

**EDITO**ModelLab

European Digital Twin Ocean

# European Digital Twin Ocean

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**Felix Dols**

Deltares

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# EU mission: Restore our Oceans and Water

## Make ocean knowledge accessible

- Prepare next generation of marine models
- Integrate in existing infrastructure
- Demonstrate capabilities
- Stakeholders become knowledge partners

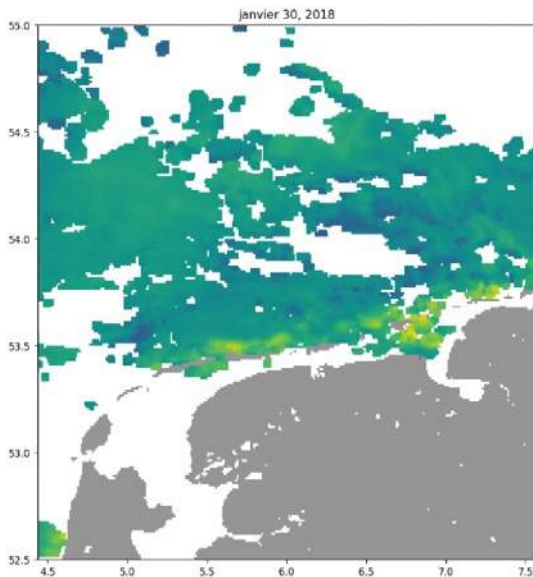


# Prepare next generation of marine models

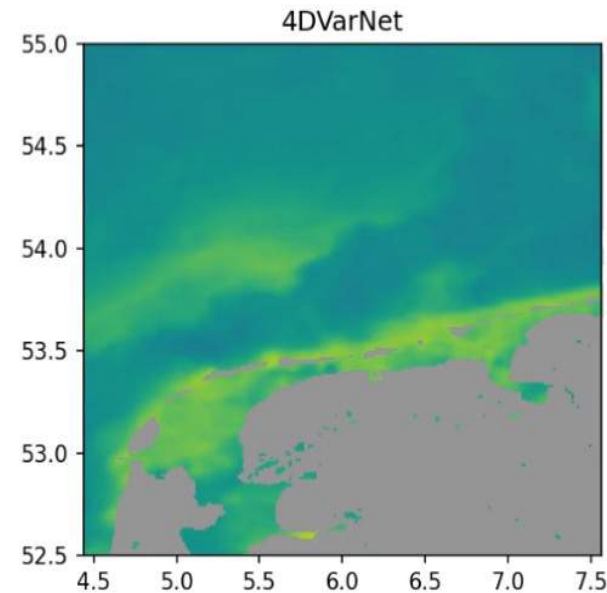


# Hybrid modelling, using EO-data and AI

- Use earth observation and AI in numerical models
- Speed up** simulation time
- Achieving better **interactivity**
- 4DVarNet for **SPM in Wadden Sea**



*Snapshot of suspended sediment concentration using remote sensing (L3 product)*



*Snapshot of suspended sediment concentration reconstructed with 4DVarNet (RMSE 0.126)*

# Integrate in existing infrastructure

- Connect to HPC
- Connect to marine- & climate data
- Make components interoperable







Demonstrate  
capabilities



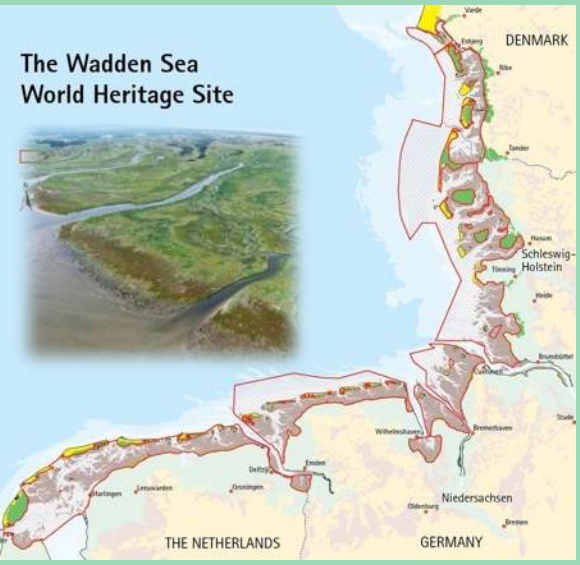
# Demonstrate capabilities: Focus Applications

## 1. Marine Protected Areas & biodiversity

Mapping habitat suitability ranges for protected species.

