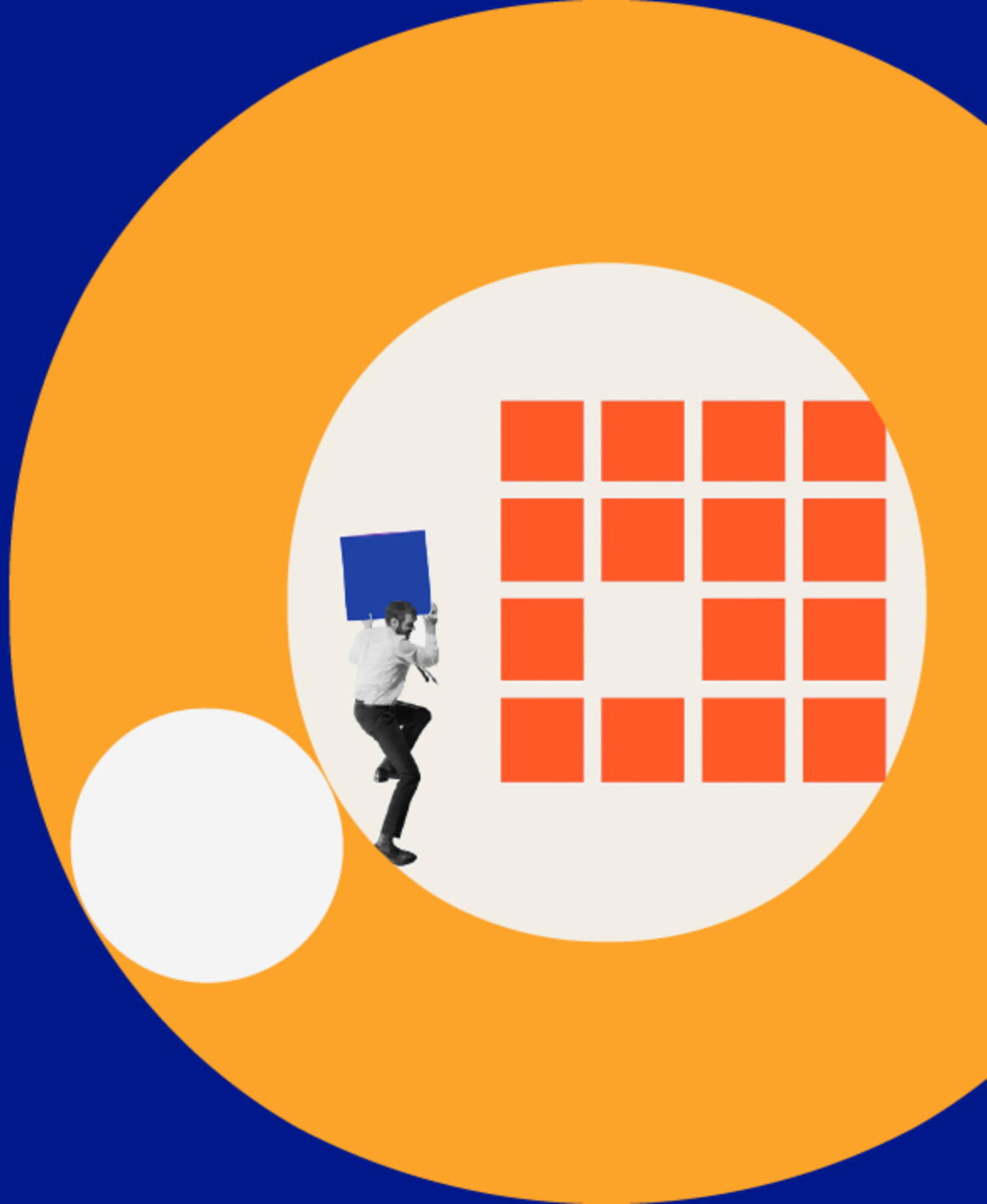
WEBINAR

Charting the currents: the potential of open marine data



data europa academy

13 June 2025

10:00 – 11:00 CEST

Rules of the game

The webinar will be recorded and published on the data.europa academy

For questions, please use the ClickMeeting chat

Please reserve 3 min after the webinar to help us improve by filling in our feedback form

data europa academy

Agenda

10.00 – 10.05	Opening and introduction – *Inmaculada Farfan Velasco*
10.05 – 10.25	Case study: Marine Analyst – *Pascal Derycke*
10:25 – 10:45	Case study: digital twin of the Southern Baltic Sea – *Aleksandra Dudkowska*
10:45 – 10:55	Q&A session
10:55 – 11:00	Closing remarks

data europa academy

Today’s speakers

Inmaculada Farfan Velasco
data.europa.eu,
Publications Office of the European Union

Pascal Derycke
Innovation Manager and Data Engineer, Sciensano

Aleksandra Dudkowska
Assistant Professor, Institute of Hydro-Engineering of the Polish Academy of Sciences

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Marine-Analyst.eu:

facilitating access to open marine data in an innovative way

Marine Analyst

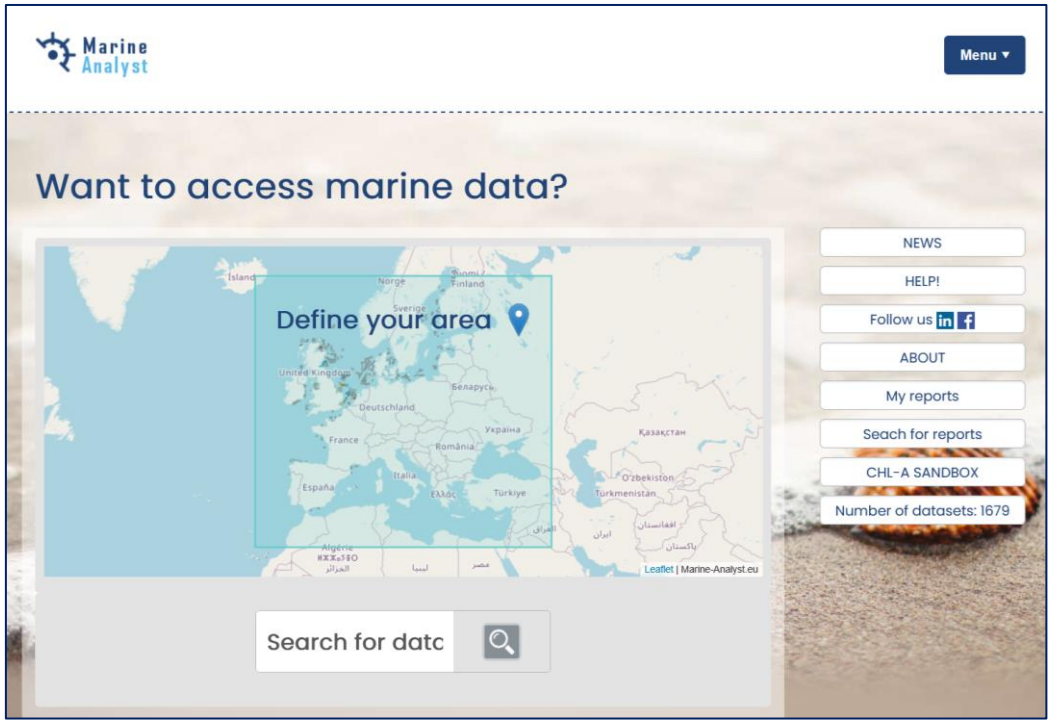
www.marine-analyst.eu

Pascal Derycke

data.Europa.eu academy webinar 'Charting the currents: the potential of open marine data' Friday, 13 June 2025

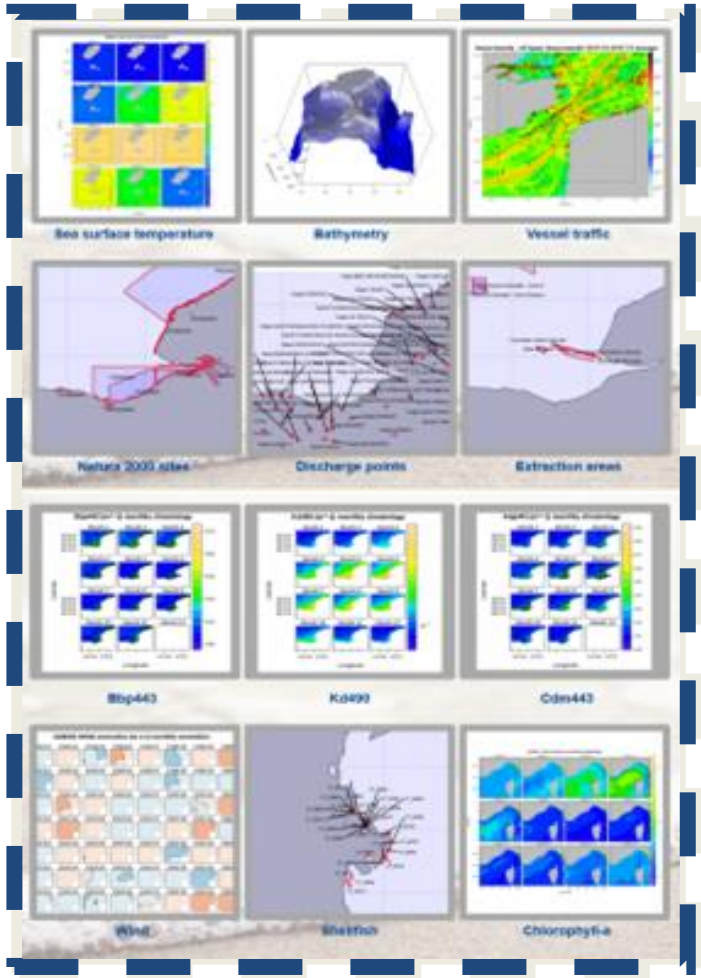
Powered by WEkEO

Launched in 2020, the Marine-Analyst.eu is an open-access web platform designed to simplify access to marine data and facilitate reproducible environmental analyses.



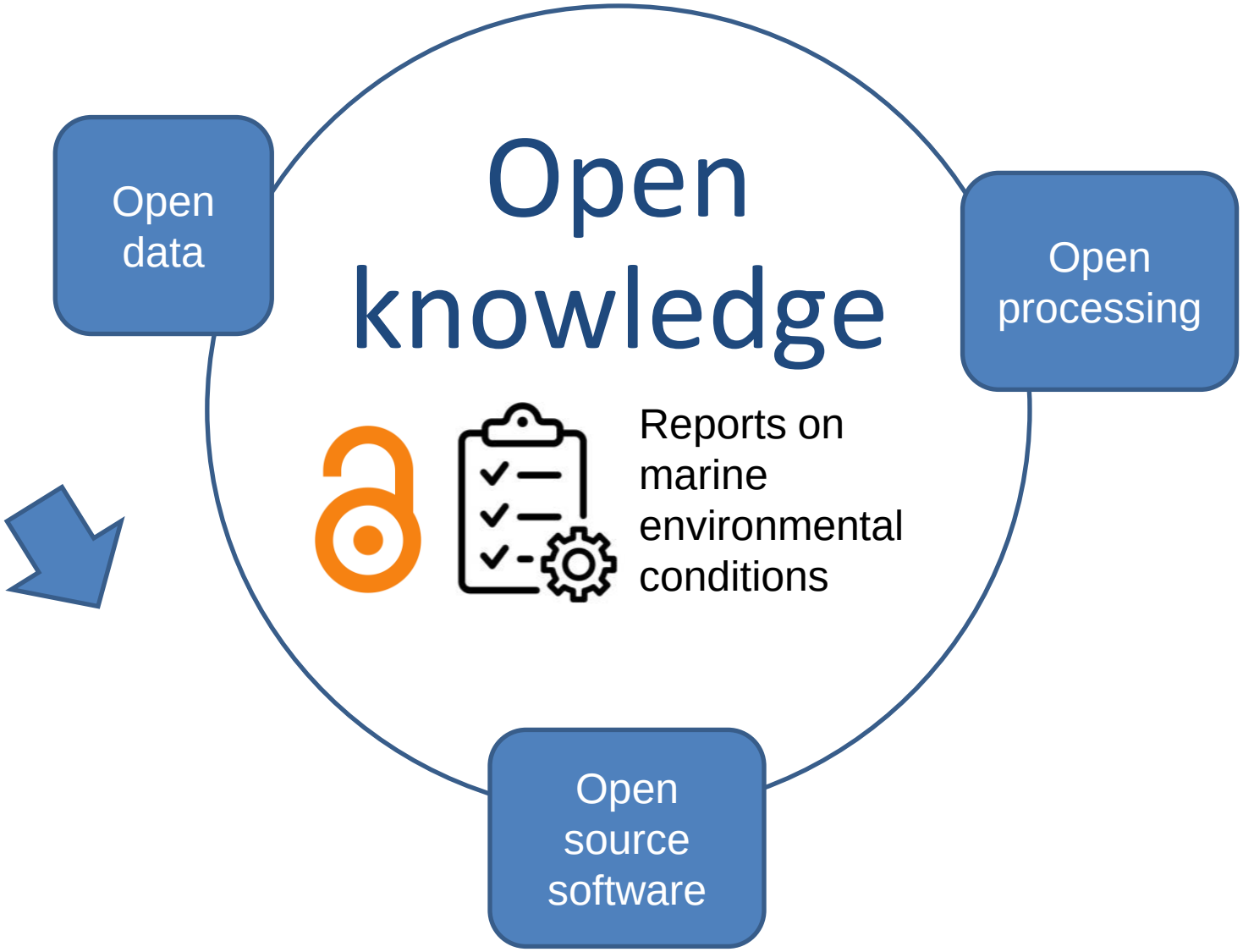
Marine-Analyst.eu offers an intuitive and easy-to-use interface, making it accessible to users with varying levels of technical expertise.

It serves as a collaborative tool for a wide range of users—including scientists, policymakers, environmental organisations, and the general public—to explore, analyse, and report on marine environmental conditions.



Users can visualise data, perform analyses, and generate reports without requiring programming skills.

Principles and purpose

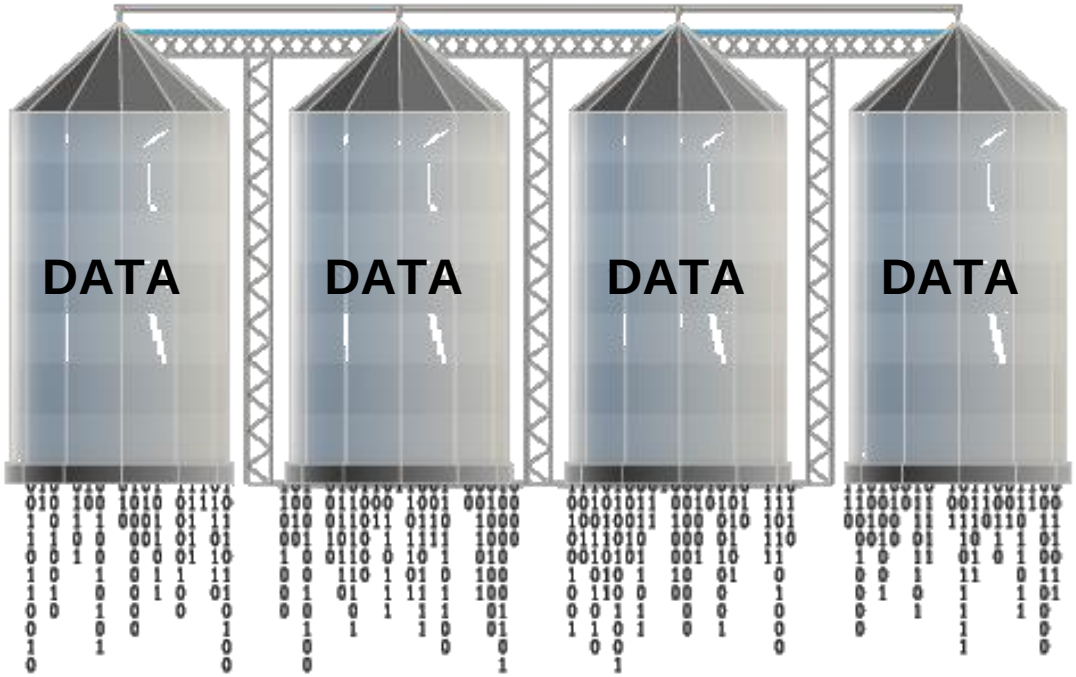


Marine Analyst

It relies on the EU Open data Policy

EMODnet
European Marine Observation and Data Network

Copernicus
Europe's eyes on Earth



INSPIRE · Infrastructure for Spatial Information in Europe

The platform provides access to over 1,500 datasets from major marine data providers such as the Copernicus Marine Service, EMODnet, GEBCO, etc.

These datasets cover various aspects of the marine environment, including sea surface temperature, marine litter distribution, bathymetry, wind data, and more.

