



COASTS

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EUSPA – AI Days



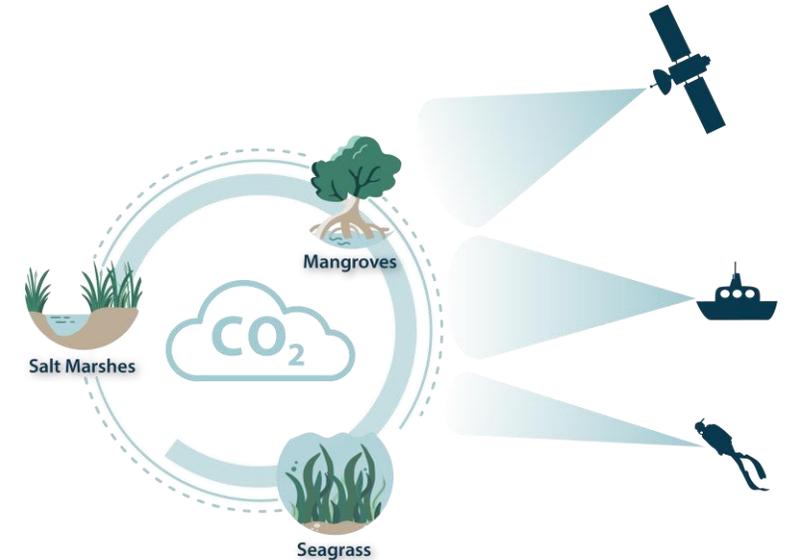
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OBJECTIVES

COASTAL OBSERVATION ADVANCES LEVERAGING SPACE TECHNOLOGY SERVICES

Project on coastal resilience and blue carbon ecosystems.
COASTS will be an innovative decision-support tool, where Earth Observation, in-situ measurements, modelling, and digital analysis and visualisation tools will interact to allow an enhance sustainable and resilient coastal management.



RATIONALE AND AMBITION



Importance of coastal zones

- Societal importance: settlement area for approx. 40% of the world's population
- Ecological importance: high biodiversity and essential ecosystem services
- Economic importance: many industries and economies
- Carbon sequestration



Threats to coastal zones

- Climate change: e.g. sea level rise and temperature rise, storms
- Human activities: e.g. land reclamation, dredging
- Erosion

PARTNERS



Project Mgmt. &
EO+IT expertise



Modelling & BD



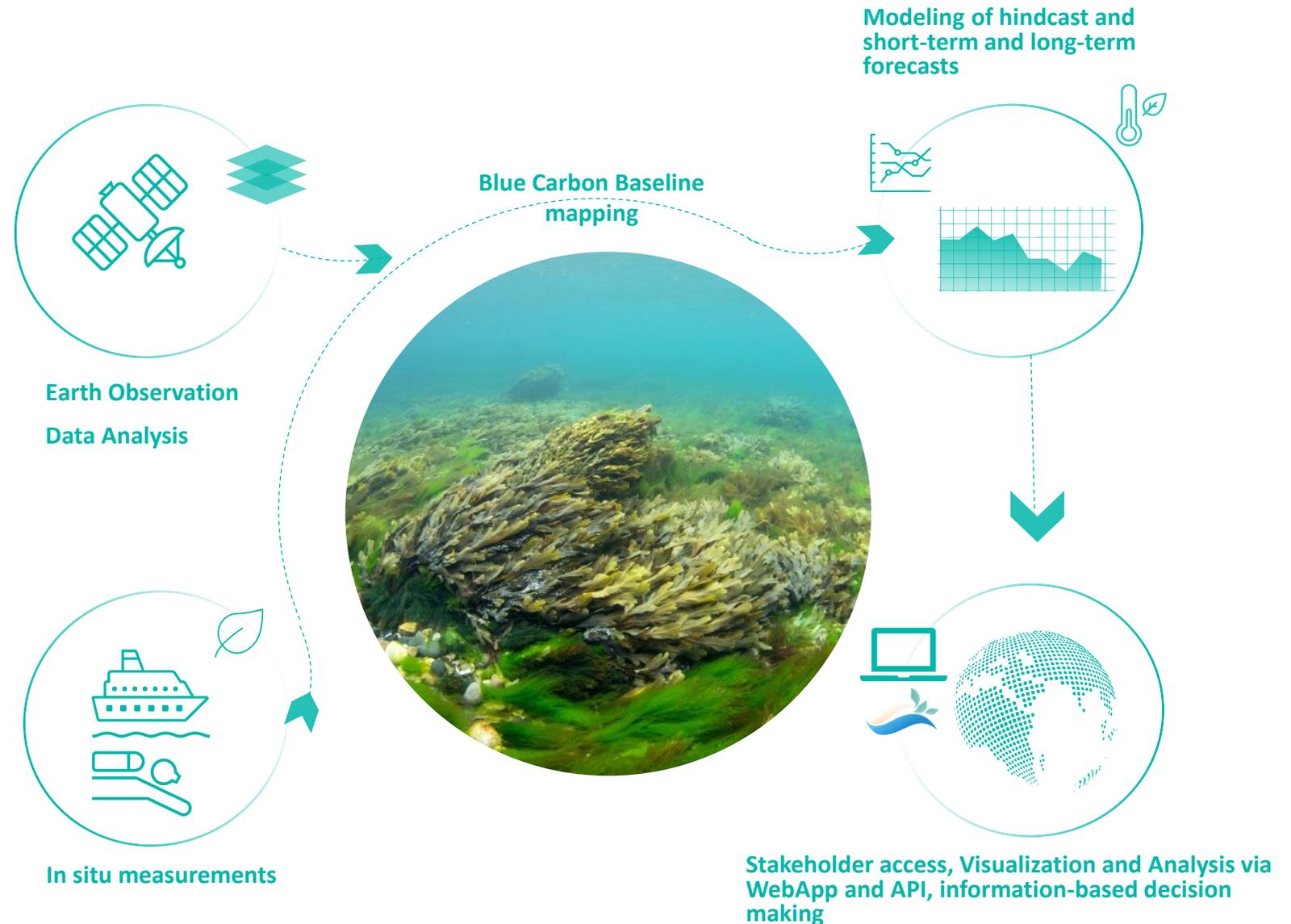
Local client
engagement & on-
site intelligence



