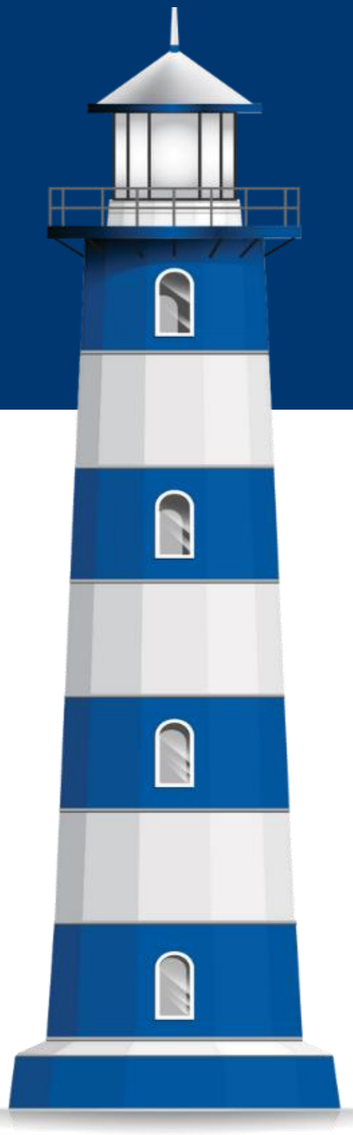
EU MISSIONS
RESTORE OUR OCEAN & WATERS

BLUE MISSION BANOS

Supporting the Mission Ocean Lighthouse in the Baltic and North Sea Basins



3rd MISSION ARENA
26-27 November 2024
Amsterdam

REGIONAL FOCUS ARENA 3

The Netherlands
BELGIUM
DENMARK I West
GERMANY I West
FRANCE I North

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BLUE MISSION BANOS

3rd MISSION ARENA
26-27 November 2024 | Amsterdam

Demonstration of the Digital Twin of the Ocean and it capabilities

27 November, 16:00-17:45
Hall 1 – The Plenary

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EDITO European Digital Twin Ocean
supported by
EMODnet
Copernicus Marine Service
MERCATOR OCEAN INTERNATIONAL
VLIZ

#MissionArena3

Funded by the European Union

Agenda

16:00 – 16:05	Welcome
16:05 – 16:15	Introduction to the Digital Twin of the Ocean and its infrastructure
16:15 – 16:30	Demonstration of the first pre-operational platform
16:30 – 16:45	DTO-BioFlow
16:45 – 17:40	Interactive session with round table discussions

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3rd MISSION ARENA
26-27 November 2024 | Amsterdam

EDITO
Digital Twin of the Ocean

27 November, 16:00-17:45
Hall 1 – The Plenary

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Goal

The main aim of EDITO-Infra, the “EU Public Infrastructure for the European Digital Twin”, is to build the EU Public Infrastructure backbone for the **European Digital Twin of the Ocean (DTO)** by upgrading, combining and integrating key service components of the existing EU ocean observing, monitoring and data programmes **Copernicus Marine Service** and the **European Marine Observation and Data Network** into a single digital framework

European Digital Twin of the Ocean

A leap in ocean knowledge and sustainable action

EDITO - Facilitate

- **the scientist work**

- **Limit data transfer** as datasets become bigger (spatial, temporal dimension) **higher resolution**
- **Simplify** high-performance computing (**HPC**) accessibility

Enable **effective data subsets** and **near-data computing**

- **the contribution to the ocean science**

- **Improve FAIRness (Findable, Accessible, Interoperable, Reusable)** of data and processes
- **Easily involve more parties** instead of identified institutes

Offer **efficient tools** in an **open and collaborative platform**

FAIR - STAC

SpatioTemporal Asset Catalogs

The STAC specification is a common language to describe geospatial information, so it can more easily be worked with, indexed, and discovered.

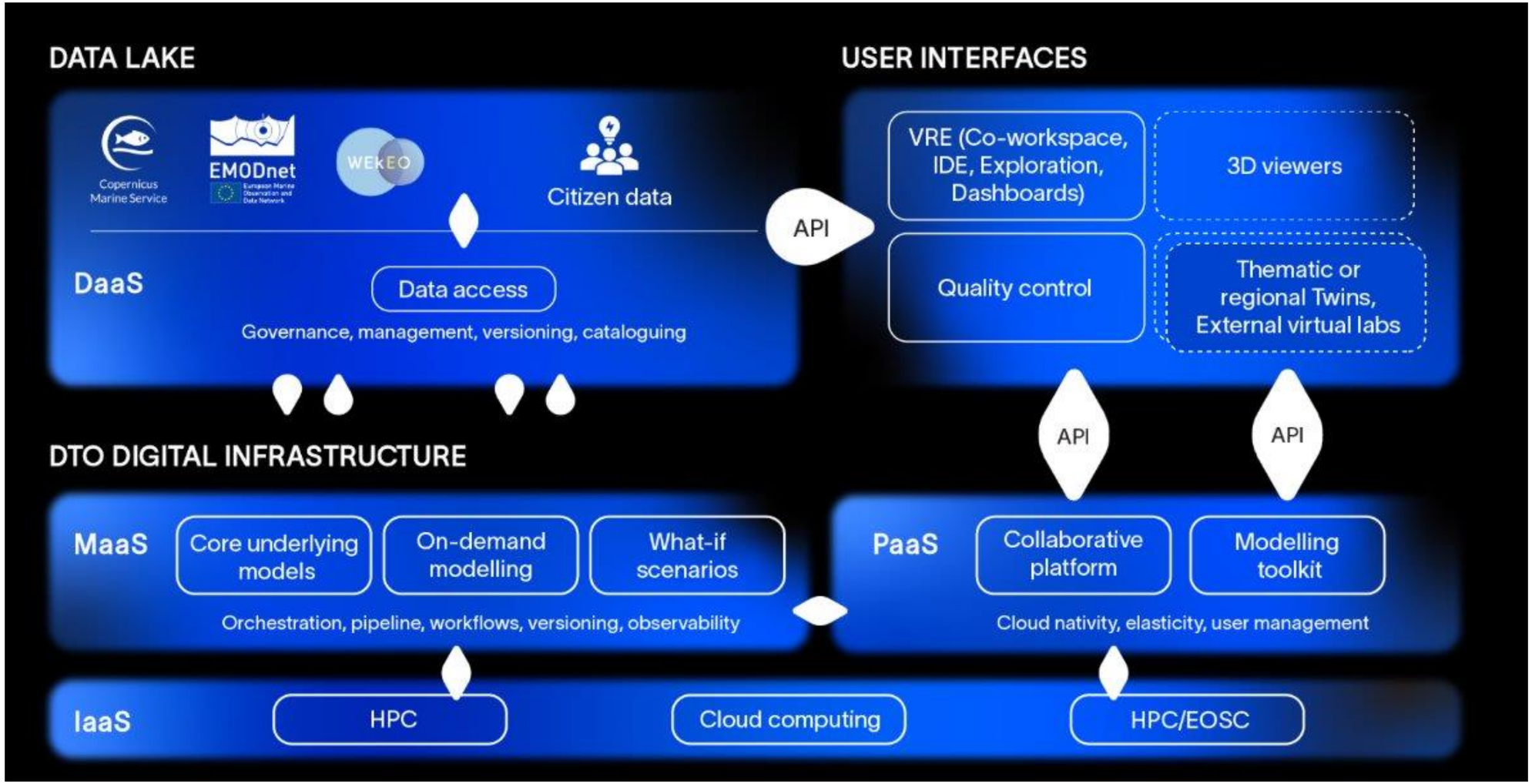
Catalogue of parameters (CF, BODC, ..)