Data access via standard Web services (APIs)

Data processing is supported by

WEkEO DIAS*
Cloud computing services

*Data and Information Access Services

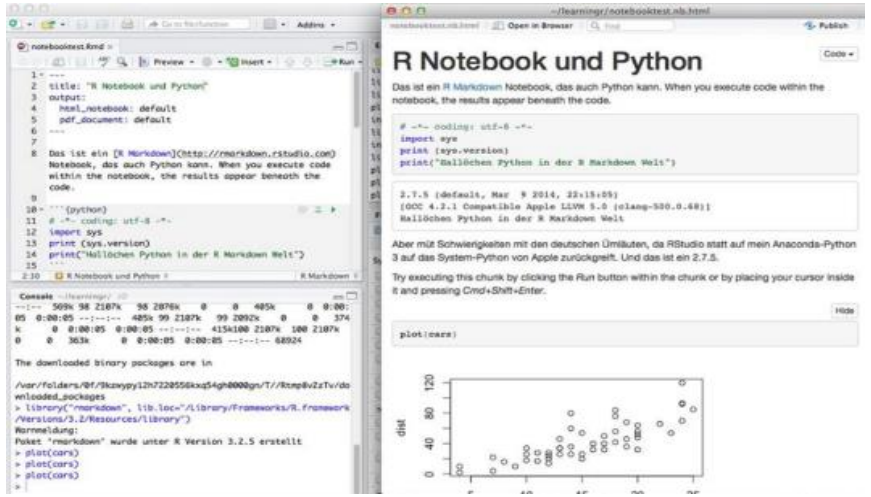
Open source software

The Marine Analyst is powered by a Content Management System that enables the management and delivery of **computational notebooks** containing analyses associated with the dataset.

INNOVATION

OPEN SOURCE

OPEN SCIENCE

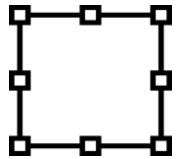


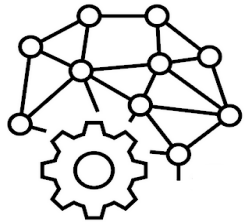
Marine Analyst

Key features

For specific areas of interest in Europe (and also at global scale), after a data access request, a document (report) is generated and published on the Web.

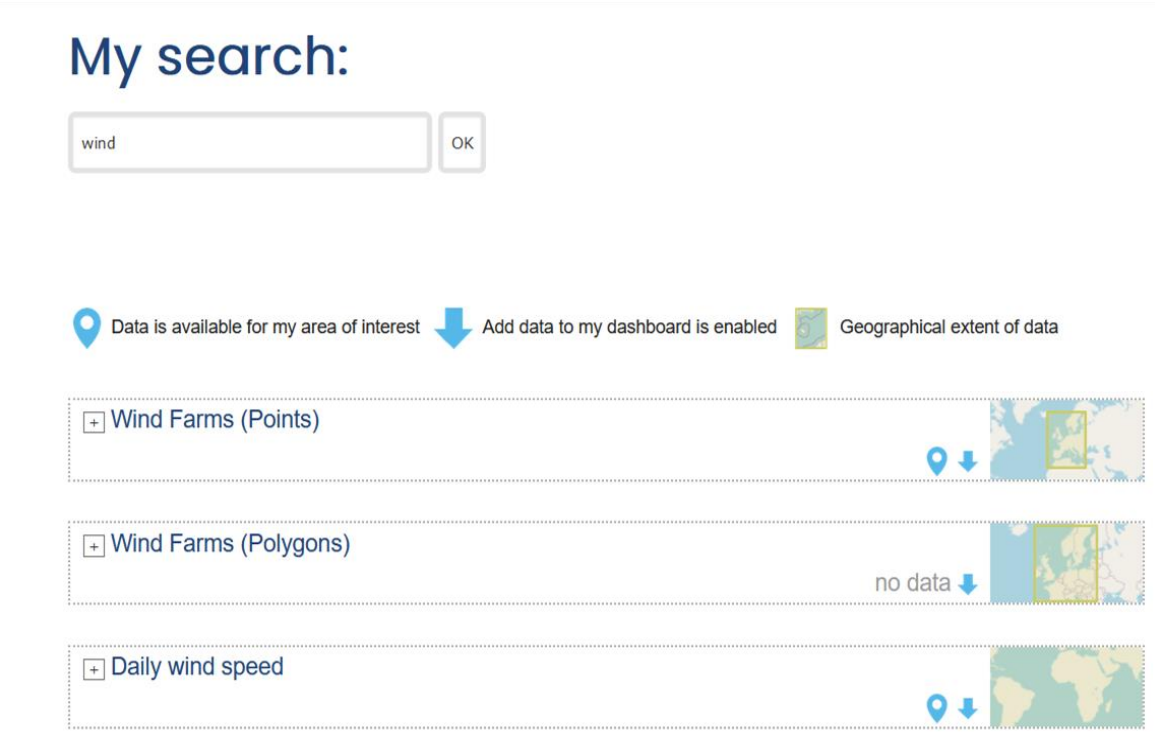
Each report is human readable (html) and machine actionable (semantically annotated with Schema.org) and publish in a DCAT dataset catalogue.



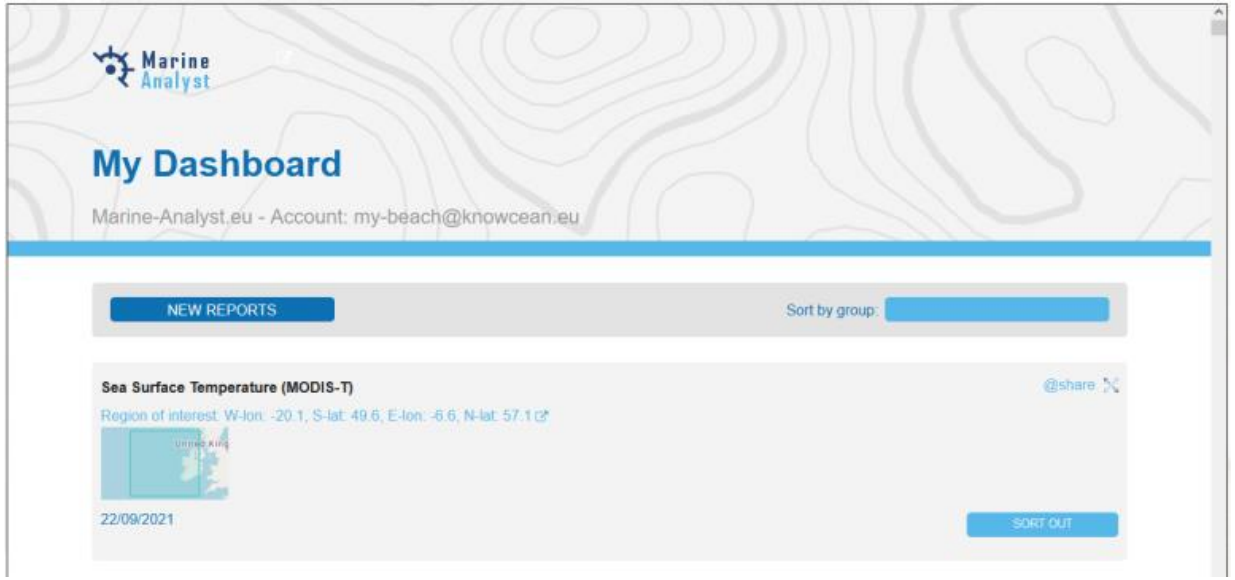


Search for data

The search result shows whether data is available for the selected area and whether a report can be downloaded to the dashboard.



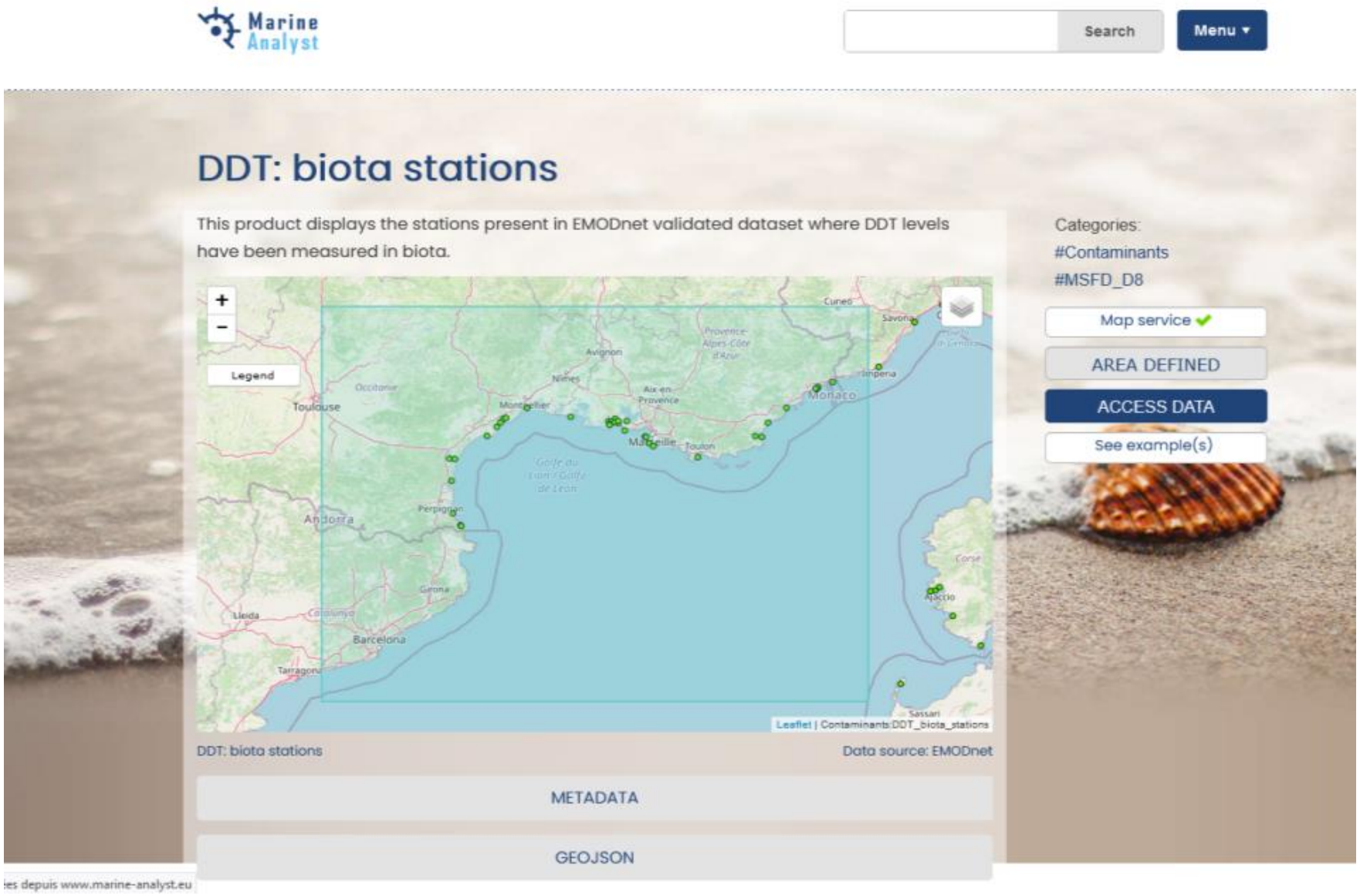
Reports are collected in a personal dashboard



Users can perform comprehensive analyses for specific areas of interest and generate automatic reports that include value-added analyses and environmental indicators.

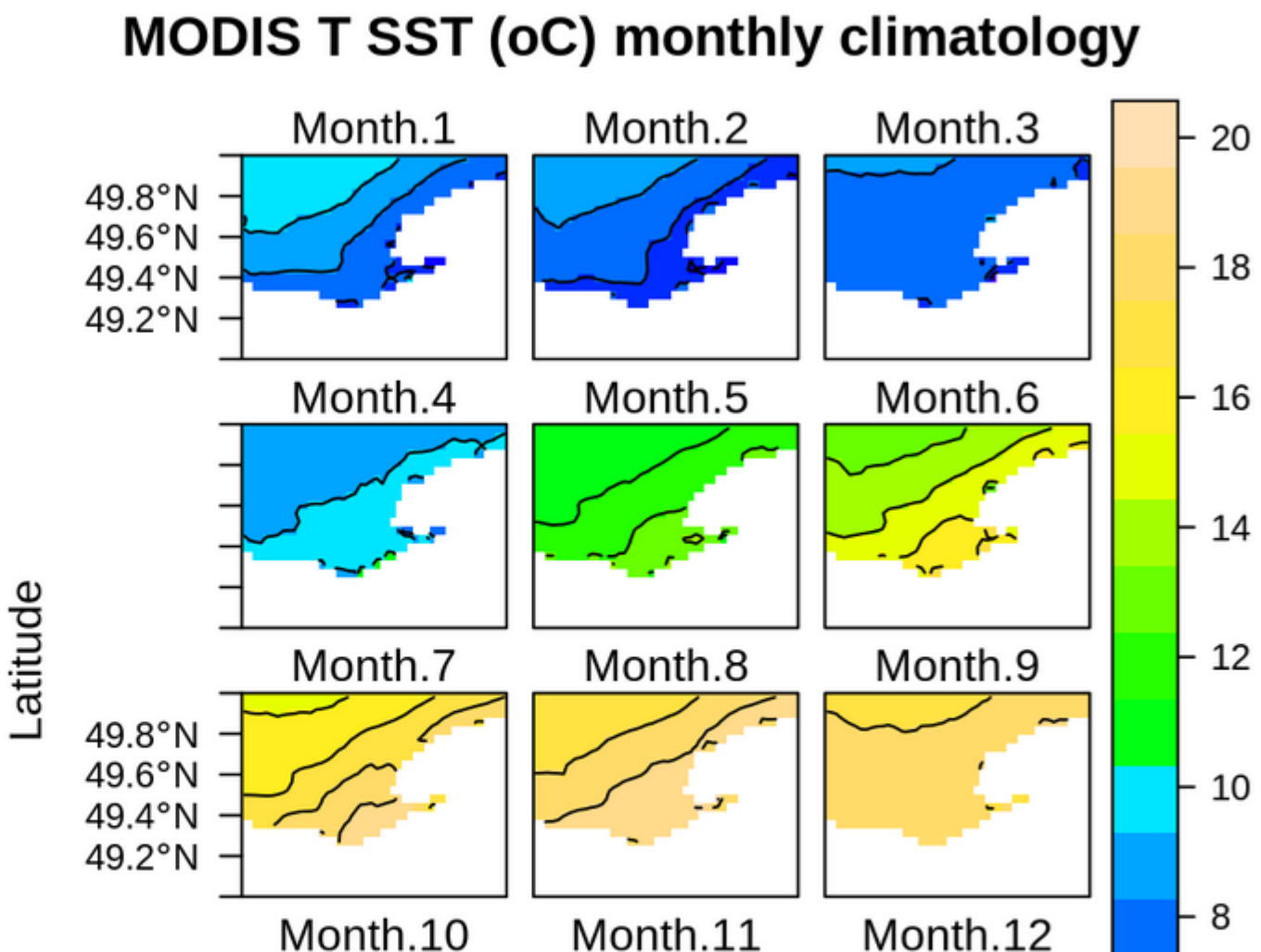
These features support tasks such as maritime spatial planning, climate change assessment, and marine protected area management.

