

AN OVERVIEW OF ODYSSEA PROJECT

**“ATELIER DE VALIDATION DE LA PLATEFORME DE DONNEES PAR LES UTILISATEURS ET DE
FORMATION A L'OCEANOGRAPHIE OPERATIONNELLE”**

Mercredi-Jeudi, 2-3 June 2021

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What is ODYSSEA



ODYSSEA is a Mediterranean-focused research project funded by EU Research and Innovation Program Horizon 2020

- 28 partners from 14 countries (6 non-EU)
- 8.398 Meuros budget
- 54 months duration
- Starting date 1st June 2017
- Ending date 30th November 2021
- 932 PMs in total
- 118 researchers involved
- 7 Advisory Board Members

Horizon 2020



Horizon 2020 is the biggest EU Research and Innovation program ever with nearly €80 billion of funding available over 7 years (2014 to 2020) – in addition to the private investment that this money will attract.

Achievements: scientific breakthroughs, discoveries and world-firsts by taking great ideas **from the lab to the market.**

The EU Blue Growth Strategy ODYSSEA

- Long term strategy to support sustainable growth in the **MARINE** and **MARITIME** sectors as a whole.
- Leads to achieving the Europe 2020 Strategy for Smart, Inclusive and Sustainable Growth.
- Recognizes that seas and oceans have great potential for innovation and growth.
- Considers the blue economy as a driver for Europe's welfare and prosperity.
- **KEY ISSUES: Jobs and Sustainability**

Marine Open Data

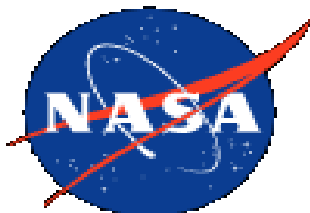


ODYSSEA



EMODnet

European Marine
Observation and
Data Network



EGO



OneGeology



British Oceanographic
Data Centre

NATURAL ENVIRONMENT RESEARCH COUNCIL



EUROPEAN RESEARCH INFRASTRUCTURE CONSORTIUM



EUROPEAN COMMISSION



FIXED-POINT
OPEN OCEAN
OBSERVATORIES



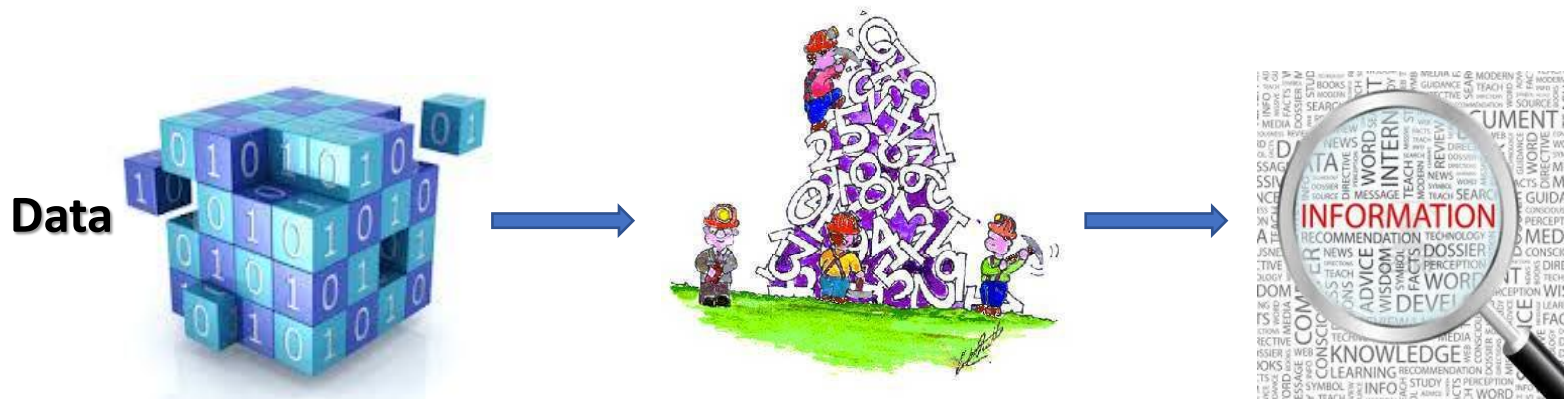
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SeaDataNet



Data to Information

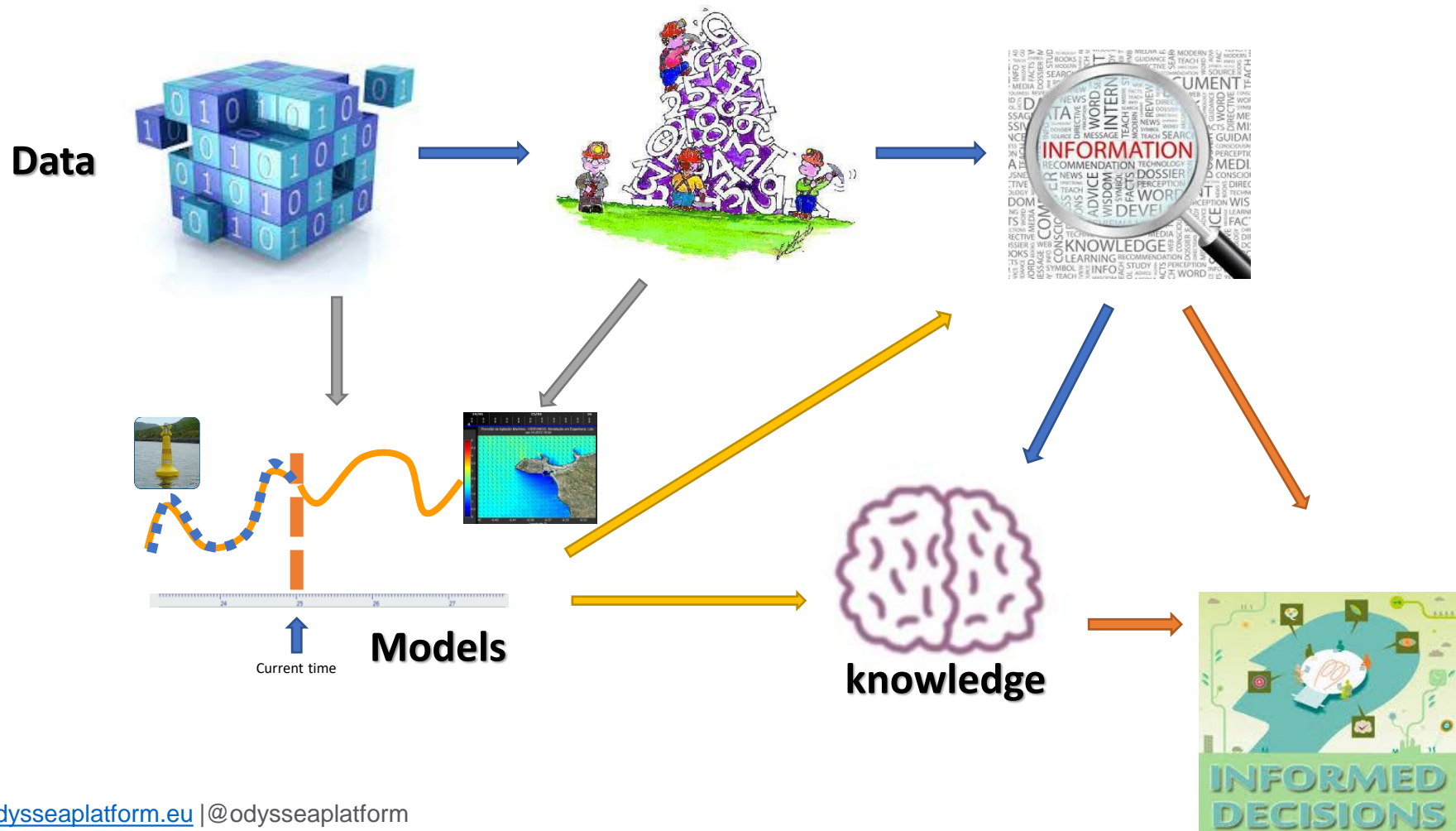


Water Temperature is 28°C

If Water Temperature is higher than 26°C for more than 5 days then 'HEAT STRESS'

High probability of fish mortality

Data to Information



Mediterranean Challenges

Vulnerable ecosystems
Overexploitation
Pollution
Climate change
Extreme events
Limited coastal protection



