ODYSSEA

Creating products and knowledge for the Mediterranean

Marinomica

Deltares

DEVELOPMENT OF MARINOMICA PRODUCTS AND SERVICES

ODYSSEA Final Conference

3rd November, 2021

Deltares

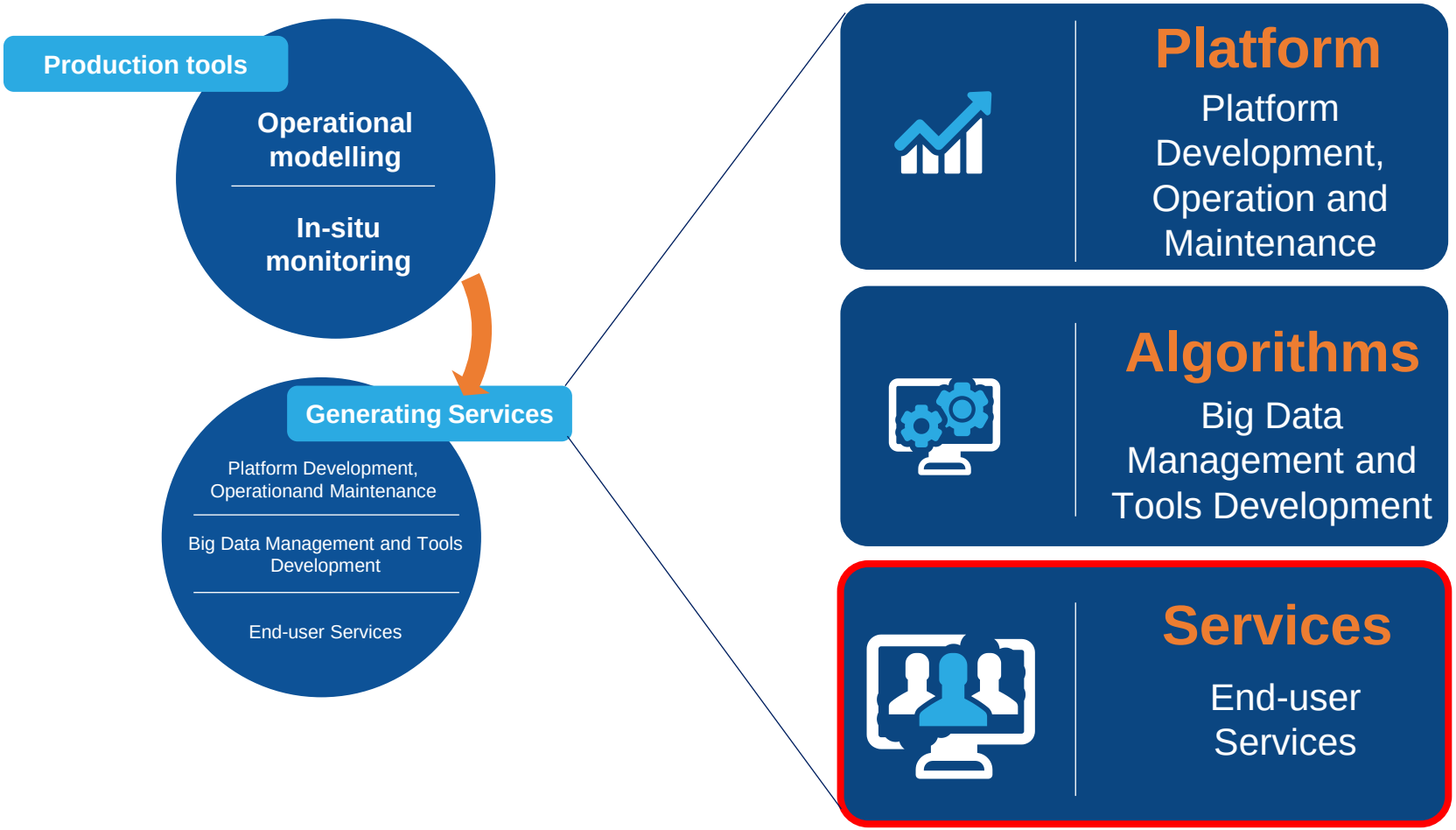
Ghada El Serafy, Lorinc Meszaros, Sonja Wanke

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 727277

“Simple to use, easy to interpret user-friendly products”

