



European Digital Twin Ocean

Empowering AI for Ocean Applications and Forecasting

Alain ARNAUD, Mercator Ocean international

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EDITO is the core infrastructure platform of the European Digital Twin Ocean

Our mission is to make ocean knowledge available to all



Pillar of the EU Ocean Pact, co-developed with the Marine community



“Together, with the **Digital Twin**, we will turn the lights on in the ocean.”

European Commission
announces the European
Digital Twin Ocean
One Ocean Summit - Brest

“The second announcement from Europe today is the incredible **Digital Twin of the Ocean**... Today, we proudly present the first demonstration version. It is **an amazing tool** that helps us better understand the Ocean, from pollution to navigation, from risks for our coasts to biodiversity, you name it.”

UN Ocean Conference - Nice

“The Digital Twin is at the heart of **OceanEye** and we are committed to make it **fully operational by 2030**.”

European Ocean Days - Bruxelles

February 2022

June 2025

March 2026

2030

Oct 2022

Aug 2028



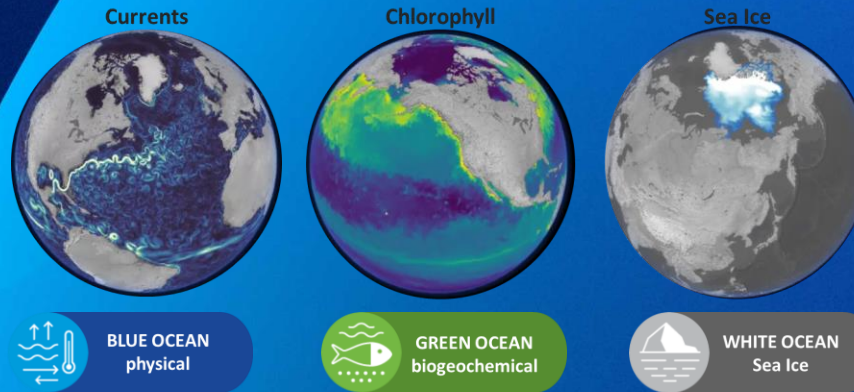
EDITO Infra
EDITO ModelLab





EDITO
European Digital Twin Ocean

DTO centralized access to AI ready data

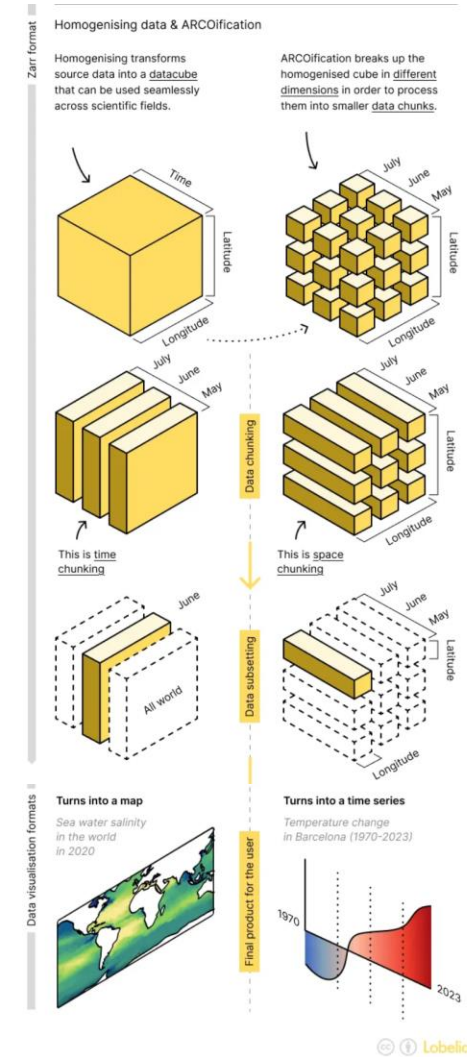


EMODnet: *in situ* marine data service

EMODnet serves users in policy, research, industry, and society, the EU Digital Twin Ocean and global ocean data initiatives