ODYSSEA Central Objective



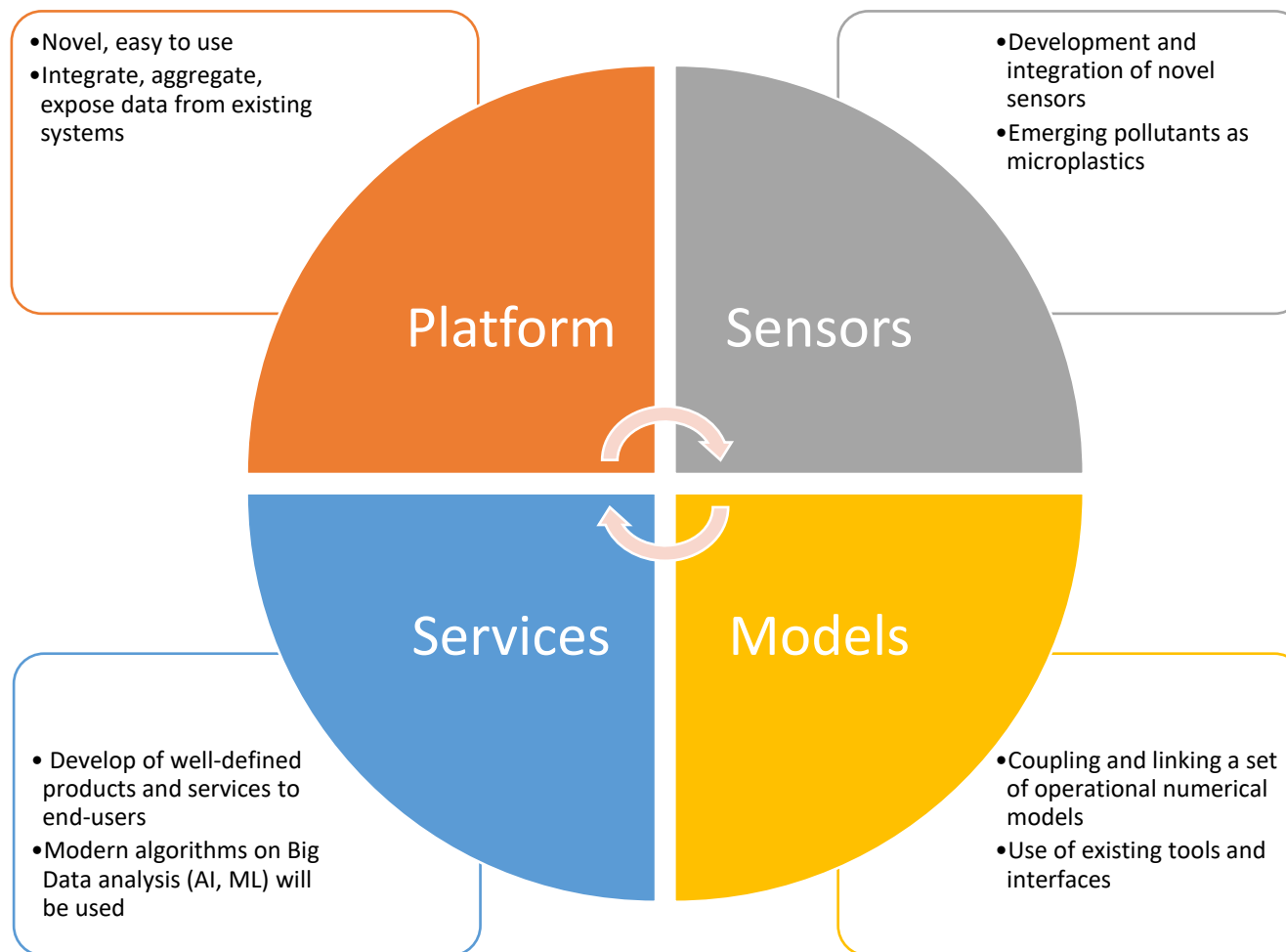
ODYSSEA is a user-centred project aiming to make Mediterranean marine data easily accessible and operational to multiple end-users, by

- harmonizing existing Earth Observing systems,
- upgrading operational oceanographic capacities,
- supporting EU policy implementation,
- improving interoperability in monitoring,
- fostering blue growth jobs creation, and
- opening participation to non-EU member states.

ODYSSEA Pillars



ODYSSEA



Specific Objectives



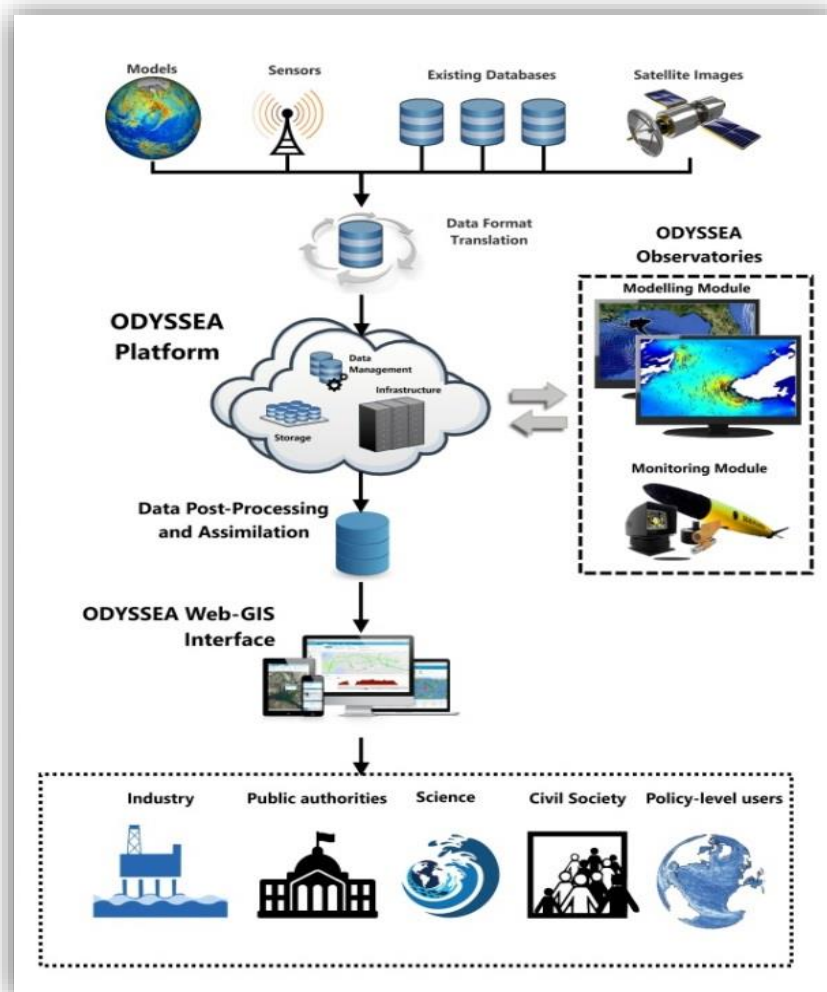
1. Develop a platform to discover, integrate and process datasets obtained from an expanded range of existing observation platforms
2. Fill-in data gaps & increase spatial and temporal resolution by establishing ODYSSEA Observatories
3. Develop a prototype 'chain' of models providing data never previously reported
4. Expand existing operational monitoring systems capacity
5. Emphasize on biological datasets
6. Combine data to extract secondary indicators
7. Link indicators to EU policies
8. Involve end-users on platform design, data collection and day-to-day operations
9. Train and educate policy-makers and end-users on platform usage
10. Improve professional skills and competences - focus on Northern Africa capacity building

ODYSSEA as a platform



ODYSSEA is a system bridging the gap between operational oceanography capacities and the need for information on marine conditions from the community of end-users.

ODYSSEA's ambition is to develop an **interoperable, fully-integrated and cost-effective multiplatform network of observing and forecasting systems** across the Mediterranean basin, addressing both the open sea and the coastal zone.



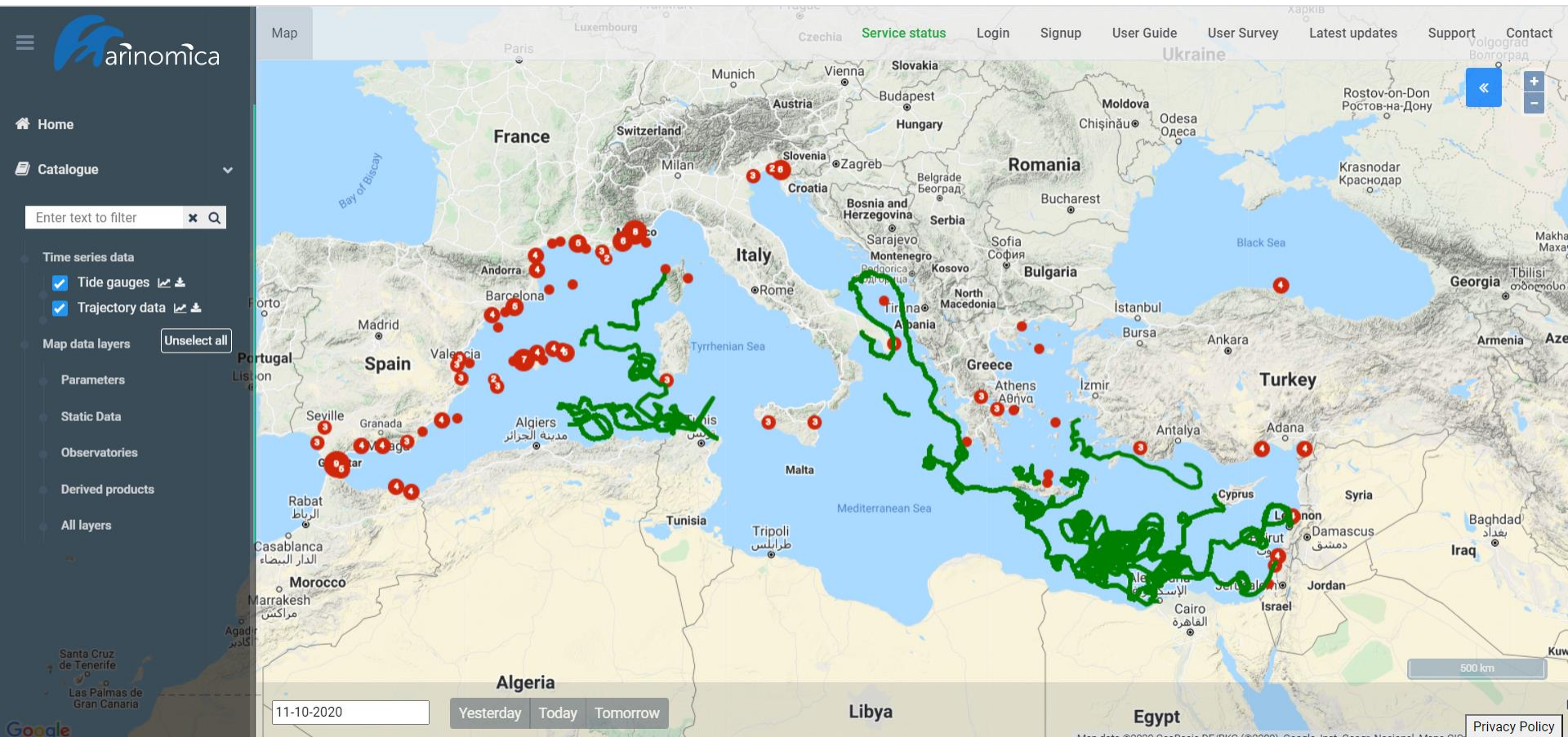
The Marinomica platform



Marinomics could be a new interdisciplinary scientific topic involving the provision of digital marine data services from sensors development, models implementation, integrative platforms, Big Data collection and processing, product development, cost analysis, marketing, testing user satisfaction, etc.

