

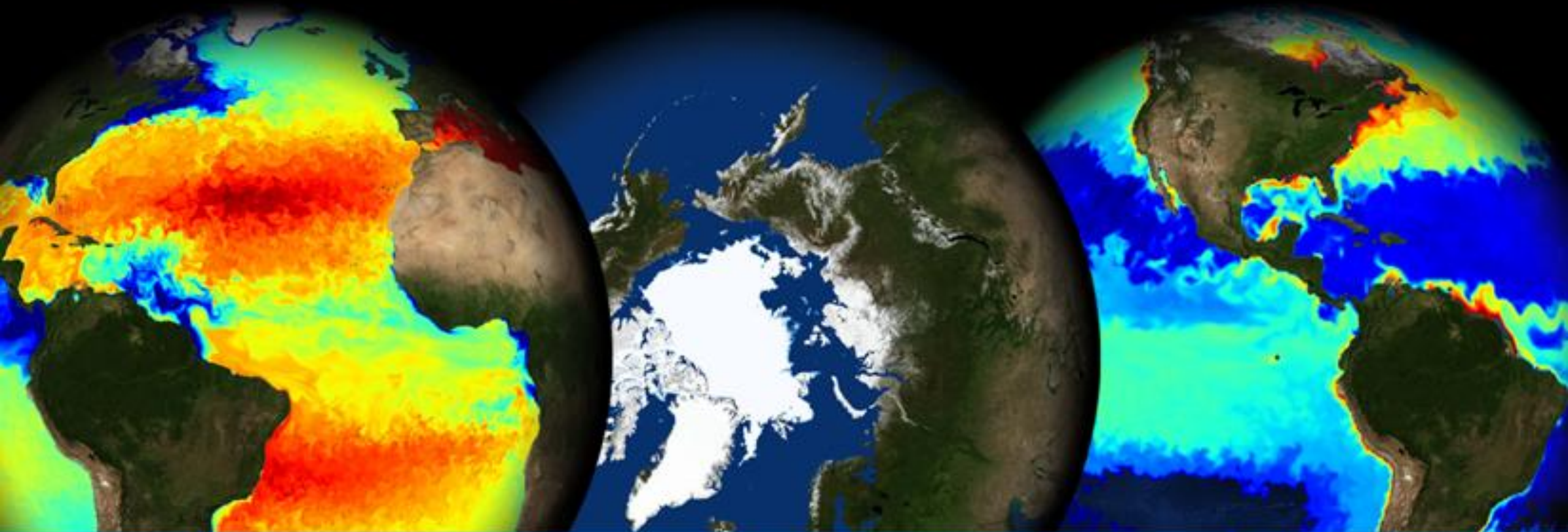


Pierre-Yves Le Traon

Mercator Ocean international



« The Ocean », according to marine.copernicus.eu



Satellite, in situ observations and models for Essential Ocean Variables, translated by experts into verified products and forecasts, indicators, reports, seen by 500,000 users worldwide/year, integrated as regular information by more than 100,000 subscribers.



