iMagine – Imaging data and services for aquatic science

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MARIS (The Netherlands)

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iMagine

Marine environmental management and implementing ocean restoration initiatives require more knowledge and understanding

In Europe, we spent circa 1.4 Billion Euro a year in marine data acquisition (1.0 BE in-situ; 0.4 BE remote sensing)

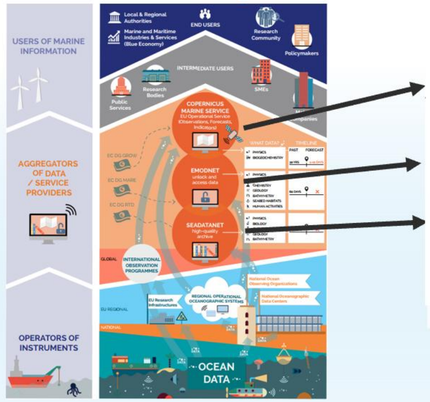
Europe already has developed an impressive capability for aquatic environmental observation, data-handling and sharing, modelling and forecasting.

Green Deal

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

Blue-Cloud

European landscape marine data management



EuroGOOS European Global Ocean Observing System
EurOBIS European Ocean Biogeographic Information System
Copernicus Marine Service
ICOS Ocean Thematic Centre
ERIC
EMODnet European Marine Observation and Data Network
elixir
ICES CIEM
PANGAEA.
SeaDataNet
Euro-Argo
ENA European Nucleotide Archive
EGDI

Data aggregators and providers of data products and services

iMagine

Artificial intelligence
Machine learning

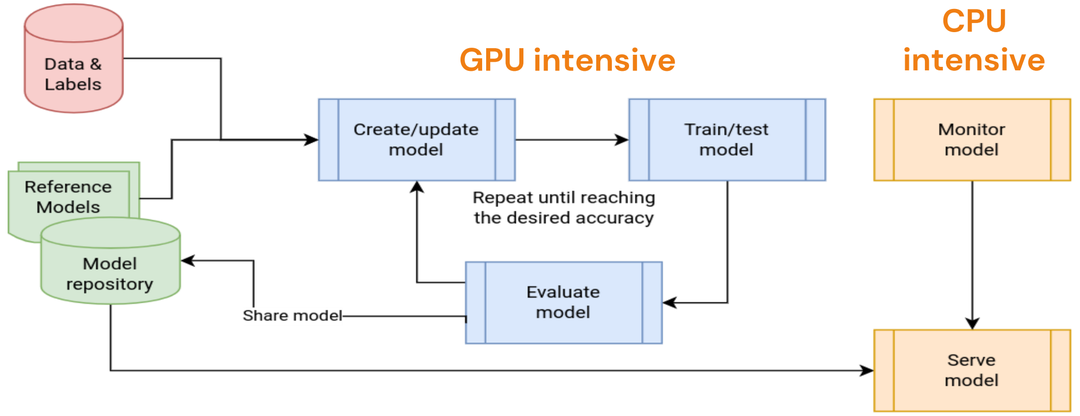
From DATA to KNOWLEDGE

Specific Objectives and indicators

O1	**Objective 1. Deliver a scalable, shared IT platform for image analysis in marine and freshwater research**	*Operational iMagine platform with common AI development framework*
O2	**Objective 2. Advance existing image analytical services to increase research performance in aquatic sciences**	*Launch of 5 aquatic AI image analytics services, running operationally on the iMagine platform*
O3	**Objective 3. Develop & prototype new image analytical services and datasets that can accelerate progress towards healthy oceans, seas, coastal and inland waters**	*3 AI-based imaging processing application pilots, 8 scientific image repositories*
O4	**Objective 4. Capture and disseminate development and operational best practices to imaging data and image analysis service providers**	*Best Practices documentation, interaction with EOSC and AI4EU platforms. Training programme*
O5	**Objective 5. Deliver a portfolio of scientific image and image analytics services targeting researchers in marine and aquatic sciences**	*Portfolio: operational services, image repositories, Best Practices, iMagine framework and platform*