Therefore, **Marinomics is a multidisciplinary scientific topic adopting the novel approaches of Earth Big Data to provide Services within the concept of Blue Economy and Growth.** Marinomics aims to improve decision-making and operations in the multitude of users operating at sea, protect the marine environment and support marine and maritime sustainable development.

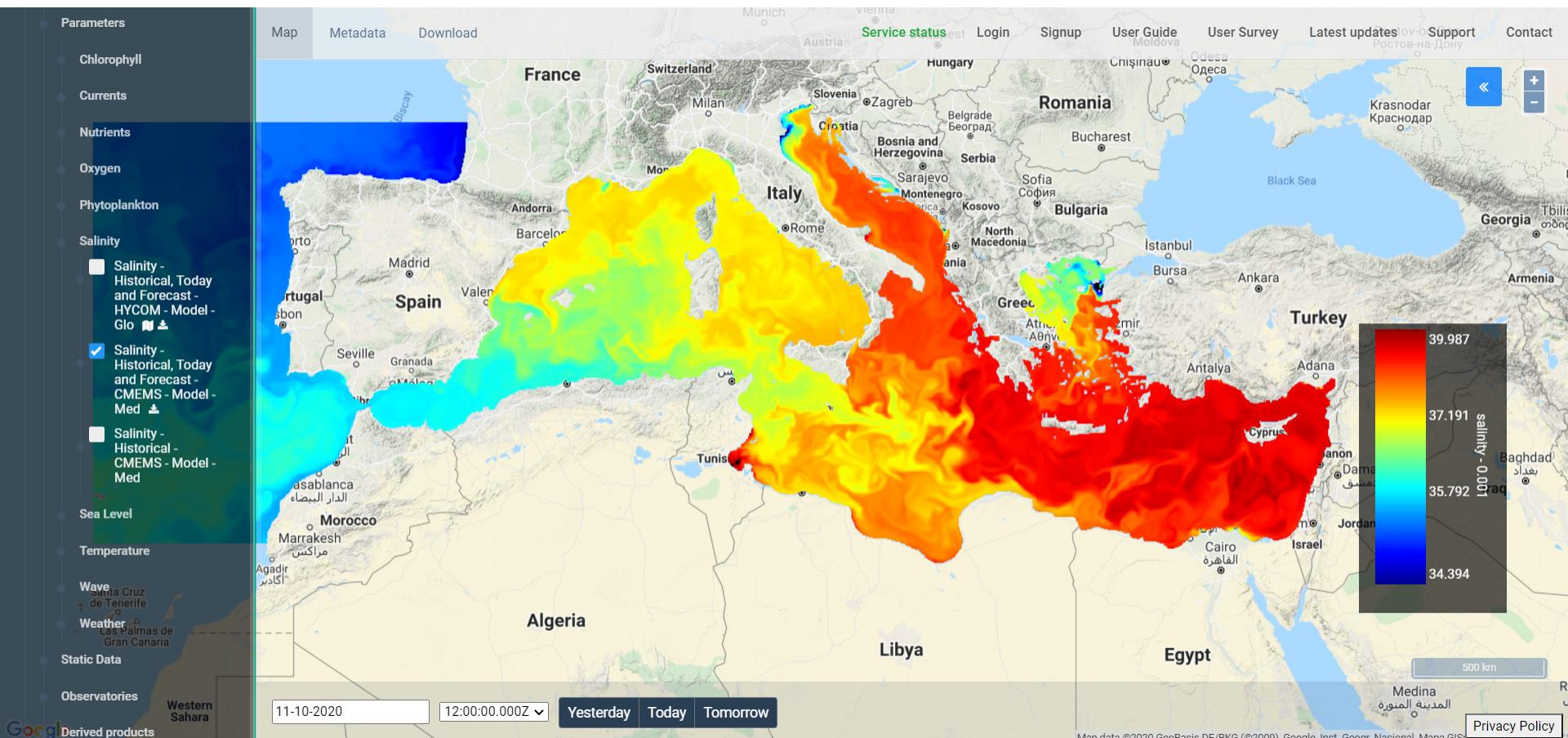
The Marinomica platform



The Marinomica platform



Surface Salinity



9 ODYSSEA Observatories



Establish ODYSSEA Observatories to fill-in data gaps & increase spatial and temporal resolution

- A. North Aegean/Thracian Sea (Greece/Turkey),
- B. Gulf of Gökova (Turkey),
- C. Valencia's regional coastline (Spain),
- D. Northern Adriatic Sea basin,
- E. Arzew Bay/Stora Gulf (Algeria)
- F. Gulf of Gabes **and Monastir-Kuriat Islands** (Tunisia),
- G. MPA National Park Al-Hoceima (Morocco),
- H. Israel's coastline and
- I. Nile River of Freshwater Influence (Egypt).

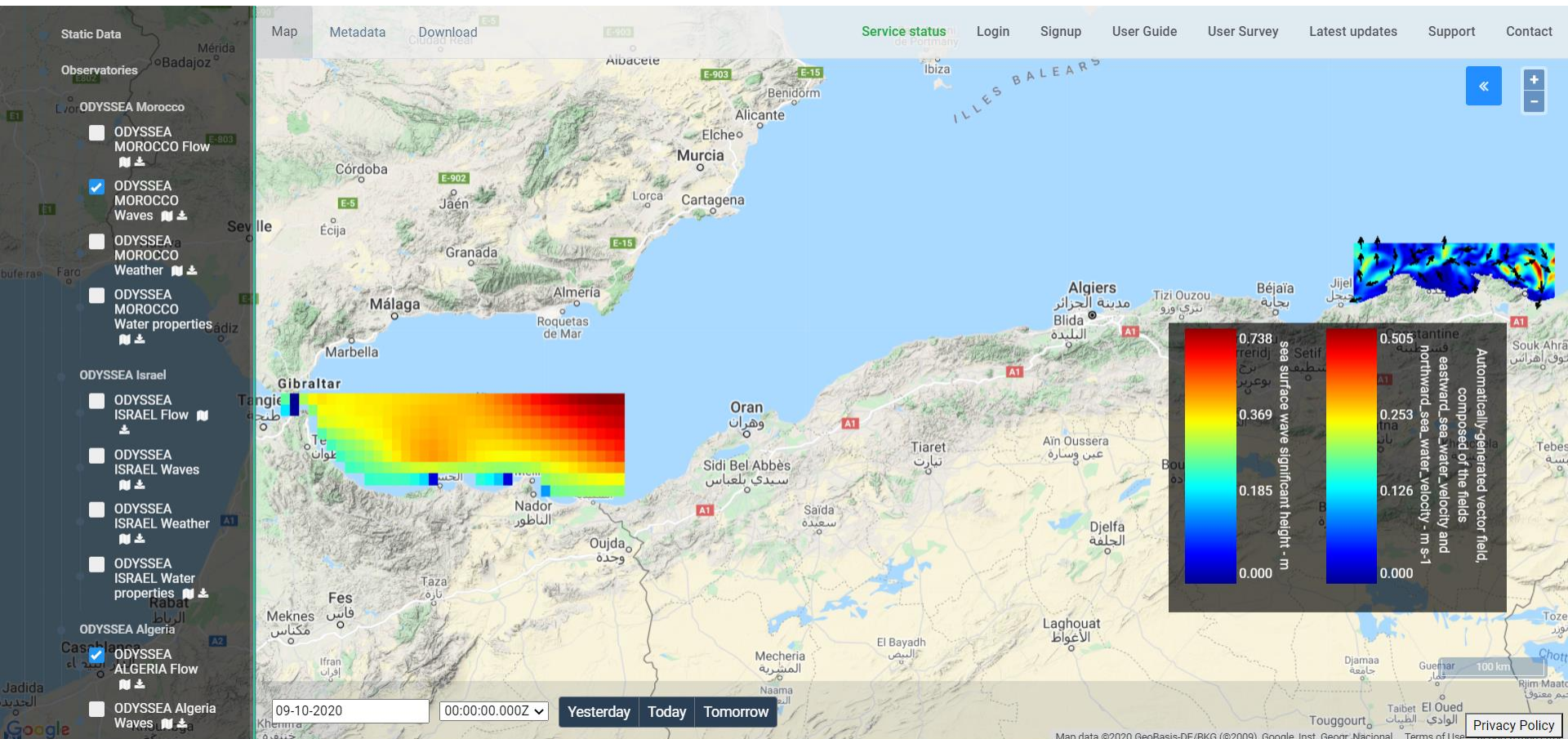
What is an ODYSSEA Observatory ?



