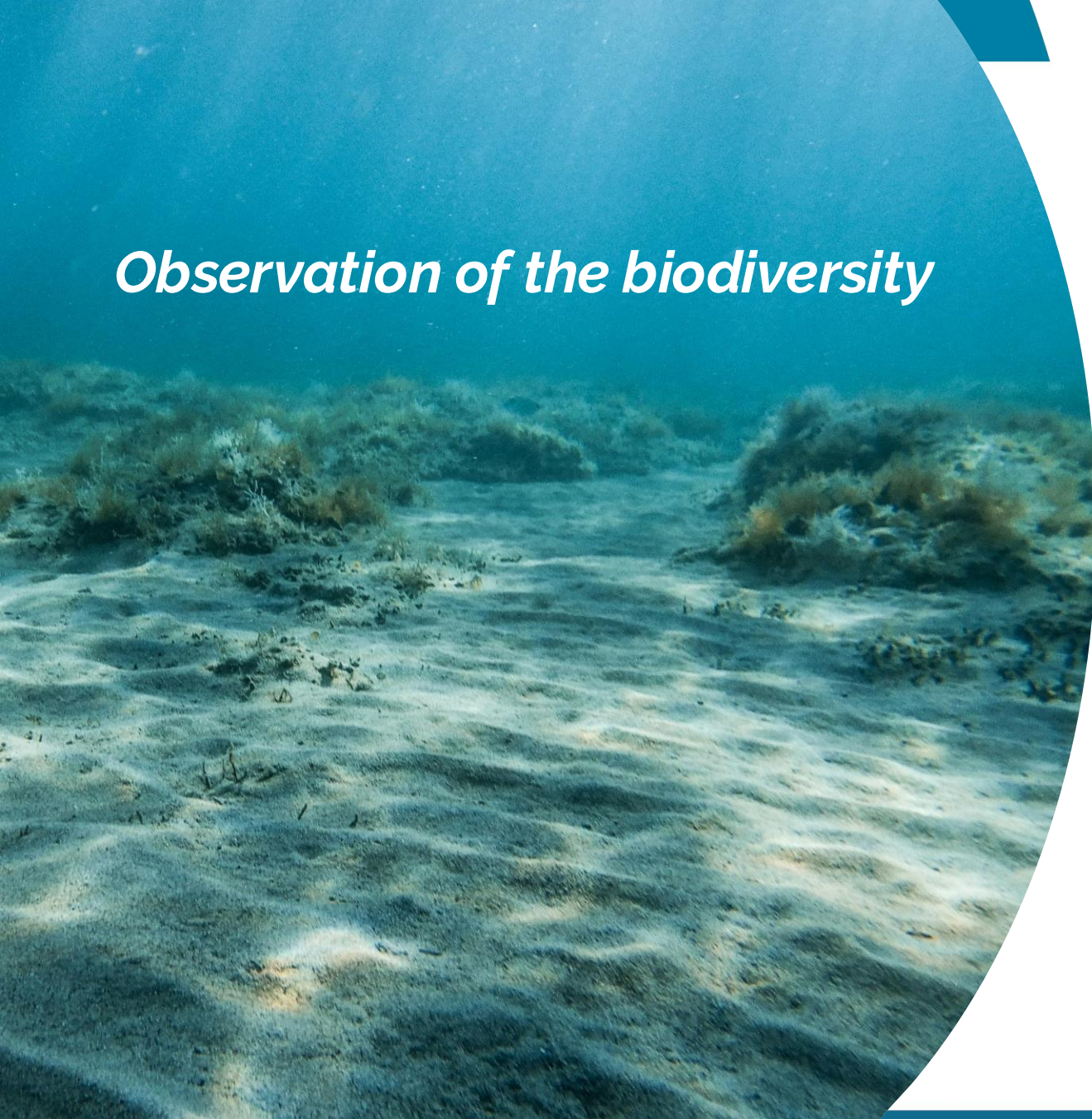


E-services



**Supporting
facilities**



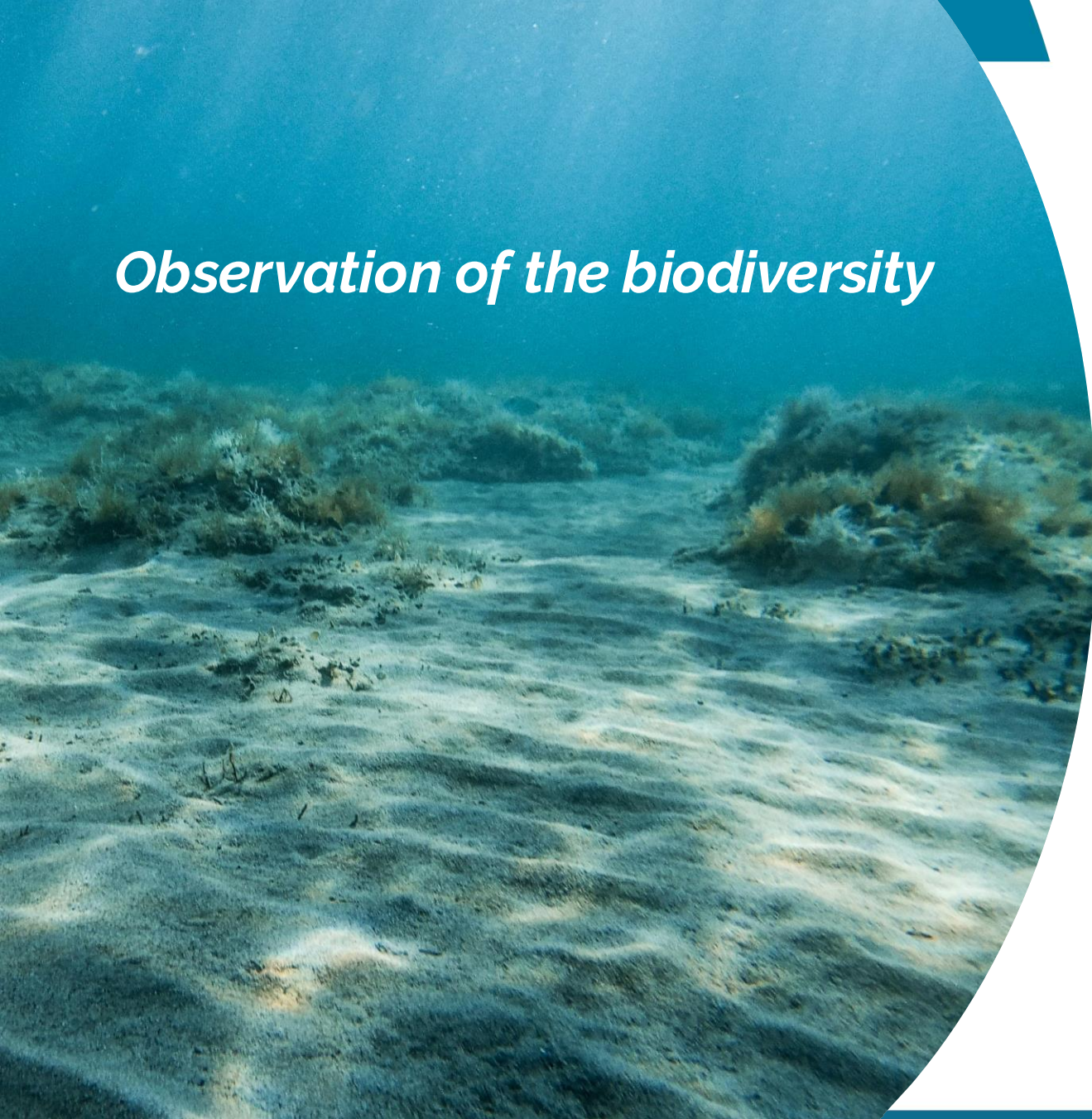


Observation of the biodiversity

Marine Biodiversity

- Core component of the ocean system
- Ecosystem sustainment