Since 2023 Copernicus Marine Data Store uses serverless ARCO Zarr



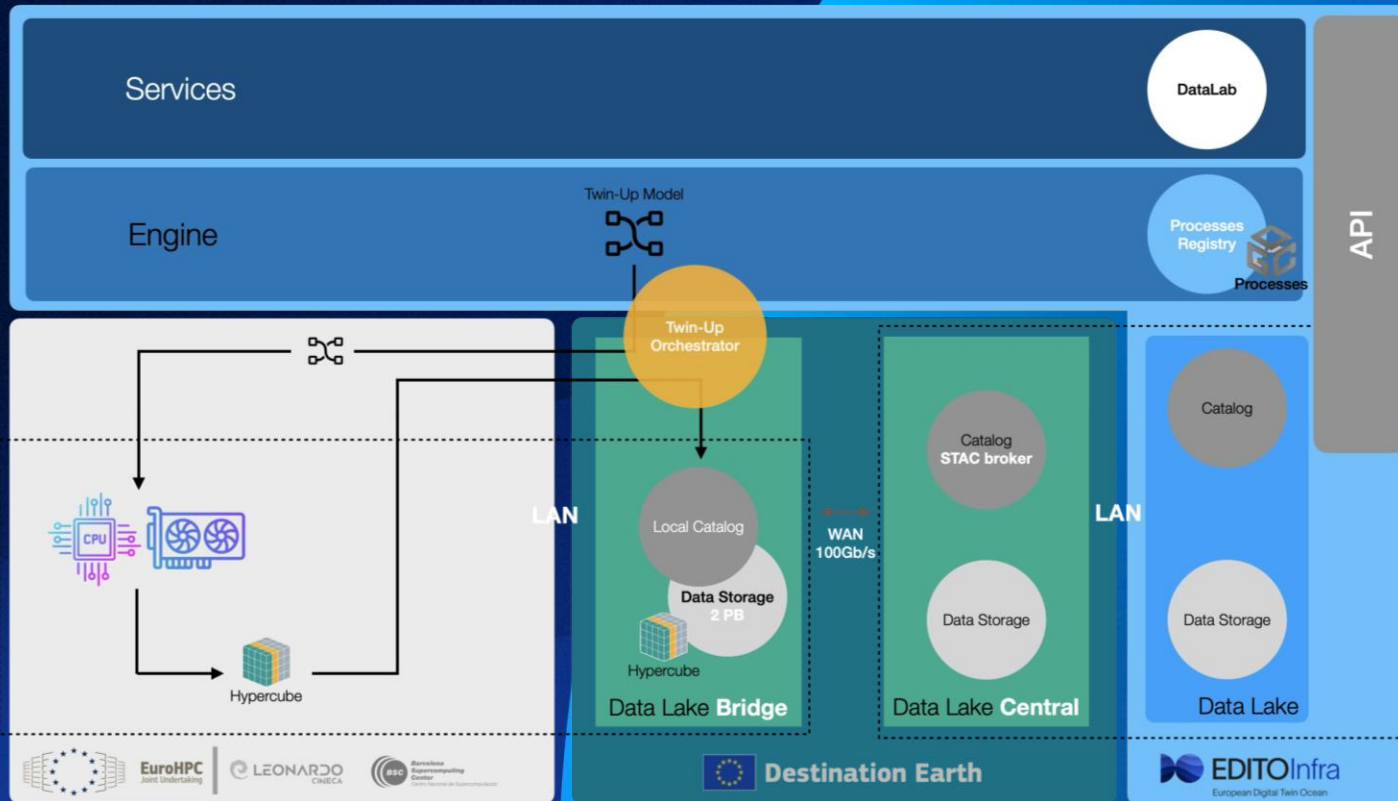
Infrastructure for AI processing on EDITO

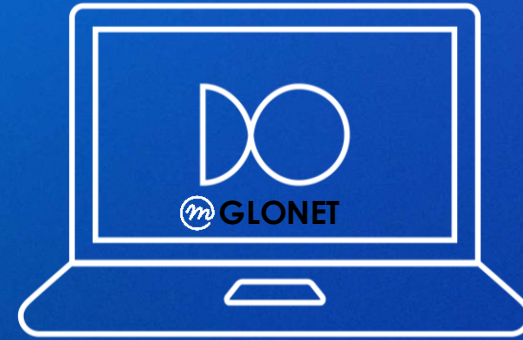
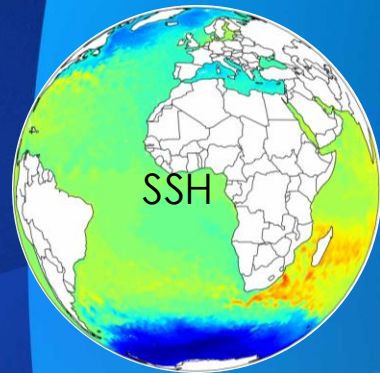
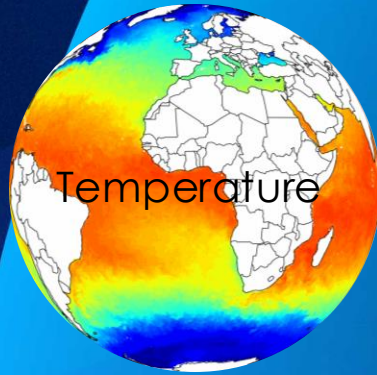
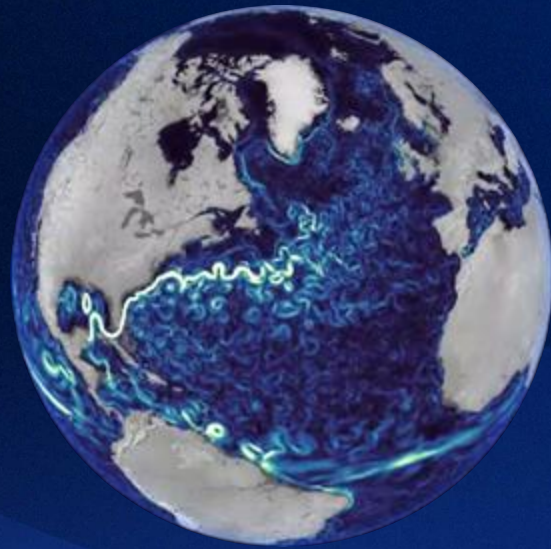
Providing a computing infrastructure supporting **AI large model training is a challenge**

DTO is working with DestinE and EuroHPC to get access to resources for training, that do not require real-time availability

Lighter resources needed in real-time for AI model inferences or What-If scenarios are directly proposed on the EDITO platform

Full operationality of the DTO in 2030 will require dedicated resources like in Copernicus Marine Service





10-day forecast produced daily

-  Visualise the latest forecast viewer
-  Browse and download catalogue
-  Execute on demand datalab

