

 EOSC | Blue-Cloud2026

## **Session 2: Services, tools and approaches for Open Science Federated services serving Mission Ocean objectives**

Session 2

---

**5-6 November** 2025, Brussels [Belgium]



Funded by  
the European Union

 | Blue-Cloud2026

## Services for mapping & understanding marine ecosystems and species

Moderator: Julia Vera, SSBE

---

**5-6 November** 2025, Brussels [Belgium]



Funded by  
the European Union

eosc | Blue-Cloud2026

# The Global Fishery Atlas

Julien Barde, IRD

---

**5-6 November** 2025, Brussels [Belgium]



Funded by  
the European Union

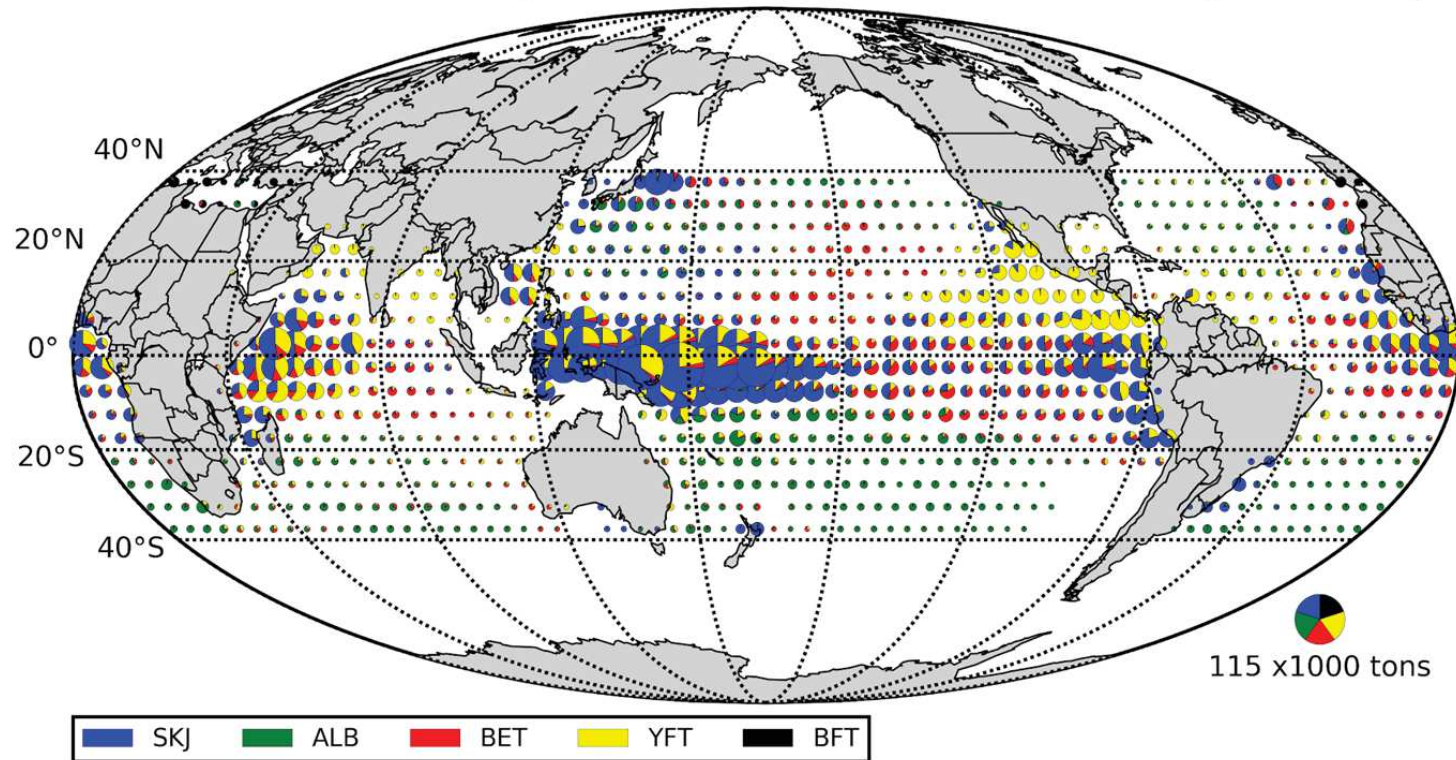


## The Global Fisheries Atlas VLab

A FAIR-compliant entry point for end users to discover, access and understand the state of stocks and fisheries worldwide



Mean annual distribution (2005 to 2015) of catches of major tuna species



Food and Agriculture  
Organization of the  
United Nations





VLab main products accessible and reproducible

- Open Data and code, DOIs being assigned by [Zenodo](#)
- Code on [GitHub](#) repos along with Docker images on GHCR (data generation workflow and Shiny apps)
- Reproducibility ? Portability / deployment checked with containers
  - [Blue-Cloud 2026](#) => D4Science
  - [EDITO-Infra](#) => Onyxia Datalab

The Zenodo logo, consisting of the word "zenodo" in a white, lowercase, sans-serif font, centered on a solid blue rectangular background.



 | Blue-Cloud2026

# Workbench eutrophication updates and its key functionalities

Nydia Catalina Reyes Suarez (OGS)

---

**5-6 November** 2025, Brussels [Belgium]



Funded by  
the European Union



# Workbench eutrophication updates and its key functionalities

Partners: OGS (lead), Ifremer, HCMR, SMHI & Pokapok.

*Blue cloud 2026 Federation Workshop  
6 Nov 2025*



Funded by  
the European Union

### The problem:

Integrating in-situ data from different marine data infrastructures presents several major challenges, many of which stem from technical, organizational, and policy-related issues.

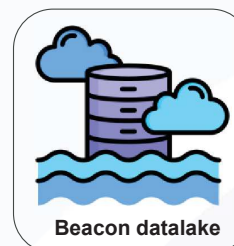
- Heterogeneous formats,
- Inconsistent metadata standards
- Semantic mismatches
- Limited discoverability
- Data gaps and inconsistencies
- Lack of validation
- Fragmented governance
- Reluctance to share
- Scalability
- Lack of Common Frameworks



### Proposed solution:

Blue-Cloud is working on three big data processing Workbenches (WB). These will facilitate the generation of **validated and harmonized data collections for a selection of Essential Ocean Variables (EOVs) in physics, chemistry and ecosystems** filling the existing gaps by integrating several datasets from different EU and non-EU Blue Data Infrastructures (BDIs) and providing EOVs datasets and workflows to EU operational services and the Digital Twin of the Ocean (DTO).