Subsetting - ARCO

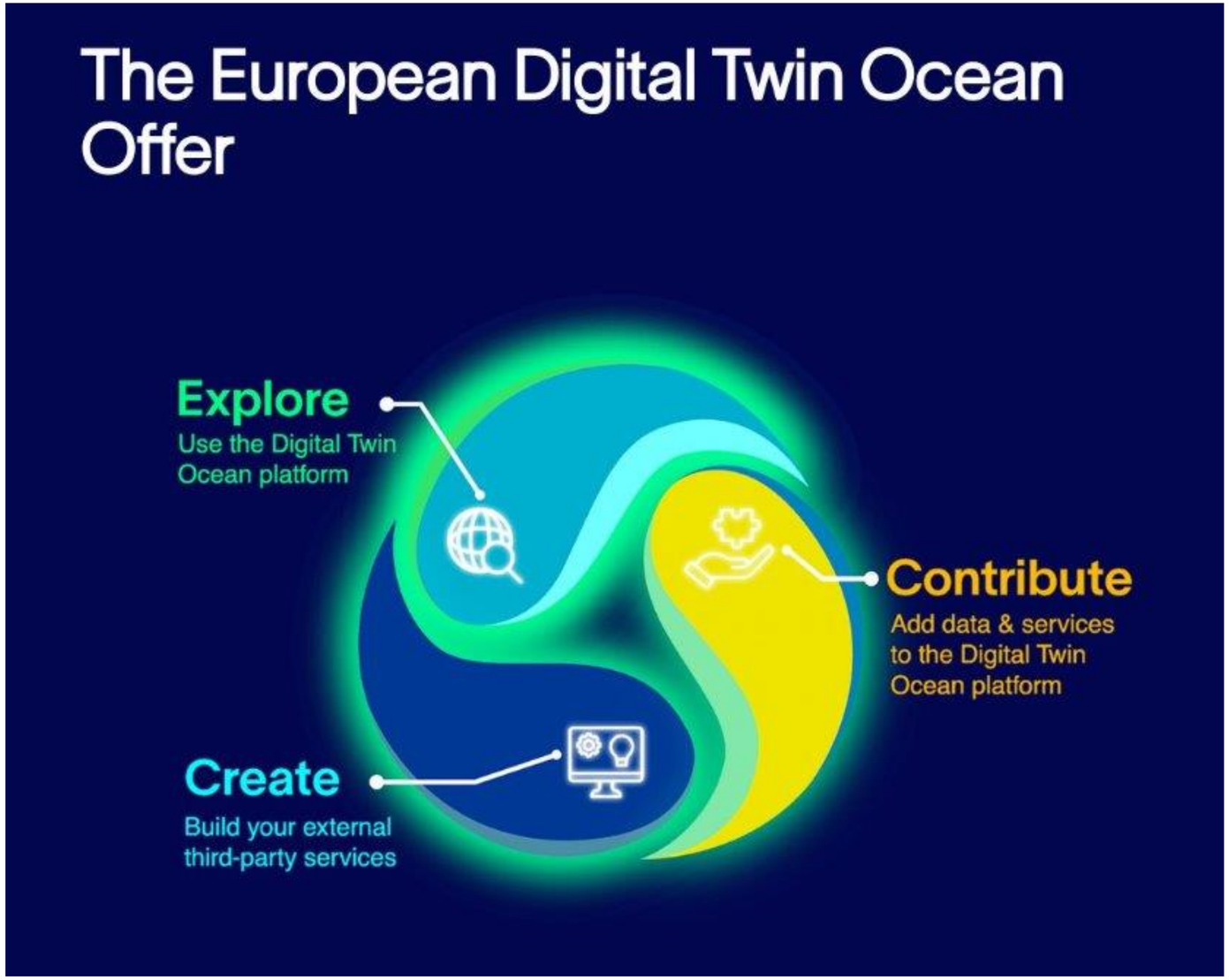
Analysis Ready and Cloud Optimized

(geo)Parquet – Vector datasets
(geo)Zarr – Raster datasets

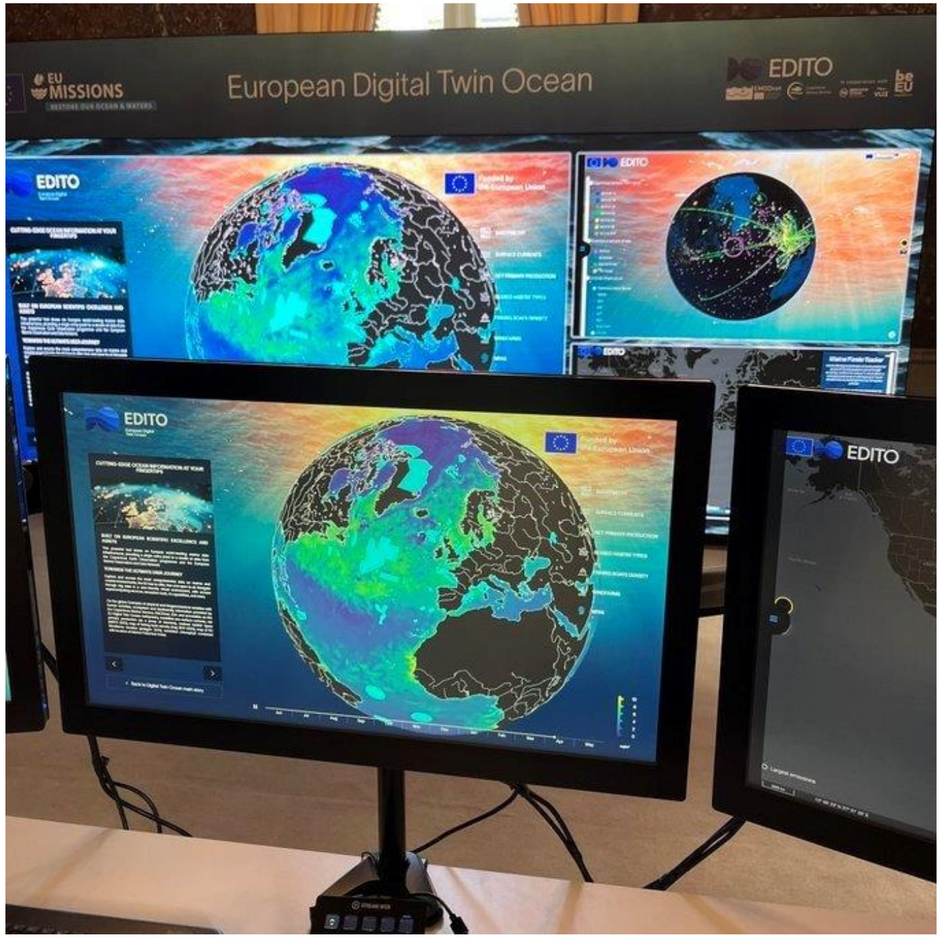
Components


DATA LAKE
USER INTERFACES
Copernicus Marine Service
EMODnet
European Marine Observation and Data Network
WEkEO
Citizen data
API
VRE (Co-workspace, IDE, Exploration, Dashboards)
3D viewers
DaaS
Data access
Quality control
Thematic or regional Twins, External virtual labs
Governance, management, versioning, cataloguing
API
API
DTO DIGITAL INFRASTRUCTURE
MaaS
Core underlying models
On-demand modelling
What-if scenarios
PaaS
Collaborative platform
Modelling toolkit
Orchestration, pipeline, workflows, versioning, observability
Cloud nativity, elasticity, user management
IaaS
HPC
Cloud computing
HPC/EOSC

Offer


The European Digital Twin Ocean Offer
Explore
Use the Digital Twin Ocean platform
Contribute
Add data & services to the Digital Twin Ocean platform
Create
Build your external third-party services

Applications



Digital Twin Ocean Applications

EU DTO application
to combat marine plastic pollution and safeguard marine environments

Monitoring marine plastic, predicting its movement to support informed decisions and actions to curb marine plastic.

EU DTO application
to support nature-based solutions against coastal hazards

Exploring the best way to use coastal vegetation such as seagrass to reduce coastal risks.

EU DTO - Blue Cloud 2025 application
An application to support marine biodiversity conservation

Unraveling plankton dynamics to monitor and predict marine life movement in support of conservation efforts.

EU DTO - BIODIVER COAST application
Monitoring water quality in support of aquaculture and biodiversity restoration

Monitoring and forecasting water quality for sustainable oyster aquaculture in the Bay of Galway, Ireland.

EU DTO - SOCIB application
Early warning system for extreme events

Predicting meteo-hazards in the western Mediterranean for managing risk and adaptation to a changing climate.

EU DTO - LISCOAST application
Assessing weather-related and socioeconomic impacts in coastal areas in present and future climates

Large-scale sea-level and coastal assessment tool to quantify coastal hazard, exposure and vulnerability and assess consequent risks.

EU DTO - OLAMUR application
Supporting sustainable multi-use of marine environment

Unveiling the potential of multi-Use offshore wind energy and low trophic level aquaculture in the Baltic Sea.

EU DTO - ILIAD application
An immersive ocean for marine resource management

3D ocean environment visualisations for marine applications and spatial planning based on video game technology.

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26-27 November 2024 | Amsterdam

EDITO Demonstrator

MAPPING HABITAT SUITABILITY

26 November, 16:00-17:45am
Hall 1

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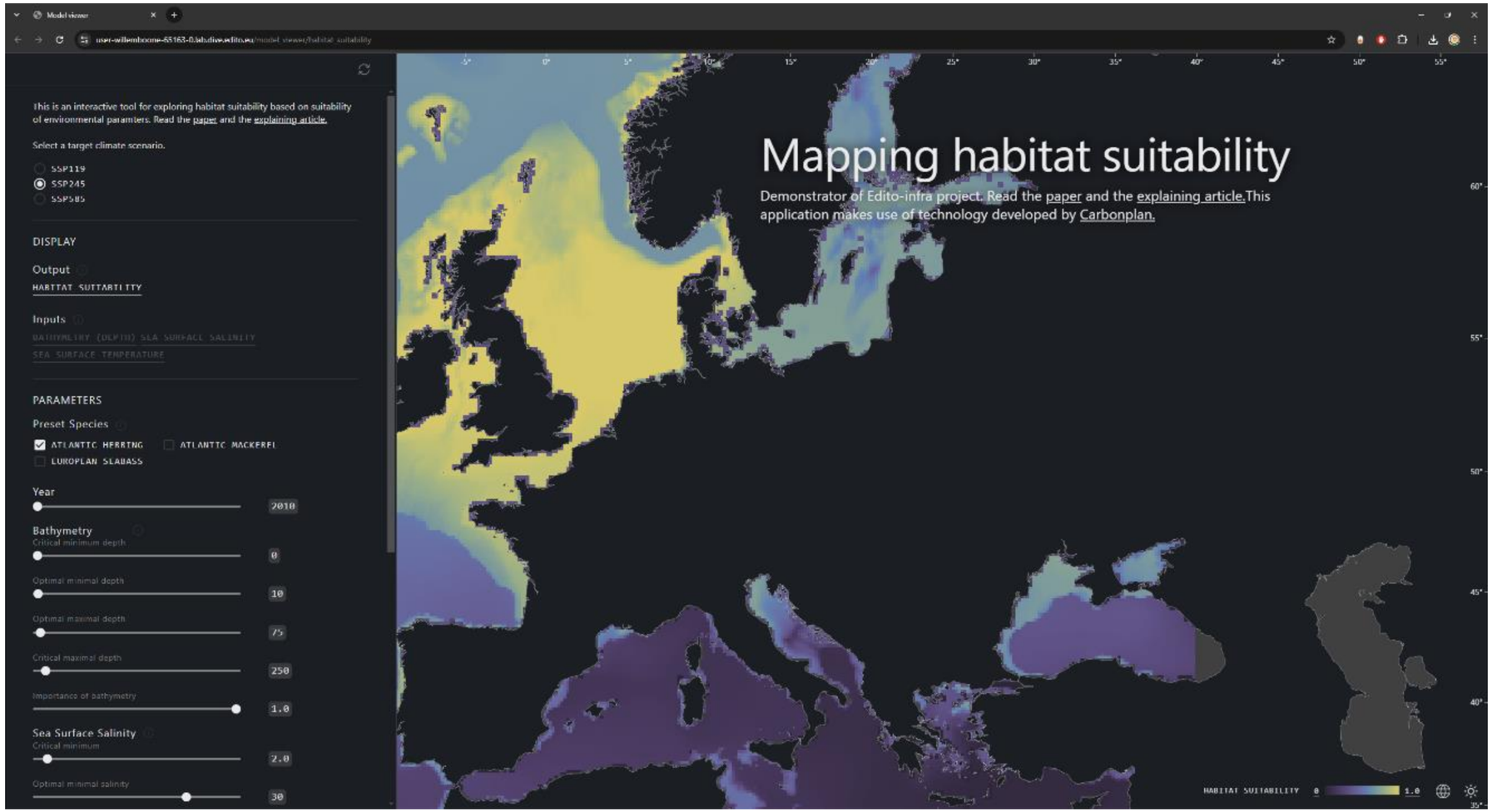
DEVELOPING IN EDITO

