Advanced Master in Sustainable Blue Economy

OGS National Institute of Oceanography and Applied Geophysics

UNIVERSITÀ DEGLI STUDI DI TRIESTE

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# From “good” data …. To good decisions

## From data to knowledge for sustainable blue economy

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## ❑ Why Marine Data Matters?

- Oceans regulate climate, biodiversity, and resources.

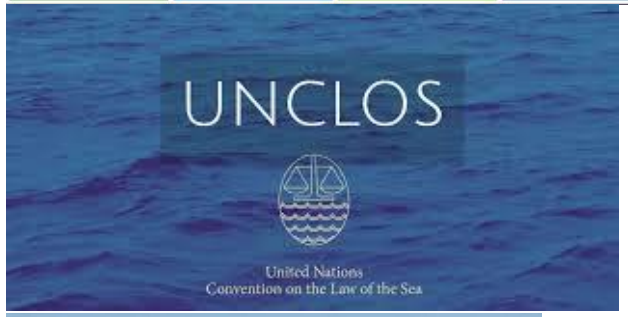
**Marine data are the basis for**:

- Climate change **monitoring**
- Fisheries **management**
- Marine spatial **planning**
- Pollution **control** & ecosystem **protection**
- ….

**Reliable data = reliable science & policy.**

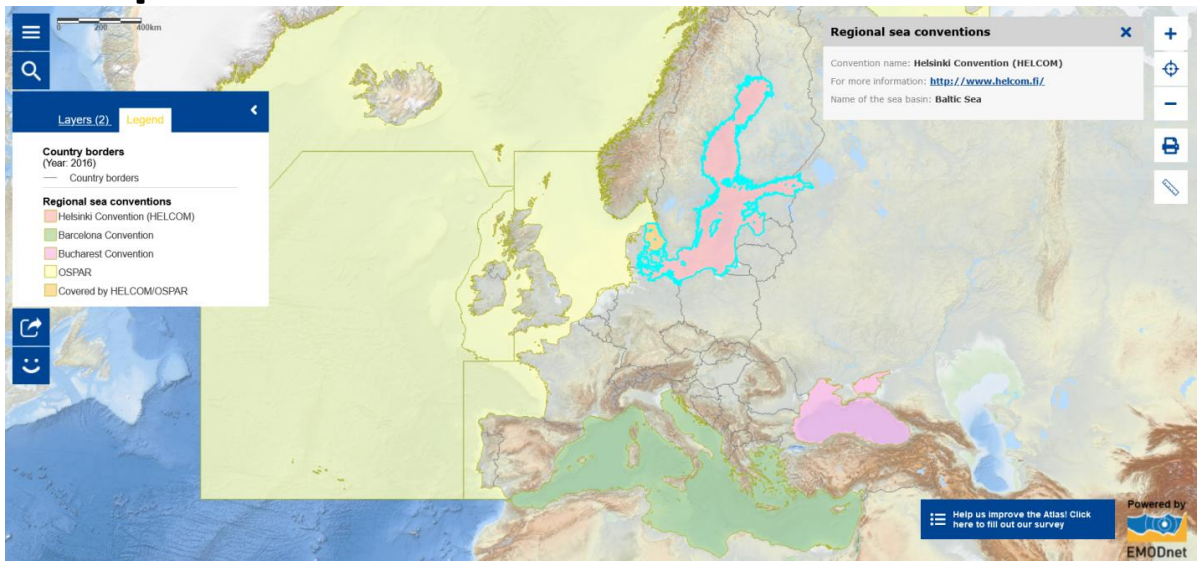
# ❑ Introduction: sustainable blue economy and legal framework

## Global scale:

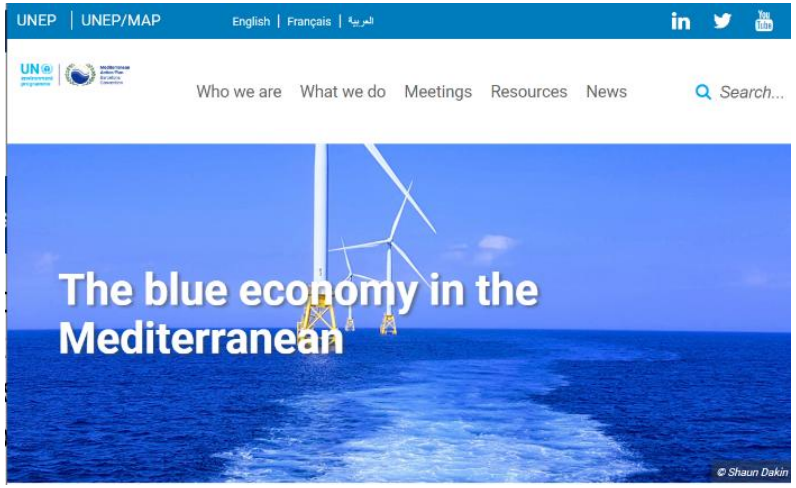





## … in the European sea basins :




## … in the Mediterranean :



European Commission

Oceans and fisheries

# Main policy framework to address Blue economy in Europe:

## Marine Strategy Framework Directive (MSFD)

… aims to achieve **Good Environmental Status (GES)** of the EU's marine waters **by 2020** and to protect the resource base upon which marine-related economic and social activities depend. It is the first EU legislative instrument related to the **protection of marine biodiversity**, as it contains the explicit regulatory objective that "biodiversity is maintained by 2020", as the cornerstone for achieving GES.