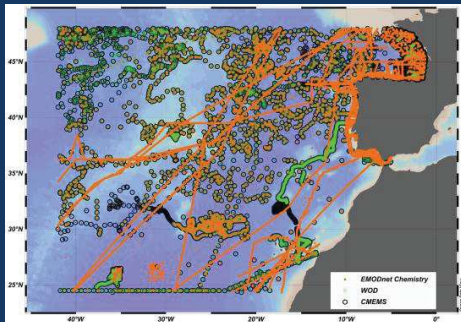
### The tools:



## H&V Eutrophication data collection

WP3-WB2

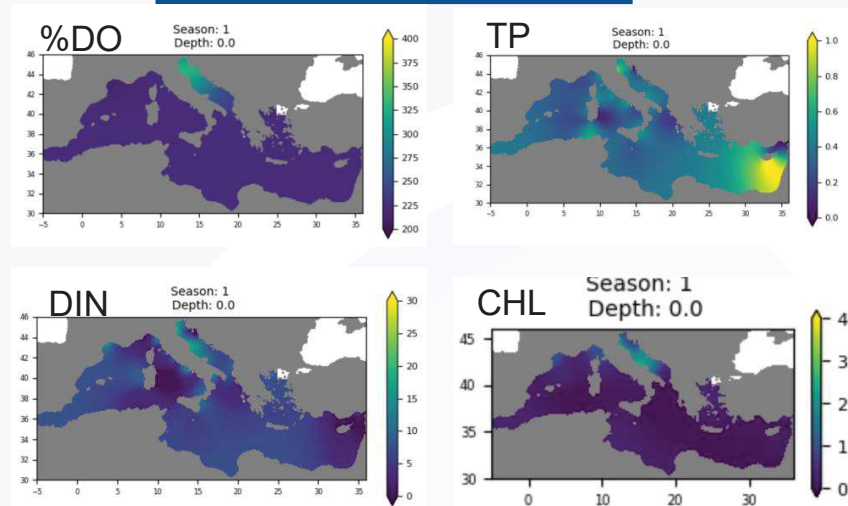
for a selection of EOVs in chemistry



## Climatologies for Chl-a, %DO, DIN and TP



WP3-WB2



## Vlab 4: MEI Eutrophication

WP4

Trophic state index TRIX

TRIX by Season







## Essential Ocean Variables Workbench in chemistry working group



WP Leader, EWB, webODV & BEACON

eosc | Blue-Cloud2026

# Physics workbench for temperature & salinity

Simona Simoncelli (INGV)

---

**5-6 November** 2025, Brussels [Belgium]



Funded by  
the European Union

# EOVs Workbench for Physics

*Simona Simoncelli*



and the **PWB team**



[simona.simoncelli@ingv.it](mailto:simona.simoncelli@ingv.it)

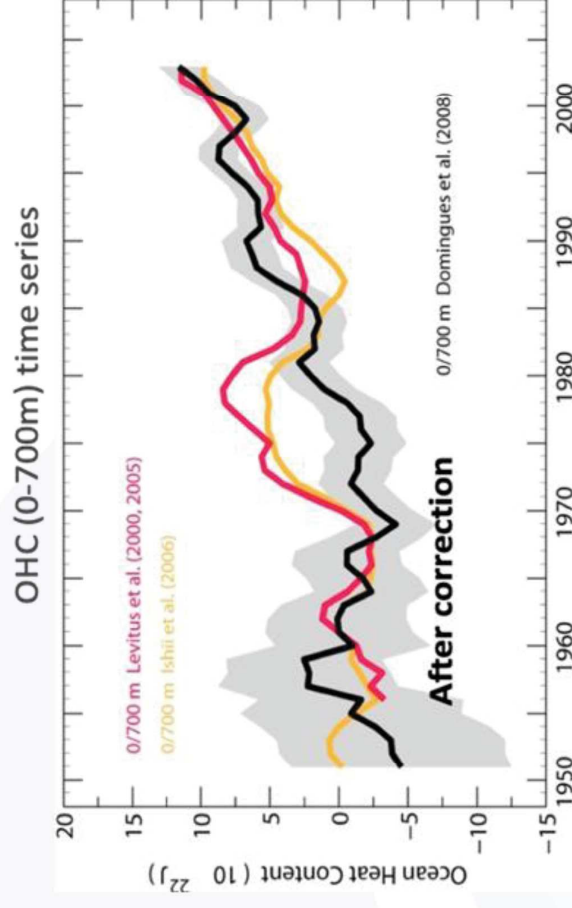
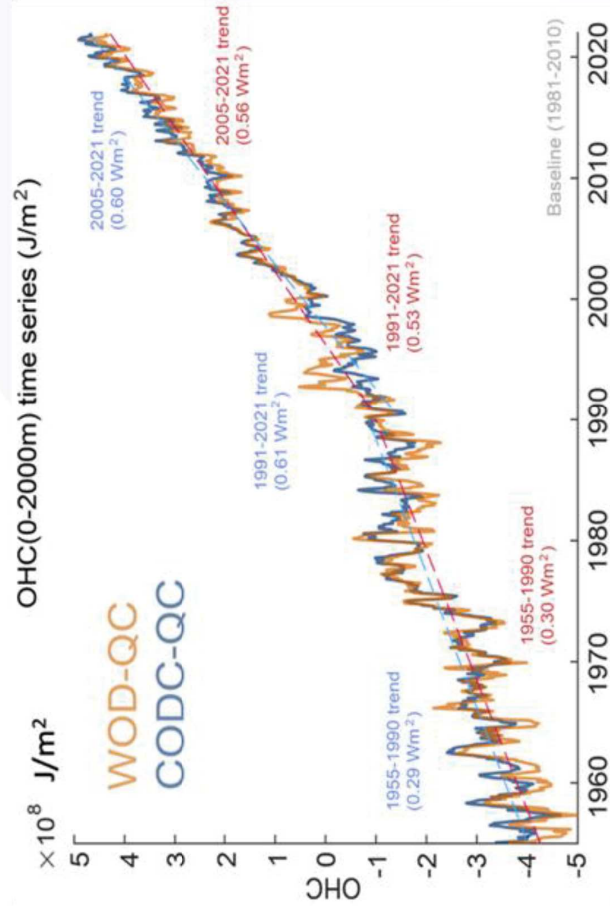
[ORCID 0000-0003-1283-2798](https://orcid.org/0000-0003-1283-2798)