The iMagine Approach

Thematic Services

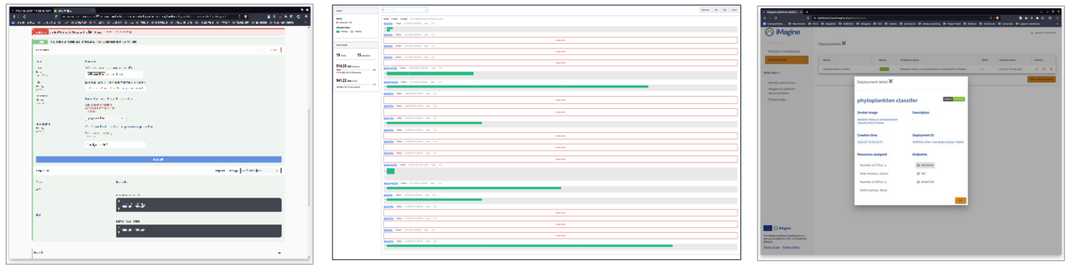


8 internal use cases

- 5 production AI services
- 3 AI application prototypes

Benefitting **10+** Research Infrastructures &

Platform Service



iMagine AI Platform: Generic, scalable platform for developing and sharing AI/ML applications. Currently serving,

- 8 internal use cases
- 2 external use cases

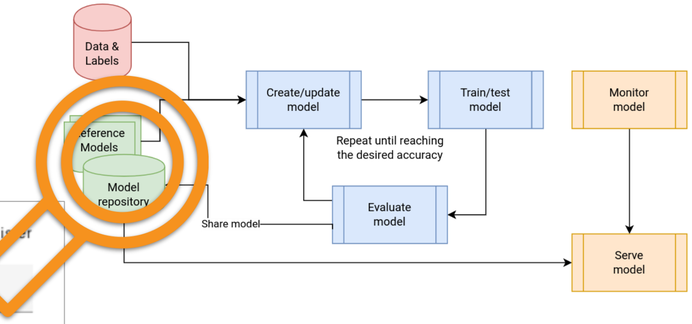
Infrastructure

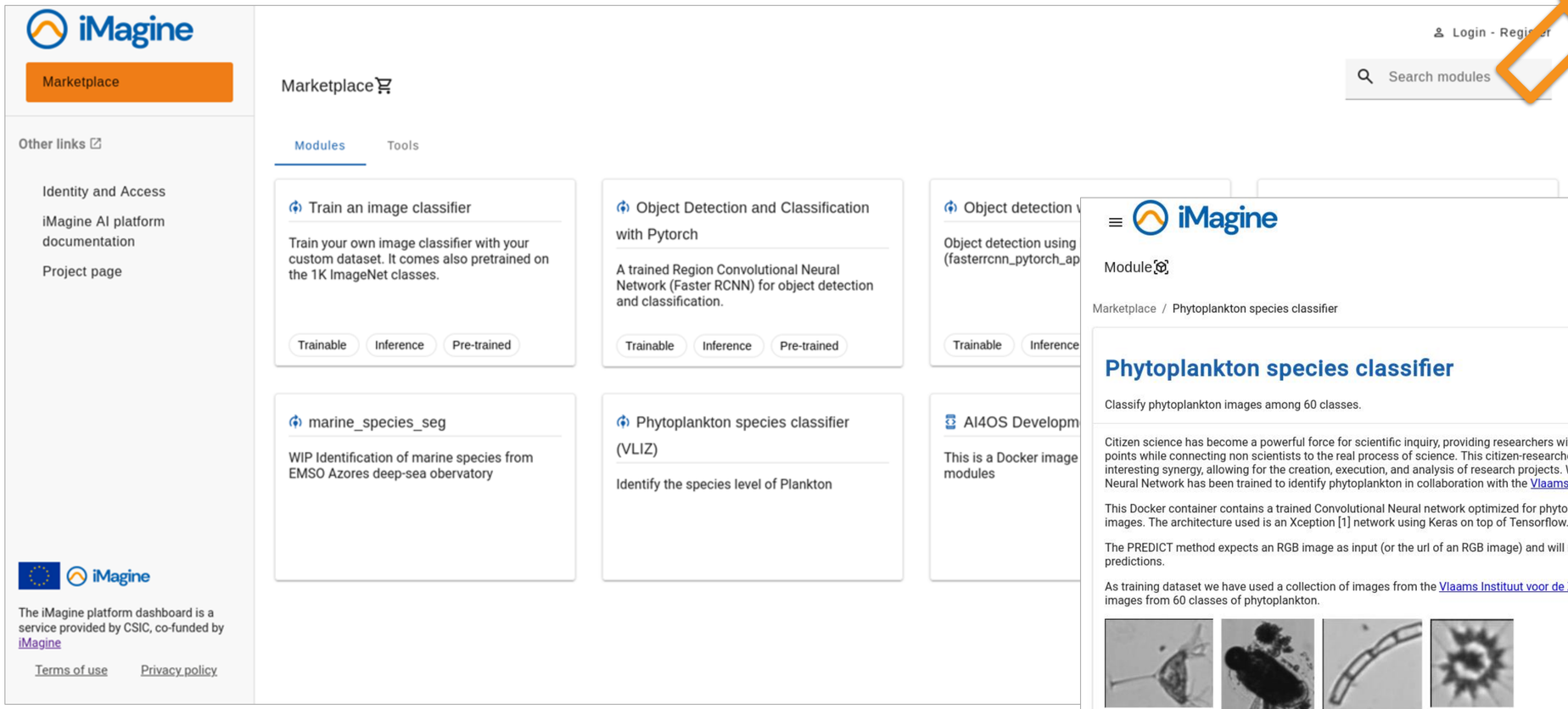
- **1500** TB-months
- **132,000** GPU-hours
- **6,000,000** CPU-hours