Services development

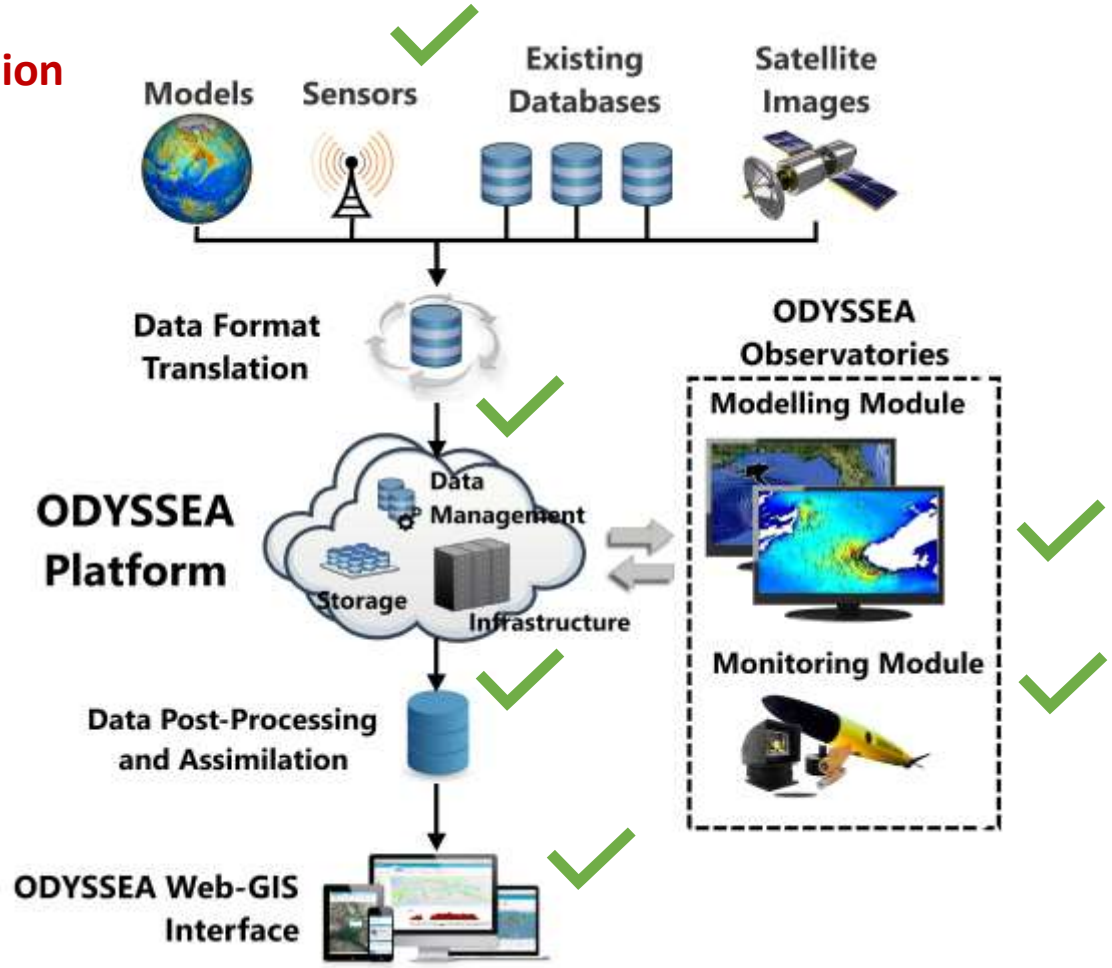
ODYSSEA



Production Chain Elements

ODYSSEA

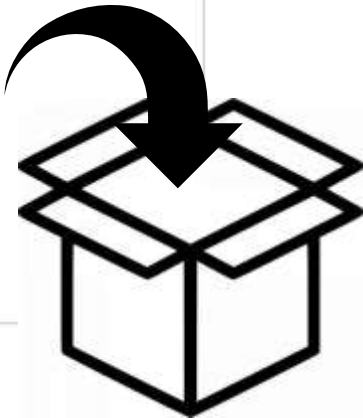
All service production chain elements in place



Technological Perspective of services

ODYSSEA

	In-situ measurements	Coastal models	External Earth Observation datasets	Citizen Science	Algorithms
OBSERVING/MODELLING PLATFORM	- **Develogic Modular Surface Sensor** (fluorometer + hydrophone + submerged camera + microplastics sensor) - **Develogic Deep Water Sea Lander** - **Alseamar SeaExplorer glider:** • Payload 1: GPS, CTD, DO, Phyto, CDOM, Turbidity, • Payload 2: Passive Acoustic Monitoring (hydrophone), • Payload 3: CTD and microplastics	- **Hydrodynamic model:** Delft3D-FLOW, MOHID - **Wave model:** Delft3D-WAVE, SWAN - **Biogeochemical model:** Delft3D-WAQ, MOHID - **Oil spill model:** MEDSLIK-II - **Mussel farm model** - **Ecosystem model:** ECOPATH - **Jellyfish model:** Delft3D-PART, OpenDrift	- CMEMS - GEOSS - EMODnet - NOAA - ECMWF - GOOS - MonGOOS - SeaDataNet - UNEP-WCMC	- Twitter - Marine LitterWatch App - Pangaea	- Algorithm for Eutrophication Index in sea water - Algorithm for TRophic IndeX in sea water - Algorithm for UNscaled TRophic IndeX in sea water - Algorithm for Efficiency Coefficient in sea water - Algorithm for wave power
ESSENTIAL OCEAN VARIABLES (EOVs)	**Physics:** - Sea state - Sea surface height - Sea surface temperature - Subsurface temperature - Surface currents - Subsurface currents - Sea surface salinity - Subsurface salinity - Ocean surface heat flux **Biogeochemistry:** - Oxygen **Biology and Ecosystems:** - Phytoplankton biomass and diversity - Fish abundance and distribution - Marine turtles, birds, mammals abundance and distribution **Cross-disciplinary:** - Ocean colour - Ocean sound	**Physics:** - Sea state - Ocean surface stress - Sea surface height - Sea surface temperature - Subsurface temperature - Surface currents - Subsurface currents - Sea surface salinity - Subsurface salinity - Ocean surface heat flux **Biogeochemistry:** - Oxygen - Nutrients - Inorganic carbon - Dissolved organic carbon **Biology and Ecosystems:** - Phytoplankton biomass and diversity - Fish abundance and distribution	**Physics:** - Sea state - Ocean surface stress - Sea surface height - Sea surface temperature - Subsurface temperature - Surface currents - Subsurface currents - Sea surface salinity - Subsurface salinity - Ocean surface heat flux **Biogeochemistry:** - Oxygen - Nutrients **Biology and Ecosystems:** - Phytoplankton biomass and diversity **Cross-disciplinary:** - Ocean colour	**EOVs:** None **Non-EOVs:** - Jellyfish, invasive species - Pollution sources	**Physics:** - Sea state **Biogeochemistry:** - Oxygen - Nutrients **Biology and Ecosystems:** - Phytoplankton biomass and diversity



Tailored marine and coastal information services

ODYSSEA

Sensing Tools

- Remote Sensing
- In-situ Sensing
- Social Sensing

Data Manipulation, Forecasting and Events Extraction Tools

- Simulations
- Machine Learning
- Data Cubes
- Statistic & Probibilistic
- Image Processing
- Rule-based Modelling

Information, Forecasts and Event Attributes

- Location
- Time
- Alarm Type
- Information Attributes

Applications

- Ecosystems
- Oil & Gas
- Marine Renewables
- Image Processing
- Shipping & Ports
- Aquaculture

Tailored to user sectors and needs

ODYSSEA

Profile

Profile Information | Update Password

Select country:

Netherlands

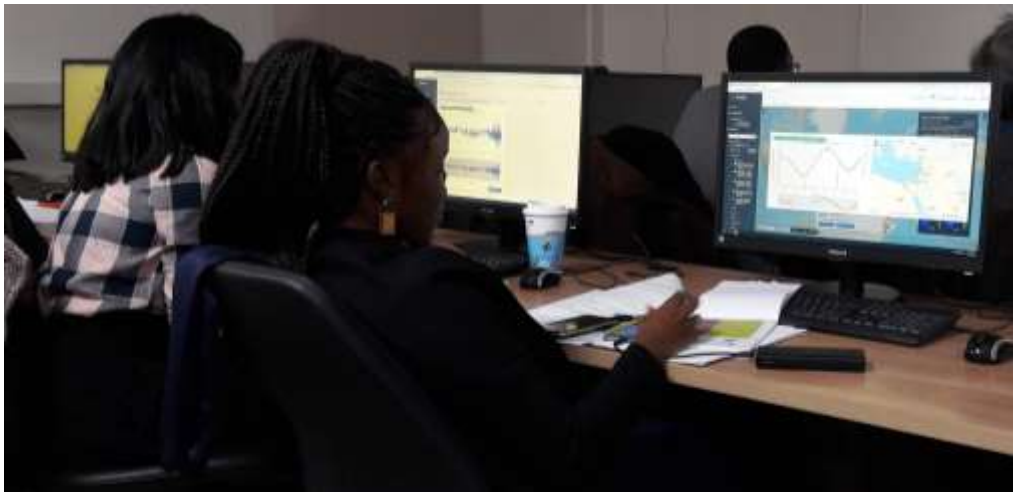
region

Select sector:

- [ ] Maritime transport
- [ ] Ship building
- [ ] Food & nutrition
- [x] Ecosystem services
- [x] Aquaculture
- [ ] Energy
- [ ] Raw materials
- [ ] Oil & gas
- [ ] Recreational
- [ ] Resident
- [ ] Small and medium-sized enterprises (SMEs)
- [x] Coastal zone management
- [ ] Policy
- [ ] Coastal protection
- [ ] Sustainable exploitation
- [ ] Education
- [ ] Research
- [x] Ocean modelling and forecasting
- [ ] Marine data management

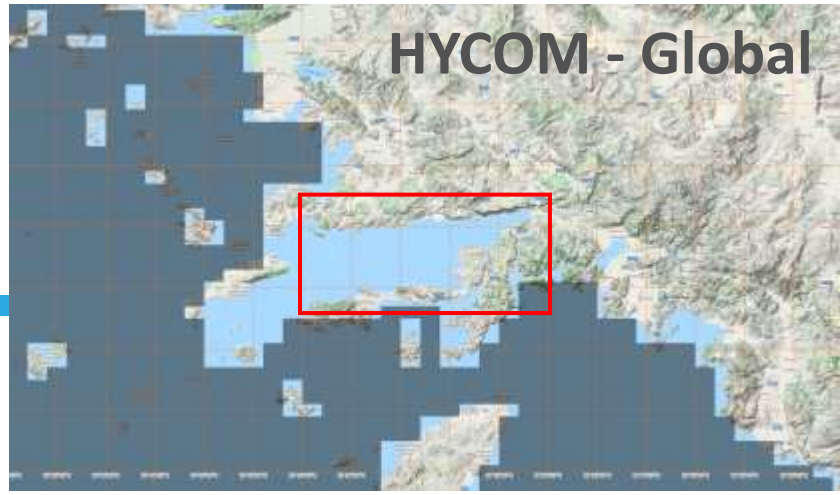
sector

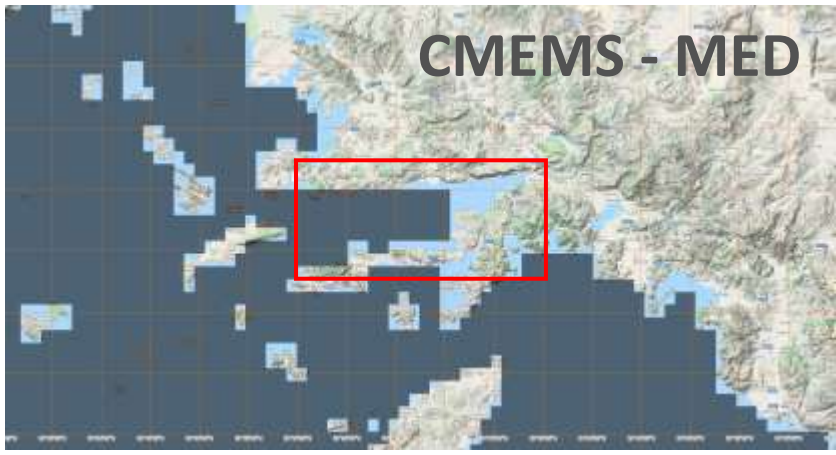
Save



Tailored marine and coastal information services

“Filling in coastal gaps at environmentally / economically important areas”





User Perspective – Service portfolio

Application/theme

Information attributes

Jellyfish Swarm Forecast

Marinomica services include early warnings of jellyfish blooms and potential stranding locations. Historical data, real-time and forecasting data are presented in maps for each pixel point of coastline, near- and offshore areas.

Ocean Energy Potential

Wind and wave energy potential mapping and forecasts; forces exerted on piles and platforms; extreme events analysis; potential for H2 production from H2S.

Maritime Safety

Vessel routes optimisation; dispersion of both accidental and non-accidental oil spill releases; dispersion of accidental litter release. Definition of areas in which ballast water exchange and/or open loop scrubber effluent discharge is allowed and defining "same location" as defined by the BWMC.

Aquaculture & Algae

Analysis on probability of occurrence of storm events, extreme waves and surges; Recommendations on cage siting, configuration and anchoring. Analysis on probability of occurrence of eutrophication incidents; early-warnings on algal blooms and toxic blooms.

Fisheries Exploitation

Marine safety and security of fishers; dynamic estimation of the probability of occurrence of certain species; stock assessments and management recommendations; probability of occurrence of invasive species.

Ports

High resolution weather and waves forecasts; incident wave energy on coastal structures; Port basin pollutants' renewal/residence time; environmental conditions inside port; dispersion accidental oil spillage.

Plastic Pollution Monitoring

Potential to identify sources of rubbish and locate and map polluted stretches of the sea and coastline. Will provide permanent and real-time access to information and date from noval plastic monitoring sensors and (in the future) reported sightings and incidents.

Leisure & Tourism

Historic and forecast shoreline erosion/deposition changes; Coastal Vulnerability Indices; metocean conditions monitoring and forecasting for safe leisure activities; potential jellyfish outbreak forecasts and tracking.

Service portfolio – cont.

Ballast water monitoring

Understand & forecast ocean behaviour & climate change, sea level rise and extreme values in coastal environments.

Marine Cultural Heritage

Mapping and classifying sensitive marine cultural heritage; analyses and assessment of the impact of major stressors (natural and anthropogenic pressures) on underwater archaeological sites; recommendations of protective measures; dissemination of maritime heritage information at regional, national and EU scale; high resolution weather/waves forecast during surveys.

Oil Spills

Can provide historical, real-time and forecast data for each pixel point of coastline, near and offshore areas tracking dispersal of accidental oil spills. Can send early warning signals to fishers, aquaculture, local and port authorities to minimise impact.

Land and river based services

Inland surface water mapping and periodicity; phenological cycle estimation; land cover/use changes; effluents' changes to sea. Recommending optimal siting for fish and mussel cultures; fish and mussel growth forecast; mean fish and mussel length and dry weight per species; expected fish and mussel production; ingestion and excretion rates and more.

Metocean hind-, now-, and forecast

Provides historical, real-time and forecast Metocean conditions including wind sped/direction, wave speed, height and direction, storm surges. Important for planning, development and protection of infrastructure and businesses. Potential alerts of threat to human life.

Coastal Erosion

Identifies coastal erosion 'hotspots' in specific areas along the shoreline and obtain forecasts about potential coastal retreat and loss of land. Results are presented in maps. Historical data, real-time and forecasting data for each pixel point of coastline, near- and offshore areas.

Sighting and Alert Services

Marinomica Mobile Application - delivers early warnings to users according to their location and settings (e.g. storm surge, jellyfish bloom). The amp enables users to report sightings e.g. plastic pollution. Reported sightings are displayed on maps.