Trained by: GLORYS12
 Initialised by: GLO12
 Forecast lead time: 10-day



2024: GLONET
 2025: On EDITO
 2026: GLONET 1.1, GLONET 2.0

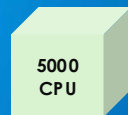
Compute key ocean variables in seconds, enabling rapid, global-scale forecast

Coalition for Sustainable AI AI & Ocean Vertical



The **AI & Ocean Vertical** aims at making **AI more sustainable** and more useful for the Ocean Preservation

Example: Benefit of AI use for Ocean Modelling



5000
CPU



1500 kWh

PHYSICAL MODEL
GLO12 ~ 6 hours



1
GPU



1Wh

AI BASED GLONET ~ 3 seconds

the consumption is divided by 1,500,000



100 tons Blue Whale

65 g sardine





AI in Copernicus Marine and EDITO

AI is a priority topic in Copernicus Marine R&D activities and Service Evolution projects since 2022, now integrated in EDITO

- AI components are already being integrated Copernicus Marine Production (like the integration Service Evolutions from 2024).
- The Digital Twin Ocean – Working Group in Copernicus Marine is promoting developments of components of the production on EDITO, including AI. New service evolution are planned on EDITO.
- Some National Collaboration Program call in Copernicus Marine are using AI-based tools. Future call will allow for implementation on EDITO.
- Key producers of Copernicus Marine are developing AI based models and processing tools.

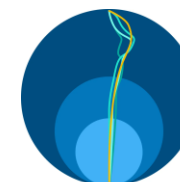
 KAILANI



 DIGITAL
TWIN
OCEAN
WORKING GROUP
Copernicus Marine Service



AIQC



GLOBIO



CERANE

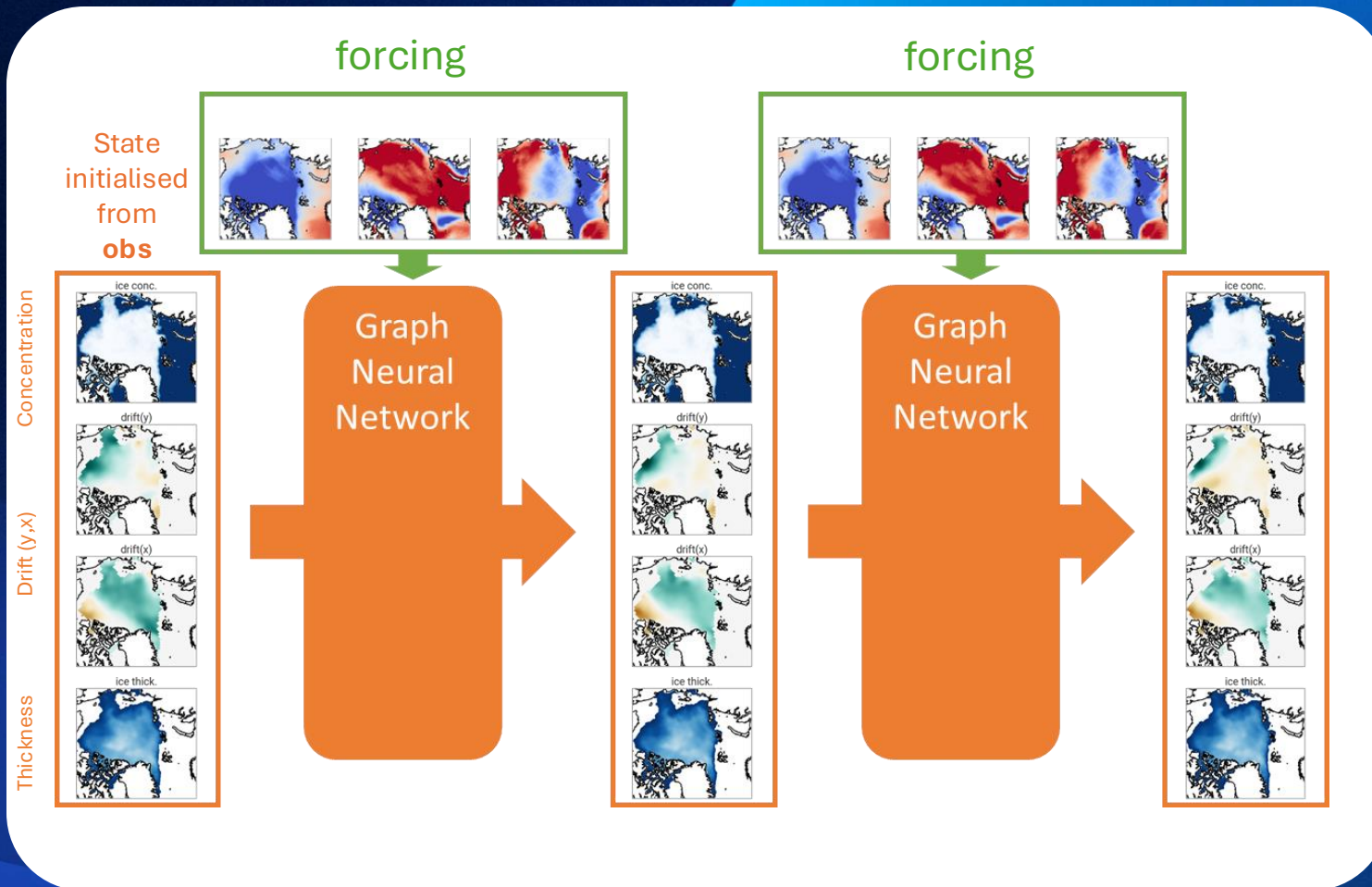


NERSC

NANSÉN ENVIRONMENTAL
AND CLIMATE CENTER
TRONDHØIM CENTER • BERGEN • NORWAY

 CMCC
Centro Euro-Mediterraneo
sui Cambiamenti Climatici

A sea ice model initialized from observations



Training: 2018-2022
Evaluation: 2022-2023

Size of the model:
~87.5 millions parameters

Forecast lead time:
10-day

Run time 10-day forecast:
IceCastNet: 10 s (1 GPU)