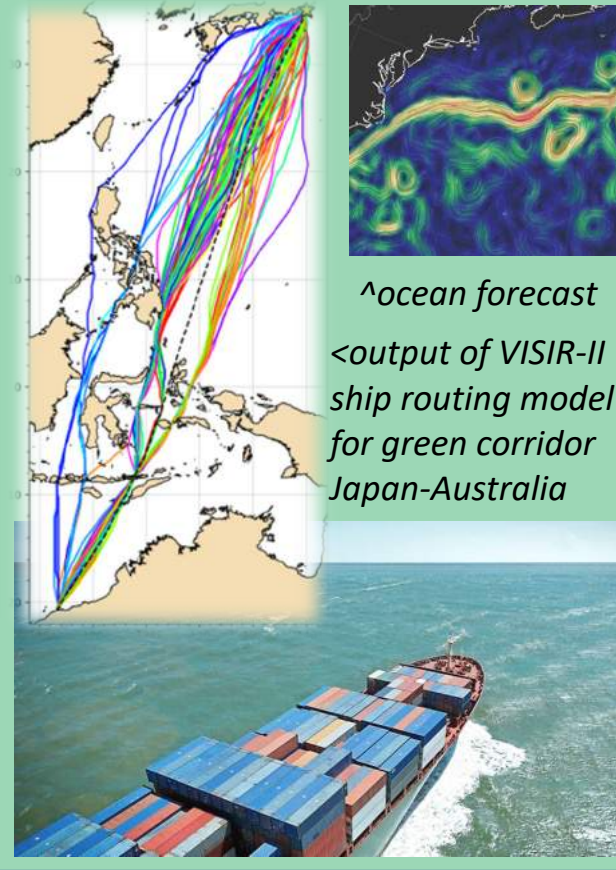


The Wadden Sea World Heritage Site



## 2. Ship routing for zero carbon

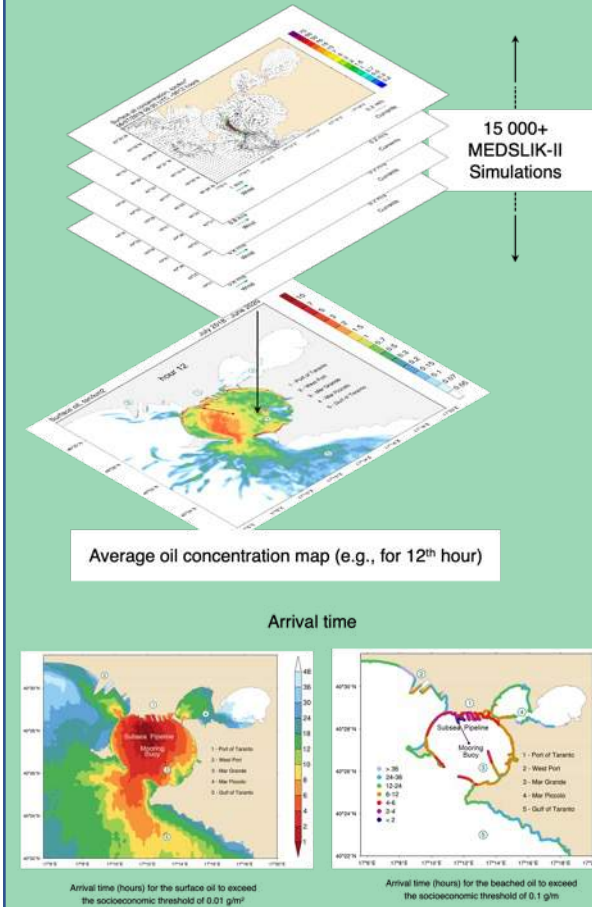
Using forecasts of ocean waves and currents to reduce CO2 emissions



^ocean forecast  
<output of VISIR-II  
ship routing model  
for green corridor  
Japan-Australia