PROGRAMME OF
THE EUROPEAN UNION



implemented by



MERCATOR
OCEAN
INTERNATIONAL

The EU Copernicus Marine Service

Global & Regional Ocean Monitoring and Forecasting

MULTI-YEAR
10 to 45 years

REAL-TIME
Daily, hourly

FORECAST
1 to 30 days

ESSENTIAL OCEAN VARIABLES

BLUE OCEAN



Physics

WHITE OCEAN



Sea Ice

GREEN OCEAN



Biogeochemistry

OBSERVATIONS
In-situ & Satellites

NUMERICAL MODELS
& data assimilation

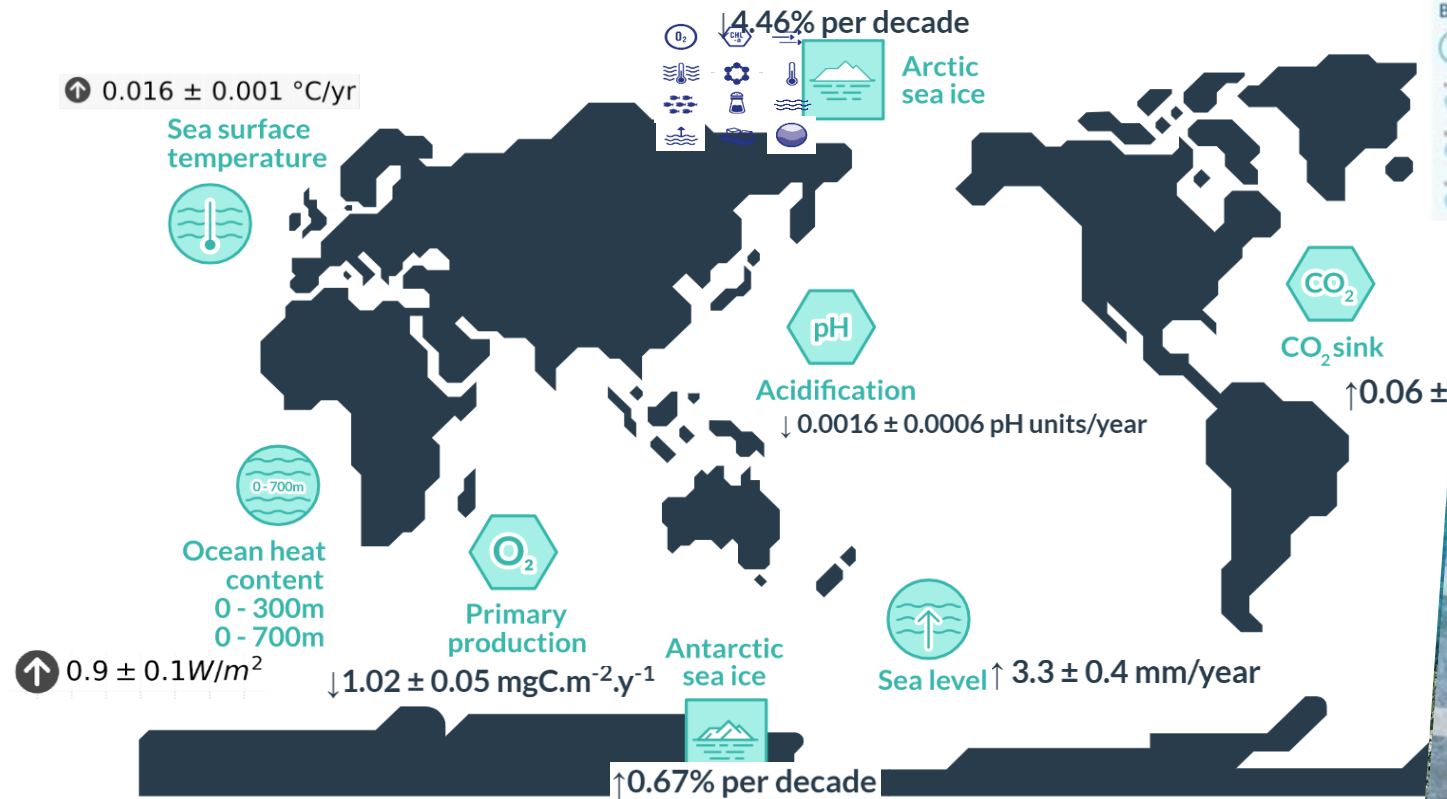
marine.copernicus.eu

Free and Open



- 1 Global
- 2 Arctic
- 3 Baltic
- 4 NWS
- 5 IRI
- 6 Med Sea
- 7 Black Sea

Informing policy : indicators and ocean state reports



Copernicus Marine supports all sectors of the blue economy

User Uptake: > 100,000 subscribers, Web: 1,500,000 visitors/year

Environment

1 POLAR ENVIRONMENT MONITORING



The Copernicus Marine Service provides key data products for the Polar Environment Monitoring sector to assess environmental impacts at both poles.