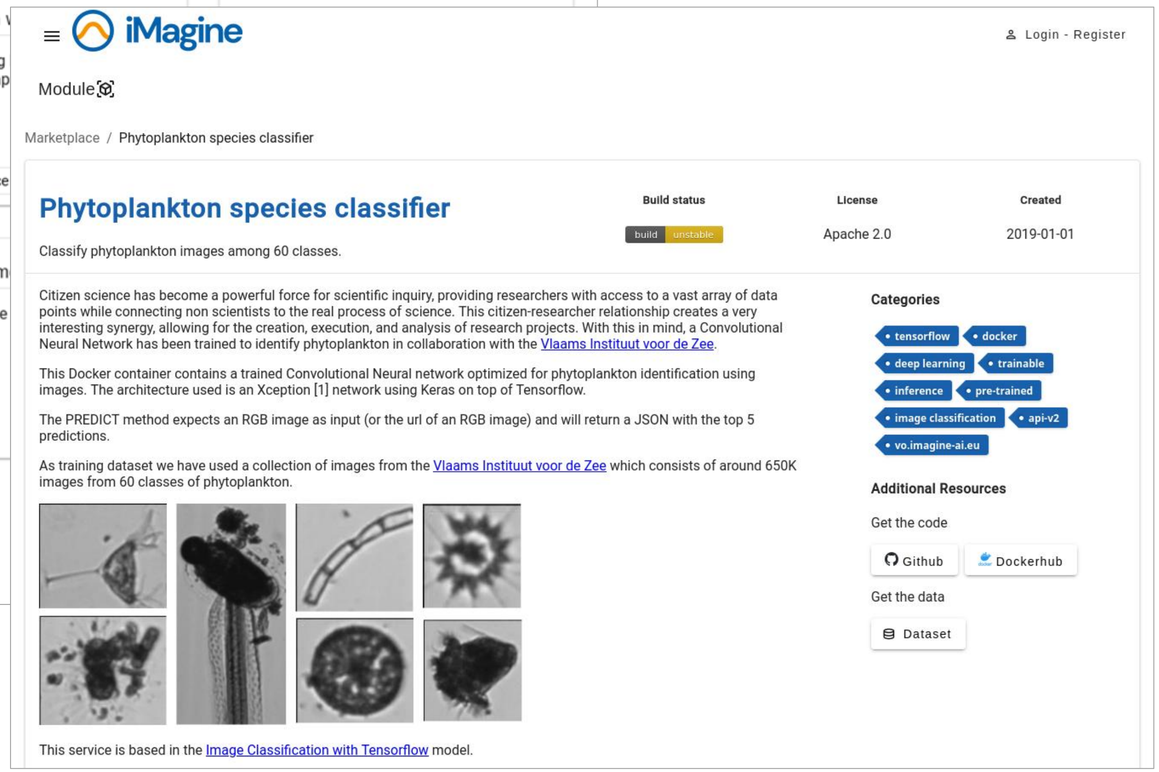
4 federated cloud infrastructures - OpenStack GPUs, CPUs, Storage - from Spain, Portugal, Turkey & Ireland.

