



DATA FOR THE UN OCEAN DECADE

A EUROPEAN FOCUS

Matching Copernicus Marine Service Data To Challenges



PROGRAMME OF THE
EUROPEAN UNION

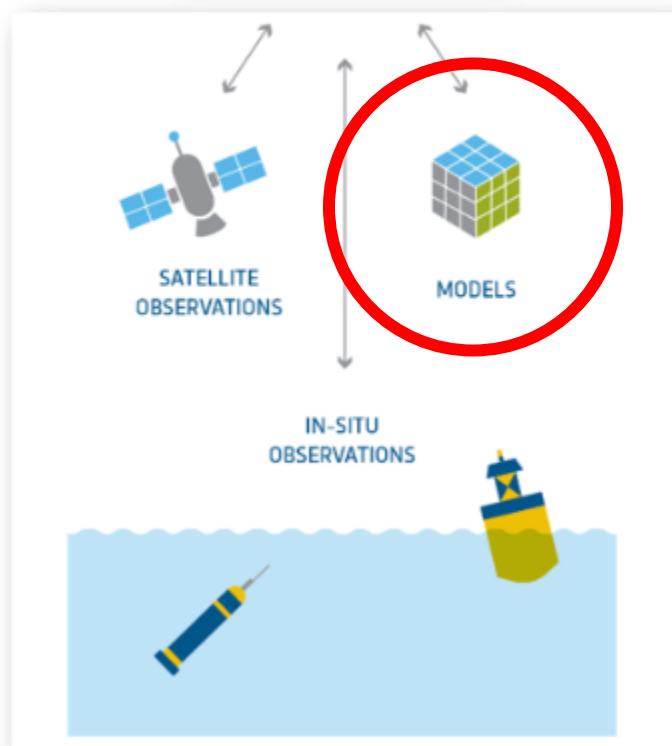


In collaboration with
the UN OD Data
Coordination Office



Copernicus Marine Service offer

DATA SOURCES



TEMPORAL COVERAGE



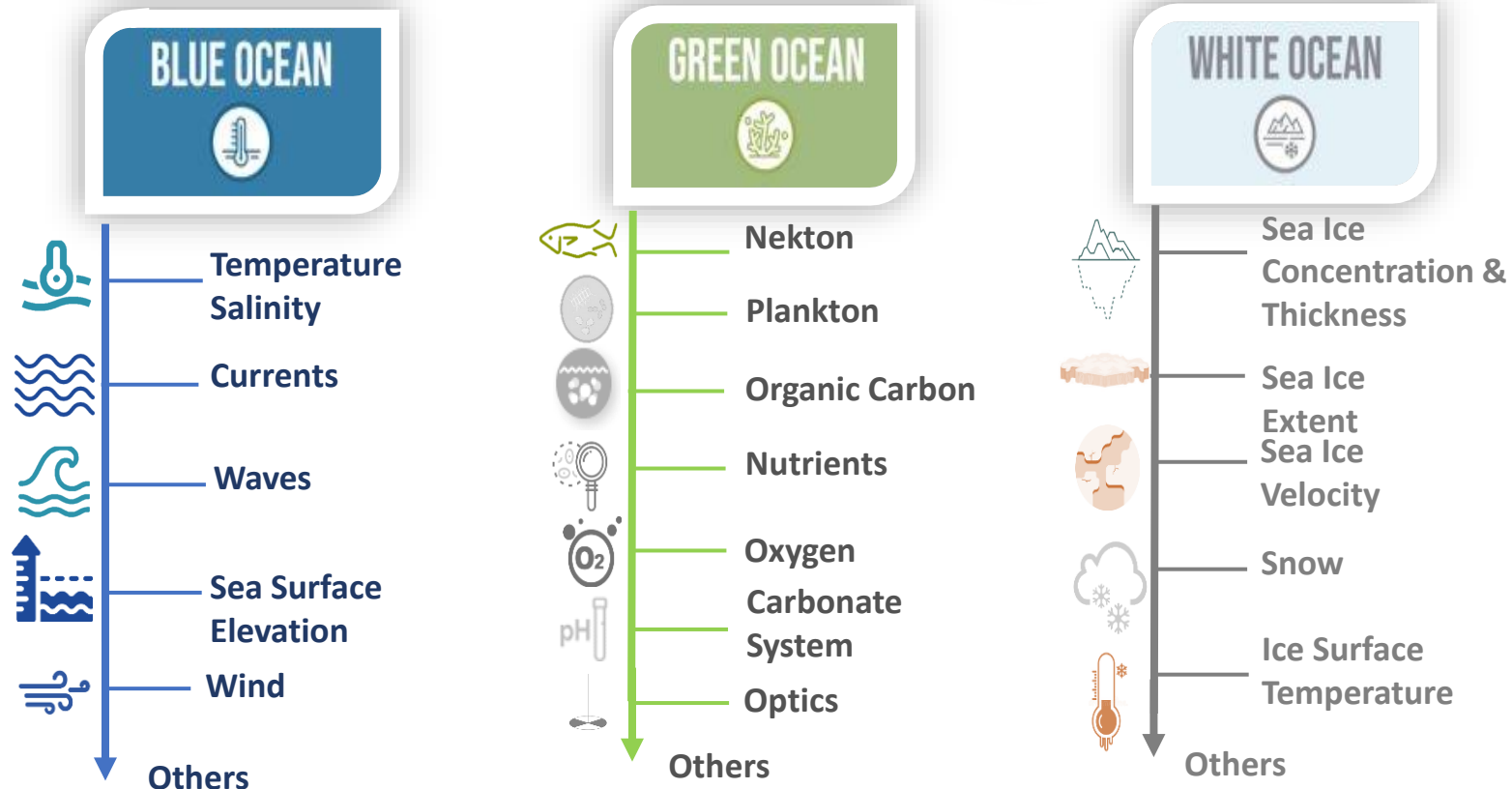
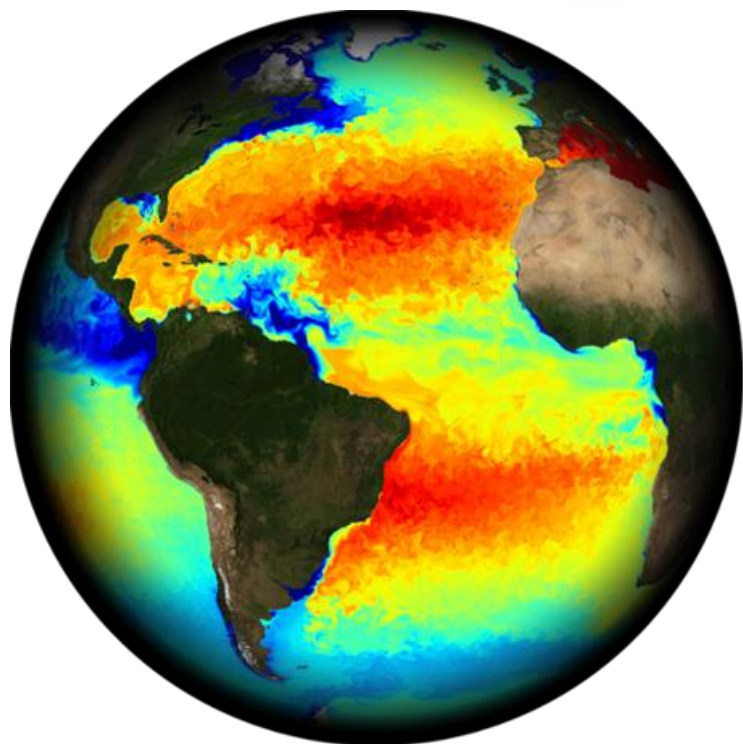
GEOGRAPHICAL COVERAGE

COPERNICUS MARINE REGIONAL OCEAN PRODUCT DIVISIONS

- ① Global Ocean
- ② Arctic Ocean
- ③ Baltic Sea
- ④ European North West Shelf Seas