Example of a data visualisation page



Example of a report

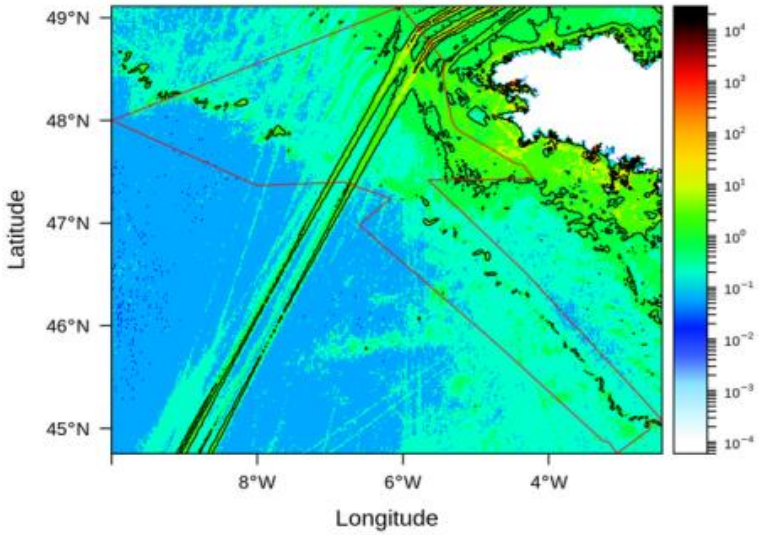
3.3 Monthly climatology



Example of report produced for the MPA “wdpaid 555643633 ” Mers Celtiques - Talus du golfe de Gascogne

https://my-beach.eu/rprocessing/temp/Report-wdpaid-vess8_6f9at4dnbhujd1keptqb390kdq_555643633.html

A spatial-temporal analysis of the shipping activity for the selected MPA



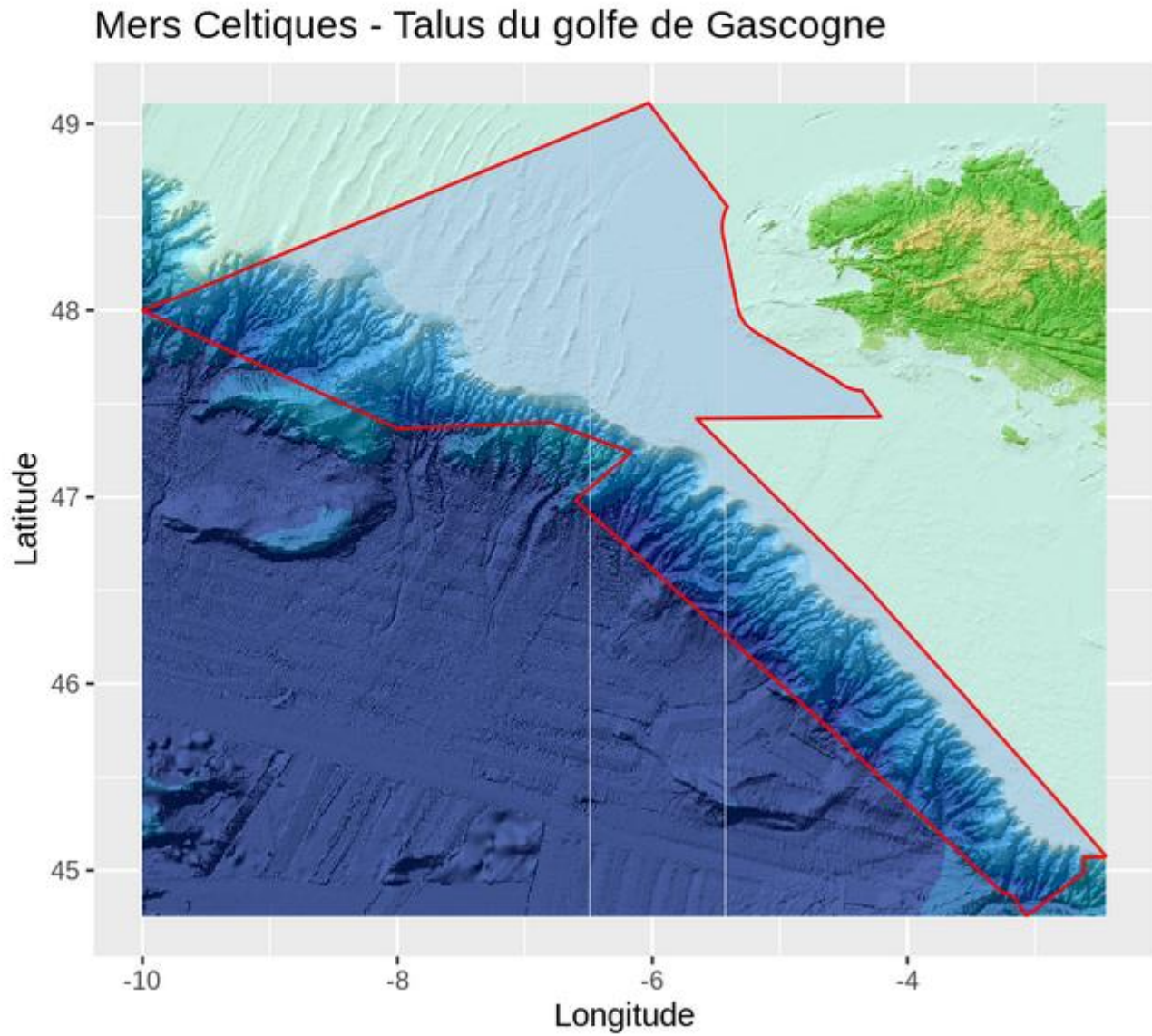
AIS data: EMODnet monthly vessel densities per vessel type (2017-2020)

Marine Protected Areas
IUCN MPA database
www.protectedplanet.net

EU Marine Protected Area: vessel traffic analysis 2017-2020

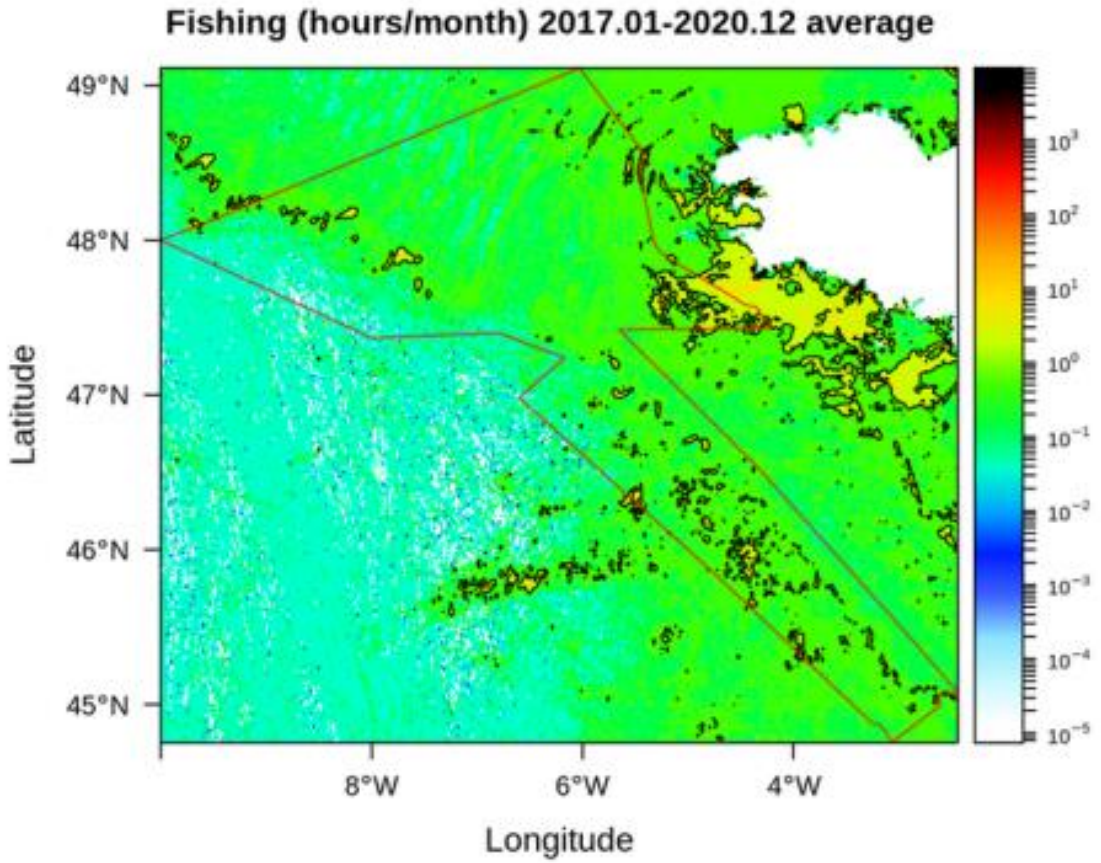
Document produced by http://www.marine-analyst.eu (Dubroca L., Cariou T., Derycke P.)

11 September, 2021



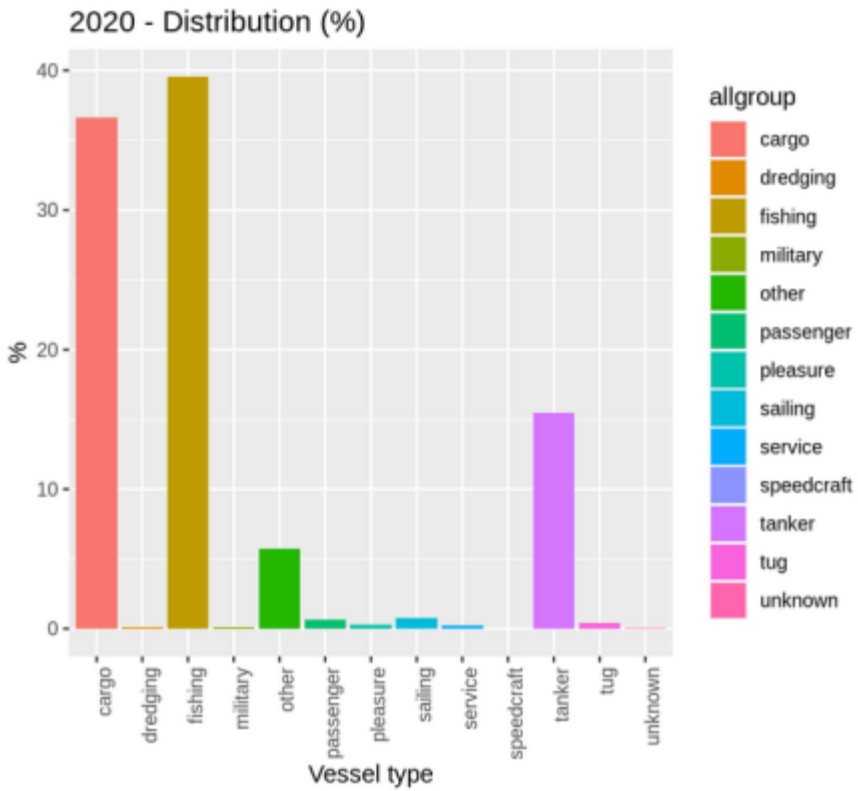
Maps

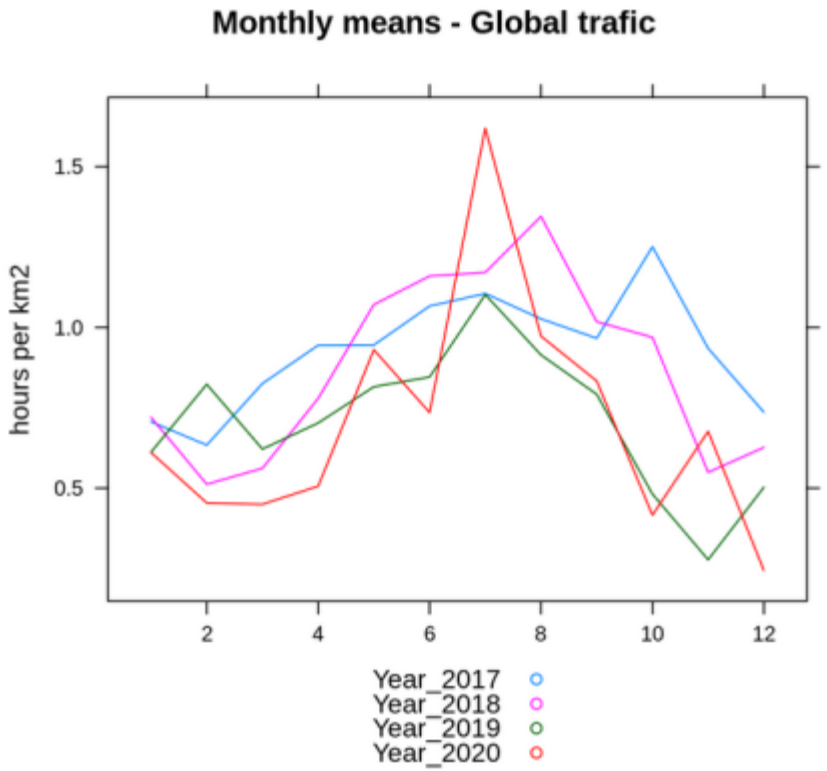
4.1 Fishing



Marine Analyst

Statistics

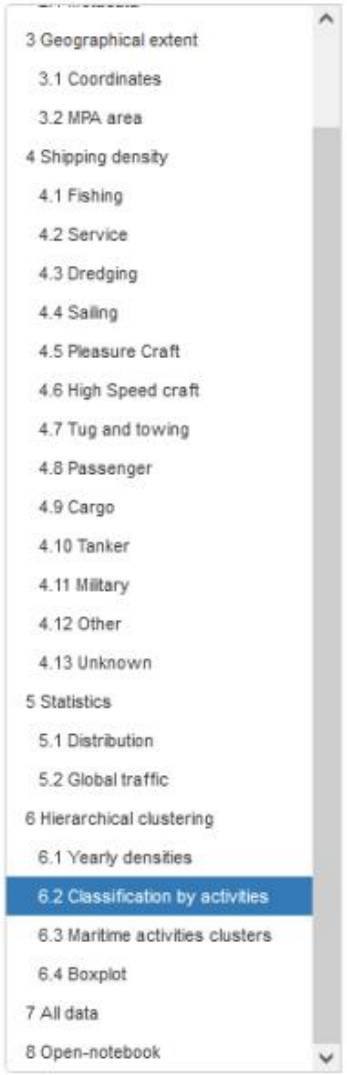

2020 - Distribution (%)
40
30
20
10
0
%
cargo
dredging
fishing
military
other
passenger
pleasure
sailing
service
speedcraft
tanker
tug
unknown
Vessel type
allgroup
cargo
dredging
fishing
military
other
passenger
pleasure
sailing
service
speedcraft
tanker
tug
unknown

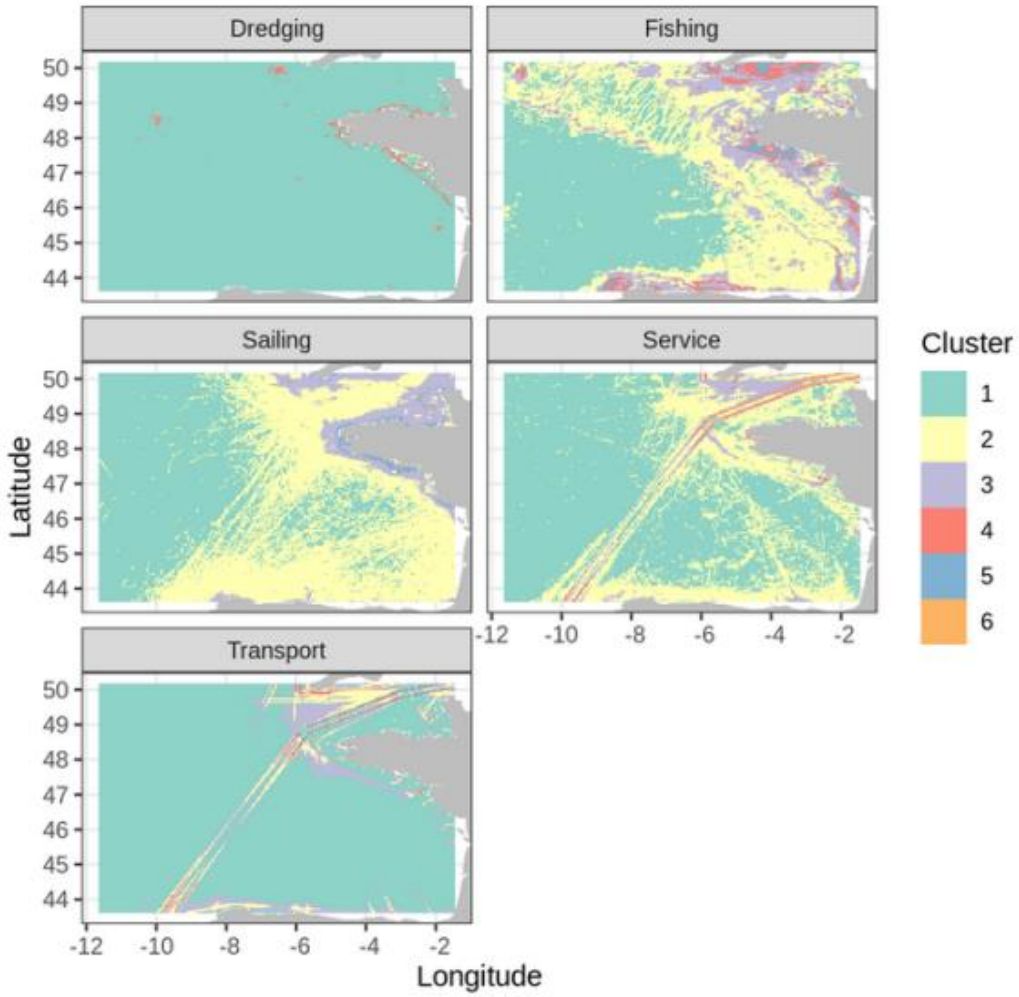

Monthly means - Global trafic
hours per km2
1.5
1.0
0.5
2
4
6
8
10
12
Year_2017
Year_2018
Year_2019
Year_2020