Deploy

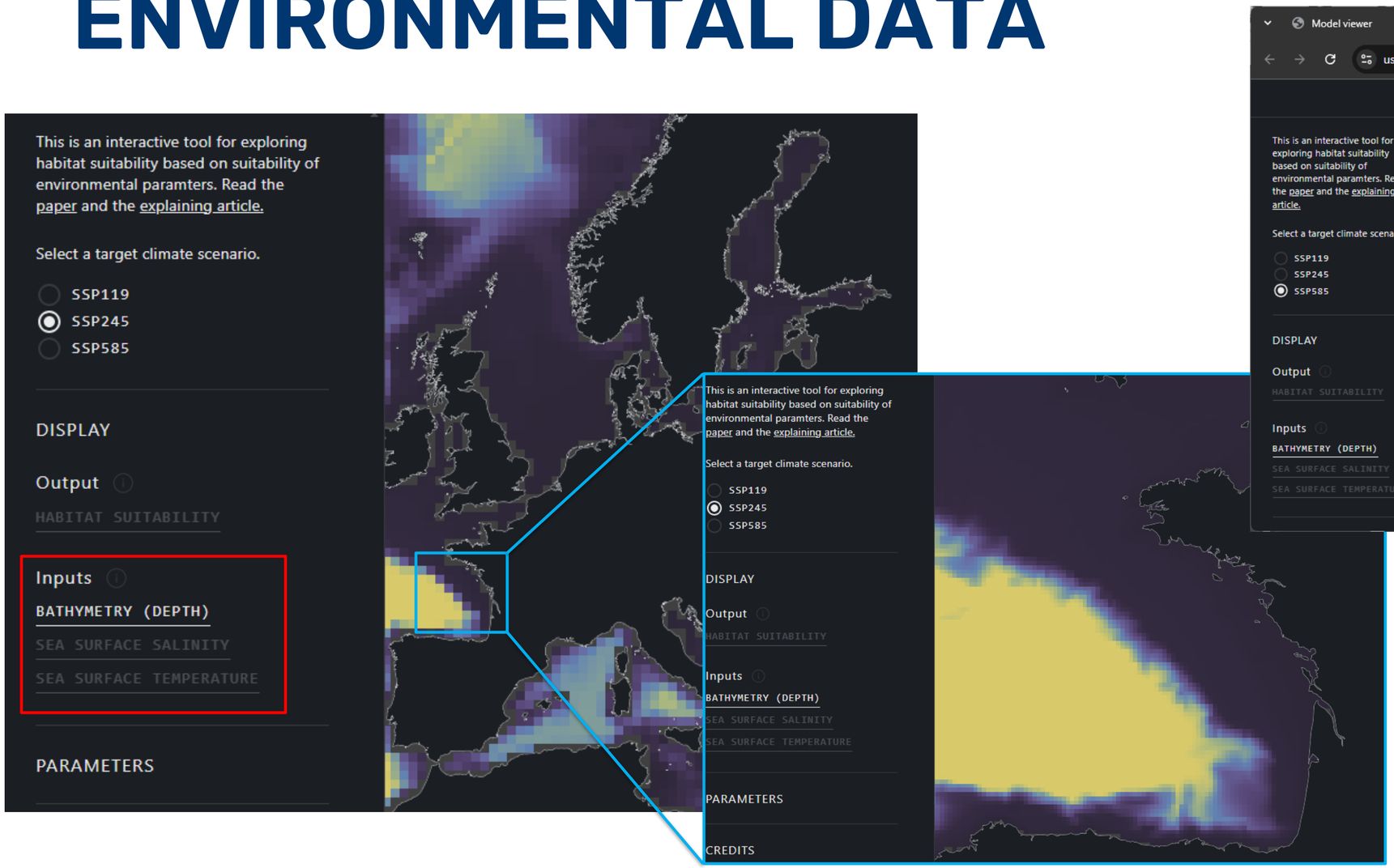
Process

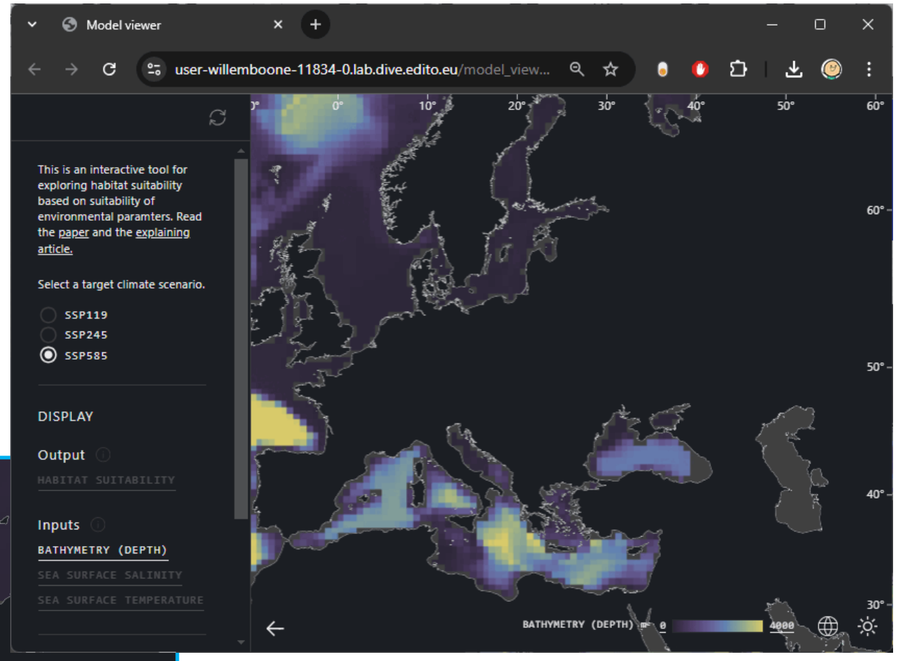
Access

OBJECTIVE

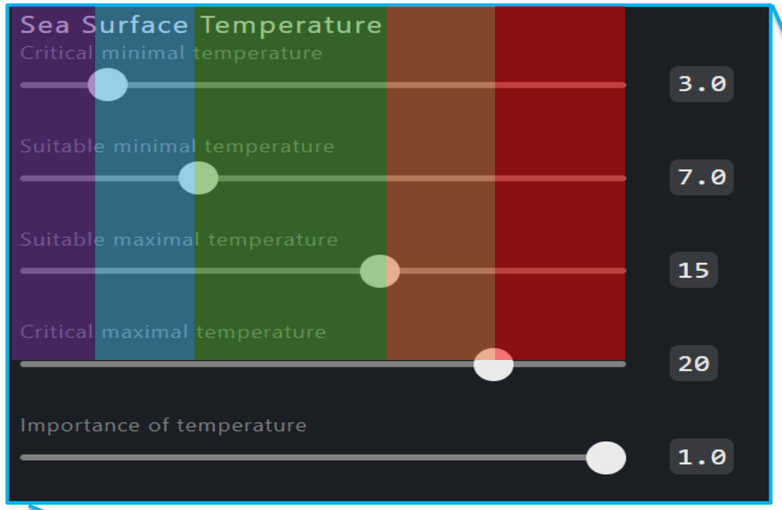

Model viewer
This is an interactive tool for exploring habitat suitability based on suitability of environmental parameters. Read the paper and the explaining article.
Select a target climate scenario.
SSP119
SSP245
SSP585
DISPLAY
Output
HABITAT SUITABILITY
Inputs
BATHYMETRY (DEPTH)
SEA SURFACE SALINITY
SEA SURFACE TEMPERATURE
PARAMETERS
Preset Species
ATLANTIC HERRING
ATLANTIC MACKEREL
EUROPEAN SEABASS
Year
2010
Bathymetry
Critical minimum depth
0
Optimal minimal depth
10
Optimal maximal depth
75
Critical maximal depth
250
Importance of bathymetry
1.0
Sea Surface Salinity
Critical minimum
2.0
Optimal minimal salinity
30
Mapping habitat suitability
Demonstrator of Edito-infra project. Read the paper and the explaining article.This application makes use of technology developed by Carbonplan.
HABITAT SUITABILITY
0
1.0

