

EU Coastal Use Cases Workshop

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SAFEBLESS: Safe Navigation in the Western Black Sea basin



Author(s) Elena **Vlasceanu**, Adelio **Silva**

Affiliation:

National Institut for Marine Research and Development «Grigore Antipa» Romania
HIDROMOD Portugalia



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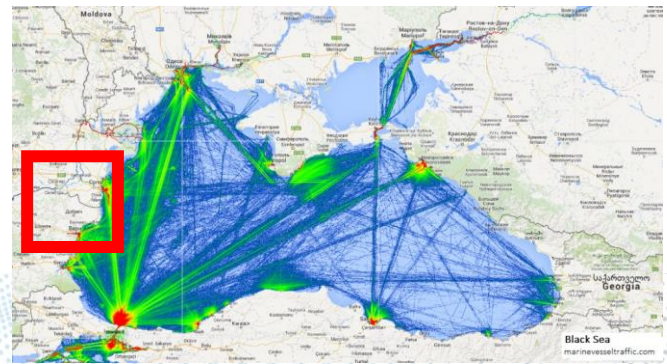
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Copernicus
Marine Service

Project in a nutshell



Necessity:

Ensure safe navigation for the two main maritime ports: **Constanta** and **Midia**

Main objectives:

- use CMEMS Black Sea products and locally acquired data , to provide **high-resolution oceanographic forecast**
- Provide an IT platform for **decision support** of specific maritime navigation stakeholders' activities

Main Outcomes:

1. Service focused on supporting Marine Spatial Planning (MSP)
2. Service focused on improving the safety of navigation in Romanian seaports.



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Consortium



Copernicus
Marine Service

NIMRD - Romanian National Institute for Marine Research and Development

- National operator of the integrated physical, chemical and biological monitoring system of the marine environment;
- National scientific responsibility for the implementation of the Marine Strategy Framework Directive (MSFD);
- Regional Activity Center for Environmental Issues in Fisheries and Management of Other Living Marine Resources;
(<https://www.rmri.ro/Home/Home.html>)



Elena Vlasceanu
Razvan Mateescu
Dragos Niculescu
Mariana Golumbeanu



Adélio Silva
Paulo Leitão
José Chambel Leitão
João Ribeiro
João Rodrigues

HIDROMOD Portugal (<https://hidromod.com/>)

- Develops and provides practical solutions based on numerical modeling and information technologies – coastal dynamics, environment, harbours & ports, oil&gas, aquaculture, etc
- Background of about 500 projects and a quality certified management system standard, offering a combination of engineering experience, scientific knowledge and technological implementation capacity.



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Context

- Midia and Constanta are the end points of the European transport corridor VI / Rhine - Danube.
- Approximately 19 thousand sea and river vessels pass through both ports annually.
- The port of Midia located on the southern border of the Danube Delta Biosphere Reserve, has been the scene of several spills and small accidental collisions in recent years.
- Deserves the facilities for oil transportation to the Midia oil refinery (2023 - 2.4 million tons of fuels - 40% of the refining capacity in Romania).
- Major treats: marine pollution
 - Interest conflicts with: the regional fishing/and /BS fisheries
 - Recent threats: marine mine from the conflict zone



Copernicus Marine Products and Coastal models

User-focused services in Black Sea:

Use Case 1 - Metocean analysis to support Maritime Spatial Planning in the western Black Sea Basin

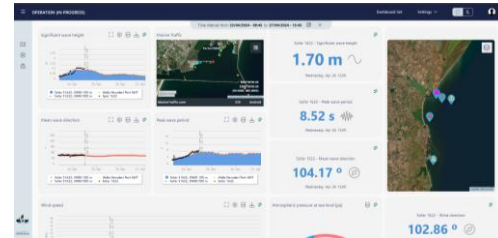
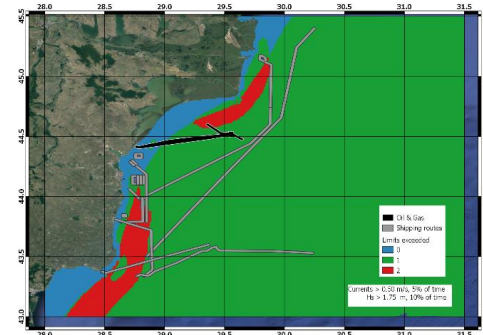
Downstream Copernicus Marine Services in seamless integration of coastal monitoring-modeling-management services within Black Sea:

Use Case 2 – Operational Service for Safe Navigation in the Western Black Sea



Model and data inventory

- **Setup use case 1:**
 - co-design step based on web-questionnaires and face to face interviews
 - Setup the base layers & relations, together with thresholds for long-term data/30 years for BS/CMEMS product: Reanalysis – Black sea
 - IT GIS platform design and interactive functionalities
- **Setup use case 2:**
 - co-design step based on web-questionnaires and consultations/face to face interviews
 - Downscale Copernicus regional Black Sea models (waves and 3D Hydrodynamics)
 - High-resolution service focused on Midia port navigation operation and safety – with Particle tracking model allowing on-demand simulations at the port scale
 - Adopt the requirements interoperability standards - Possibility to export





MAPPING METOCEAN LIMITS - ROMANIA
Dashboard Set

EMODNET

Operational thresholds

Currents

Above Below

Data type: Modelling

Value: 0.15 m/s 1.00 m/s

Duration: 50 % 90 %

CMEMS - Black Sea Physics Reanalysis

Significant Wave Height

Above Below

Data type: Modelling

Value: 0.00 m 1.00 m

Duration: 1 % 50 %

CMEMS - Black Sea Waves Reanalysis

Water Salinity

Above Below

Data type: Modelling

Value: 15.00 - 0.00 -

Duration: 50 % 0 %

CMEMS - Black Sea Physics Reanalysis

Water Temperature

Above Below

Value: Value:

Calculate

Map

- Ecology
 - Natura2000Sites
 - Natura2000 SCI
 - Natura2000 SPA
- Activities
 - Aquaculture
 - Fishing Areas
 - Oil & Gas
 - Shipping Routes
- Calculated Map Limits
 - Compliance
 - Currents > 0.15 m/s, 50% of time
 - Currents < 1 m/s, 90% of time
 - Significant Wave Height > 0 m, 1% of time
 - Significant Wave Height < 1 m, 50% of time
 - Water Salinity > 15 -, 50% of time

Coordinates: 43°43'15"N | 29°4'48"E

maptalks - © OpenStreetMap contributors





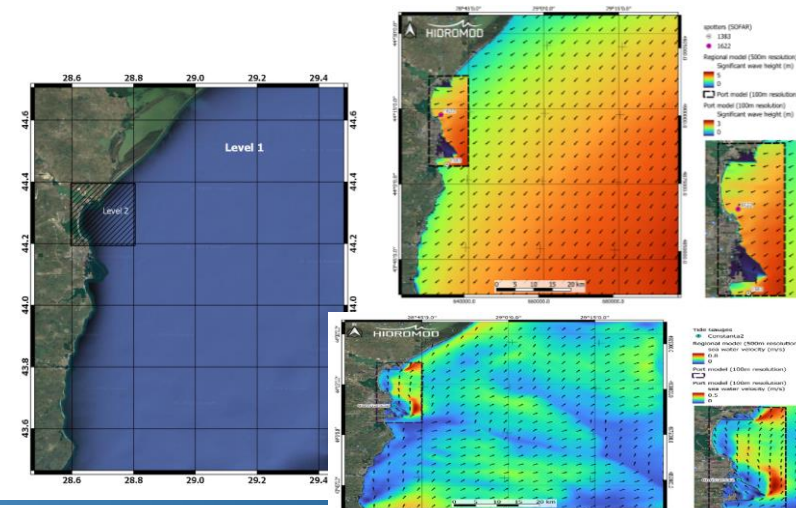
USE CASE 2

- **Targeted users and potential customers**
 - Port/Romanian Navigation Authorities, Coastal Municipalities, Coast Guard, Port and Coastal maritime transport operators
 - Oil & Gas companies, users requiring high resolution services & information, accurate short-term forecasts (early warnings & alerts and oil spill tracks on request)
 - **Forcing: Atmosphere: ICON**
- **Open Boundary: Copernicus Marine products:**
 - Black Sea Physics/Nemo/ $0.025^\circ \times 0.025^\circ$ Black Sea Physics Analysis and Forecast
 - Waves/WAM/ $0.025^\circ \times 0.025^\circ$: Black Sea Waves Analysis and Forecast
- **Geographical area: Romanian shelf**
- **Downscale: EEZ and ports area**

Model Resolution:

Level 1: Waves (SWAN) + 3DHydrodynamic (MOHID), Horizontal resolution 0.005° (500m)
Vertical resolution (Black Sea CMEMS)

Level 2: Waves (SWAN) + 3DHydrodynamic (MOHID) Horizontal resolution 0.001° (100m)
Vertical resolution (Black Sea CMEMS)