..the Directive follows an **adaptive management** approach, the Marine Strategies must be kept up-to-date and reviewed every 6 years.


## *Maritime Spatial Planning (MSP)*

What is it?

Competition for maritime space – for renewable energy equipment, aquaculture and other uses – has highlighted the need to **manage our waters more coherently**. Maritime spatial planning (MSP) works across borders and sectors to ensure human activities at sea take place in an **efficient**, **safe** and **sustainable** way.
….a common framework for maritime spatial planning in Europe.

**Sustainability and Good Environmental Status (GES)**

# Need to assess:

## Environmental status

Chemical status
Biological Status
Physical status

## Environmental vulnerability

Where
When
To what degree

## Pressures of human activities

Where (geographic – vertical)
When
How long

## Cumulative effects

## Climate change effects

→**Need of lots of data!**

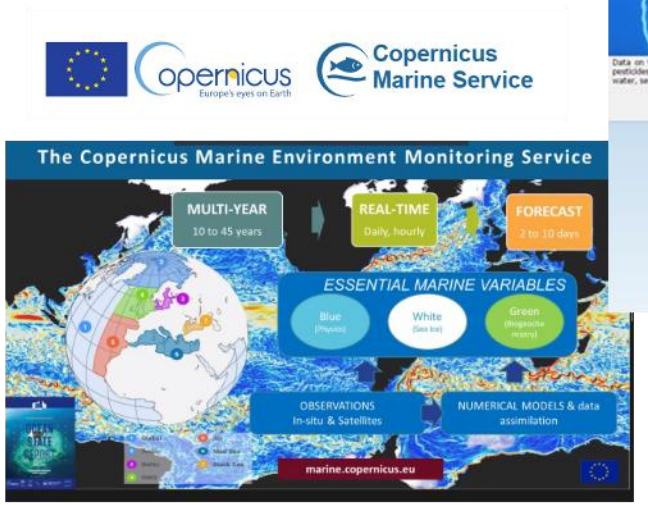
# Where to find data

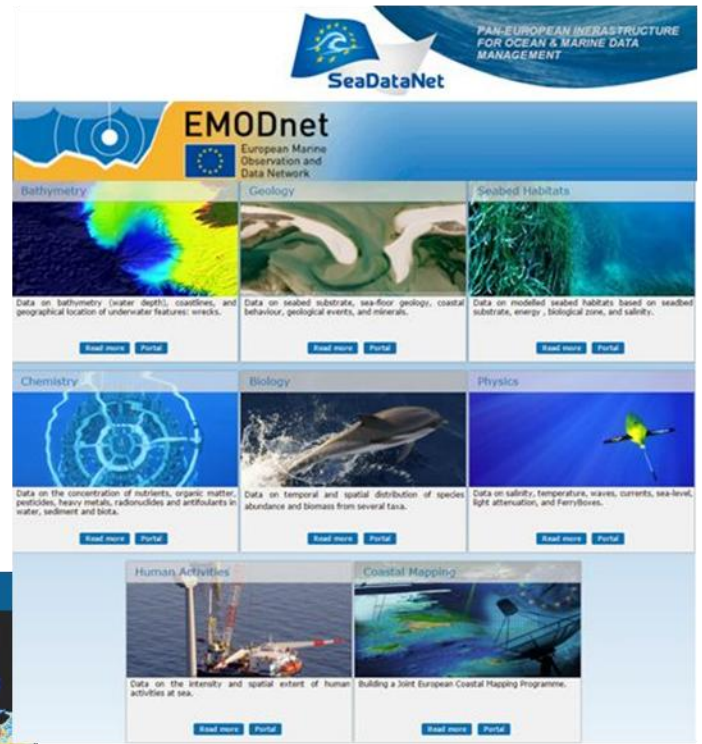
## *EU and global initiatives on marine data*

to assemble,…., facilitate use and re-use of marine data for research AND environmental management.