Copernicus*: 12 h* (100 CPU)



*operational product

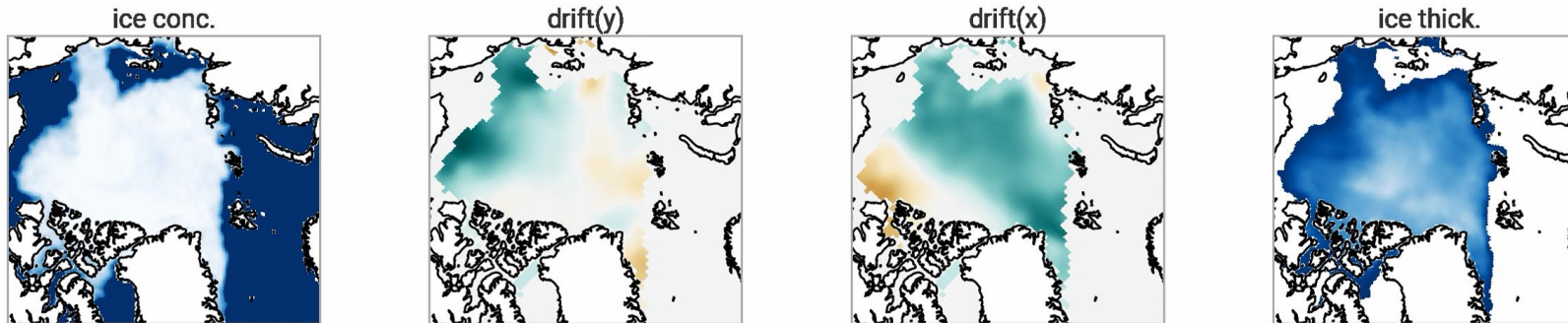
*The Sea Ice model is ~10% of the Copernicus TOPAZ run (official Copernicus product for Arctic region)