Funded by  
the European Union



## Ocean Heat Content indicator

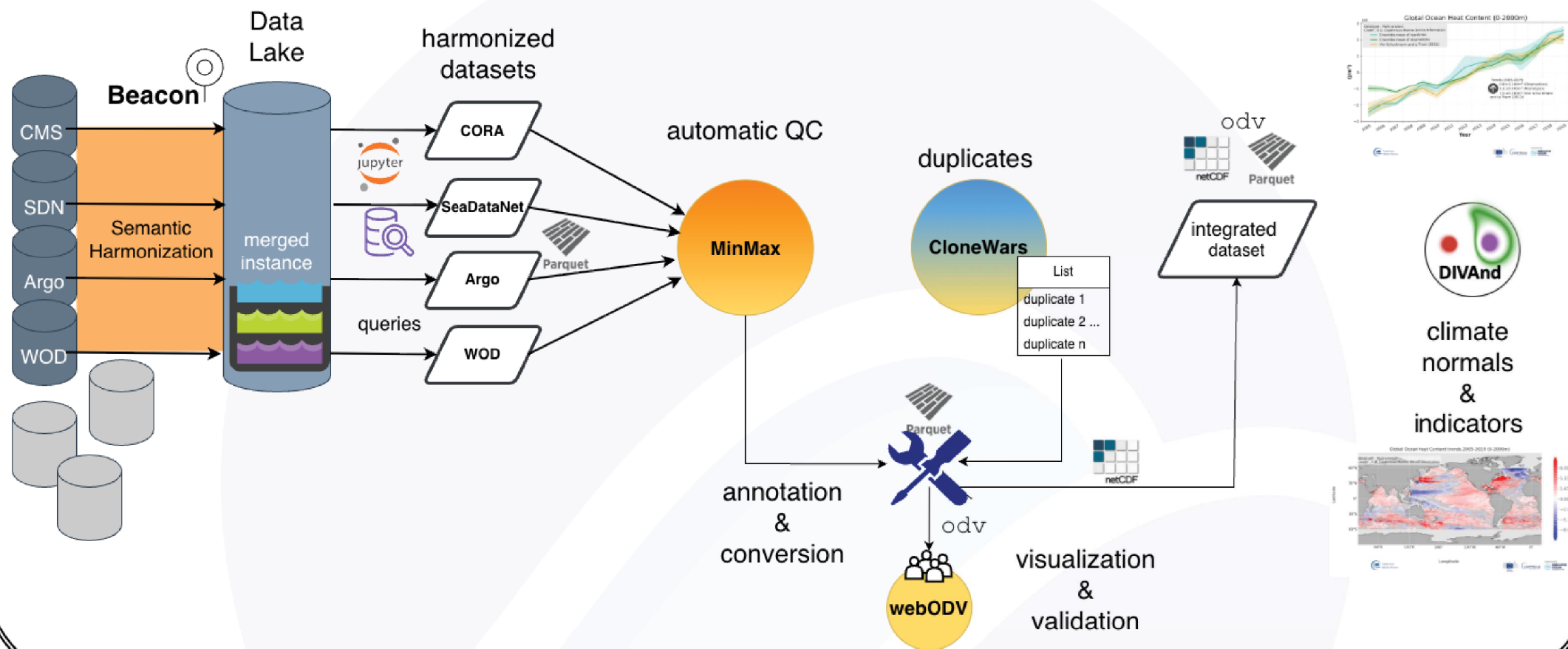


**Impact of QC on OHC 0-2000 m**

**~8% trend difference from 2005-2021**

**Impact of instrumental bias on OHC 0-700 m**

**~50% trend difference from 1970-2000**



- **ocean physics thematic service** will gradually get **operational** to serve **multiple users** with added value temperature and salinity datasets and derived products
- the **data integration** process will expand including BDIs and RIs in the data federation tackling the coastal and deep ocean
- the data lake is continuously updated speeding up the information generation process
- the products will be ready and easy to use for digital twin applications and AI
- the workflow relies on generic services (webODV, DIVAnd) which will be co-developed



eosc | Blue-Cloud2026

# **TwinTrack Digital Twin prototype for aquatic animal movement in the North Sea**

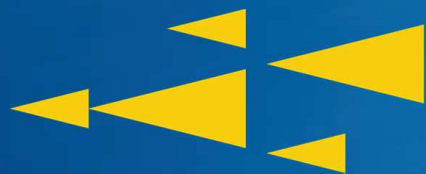
Samuel Fooks (VLIZ)

---

**5-6 November** 2025, Brussels [Belgium]



Funded by  
the European Union



Sustainable Blue  
Economy Partnership



# DTO Twin Track

From Data Streams to Living Models

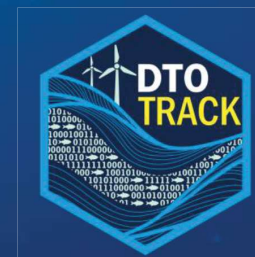
Tracking Marine Life to Strengthen Ocean Management

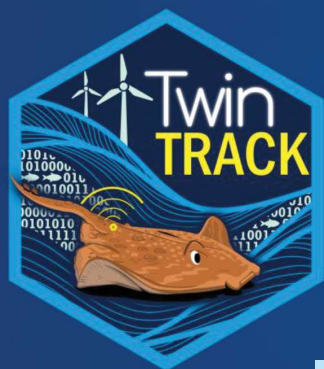
Lotte Pohl, Flanders Marine Institute

Samuel Fooks, Flanders Marine Institute

EOSC Blue-Cloud 2026  
A federated European FAIR and Open Research Ecosystem  
for oceans, seas, coastal and inland waters