Sampling &
measurements

THE AMBITION

- Establishment of more precise and detailed **information on Blue Carbon ecosystems**
- Development of a **scalable and user-friendly solution**
- Establishment of a sustainable **Copernicus Marine downstream service**
- Develop a solution towards a sustainable and resilient management of Blue Carbon ecosystems and coastal zones



WORK PACKAGES

WP 1 Project Management (EOMAP)

- Admin & Finance
- Internal communication & organization
- QA and risk management

WP 2 Data (Fugro)

- Data harvesting
- EO Modelling and BC Mapping
- Model hindcast and forecast
- Scenario development
- Data management

WP 3 IT (EOMAP)

- Backend
- Frontend
- Api

WP 4 Use Case (EOMAP)

- Germany
- Maldives
- Jersey
- France

WP 5 Business Development (Fugro)

- Stakeholder analysis
- Communication activities
- Dissemination and capacity building
- Business plan

USE CASES

Trial and demonstration sites for:

- + EO observation on habitats, bathymetry and topography, water quality and metocean, ...**
- + Nested nearshore metocean models**
- + on-site collection of habitat information and sediments**
- + User engagement and COASTS app evaluation**

Germany, Baltic Sea

Jersey
& Chausey

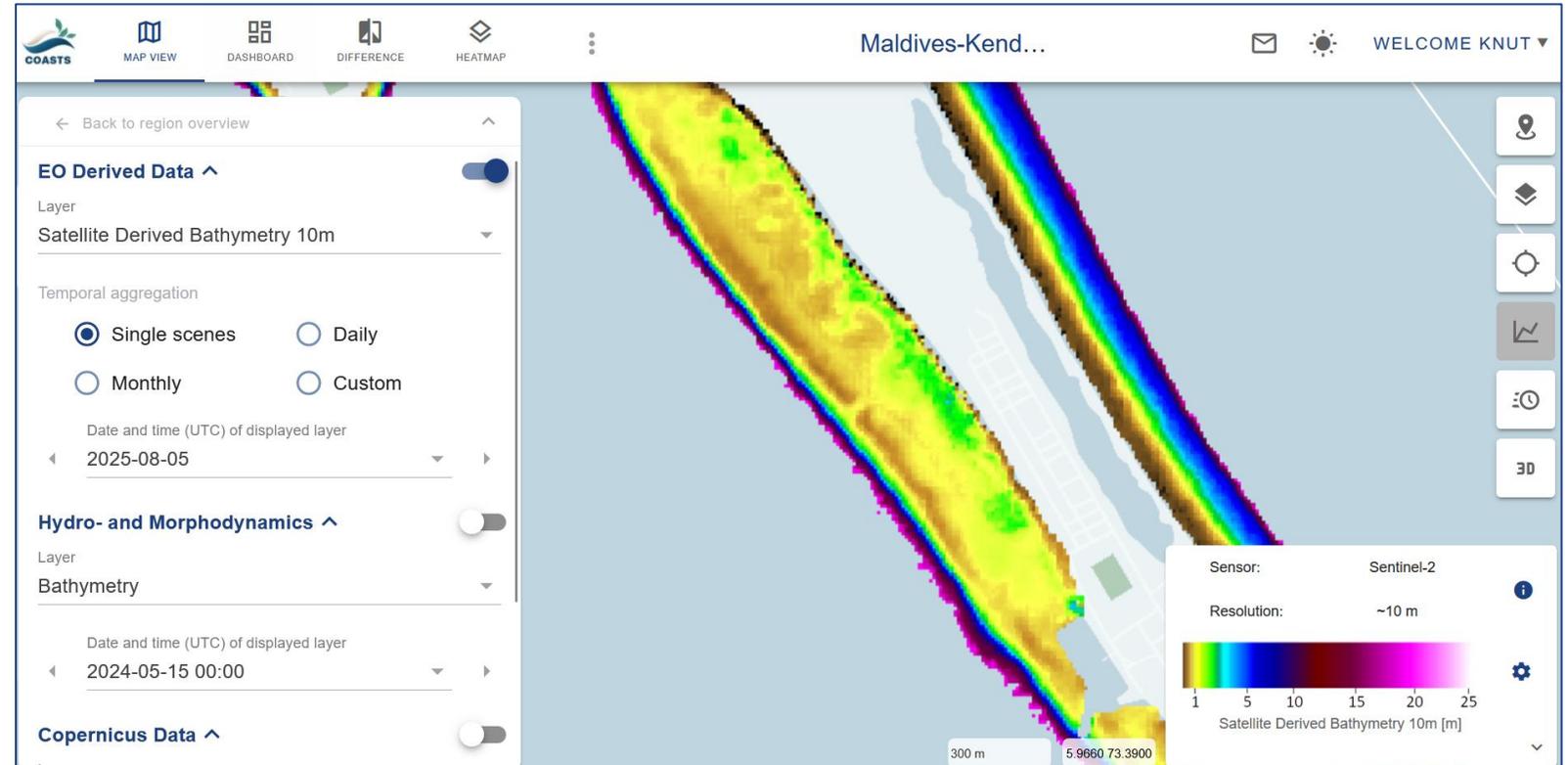
Maldives



APP

[HTTPS://COASTS.EOAPP.DE/](https://coasts.eoapp.de/)

**Alpha version released
(no public access, yet)**



AMBITIONS IN DATA ANALYTICS, INCLUDING AI

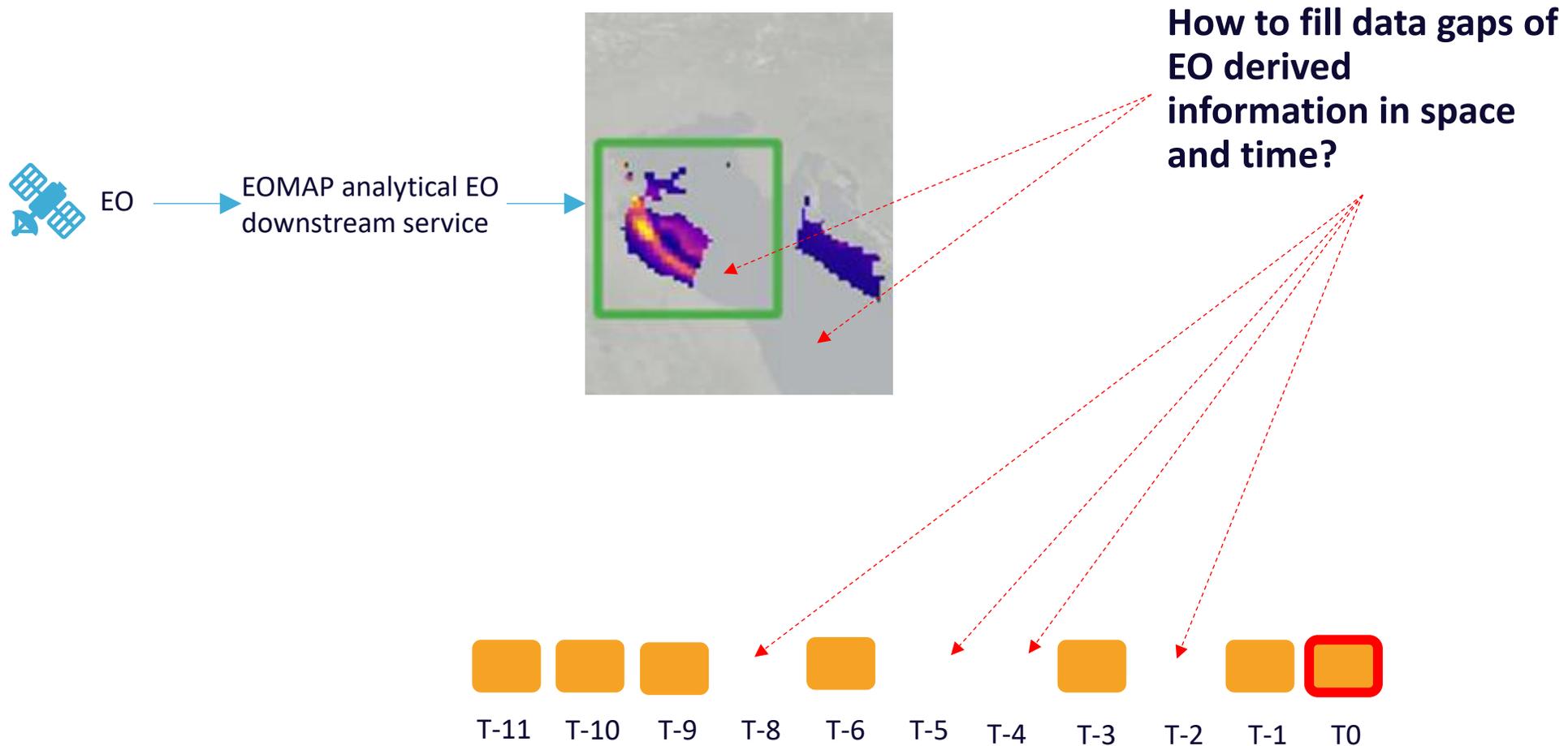
COASTS leverages AI and ML technologies to