- Connected to society services (oxygen, food, economy)





Observation of the biodiversity

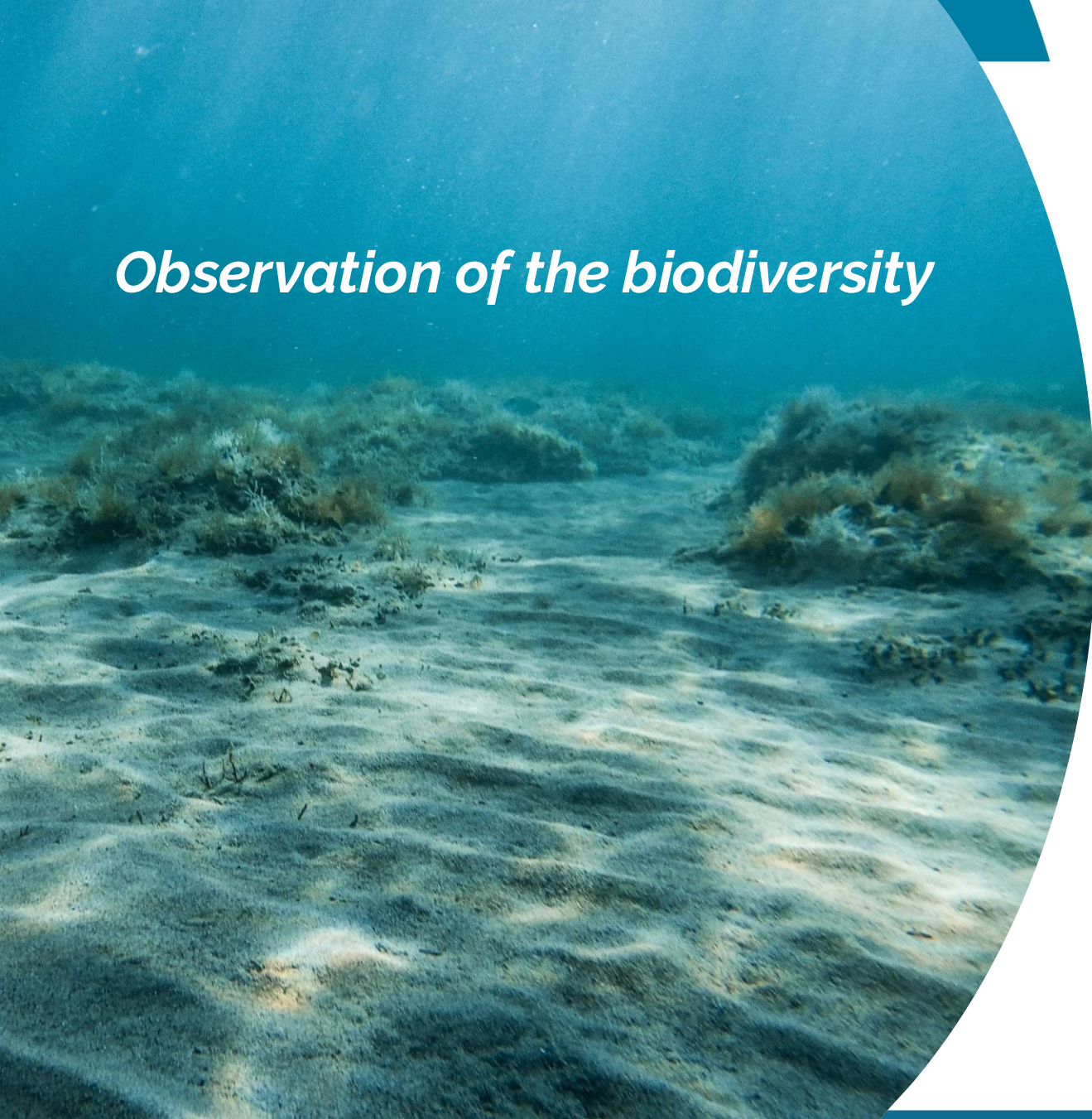
Marine Biodiversity

- Core component of the ocean system
- Ecosystem sustainment
- Connected to society services (oxygen, food, economy)