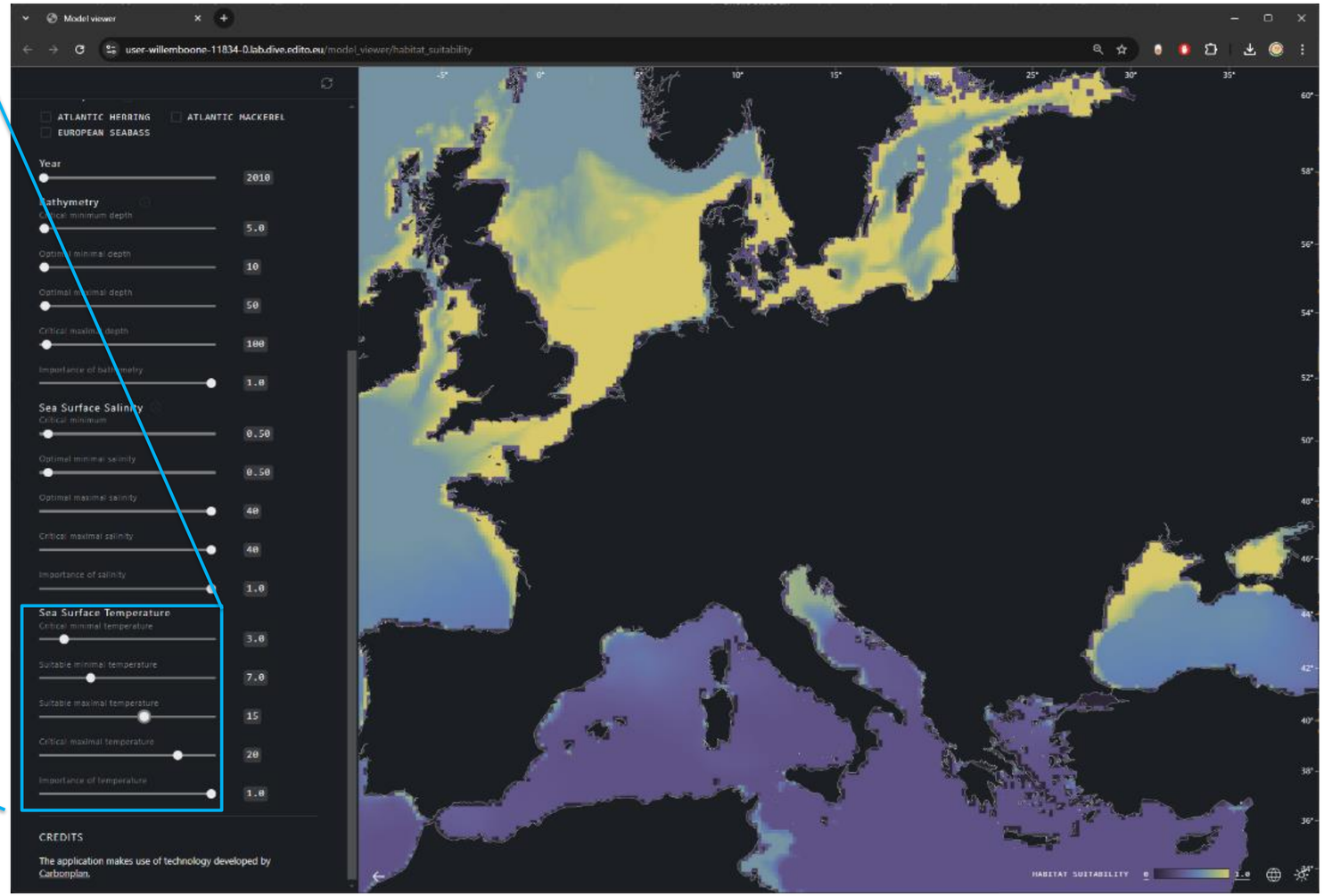
ENVIRONMENTAL DATA



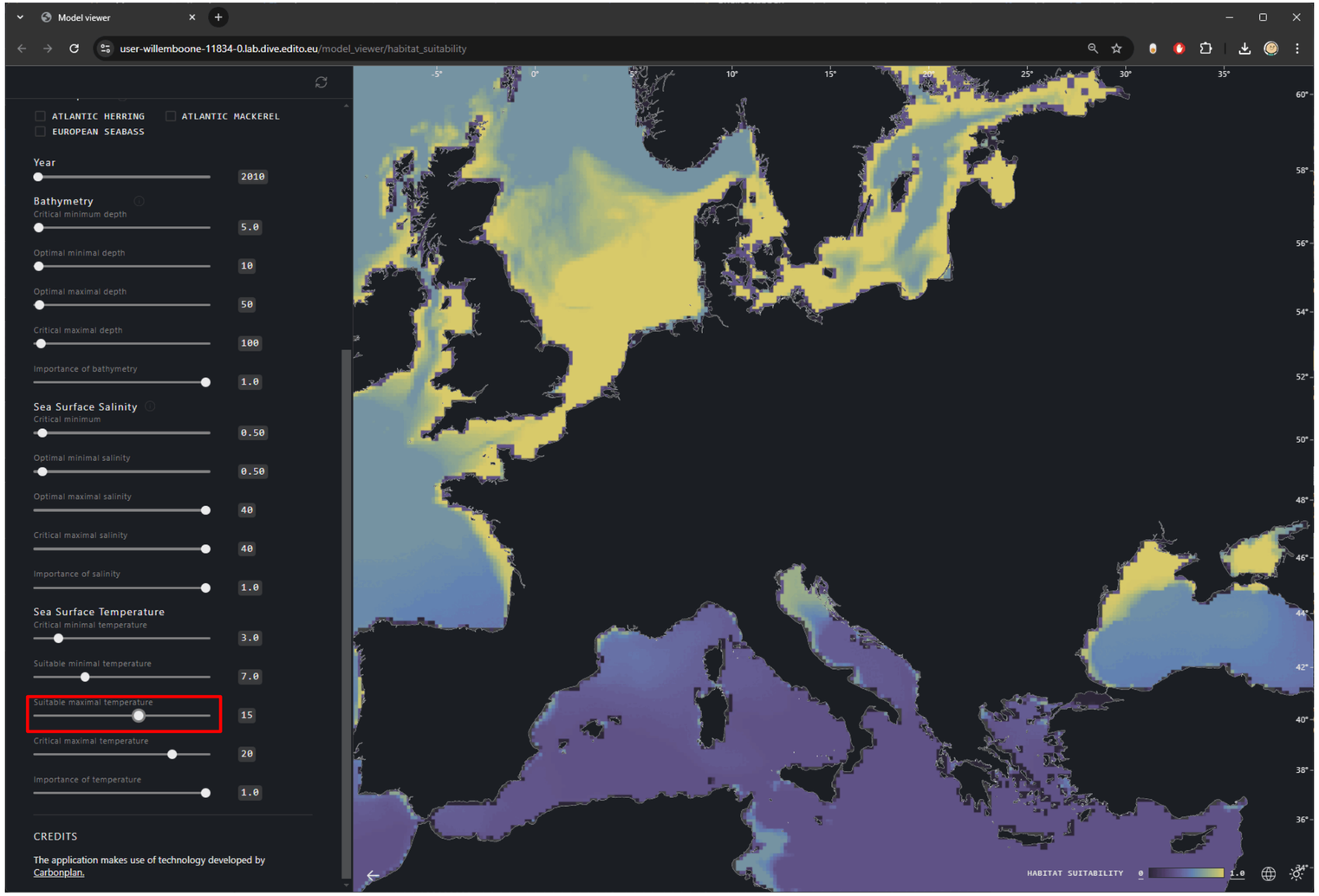


MODEL SETTINGS

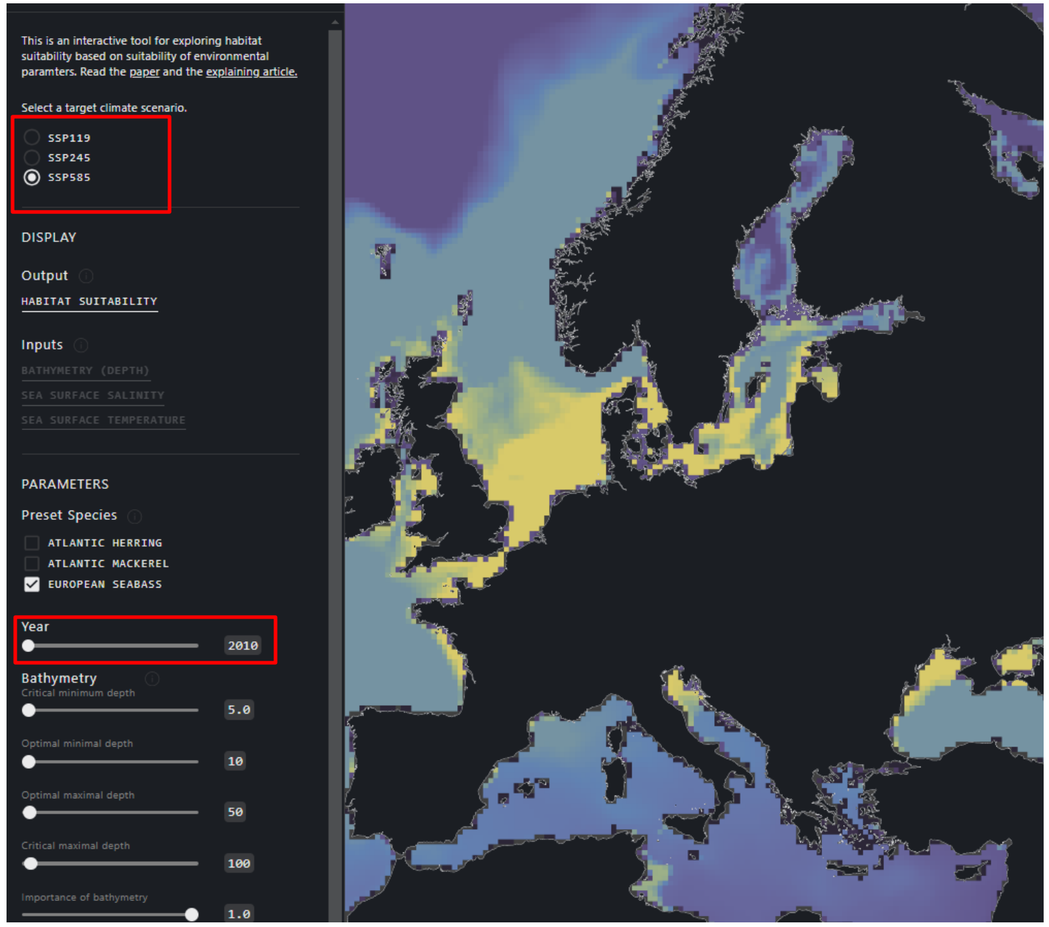




REAL TIME SIMULATION



TIME SERIES


This is an interactive tool for exploring habitat suitability based on suitability of environmental paramters. Read the paper and the explaining article.
Select a target climate scenario.
SSP119
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DISPLAY
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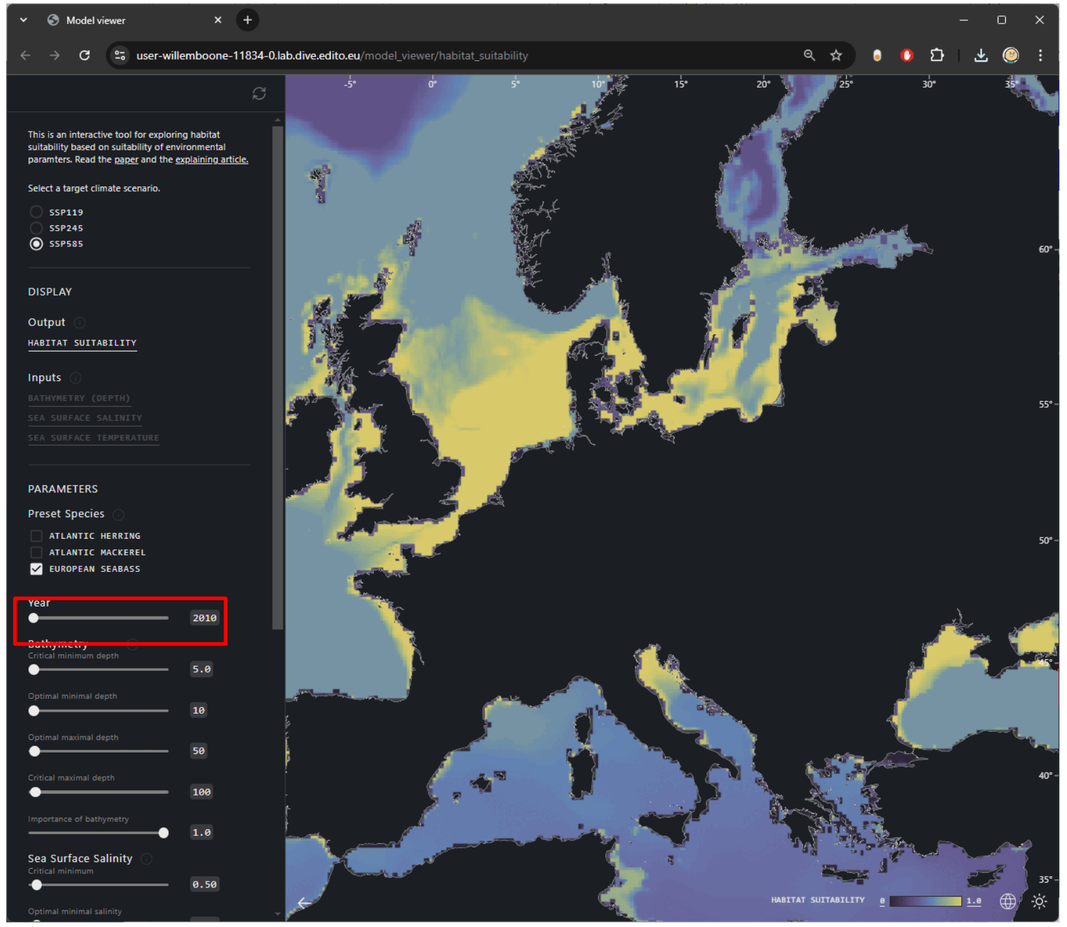
SEA SURFACE SALINITY
SEA SURFACE TEMPERATURE
PARAMETERS
Preset Species
ATLANTIC HERRING
ATLANTIC MACKEREL
EUROPEAN SEABASS
Year
2010
Bathymetry
Critical minimum depth
5.0
Optimal minimal depth
10
Optimal maximal depth
50
Critical maximal depth
100
Importance of bathymetry
1.0


Model viewer
user-willemboone-11834-0.lab.dive.edito.eu/model_viewer/habitat_suitability
This is an interactive tool for exploring habitat suitability based on suitability of environmental paramters. Read the paper and the explaining article.
Select a target climate scenario.
SSP119
SSP245
SSP585
DISPLAY
Output
HABITAT SUITABILITY
Inputs
BATHYMETRY (DEPTH)
SEA SURFACE SALINITY
SEA SURFACE TEMPERATURE
PARAMETERS
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ATLANTIC HERRING
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Optimal maximal depth