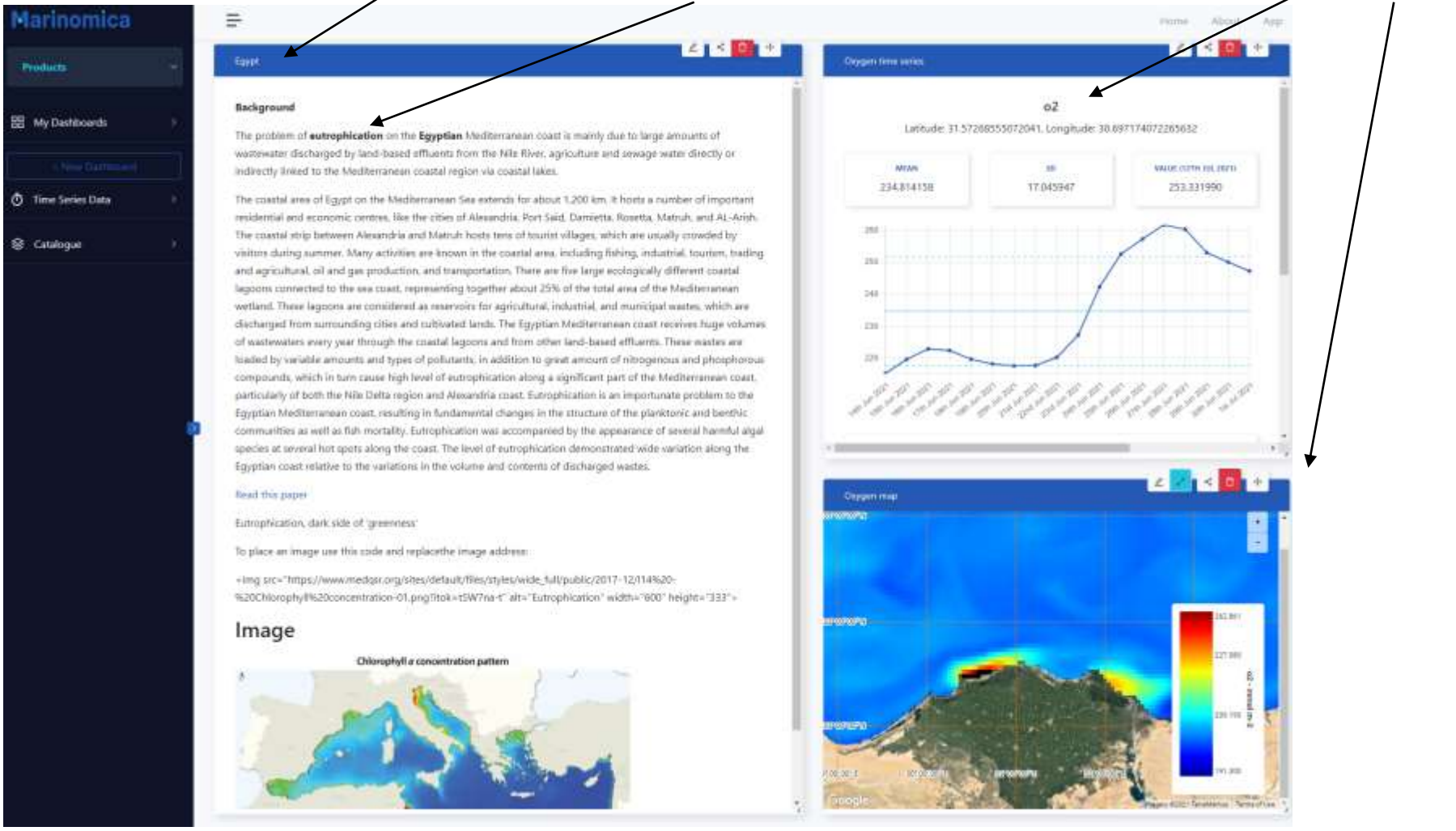
Dedicated dashboards

ODYSSEA

geographic area

topic of interest

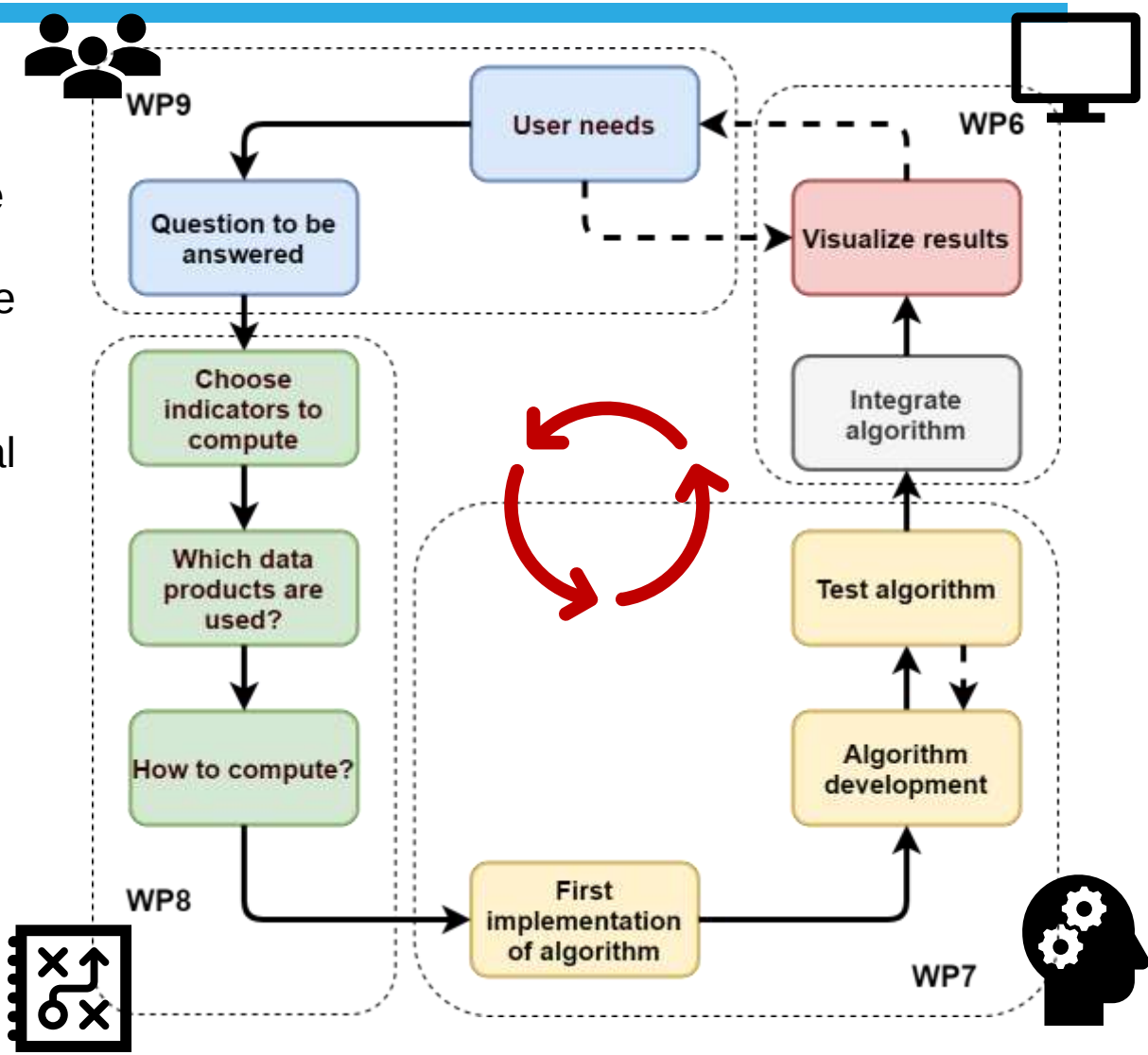
indicators



Services Development Cycle

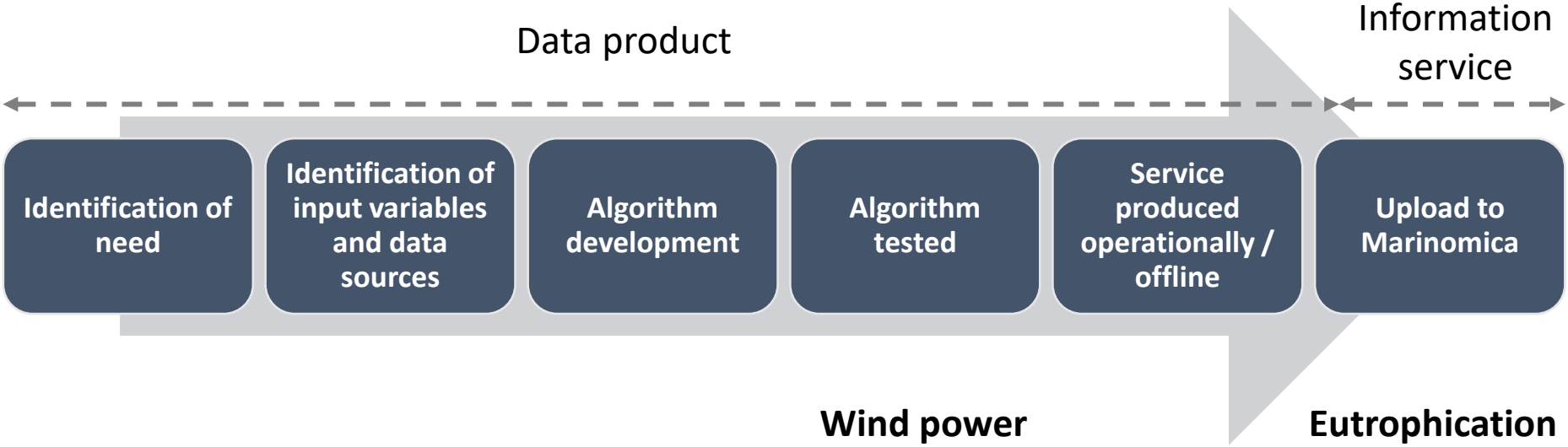
ODYSSEA

- **Product owners steer the development**
- **Users are involved to define and update requirements**
  - Type of visualization (time series, maps, text messages, etc.)
  - Expected spatial/temporal resolution