- make resource and time intensive computation more effective (faster and less resources)
- Enable new insights (forecasts and hindcasts)
- Improve decision making (LLM chatbot, illustrate scenarios)
- ... *and having fun*

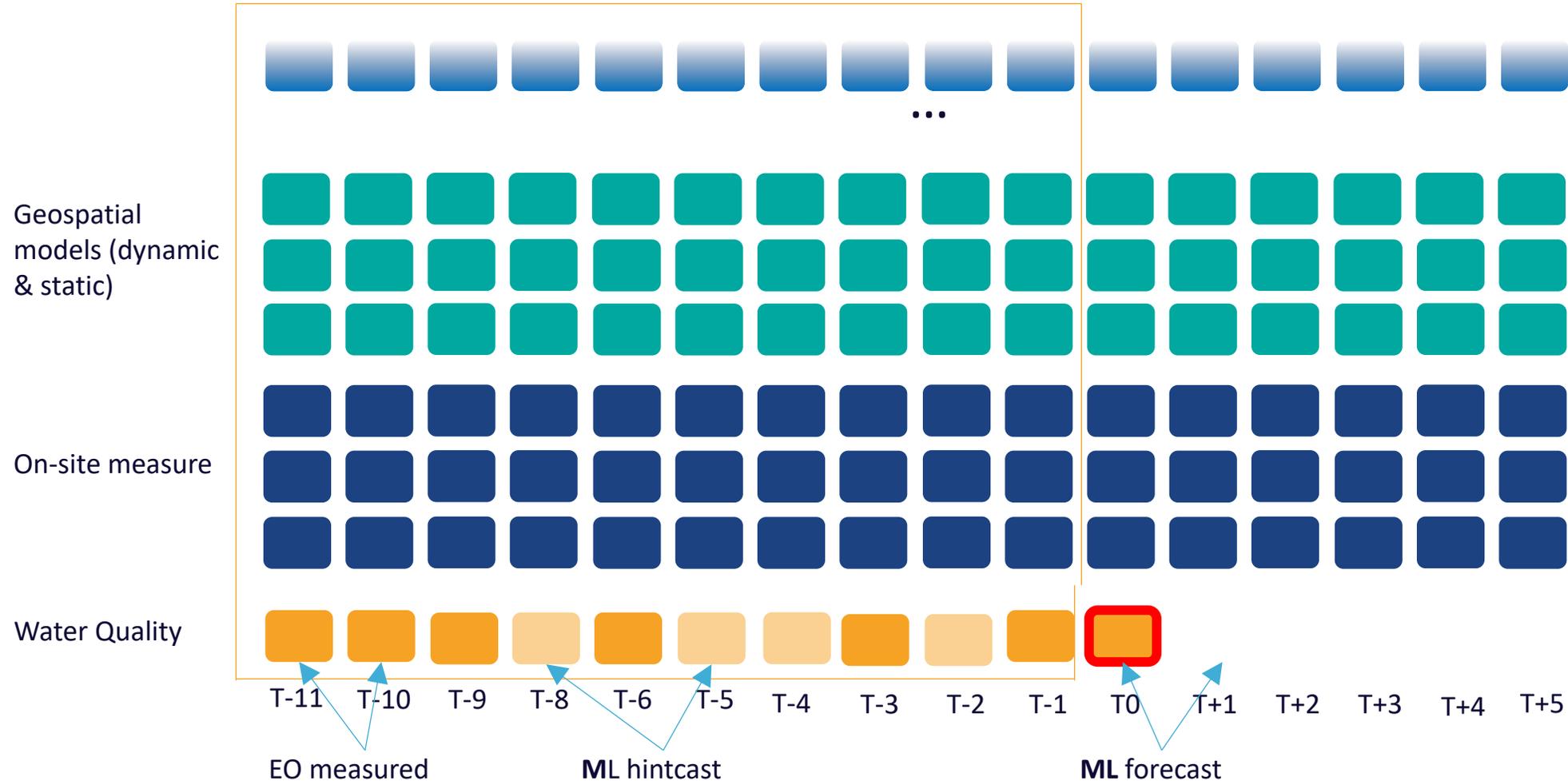




EXAMPLE: AI TO IMPROVE HINTCASTS & FORECASTS ON COASTAL WATER QUALITY

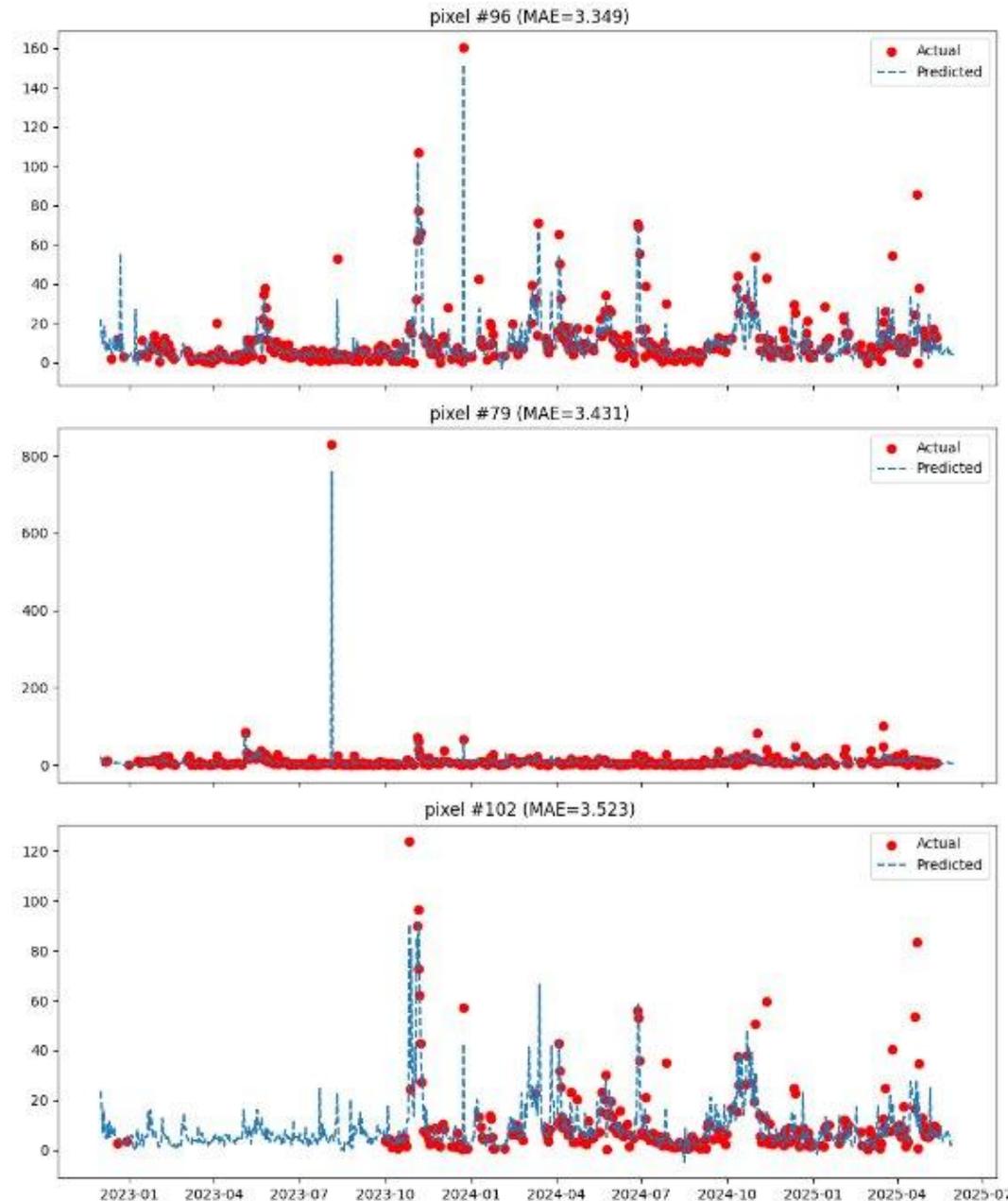


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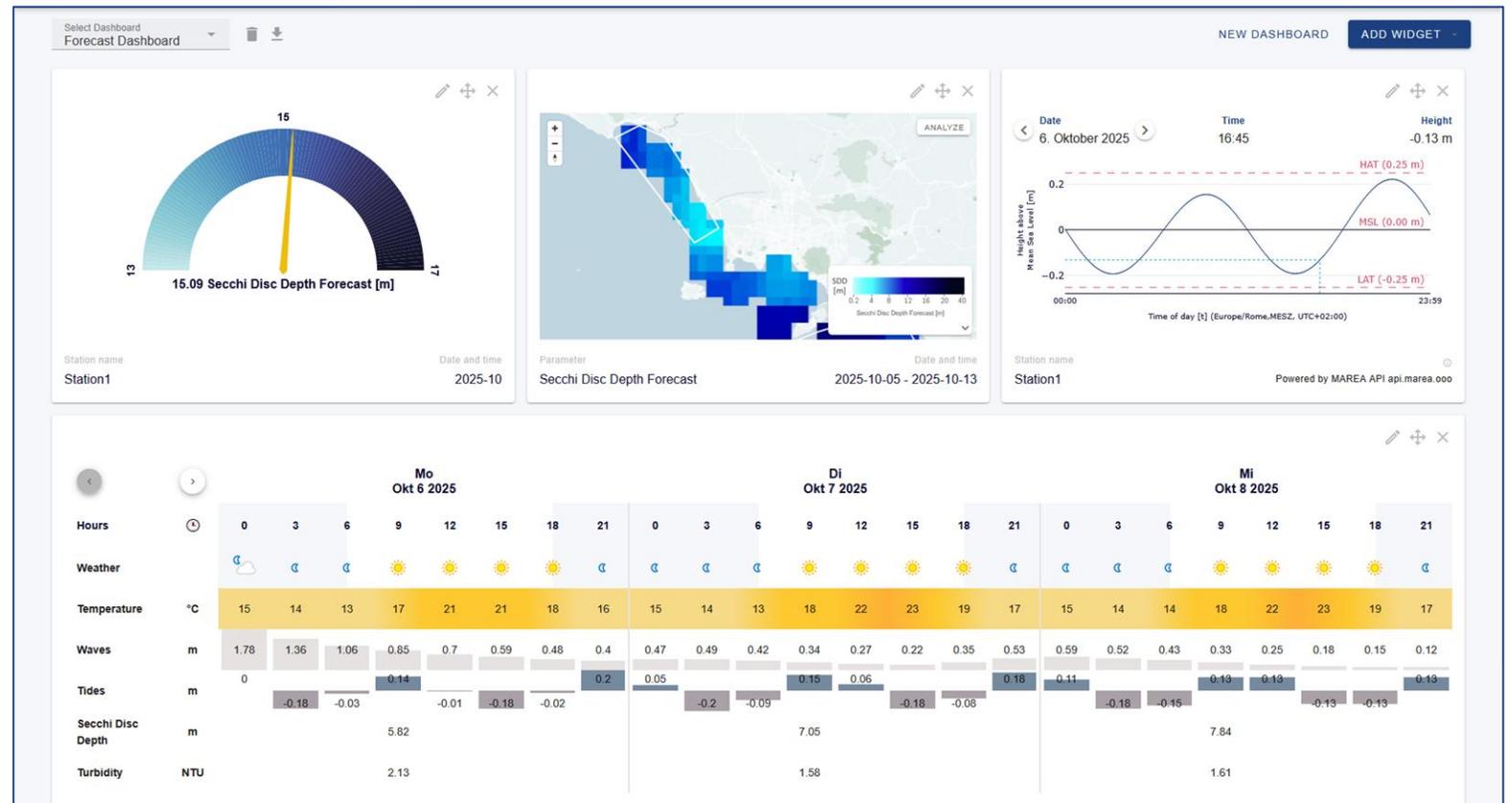
- **Operations and insitu data collection** can be supported by **near real time, gap free monitoring** and short-term **forecasting** of current and expected conditions in an area of interest



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-> prototype shows good results and approach will be transferred to other sites



EXAMPLE: AI TO ACCELERATE INFORMATION UPTAKE

LLM CHATBOT TRAINED WITH LOCAL + EO EXPERTISE

- Language model, trained with technical information
- Helps the user to better understand processes and data
- Guides the user to a most effective data analysis and information uptake

My Regions

Here you can see your purchased regions. In these areas, you can process unlimited SDB to create a product tailored to your needs and unlock a new area.

+ PURCHASE NEW REGION

	VHR Bahamas Created : 2025-10-14 06:14 Area: 6.35 km ²
	Barbados_IceSat Created : 2025-01-20 15:16 Area: 5.99 km ²

EoChat ✕

Hello! Ask me anything about COASTS or EOMAP.

How is Satellite-Derived Bathymetry calculated?

