COASTS

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EUSPA – AI Days

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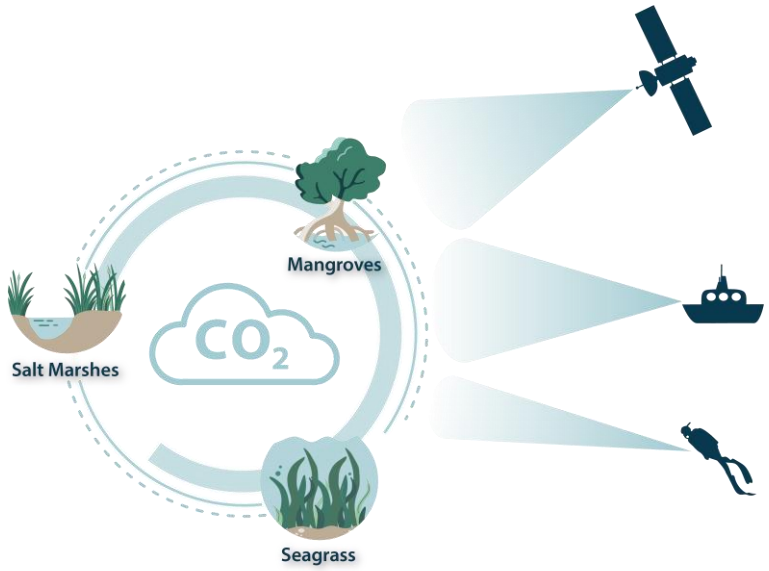
EOMAP FUGRO submaris msro

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.



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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

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PARTNERS

Project Mgmt. & EO+IT expertise

Modelling & BD

Local client engagment & on-site intelligence

Sampling & measurements

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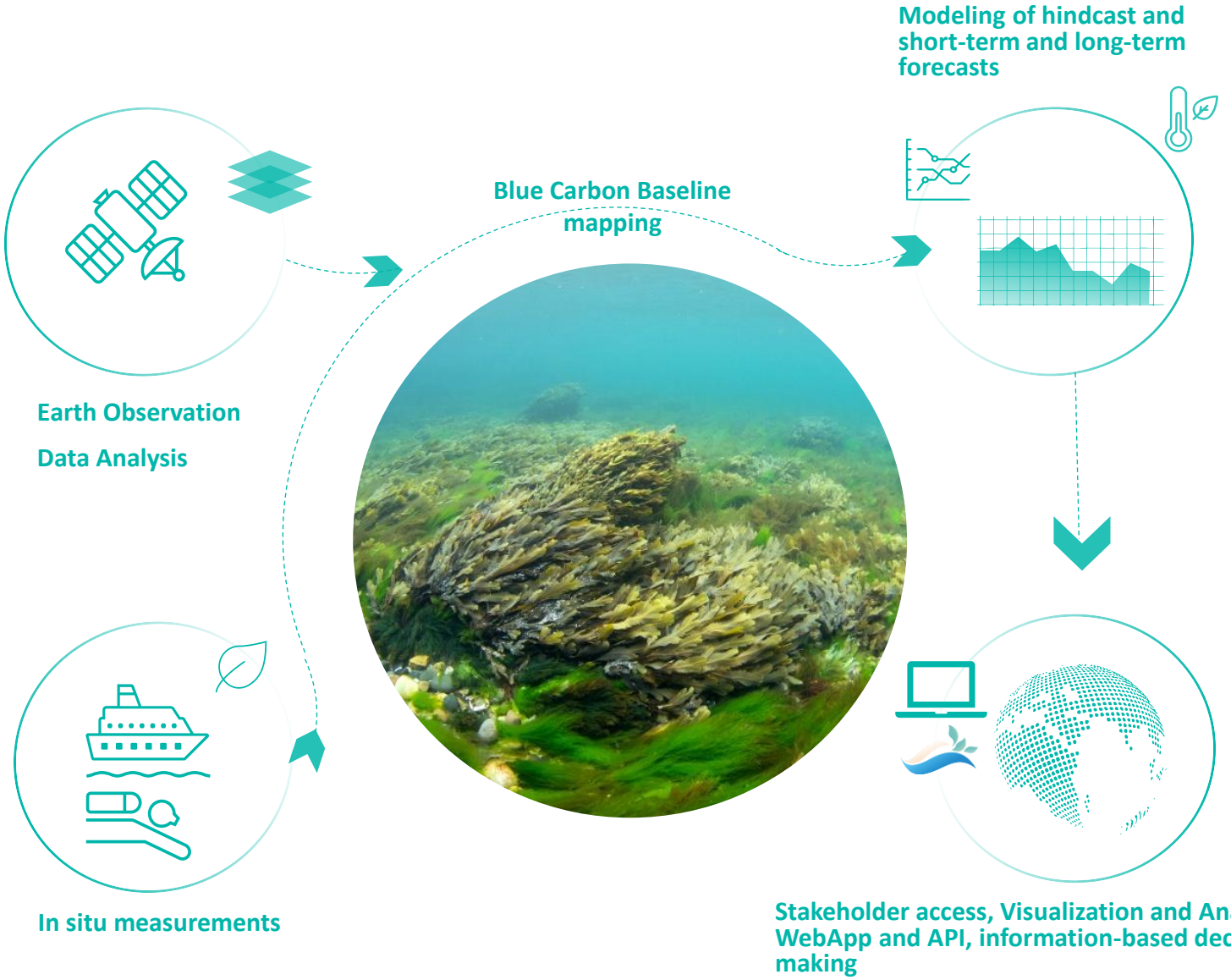
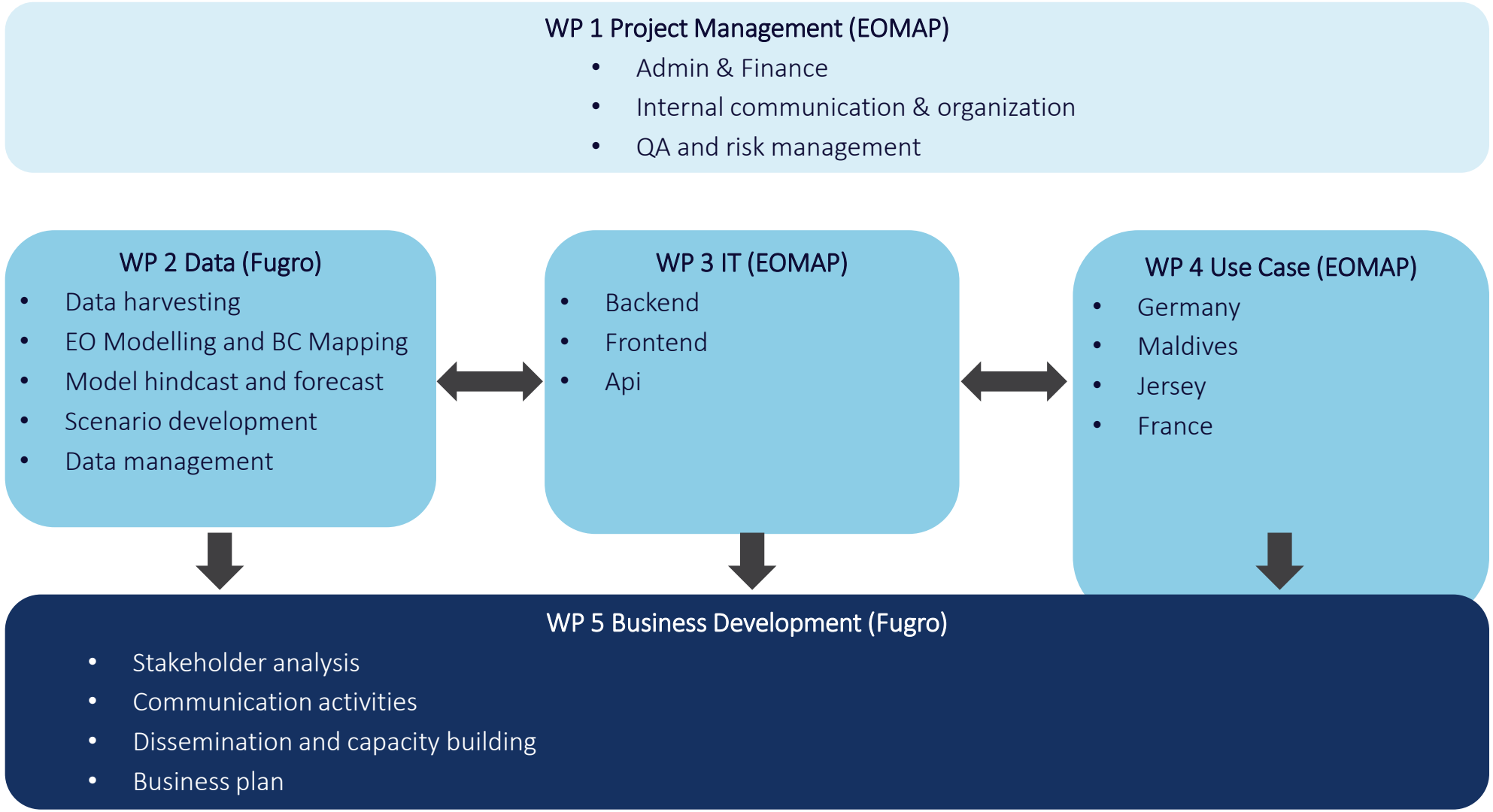
THE AMBITION