Services for AI/ML development

Model marketplace







https://dashboard.cloud.imagine-ai.eu/marketplace

https://marketplace.eosc-portal.eu/services/imaging-ai-platform-for-aquatic-science

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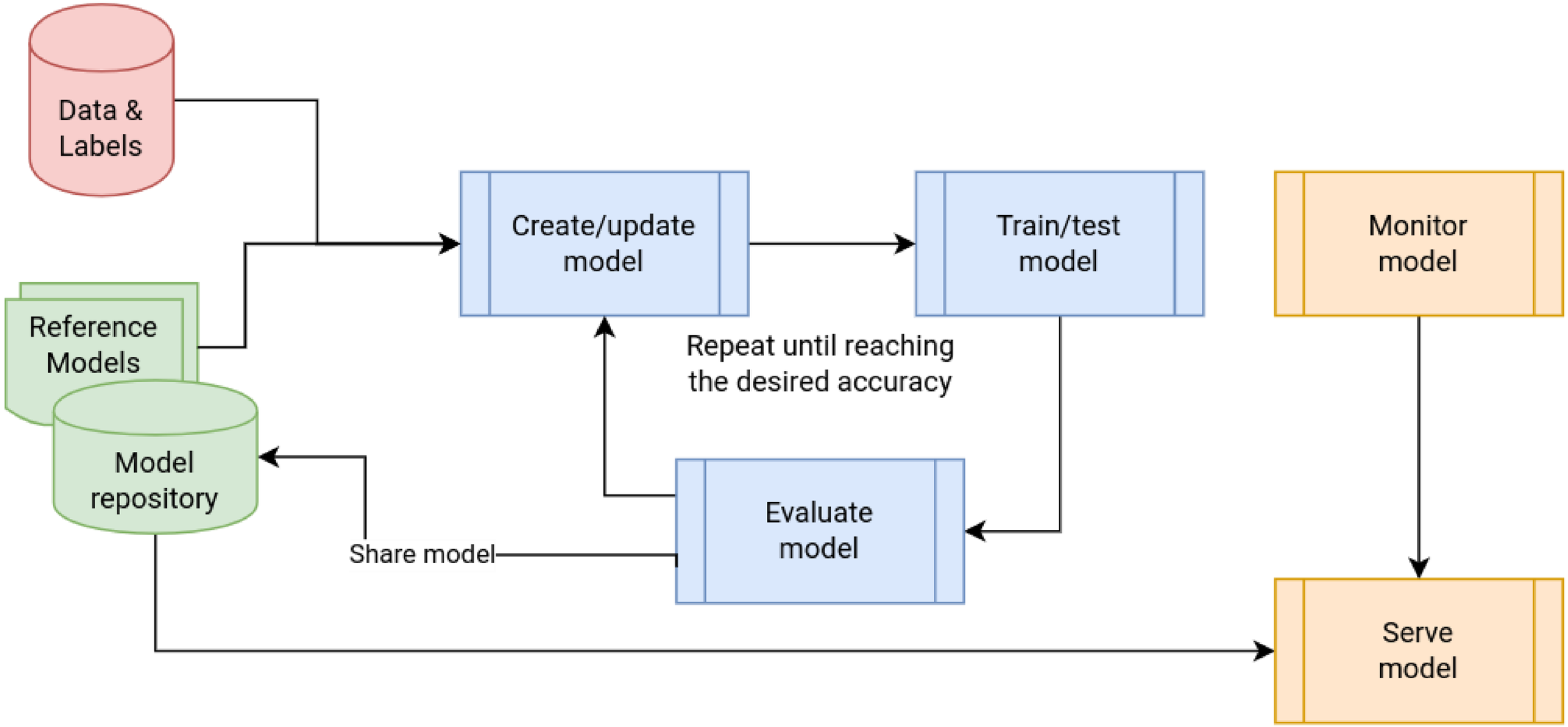
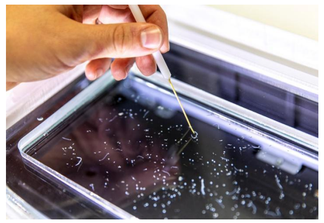
Competence Center: support whole AI/ML development cycle



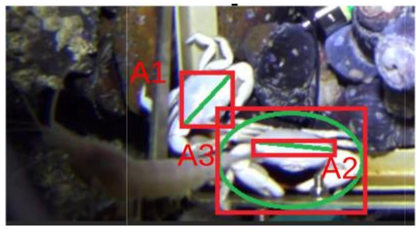
Use cases overview (mature UCs)

Aquatic Litter Drones (DFKI, MARIS, OGS):
Monitoring system for Aquatic Litter Pollution

Zooscan – EcoTaxa pipeline (Sorbonne Université):
Taxonomic identification of zooplankton using Zooscan