  - Time window (historical, real-time, forecast)
  - Etc.



(Priority) Services Status

ODYSSEA



Wind power

Jellyfish

Eutrophication

Wave power

Coastal erosion (only in app)

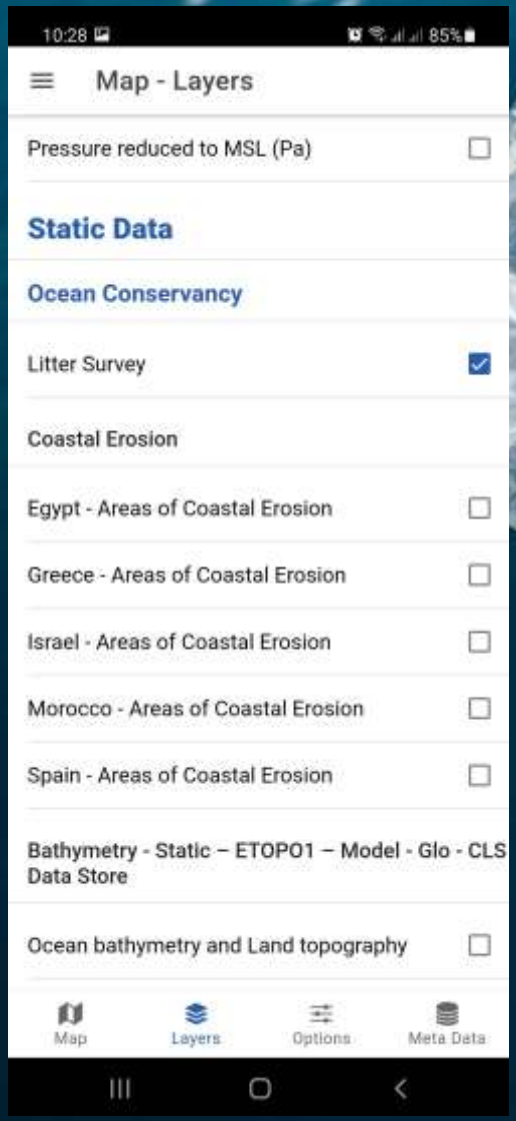
Marine litter (citizen science, only in app)

- ✓ Service development management structure is in place
- ✓ Priority services were developed or end of the pipeline
- ✓ User requirements guided the development and improvements