- 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



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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

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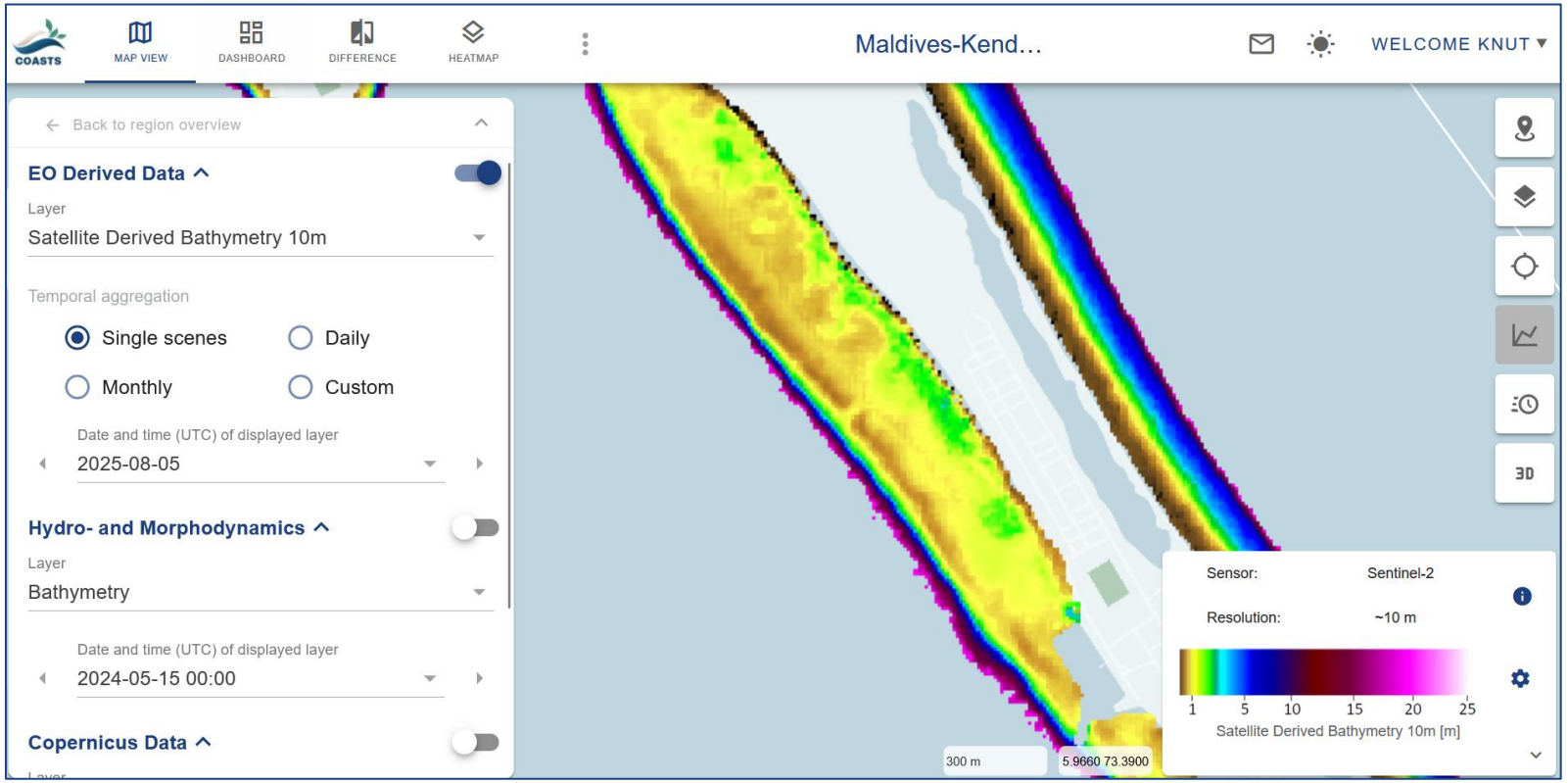
APP