## 3. Zero pollution

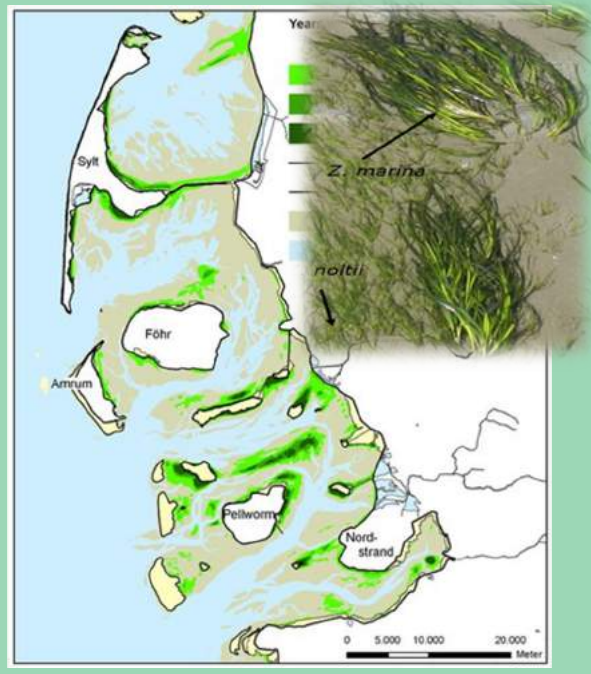
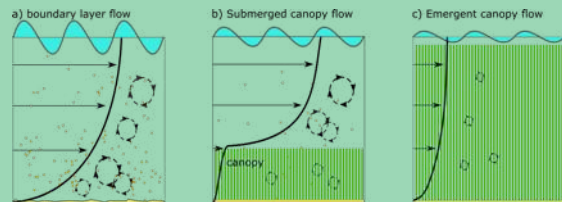
Simulating release of oil from ships and plastics from land.



# Demonstrate capabilities : *What if...? scenarios*

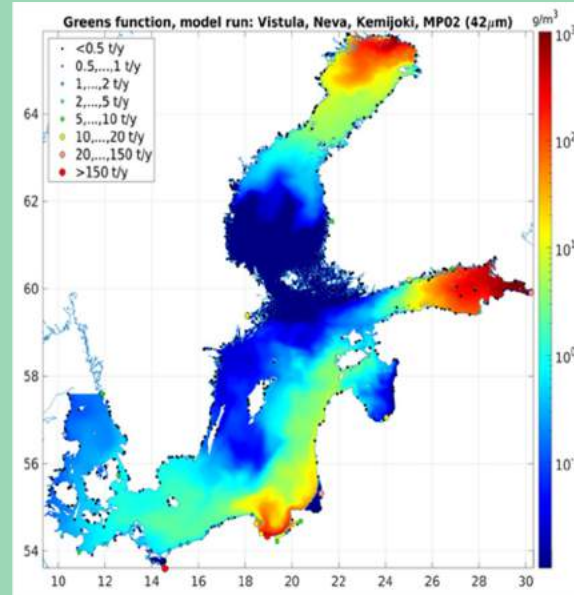
## 1. Nature based solution

What if we reconstruct seagrass to absorb wave energy?



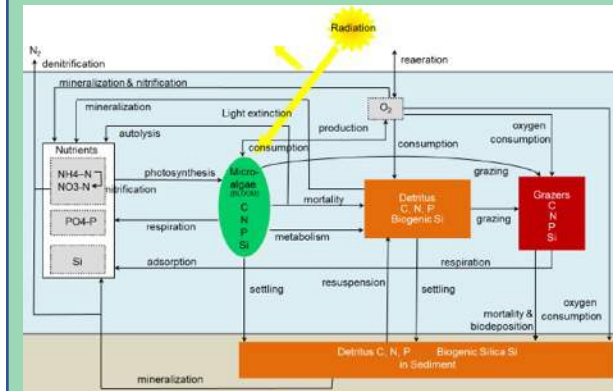
## 2. Marine Plastics

What if we capture plastics before they reach our seas?  
Modelling circulation and wave



## 3. Aquaculture & Zero Carbon

Simulating impact of large scale aquaculture farms (e.g. mussels) on carbon sequestration.