They are pilot facilities referring to an **ODYSSEA local partner** with the aim to:

- Identify, contact and inform potential users and stakeholders needing marine data;
- Promote and train scientists and users on Marinomica Platform
- Customize the dashboard of Marinomica Platform according to users' needs
- Have trained staff to operate numerical models for local forecasts on sea conditions
- Have trained staff to operate and maintain at least a sensor at sea located at the facility of an end-user
- Have special interest to 'sell' services and products to marine and maritime users through Marinomica platform

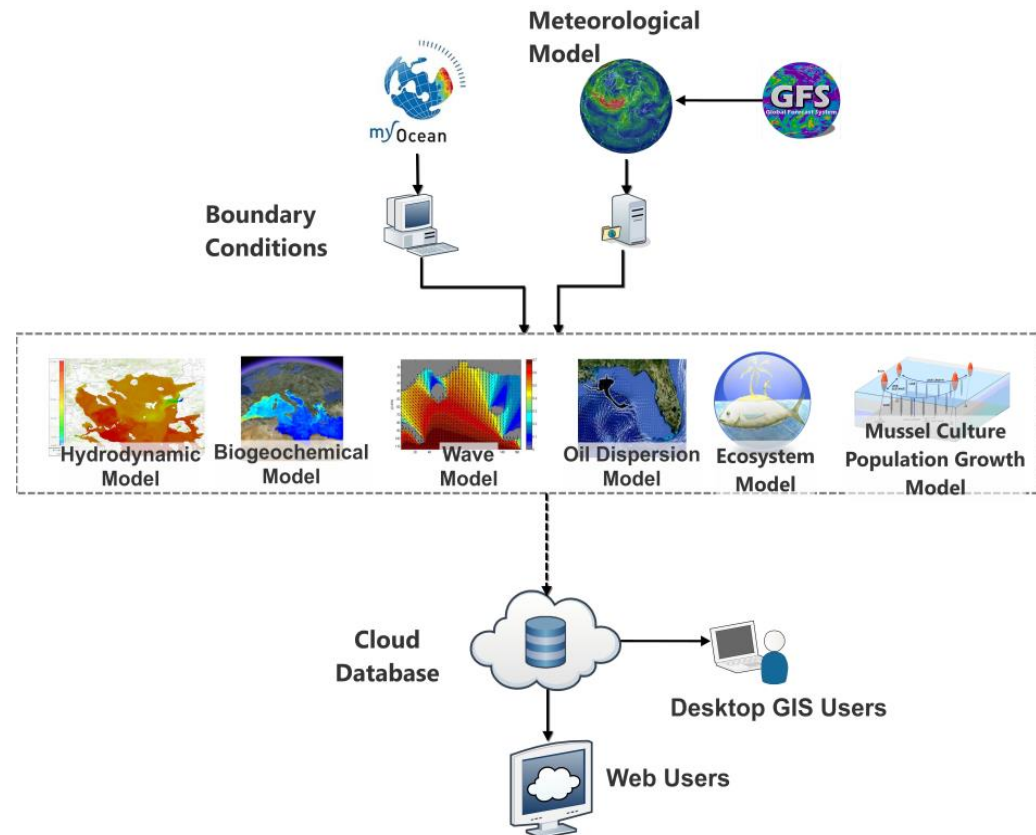
Marinomica Platform and ODYSSEA Observatories



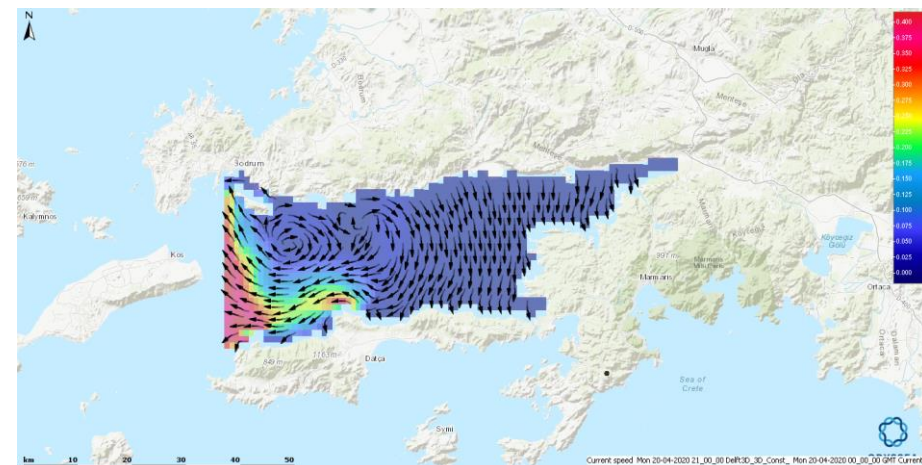
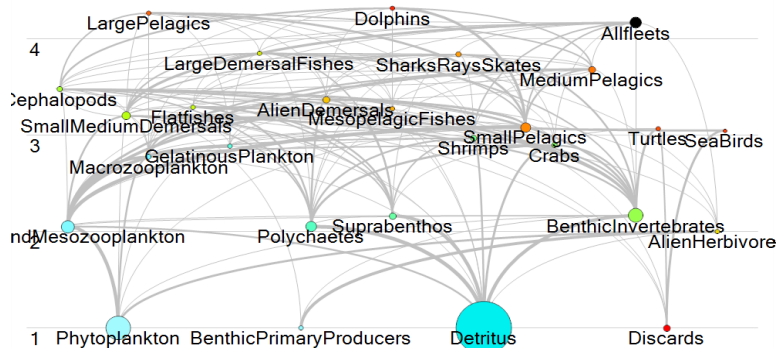
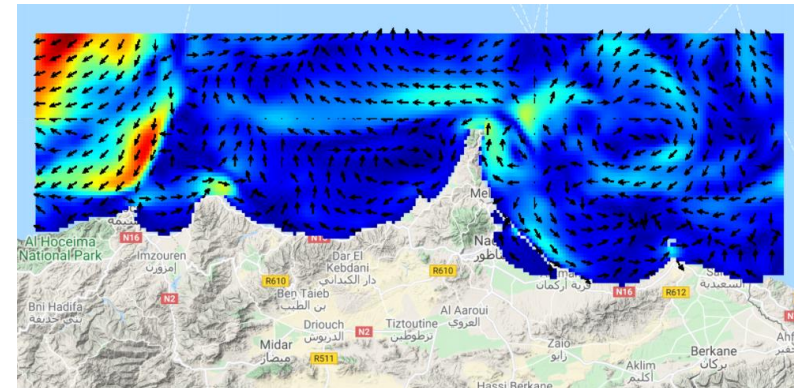
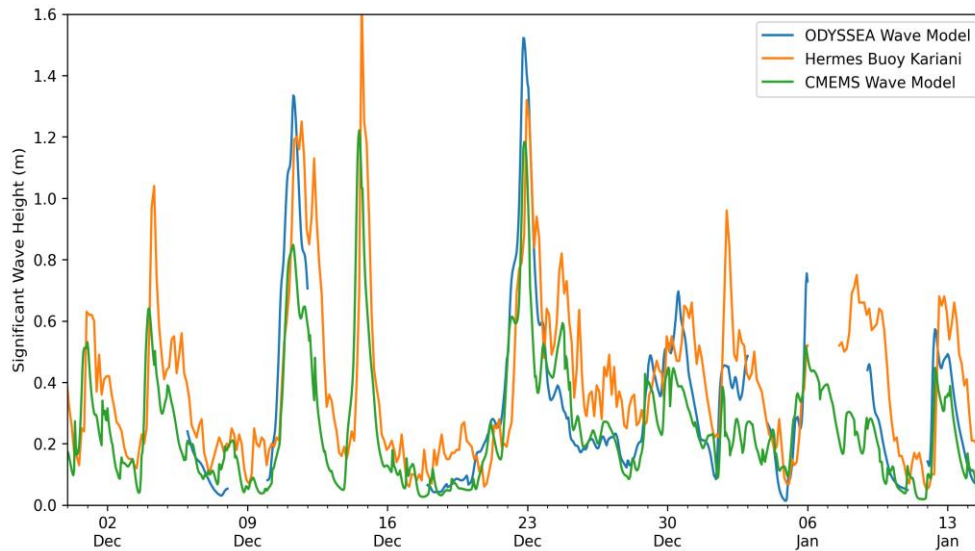
The Models

- ✓ A prototype 'chain' of operational models will be developed,
- ✓ Link models to existing databases,
- ✓ Provide short- and long-term prognostic results,
- ✓ Manage risks and emergencies in coastal and offshore areas,
- ✓ Meet the requirements of various end-user groups,
- ✓ Report on parameters never previously reported,

Models: 3D hydrodynamic (Delft3D), Wave (SWAN), Oil spill (MEDSLICK-II), Water quality (DELWAQ), Ecosystem models (Ecopath with Ecosim), Fish and Mussel/oyster culture population growth