HTTPS://COASTS.EOAPP.DE/

Alpha version released
(no public access, yet)



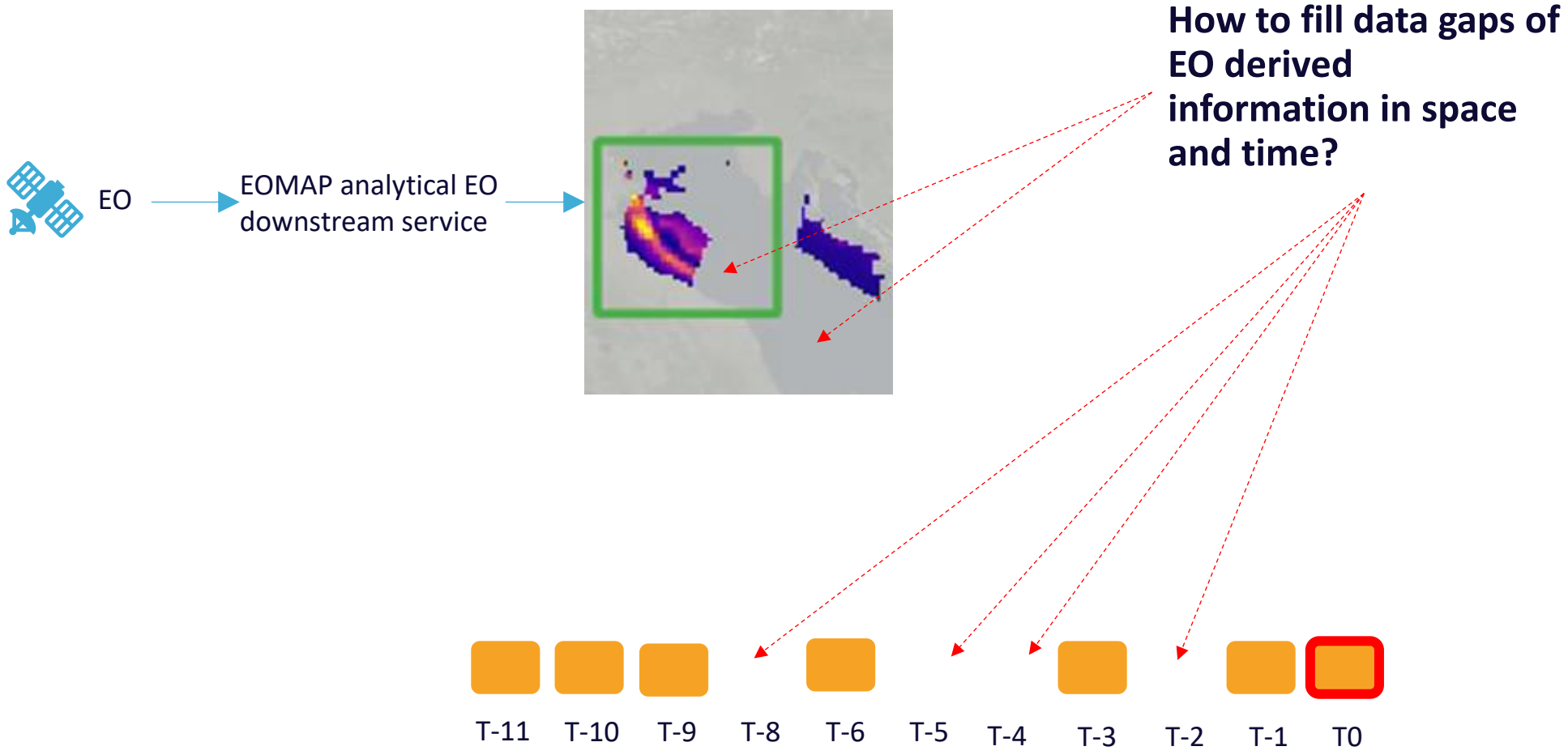
AMBITIONS IN DATA ANALYTICS, INCLUDING AI