Protection & restoration of biodiversity

- In policies [Green Deal | Biodiversity strategy | Biodiversity Strategy | UN Decade of Ocean Science for Sustainable Development]
- Special mention to biodiversity observation





Observation of the biodiversity

Marine Biodiversity

- Core component of the ocean system
- Ecosystem sustainment
- Connected to society services (oxygen, food, economy)

Protection & restoration of biodiversity

- In policies [Green Deal | Biodiversa strategy | Biodiversity Strategy | UN Decade of Ocean Science for Sustainable Development]
- Special mention to biodiversity observation

However...

- the capacity for biological observation is not as standardized as for the rest of the ocean scientific disciplines
- Marine biodiversity data → fragmented & hypothesis driven





EMO BON

EUROPEAN
MARINE
OMICS
BIODIVERSITY
OBSERVATION
NETWORK





EMO BON

EUROPEAN
MARINE
OMICS
BIODIVERSITY
OBSERVATION
NETWORK

EMO BON

European Marine Omics
Biodiversity Observation Network

↓
1st

coordinated genomic
observatory in Europe

↓
17

participating
marine sites

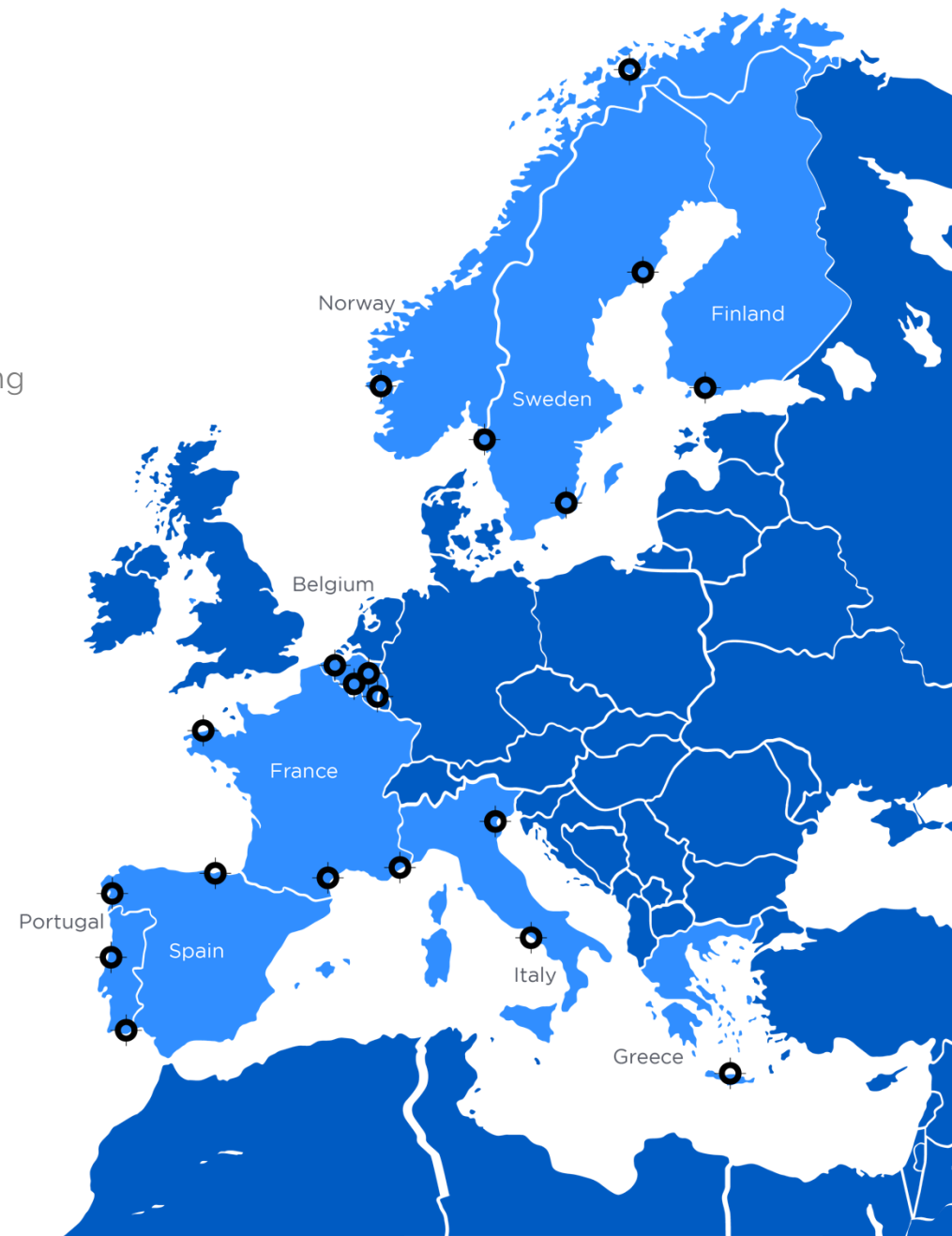


20

• Partner
institutes

9

Participating
countries



EMO BON Objectives

- **Long-term**

min 5 year of data collection

- **Comparable biodiversity data**

standardized methods
(from conception to publication)

- **Framework for genomic observation**

procedures, (meta)data standards, regulations

- **Contribute to the global biodiversity observation networks**

open data, International networks (OmicBON, OBON)