3 OCEAN HEALTH



The Copernicus Marine Service provides important inputs to monitor the ocean's state and vital health signs, essential for the well-being of life on Earth.

2 CLIMATE & ADAPTATION



The Copernicus Marine Service provides scientists with ocean data and information to conduct their environmental, climate and oceanographic research to support climate adaptation.

4 MARINE CONSERVATION & BIODIVERSITY



The Copernicus Marine Service provides key data to monitor marine biodiversity and to protect Marine Protected Areas, preserving at-risk ecosystems.



Society

5 SCIENCE & INNOVATION

The Copernicus Marine Service provides scientists and businesses with ocean data, allowing them to innovate their practices and build new applications and services for intermediate and final users.



6 POLICIES & OCEAN GOVERNANCE & MITIGATION

The Copernicus Marine Service provides key data to support European Member States in the implementation of European Directives. It also collaborates with international institutions to support Ocean Governance.



7 EDUCATION, PUBLIC HEALTH & RECREATION

The Copernicus Marine Service supports businesses and non-profit organizations to develop public health, ocean literacy and educational tools to raise awareness on the many challenges facing the ocean.



8 EXTREMES, HAZARDS & SAFETY

The Copernicus Marine Service supports safety at sea and pollution response by providing oceanic parameters for extreme situations at sea and pollutant drift forecasts.



Economy

9 MARINE FOOD



The Copernicus Marine Service supports the management of aquaculture farms and the sustainable exploitation of ocean's living resources.

11 TRADE & MARINE NAVIGATION



The Copernicus Marine Service provides key ocean parameters contributing to safer and more ecological marine navigation.

10 COSTAL SERVICES



The Copernicus Marine Service provides key data that can be used to develop high-resolution coastal models to manage and monitor coastal areas.