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*


Veo

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



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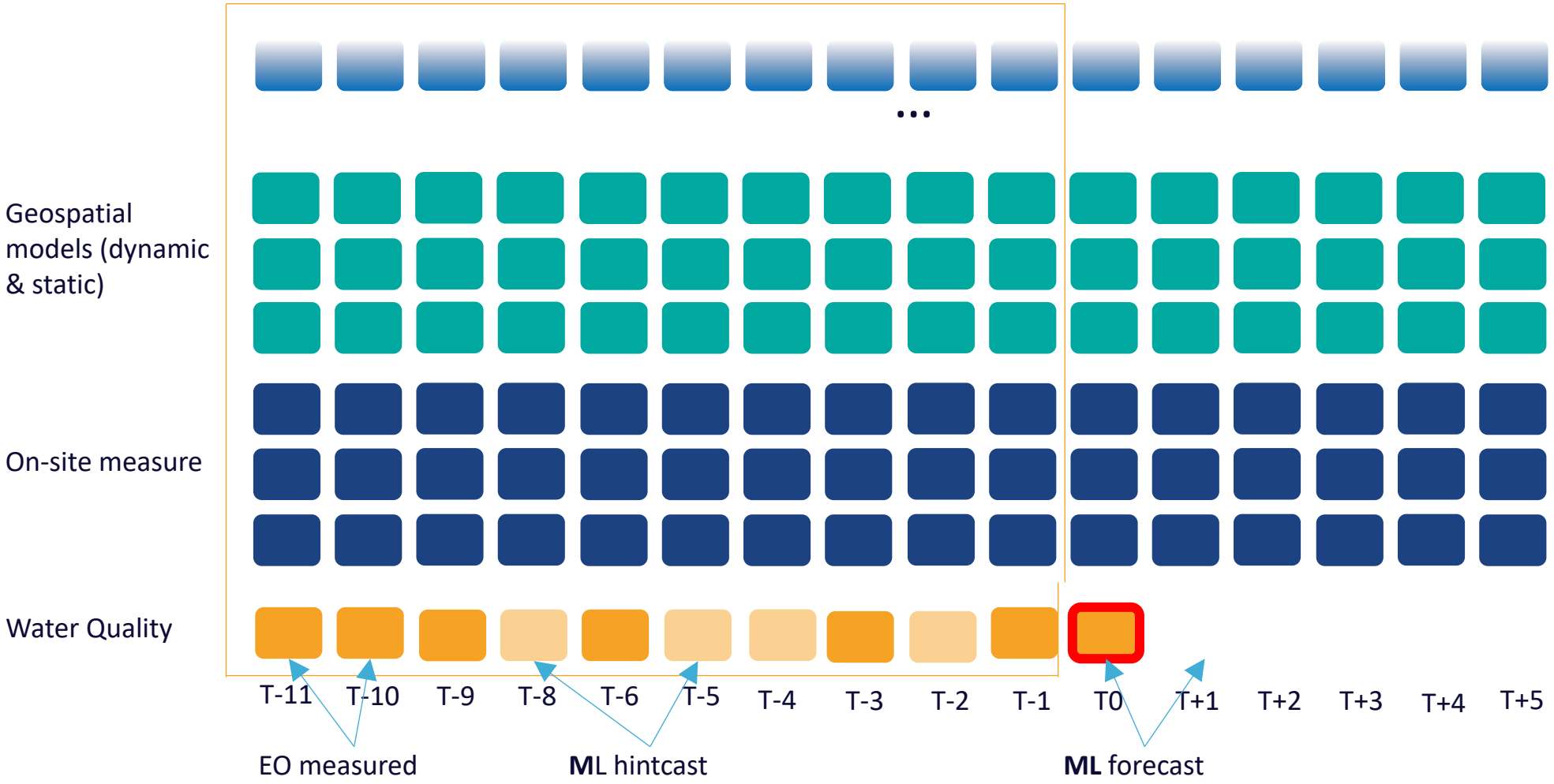

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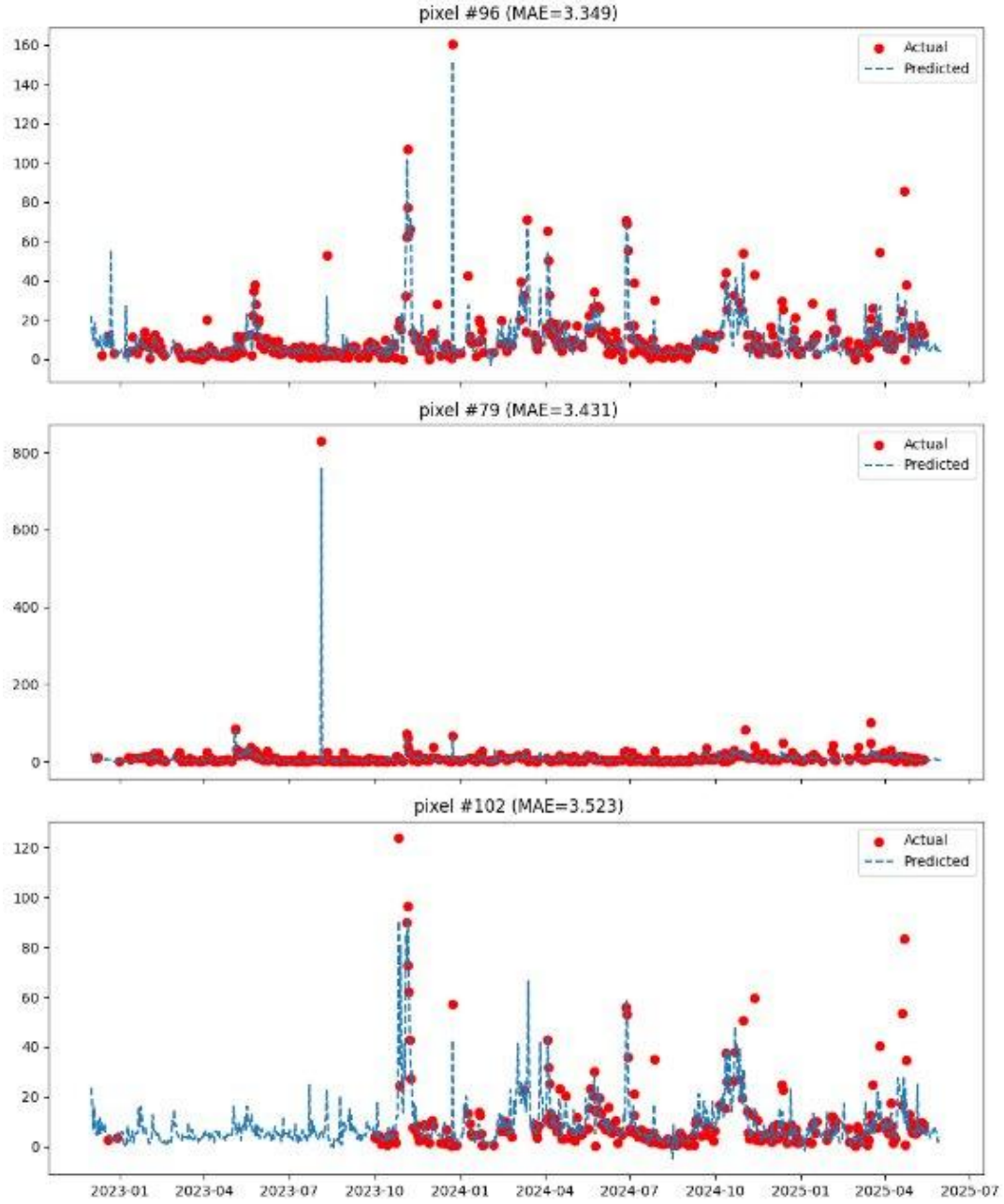
EXAMPLE: AI TO IMPROVE HINTCASTS & FORECASTS ON COASTAL WATER QUALITY