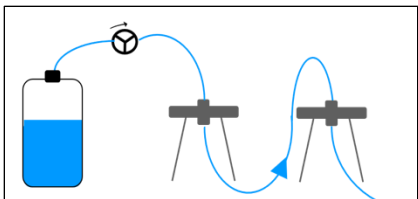


EMO BON – sample collection

Water Column



- ▶ Bimonthly sampling
- ▶ Microbial community
- ▶ 3-200 & 0.2-3 μm size fractions
- ▶ Metagenomics



Soft Substrates



- ▶ **Microbial community**
 - Bimonthly sampling
 - Metagenomics
- ▶ **Meio- & macro-benthos**
 - 2-3 samplings a year
 - COI & 18S metabarcoding

Hard Substrates



- ▶ Passive sampling using Autonomous Reef Monitoring Structures (ARMS) units
- ▶ Long term (12-month deployment)
- ▶ Sessile and motile organisms
- ▶ COI & 18S metabarcoding

EMO BON Handbook

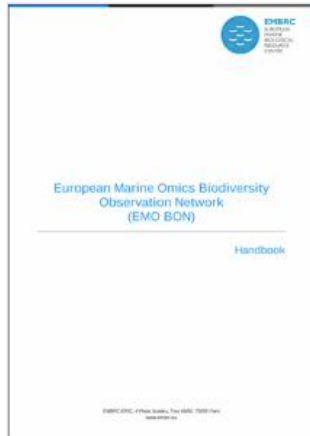
- in detail



Repository of community practices in Ocean Research, Applications and Data/Information Management

🏠 Repository OceanBestPractices / ⇒ EMBRC: European Marine Biological Resource Centre / European Marine Omics Biodiversity
/ EMO BON Practices / View Item

European Marine Omics Biodiversity Observation Network (EMO BON) Handbook (Version 1.0).



The European Marine Omics Biodiversity Observation Network (EMO BON) is a European initiative from the European Marine Biological Resource Centre (EMBRC) to establish a coordinated, long-term biodiversity observatory. Currently there are many ongoing genomic observation stations in Europe. The goal for EMO BON is to support the individual marine biodiversity observatories within EMBRC and connect them under one centrally coordinated network, with shared protocols, data, and metadata standards. EMBRC provides the context and opportunity for partner institutions to participate and complement EMO BON by initiating biodiversity observation stations. EMO BON includes marine stations from Polar regions to the Red Sea that will sample for genomic marine biodiversity at frequent intervals. This network will contribute to the United Nations Decade of Ocean Science for Sustainable Development and aims to be an important European component to the global ocean observation networks. Collection of

Resource URL
<https://www.embrc.eu/emo-bon>
<https://www.embrc.eu/>

Publisher
EMBRC-ERIC
Paris, France

Document Language
en

View/Open
📄 PDF (1.334Mb)

Date
2021

Sampling protocols

- ≈ Seawater 0.2 - 3 µm & 3 - 200 µm
- ≈ Seawater > 20 µm
- ≈ Seawater > 200 µm
- ≡ Sediment microorganisms
- ≡ Sediment meiobenthos
- ≡ Sediment macrobenthos
- ⌘ Hard substrate passive sampling (ARMS)