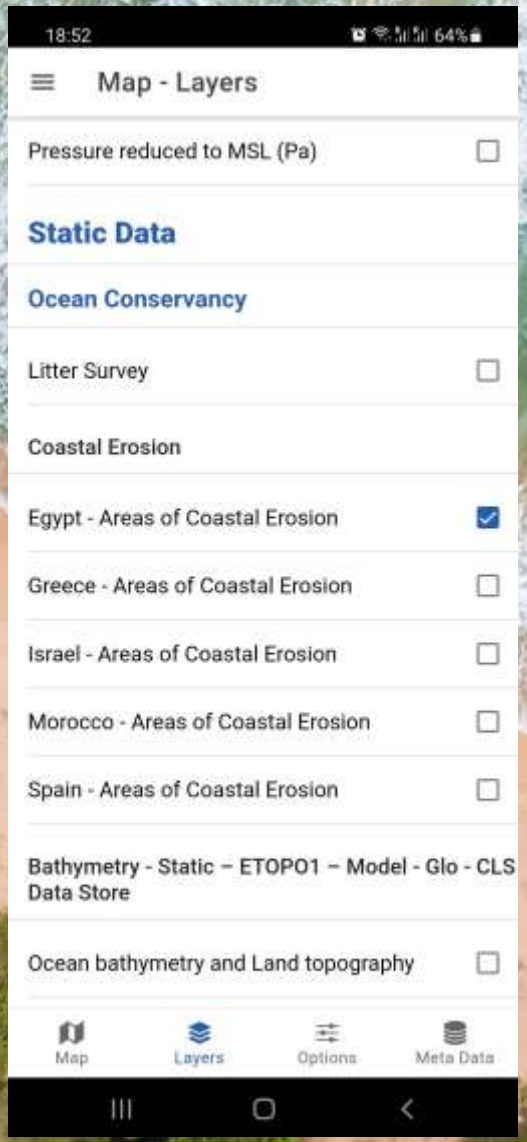
ODYSSEA

Examples of Services

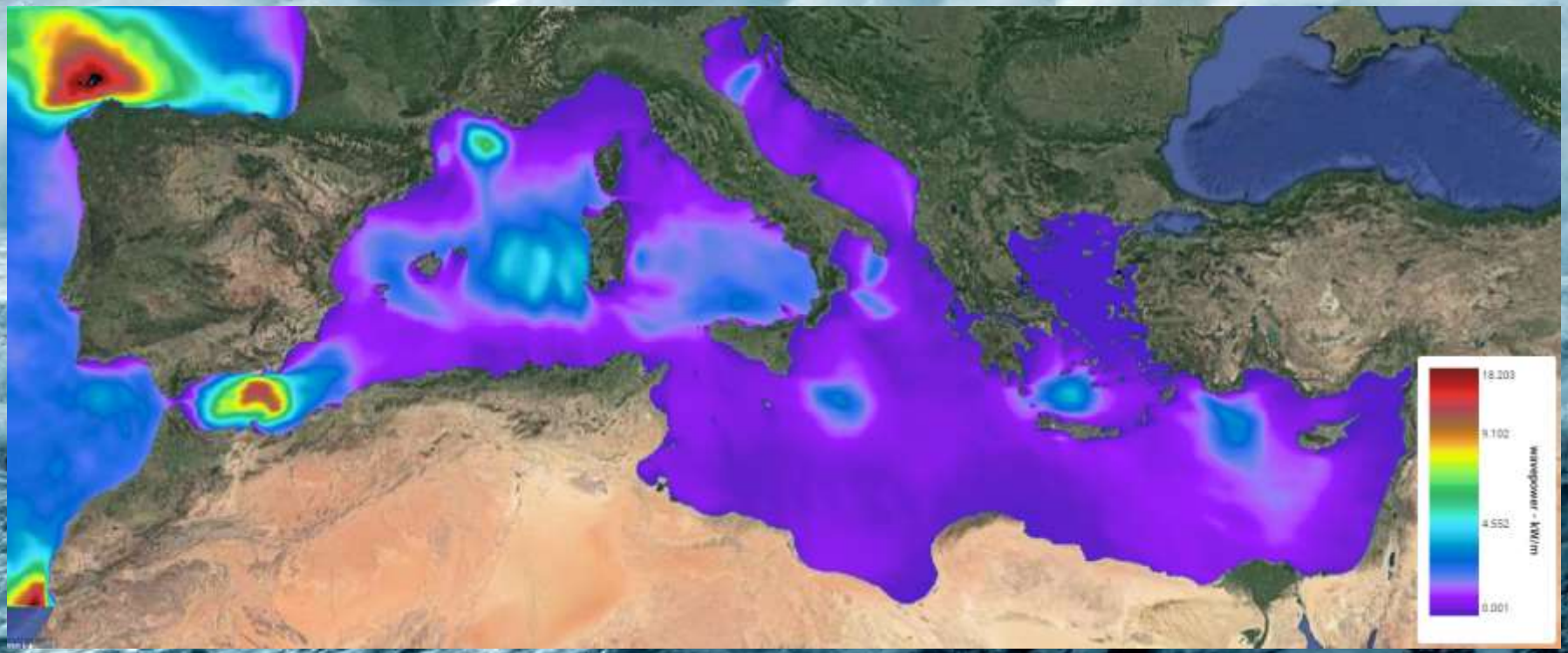
Marine Litter [Citizen Science]



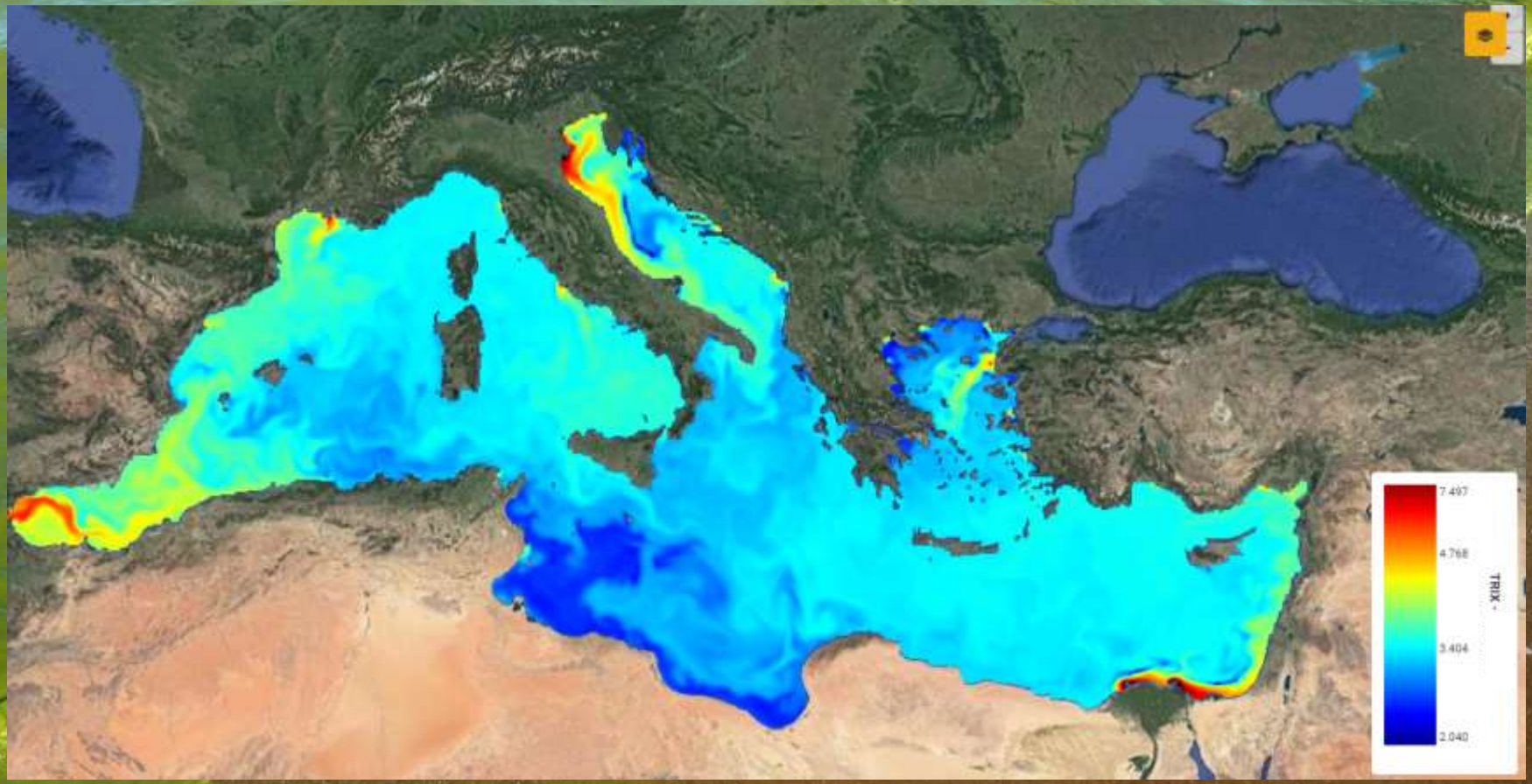
Coastal Erosion [Algorithm]