- ⑤ Iberian Biscay Ireland Seas
- ⑥ Mediterranean Sea
- ⑦ Black Sea



Copernicus Marine Service offer



One single access point

Copernicus Marine Data Store

Home > Marine Data Store

Filters

FREE-TEXT SEARCH

Free text

TIME RANGE ▲

jj/mm/aaaa

jj/mm/aaaa

Covering full interval

WITH DEPTH 36

DEPTH RANGE ▲

UNIVERSE ▲

Blue Ocean 199

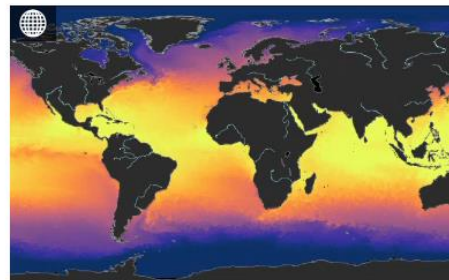
White Ocean 40

Green Ocean 78

MAIN VARIABLES ▲

Products 284*

MOST POPULAR



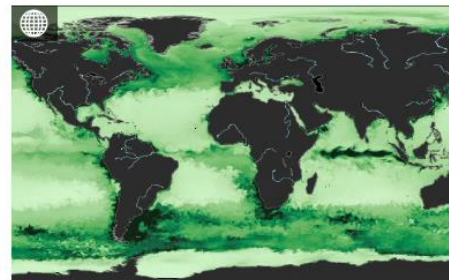
Global Ocean Physics Analysis and Forecast

