

e-shape solutions: Earth Observation for biodiversity and water
management
13-14 February 2023



Marine Monitoring

Advancing marine monitoring and protection with Copernicus Marine

Tina Silovic et al.- Mercator Ocean International



Implemented by





WE DO



WE SERVE



WE CONNECT

MERCATOR OCEAN INTERNATIONAL

- International Non-profit organisation based in France (Toulouse)
- 10 shareholders in 5 countries (FR, ITA, NOR, SPA, UK)

- 25 Years expertise in Ocean modelling and forecasting
- Implementer of the **EU Copernicus Marine Service**

- Connecting the world around the Ocean Prediction
- Preparing Global Ocean Modelling and Forecasting System

- Nesting Ocean Prediction in a digital ocean
- Federating the European Community towards the EU DTO Ocean



TOWARDS AN INTERGOVERNMENTAL ORGANISATION

- . Announced during the One Ocean Summit (Feb 2022)
- . 6 Founding Member States : FR, ITA, NOR, PRT, ESP, UK

- . Open to all EU coastal states after entry into force
- . Helping Member States perform their own sovereign missions

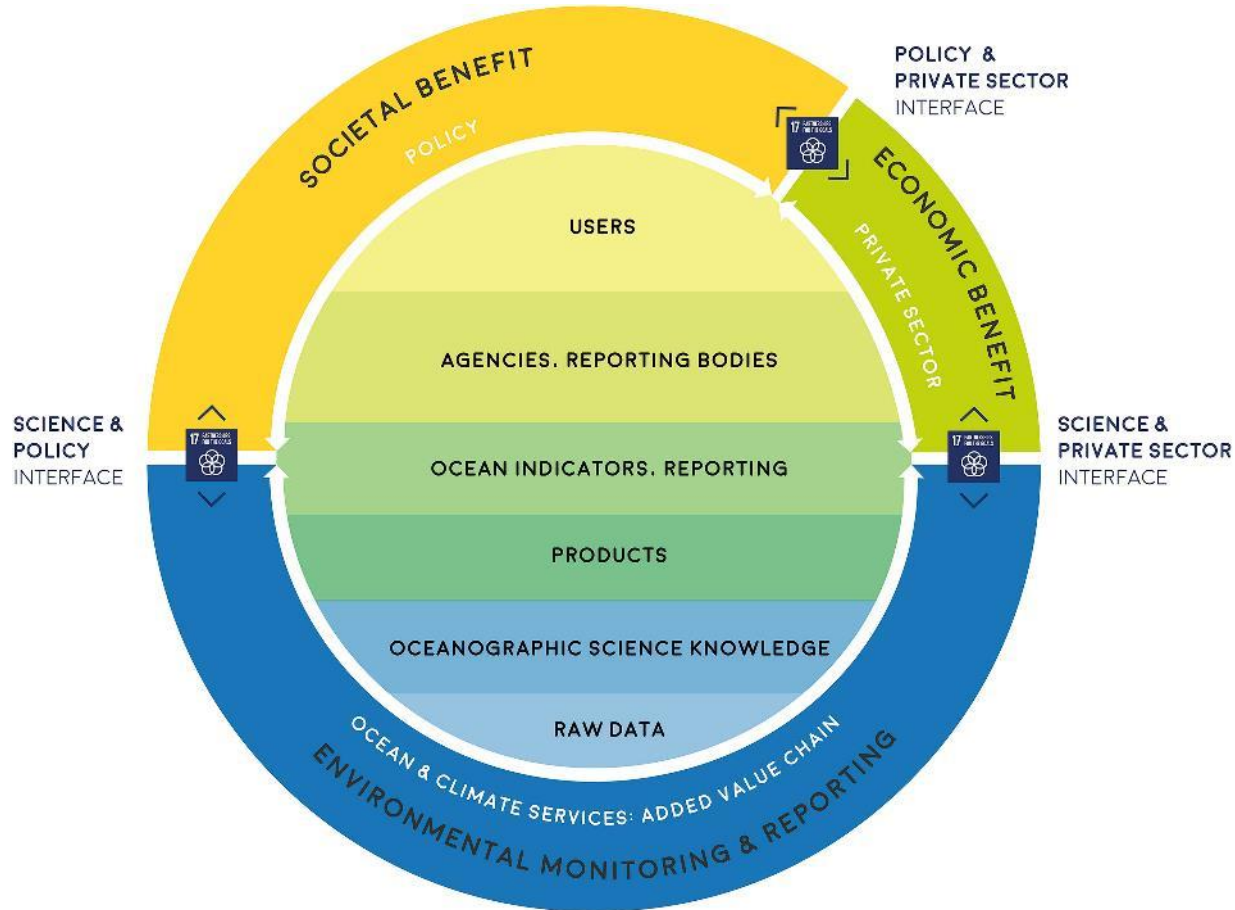
Creating a European authoritative voice for a global digital ocean and the EU DTO