Data labelling

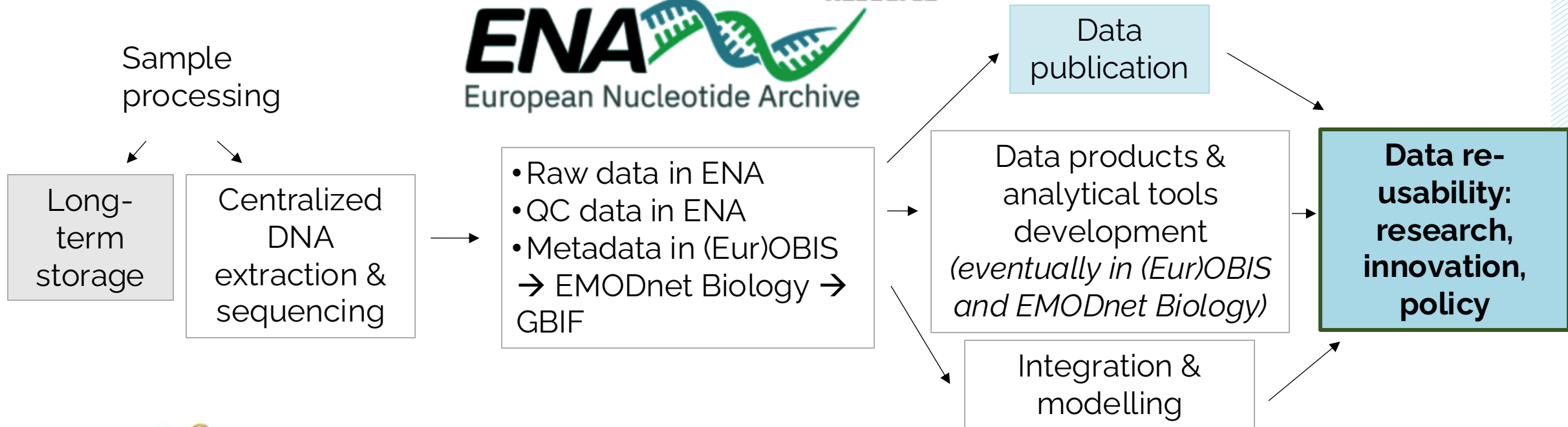
Metadata

DNA extraction & sequencing

Calibration efforts

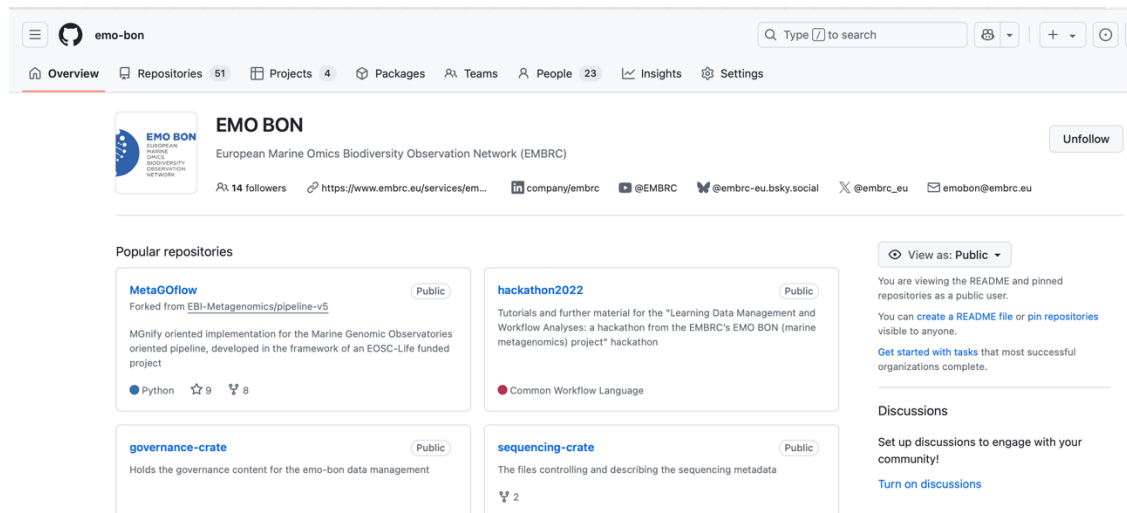
<https://repository.oceanbestpractices.org/handle/11329/1738>

EMO BON – data flow



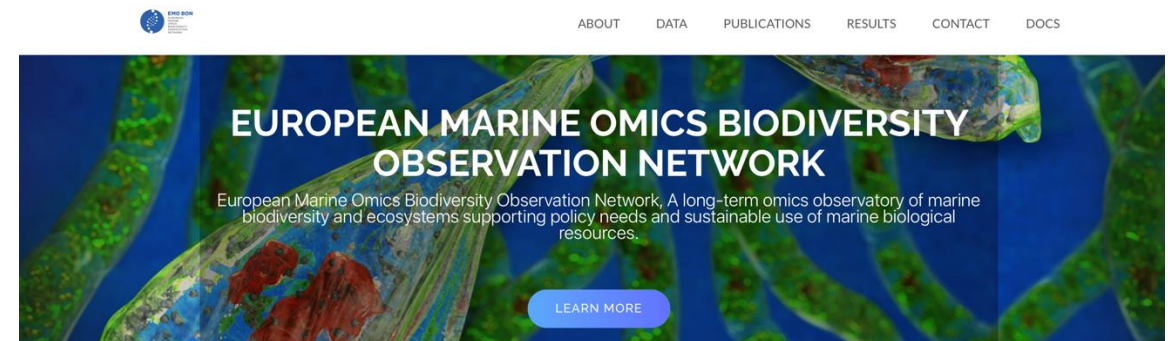
EMO BON – data management

<https://github.com/emo-bon>



The screenshot shows the GitHub repository page for EMO BON. The repository is named "EMO BON" and is described as the "European Marine Omics Biodiversity Observation Network (EMBR)". It has 14 followers and a link to the website "https://www.embr.eu/services/em...". The page lists four popular repositories: "MetaGOflow" (forked from EBI-Metagenomics/pipeline-v5), "hackathon2022" (tutorials and material for a hackathon), "governance-crate" (holds governance content), and "sequencing-crate" (files controlling and describing sequencing metadata). The page also includes a "Discussions" section with a link to "Turn on discussions".

<https://data.emobon.embrc.eu>



The screenshot shows the homepage of the EMO BON website. The header includes the EMO BON logo and navigation links: ABOUT, DATA, PUBLICATIONS, RESULTS, CONTACT, and DOCS. The main banner features a large image of a marine organism with the text "EUROPEAN MARINE OMICS BIODIVERSITY OBSERVATION NETWORK" and a description: "European Marine Omics Biodiversity Observation Network, A long-term omics observatory of marine biodiversity and ecosystems supporting policy needs and sustainable use of marine biological resources." A "LEARN MORE" button is visible in the bottom right corner of the banner.

ABOUT US

A LONG-TERM OMICS OBSERVATORY OF MARINE BIODIVERSITY



EMO BON – data management plan

🏠 Repository OceanBestPractices / ⇒ EMBRC: European Marine Biological Resource Centre / European Marine Omics Biodiversity
/ EMO BON Practices / View Item

European Marine Omics Biodiversity Observation Network (EMO BON) – Data Management Plan.



In 2021 The European Marine Biological Resource Centre European Research Infrastructure Consortium (EMBRC-ERIC, hereinafter referred as EMBRC) launched the European Marine Omics Biodiversity Observation Network (EMO BON) which aims to be the first long-term marine genomic observatory on a European scale. EMO BON is a biological observatory network built on robust methodologies that produces quality-controlled genomic data following high standards. EMO BON focuses on producing and providing access to long-term baseline genomic biodiversity data and supporting the monitoring of Essential Ocean and Biodiversity Variables (EOVs and EBVs) and ecosystem research. The project data, metadata, and their life cycle are described in this current document: the Data Management Plan (DMP). The DMP is a living document that will be updated continuously during the pilot period when the project is re-evaluated by the EMBRC General Assembly (GA) and the EMO BON Operational Committee.....