The Models – Present Status

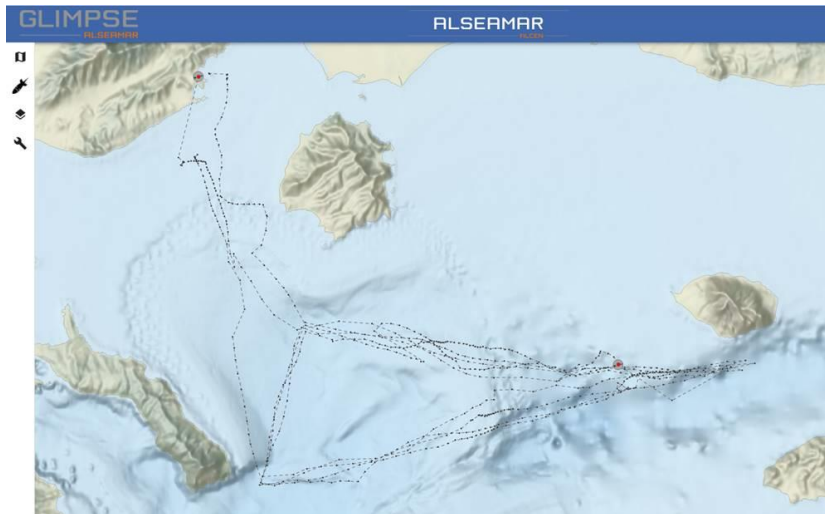


Mobile Monitoring Systems

- 2 SEAEXPLORER GLIDERS
- 3 sensor payloads:
 - ❖ Payload 1
 - ✓ Temperature, salinity, pH, dissolved oxygen, chlorophyll-a, turbidity, CDOM
 - ❖ Payload 2
 - ✓ Passive Acoustic Monitoring (PAM)
 - ❖ Payload 3
 - ✓ Temperature, salinity, microplastics



Mobile Monitoring Systems

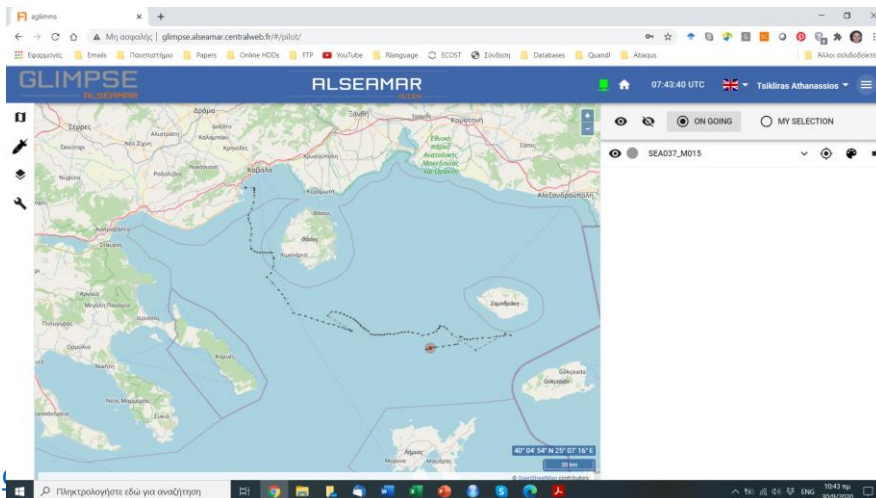


Status Gliders

Two CTD glider missions have been completed successfully in Thracian Sea

One PAM glider mission is currently in operation

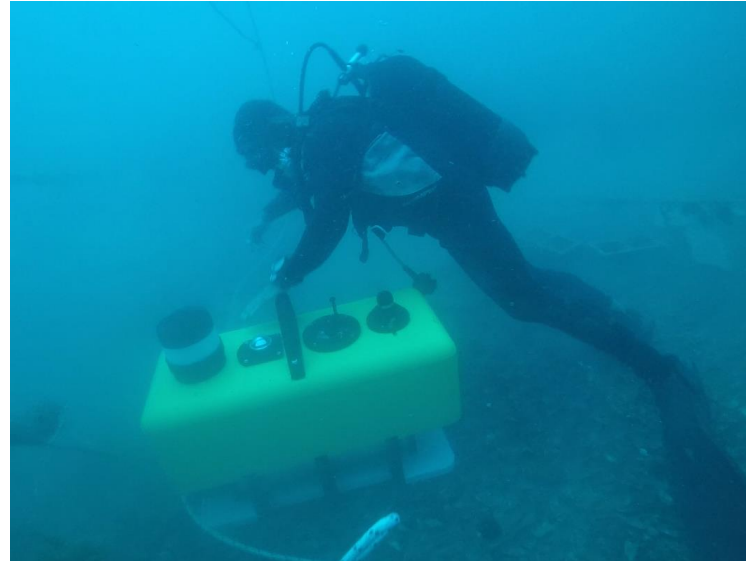
One CTD + MPS glider mission in Morocco is prepared



Fixed Monitoring Systems



DUTH deployed a surface system near a mussel farm in Olympiada



DUTH in collaboration with Energean Oil & Gas deployed a MSL Lander near an oil platform in N. Aegean Sea



ODYSSEA

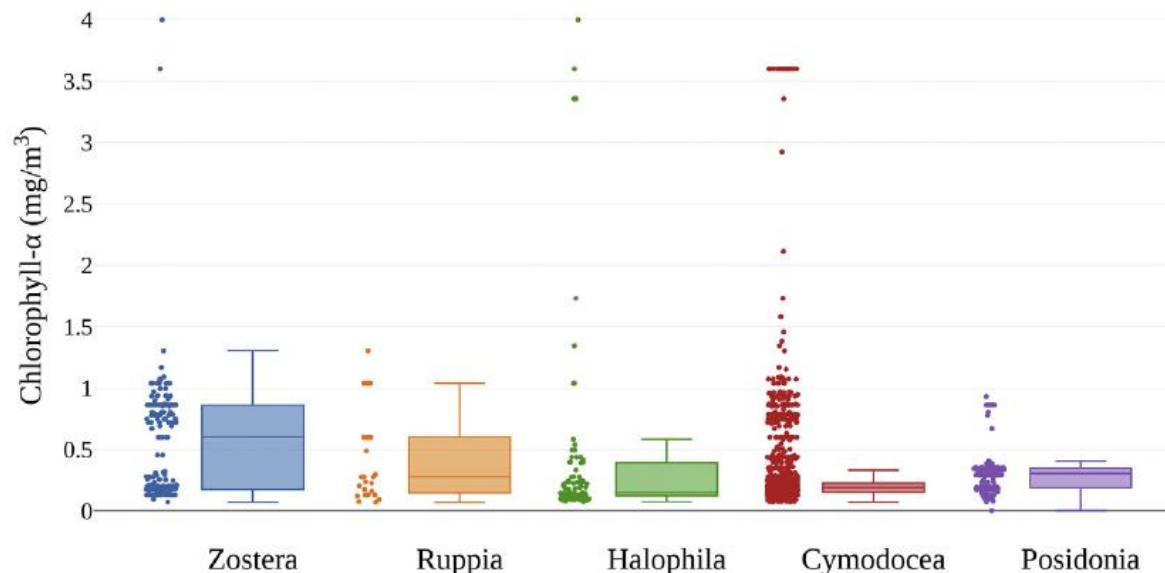


Fig. 9. Distribution of Chlorophyll- α -December values per seagrass family.

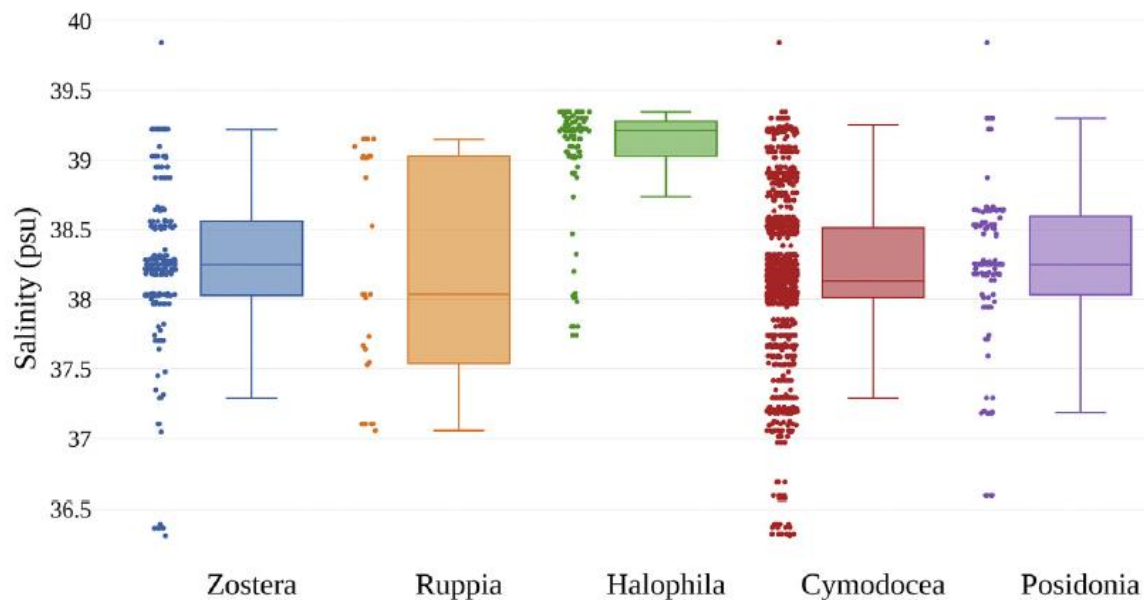


Fig. 10. Distribution of Salinity-December values per seagrass family.