- **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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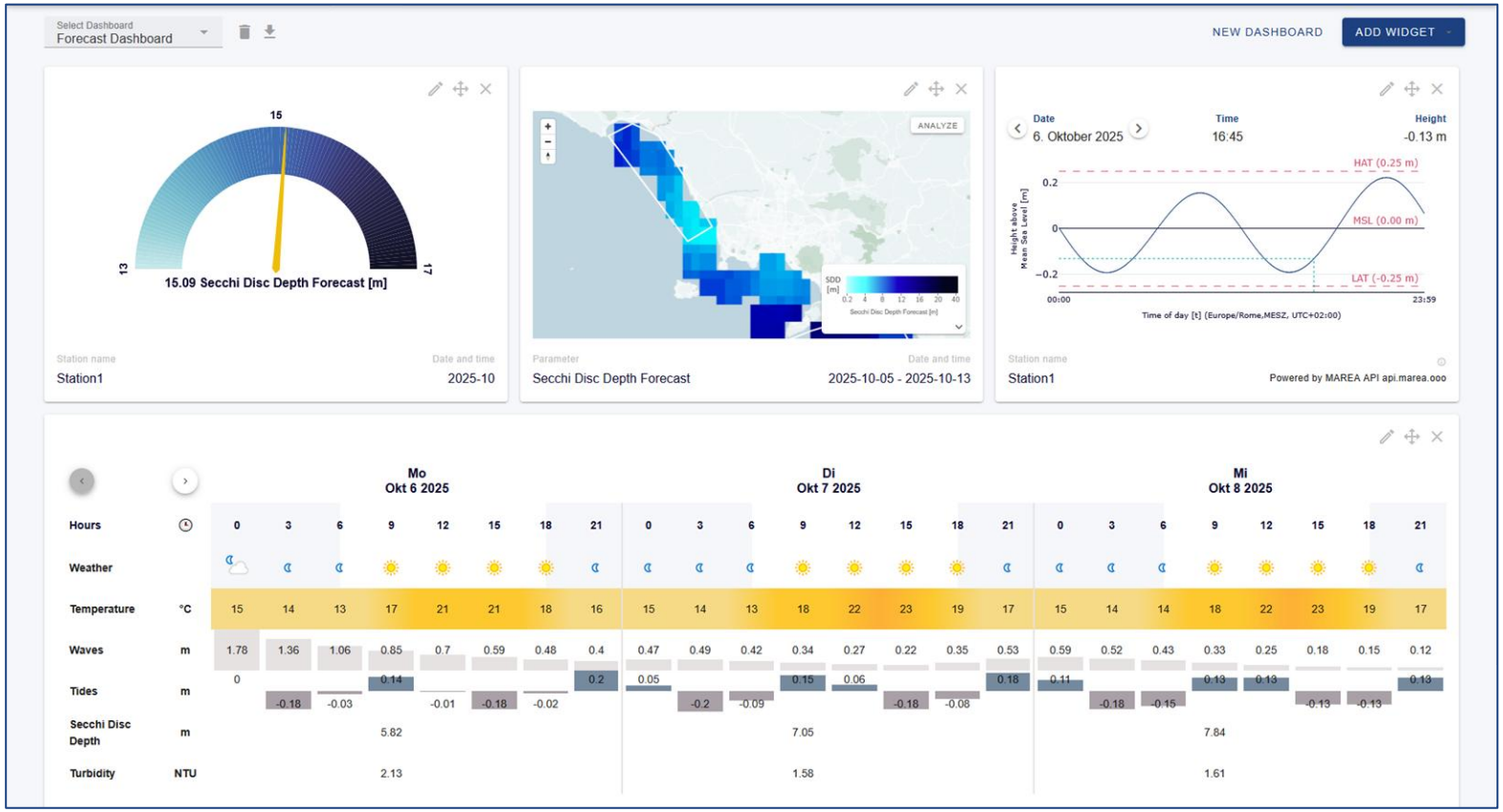
AI TO IMPROVE HINTCASTS & FORECASTS ON COASTAL WATER QUALITY