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Critical maximal depth
100
Importance of bathymetry
1.0
Sea Surface Salinity
Critical minimum
0.50
HABITAT SUITABILITY

THANK YOU FOR YOUR ATTENTION

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3rd MISSION ARENA
26-27 November 2024 | Amsterdam

DTO-BioFlow

Integration of Marine Biodiversity monitoring data into the Digital Twin of the Ocean

Klaas Deneudt – VLIZ

26 November, 16:00-17:45am
Hall 1 – The Plenary

#MissionArena3

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The Digital Twin of the Ocean

European Commission

DIGITAL TWIN OCEAN

An interactive replica of the ocean for better decision-making

A digital space providing access to vast amounts of data, models, artificial intelligence and other tools, which will allow the replication of the properties and behaviours of marine systems, including ocean currents and waves, marine life and human activities, and their interactions, in and near the sea.

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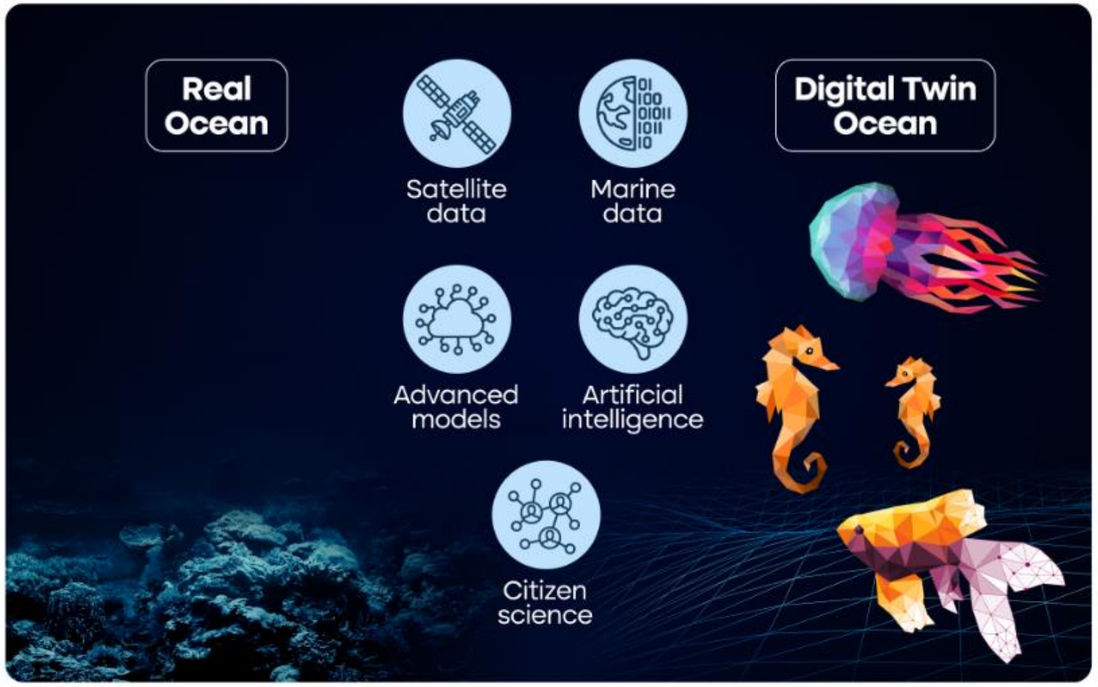
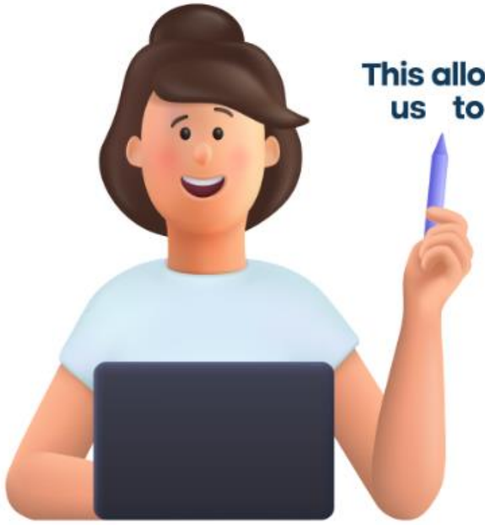


Better decision-making

By connecting data and models through tailor-made applications, scientists, marine experts, policymakers, entrepreneurs and user-driven applications can test different specific scenarios.