Resource URL

<https://www.embrc.eu/emo-bon>

<https://www.embrc.eu/>

<https://repository.oceanbestpractices.org/handle/11329/1918>

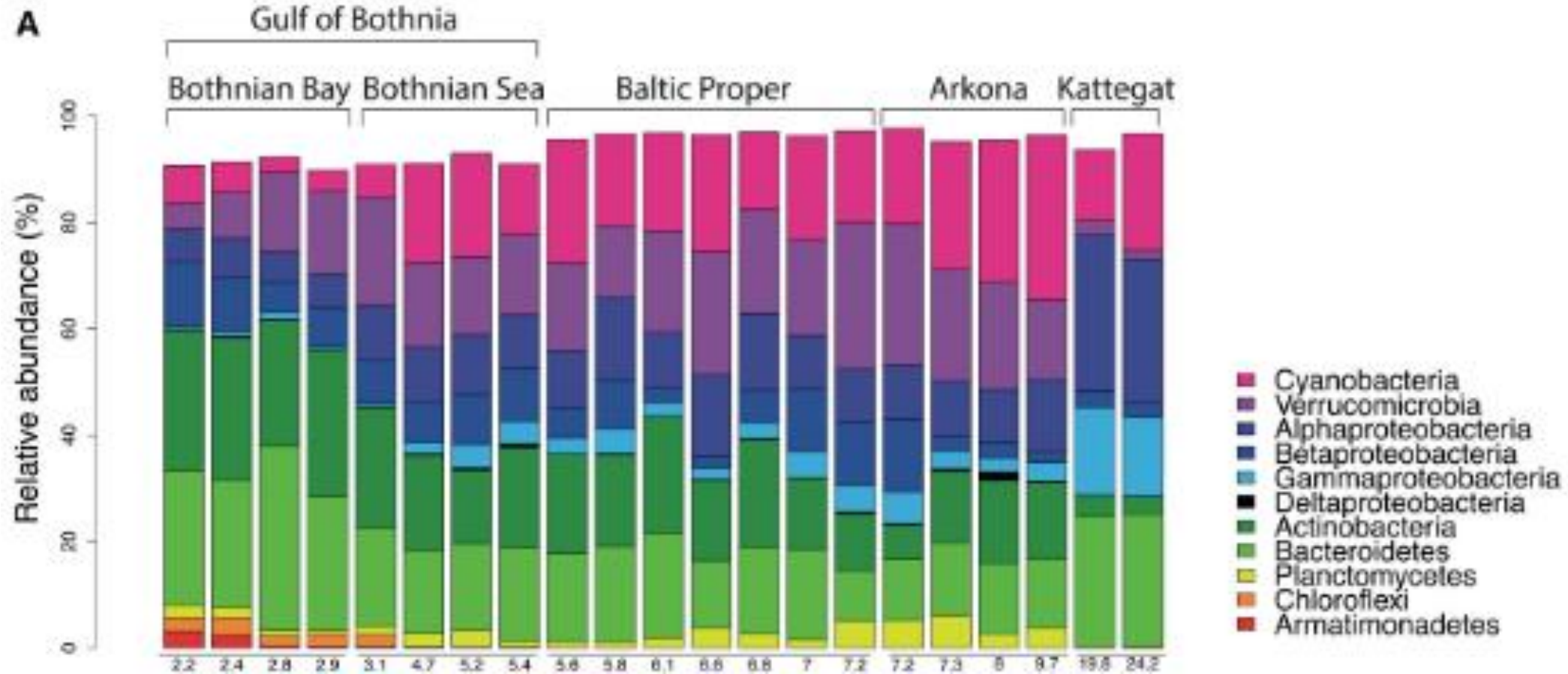


What are raw sequencing data?

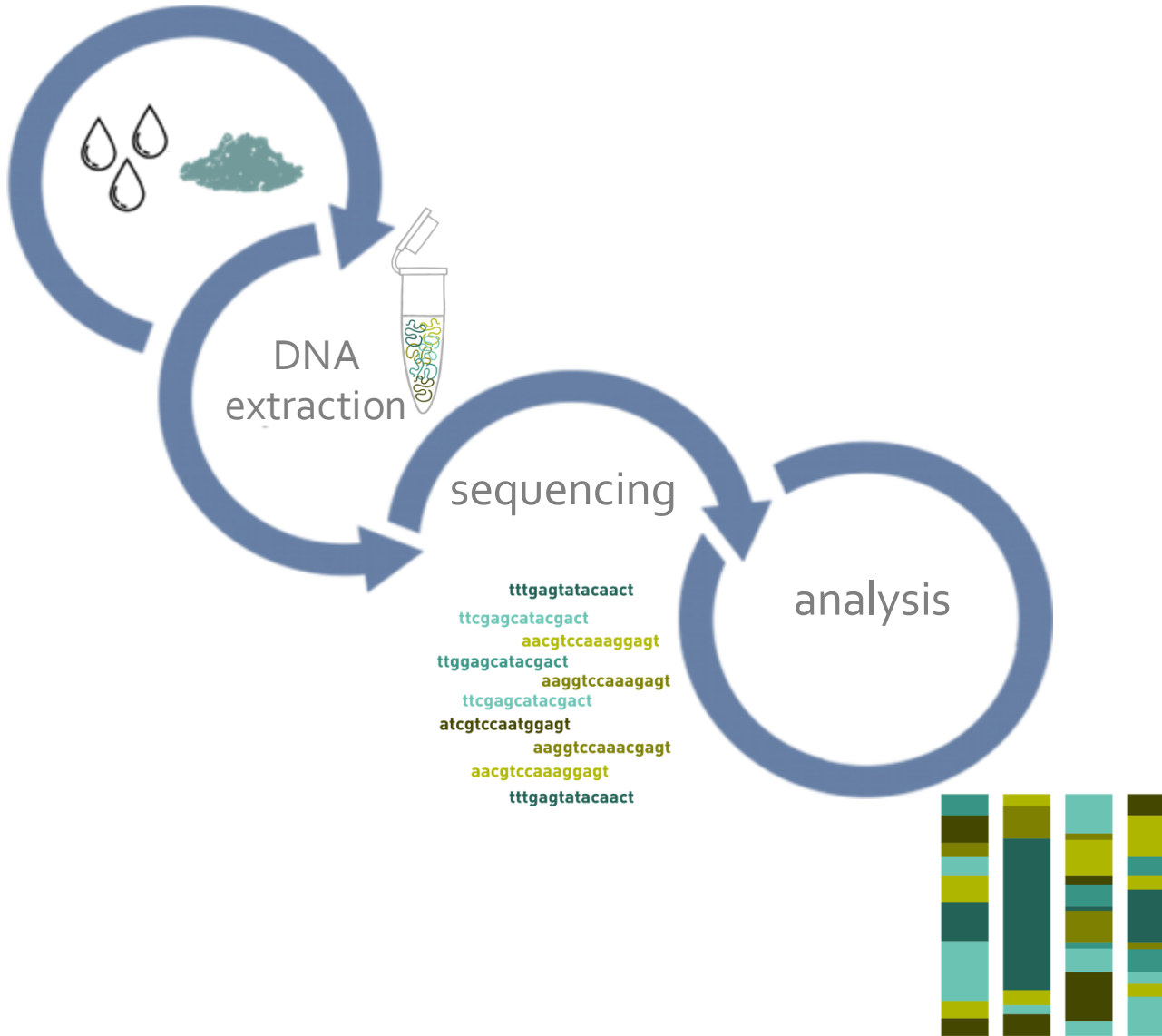


```
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+
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+
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//9;/B:@9@---
```