- **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

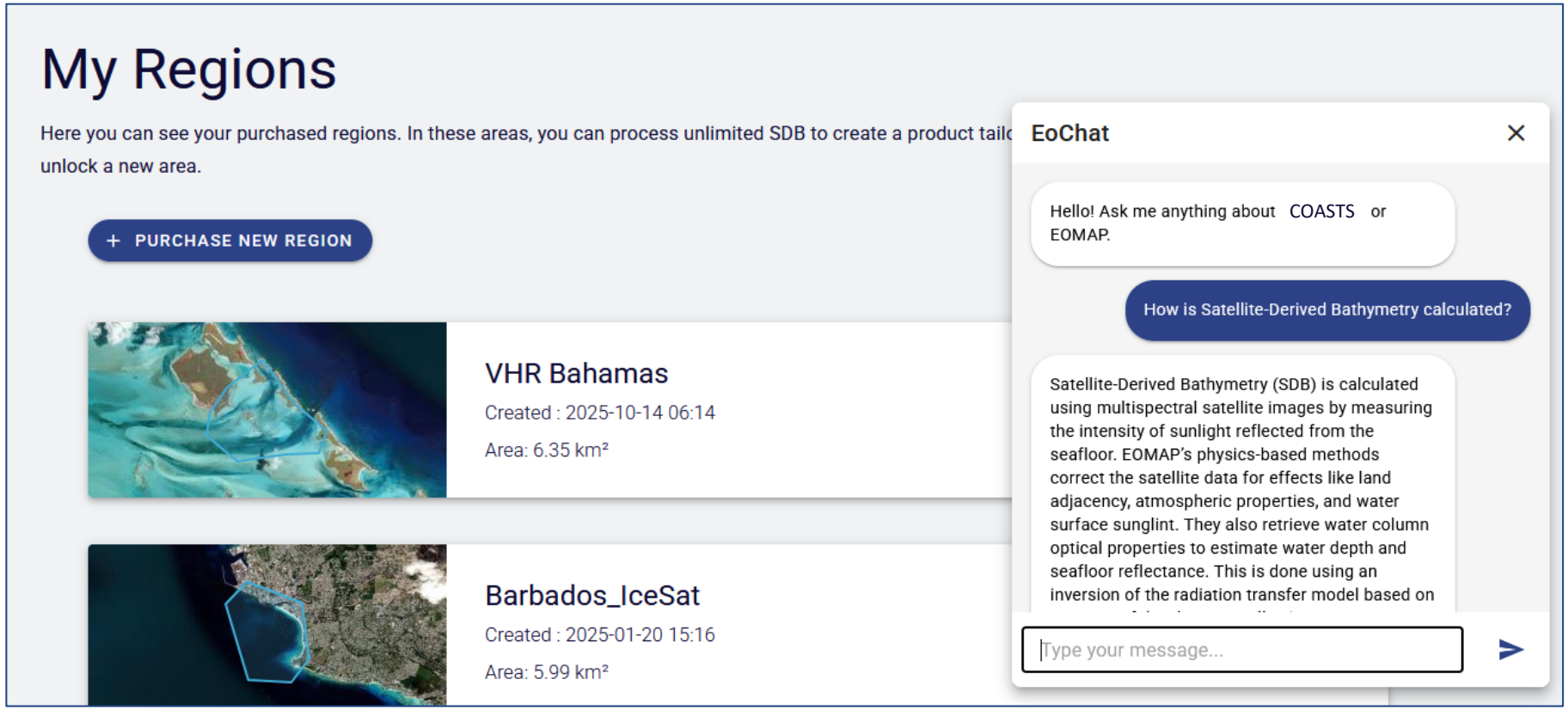
-> prototype shows good results and approach will be transferred to other sites



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



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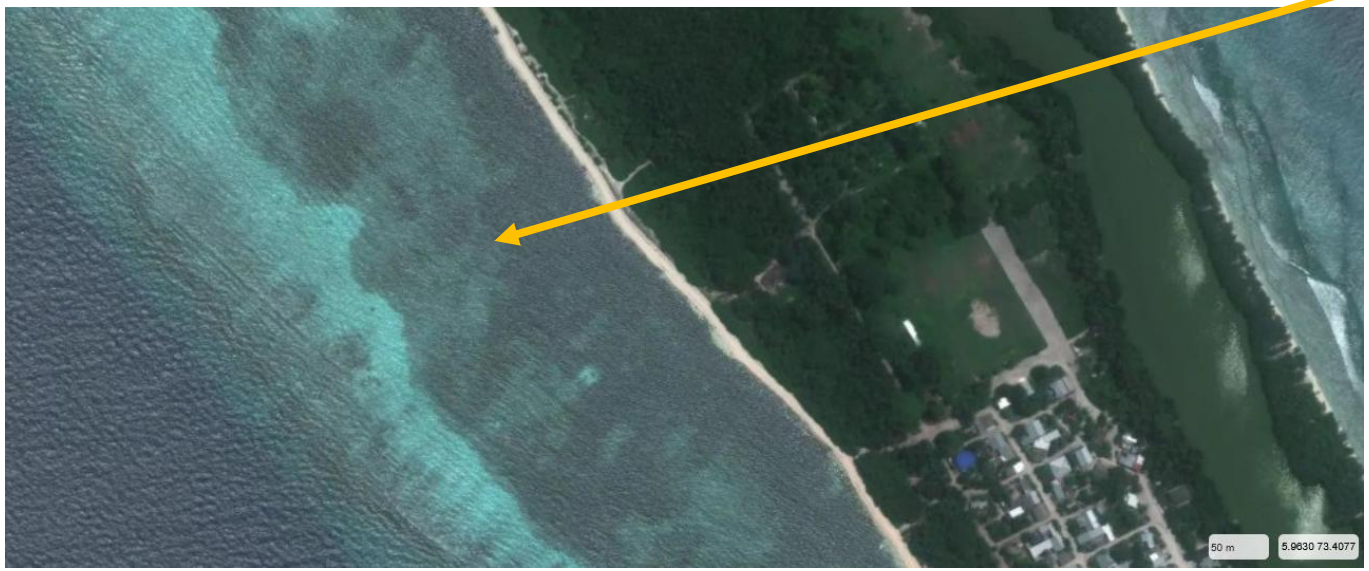
EXAMPLE: AI TO SPEED UP CLASSIFICATION OF AUV

ANALYSIS OF AUV MOSAICS FOR SEABED HABITATS

+ rapid and time efficient thematic classifciation of seabed habiats and their health
+ integrated in EO workflows to result in improved benthic classificaiton maps and monitoring programs.