FULL, FREE AND OPEN ACCESS TO DATA



-  ATMOSPHERE MONITORING
-  MARINE ENVIRONMENT MONITORING
-  LAND MONITORING
-  CLIMATE CHANGE
-  EMERGENCY MANAGEMENT
-  SECURITY



The role of Ocean monitoring in society and economy and related value chain -
from von Schuckmann et al., *Marine Policy* Vol 121, 2020, 104154





Copernicus Marine Service

Providing free and open marine data and services to enable marine policy implementation, support Blue growth and scientific innovation.

Access Data

DATA

OCEAN PRODUCTS

A robust ocean data catalogue, to download or visualise data including hindcasts, nowcasts and forecasts.

EXPERTISE

OCEAN STATE REPORT

Extensive annual analysis on the state of the ocean over nearly 20 years and severe/notable annual events.

TRENDS

OCEAN MONITORING INDICATORS

Essential variables monitoring the health of the ocean over the past quarter of a century.

EXPLORATION

OCEAN VISUALISATION

Dive into our 4D digital oceans through our 3 visualisation tools for beginner, intermediate and advanced users

Copernicus Ocean State Report 6 Release



The sixth issue of the Copernicus Ocean State Report and its summary is now available online, coordinated by [Mercator Ocean International](#), the implementing entity of the Copernicus Marine Service. This annual publication provides a comprehensive and state-of-the-art overview of the current state, variations, and changes occurring in the European regional seas and global ocean over the past decades and for recent years, particularly for 2020. It also highlights the importance of ocean data, how the collection of data on different aspects of the ocean can help us better understand and adapt to the challenges of ocean change.

[Learn more](#)

Online catalogue

marine.copernicus.eu

**More than 300
scientifically qualified
products**

User driven

>45 000 subscribers

Open and Free



Copernicus Marine Portfolio

MULTI-YEAR
10 to 45 years

REAL-TIME
Daily, hourly

FORECAST
2 to 10 days

ESSENTIAL MARINE VARIABLES

BLUE OCEAN



Physics

WHITE OCEAN



Sea Ice

GREEN OCEAN



Biogeochemistry

OBSERVATIONS
In-situ & Satellites



NUMERICAL MODELS
& data assimilation

marine.copernicus.eu



COPERNICUS MARINE REGIONAL OCEAN PRODUCT DIVISIONS

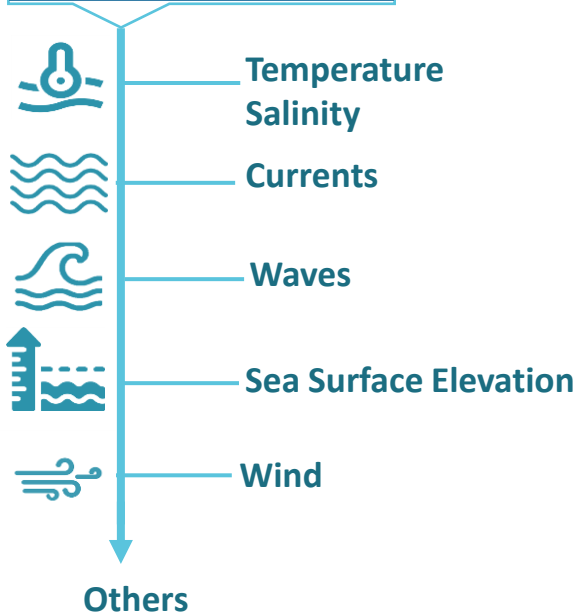
- 1 Global Ocean
- 2 Arctic Ocean
- 3 Baltic Sea
- 4 European North West Shelf Seas
- 5 Iberian Biscay Ireland Seas
- 6 Mediterranean Sea
- 7 Black Sea