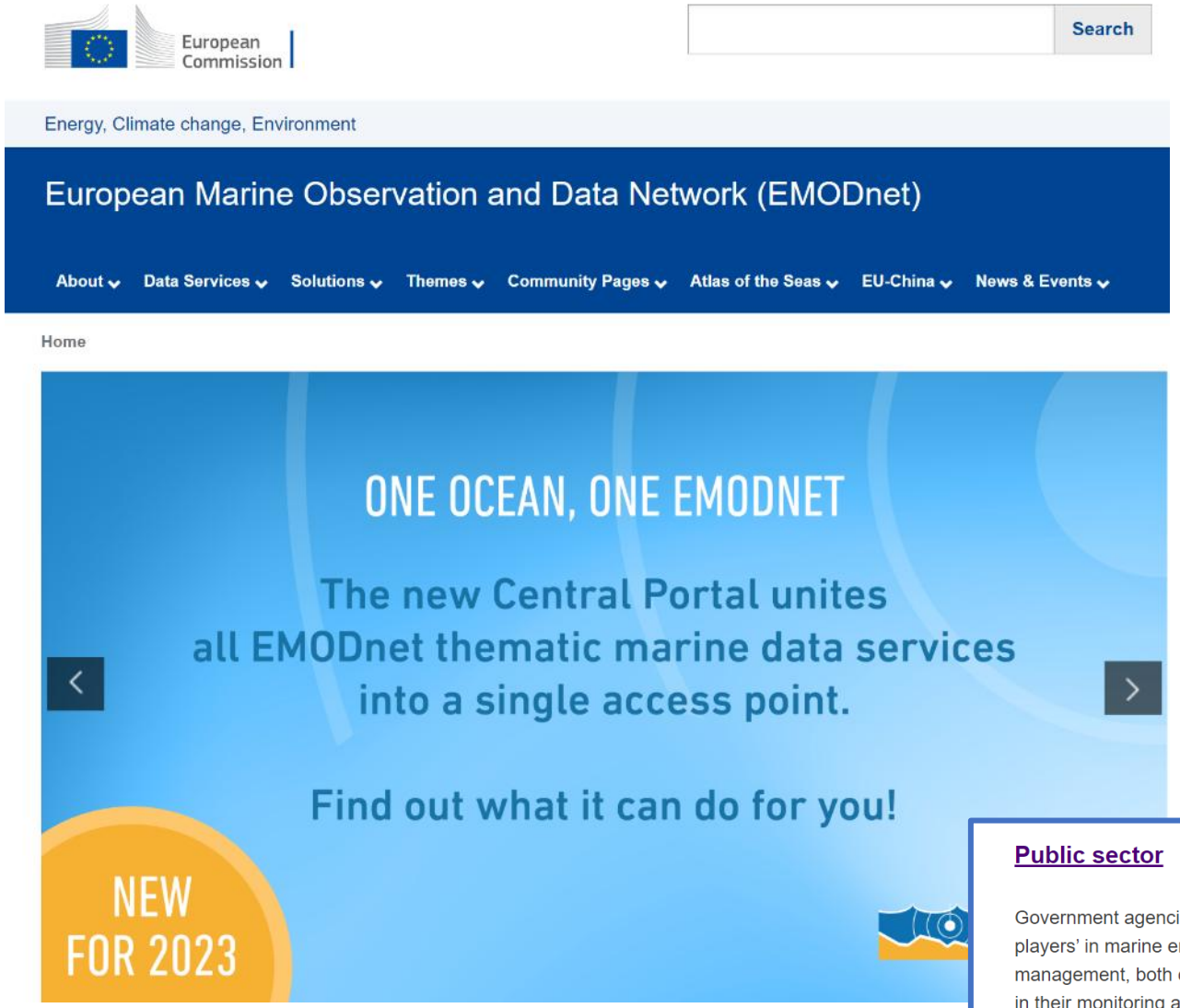
- SeaDataNet (now SeaDataCloud)
- EMODnet
- Copernicus
- World Ocean Database


https://marine.copernicus.eu/


https://www.emodnet.eu/en




https://emodnet.ec.europa.eu/en

The European Marine Observation and Data Network (EMODnet) is a **network** of organisations supported by the EU's integrated maritime policy. These organisations work together to **observe the sea**, **process the data according to international standards** and **make that information freely available** as interoperable data layers and data products.

This "**collect once and use many times**" philosophy benefits all marine data users, including policy makers, scientists, private industry and the public.

**Public sector**

Government agencies are key-players' in marine environmental management, both collecting data in their monitoring activities and using data to ensure the health of the marine environment and the safety of those operating at sea.

**Civil Society**

The democratisation of science and open access to scientific data has a positive knock-on effect on society. For this reason, the activities and achievements of EMODnet need to be closely linked to everyday issues impacting citizens, such as the environment, the conservation of marine living resources, public investment, new services and job creation.