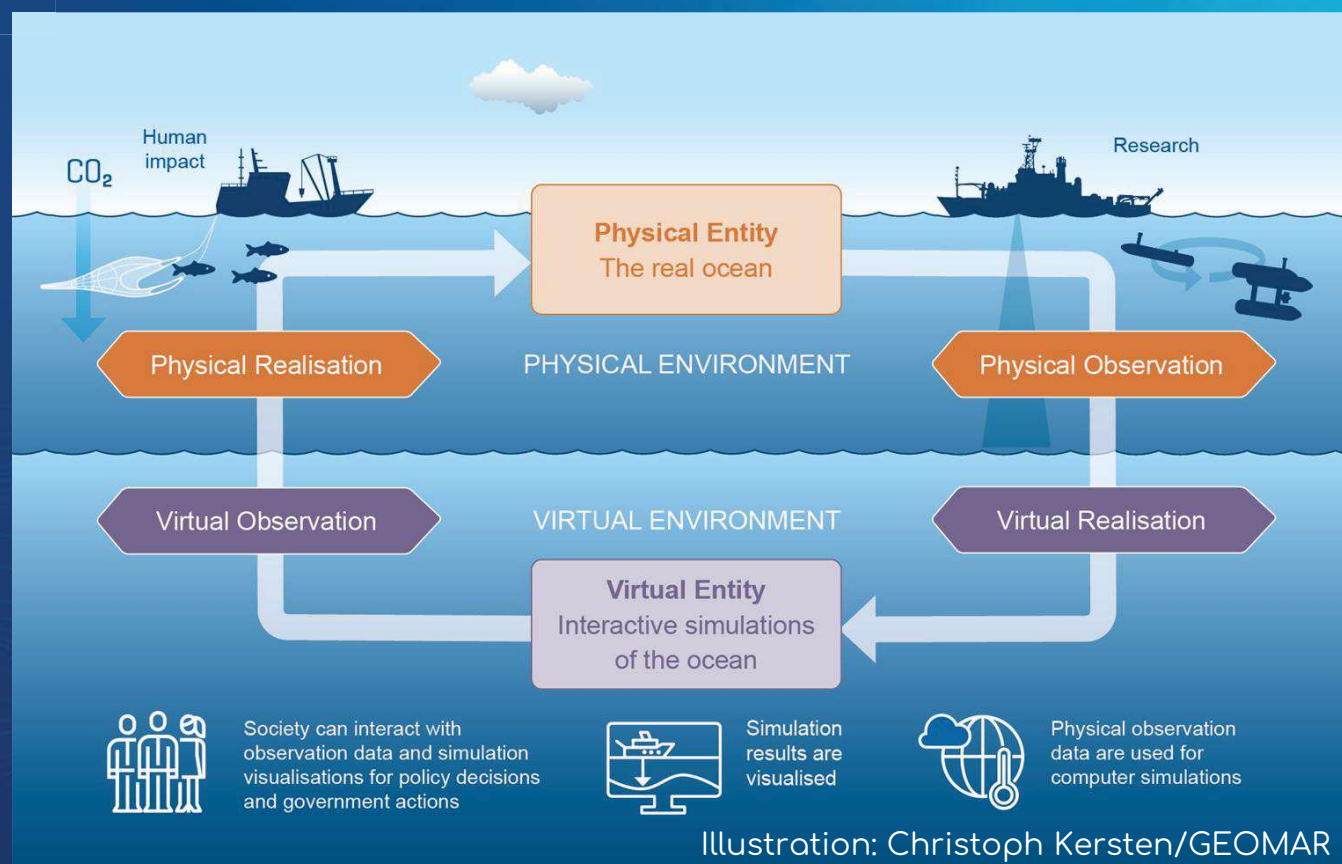
Blue-Cloud  
Hackathon 2025





Sustainable Blue  
Economy Partnership

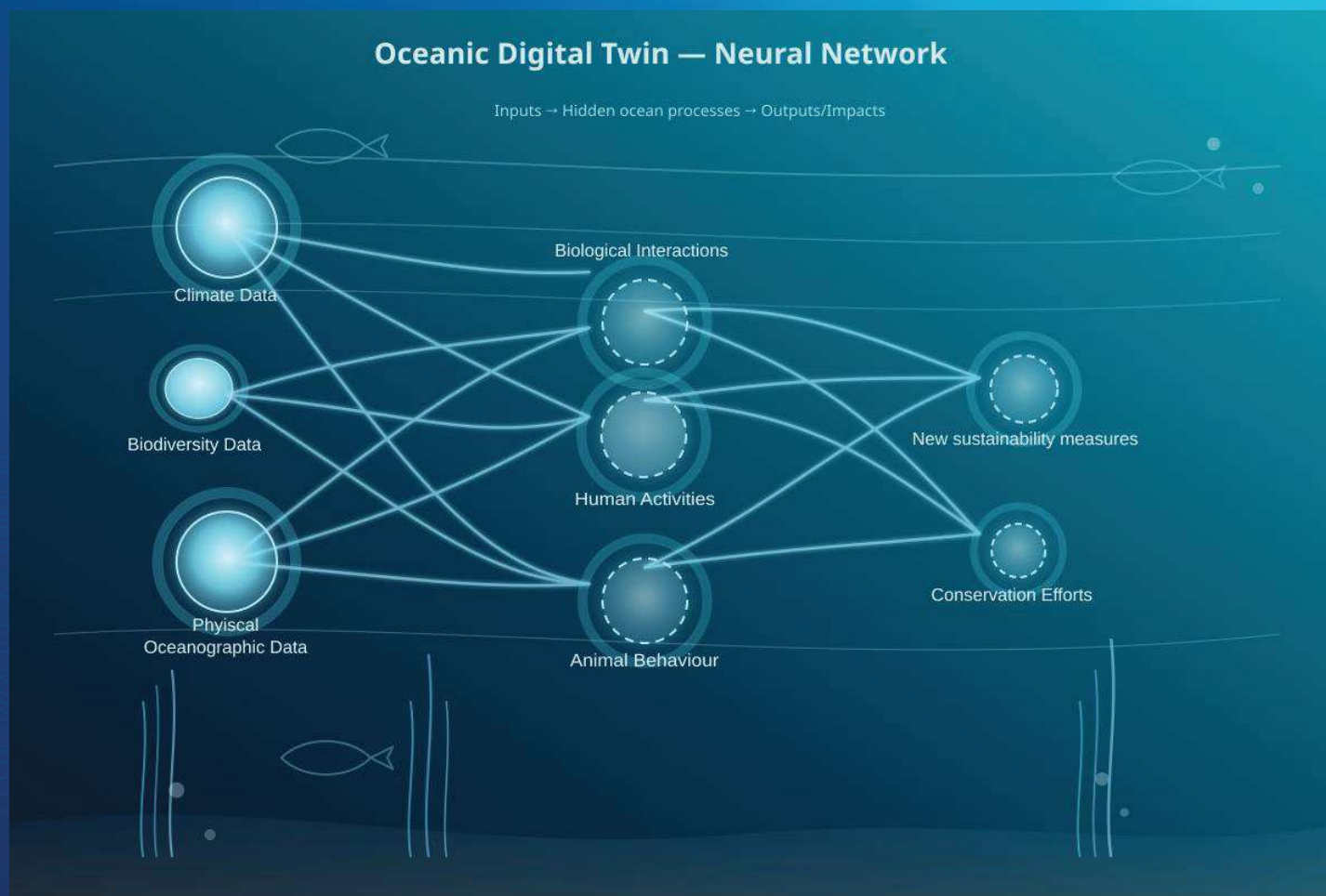
# Digital Twins: A Key to Smarter Ocean Management