We dealt with the problem of detecting seagrass presence/absence and distinguishing seagrass families in the Mediterranean via supervised learning methods. We merged datasets on seagrass presence and other external environmental variables, we develop suitable training data, enhanced by seagrass absence data algorithmically produced based on certain hypotheses

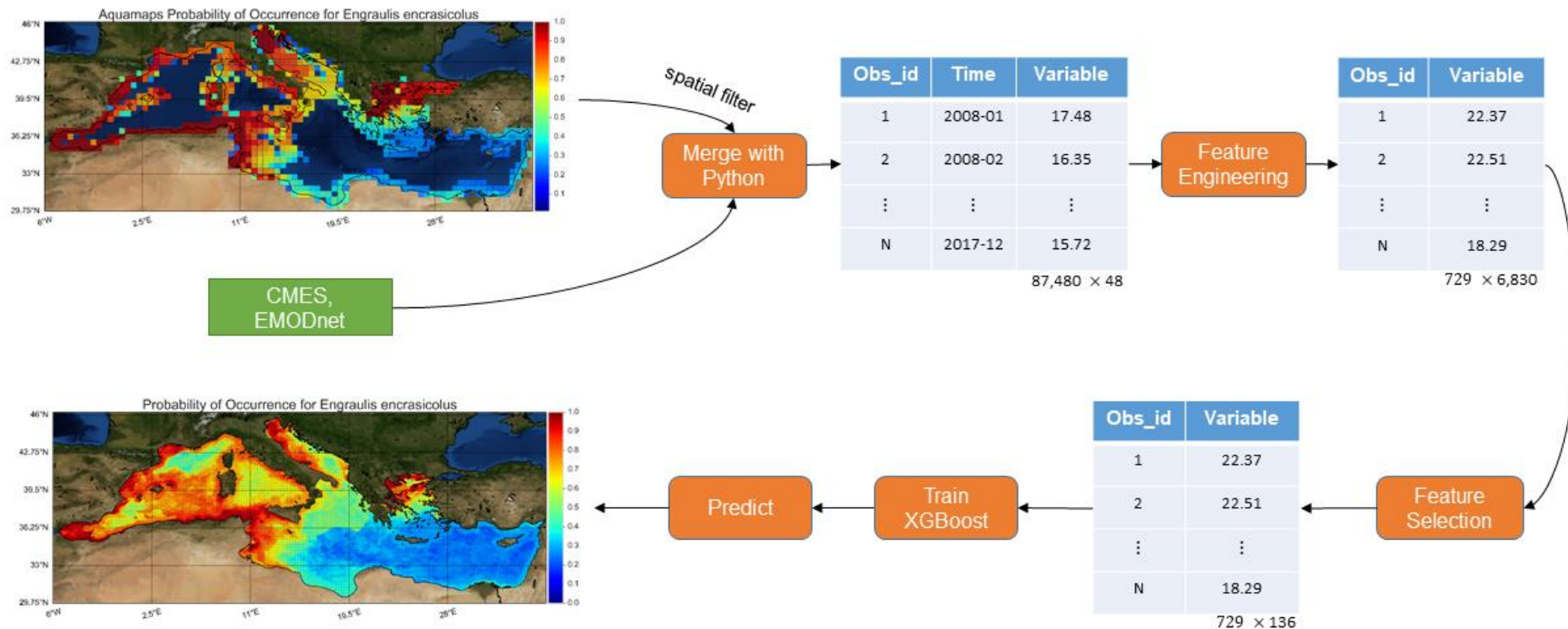
Informing Sustainable Fishery Exploitation

Observatory	Catch	Troph	FiB	EcoInd	Overall
1. North Aegean/Thracian Sea	Red	Orange	Red	-	Red
2. Gulf of Gökova	Orange	Green	Green	-	Green
3. Valencia's regional coastline	Red	Orange	Red	-	Red
4. Northern Adriatic Sea	Red	Orange	Red	-	Red
5. Gulf of Arzew/Stora Bay	Green	Green	Green	-	Green
6. Gulf of Gabes	Green	Red	Orange	-	Orange
7. Israel Coastal	Red	Green	Red	-	Red
8. National Park of Al-Hoceima	Orange	Orange	Red	Orange	Orange
9. Nile river region	Green	Red	Green	Orange	Orange

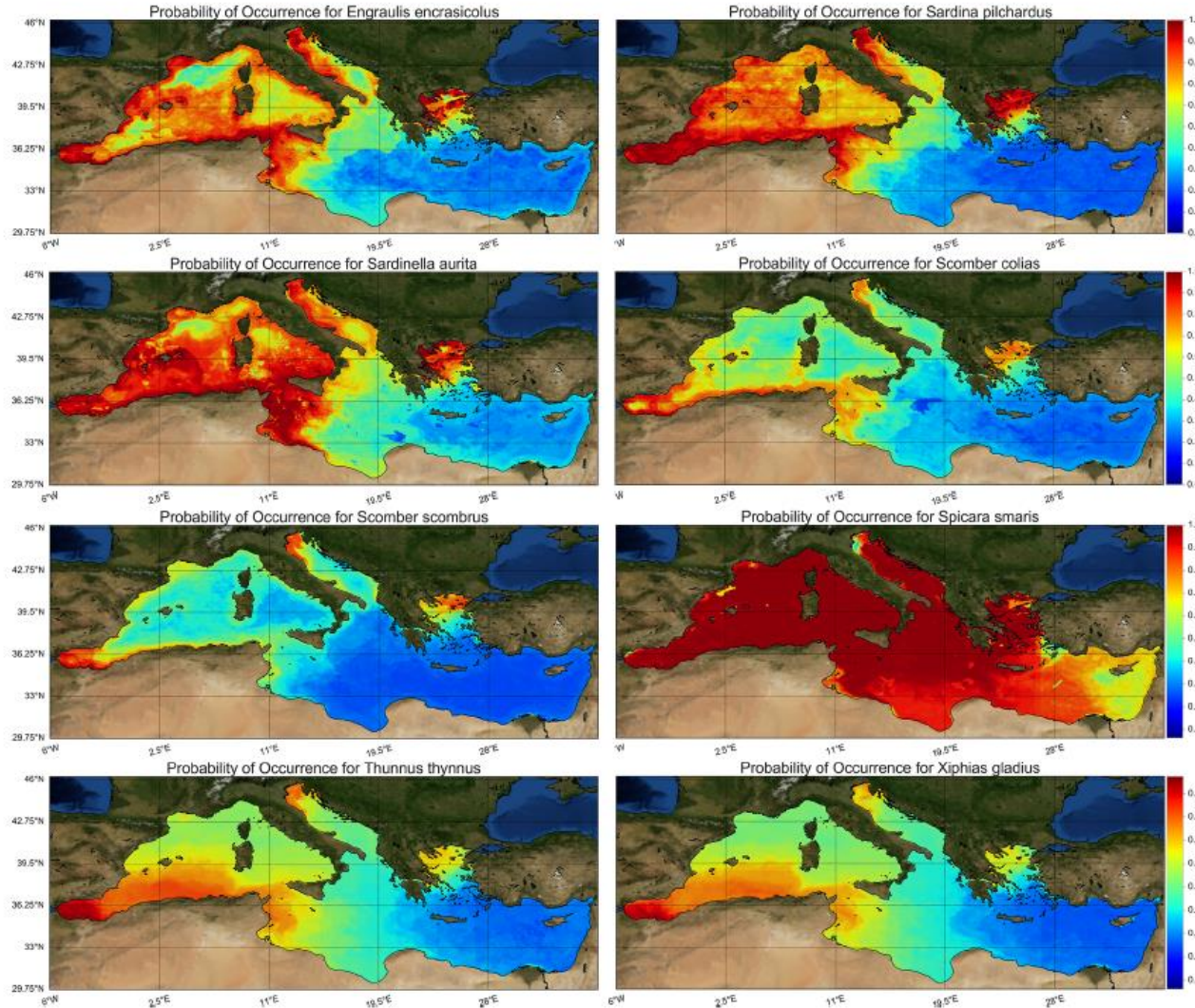
Comparison of the ecosystem status of all observatories concerning catch based indicators (Catch), trophic level (Troph), Fishing-in-Balance index (FiB) and ecoindicators from EwE ecosystem models (EcoInd) and overall performance (Green: good; Orange: intermediate; Red: bad)

Revealing Fish Species Distribution Dynamics

Apply AI and ML tools for Species Distribution Models



Habitat Mapping



High resolution produced habitat maps depicting the probability of occurrence in the whole Mediterranean Sea for the eight commercial fish species