GLOBAL_ANALYSISFORECAST_P... 001_024
Models

Global, 0.083° × 0.083° × 50 levels

1 Jan 2019 to 14 Oct 2024, hourly, daily,...

Temperature, salinity, sea surface height



Global Ocean Biogeochemistry Analysis and Forecast

GLOBAL_ANALYSISFORECAST_B... 001_028
Models

Global, 0.25° × 0.25° × 50 levels

1 Oct 2021 to 11 Oct 2024, daily, monthly

Chlorophyll, nutrients, oxygen, carbonate

Online catalogue

marine.copernicus.eu

Nearly 300
scientifically qualified
products & Ocean
monitoring indicators

User driven

Common format
(Netcdf)

Open and Free



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Challenge 1 Understand and beat marine pollution

Pollution sources

Plastic

Oil spill

Pesticides and
fertilisers

Heavy metals

Toxic
chemicals

Sea Level



Waves

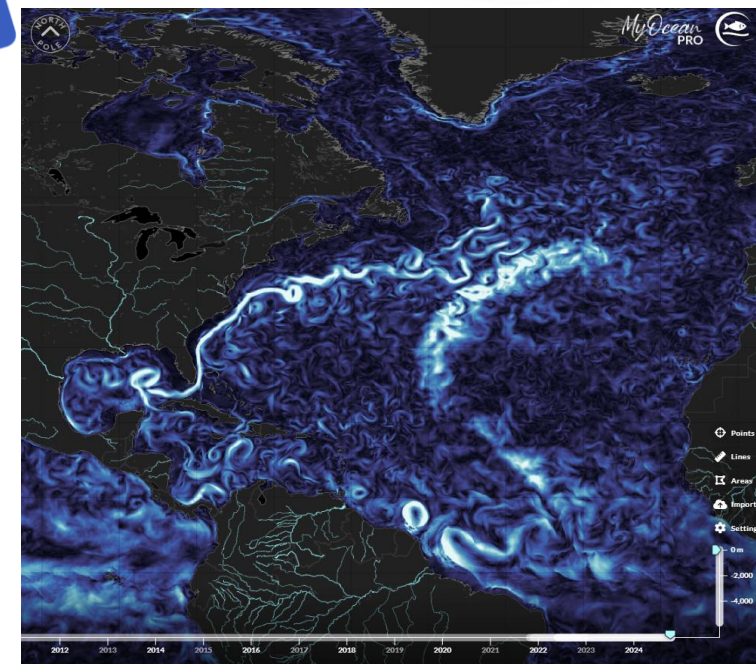
Currents



Chlorophyll-A



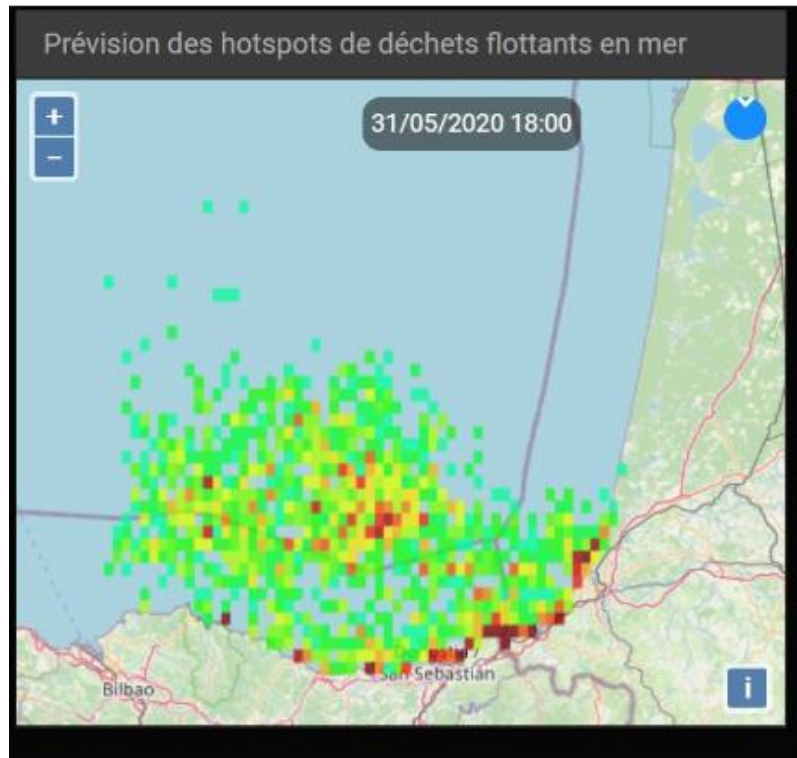
Temperature



Global Ocean Physics Analysis
and Forecast product

Challenge 1 Understand and beat marine pollution

FML-Track Floating Marine Litter Tracking in coastal areas



Monitors and tracks the origin and destination of marine litter across the coastal ocean by combining:

- Video monitoring
- Satellite imagery
- Metocean observation and modelling

Challenge 2 Protect and restore ecosystems and biodiversity

Ecosystems

Coral reefs

Mangroves

Coastline

MPAs

Polar

Deep sea

Oxygen



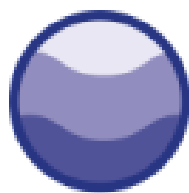
Acidity



Micronekton



Chlorophyll-A



Turbidity



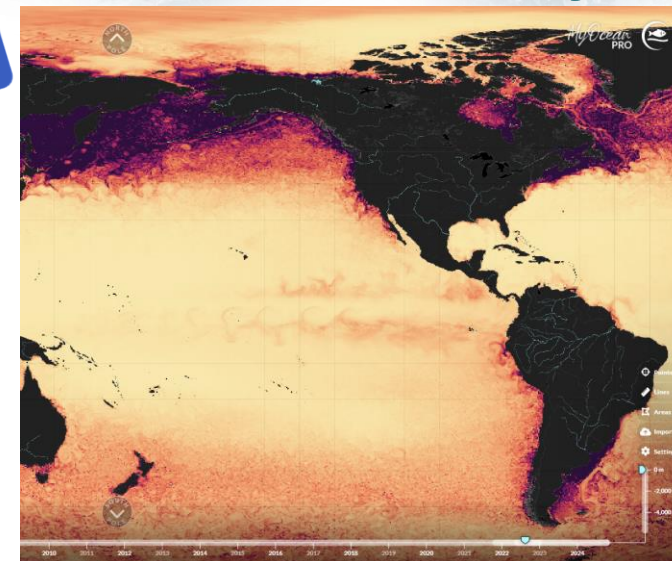
Temperature



Ocean Currents

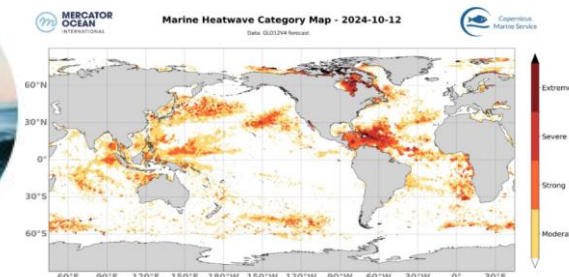


Salinity



Global ocean low and mid trophic levels
biomass content hindcast product

Forecasts for October 12th



PROGRAMME OF THE
EUROPEAN UNION

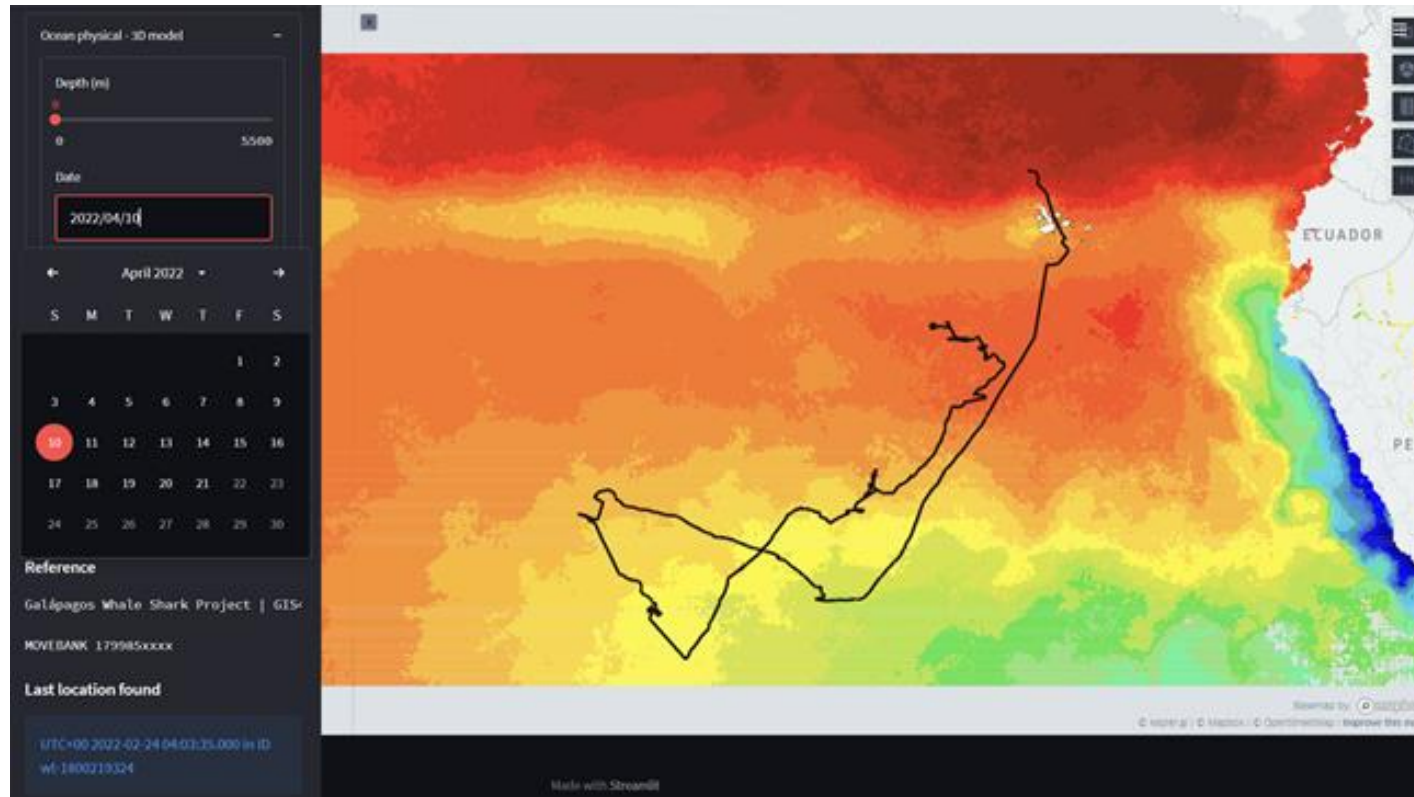


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Challenge 2 Protect and restore ecosystems and biodiversity

Wildlife Tracker for Oceans



Observes what may determine or affect the movements of marine megafauna through a cloud geo-framework that overlays:

- The tracks of marine megafauna
- Ocean bio-physical data layers

Challenge 5 Unlock ocean-based solutions for climate change

Ocean-based solutions

Ocean energy

Mangroves

Tidal marshes

Seagrass beds

Sustainable
marine food

Sustainable
ocean tourism

Sea Level



Currents



Chlorophyll-A



Waves



Temperature



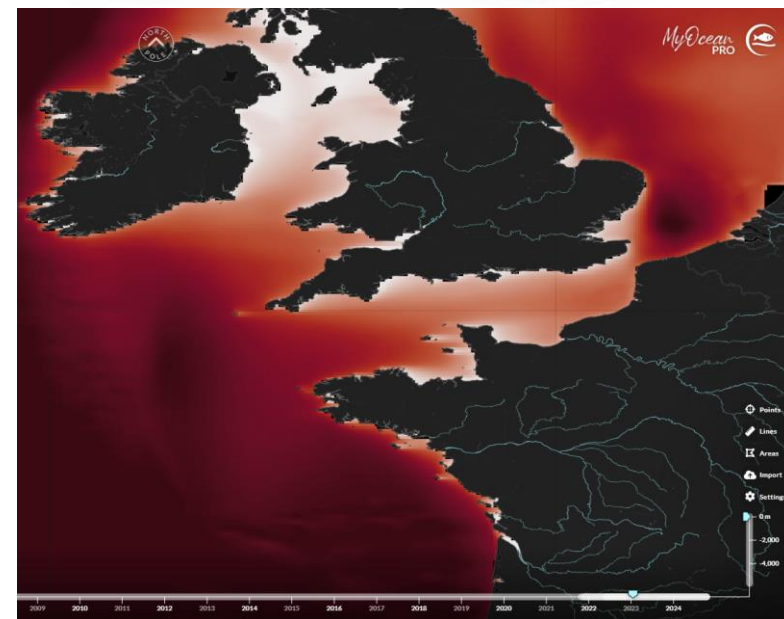
Sea Ice



Acidity



Salinity

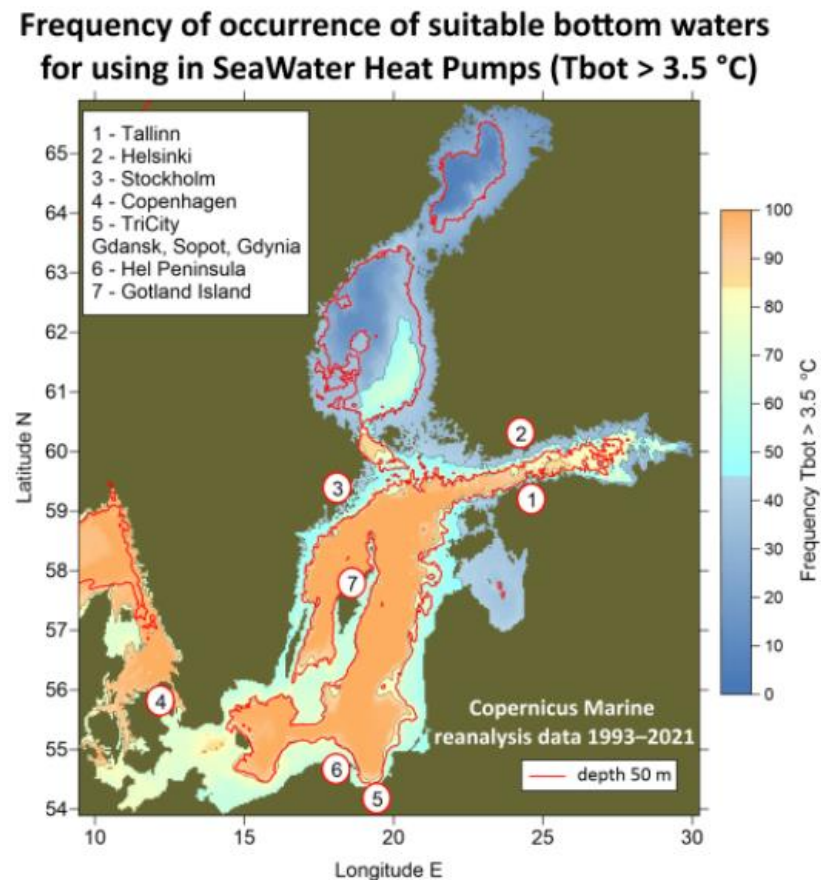


Atlantic-Iberian Biscay Irish-
Ocean Wave Analysis and
Forecast product

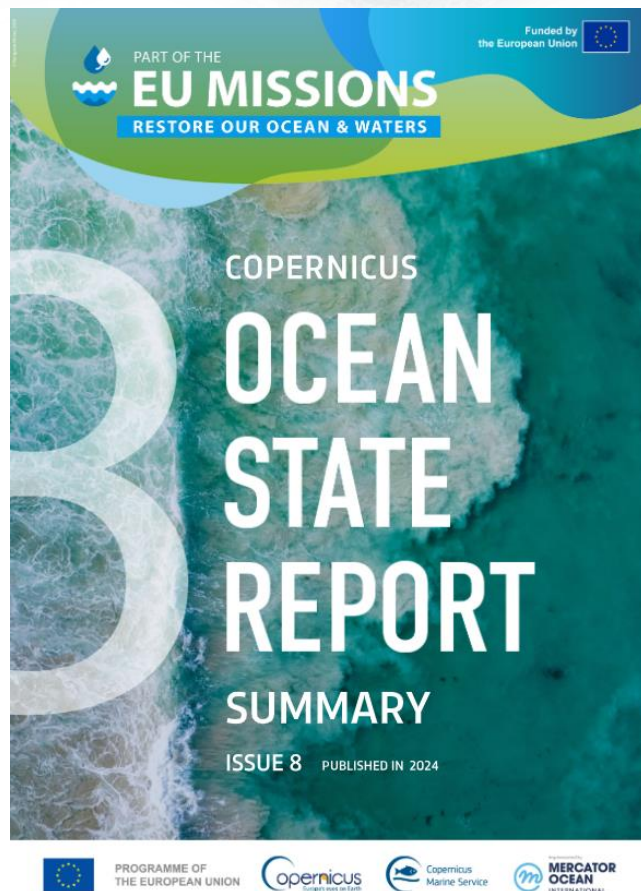
Challenge 5 Unlock ocean-based solutions for climate change

Powering cities with seawater heat pumps

Planning locations for seawater heat pumps in the Baltic Sea using oceanographic preconditions



Ocean State Report & Summary



ABOUT THE REPORT & SUMMARY

REPORT AT A GLANCE

THE STATE OF THE OCEAN

OCEAN-CLIMATE INTERACTIONS

OCEAN & SOCIETY: INNOVATIONS

ABOUT US

SECTIONS

- 01 THE STATE OF THE OCEAN
- 02 OCEAN-CLIMATE INTERACTIONS
- 03 OCEAN & SOCIETY: INNOVATIONS
- 04 ABOUT US

LEGEND

- Blue Ocean**
The physical state of the ocean
- Green Ocean**
The biological and biogeochemical state of the ocean
- White Ocean**
The lifecycle of sea ice within the polar regions

WHAT IS...
Provides definitions

IMPACTS
Highlights the impacts of ocean change and extremes on the ocean, ecosystems and society

OSR 8
Link to the relevant section in the complete OSR 8 (digital only)

EXPLORE THE COMPLETE REPORT

THIS DOCUMENT IS INTERACTIVE!

The **toolbar** above was developed to help you navigate the summary. The left and right arrows cycle through the pages and sections. Throughout the document, **blue** buttons link to supplementary information from the Mercator Ocean International website, and **OSR 8** buttons link to the relevant section in the complete OSR 8.

ABOUT THE OCEAN STATE REPORT

The **Copernicus Ocean State Report (OSR)** is an annual publication of the Copernicus Marine Service, which is implemented by Mercator Ocean International. The report provides state-of-the-art scientific knowledge about the current conditions, natural variations, and ongoing changes in the European regional seas and the global ocean. It is meant to act as a reference for the scientific community, national and international bodies, decision-makers, blue economy actors, and the general public.