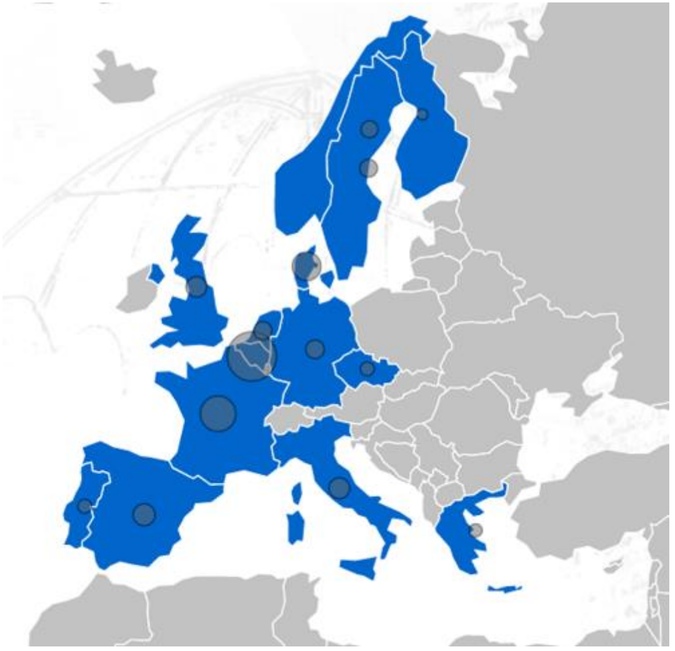
1. Better understand the ocean
2. Simulate alternative scenarios
3. Predict its rsponse to changes
4. **Make the best informed decision**

The DTO BioFlow project

Integration of biodiversity monitoring data into the digital twin ocean

OBJECTIVE:

*DTO-BioFlow will unlock "sleeping" biodiversity data, **enabling the sustained flow** of these and new **biodiversity monitoring data into the EU Digital Twin Ocean**. It will create essential components for a digital replica of marine biological processes, transforming new and existing data flows into evidence-based knowledge.*

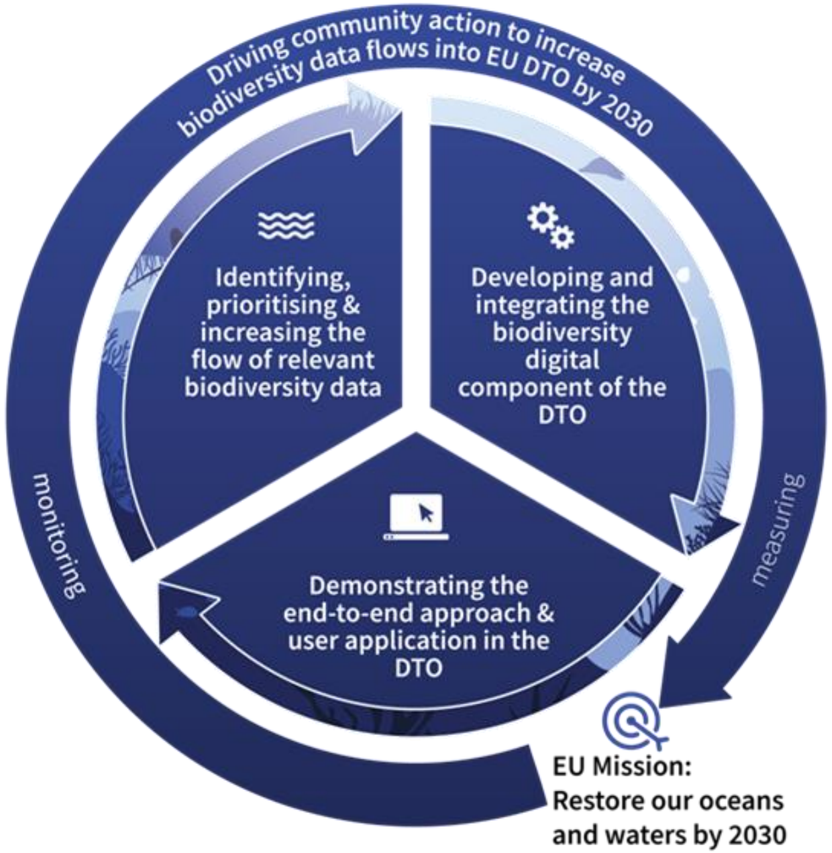


- HORIZON-MISS-2022-OCEAN-01-07
- **42** project months
- From **Sept 2023** until **Feb 2027**
- **€10.0 million** EC funding
- **32** participants
- **€1.0 million** FSTP grants

Funded by the European Union

DTO-BioFlow
Integration of biodiversity monitoring data into the Digital Twin Ocean

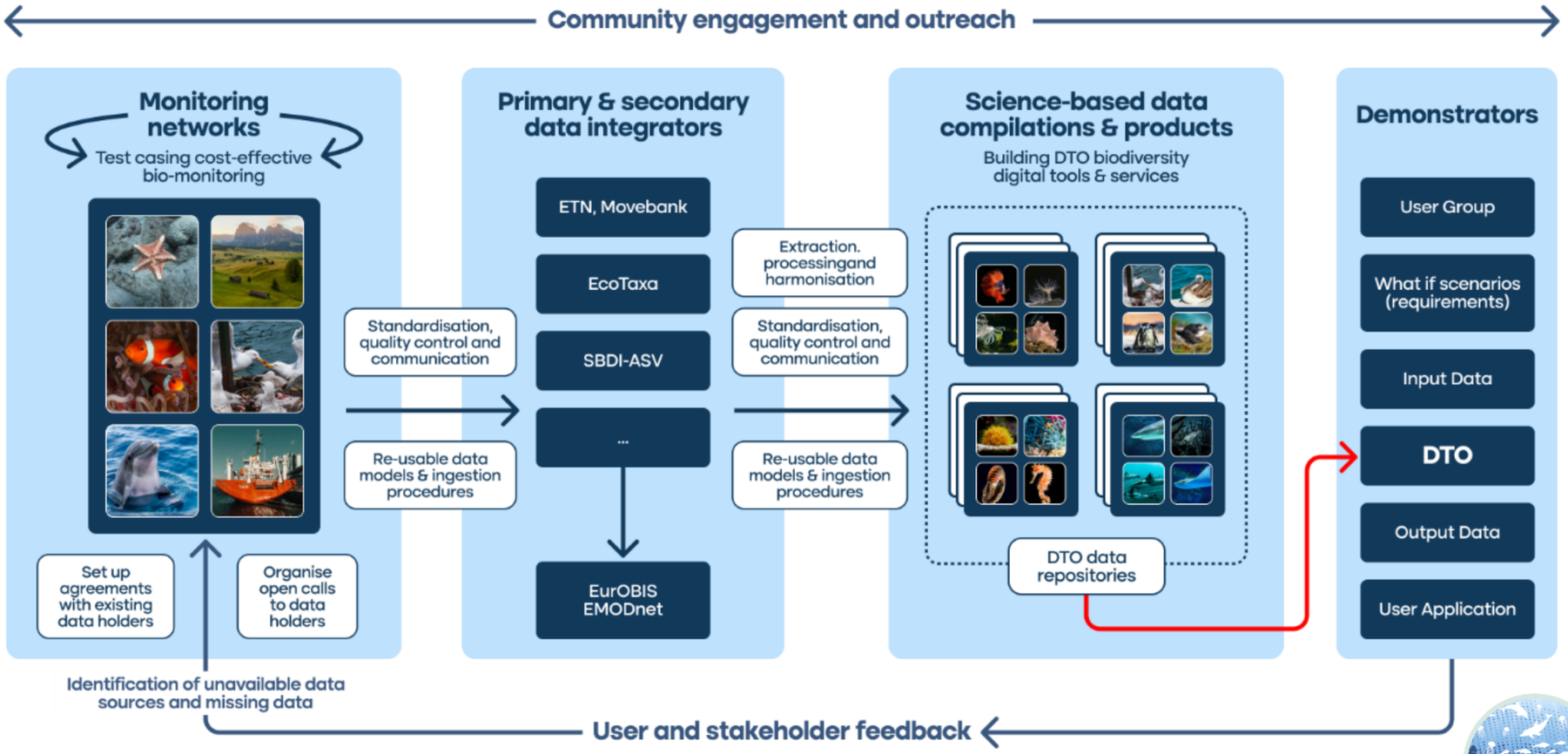
OBJECTIVES



- OO1: **Increase the flow of relevant biodiversity data,** by assessing opportunities and unlocking current barriers to assimilation and ingestion.
- OO2: **Develop and integrate the biodiversity digital component** of the EU Digital Twin Ocean **ensuring sustainable data flows** after project end.
- OO3: **Demonstrate an end-to-end approach for biodiversity monitoring** based on the digital environment provided by EU DTO & data sources
- OO4: Establish mechanisms to **drive community action** towards increasing biodiversity data flows into EU DTO by 2030