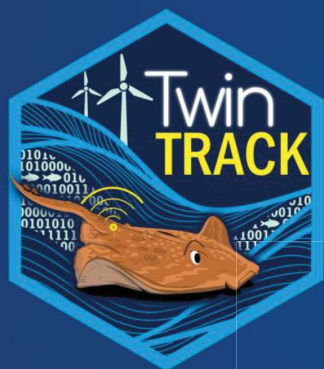


Sustainable Blue  
Economy Partnership

# Status Quo for Biodiversity DTs







Sustainable Blue  
Economy Partnership

# TwinTrack: Bridging the gap

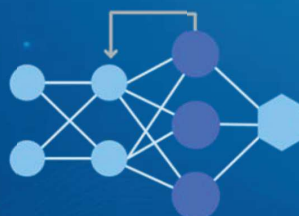
eosc | Blue-Cloud2026

VLABS

1. Global Fisheries Atlas
  2. Zoo and Phytoplankton
- EOV products



Human  
activities &  
environmental  
data



Long Short-Term Memory  
(LSTM) model



Interactive Web Application

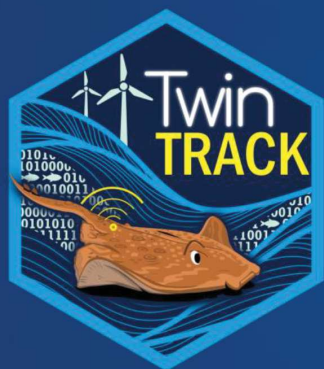


Fish  
tracking  
data



EDITO Datalab

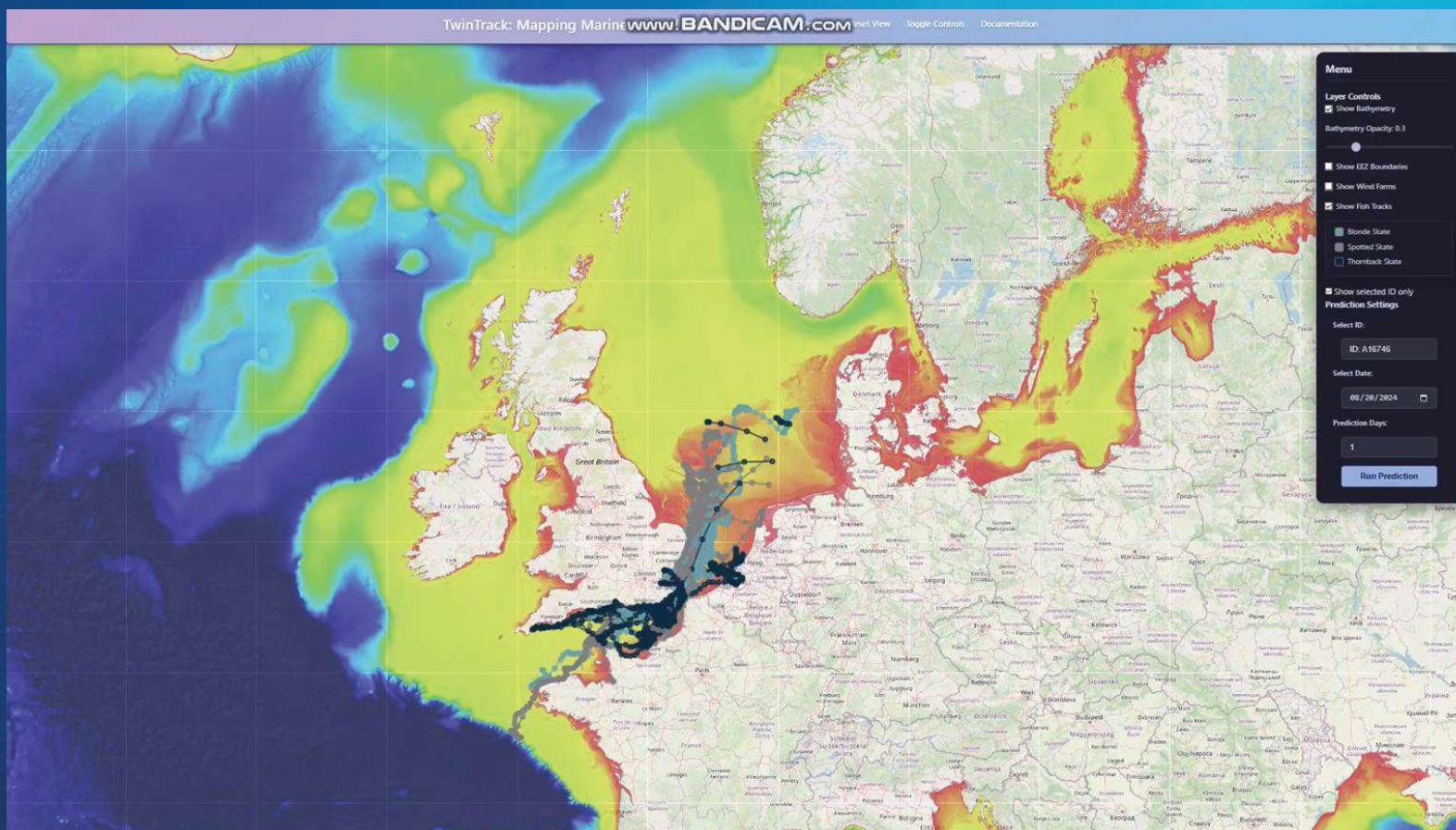




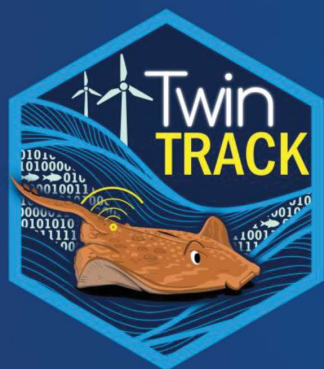
# TwinTrack App



Sustainable Blue  
Economy Partnership





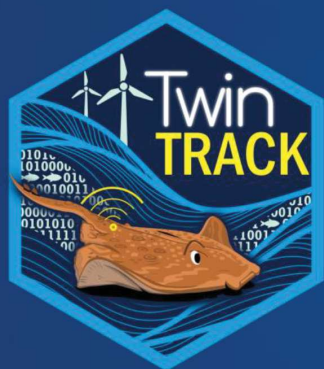


Sustainable Blue  
Economy Partnership

# TwinTrack benefits

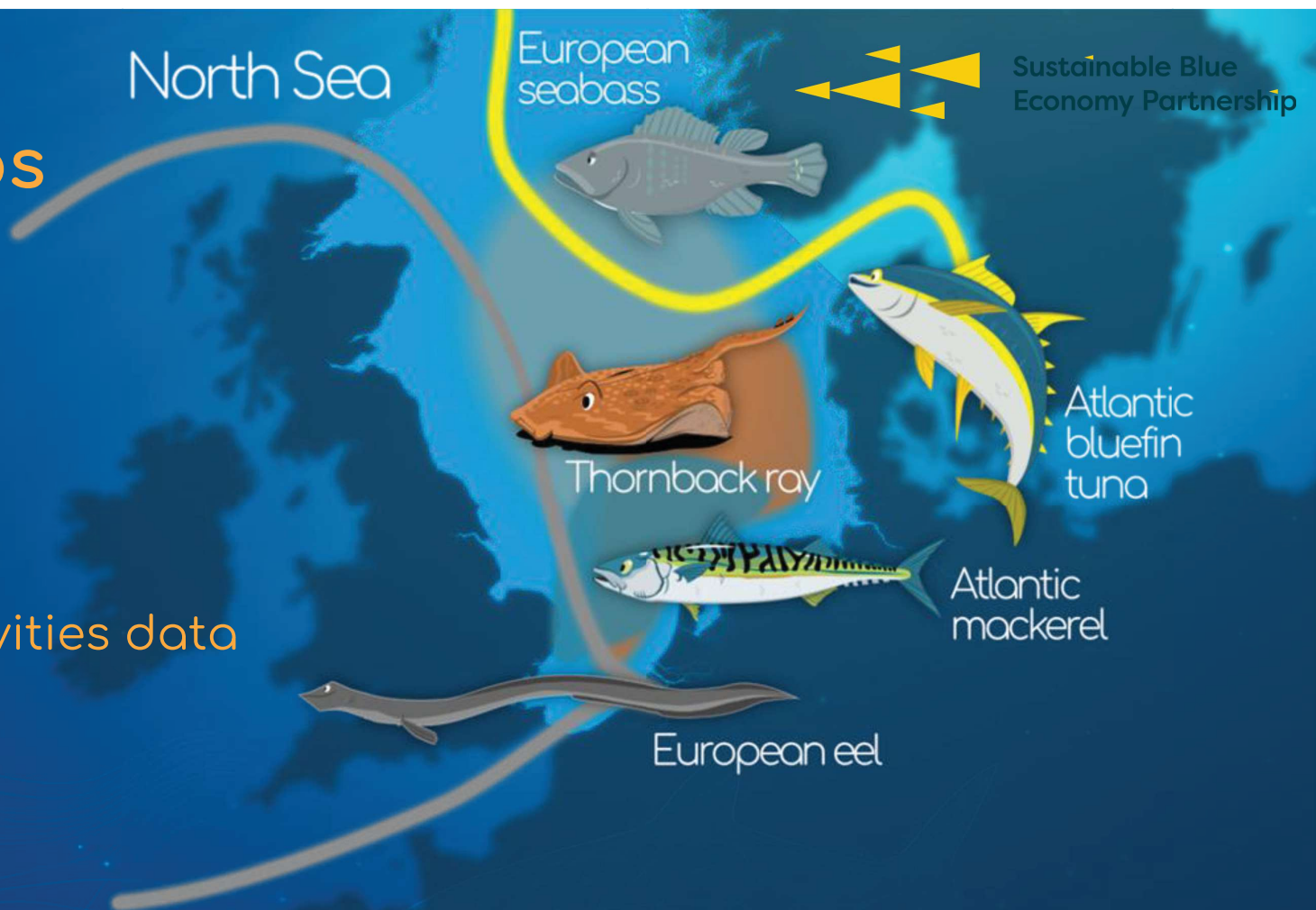
- 1 integrate observations & models in one place
- 2 make fish movement visible and actionable
- 3 Promote transparency & collaboration
- 4 enable real-time understanding of marine species & ecosystems