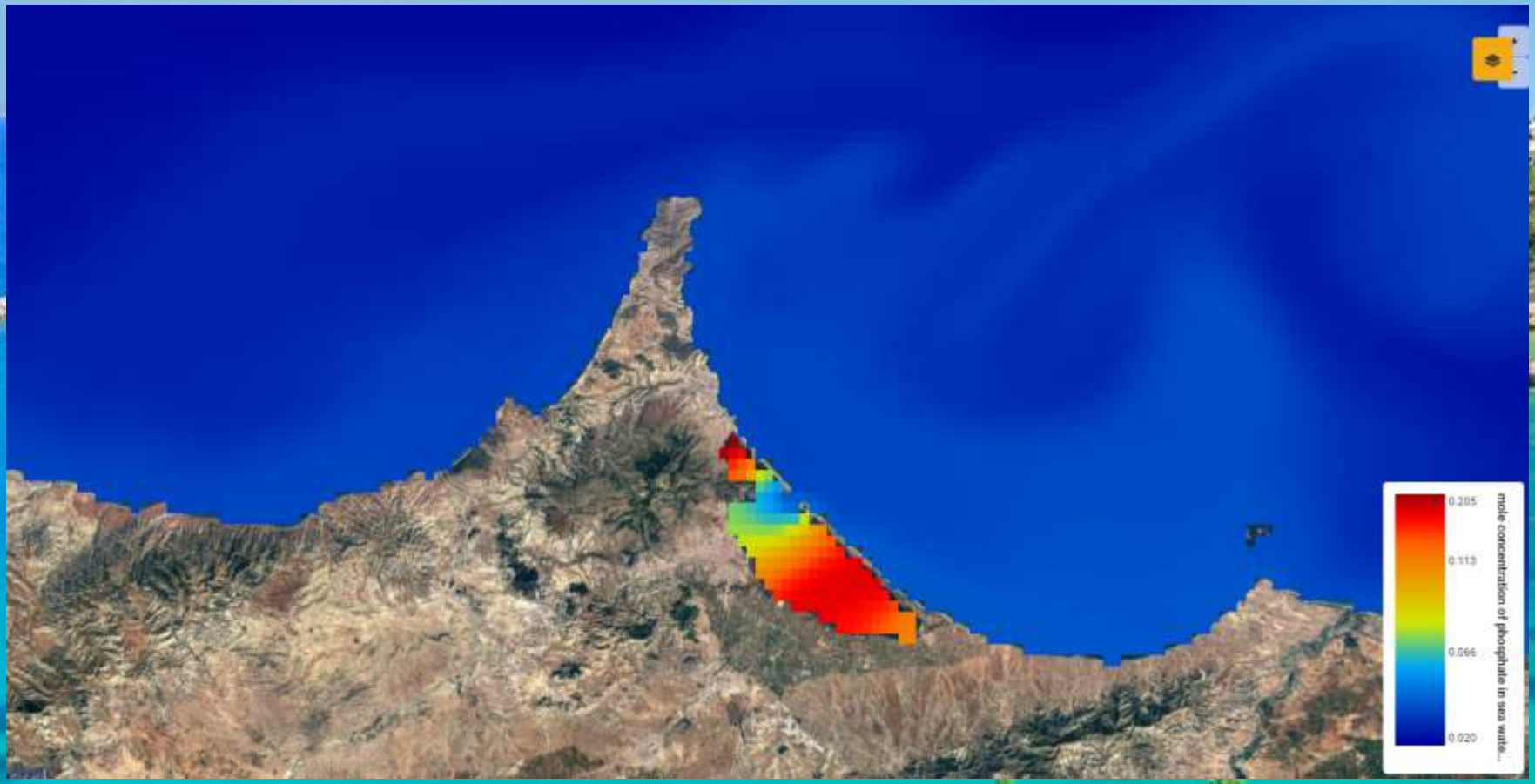
Wave power [Algorithm]