Realcolor 8bit orthomosais or imagery from AUV.

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

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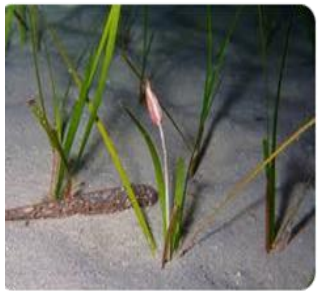
EXAMPLE: AI TO SPEED UP CLASSIFICATION OF AUV

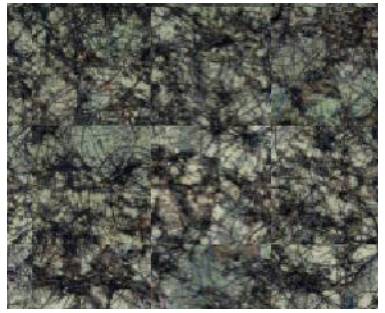
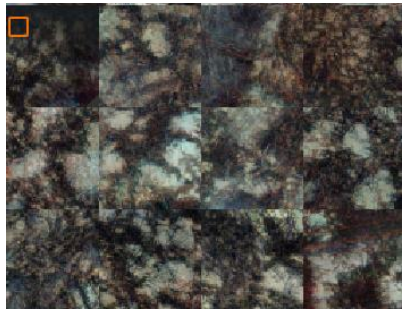
1. SPARCE COVER



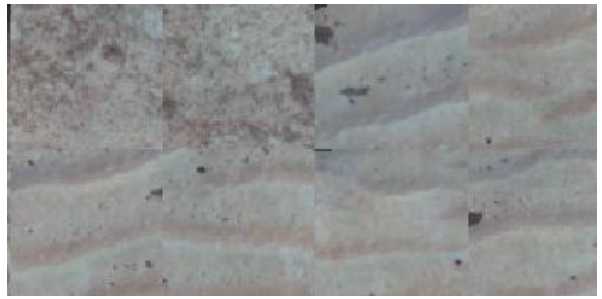


2. DENSE COVER



3: OTHER CLASSES
-SAND, ROCKS, CORALS ETC…

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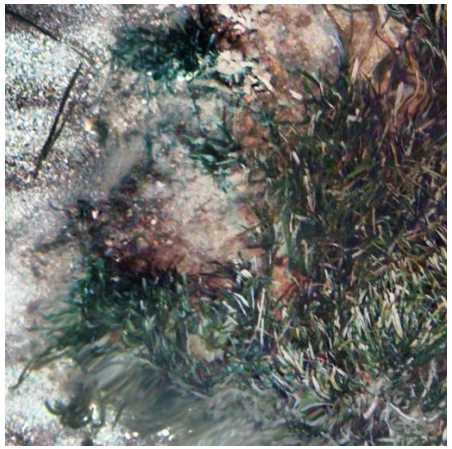
SUMMARY ON COASTS AND AI

Original Image



Representation:
512x512x3 -> ca. 800 k

Feature **extraction**
Mean,Texture,NN

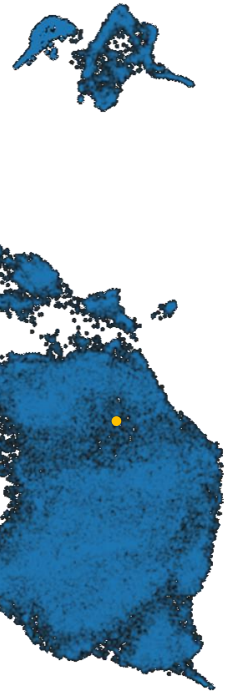
Image representation as Feature Vector

V1
V2
V3
V4
V5
V6
V7
V8
V9
.
.
.

Representation:
Approx. low 10s to 1k

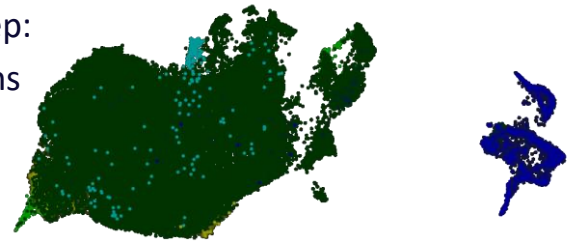
Feature **reduction** step:
PCA, UMAP, t-SNE