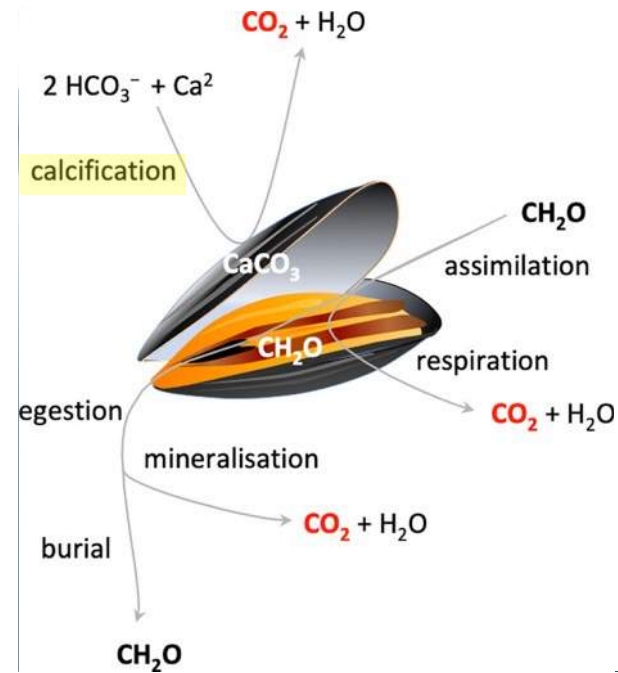




# What-If scenario 3

## Aquaculture for Zero Carbon Emission

- 🌐 Marine aquaculture offers growth opportunities for the Blue Economy.
- 🌐 *What-if* Scenario to **analyze the impact of shellfish cultivation on carbon emissions.**
- 🌐 Include **shell growth** of shellfish, using Dynamic Energy Budgeting (**DEB**) for **biocalcification**. (Stechele & Levaud, 2023)
- 🌐 **Simulation of carbon** and nutrient **fluxes** with **Delft3D-FM** model of the Dutch Continental Shelf (**DCSM**), including Water Quality and DEB.



# UI



Sea ice  
NUMERICAL MODEL



Salinity  
NUMERICAL MODEL



Temperature  
NUMERICAL MODEL



Currents  
NUMERICAL MODEL

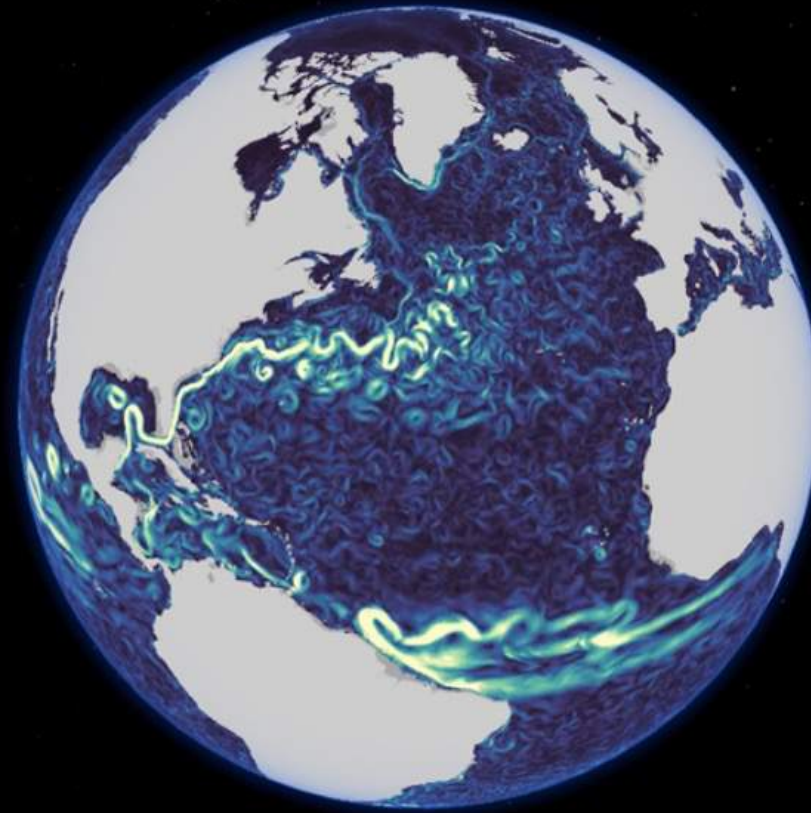
[Learn more](#)