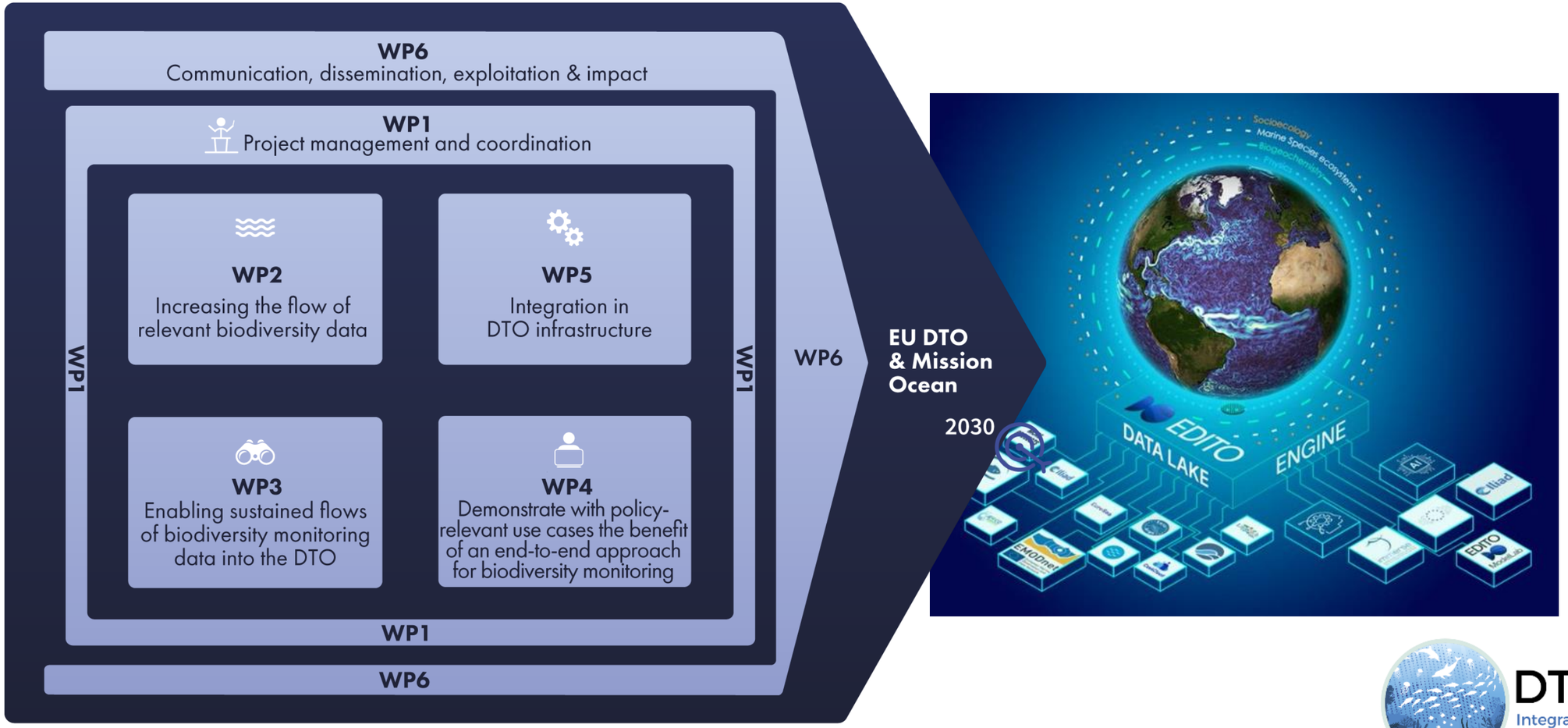
DTO-BioFlow
Integration of biodiversity monitoring data into the Digital Twin Ocean

METHODOLOGY AND WORKFLOW



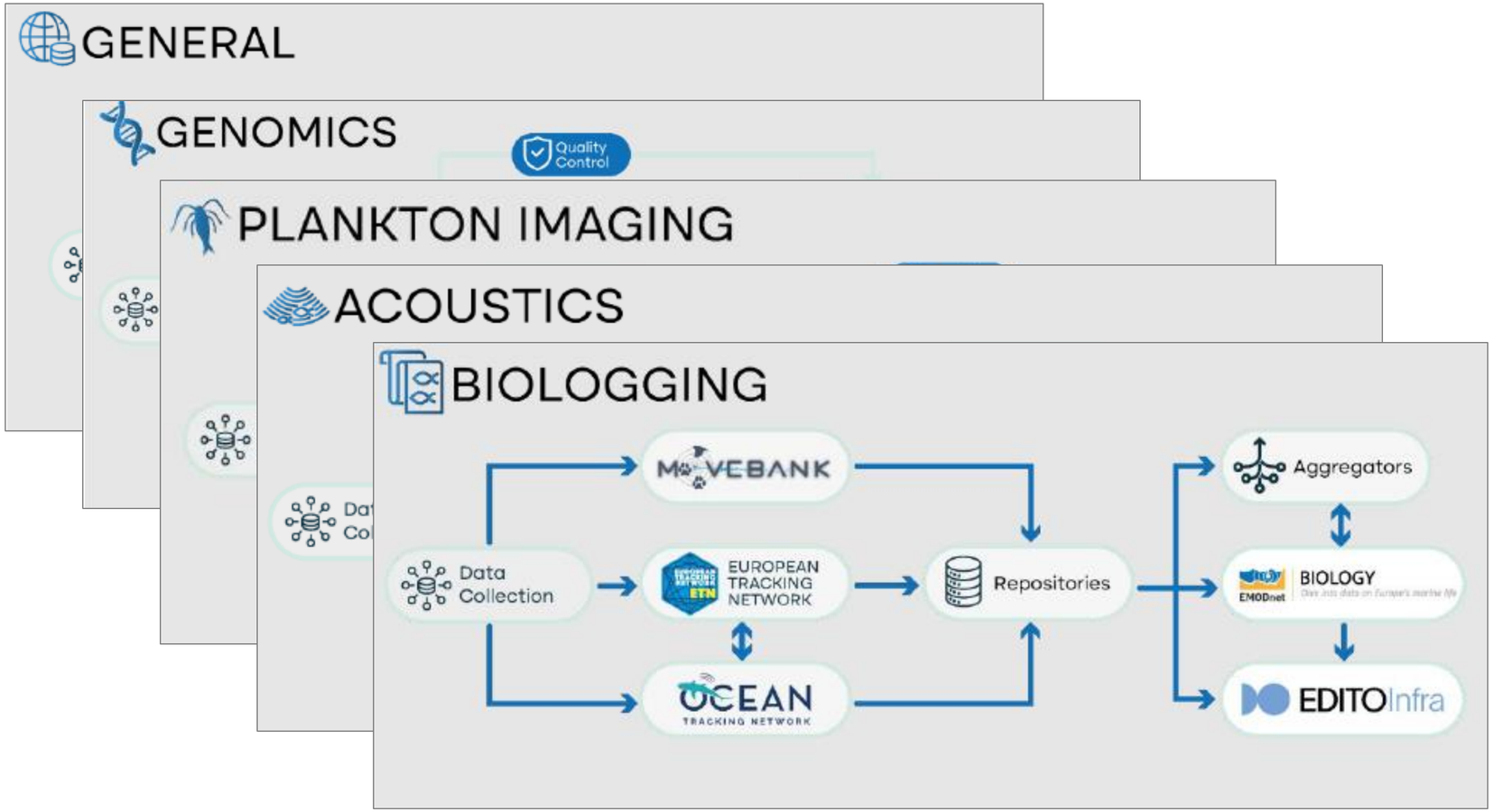
DTO-BioFlow
Integration of biodiversity monitoring data into the Digital Twin Ocean

WORK PACKAGES



DTO-BioFlow
Integration of biodiversity monitoring data into the Digital Twin Ocean

BLUEPRINT



DTO-BioFlow
Integration of biodiversity monitoring data into the Digital Twin Ocean

DEMONSTRATION USE CASES

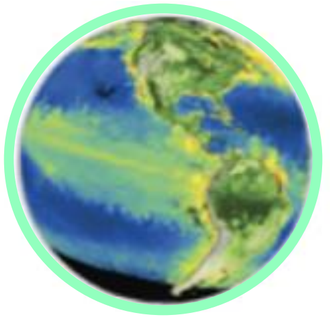
invasive species management

adaptive offshore construction and energy harvesting

assessment of Plankton diversity

spatial planning of sustainable mariculture

ecosystem based spatial planning and MPA management



ocean colour Seasonal forecasting

DTO-BioFlow
Integration of biodiversity monitoring data into the Digital Twin Ocean

DEMONSTRATION USE CASES

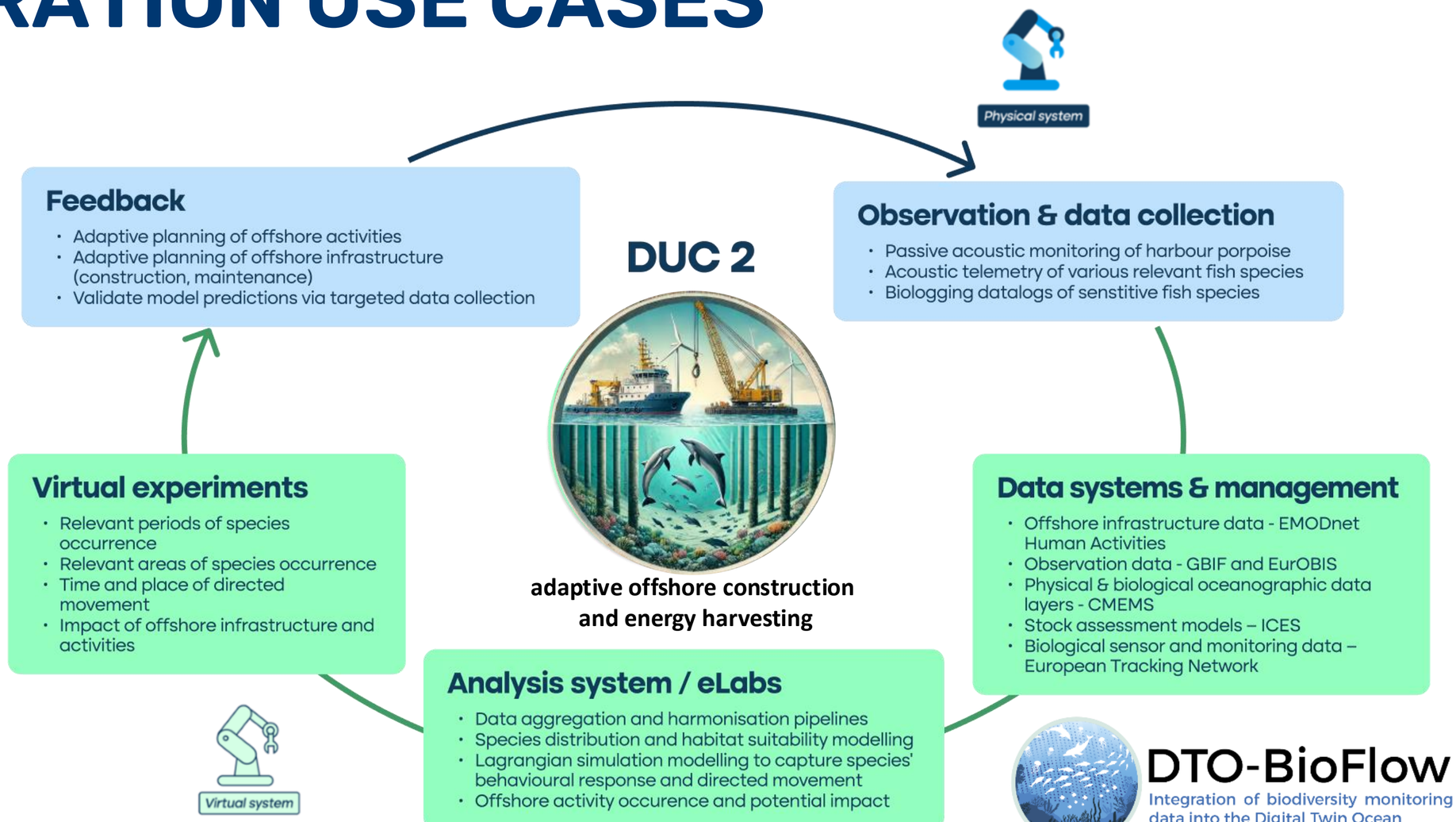
Objectives:

To predict hotspots in space and time for relevant migratory marine species.