Validation of 10-day forecast

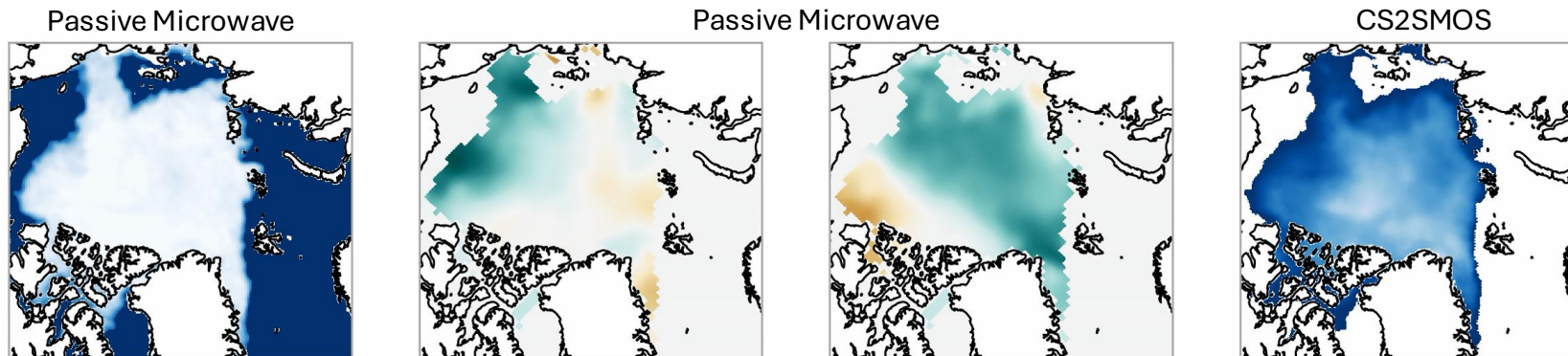
Animation 20-30 Oct 2022

2022-10-20

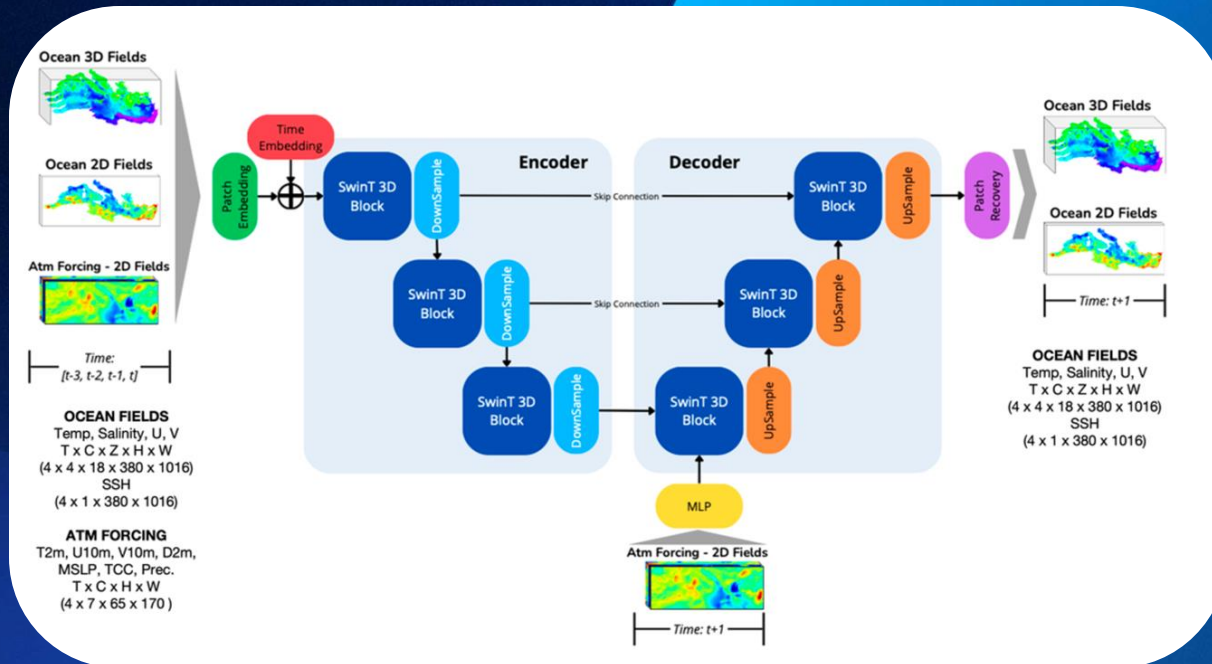
IceCast model



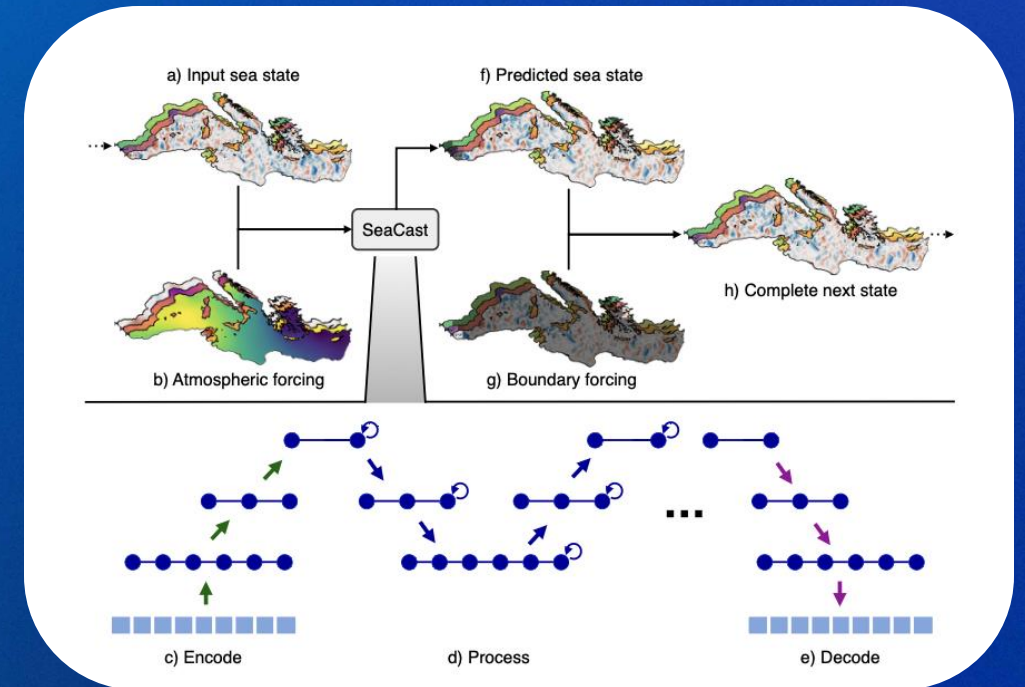
Observations



MedFormer



SeaCast Emulator



U-Net hierarchical architecture encoder and decoder made of 3-layer blocks

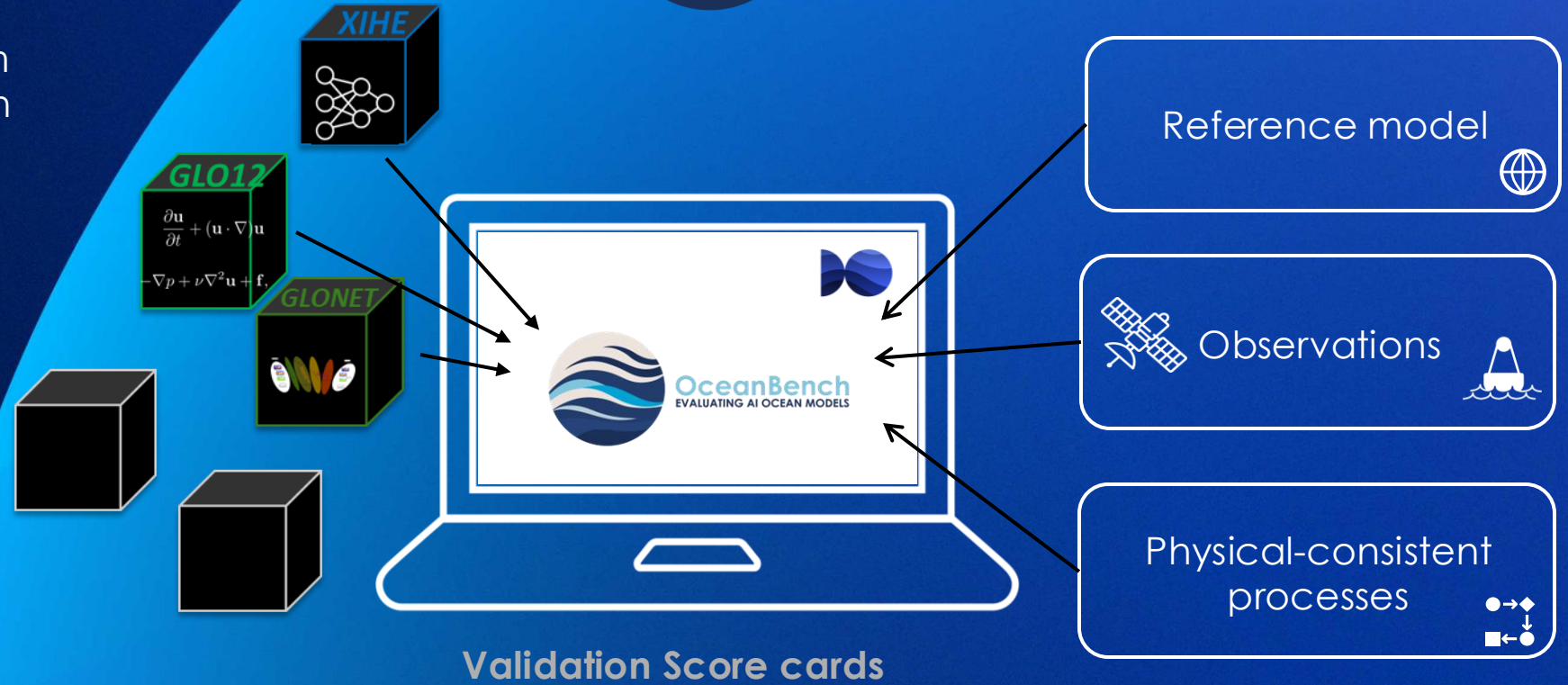
Autoregressive forecasting **Graph** neural network

Evaluating AI Ocean Models

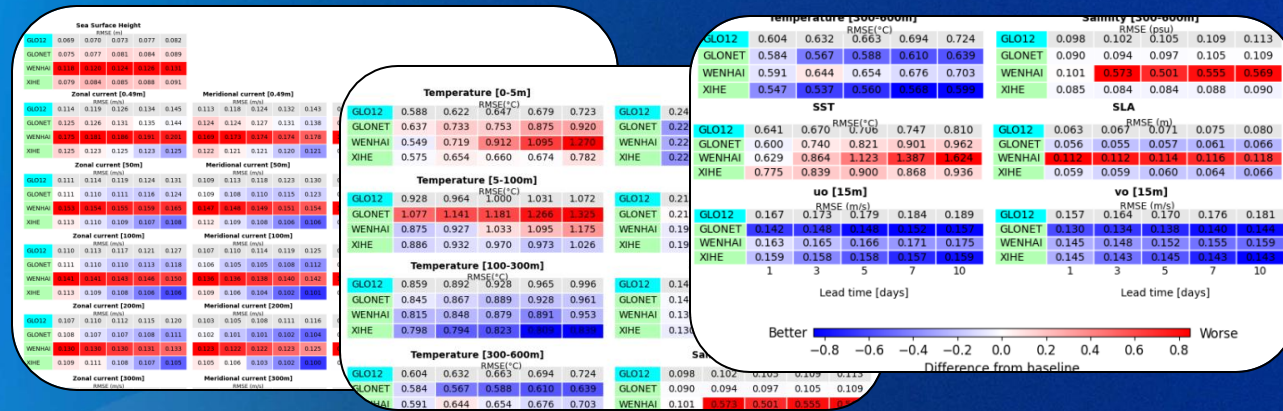


The DTO being an open platform operating 3rd parties contribution requires a **strong validation component**

Oceanbench is the global **reference** collaborative tool for benchmarking ocean models including AI based models



Validation Score cards



AI Applications on EDITO platform using Copernicus data

- Start-Up specialized in data fusion with AI
- Improving model output into High Resolution (decametric) products using Sentinel 1&2 data
- Open products and commercial services