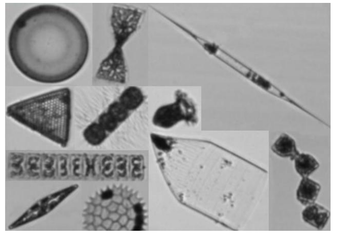


Marine Ecosystem Monitoring
(EMSO ERIC, UPC, IFREMER, MI):
Ecosystem Monitoring by means of video imagery from cameras at EMSO sites

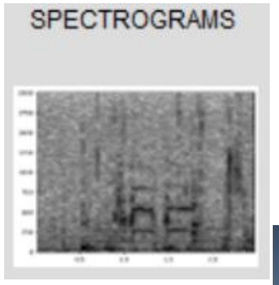


Oil Spill Detection (CMCC, OrbitalEOS, UNITN):
Oil spill detection from satellite images

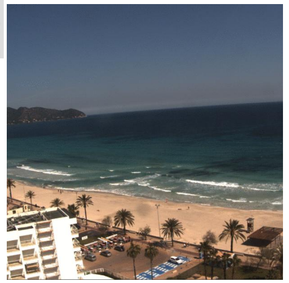
Flowcam phytoplankton identification (VLIZ):
Taxonomic identification of phytoplankton



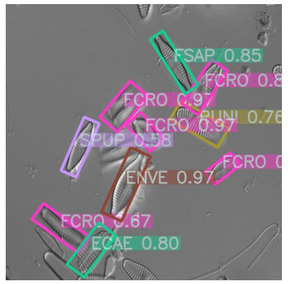
Use cases overview (prototype, external)



Underwater noise identification (VLIZ):
Identification of sound events from acoustic recordings using spectrograms



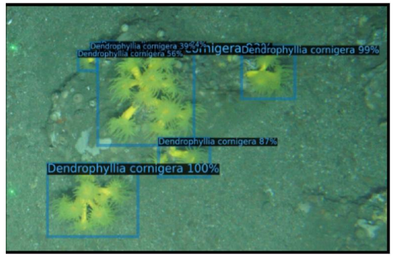
Beach monitoring (SOCIB):
Posidonia oceanica berms and rip-currents detection from beach monitoring systems



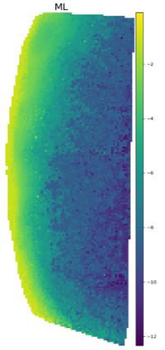
Freshwater diatoms identification (UL-LIEC):
Diatom-based bioidentification using automatic pattern recognition on microscope images

From Nov. 2023:

Improving knowledge about Cold Water Coral Reef
(IEO, CSIC) Use AI to precisely delineate areas of living coral and dead coral



Satellite-Derived Bathymetry (ICMAN-CSIC)
Nearshore bathymetry for coastal studies



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Enabling scalable AI/ML services

ANTARES

emso ERIC
EUROPEAN RESEARCH INFRASTRUCTURE CONSORTIUM

EMODnet
European Marine Observation and Data Network

OBSEA
EXPANDABLE SEAFLOOR OBSERVATORY

SeaDataNet

JERICO RI
SCIENCE - SERVICES - SUSTAINABILITY

EMBRC
EUROPEAN MARINE BIOLOGICAL RESOURCE CENTRE

Copernicus Marine Service

LifeWatch ERIC

Euro Argo

PAP

OBSERVATOIRE OCEANOLOGIQUE VILLEFRANCHE/MER

5 AI/ML technology development institutes (*LIP, CSIC, IISAS, KIT, UPV*)

12 research infrastructures supporting use cases

4 national cloud compute centres (*TUBITAK, CSIC, INCD, Walton*)

Key Exploitable Results

1. A common iMagine AI framework and computing platform, based upon earlier DEEP developments and to be built on EGI resources, connected to EOSC, facilitating researchers in development, testing, training, hosting, and operating of AI based image analysis services, following FAIR practices.

2. Five operational and three prototype AI based image analysis services with image repositories, highly relevant for aquatic sector, to be deployed at the iMagine AI platform for open access and exploitation by researchers. These will demonstrate value and foster further uptake.

3. Best Practices consisting of documentation and training materials, giving practical guidance and examples to end-users on how to exploit image datasets and analysis applications offered by the iMagine portfolio, and to research engineers who wish to develop and deliver similar services, making use of the facilities of the iMagine AI platform

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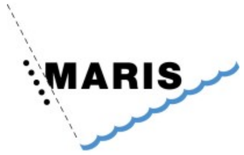
Consortium Overview



Preliminary Results

SCAN ME

YouTube

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Thank you for your attention

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https://www.imagine-ai.eu

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