Satellite-Derived Bathymetry (SDB) is calculated using multispectral satellite images by measuring the intensity of sunlight reflected from the seafloor. EOMAP's physics-based methods correct the satellite data for effects like land adjacency, atmospheric properties, and water surface sunglint. They also retrieve water column optical properties to estimate water depth and seafloor reflectance. This is done using an inversion of the radiation transfer model based on...

|Type your message... ▶

EXAMPLE: AI TO SPEED UP CLASSIFICATION OF AUV

ANALYSIS OF AUV MOSAICS FOR SEABED HABITATS

- + rapid and time efficient thematic classification of seabed habitats and their health
- + integrated in EO workflows to result in improved benthic classification maps and monitoring programs.



Realcolor 8bit orthomosaics or imagery from AUV.

Records have a width of approx. 2m and are collected along transects over the AOI.

EXAMPLE: AI TO SPEED UP CLASSIFICATION OF AUV

1. SPARCE COVER



2. DENSE COVER



3: OTHER CLASSES

-SAND, ROCKS, CORALS ETC...



SUMMARY ON COASTS AND AI

Original Image



Representation:
512x512x3 -> ca. 800 k

Feature **extraction**
Mean,Texture,NN



Image representation as Feature Vector

$$\begin{pmatrix} V1 \\ V2 \\ V3 \\ V4 \\ V5 \\ V6 \\ V7 \\ V8 \\ V9 \\ \vdots \\ \vdots \end{pmatrix}$$

Representation:
Approx. low 10s to 1k

Feature **reduction** step:
PCA, UMAP, t-SNE

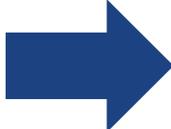
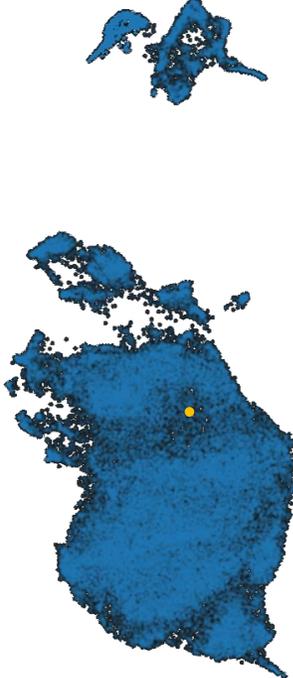
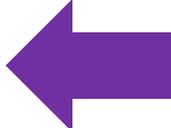
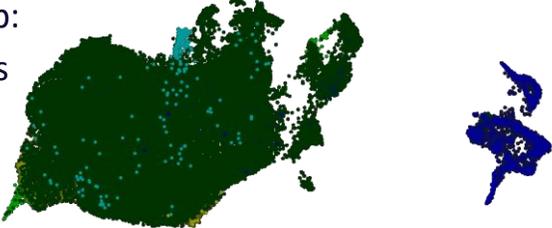