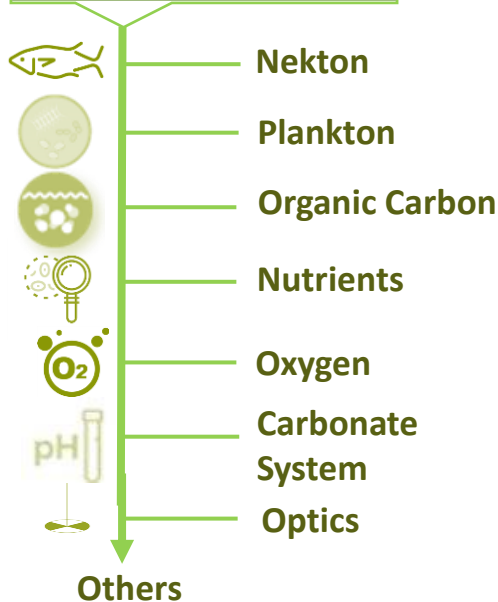
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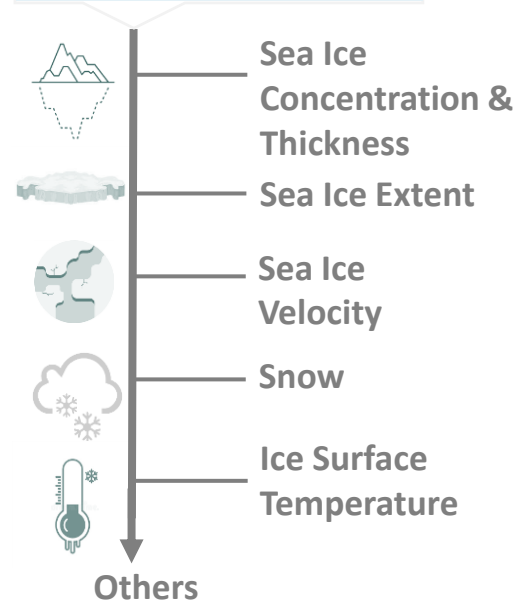
BLUE OCEAN