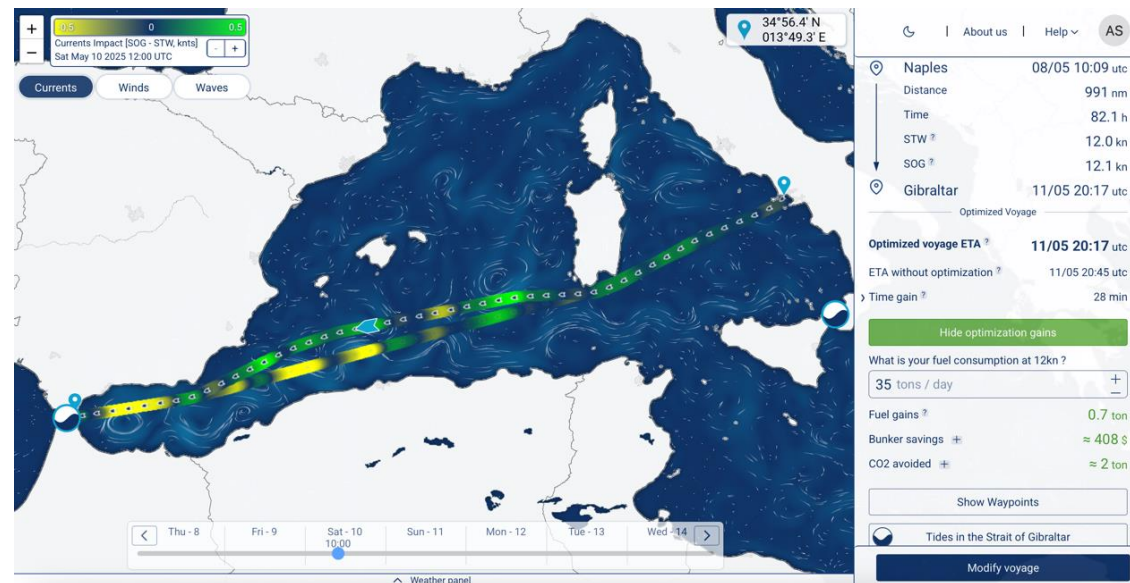


Pioneering Ocean Intelligence

At Amphitrite we harness satellite observation and artificial intelligence to help maritime operators make the best decisions at sea



Trusted by Maritime and Space Organizations Worldwide



Fast AI developments on EDITO

From an idea to a Digital Twin prototype in 3 days

Digital Twin Prototype for Animal Movement Patterns

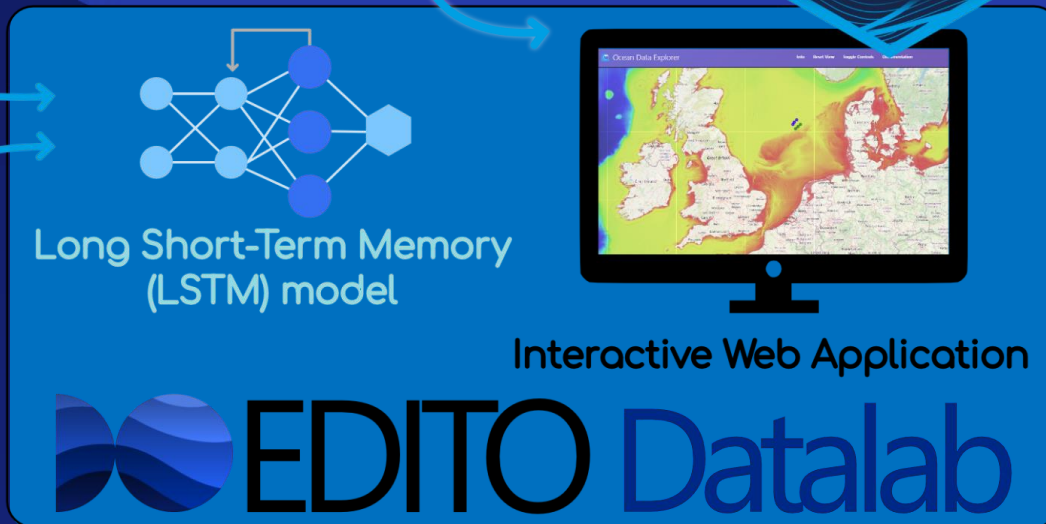
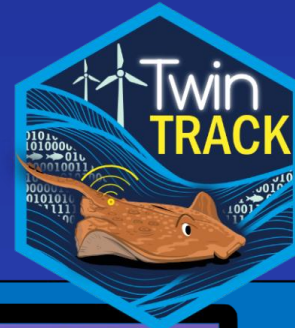
eosc | Blue-Cloud2026

VLABS

1. Global Fisheries Atlas
2. Zoo and Phytoplankton EOY products



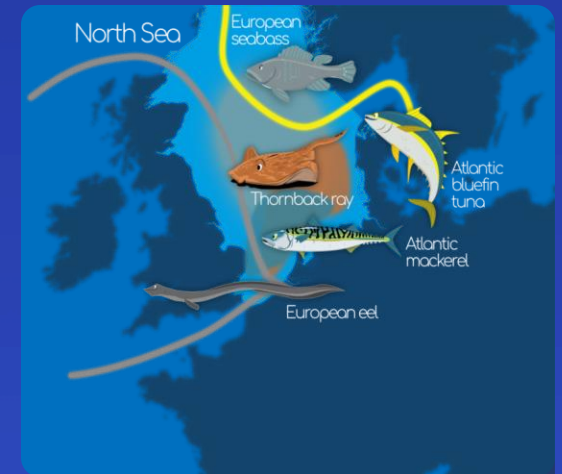
Human activities & environmental data



Fish tracking data

NEXT STEPS

- More species
- Integrate Human Activities data
- Improved User Interface
- Refine the model



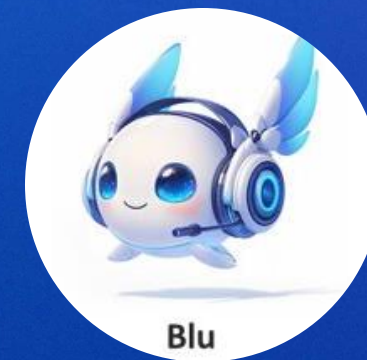


AI components in Copernicus Marine

Blu AI agent for Customer Service:

Originally made for user support it is now able to answer questions on Ocean information and link to the data source (here opening the My Ocean viewer on a Copernicus Marine product)

An improved version integrating Chatbot and Viewer is under development for EDITO – Ocean intelligence



Chat Interface:

Blu
The team can also help

What is the temperature of the sea in marseille today

I can help you find sea temperature data for Marseille! Based on today's date (March 5, 2026), here are the best ways to get current sea temperature data for the Marseille area:

For quick access to today's temperature:

Use [MyOcean Pro](#) - our interactive viewer. Simply:

1. Click on the map at Marseille's location
2. A graph will show current temperature data for that point
3. Click the three dots (:) on the graph and select "Export to CSV" to download the data

By chatting with us, you agree that the information you share may be collected and processed in line with our [Privacy Policy](#).