Chlorophyll  
NUMERICAL MODEL



Waves  
NUMERICAL MODEL



The EDITO-Infra Smart Viewer

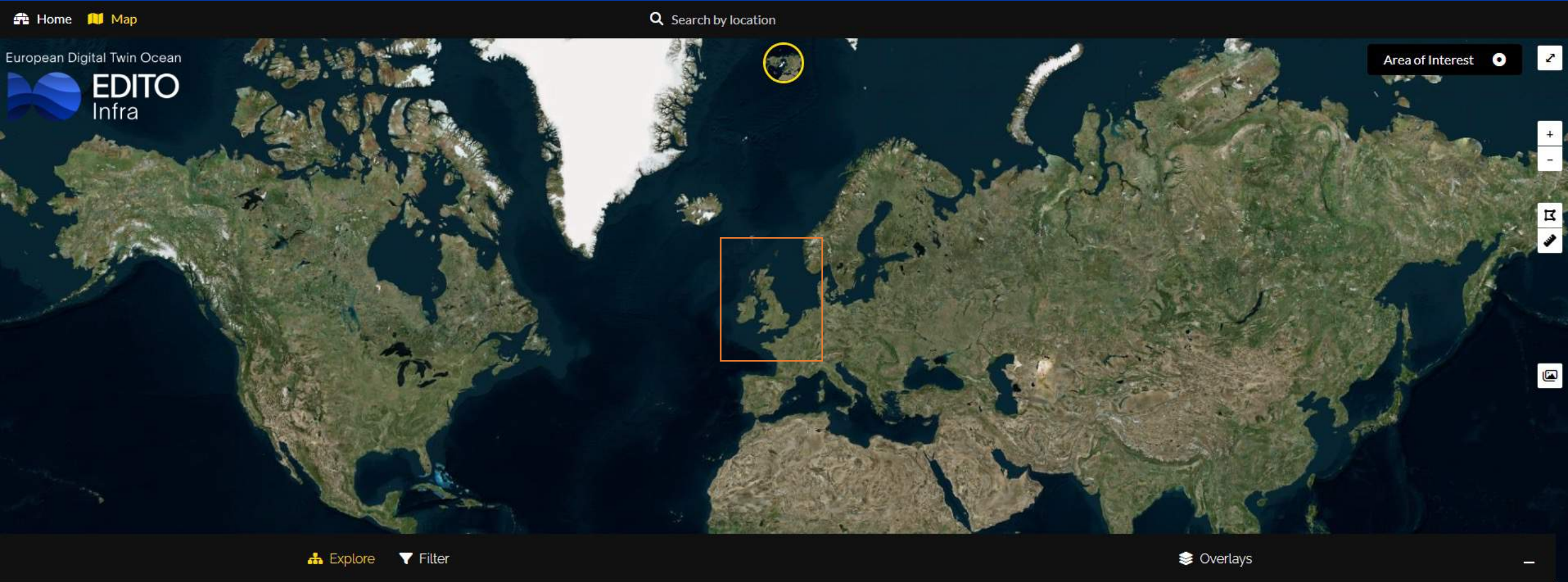


# Digital Twin Ocean: GIS viewer

Home Map Search by location

European Digital Twin Ocean  
EDITO  
Infra

Area of Interest



Explore Filter Overlays

/ EDITO

- All collections 95989
- Age of first year ice 23
- Barotropic eastward sea water velocity 2
- Barotropic northward sea water velocity 1
- Downwelling photosynthetic photon flux in sea water 29
- Eastward sea ice velocity 1818
- Eastward sea water velocity 1800

## Catalog : EDITO

Title	European Digital Twin Ocean Catalog
Description	Search endpoint to all resources available within the European Digital Twin Ocean Data Lake
Temporal extent	January 8th 1950 - September 11th 2023
Spatial extent	-180, -90 359.9375, 90
Keywords	edito. dto. european. digital. twin. ocean

# Digital Twin Ocean: service catalog

## Service catalog

Explore, launch and configure services with just a few clicks.  
You are exploring Helm Chart Repository Ocean Modelling: Ocean Modelling services

SEARCH

IDE Databases Automation Ocean Modelling

### Jupyterlab-autosubmit-bsc

Launch a jupyter python 3.10.12 with Autosubmit installed

Launch

### Autosubmit-computing-node-ssh

An autosubmit computing node service (openssh-server) to run alongside Jupyterlab-autosubmit-bsc

Launch

### D-EcolImpact

Deltares' impact assessment tool, compatible numerous spatial output data formats.

Launch

### Delft3D-FM

Deltares' hydrodynamic simulation software suite. Including D-Morphology and Delwaq.

Launch

<https://datalab.digitaltwinocan.edito.eu/catalog/ide>



# European Digital Twin Ocean

More information

EDiTO-Lab  
website



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