To link identified hotspots in space and time to offshore activities (e.g. construction of energy harvesting sites)

Main stakeholders:

- **Offshore industry companies**
- **Environmental impact assessors**
- **Marine spatial planners**
- **Maritime and Energy Regulators**
- **Environmental Agencies**



DTO-BioFlow
Integration of biodiversity monitoring data into the Digital Twin Ocean

CALLS FOR DATA

"Marine Megafauna Data for EU Digital Twin Ocean"

Beneficiary: Bangor University School of Ocean Sciences

The purpose of this project is to make available for re-use previously inaccessible unique multi-decadal data on marine megafauna in European seas. These biodiversity data have been collected by scientists, citizen scientists and members of the public for more than 20 years in observing programmes carried out by the UK Sea Watch Foundation (SWF) and its partners. Only a small proportion of the high value effort-related data, primarily for cetaceans, held by SWF have been reported to ICES (ICDF...Read more

"Futurismo: linking whale watching tourism with cetacean research in the Azores"

Beneficiary: Futurismo Azores Adventures Portugal

Whale watching has become one of the most important touristic activities in the Azores archipelago (Portugal). The number of commercial tours has increased over the years, providing therefore an increasing number of opportunities for cetacean data collection at sea. Futurismo Azores Adventures is one of the leading companies in the region and has been registering data during their trips consistently since 2008.
Currently, the existing data gathers more than 15000 sightings...Read more

"KAIROS - ZooplanKton data from Arctic marIne time-seRies to understand biOdiversity dynamicS"

Beneficiary: Institute of Polar Sciences, National Research Council (ISP-CNR)

The Arctic is a climate change hot spot, with ocean warming, freshening, sea-ice decline, linked to changing atmospheric and terrestrial environments. These processes are imprints of Atlantification, a progressive propagation of the Atlantic signal into the Arctic Ocean, significantly influencing climate, ecosystems, and marine food webs. In the Svalbard archipelago global warming is notably accelerated.
In 2010, the first deployment of Mooring Dirigibile Italia (MDI) in Kongsfjorden, eight...Read more

"Integration of southeastern Mediterranean long-term biodiversity data into EU-DTO"

Beneficiary: Israel Oceanographic and Limnological Research

The Israeli territorial waters and its Exclusive Economic Zone (EEZ) are delimited by a rectangular polygon parallel to the shore and spans the depth range of 0-2000 m and an area of ~26,000 square Km. In 2022, The Israel Oceanographic and Limnological Research (IOLR) signed a publicly available database, designated ISRAMARBIO, which is aimed at including all the biotic data collected in the last ~120 years along the Mediterranean waters of Israel as well as selected adjacent interesting site...Read more

"Management and publication of Marine Characterisation Research Project data"

Beneficiary: Menter Môn

The Marine Characterisation Research Project (MCRP), managed by Menter Môn, is an innovative research and development project which is collecting an extensive range of data on the marine environment in North West Wales. The focus is on understanding size of populations, seasonal distribution and fine-scale behaviour of marine ma...Read more

"Pipeline for biodiversity data from the British Oceanographic Data Centre (BODC) to the OBIS network and EMODnet."

Beneficiary: National Oceanography Centre

While BODC is a key provider of physical, geophysical and biogeochemical data to EMODnet Physics, Bathymetry and Chemistry, we do not currently have the capacity to easily provide biodiversity data to EurOBIS and EMODnet Biology. The reason for this is that the Darwin Core Archive (DwCA) format was never integrated into BODC's data workflows. BODC manages and ingests plankton and, to a lesser extent benthos data, alongside concomitant environmental measurements, into its databases, but there...Read more

"Managing and publishing biodiversity data from Nord University"

Beneficiary: Nord University

Nord University initiated a standardised zooplankton biannual time-series in 1980, now replicated in three fjords. More recently, a benthos time-series and two livestreaming underwater videos have been established. Funding has also been obtained to develop automated image analysis (AI) of these samples. However, to date, there is no organised system for biodiversity data management from data recording to archiving, which complicates data publication. The project would hire a post-doctoral leve...Read more

"Strandaanspoelsel (beach washup) Monitoring Project (SMP)"

Beneficiary: stichting ANEMOON

The SMP was started in 1997 to track changes in populations of organisms along the Dutch coastline and is carried out by volunteer observers (citizen scientists). These observers walk a fixed SMP route (SMP-Project) along the beach once every two or four weeks at low tide at one of our fourteen SMP-Projects along the Dutch shoreline.
They register all washed-ashore organisms and/or their remains. These data are used to calculate trends and indicate changes in the species populations living...Read more

"Plankton Imaging Data Flow: Establishing a European data flow for phyto- and microzooplankton data from automated AI-assisted imaging in flow analyses"

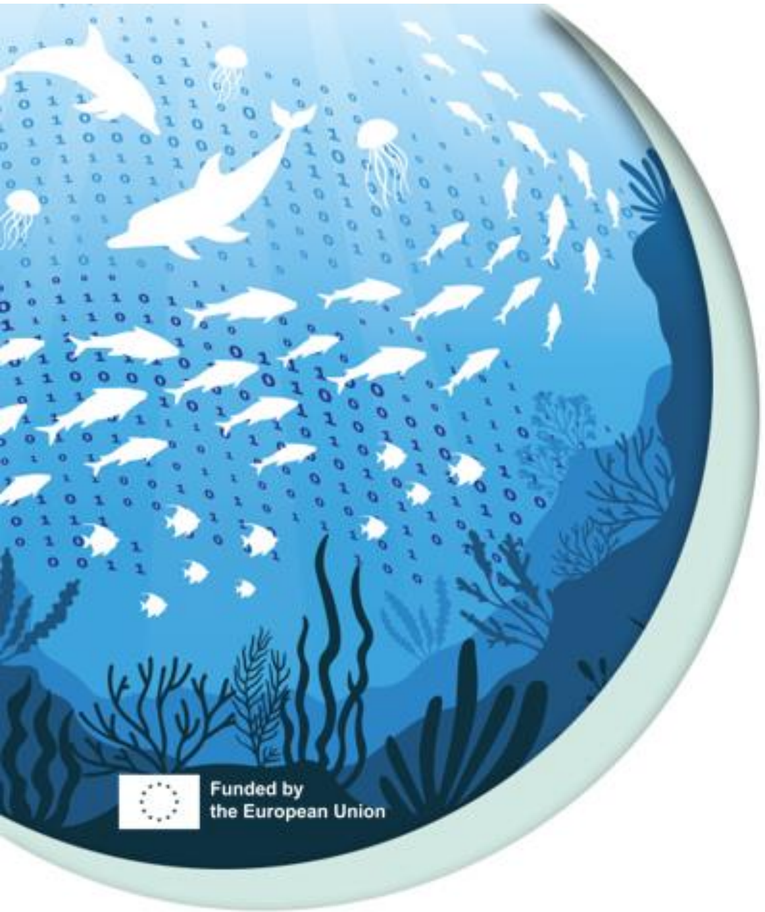
Beneficiary: Swedish Meteorological and Hydrological Institute Sweden

The absence of a standardized data format for automated classified image data from Imaging Flow Cytobots (IFCBs) in Europe has led to decentralized storage practices, with each partner within the European IFCB network managing their own datasets.
For instance, the processed data from our own IFCB is housed on servers accessible exclusively to staff at the Swedish Meteorological and Hydrological Institute (SMHI). We are aware of, and involved in initiatives to create best practices for IFC...Read more

Second Call coming up!

DTO-BioFlow
Integration of biodiversity monitoring data into the Digital Twin Ocean

THANK YOU FOR YOUR ATTENTION



DTO-BioFlow
Integration of biodiversity monitoring data into the Digital Twin Ocean

For any other questions please contact
info@dto-bioflow.eu

THANKS!

dto-bioflow.eu @DTOBioFlow /company/dto-bio-flow @DTOBioFlowProject

EU MISSIONS
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BLUE MISSION BANOS

3rd MISSION ARENA
26-27 November 2024 | Amsterdam

Interactive part

27 November, 16:00-17:45
Hall 1 – The Plenary

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Practicalities

- There are 4 parts with different questions to be discussed
- Please use post-its to write your answers on and use the same colour for each question
- Time per question is indicated on the slide

- Questions? My colleagues and I are happy to help!

1. General

(5min think, 5min share, please use post-its)

- In which sector are you working? What is your background?

- In what context will you use the digital twin?

2. Development and integration of applications

(5min think, 10min share, please use post-its)

- Which (biological) models or applications would you like to see or use in the DTO?

3. Integration of more data and data lakes

(5min think, 10min share, please use post-its)

- Is there any specific biological data missing? Can this data be integrated through DTO-BioFlow?

- Is there any other data missing? How can we get this data integrated? Which approach would you suggest?

4. Importance of continuity and data pipelines

(5min think, 10min share, please use post-its)

- How can we include external entities? Are there any entities willing to contribute (on a voluntary basis), for their own benefit? Why, what data, for what application?