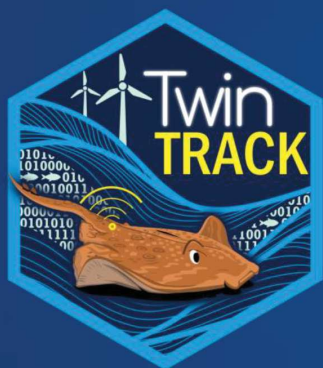


## Next Steps

- ❖ More species
- ❖ Integrate human activities data
- ❖ Improve interface
- ❖ Refine model







# Acknowledgements



WAGENINGEN  
UNIVERSITY & RESEARCH



Sustainable Blue  
Economy Partnership



GEOMAR



EDITO



Copernicus  
Marine Service



EMODnet  
European Marine  
Observation and  
Data Network

European Digital Twin Ocean



DTO-BioFlow

Integration of biodiversity monitoring  
data into the Digital Twin Ocean



Blue-Cloud 2026

A federated European FAIR and Open Research Ecosystem  
for oceans, seas, coastal and inland waters

 | Blue-Cloud2026

**A workflow for mapping and  
monitoring seagrass meadows  
using low-cost drones and open-  
source software Sea**

Valentina Costa (Stazione Zoologica Anton  
Dohrn)

---

**5-6 November** 2025, Brussels [Belgium]



Funded by  
the European Union



# A workflow for mapping and monitoring seagrass meadows using low-cost drones and open-source software

**Valentina Costa (1,2,3), Teresa Romeo (2,3,4)**

1. CRIMAC Calabria Marine Centre, Stazione Zoologica Anton Dohrn, Italy
2. National Institute of Oceanography and Applied Geophysics, OGS, Italy
3. National Center for Future Biodiversity, Italy
4. Sicily Marine Centre, Stazione Zoologica Anton Dohrn, Italy
5. National Institute for Environmental Protection and Research, Italy



**NATIONAL  
BIODIVERSITY  
FUTURE CENTER**



**OGS**





# The importance of Marine Seagrass Monitoring



Blue Carbon Ecosystems

Biodiversity Hotspots



Threats



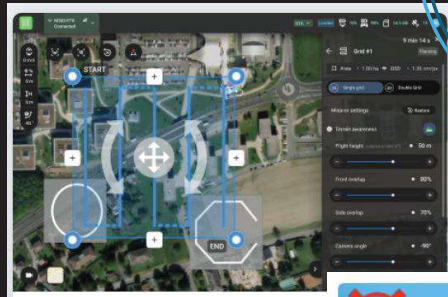


# The solution: Low-cost Drones and Open Source Workflow

Plan

Capture

Process



Planning  
Software



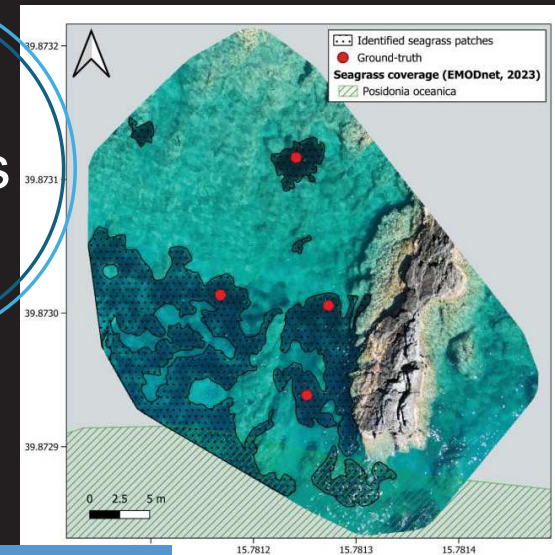
WaypointMap



Altitude: 45  
meters  
Speed: 2.5 m/s  
Gimbal Angle: 90°



Photogrammetry  
Software



# Impact and Future Potential



**Scalable Global Adoption**



**Citizen Science and Education**



**Long-Term Ecological Impact**



**WaypointMap**



**DJI Mini 4 Pro**



- Replicable Globally
- Foster Citizen Science collaboration
- Long-term evidence are needed to guide Restoration and Protection Measures

# Thank you!



Valentina Costa  
**Stazione Zoologica Anton Dohrn**  
**CRIMAC, Amendolara**  
**Italy**

 @valecosta83.bsky.social

 @valecosta83

 valentina.costa@szn.it

Sponsors: **British Ecological Society – Small Research Grant SR23\14**



**NATIONAL  
BIODIVERSITY  
FUTURE CENTER**



**OGS**



eosc | Blue-Cloud2026

# Ecosystem Workbench for plankton biodiversity & biomass

Jean-Olivier Irisson (Sorbonne University)

---

**5-6 November** 2025, Brussels [Belgium]



Funded by  
the European Union



# WB3: Ecosystem workbench

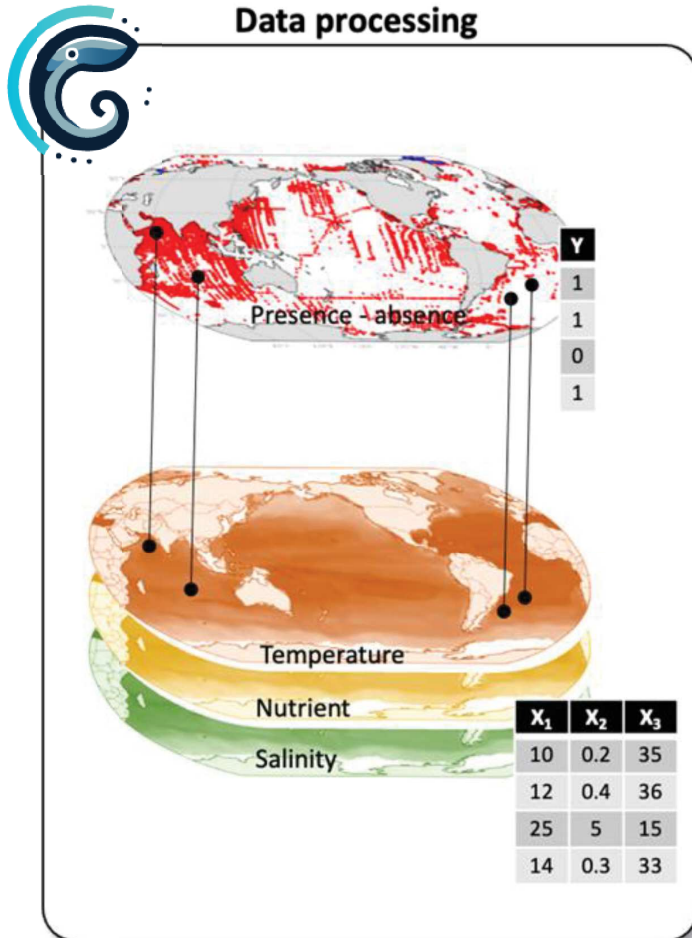
**Jean-Olivier Irisson**, Virginie Sonnet, Victoria Bancel  
(Sorbonne Université)