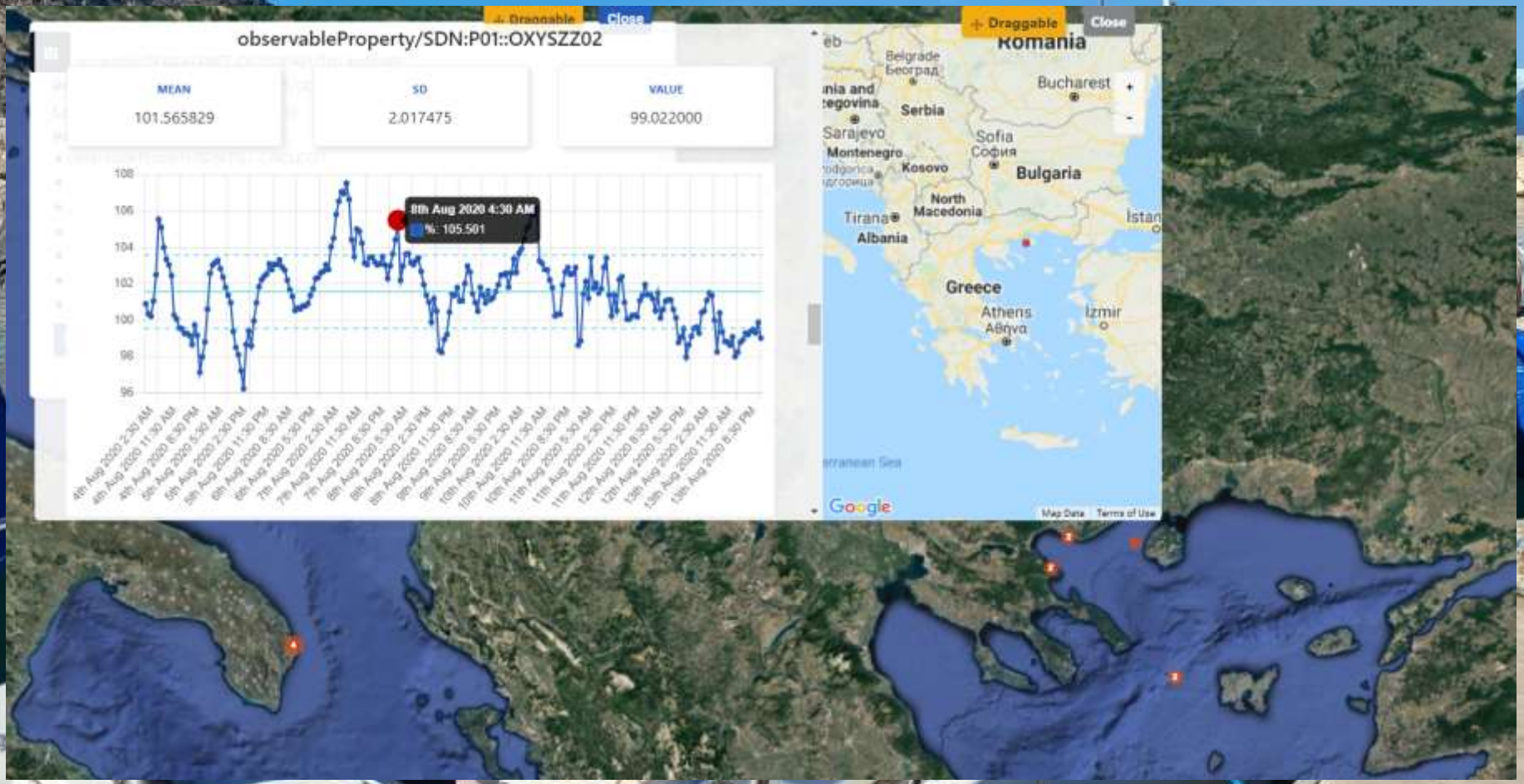
Trophic index [Algorithm]



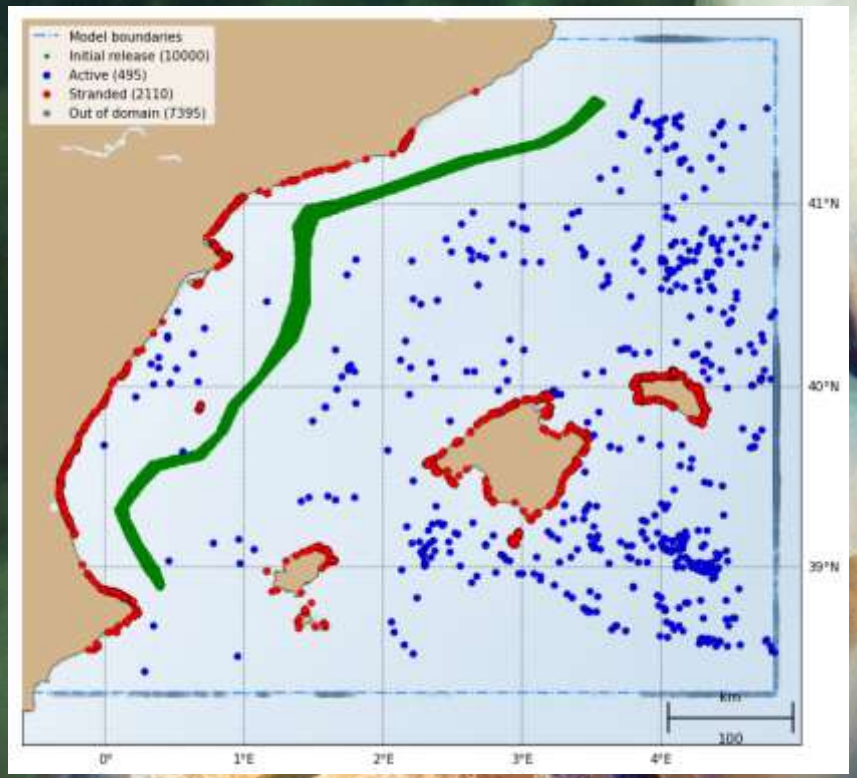
Nutrient conc. [Coastal model]

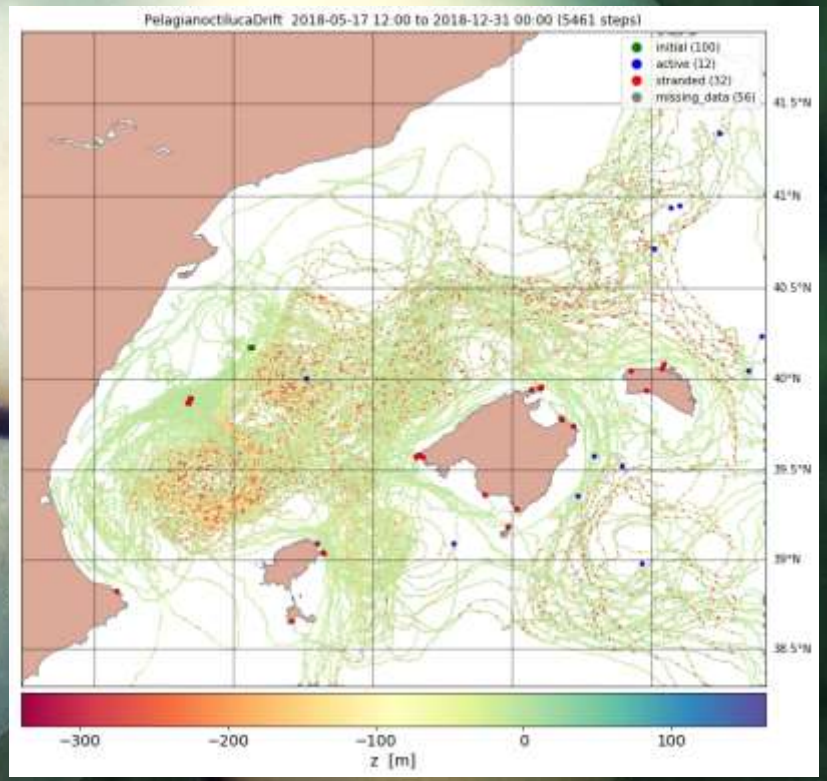


Oxygen level [ODYSSEA Lander]



Jellyfish occurrence [ODYSSEA model]





Interactive feedback session

ODYSSEA