Bio-acoustics for Marine Mammals



GLIMPSE **ALSEAMAR** **ALCEN**

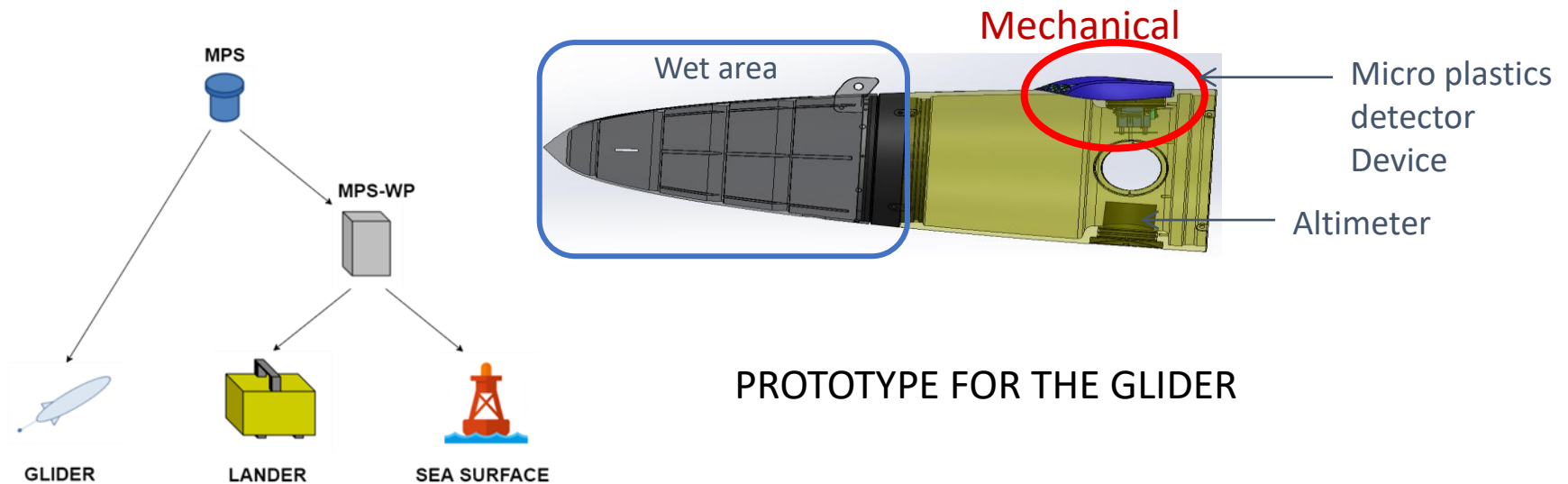
17:30:57 UTC Tsikliras Athanassios

Map showing the Aegean Sea region, including islands like Thasos, Samothrace, and Gökçeada. A red dot indicates a specific location. The map is overlaid with a dashed line representing a survey track. The text "Εθνικό πάρκο Ανατολικής Μακεδονίας και Θράκης" is visible on the map.

40° 01' 49" N 25° 21' 13" E

20 km

Integrating MPS in glider



PROTOTYPE FOR THE GLIDER



Integrating MPS in Surface Systems and Landers



Surface system



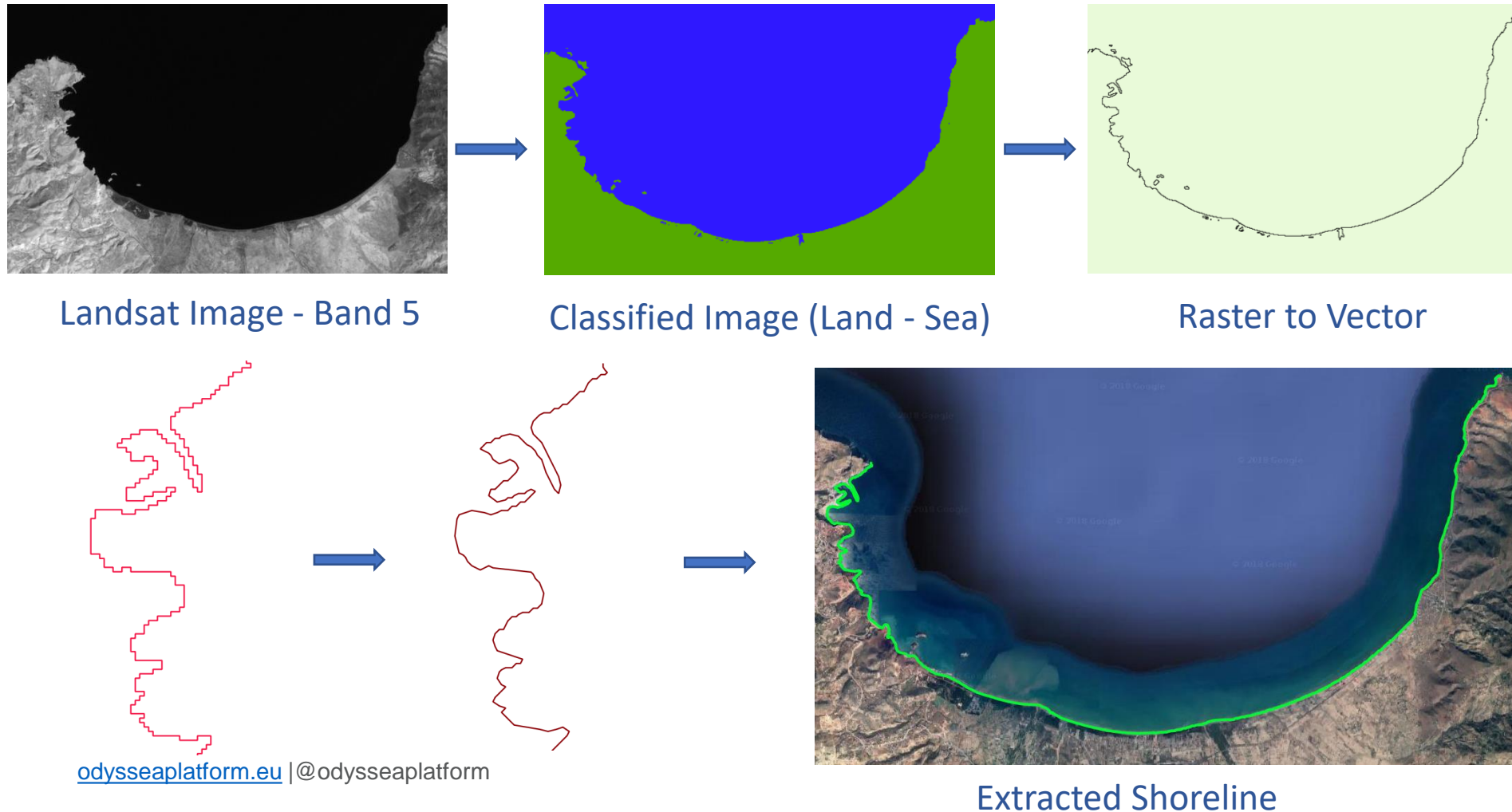
MPS pack



Lander

Historic Shoreline extraction

Semi-Automatic Classification Plugin (SCP) for QGIS



Coastal Erosion in Al-Hoceima Observatory

WLR

- 1.60 - -0.50 High Erosion Rate
- 0.49 - -0.10 Medium Erosion Rate
- 0.09 - 0.10 Stable Coastline
- 0.10 - 0.50 Medium Accretion Rate
- 0.50 - 1.60 High Accretion Rate

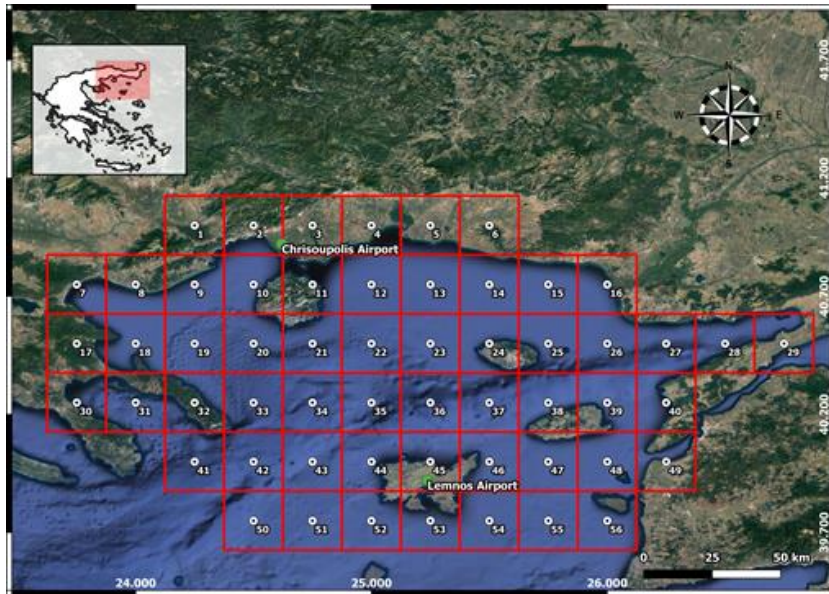
West

East

Central

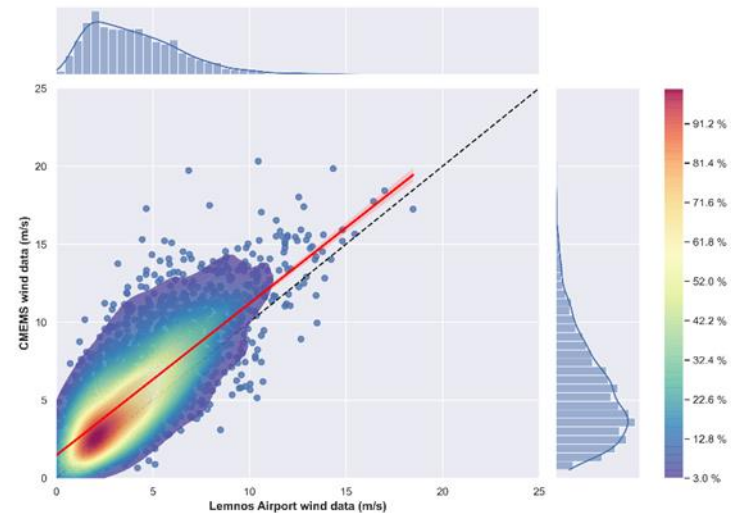


Wind Resource Assessment



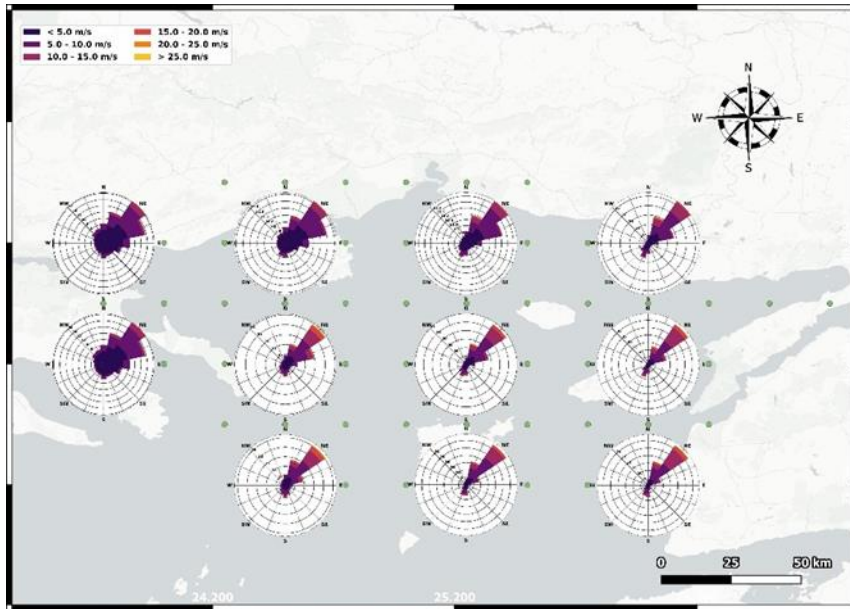
Study area map and CMEMS
grid discretization

The 6-hourly data of wind speed (eastings and northings) measured 10 m above sea level with a spatial resolution of $0.25^\circ \times 0.25^\circ$ were retrieved from the Copernicus Marine Environmental Monitoring Service (CMEMS).