Yearly means per vessel type

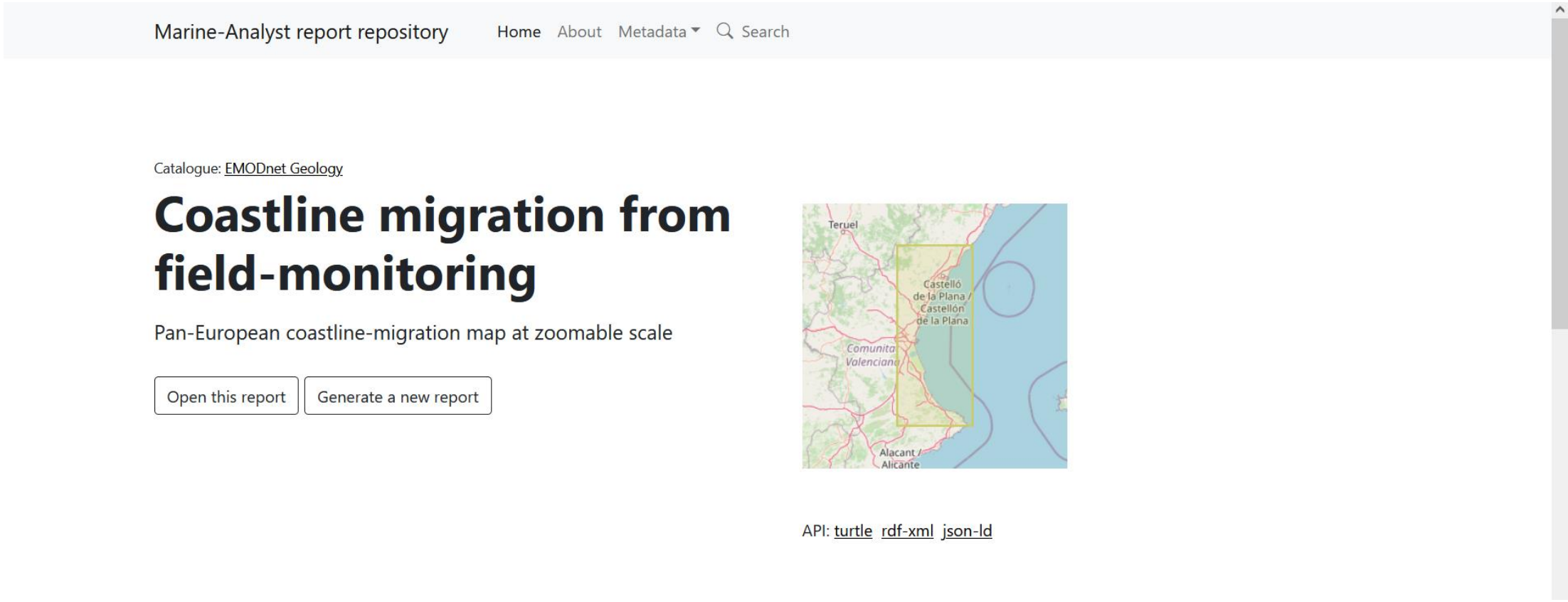
allgroup <fctr>	mean2017 <dbl>	mean2018 <dbl>	mean2019 <dbl>	mean2020 <dbl>
fishing	3.9657409014	3.706710445	2.9117118873	3.3406106607
service	0.0199139950	0.015947871	0.0111375437	0.0177013725
dredging	0.0161538911	0.010139497	0.0093468530	0.0069803571
sailing	0.0731917996	0.104161330	0.0776845644	0.0668570534
pleasure	0.0228101137	0.033030653	0.0289549412	0.0242848099
speedcraft	0.0009128923	0.001415042	0.0003514705	0.0006877847
tug	0.0589612823	0.045906279	0.0357350823	0.0368232679
passenger	0.0859281481	0.096371148	0.0817031558	0.0522820548
cargo	4.5335253260	4.245162086	3.3798986481	3.0965203022
tanker	1.7297559838	1.663498230	1.3906645089	1.3090270318

Cluster analysis (AI)





Adopting Semantic Web and Linked Data principles: http://fair.knowcean.eu (DCAT RDF catalogue)



FAIR Datasets

Google

Search

Sign in

M

Data from: Macroalgae (seaweeds)

my-beach.eu
fair.knowcean.eu
+2more

html

Updated Sep 26, 2024
+ more versions

M

Coastline migration from field-monitoring

fair.knowcean.eu
my-beach.eu

html

Updated Nov 22, 2021

M

Waste at Ports (tonnes)

fair.knowcean.eu
marine-analyst.eu
+2more

html

Updated May 21, 2022
+ more versions

M

Data from: Shellfish production

my-beach.eu
fair.knowcean.eu
+2more

Coastline migration from field-monitoring

Explore at: Marine Analyst | fair.knowc... | my-beach.eu

html

Dataset updated

Nov 22, 2021

Dataset provided by

http://www.marine-analyst.eu

Authors

Marine Analyst

License

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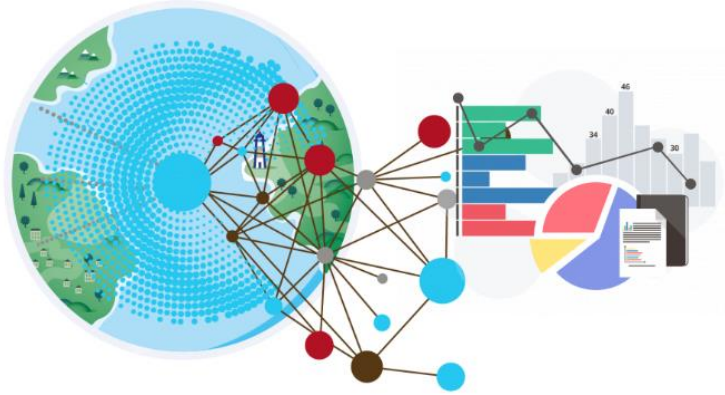
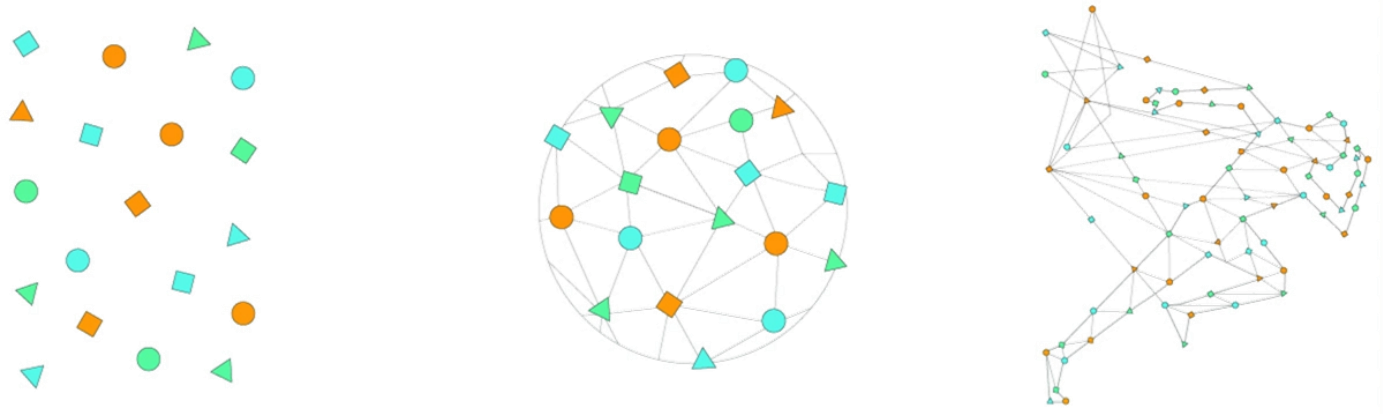
License information was derived automatically

Area covered

Conclusion

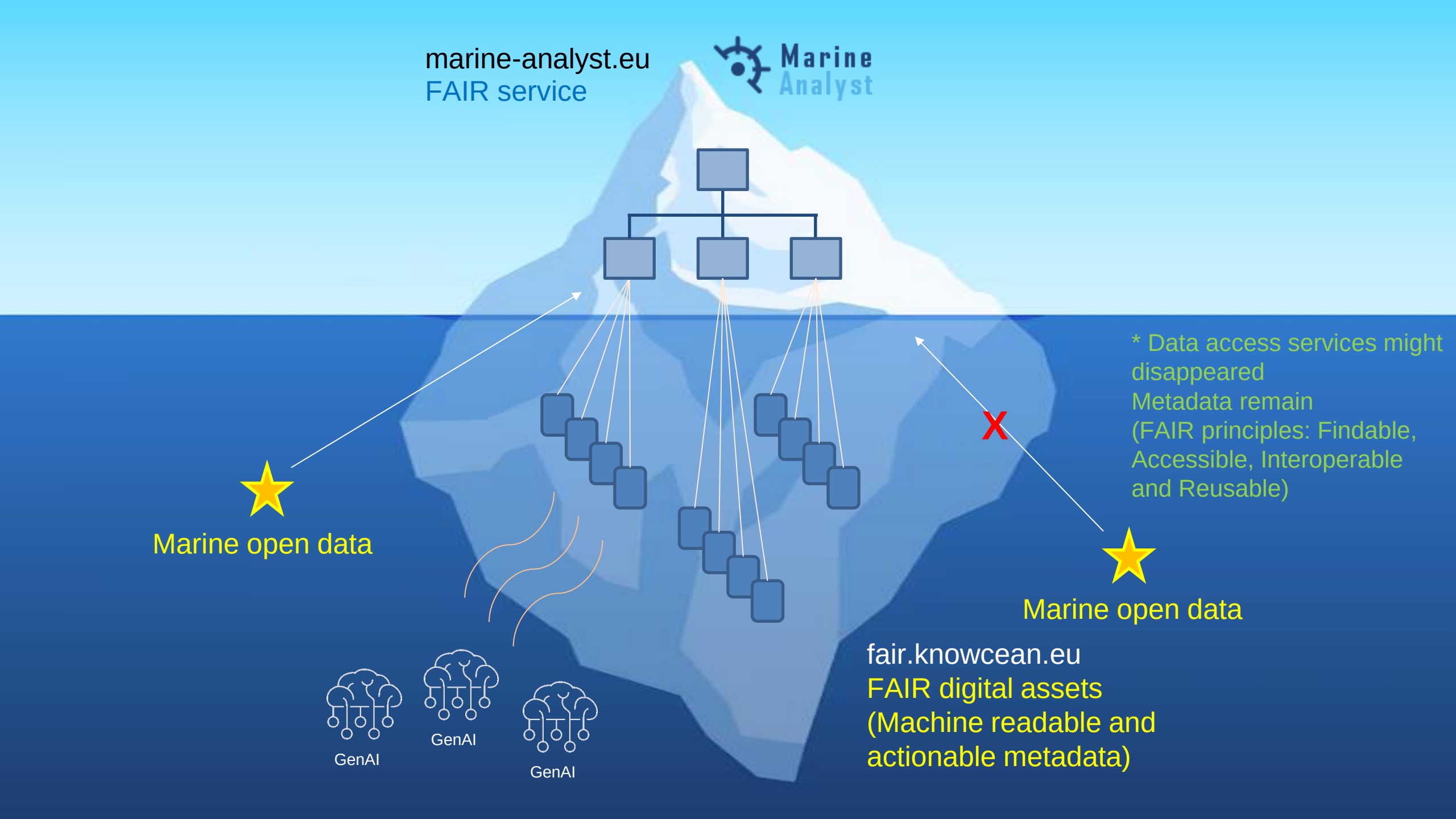
From open data, to information, to knowledge





Data → Information → Knowledge

https://knowmax.ai/blog/data-vs-information-vs-knowledge/


marine-analyst.eu
FAIR service
Marine Analyst
Marine open data
* Data access services might disappeared
Metadata remain
(FAIR principles: Findable, Accessible, Interoperable and Reusable)
X
Marine open data
fair.knowcean.eu
FAIR digital assets
(Machine readable and actionable metadata)
GenAI
GenAI
GenAI

Press Review:

Innovating access to marine data: “Marine Analyst simplifies access to datasets and analysis tools for the marine environment.”

WEKEO news: “Marine Analyst: facilitating access to marine data in an innovative way.”

Eumetsat: “Data in Action: Innovative platform to access complex marine data.”

Marine Copernicus use cases: “From open data to marine knowledge: A service for augmented data access and reproducible data analysis.”

Thank you

Pascal Derycke
Contact: my-beach@knowcean.eu
www.linkedin.com/in/marine-analyst
http://marine-analyst.eu

Digital Twin of the Southern Baltic Sea

An initiative for smarter, data-driven coastal management in Poland

Photo:
E: hello@baltyk.co
FB: www.fb.com/Baltyk.co
IG: www.instagram.com/baltyk_co

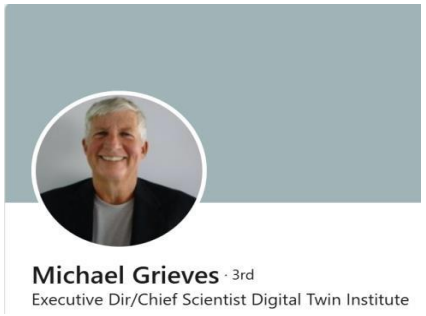
On April 11, 1970, Apollo 13 lifted off for the moon with Commander Jim Lovell, Command Module Pilot Jack Swigert and Lunar Module Pilot Fred Haise aboard. Two days later, with the spacecraft well on its way to the moon, an oxygen tank exploded, scrubbing the lunar landing and putting the crew in jeopardy.

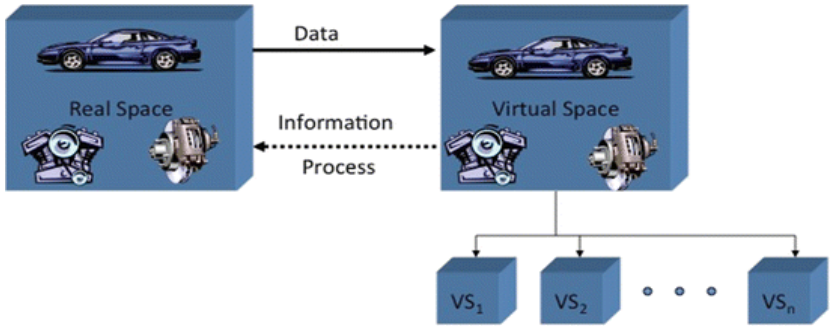
Okay, Houston, we've had a problem here.

Origin of the Digital Twin

2002 – Prof. Michael Grieves formally initiates the idea of digital twin

Conceptual Ideal for PL, Dr. Michael Grieves, University of Michigan, Lurie Engineering Center, Dec 3, 2002





M. Grieves and J. Vickers: Digital Twin: Mitigating Unpredictable, Undesirable Emergent Behavior in Complex Systems, July 2017, In book: Transdisciplinary Perspectives on Complex Systems by Springer.

The idea of the Digital Twin is to be able to design, test, manufacture, and use the virtual version of the systems

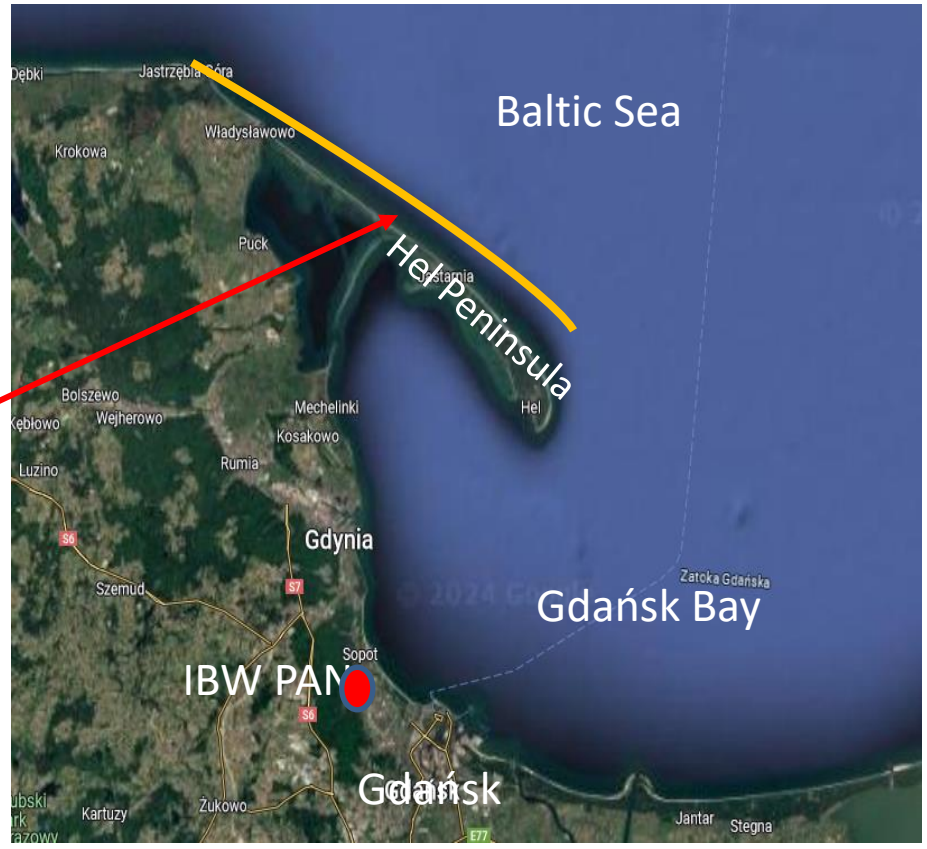
Digital information of a system is a „twin” of the information of its physical representative

What is a Digital Twin?

Digital replica of real-world systems
powered by real-time data.