USE CASE 2

- In-situ data /sensors installations Sofaroccean's SPOTTERS

SOFAR

SPOT-1624
New data received 5 minutes ago
0.44 m @ 5.7 s @ 6.80 m/s @ 23.34 C

WAVE HEIGHT	DIRECTION	PERIOD	SPREAD
MEAN 0.44 m	74°	2.7 s	74°
PEAK	105°	5.7 s	42°

WIND SPEED 6.80 m/s
DIRECTION 325°
SURFACE choppy

SEA SURFACE TEMPERATURE 23.34 C

44.318483°, 28.733500°
09/15/2024 14:39:19 EEST

SETTINGS → HISTORICAL DATA →

SPOT-30340R
New data received 5 minutes ago
0.22 m @ 25.6 s @ 1.60 m/s

SPOT-30092D
New data received 5 minutes ago
4.55 m @ 9.3 s @ 6.00 m/s

<https://spotters.sofaroccean.com/?spotter-filter=SPOT-1624>

<https://spotters.sofaroccean.com/?spotter-filter=SPOT-1622>

<https://spotters.sofaroccean.com/?spotter-filter=SPOT-1383>



Near future:

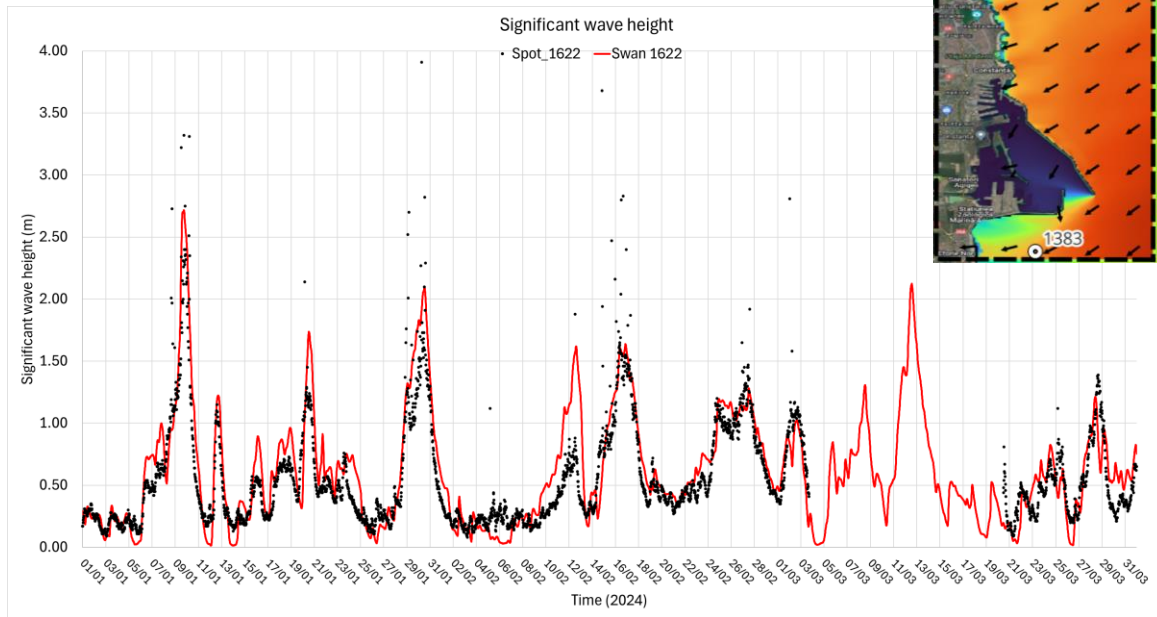
- Meteorological data from local meteorological stations
- Shore connected ADCP (NIMRD)



Validation:

- Spotters/SofarOcean :
SPOT - 1622

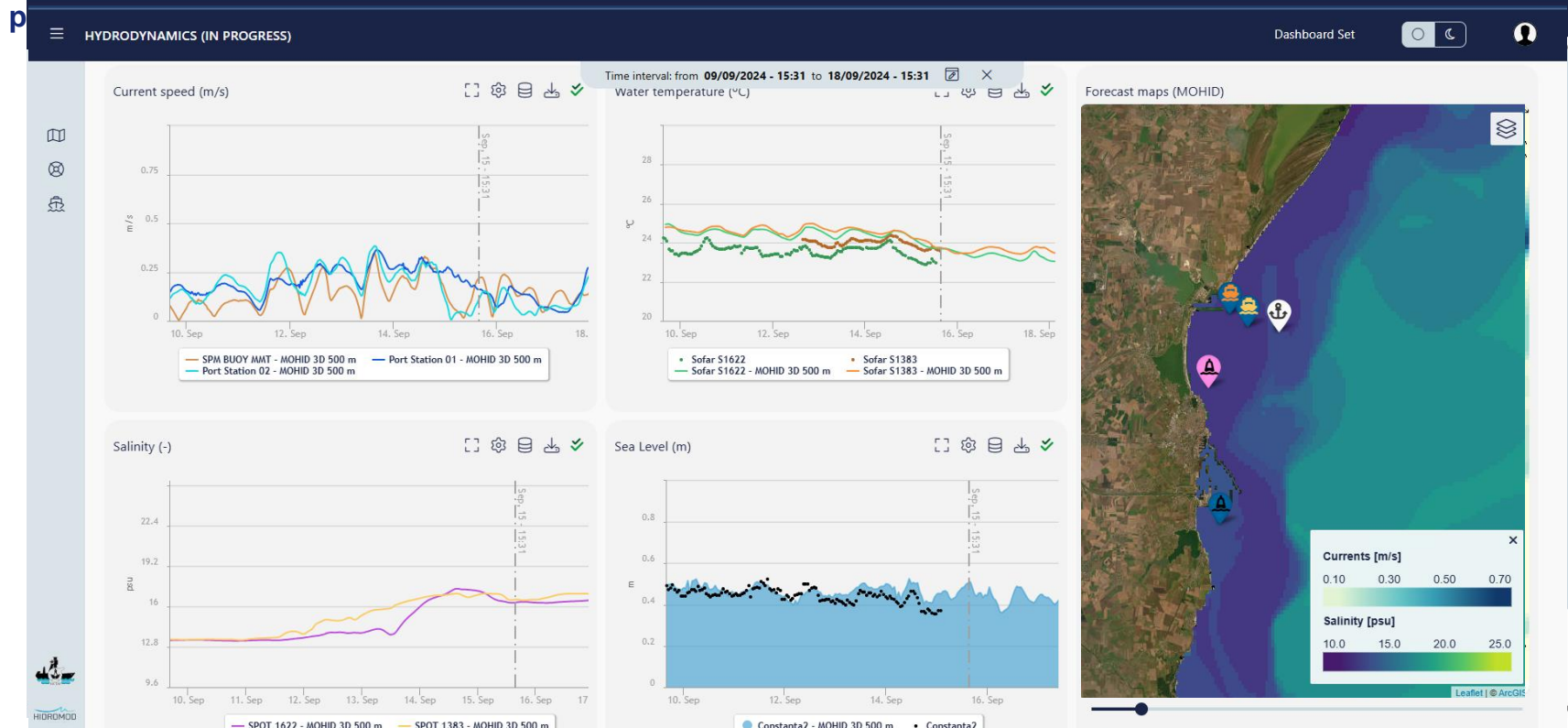
SPOT-1622	Hs	Tm	Tp	Dm
STDEV_OBS	0.40	1.22	3.36	54.79
AVERAGE_OBS	0.52	3.65	5.37	110.12
BIAS	0.06	0.31	-0.33	-6.71
RMSE	0.25	1.07	3.31	50.45
Normalise RMSE [%]	15.54	21.89	24.57	23.02
Unbias RMSE	0.24	1.02	3.29	50.00
Normalise unbias RMSE[%]	15.02	20.95	24.45	22.81
rcorr	0.85	0.66	0.37	0.50
NASH-SUTCLIFFE	0.67	0.38	0.13	0.21
SKILL	0.92	0.74	0.40	0.67
rcorr_quad	0.73	0.43	0.13	0.25
Total values compare	3564.00	3564.00	3564.00	3564.00





Service Use Case 2

Real time dashboards focus on the needs of each user (e.g. navigation authorities, port operators, and harbour



Dissemination activity

Promotion collaboration among stakeholders for advancing coastal safe-navigation systems at regional level: posters and presentations in 2023 and 2024

1. The project file/summary – CMEMS website;
2. Regional Stakeholder List
3. Press release kick-off meeting
4. SafeBLESS dissemination materials Poster, Leaflet and Factsheet
5. Social media channels/campaigns Facebook NIMRD:
6. Twitter NIMRD:
7. LinkedIn_NIMRD: Scientific presentations/publications related to the project

The next workshop will promote discussion and collaboration among stakeholders interested in Copernicus Marine Service data and products: 23-25 October as part of the MarBLUE conference, organized by NIMRD, Geocomar and Ovidius University of Constanta: <https://www.marblue.ro/>

Conclusion and future steps

SafeBLESS:

- Improved and integrate multiple CMEMS products to create a viable safe maritime support system for Midia – Constanta Ports areas and demonstrate the value of modeling, remote sensing and in-situ products through enhanced communication to stakeholders/authorities and end-users: port operators/coastguard/S&R services
 - Maritime stakeholders:
 - Community of the maritime activities: port planning and administration, port operators and oil & gas companies / oil transport operators
 - The scientific and academic community
 - The general public and tourist/agreement navigation in the implementation area – western Black Sea coastal
- The premises created by the SafeBLESS project: the expansion of a high-resolution coastal forecast service and a service for better harmonization of maritime activities, respectively, an improved monitoring and forecasting the hydrological state and the metocean parameters of marine/coastal waters for the western Black Sea / Romanian maritime area.



Thanks for your attention!