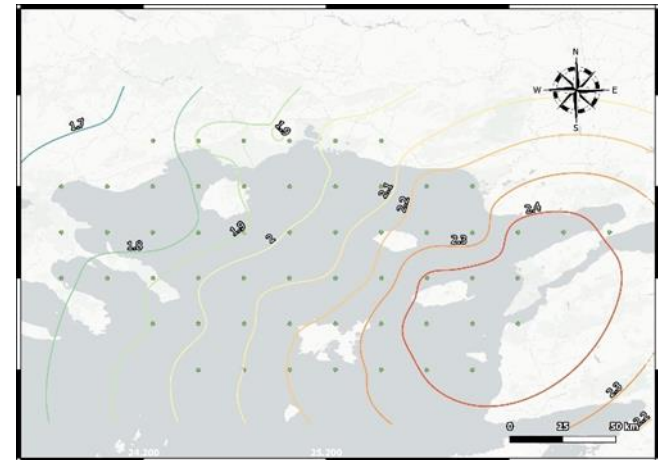


Density plots histograms of CMEMS wind speed data against
wind data from on-site stations in Lemnos Airport

Wind Resource Assessment



Wind frequency roses at hub height over the study area.



Wind Resource Assessment

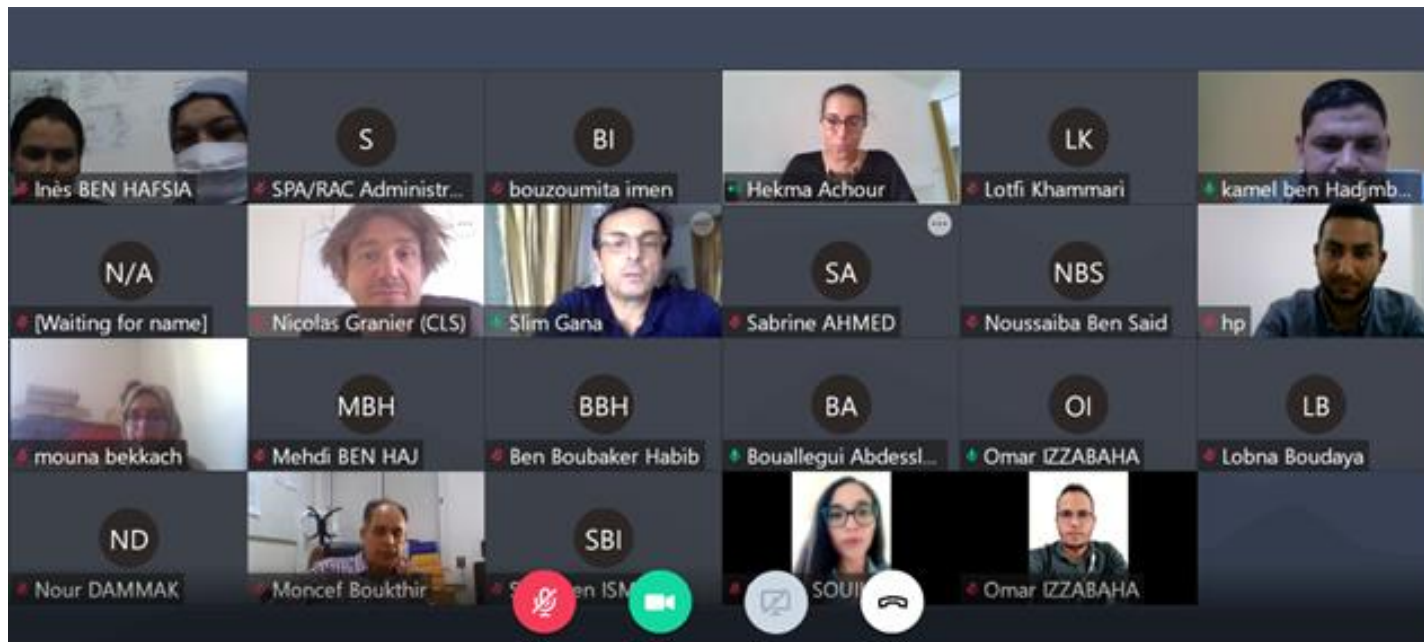
Total annual wind energy content (in kWh/m²) at hub level, per directional bin, for all sub-areas.

Sub-Areas/ Directional Bins	West Thracian Sea	Central Thracian Sea	East Thracian Sea	Lemnos Plateau	Dardanelles	Siggitikos/Mt Athos
N	82	62	80	73	59	91
NNE	214	389	775	887	973	436
NE	435	664	1,256	2,256	2,206	1,308
ENE	222	238	262	353	252	556
E	60	47	30	42	32	96
ESE	60	15	9	19	14	45
SE	18	30	12	27	21	33
SSE	23	23	25	72	58	62
S	69	112	183	358	395	168
SSW	27	87	227	235	272	89
SW	42	26	52	56	61	40
WSW	14	14	21	29	22	34
W	9	8	6	13	7	21
WNW	16	9	5	10	7	24
NW	29	14	8	17	11	40
NNW	36	37	13	15	9	47
all	1,354	1,774	2,964	4,455	4,398	3,091

ODYSSEA End-User Workshops



ODYSSEA partners developed activities to exchange experiences and collaborate with other European projects and initiatives in the Mediterranean Sea (e.g. [ENI SEIS II](#), [Maestrale](#), [LAKHsMI](#), [CLAIM](#), [EuroSea](#), HiSea, COSPAR Panel for Capacity Building)



ODYSSEA Summer Schools



ODYSSEA



odysseaplatform.eu



2nd ODYSSEA Summer School
Oceanography and Fisheries in the Mediterranean
Patitiri Village, Alonissos, Greece
2-6 September 2019



View of the main harbor (Patitiri Village) of Alonissos Island, Greece

Co-organized through ODYSSEA Project by:

School of Biology
Aristotle University of Thessaloniki

Department of Environmental Engineering
Democritus University of Thrace



Supported by Thalassa Foundation



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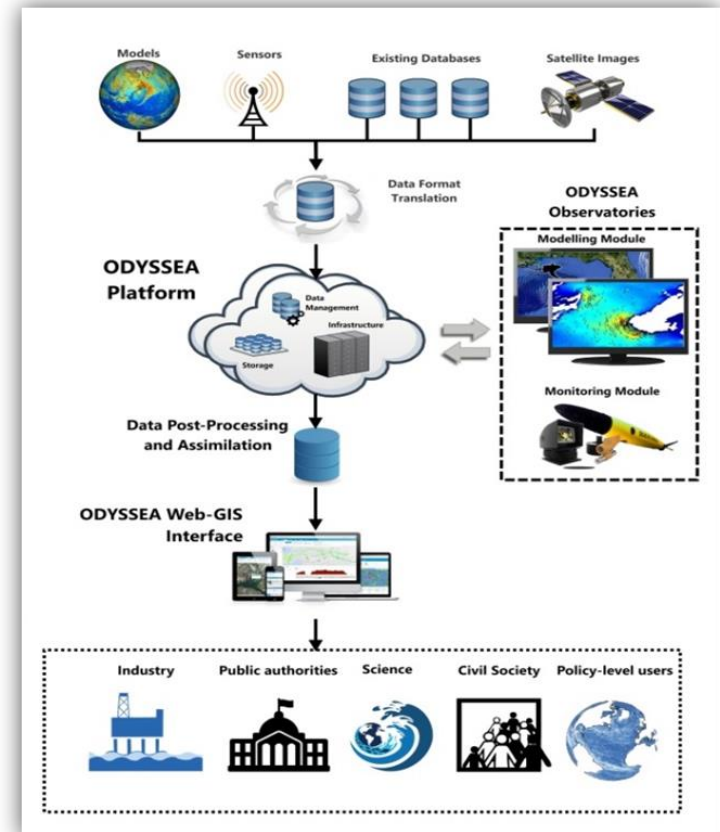
ODYSSEA Training on the Platform



ODYSSEA's Main Message



ODYSSEA is a research project to create novel knowledge, services and products for the Mediterranean with a bottom-up approach (from local/regional to broad and general) to cover end-user needs from diverse marine and maritime sectors



**Creating products and knowledge
for the Mediterranean**



THANK-YOU

Prof. Georgios SYLAIOS

Democritus University of Thrace

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