**Alexandre Schickele**, Meike Vogt, Corentin Clerc, Matthias  
Münnich, Urs Hofmann (ETHZ)

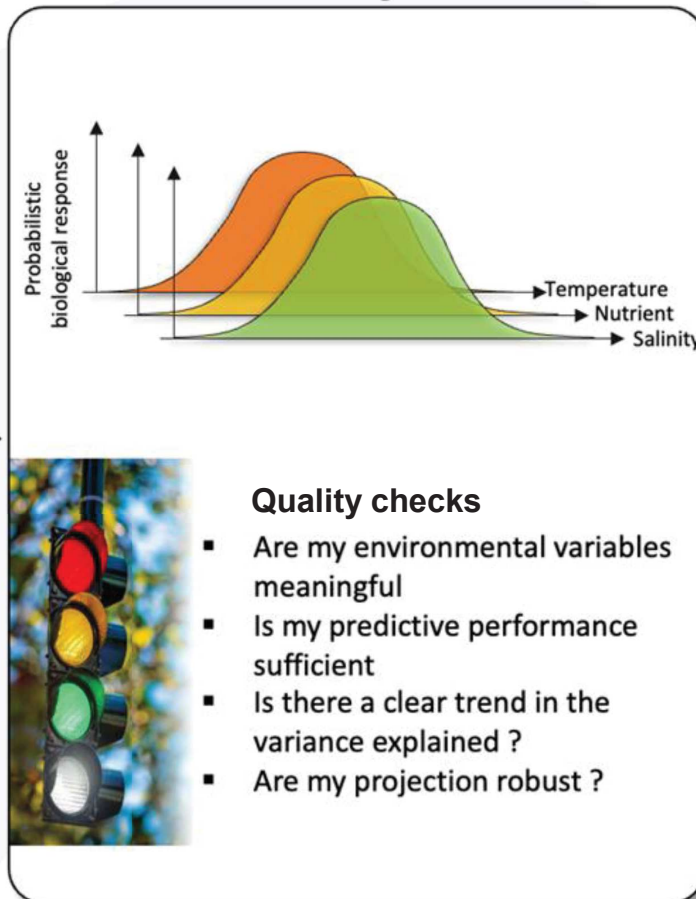


Funded by  
the European Union

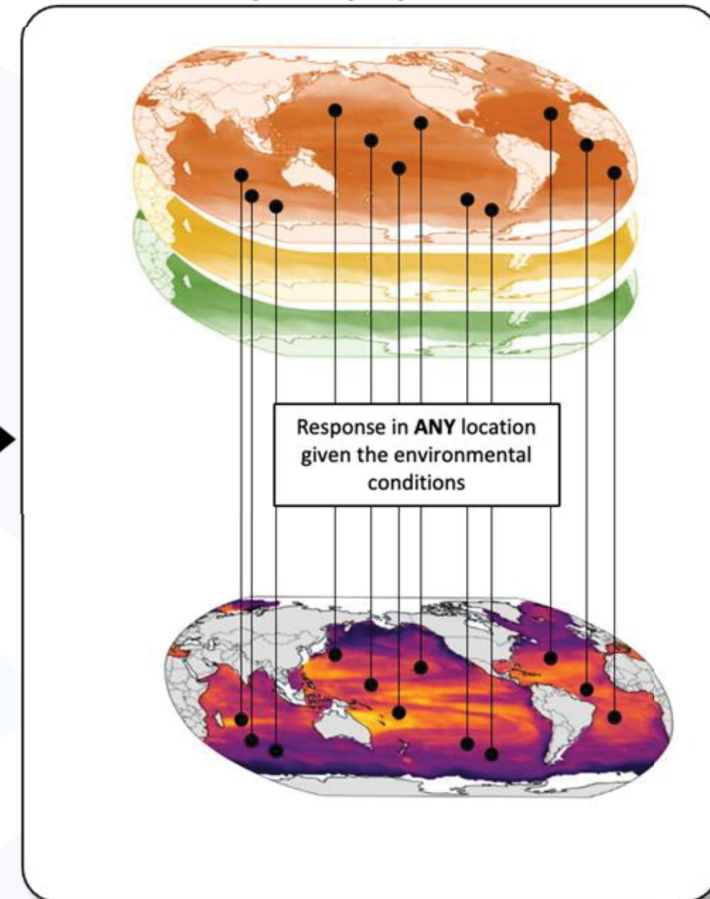
## Data processing

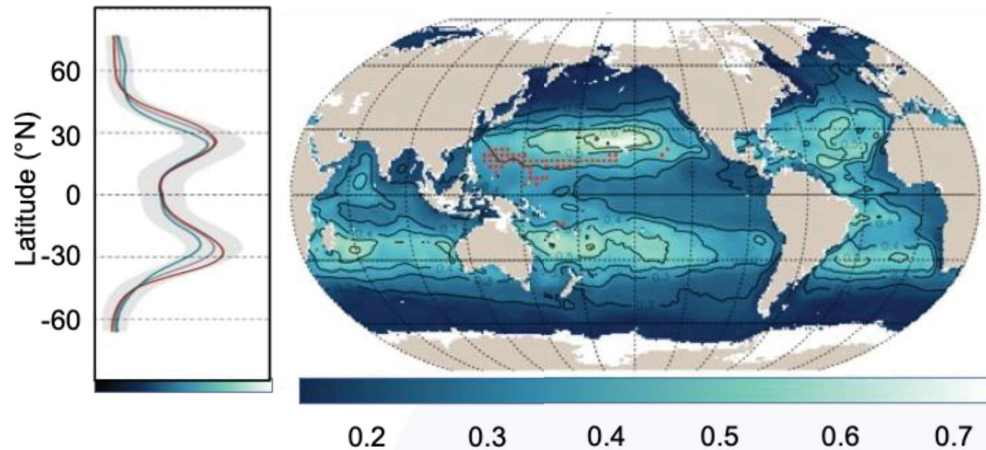


## Model training & evaluation



## Spatial projections

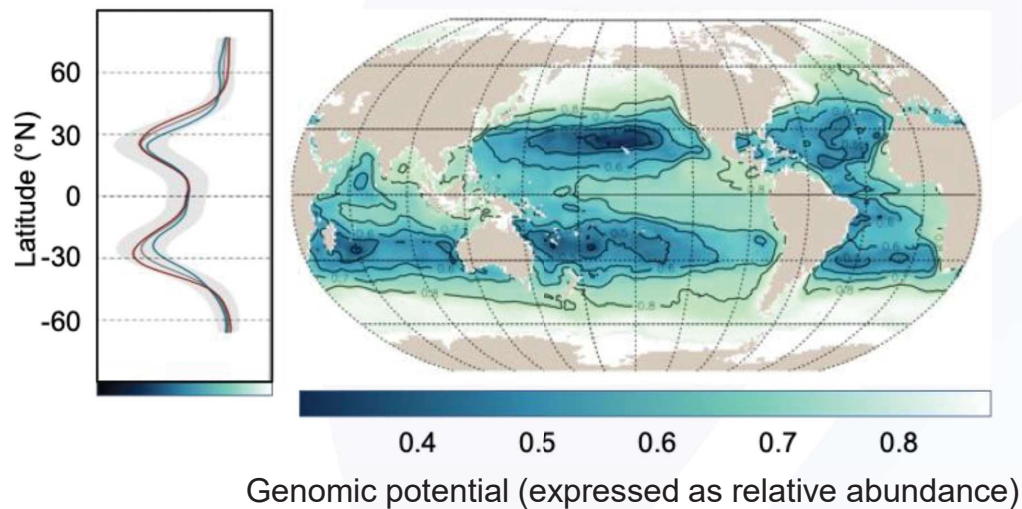




Enzymes supporting Marine Nitrogen Metabolism mapped from metagenomic data, using CEPHALOPOD and WB3

## ► Nitrogen fixation

- Aerobic process
- Used for cellular biosynthesis in nutrient poor regions
- Associated to the epipelagic layer



## ► Denitrification

- Anaerobic process
- Used for energy requirements in excess nutrient regions
- Associated to the mesopelagic layer, sub- and anoxic layers

Schickele et al. (under review)

doi: <https://doi.org/10.1101/2025.10.28.685123>



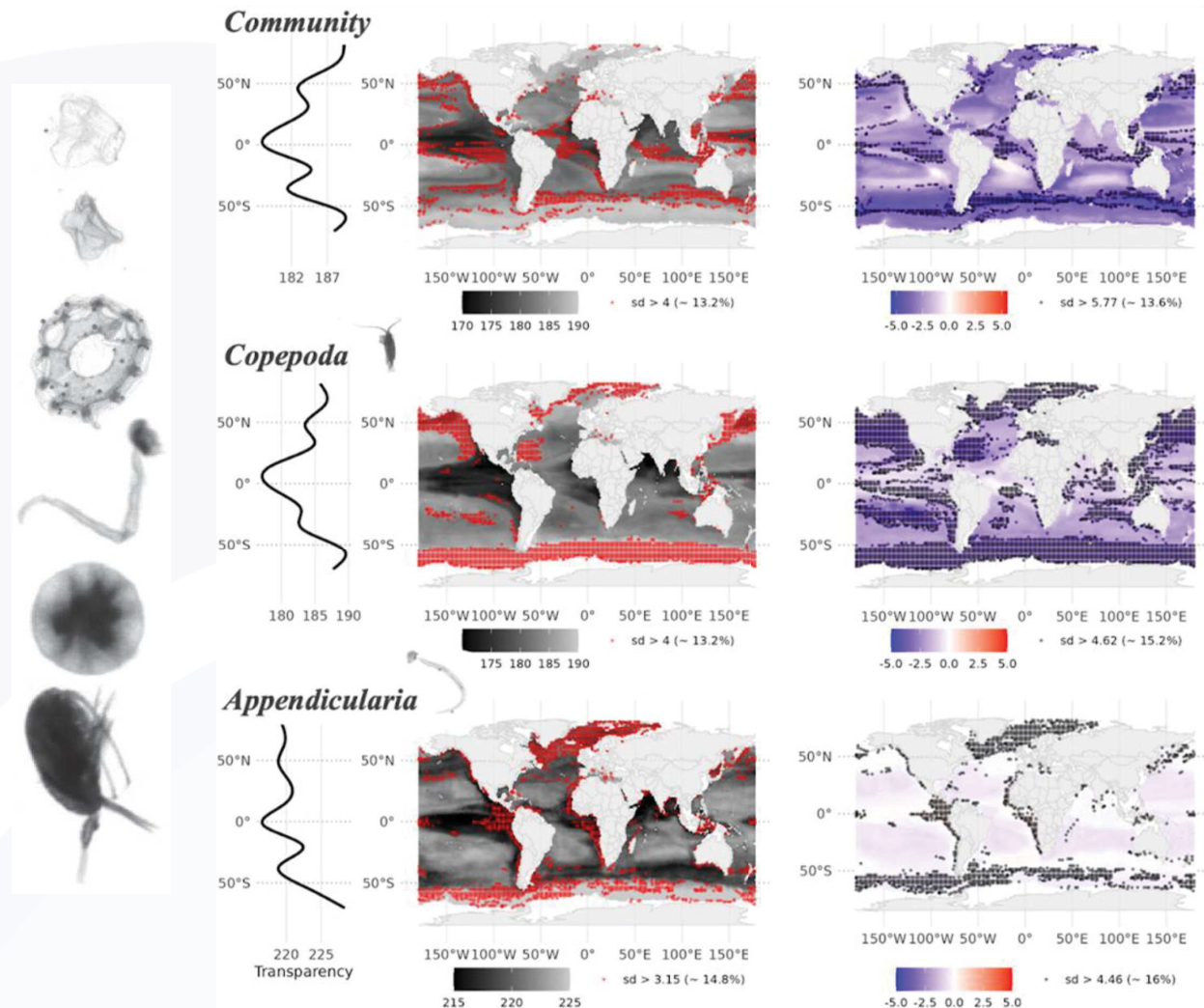
**Coloration** well studied **on land** (Golger's and Bolger's rules) relates to thermoregulation and humidity = **not applicable** to ectotherms in water!

Transparency in **zooplankton** is an **important** morphological trait (25% of morphological variation) and **independent of size** (different selection pressures)

Over 0-200m, zooplankton is:

- more opaque at **night**: migration of more **pigmented** organisms from **depth**
- more homogeneously transparent when it is transparent and more transparent in oligotrophic regions: avoidance of **predation**
- more opaque in productive (particularly equatorial) regions: food source (phytoplankton) is close to the surface => **protection against UVs**

Sonnet et al. (to be submitted soon)



eosc | Blue-Cloud2026

**Thank You!**

---

**5-6 November** 2025, Brussels [Belgium]



Funded by  
the European Union

 | Blue-Cloud2026

# Panel discussion

---

**5-6 November** 2025, Brussels [Belgium]



Funded by  
the European Union



eosc | Blue-Cloud2026

## Lunch break

13:00 - 14:30

---

**5-6 November** 2025, Brussels [Belgium]



Funded by  
the European Union