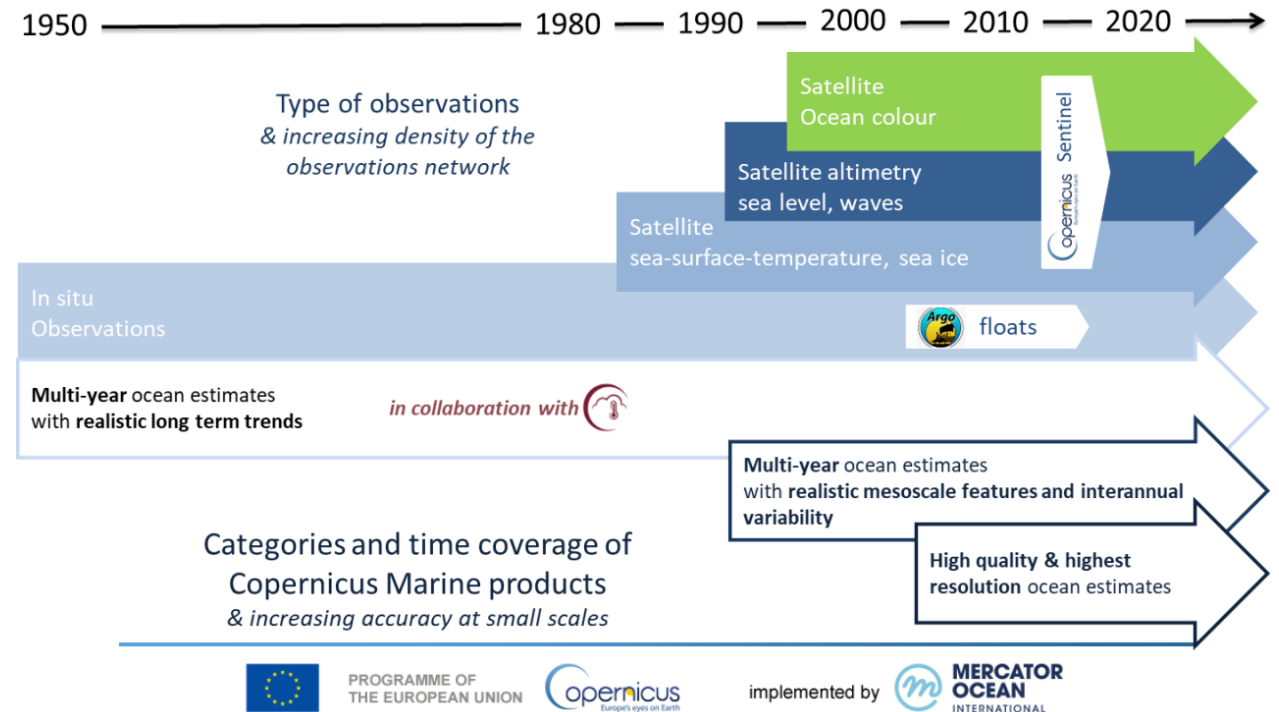
12 NATURAL RESOURCES & ENERGY



The Copernicus Marine Service provides key data products for the oil & gas, deep sea mining and marine renewable energy sectors.

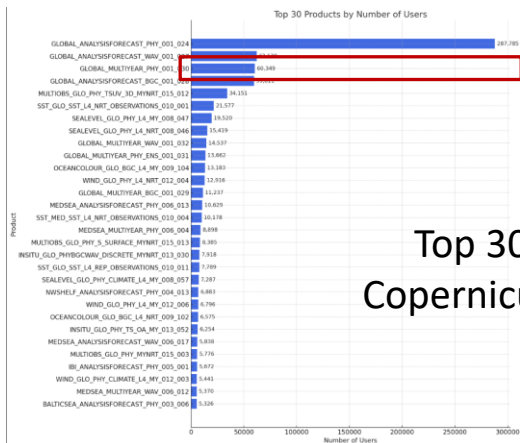


- ✓ Ocean reanalyses (global, regional) for physics, sea ice and biogeochemistry
- ✓ Reprocessed satellite and in-situ ocean observations and high level products
- ✓ Ocean Monitoring Indicators
- ✓ Ocean State Report and high level summary
- ✓ Partnership with ECMWF / C3S



GLORYS12V1, a reference product:

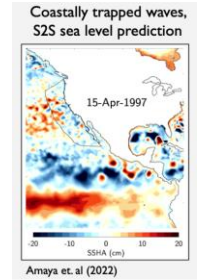
- Global 1/12° physical reanalysis (GLORYS12V1); period 1993 – 3 months from present
- Assimilation : SSH, SST, Sea Ice (satellites), in-situ
- 3rd most downloaded product
- 60,000 users
- Reference paper (Lellouche et al. 2021): ~2000 downloads and more than 200 citations



Top 30 of downloaded
Copernicus Marine products

A large range of applications:

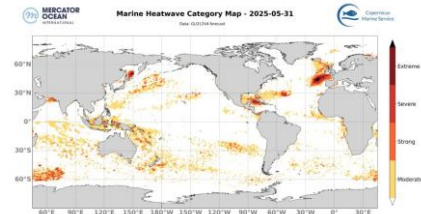
- ✓ Scientific studies



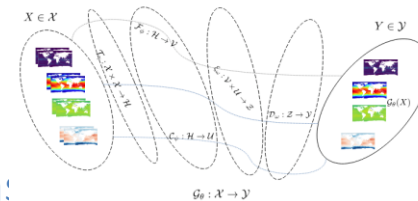
- ✓ Monitoring of the Ocean
Sea level, Ocean Heat Content , sea ice,...



- ✓ Reference for extremes:
Marine heat wave, sea level,...