GREEN OCEAN



WHITE OCEAN





Supporting wide range of applications

1 POLAR ENVIRONMENT MONITORING

2 CLIMATE & ADAPTATION

3 OCEAN HEALTH

4 MARINE CONSERVATION & BIODIVERSITY

5 SCIENCE & INNOVATION

6 POLICIES & OCEAN GOVERNANCE & MITIGATION

7 EDUCATION, PUBLIC HEALTH & RECREATION

8 EXTREMES, HAZARDS & SAFETY

9 MARINE FOOD

10 COASTAL SERVICES

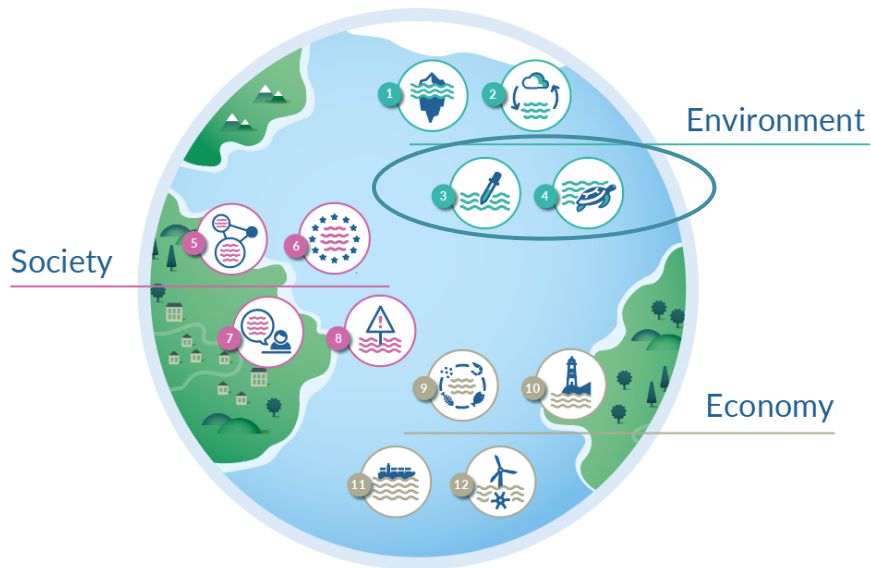
11 TRADE & MARINE NAVIGATION

12 NATURAL RESOURCES & ENERGY





Supporting Ocean Health



Ocean Health

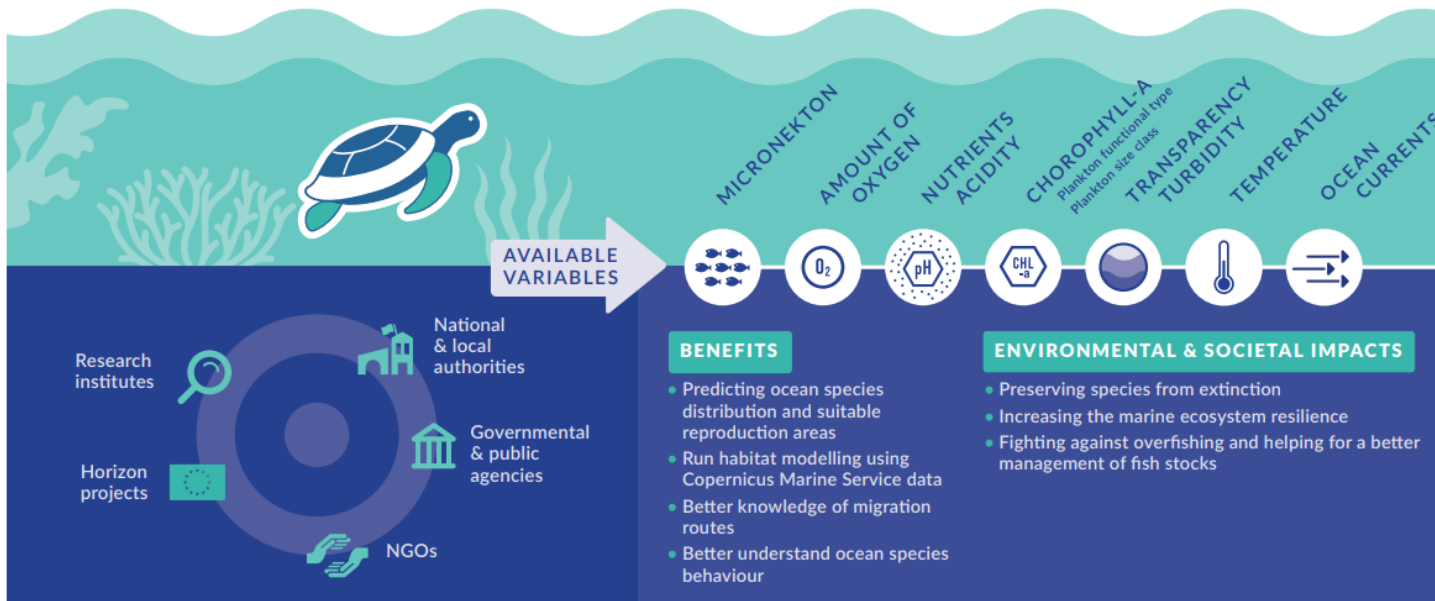


Marine Conservation & Biodiversity



MARINE CONSERVATION & BIODIVERSITY

The Copernicus Marine Service provides key data to monitor marine biodiversity and Marine Protected Areas, preserving at-risk ecosystems.