How do we get to this?







metaGOflow: a workflow for the analysis of marine Genomic Observatories shotgun metagenomics data



Bioinformatics Development

- Follow IOC data recommendations for FAIR data
- Development of general tools and data pipelines for environmental genomics
- Open access tools built on existing databases and e-resources



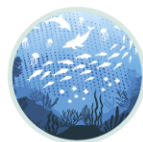
<https://metagflow.readthedocs.io/>

- used for any type of **shotgun sequencing data**
- Assigns taxonomic identification to metagenomes
- data analysis in a **timely, standardized** and **reproducible** manner
- based on the MGnify (EMBL-EBI) pipeline



<https://my.lifewatch.eu/workflow/workflow-information/arms>

- Pipeline for identifying invasive species from metabarcode
- Highlights any invasive species in the samples
- Based on WoRMS database



DTO-BioFlow
Integration of biodiversity monitoring
data into the Digital Twin Ocean



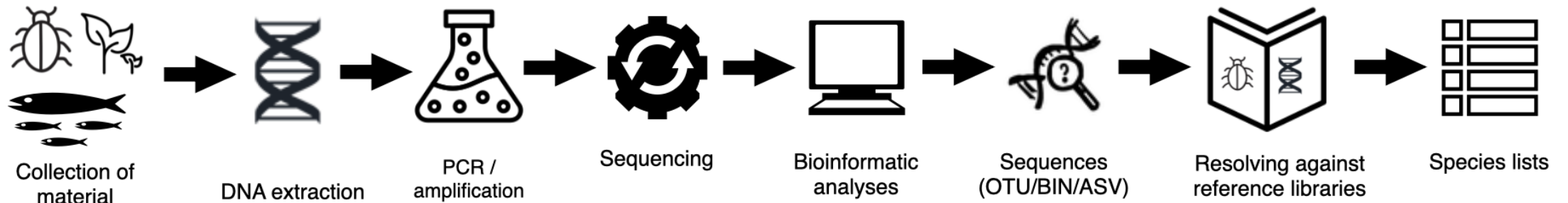
Blue-Cloud2026



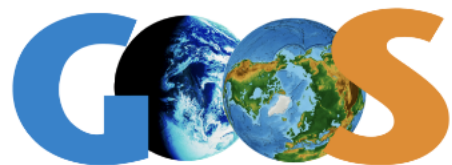
Data products in EurOBIS/EMODnet

DNA derived data extension → Darwin Core Archive

<https://docs.gbif.org/publishing-dna-derived-data/en/>



EMO BON and EOVs



The Global Ocean Observing System

Essential Ocean Variables

To be able to deliver ocean forecasts and early warnings, climate projections and assessments and protect ocean health and its benefits, it is vital to measure Essential Ocean Variables (EOVs).



EMO BON and EOVs



The Global Ocean Observing System

Biology and Ecosystems

Phytoplankton biomass and diversity

Zooplankton biomass and diversity

Fish abundance and distribution

Marine turtles, birds, mammals abundance and distribution

Hard coral cover and composition

Seagrass cover and composition

Macroalgal canopy cover and composition

Mangrove cover and composition

Microbe biomass and diversity (*pilot)

Invertebrate abundance and distribution (*pilot)



EMO BON and EOVs



The Global Ocean Observing System

Biology and Ecosystems

Phytoplankton biomass and diversity

Zooplankton biomass and diversity

Fish abundance and distribution

Marine turtles, birds, mammals abundance and distribution

Hard coral cover and composition

Seagrass cover and composition

Macroalgal canopy cover and composition

Mangrove cover and composition

Microbe biomass and diversity (*pilot)

Invertebrate abundance and distribution (*pilot)



Recent Advancements - Data Releases & Publications

Using the long-term genetic monitoring network ARMS-MBON to detect marine non-indigenous species along the European coasts

Original Paper | [Open access](#) | Published: 01 February 2025

Volume 27, article number 77, (2025) | [Cite this article](#)

Justine Pagnier ✉, Nauras Daraghmeah & Matthias Obst

metaGOflow: a workflow for the analysis of marine Genomic Observatories shotgun metagenomics data



Haris Zafeiropoulos ✉, Martin Beracochea ✉, Stelios Ninidakis, Katrina Exter, Antonis Potirakis, Gianluca De Moro, Lorna Richardson, Erwan Corre, João Machado, Evangelos Pafilis ... [Show more](#)