**Private Sector**

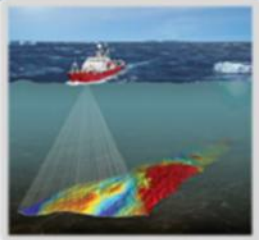
Businesses can provide their contribution and use EMODnet to their advantage in many ways, whether they are Large or Small & Medium sized (SMEs) enterprises, dynamic European start-ups or entrepreneurs-to-be, researchers, developers, deployers, providers, or distributors, etc.

**Research Community**

Research institutes, academic institutions, university departments and, more generally, any organisation heavily involved in promoting, supporting and enabling research producing activities in the Blue Growth sector, play an essential role in the marine and maritime ecosystem.

# Thematic DATA coveraged by the portals

## Bathymetry



Survey tracks

Water depth and depth profiles

Undersea features

Wrecks

High resolution bathymetry in coastal areas

## Geology

Seabed substrate

Sediment accumulation rates

Seafloor lithology

Seafloor stratigraphy

Coastal behaviour

Geological events and probabilities

Mineral occurences

## Seabed habitats

Seabed habitat maps (broad-scale and specific per basin)

Individual seabed habitat maps from surveys

Environmental variables influencing habitat type (depth, salinity, currents, light, ...)

## Physics

Wave height and duration

Sea temperature

Wind speed and direction

Salinity

Horizontal speed of the water column

Water clarity

Changes in sea level

Inflow from rivers

Water conductivity / biochemical parameters

Atmospheric parameters

Underwater noise

## Chemistry

Acidity

Antifoulants

Chlorophyll

Dissolved gases

Fertilisers

Hydrocarbons

Marine litter (micro, beach, seafloor)

Heavy metals

Organic matter

Polychlorinated biphenyls

Pesticides and biocides

Radionuclides

Silicates

## Biology

Occurrences and abundances of species of:

Phytoplankton

Zooplankton

Macro-algae

Angiosperm

Fish

Reptile

Benthos

Bird

Sea mammal

## Human activities

Aggregate extraction

Aquaculture

Cultural heritage

Dredging

Fisheries

Hydrocarbon extraction

Traffic in main ports

Ocean energy facilities

Pipelines and cables

Protected areas

Status of bathing sites

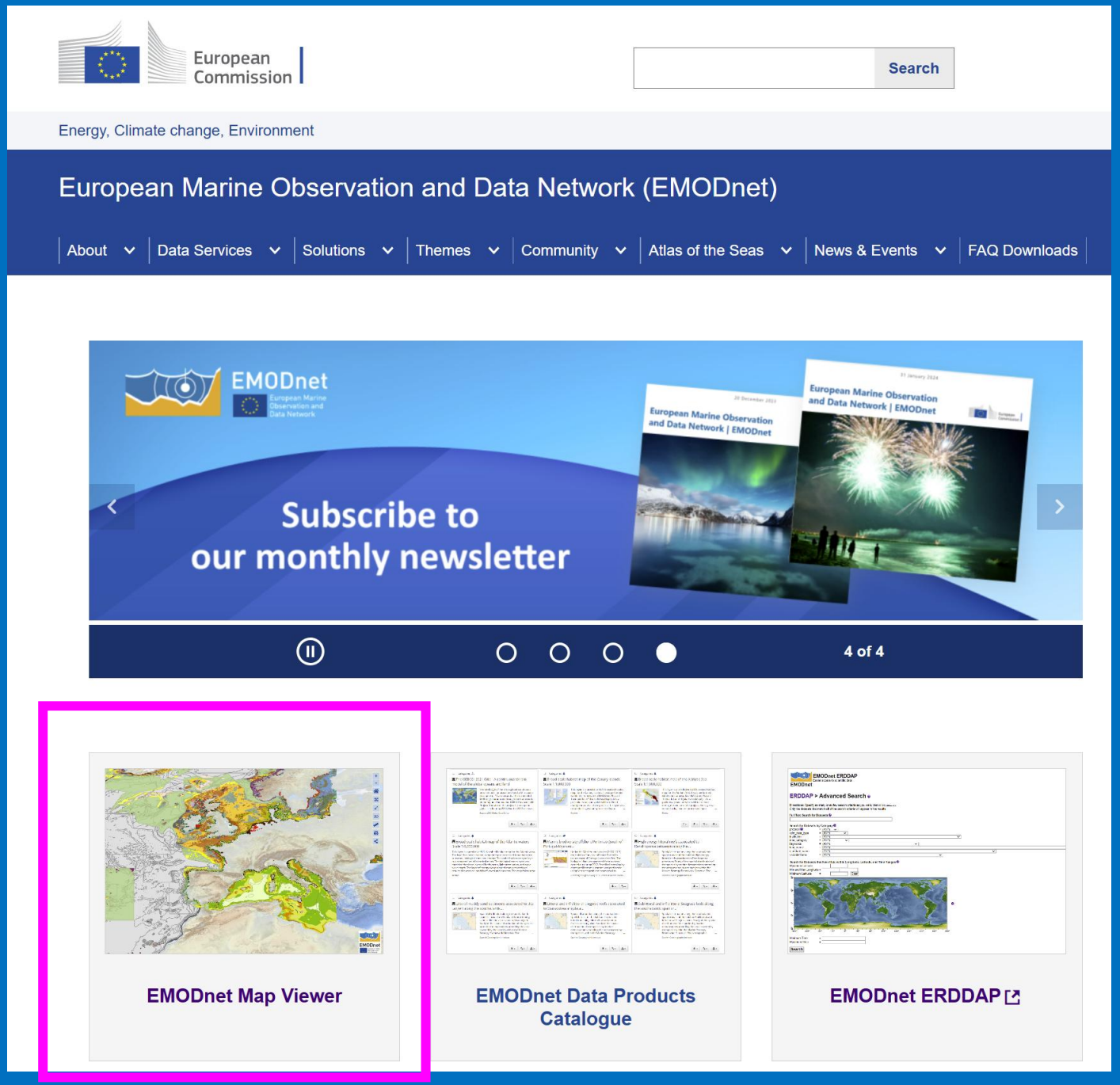
Vessel density

Waste disposal (solids)