Conservation & Biodiversity - USE CASES



Use Cases

Home > Services > Use Cases

Region: All Country: All Markets: Marine Conservation & Biodiversity

Mobile Application Demo

Search

SEAPODYM - Evaluating Conservation Impact of Marine Protected Areas for Pacific Tunas

SEA CLEARLY - A tool to assess ocean plastic transport on and by aquaculture farms

Real-time assessment of MPAs with marine megafauna movements and bio-physical ocean variables

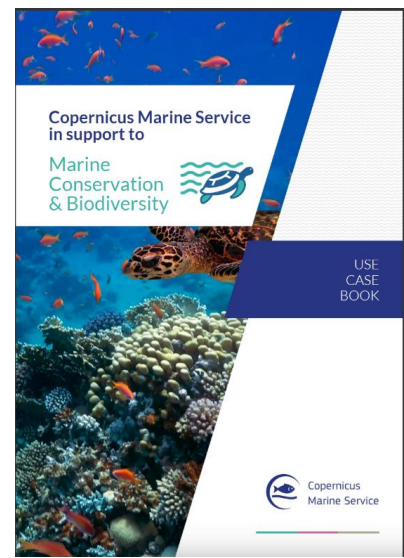
Enhancing traceability and tracking in Aquaculture and fisheries supply chain through the use of blockchain and earth observation

T-MEDNet - Tracking the effects of climate change in the Mediterranean

The MarCOSouth Western Indian Ocean Coral Bleaching Monitoring Service

From open data to marine knowledge: A service for augmented data access and reproducible data analysis

TURTLES: Effects of swimming behaviour and oceanography on sea turtle hatchling dispersal





USE CASES to better understand marine species



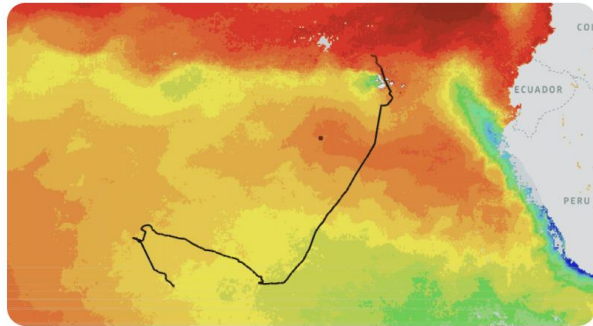
trajectories of
juvenile turtles



Pacific
Community
Communauté
du Pacifique



MERCATOR
OCEAN
INTERNATIONAL



SST + Copernicus chl a + in situ
data → predicting movements



particle tracking model +
Copernicus ocean currents + in
situ hatchling behavioural data.