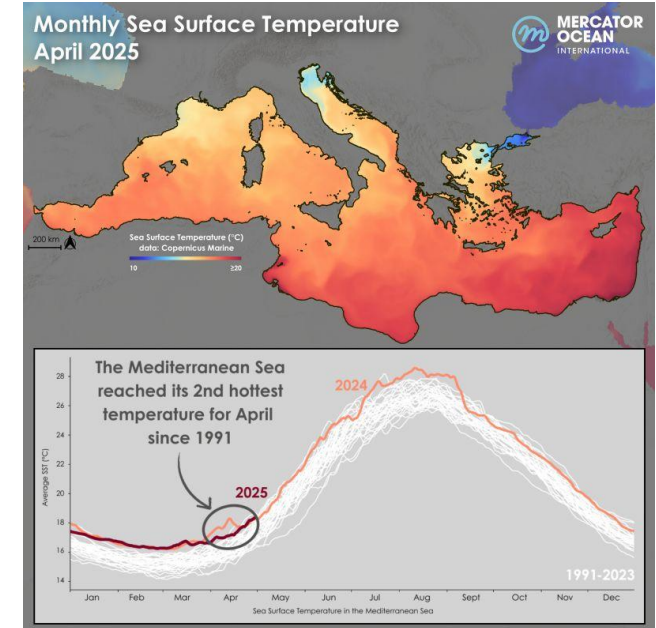
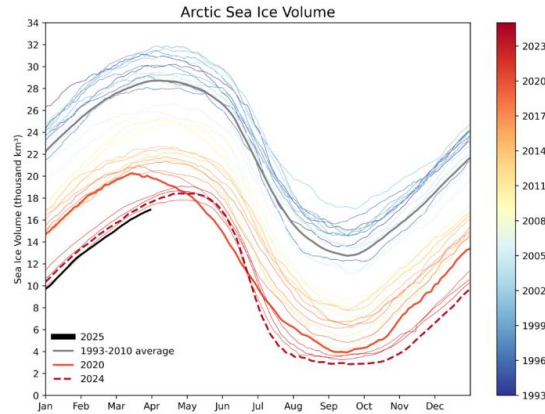
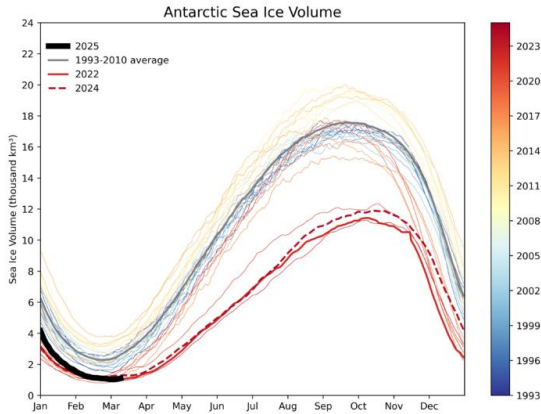
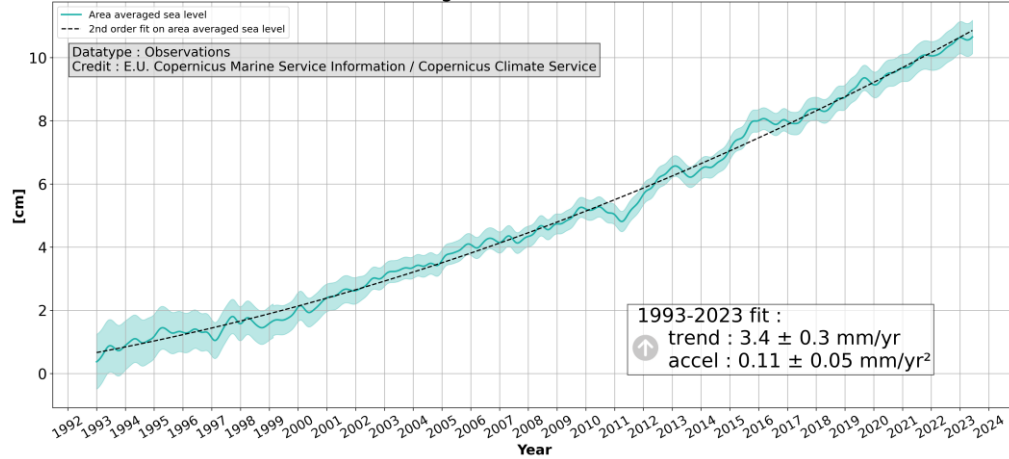