Image representation as Low 2D/3D Feature Vector

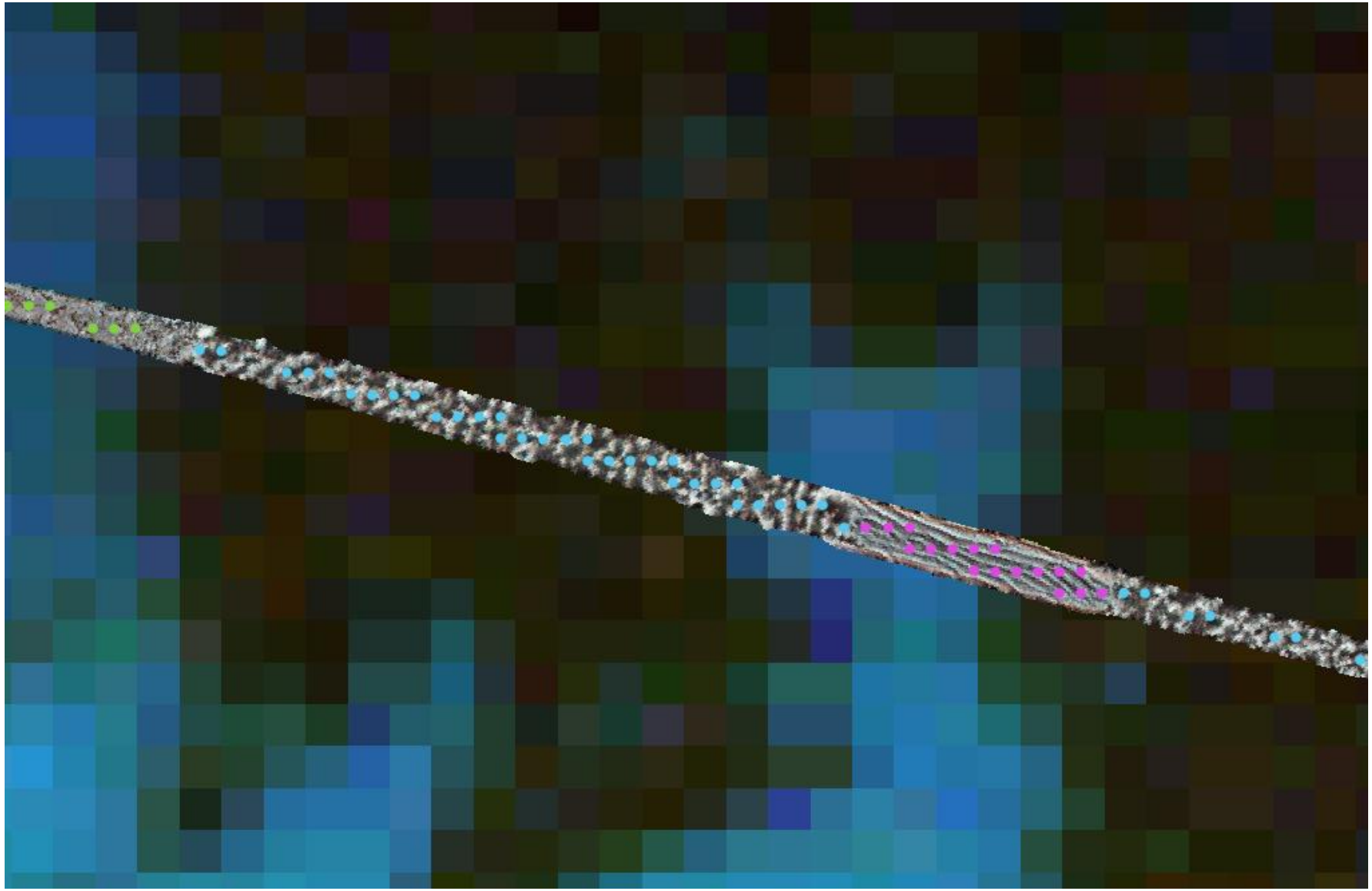


Representation:
2 or 3

Classification step:
HDSCAN,K-means



SUMMARY ON COASTS AND AI



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

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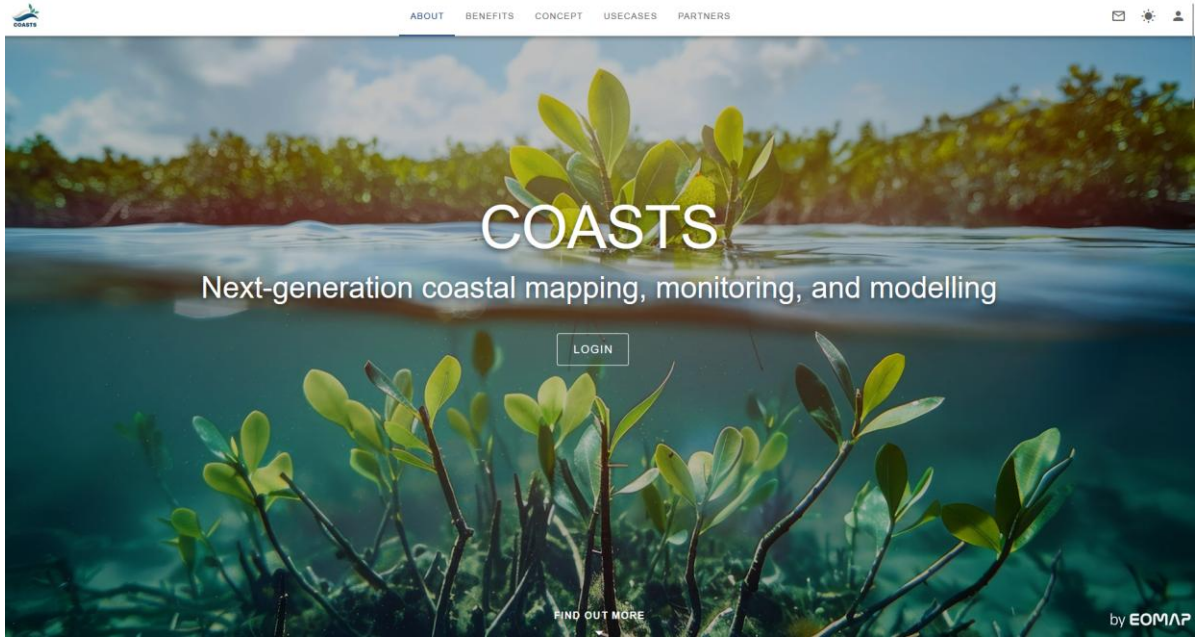
SUMMARY

AI FOR COASTS

+ **COASTS is an ongoing EUSPA co-funded project on coastal reslience**
+ **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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