Wind farms

Other forms of area management/ designation

Exercise on searching for data products

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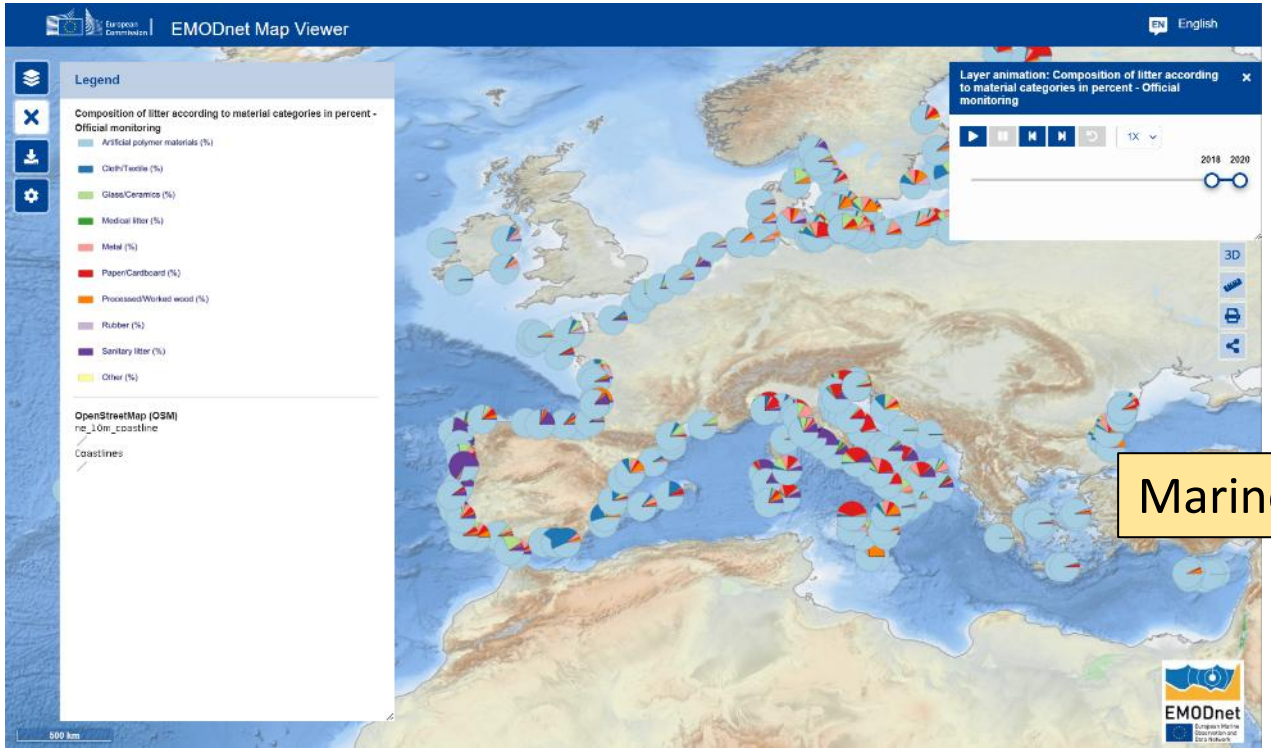
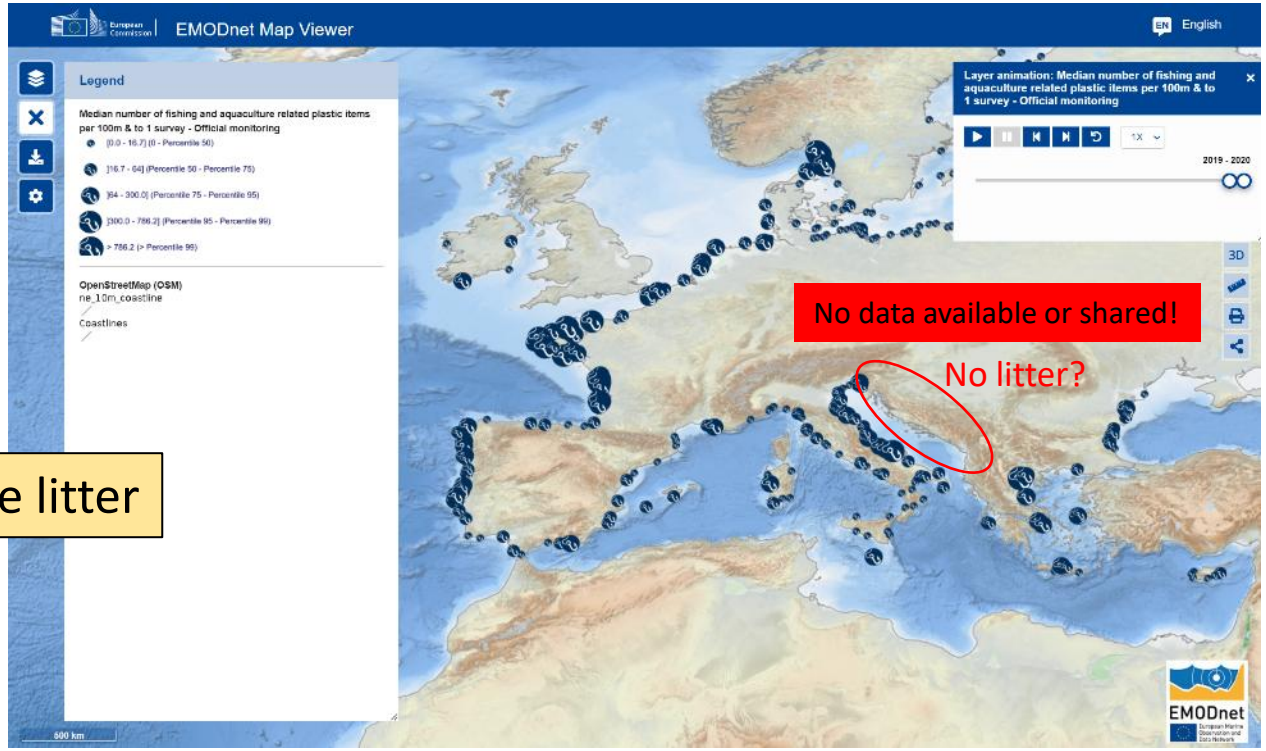
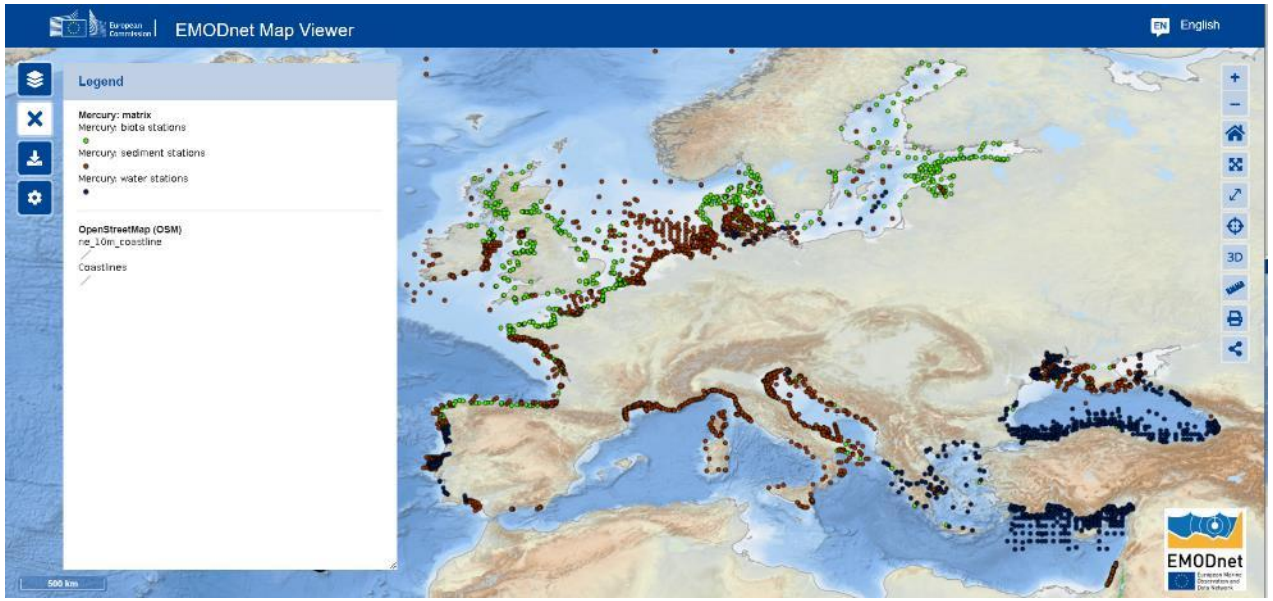