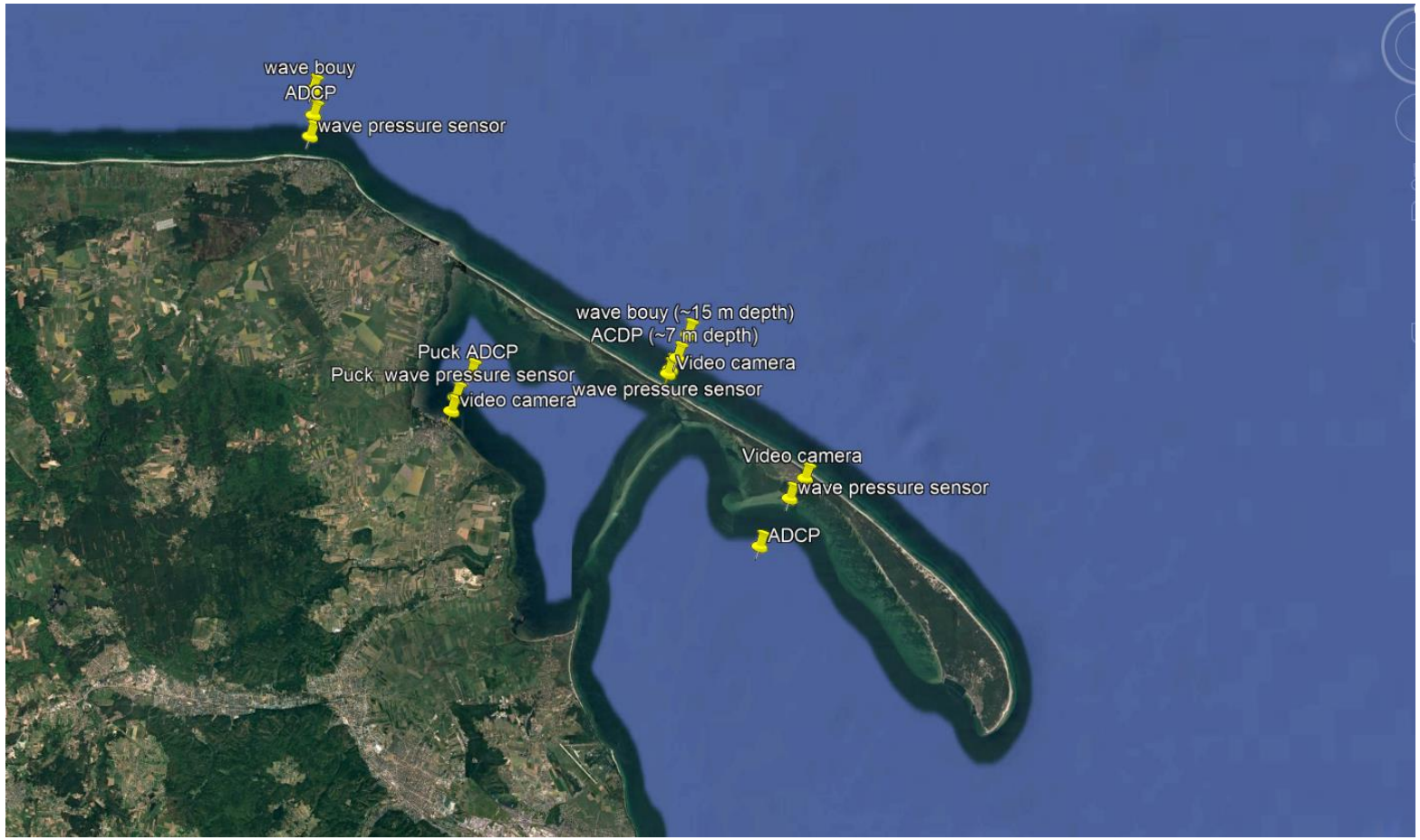
Hel Peninsula monitoring: pilot case

Why Hel Peninsula is an ideal testbed
for Digital Twin of marine environment development ?



Measurement Infrastructure

Sensors, buoys, cameras, and weather stations



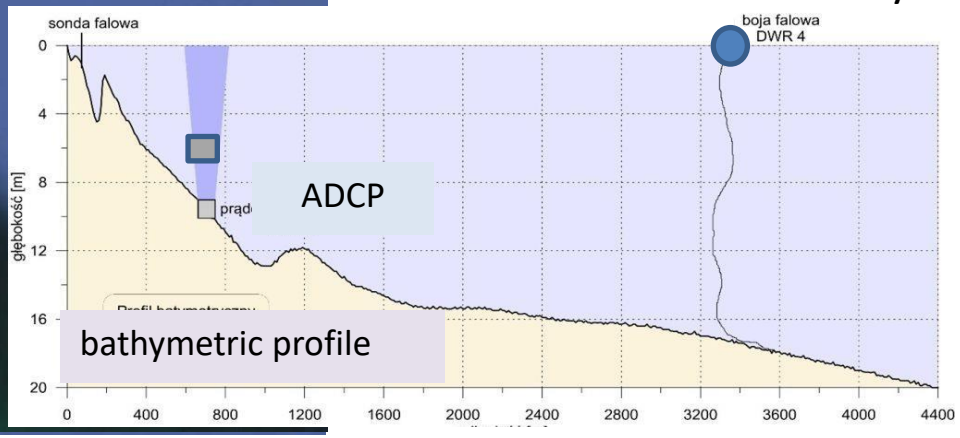
Measurement Infrastructure

Sensors, buoys, cameras, and weather stations

Measurement Infrastructure

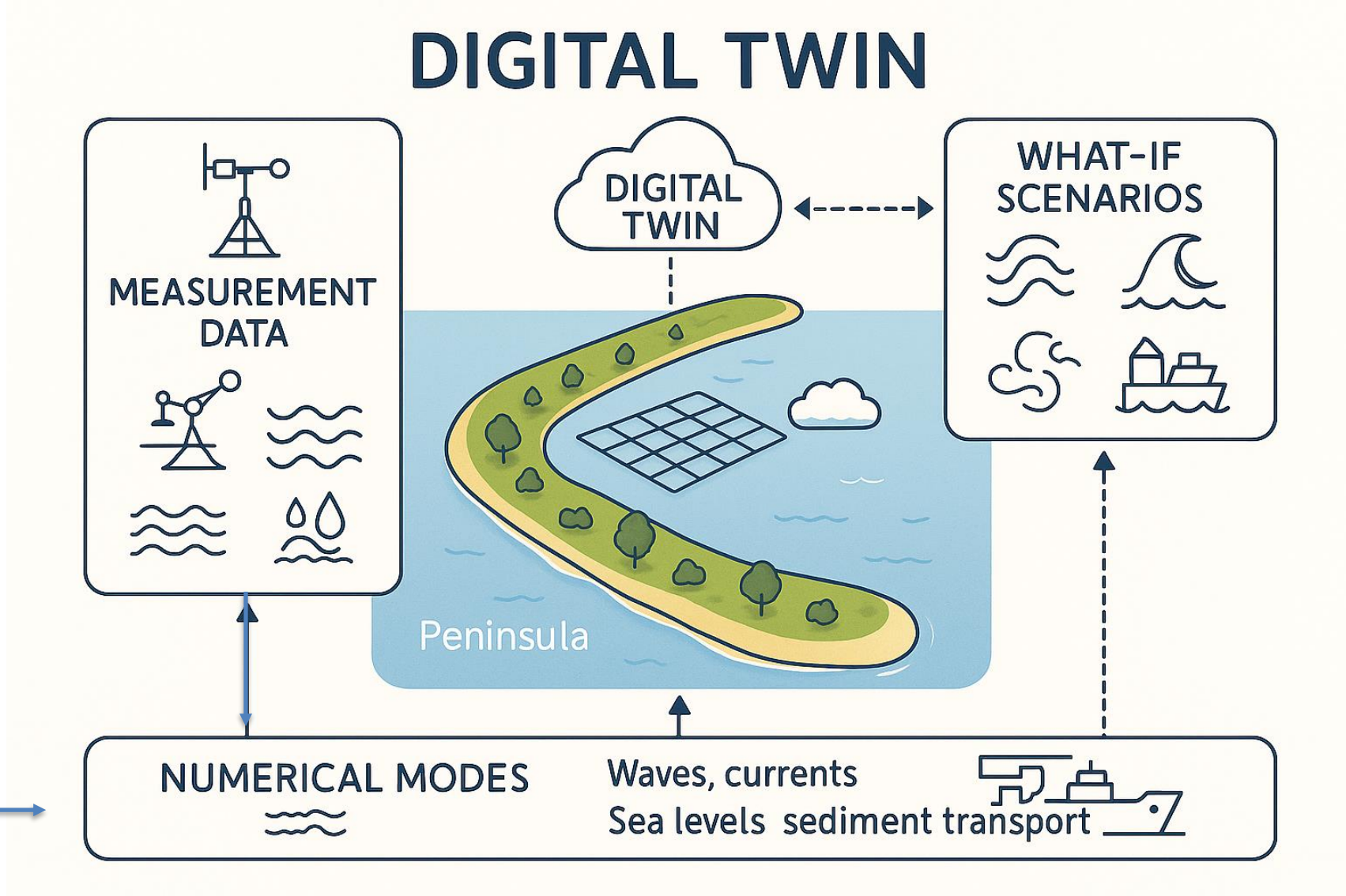
Sensors, buoys, cameras, and weather stations

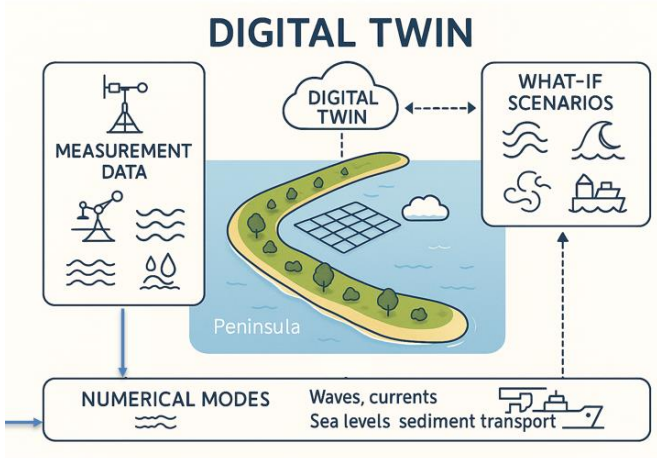
waverider bouy



EXTERNAL
OPEN DATABASES

- Atmosphere
- Sea



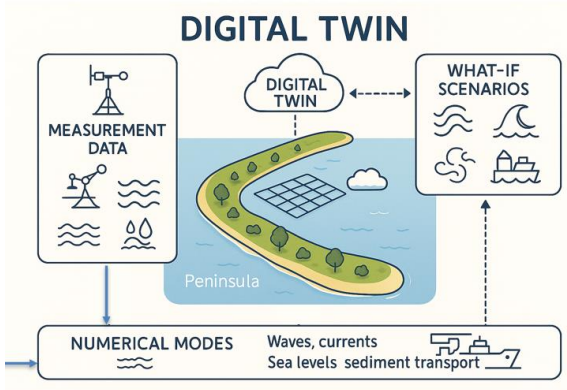


Hydrodynamic monitoring of the Hel Peninsula

Numerical modelling

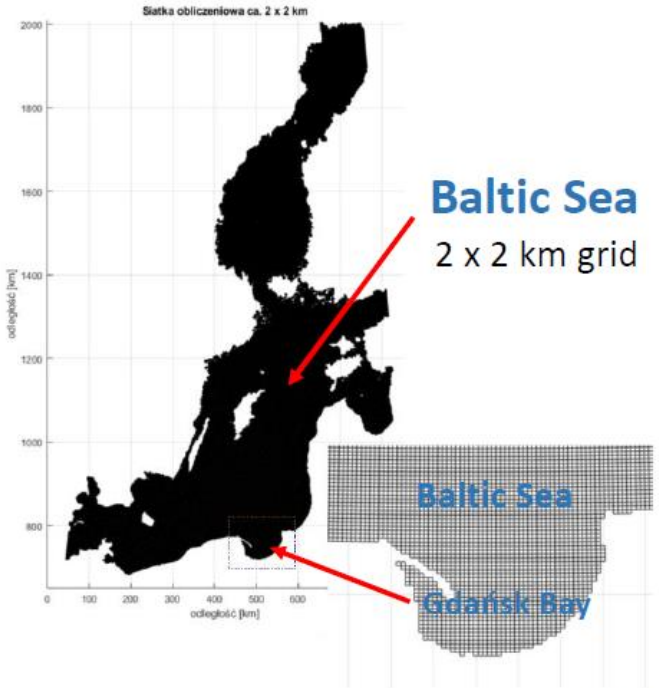
- **Input:** 48 hour wind and pressure forecast from ECMWF

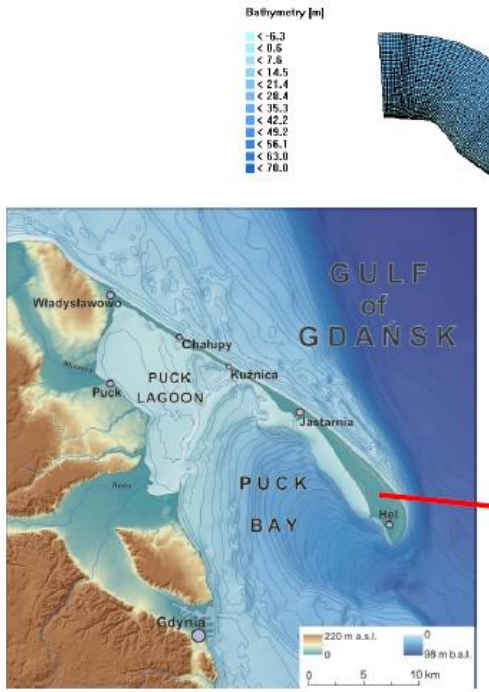
  (European Centre for Medium-Range Weather Forecasts)
- **Waves** by **SWAN** (Simulating WAves Nearshore) –TU Delft
- **Currents and water levels** by **Delft3D** - Deltares
- **Waves in port basins** by **semi-analytical model** (M. Paprota, 2019, IBW PAN)
- **Nearshore currents and sediment transport** by **LONG-CUR** (IBW PAN)
- **Shoreline and coast evolution** by **XBeach** model - Deltares