Using model data and satellite and in situ measurements this integrated description of the ocean state feeds into a four-dimensional view (latitude, longitude, depth, and time) of the **Blue, Green, and White Ocean** (see Legend). The Ocean State Report draws on the expert analysis of more than 120 scientific experts from research institutions across Europe and around the world. Scientific integrity is assured through a process of independent peer review in collaboration with the State of the Planet journal from Copernicus Publications.

The Ocean State Report is a contributing initiative to the **EU Mission: Restore Our Ocean and Waters**. This mission aims to protect and revitalize the ocean by 2030, by supporting innovation, research, blue investments and citizen action across EU seas and river basins.

ABOUT THIS SUMMARY

This summary of the 8th issue of the annual Ocean State Report highlights the current state, variations, and ongoing changes in the ocean in Europe and around the world. It explores the ocean as a living, dynamic entity, one experiencing a range of extremes, and which has strong interactions with both Earth's climate and our society.

Section 1 focuses on chapter 1 of the OSR 8 — The State of the Ocean — which is dedicated to detailing variations and trends in key characteristics of the ocean, including the Ocean Monitoring indicators. It also shows the global picture of extreme and notable ocean events across 2022 and 2023. **Section 2** focuses on the complex interplay between the ocean

and the other components of Earth's climate system, and dives into key oceanographic processes. **Section 3** showcases some of the innovations and technologies which directly benefit society — innovations and technologies supporting humans and improving our relationship with the ocean.

Together, the information in this summary demonstrates how accurate and timely information is key to monitoring, understanding and adapting to a changing ocean.

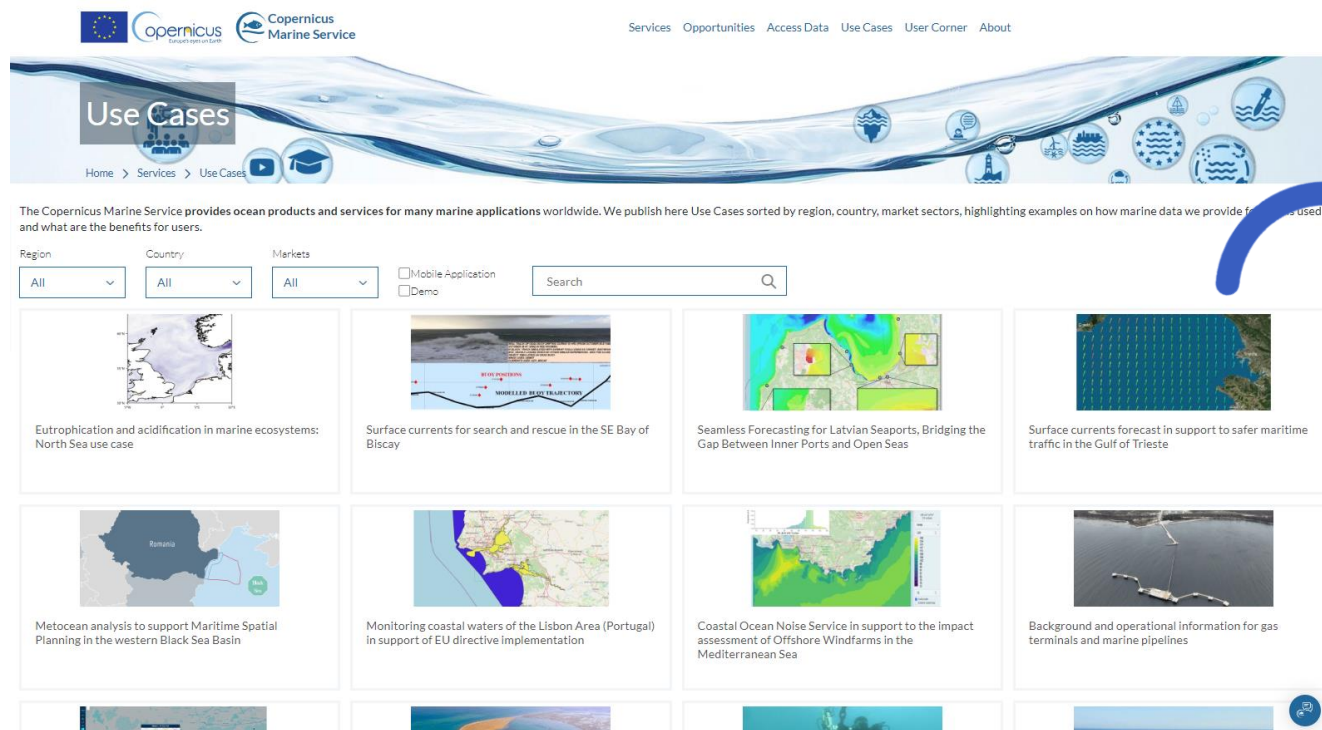
In this summary, an "anomaly" is defined as the difference of a measurement when compared to the long-term average, representing the mean state.