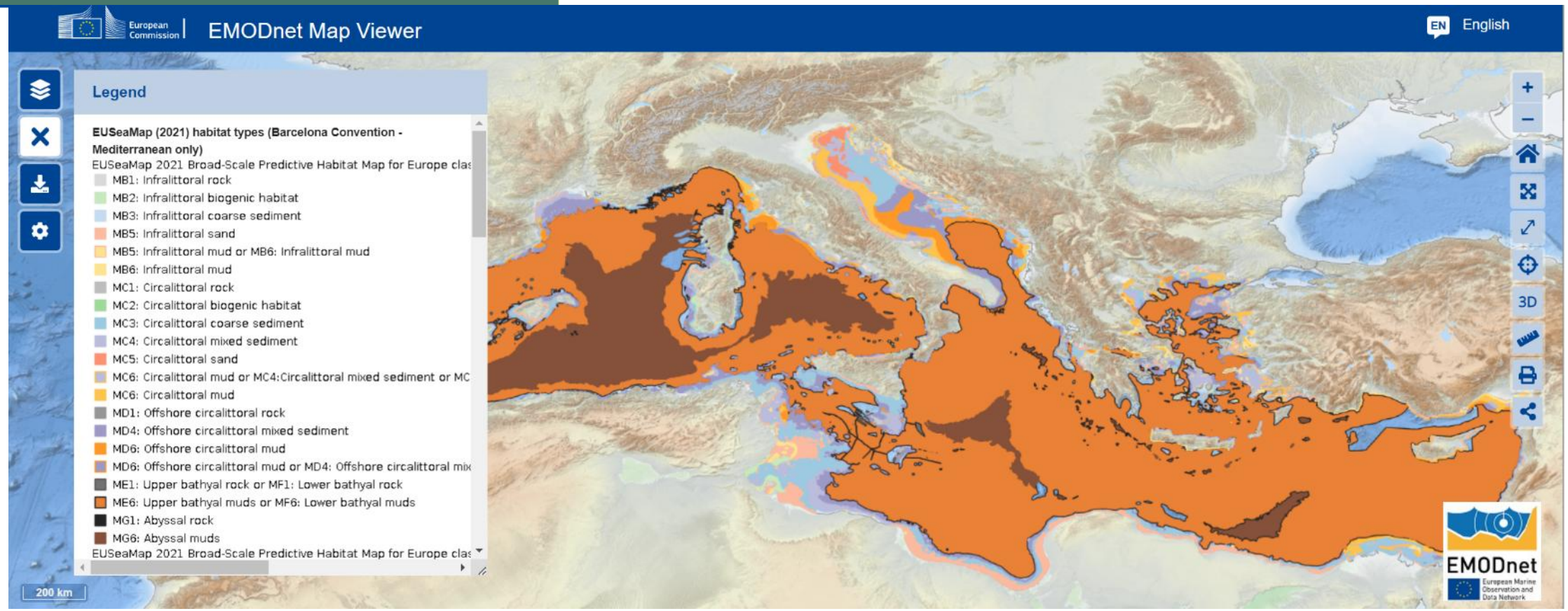

Marine litter




Chemical pollution

- Administrative units
- EMODnet Bathymetry
- EMODnet Biology
- EMODnet Chemistry
- EMODnet Geology
- EMODnet Human Activities
- EMODnet Physics
- EMODnet Seabed Habitats