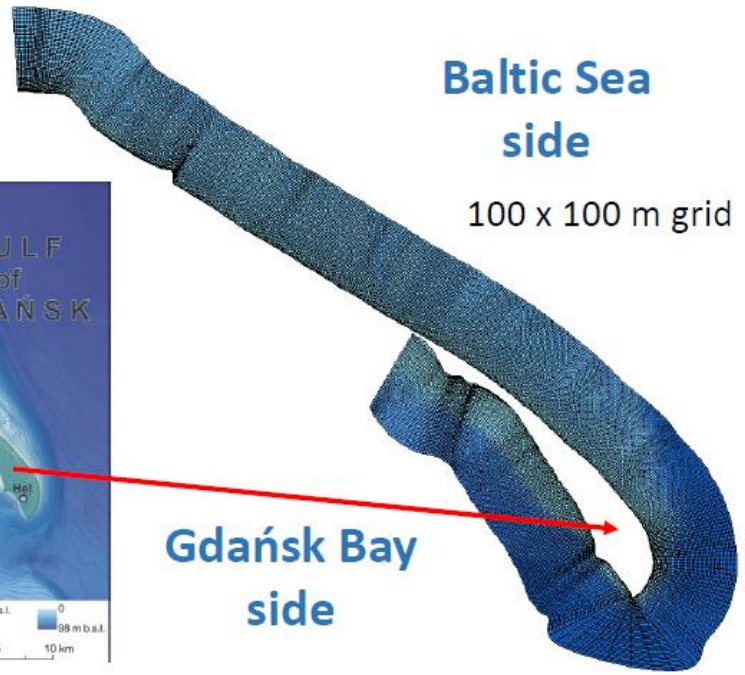


Hydrodynamic monitoring of the Hel Peninsula

Numerical modelling – grid nesting



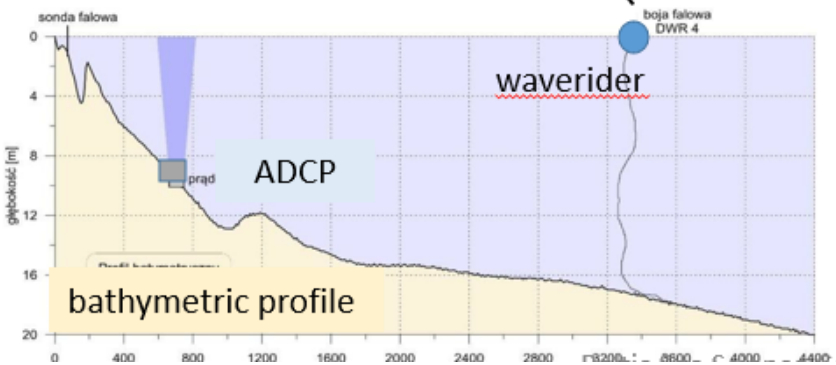


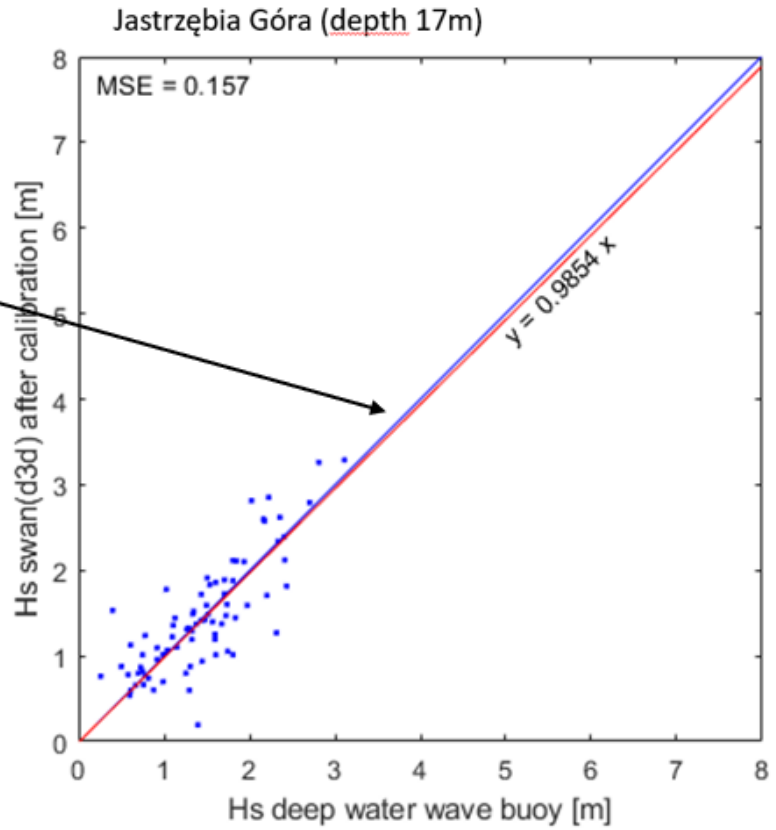


Models calibration – the real results

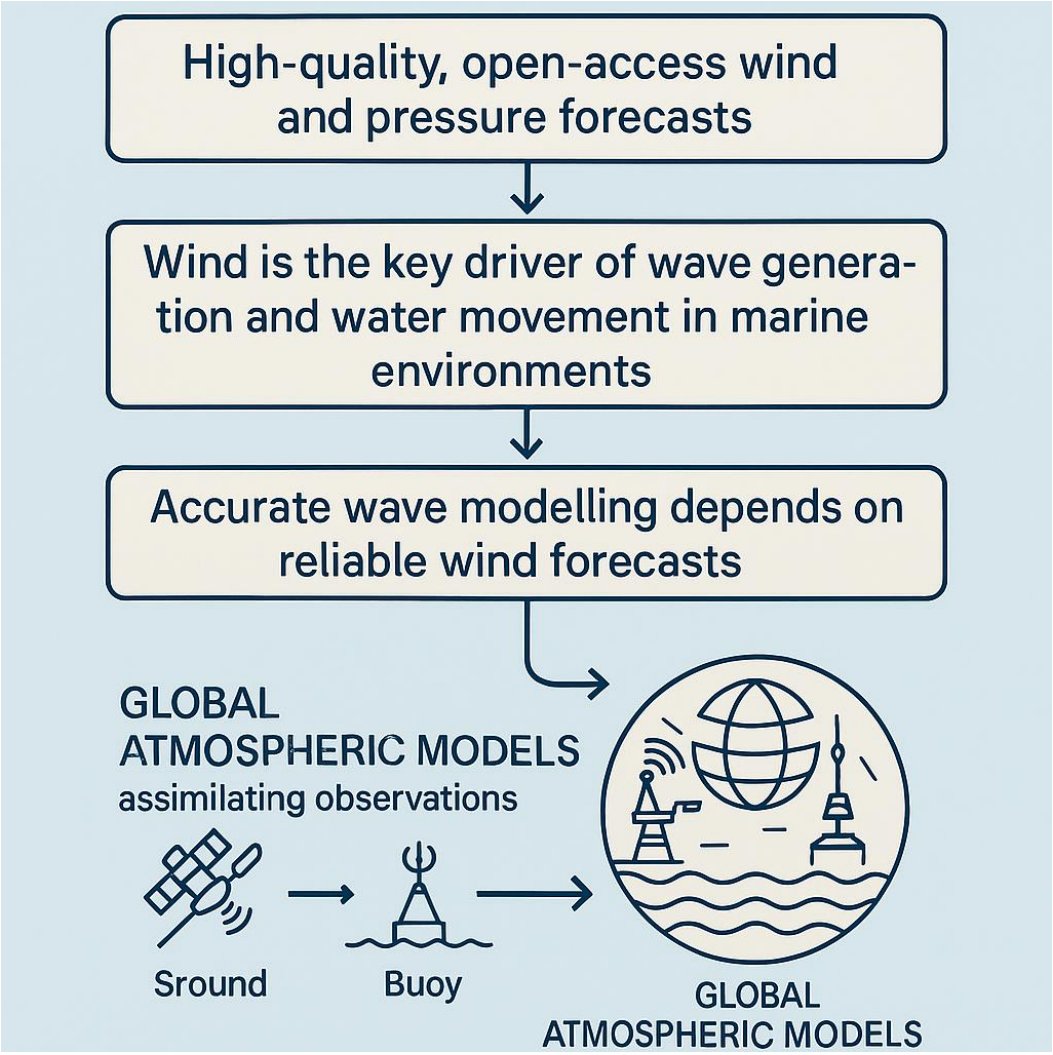
Hydrodynamic monitoring of the Hel Peninsula

Numerical modelling: SWAN model calibration





Open Data for Numerical Modeling

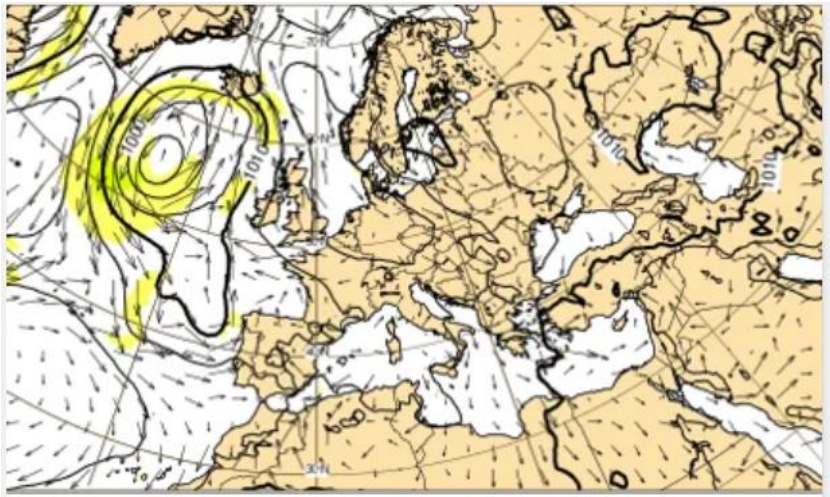


European Centre for Medium-Range Weather Forecasts provides high-quality, open-access wind and pressure forecasts.

ECMWF forecasts are generated using global atmospheric models assimilating observations from satellites, ground stations, aircraft, and buoys.

Open access available via:
https://www.ecmwf.int/en/forecasts/datasets/open-data

Licensing: Open data under the ECMWF Open Data License (free for commercial and non-commercial use with attribution).



Latest forecast

10 m wind and mean sea level pressure

The surface wind is influenced by the roughness of the earth's surface and is likely to be less strong, and a little backed (in the northern hemisphere) or veered (in the southern hemisphere)...

jupyter github launch binder Open in Cola

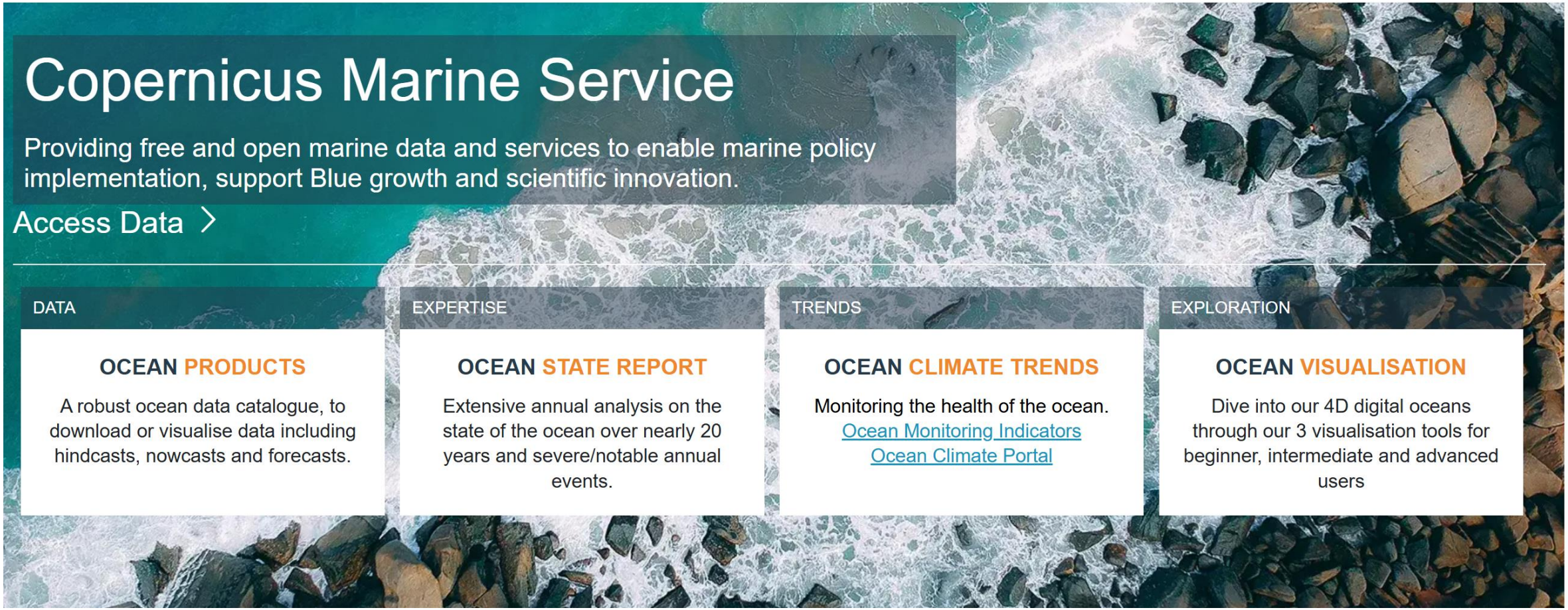
Open real-time data can be accessed free of charge via the public FTP.

IBW PAN
EST. 1953

Copernicus Europe's eyes on Earth

Copernicus Marine Service

Services Opportunities Access Data Use Cases User Corner About



Copernicus Marine Service

Providing free and open marine data and services to enable marine policy implementation, support Blue growth and scientific innovation.

Access Data >

DATA	EXPERTISE	TRENDS	EXPLORATION
OCEAN PRODUCTS	**OCEAN STATE REPORT**	**OCEAN CLIMATE TRENDS**	**OCEAN VISUALISATION**
A robust ocean data catalogue, to download or visualise data including hindcasts, nowcasts and forecasts.	Extensive annual analysis on the state of the ocean over nearly 20 years and severe/notable annual events.	Monitoring the health of the ocean. Ocean Monitoring Indicators Ocean Climate Portal	Dive into our 4D digital oceans through our 3 visualisation tools for beginner, intermediate and advanced users

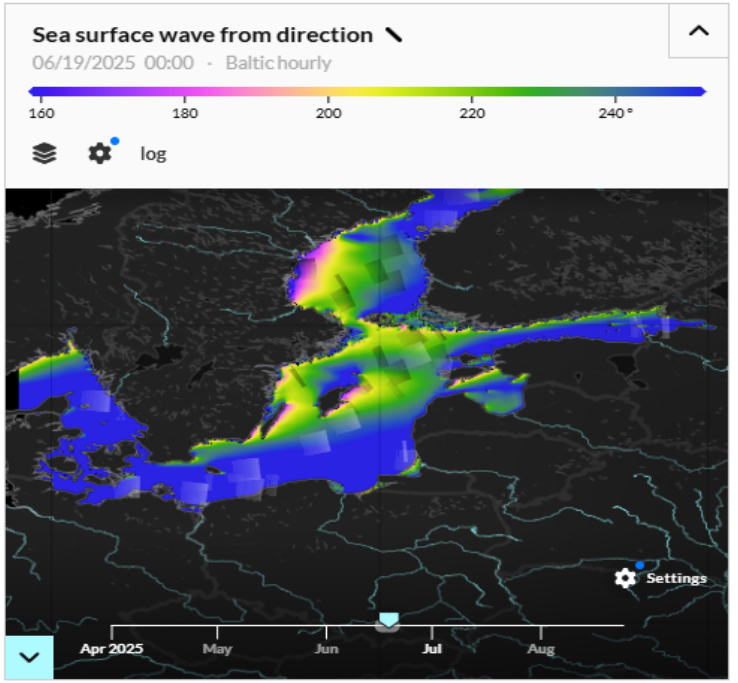
Baltic Sea Wave Analysis and Forecast

DOI
10.48670/moi-00011

Overview

This Baltic Sea wave model product provides forecasts for the wave conditions in the Baltic Sea. The Baltic forecast is updated twice daily from a 00Z production proving a 10 days forecast and from a 12Z production providing a 6 days forecast. Data are provided with hourly instantaneous data for significant wave height, wave period and wave direction for total sea, wind sea and swell, the Stokes drift, and two paramters for the maximum wave. The product is based on the wave model WAM cycle 4.7. The wave model is forced with surface currents, sea level anomaly and ice information from the Baltic Sea ocean forecast product (BALTICSEA_ANALYSISFORECAST_PHY_003_006). The product grid has a horizontal resolution of 1 nautical mile. The area covers the Baltic Sea including the transition area towards the North Sea (i.e. the Danish Belts, the Kattegat and Skagerrak).

DOI (product):
https://doi.org/10.48670/moi-00011



Explore in MyOcean Pro

Copernicus Marine Data
Baltic Sea Wave Forecasts

Copernicus Marine Service offers global and regional model outputs for marine conditions.

↓

The “Baltic Sea Wave Forecast” product provides open access to numerical wave model data.

↓

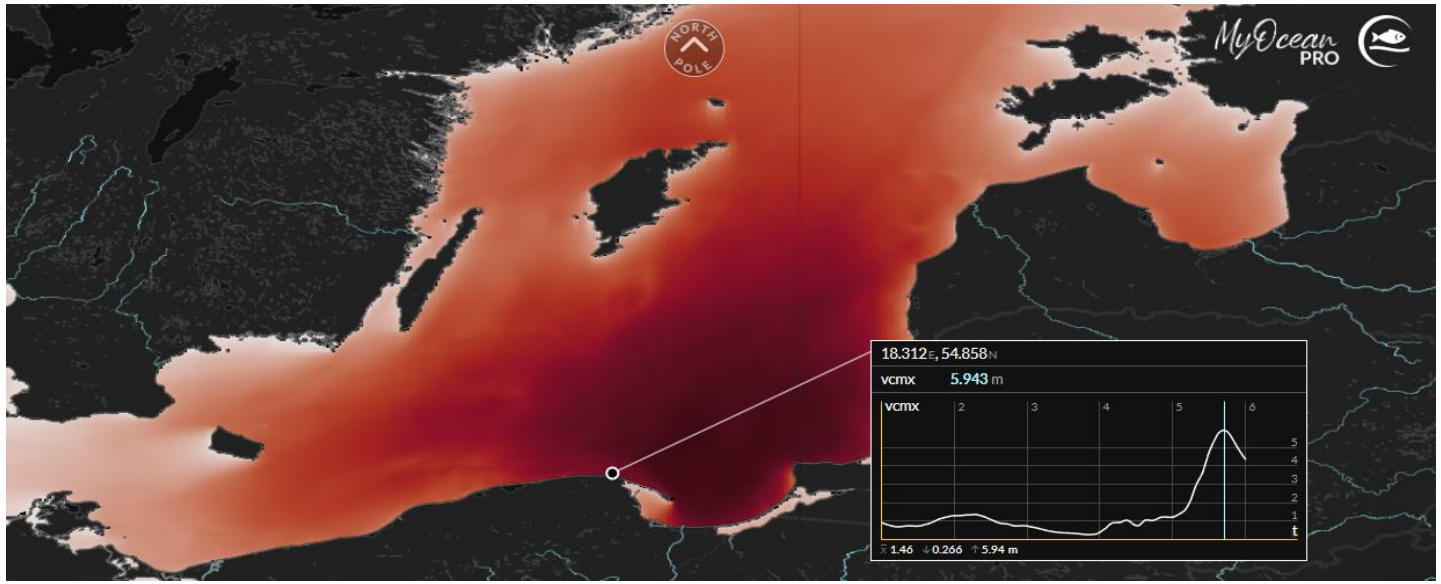
Model resolution: ~2 km horizontal grid spacing

↓

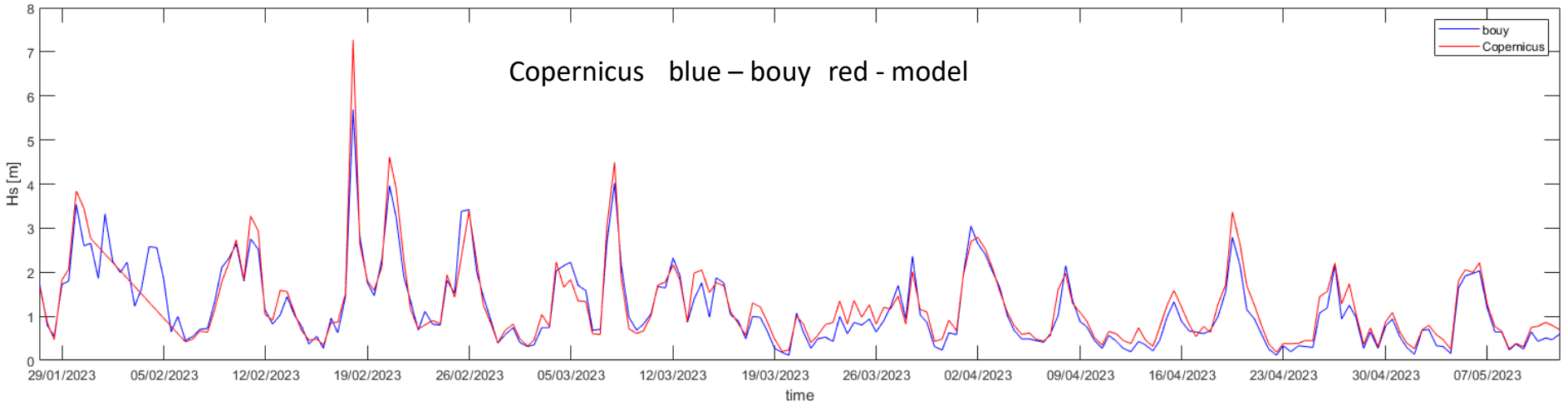
Source: https://marine.copernicus.eu (search for ‘Baltic Sea Wave Forecast’)

↓

These data are validated and quality-controlled, serving as a reference for our high-resolution coastal models.