- ✓ Train or benchmark IA applications



- ✓ Boundary Conditions for regional systems

Area averaged Sea Level: Global Ocean





ocean & climate

SEA LEVEL RISE



SEA LEVEL

UNITS: mm/year

TIME: 1999-2023



Ocean
and Water

Global
Ocean



3.4

± 0.3 mm/year

Northeast Atlantic
and Adjacent Seas



3.2

± 0.8 mm/year

North West
Shelf

3.2

± 0.8 mm/year

Iberian-
Biscay-Ireland

4.0

± 0.8 mm/year

Baltic Sea

4.1

± 0.8 mm/year

Black Sea

1.0

± 0.8 mm/year

Mediterranean
Sea

2.5

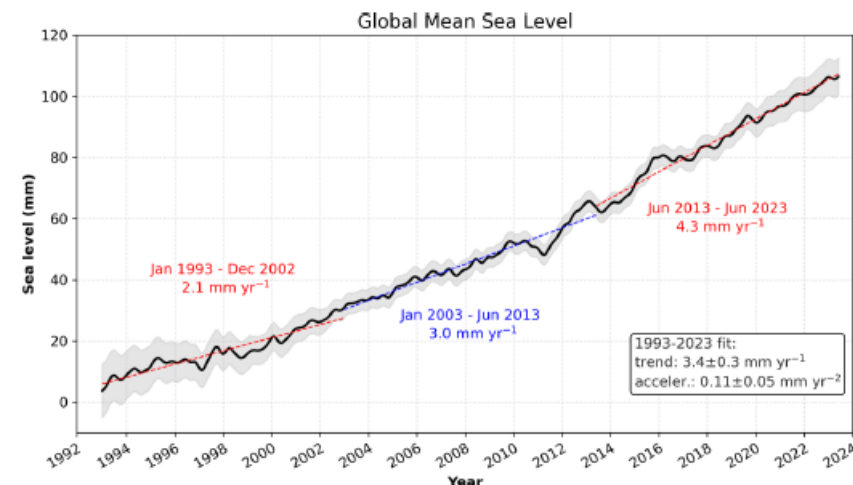
± 0.8 mm/year

KEY FIGURES

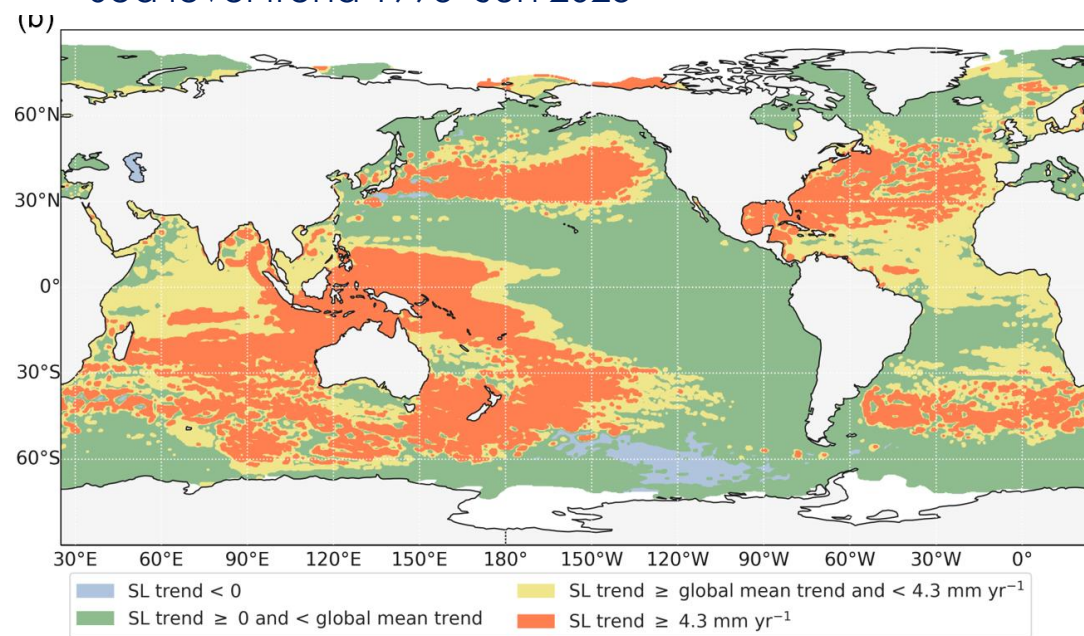
OSR 8