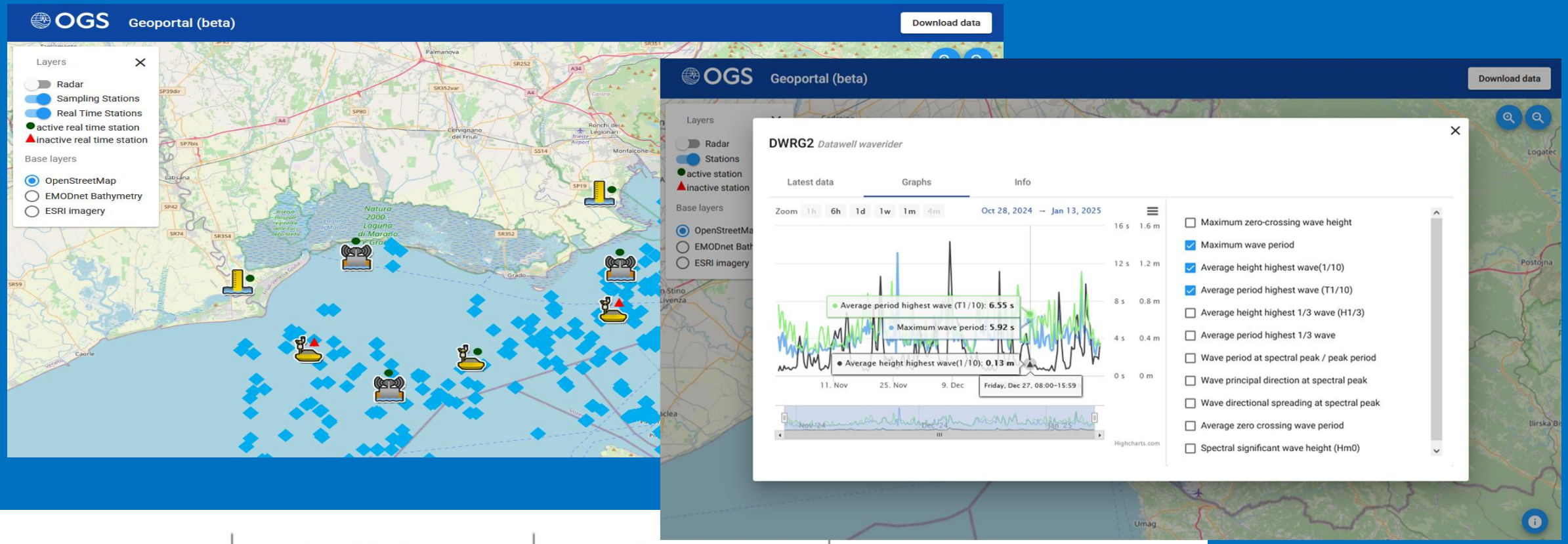


# Addressing environmental risks – supporting Civil Protection and timely intervention:

Exercise on exploring Real Time data

## Real time data:

https://nodc.ogs.it/geoportal/?msv=0





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Ministero dell'Università e della Ricerca

Italiadomani PIANO NAZIONALE DI RIPRESA E RESILIENZA

iNEST Interconnected Nord-Est Innovation Ecosystem

# Next steps:

Combine all data (Real Time, delayed mode, historic data), data products, model outputs, forecasting and information to build:

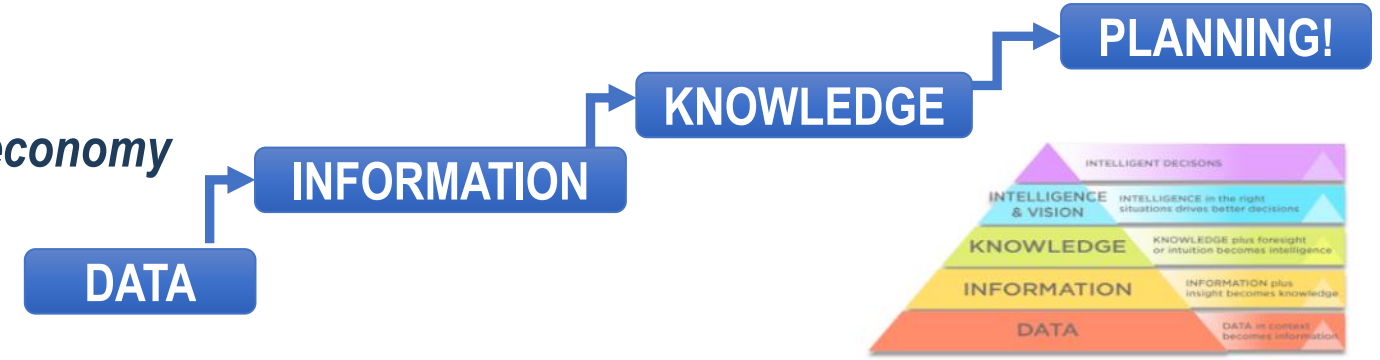
## DTO - Digital Twin Ocean

… is a consistent, high-resolution, multi-dimensional and **near real-time virtual representation of the ocean**, combining ocean **observations**, **artificial intelligence**, **advanced modelling** operating on high-performance computers and accessible to all.

**To enable «good decisions»**

# *Take home messages:*

***From data to knowledge for sustainable blue economy***




- **Sustainable blue economy** requires a large amount of **data** at several spatial & temporal scales (many available, **but where**…., many missing!)
- Strong need for harmonized tools for data management to provide required information
- Strong need to engage with different disciplines (not only scientific)

- ***EMODnet*** *facilitates data discovery and access to interoperable, harmonized multidisciplinary data and data products (FAIR data)*
- *But… not «all» data go to EMODnet (multiple – overlapping infrastructures, limited interoperability,…)*

# Thanks for your attention!

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