First step


Copernicus blue – bouy red - model
bouy
Copernicus
Hs [m]
time
29/01/2023
05/02/2023
12/02/2023
19/02/2023
26/02/2023
05/03/2023
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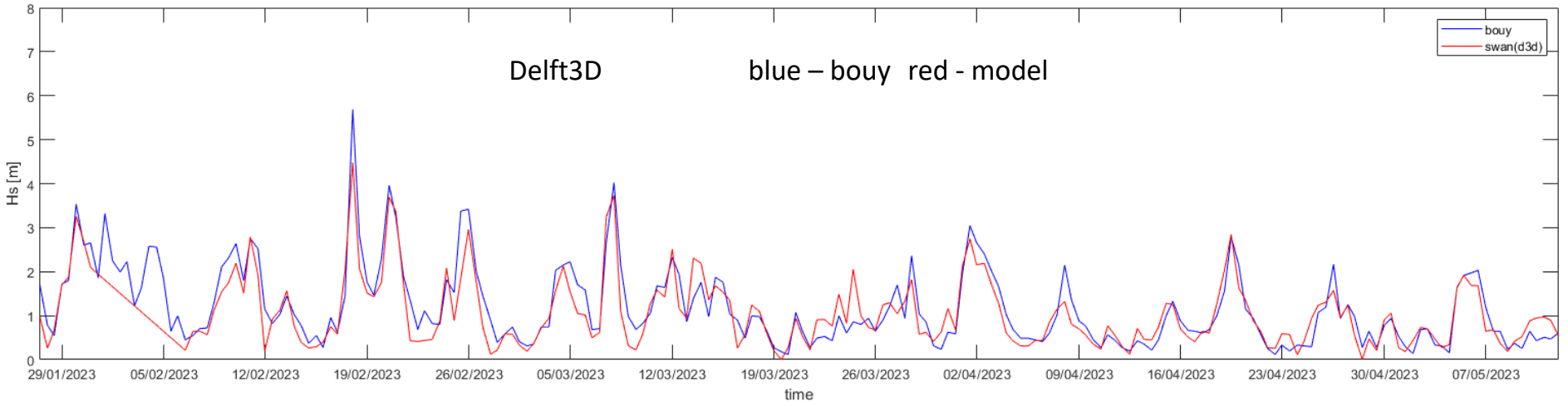
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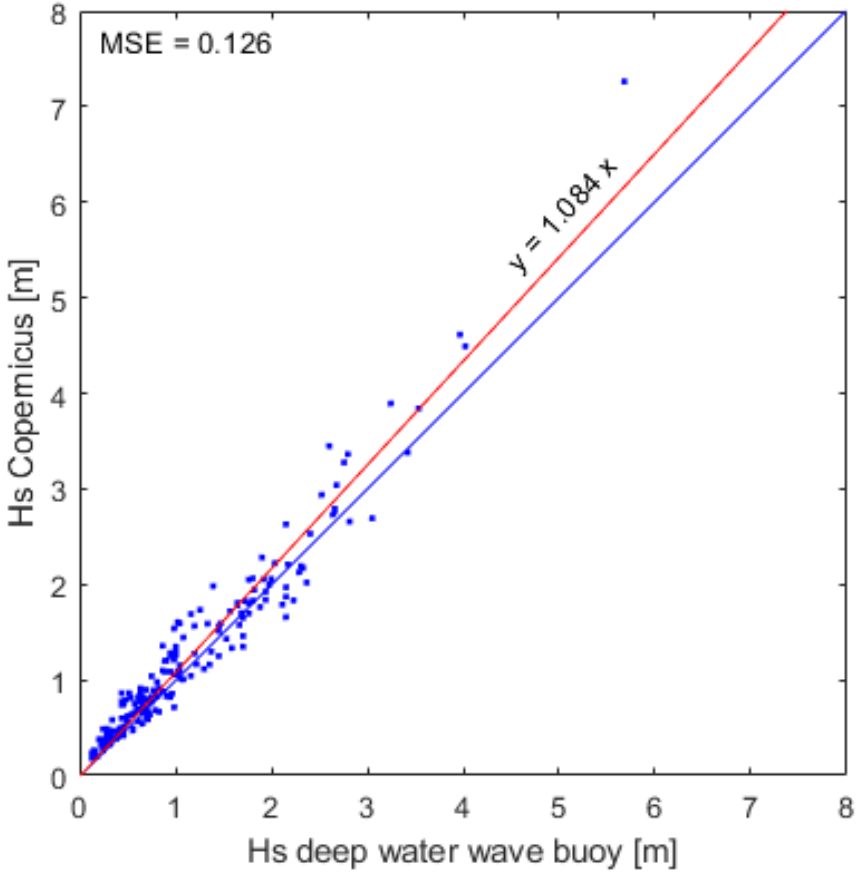
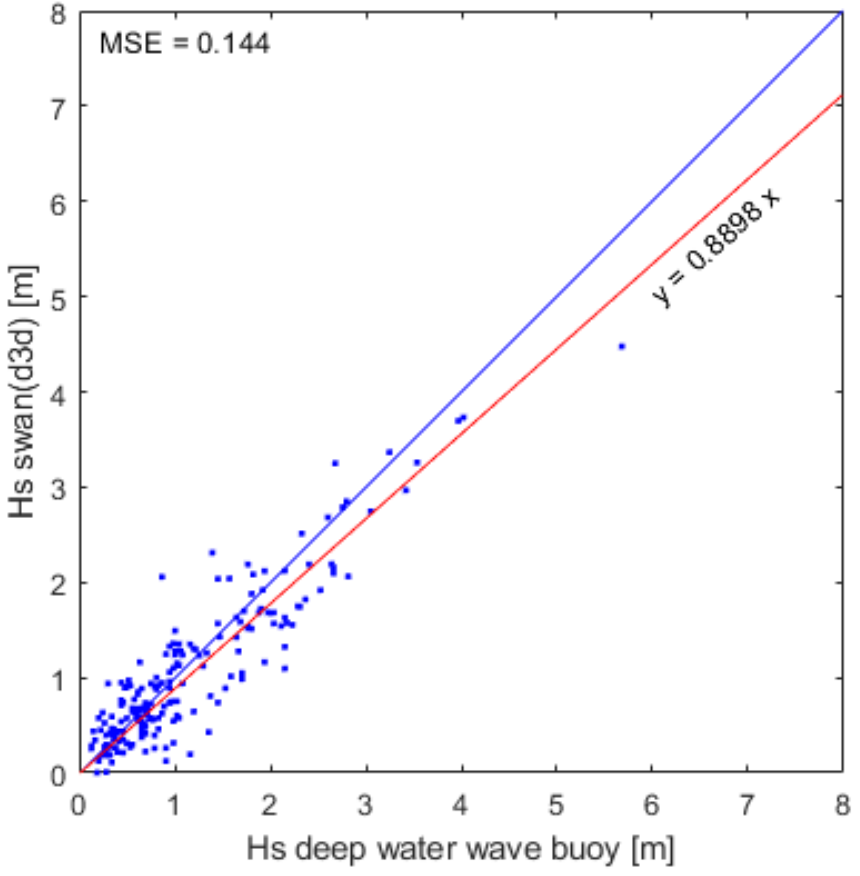
MODEL CALIBRATION - first step

Copernicus blue – 1:1 red – y = ax

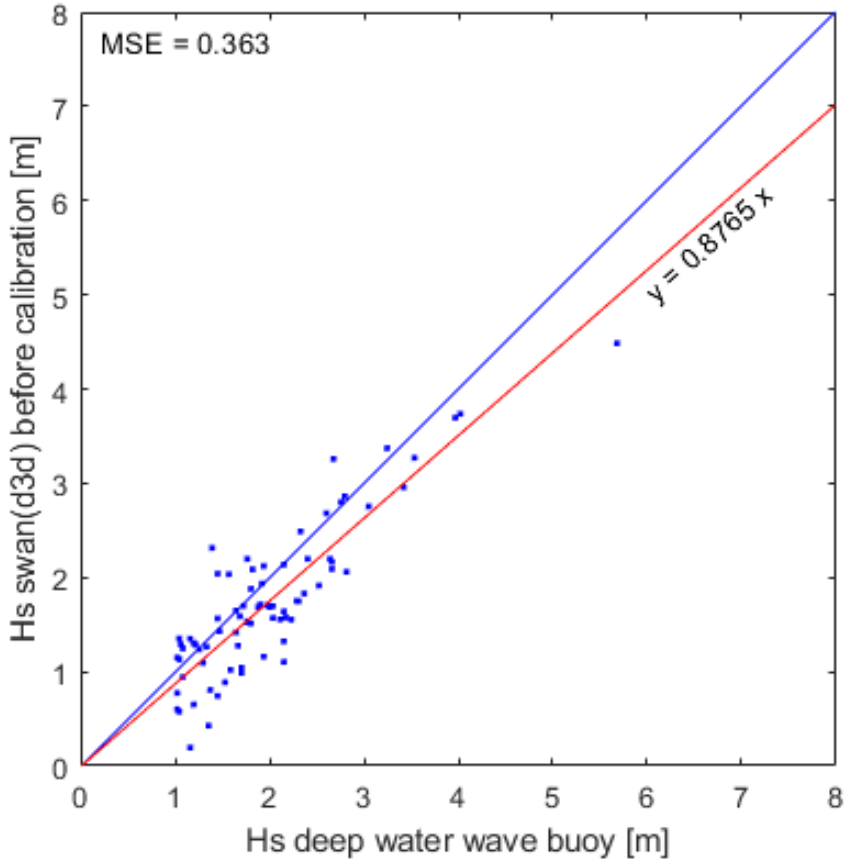


Delft3D blue – 1:1 red – y = ax

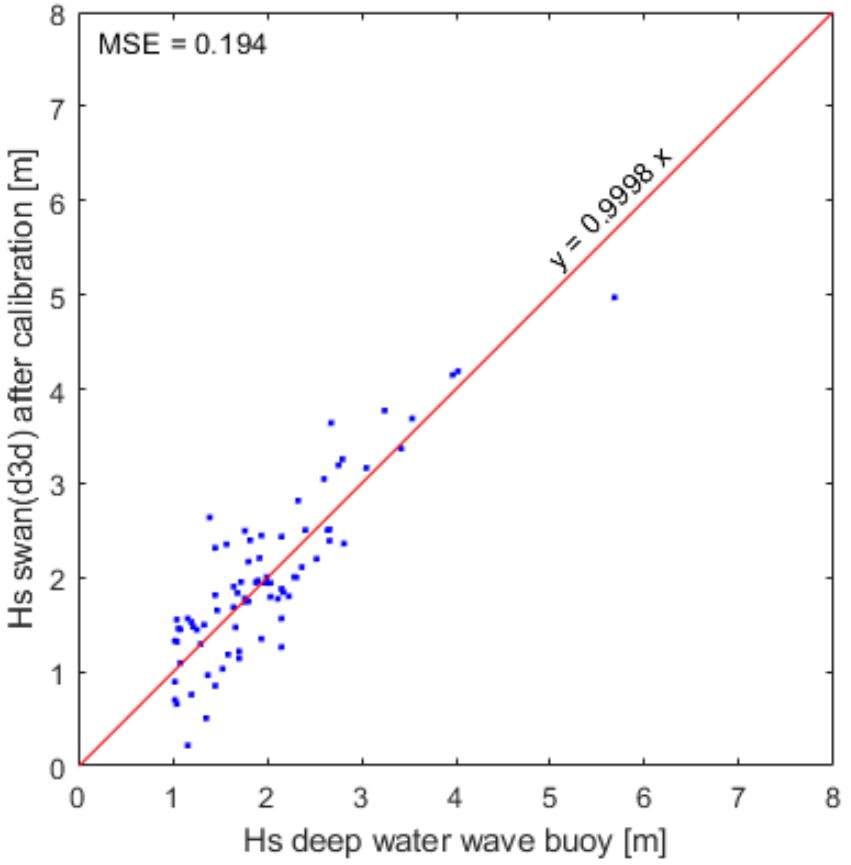


MODEL CALIBRATION - first step

Before calibration (deep water wave buoy 54m)

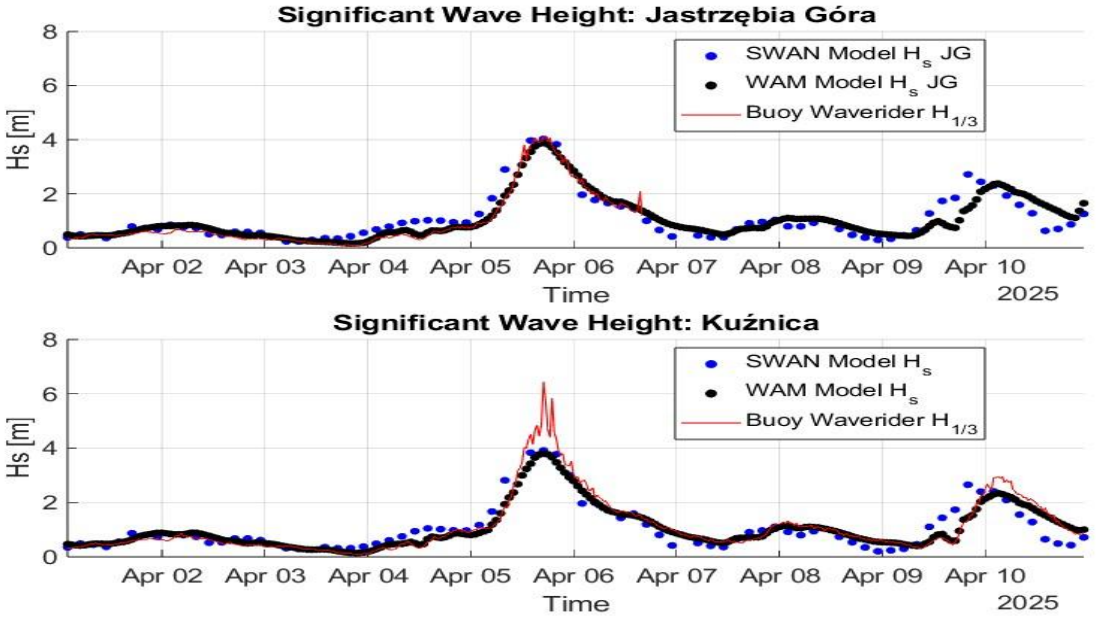


After calibration (deep water wave buoy 54m)