The North Atlantic Ocean has expanded its size almost continuously since 2002, due to the loss of mass from land ice melt, thermal expansion, and land water storage.

Regional sea level rise is not uniform, and almost 50% of the ocean is rising faster than the global average.



Sea level trend 1993- Jun 2023





ocean & climate

OCEAN ACIDIFICATION



OCEAN ACIDIFICATION

UNITS: pH units/decade

TIME: 1985–2022



Ocean and Water

*A decrease in pH denotes an increase in ocean acidification.

Global Ocean

↓ **-0.017**

±0.002 pH units/decade

Northeast Atlantic and Adjacent Seas

↓ **-0.017**

±0.01 pH units/decade

KEY FIGURES

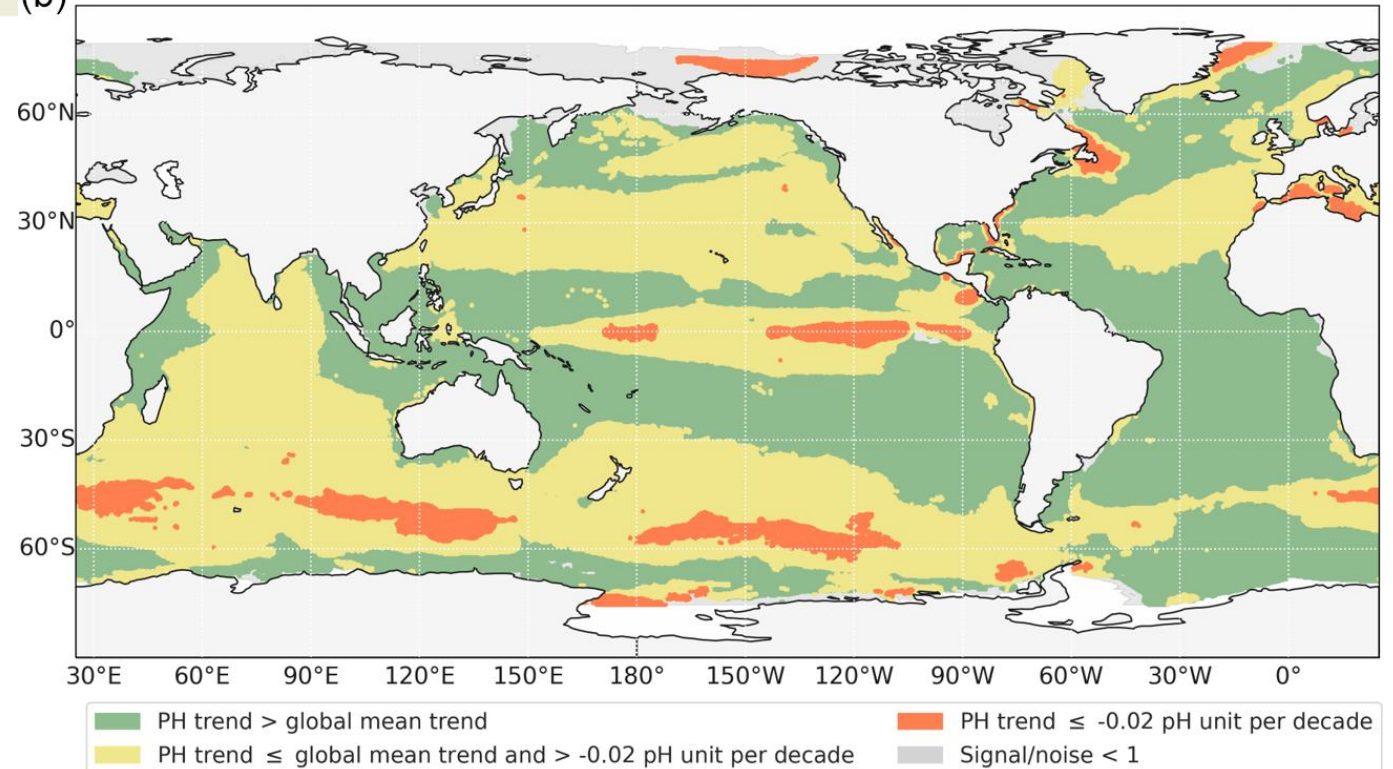
There has been a
**30% increase in
acidity** since 1985.