[Author Notes](#)

GigaScience, Volume 12, 2023, giad078, <https://doi.org/10.1093/gigascience/giad078>

Published: 18 October 2023 | [Article history](#)

Data Releases

- 1st data release (water & sediment)

<https://www.ebi.ac.uk/ena/browser/view/PRJEB51688>

- 1st data paper

<https://bdj.pensoft.net/article/143585/>



Project: PRJEB51688

- ARMS publication & data release

<https://onlinelibrary.wiley.com/doi/10.1111/1755-0998.14073>

MOLECULAR ECOLOGY RESOURCES

RESOURCE ARTICLE | [Open Access](#) |

A Long-Term Ecological Research Data Set From the Marine Genetic Monitoring Program ARMS-MBON 2018–2020

Nauras Daraghmeah, Katrina Exter, Justine Pagnier, Piotr Balazy, Ibon Cancio, Giorgos Chatzigeorgiou, Eva Chatzinikolaou, Maciej Chelchowski, Nathan Alexis Mitchell Chrismas ... [See all authors](#)

First published: 31 January 2025 | <https://doi.org/10.1111/1755-0998.14073>

Other publications

- non-indigenous species along the European coasts

<https://link.springer.com/article/10.1007/s10530-024-03503-2>

- Metagenomic Analyses Bioinformatics workflow (EOSC-Life)

<https://github.com/emo-bon/MetaGOflow>

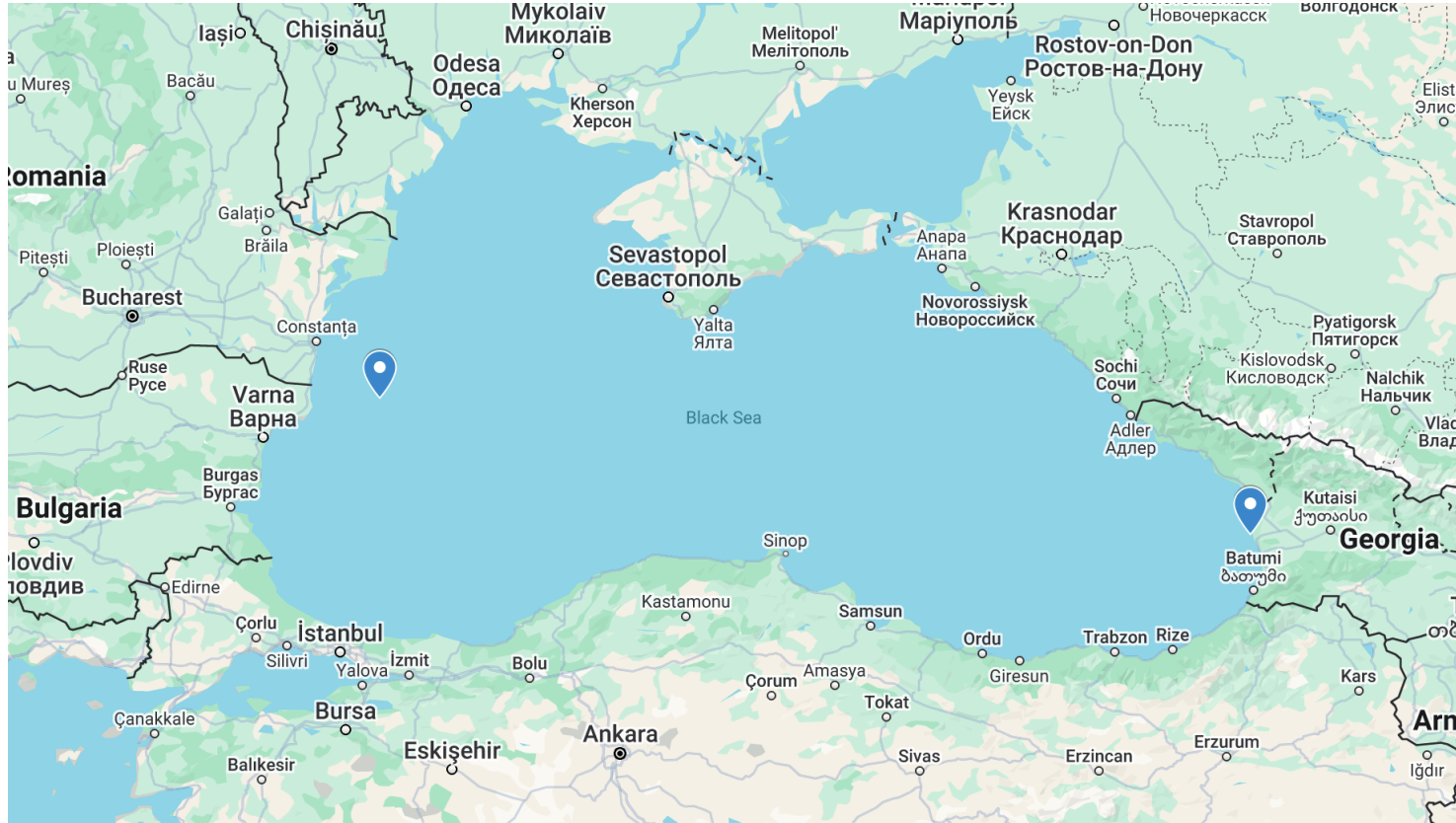
<https://doi.org/10.1093/gigascience/giad078>

emo-bon / MetaGOflow [Public](#)

forked from EBI-Metagenomics/pipeline-v5



EMO BON protocols in the Black Sea



- Water sampling
- June 2024
- Samples were collected by Laurent Tofflin and Mamuka Gvilava
- Sequencing has been completed
- Raw sequencing data will be available in ENA
- Metadata will be added in the DOORS System of Systems (SoS)



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Thank you!



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