THE REPORT AT A GLANCE

The ocean is a dynamic and complex system, which changes constantly through natural variations — and due to unprecedented impacts from human overexploitation, pollution and climate change. This section provides the key takeaways from the OSR 8, showcasing some of the ways the ocean is transforming.

- Unprecedented Marine Heatwaves**
Strong and extreme marine heatwaves have grown in frequency, duration, intensity and geographical spread over the past four decades.
22% of the global ocean surface experienced at least one severe to extreme marine heatwave event in 2023.
In the northeast Atlantic Ocean and nearby seas, marine heatwaves grew stronger, more frequent, larger and longer over the past few decades. Areas of this region suffering marine heatwaves in any given year grew from around 20 % to over 90 % between 1982 and 2023.
- Sea Ice**
2023 saw the lowest sea ice on record in the world's polar regions. The Arctic region lost 4 % of sea ice per decade during the period 1979–2023, followed by an increase in surface water temperature in the region. Meanwhile, the Antarctic region reached the lowest ever sea ice value since the beginning of satellite observations.
4% mean annual sea ice lost in the Arctic per decade since 1979.
- Deep Marine Heatwaves**
A marine heatwave in the Mediterranean Sea reached up to 1500 m below the surface. While heatwaves were more frequent at the surface, temperatures rose further and for longer beyond 150 m.
- Rising Ocean Heat Content**
A new method to measure Earth's energy budget shows a significant positive trend of 0.25 W m⁻² over the period 1993–2022, indicating continued warming of the ocean.
- Unexpected Bloom**
An extreme phytoplankton bloom was detected southeast of Crete in 2022, caused by a strong and unusual cold spell across the eastern Mediterranean Sea. The event led to a 35 % rise in annual primary productivity in the area, which may have impacted marine life across food chains.
35% rise in annual primary productivity.
- Record-Breaking Wave Events**
The tallest 5 % of global ocean waves have grown much higher in recent years. A violent storm that struck Melilla, Spain in April 2022 broke several records at once, with towering, enduring waves sweeping over the port and disrupting maritime operations.
- Key Ocean Innovations**
New tools and technologies are helping to monitor the ocean and support our society. This includes safeguarding marine life to bolster aquaculture, state-of-the-art wave analysis which could improve coastal protection, and a pioneering technique to power heat pumps with thermal energy from the ocean.

Copernicus Marine Service Use cases



The Copernicus Marine Service provides ocean products and services for many marine applications worldwide. We publish here Use Cases sorted by region, country, market sectors, highlighting examples on how marine data we provide for is used and what are the benefits for users.

Region: All Country: All Markets: All ☐ Mobile Application ☐ Demo Search

- Eutrophication and acidification in marine ecosystems: North Sea use case
- Surface currents for search and rescue in the SE Bay of Biscay
- Seamless Forecasting for Latvian Seaports, Bridging the Gap Between Inner Ports and Open Seas
- Surface currents forecast in support to safer maritime traffic in the Gulf of Trieste
- Metocean analysis to support Maritime Spatial Planning in the western Black Sea Basin
- Monitoring coastal waters of the Lisbon Area (Portugal) in support of EU directive implementation
- Coastal Ocean Noise Service in support to the impact assessment of Offshore Windfarms in the Mediterranean Sea
- Background and operational information for gas terminals and marine pipelines

Products used

- ATLANTIC-IBERIAN BISCAY IRISH- OCEAN PHYSICS ANALYSIS AND FORECAST
- ATLANTIC-IBERIAN BISCAY IRISH- OCEAN WAVE ANALYSIS AND FORECAST
- GLOBAL OCEAN- IN-SITU NEAR REAL TIME OBSERVATIONS OF OCEAN CURRENTS
- ATLANTIC IBERIAN BISCAY IRISH OCEAN- IN-SITU NEAR REAL TIME OBSERVATIONS
- NORTH ATLANTIC REMOTE SENSING REFLECTANCES, ATTENUATION COEFFICIENT AT 490NM, AND INHERENT OPTICAL PROPERTIES FROM SATELLITE OBSERVATIONS

Copernicus Marine Service User corner

E-learning Materials

Home > Services > User Learning Services > E-learning materials

- Training/Workshop >
- E-learning material** >
- Jupyter environment >

Level Subject Tool

- Any - - Any - - Any -

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Help Center & FAQ

Have a question about our services?
Find everything gathered in one intuitive place online.



Contact Us

If you still have unanswered questions,
our team of experts just is one click away.



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A satellite with solar panels is shown orbiting a turbulent ocean surface. The satellite is positioned on the left side of the frame, with its solar panels extended. The ocean below is characterized by large, white-capped waves, creating a high-contrast, textured appearance. The text "THANK YOU" is overlaid in the center of the image.

THANK YOU

#EUdata4OceanDecade

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UN OCEAN DECADE
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