CONTRIBUTIONS
TO EUROSTAT →

Global ocean acidification has continuously increased over the past 37 years (1985–2022), with an observed rate of decrease in ocean pH of -0.017 pH unit per decade.

Regionally, ocean acidification is not increasing uniformly. About 47% of the sampled ocean is losing pH at a faster rate than the global average, particularly in the Indian Ocean, the Southern Ocean, the eastern equatorial Pacific Ocean, the northern tropical Pacific, and some regions in the Atlantic Ocean.

(b)



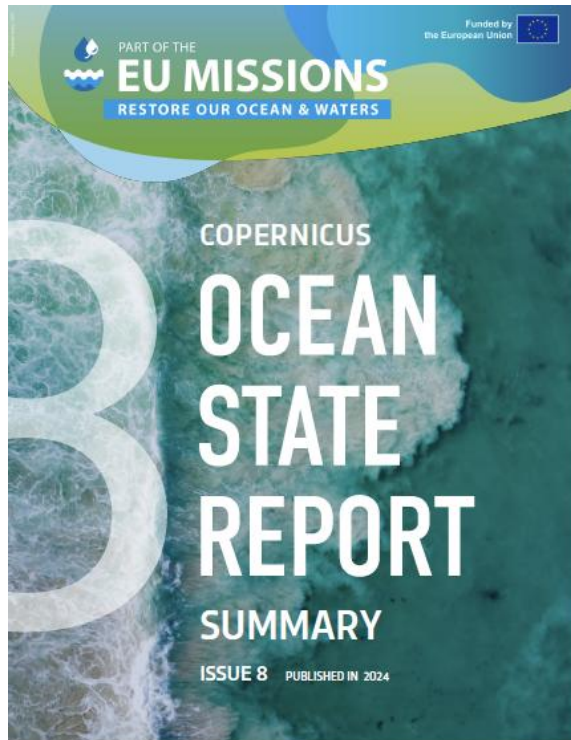
The Copernicus Ocean State Report



ISSUE 9: under review
ISSUE 10: Call for Contributions

<http://marine.copernicus.eu/science-learning/ocean-state-report/>

- Annual publication of Copernicus Marine, implemented by Mercator Ocean International.
- Provides a state-of-the-art reference for the variability, changes, and state of the ocean, incl. new methods & tools, relevant scientific knowledge, and recent unusual events
- Provides key inputs that support major EU and international policies & initiatives
- Collaboration of more than 150 scientific experts from more than 25 European institutions



From science to
policy and
beyond ...

...building on the
OSR & OMIs & co-
constructing with
communication
experts ...