SWAN model validation

Case study – storm 5th April 2025



Stakeholders

Stakeholders

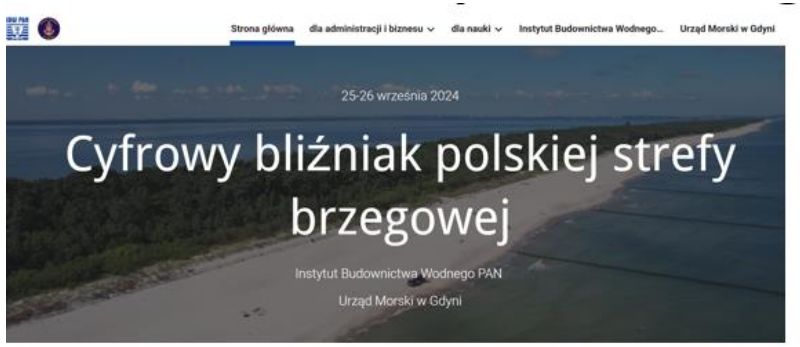
the Maritime Office in Gdynia

the Maritime Office in Szczecin

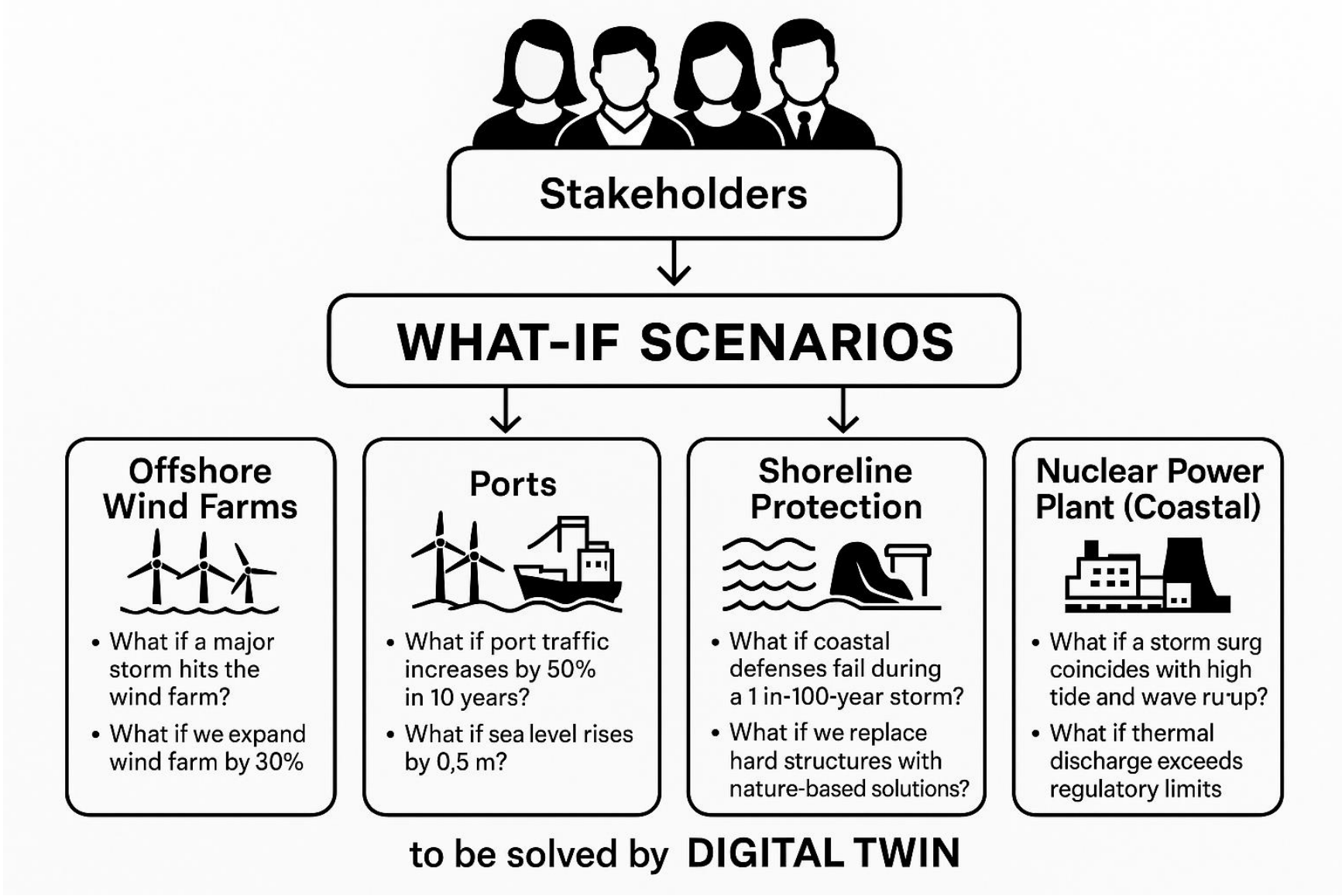
The Ministry of Infrastructure

the Spatial Information System of the Maritime Administration (SIPAM)

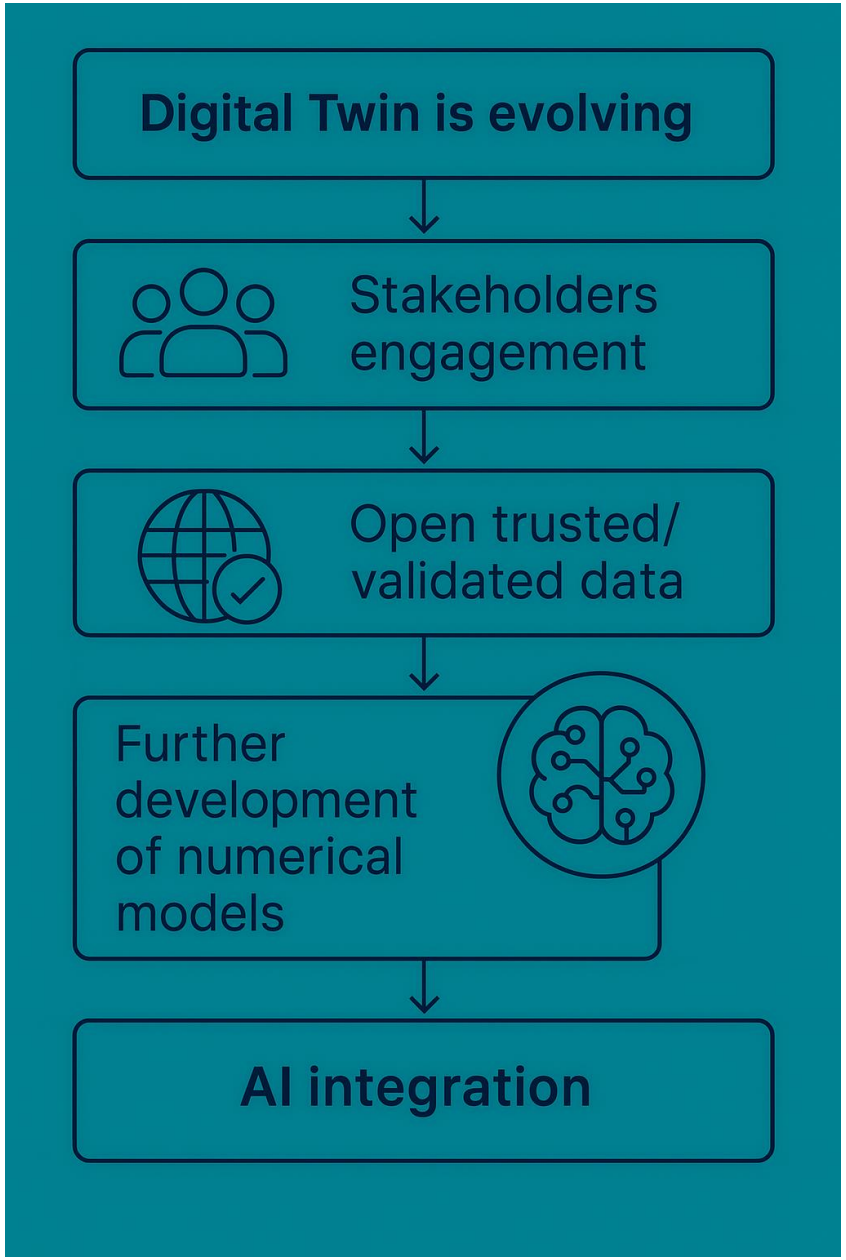
Growing Polish Maritime Industry (ports, offshore wind)



Baltic Sea Science Congress, 26-30 May 2025, Sopot, Poland


Stakeholders
WHAT-IF SCENARIOS
Offshore Wind Farms
• What if a major storm hits the wind farm?
• What if we expand wind farm by 30%
Ports
• What if port traffic increases by 50% in 10 years?
• What if sea level rises by 0,5 m?
Shoreline Protection
• What if coastal defenses fail during a 1 in-100-year storm?
• What if we replace hard structures with nature-based solutions?
Nuclear Power Plant (Coastal)
• What if a storm surg coincides with high tide and wave ru·up?
• What if thermal discharge exceeds regulatory limits
to be solved by DIGITAL TWIN

Summary


Digital Twin is evolving
Stakeholders engagement
Open trusted/ validated data
Further development of numerical models
AI integration

Stay up-to-date on our
2025 activities!

data.europa academy

Register now for our next webinar!

data europa academy

Continue the discussion on our collaboration channel!

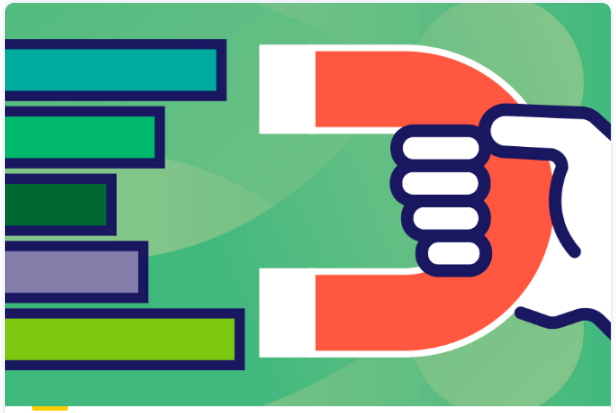
Collaboration channel

Connect with a vibrant community of data enthusiasts!

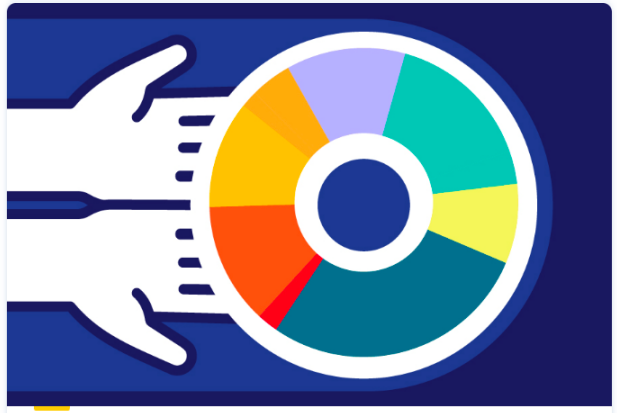
This space is designed for users to share ideas and exchange challenges and opportunities in the scope of the constantly evolving data landscape. You can join the group and topic you prefer, follow and be updated on ongoing conversations and participate in discussions on topics that matter to you.

Whether you are a data provider or a data reuser, you will find a dedicated space for collaboration where you can foster meaningful discussions.

If you are an official data provider, you can request access to this restricted forum, and we will carefully analyse your request. If you are a data reuser, you can join and will have direct access to this community to connect and engage with other members.



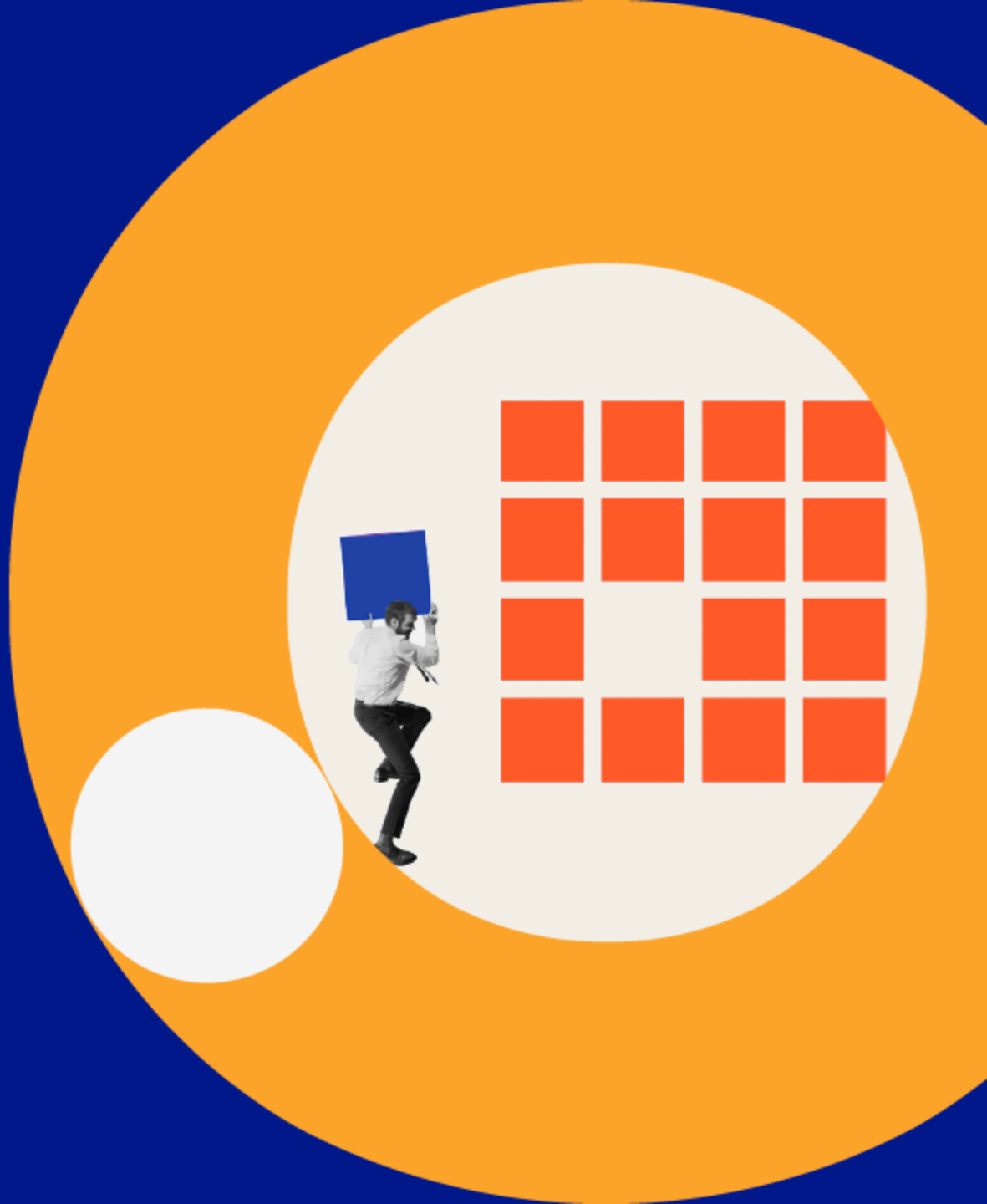
Data reusers



Data providers

data europa academy

Your opinion is important to us!



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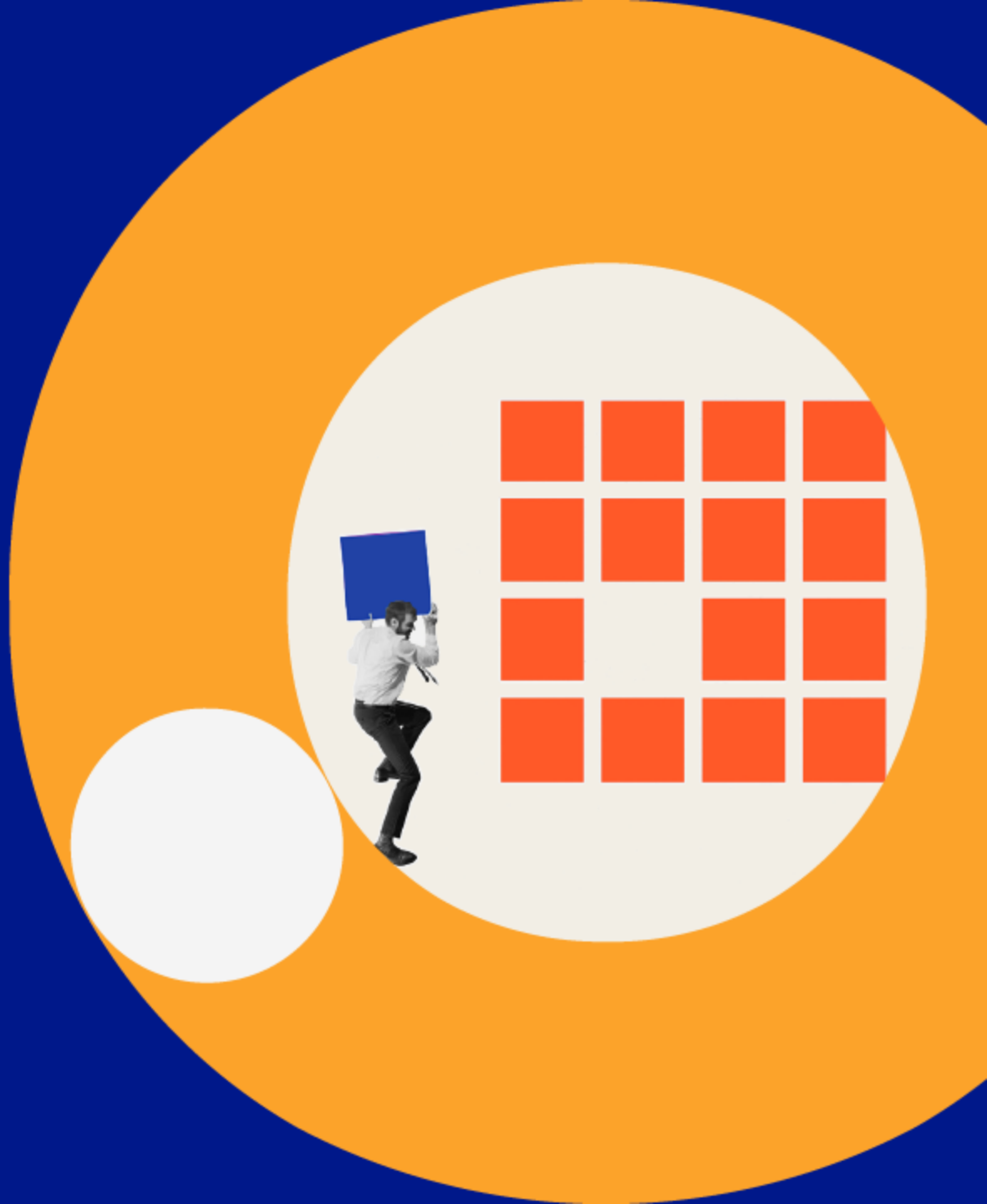
Thank you!



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