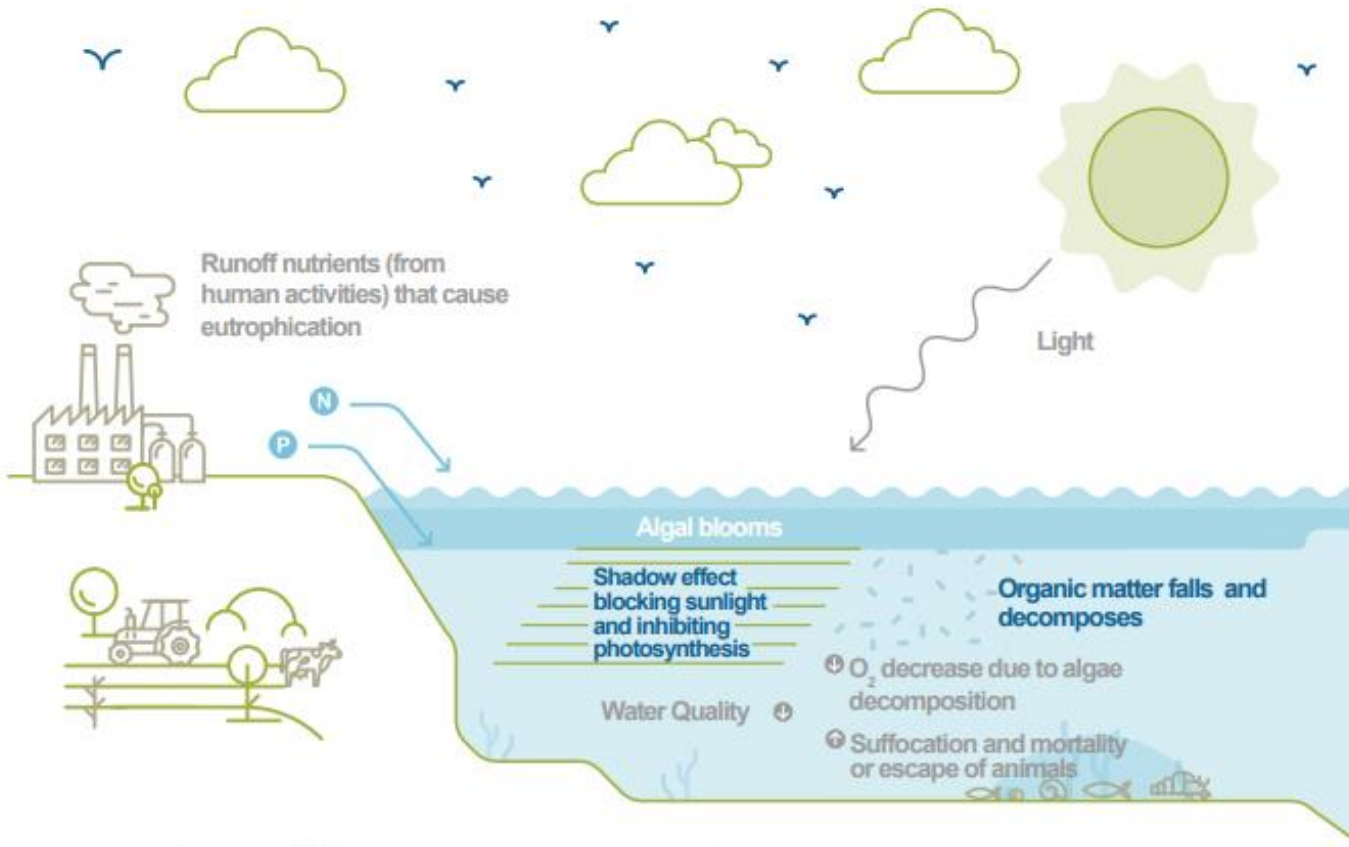


ocean circulation model + PP
(ocean colour), O₂ + simulation of
micronecton + tuna model





Challenges for Conservation & Biodiversity



CHALLENGES:

- > Increasing Pollutions
- > Loss of Biodiversity
- > Over – fishing
- > Heatwaves
- > De-Oxygenation
- > Ocean acidification

GOALS:

- > Environment policies
- > Protected marine biodiversity
- > Sustainable exploitation of marine resources



Threats & Extremes – Marine Heatwaves

THE EFFECTS OF MARINE HEATWAVES AND COLD SPELLS IN THE NORTH SEA

This issue of the Ocean State Report has analyzed the impact of marine heatwaves and cold spells on catch in the North Sea, with particular impact on five species, namely sea bass, sole, European lobster, edible crabs, and red mullet.



RED MULLET



EUROPEAN LOBSTER



SOLE



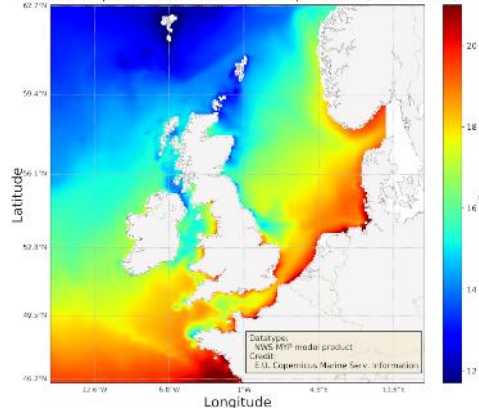
EDIBLE CRABS



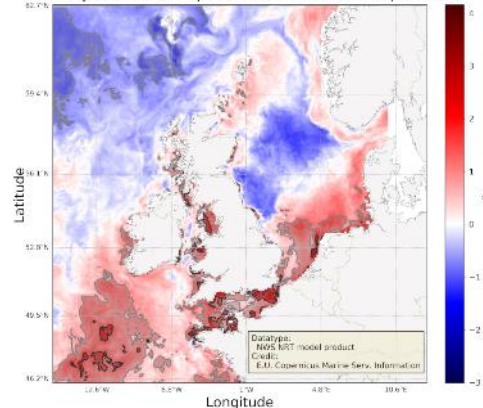
SEA BASS

North-West EU Seas temp. extreme variability mean and anomaly.