Image representation as Low 2D/3D Feature Vector

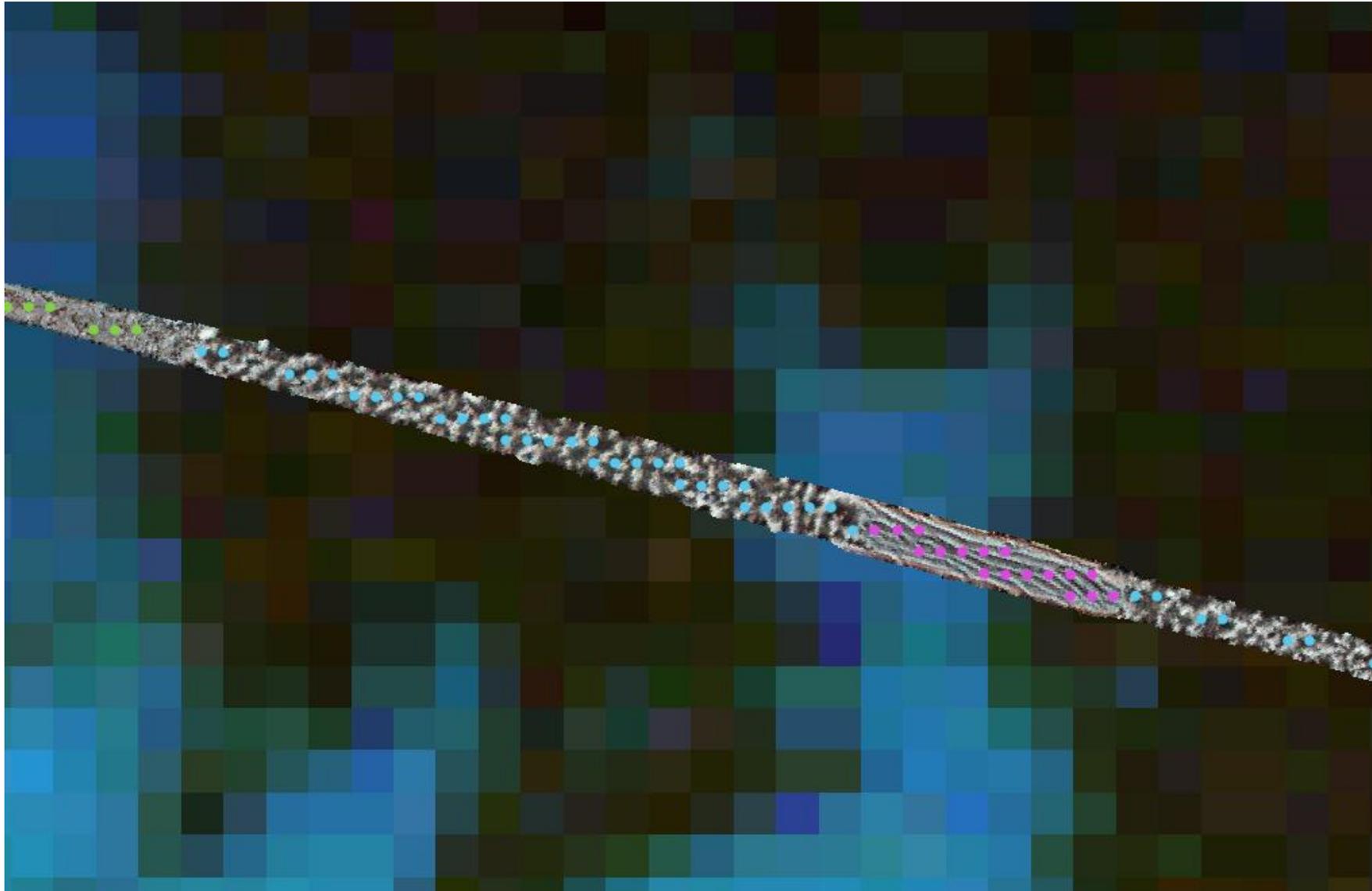


Representation:
2 or 3

Classification step:
HDSCAN,K-means



SUMMARY ON COASTS AND AI

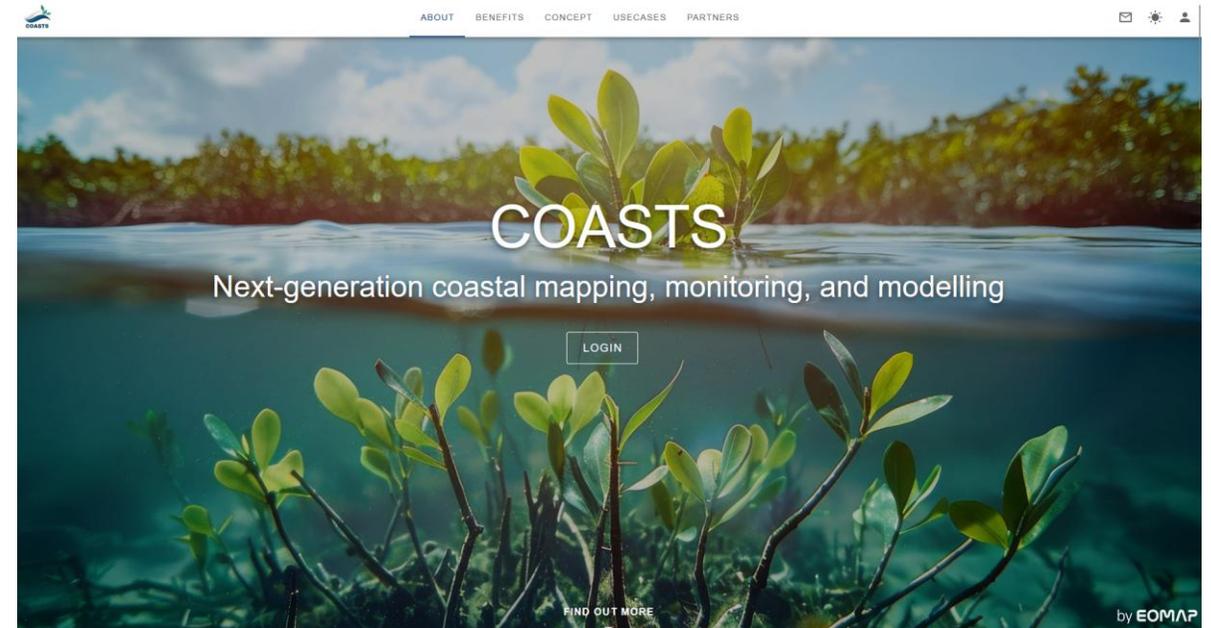


- Sand (coarse ripple)
- Sand with organic material
- Seagrass
- Rocks

SUMMARY

AI FOR COASTS

- + **COASTS** is an ongoing EUSPA co-funded project on coastal resilience
- + AI is integrated part of the **COASTS development** (although considered as one tool amongst others)
- + AI improves insights into environmental aspects



<https://coasts.eoapp.de/>



CONTACT US

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