If you need any more help accessing sea...
Blu • Just now

Viewer Interface:

MyOcean PRO

+ Add layer...

- Sea water velocity swv
06/03/2026 -0.5 m Global daily
- Sea water potential temperature thetaw
06/03/2026 -0.5 m Global daily

10 15 20 25 °C

4.422°N, 43.163°E

swv 0.198 m/s
thetaw 13.93 °C

thetaw 2023 2024 2025 2026

17.8 ↓ 12 ↑ 25.5 °C

h 13.8 13.85 13.9 13.95 thetaw

h - thetaw Jul 2026

16.4 ↓ 12.2 ↑ 25.6 °C

+ Add graph

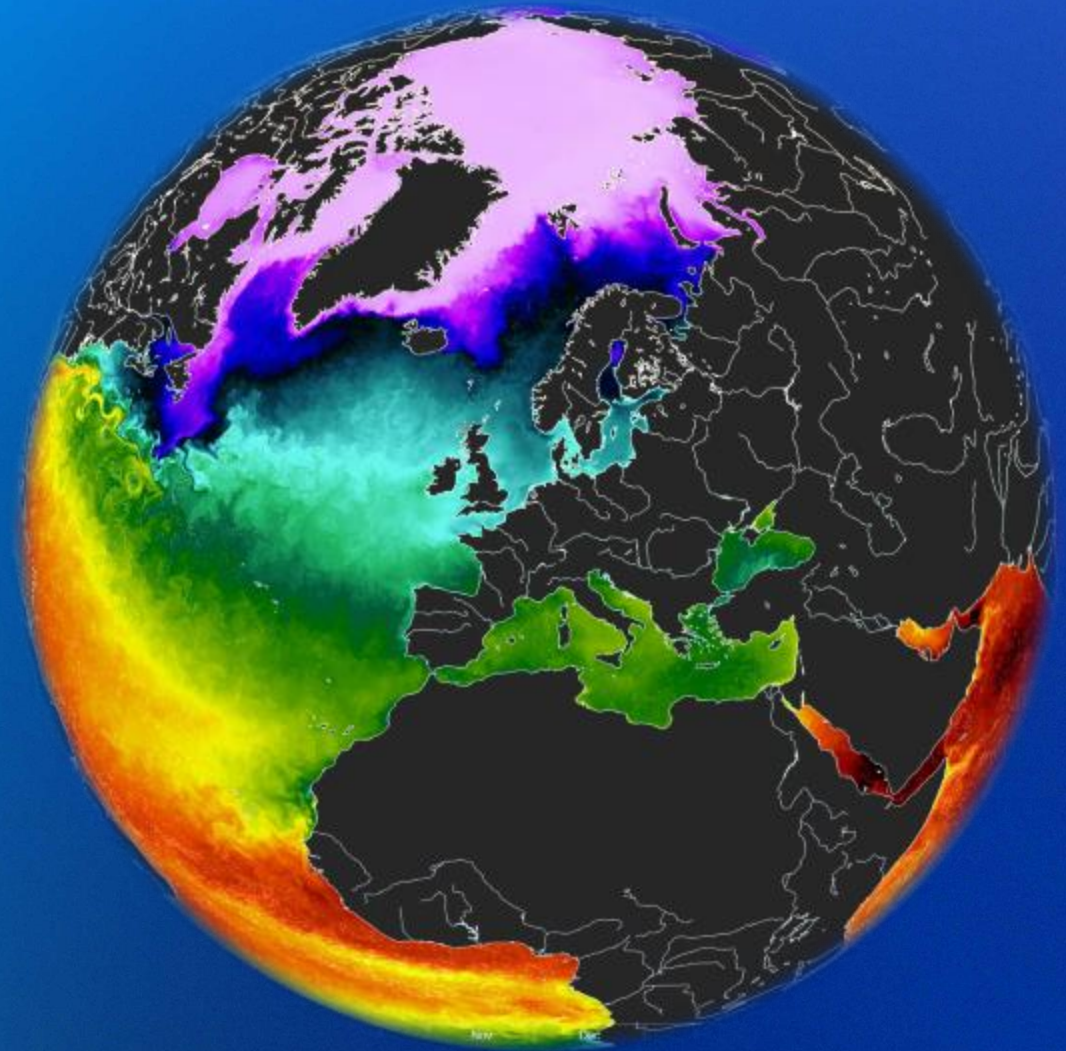
Points
Lines
Areas
Import
Settings

0 m
-2000

Apr Jul Oct 2023 Apr Jul Oct 2024 Apr Jul Oct 2025 Apr Jul Oct 2026 Apr

Building the Digital Twin Ocean, Together.

By 2030, EDITO envisions a fully **operational DTO**, enabling on demand production of products based on AI and serving as a global benchmark for digital ocean solutions



Join edito.eu