Mean 99th percentile of Surface Temperature (1993-2019)



Anomaly of 2020 99th percentile of Surface Temperature





Gathering and processing of new biogeochemical and biology *in situ* and satellite **observations**

- **New processes** in biogeochemical models (benthic/pelagic coupling, riverine inputs).
- **Ecosystem modelling** (low → mid → high tropic level) – NECCTON project
- **Assessing scenarios** for climate change impacts on stocks and protected species.
- **Digital Twin of the Oceans** (DTOs) includes ecosystem models and data, what-if scenarios.

Inform marine biodiversity and food resource management



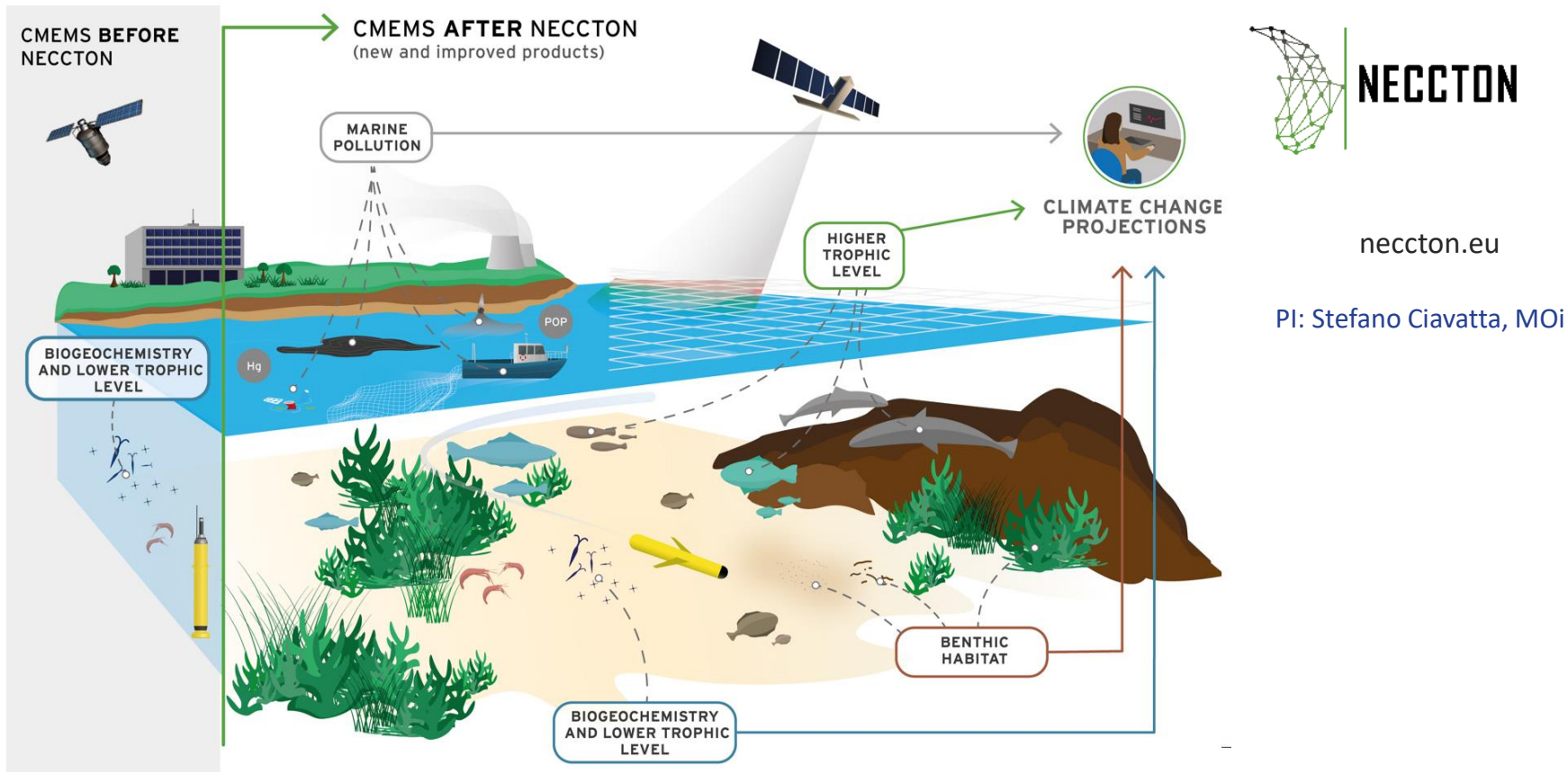
Convention on Biological Diversity



EUROPEAN
GREEN
DEAL



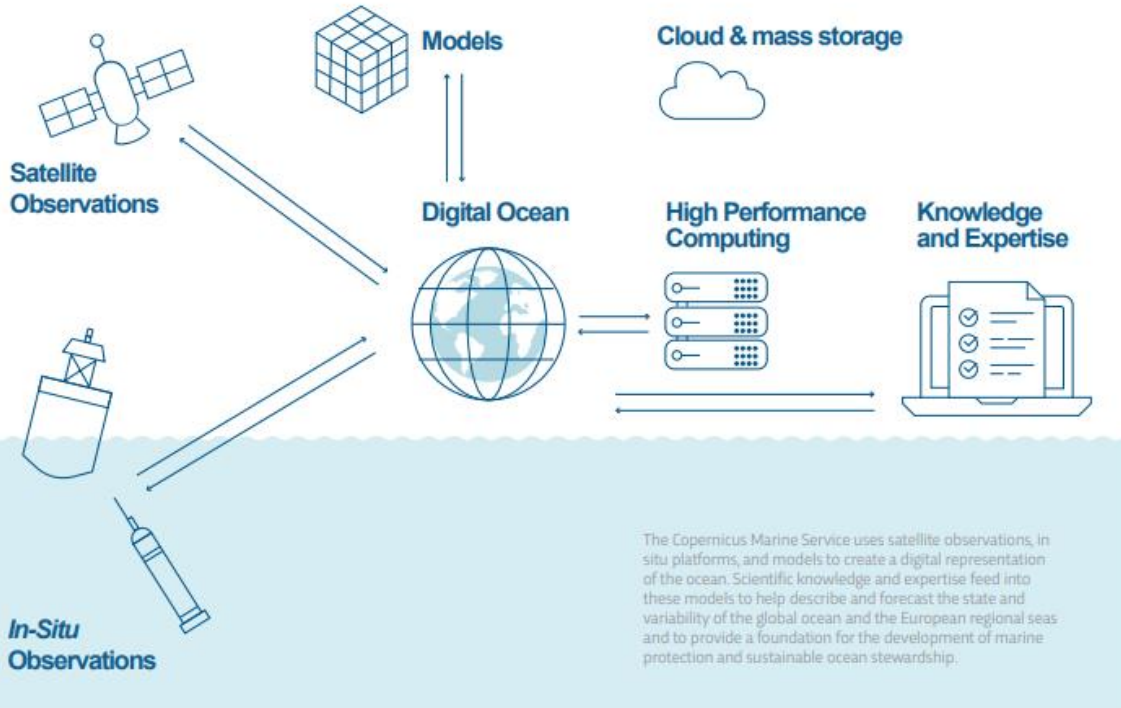
Towards a new offer for marine biology



→ enable CMEMS to inform marine biodiversity conservation and food resources management, by fusing innovative ocean ecosystem models and new data



Copernicus Marine - Home take message



- ✦ Copernicus Marine provides a comprehensive monitoring of the marine environment that allows a better understanding of marine biodiversity and adopt protection strategies
- ✦ Important part of integrated (observations, models) Copernicus Marine offer” - Sentinel missions (S2, S3 and future (CHIME) and in-situ observations
- ✦ Major evolutions planned are prepared through R&D programmes (H2020, Horizon Europe) for biology → improved offer for marine biodiversity monitoring and protection in response to EU policy needs (Green Deal).





Marine Monitoring

THANK YOU



Implemented by

