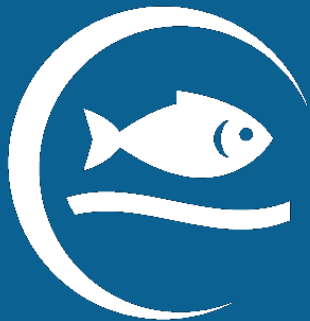


The Copernicus Marine Service in support of the Sustainable Development Goals



Marine Monitoring

Karina von Schuckmann
Mercator Ocean International

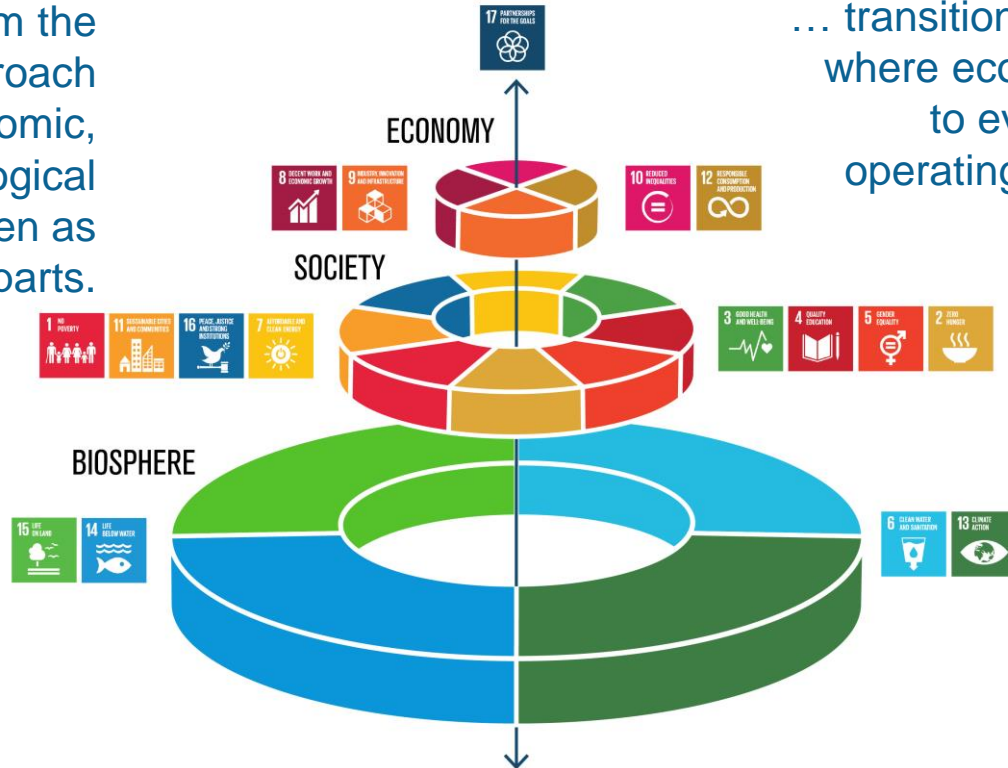


The wedding cake presentation for the SDGs

Sustainable Development Goals: Economies and societies are embedded parts of the Earth system

... moving away from the current sectorial approach where social, economic, and ecological development are seen as separate parts.

... transition toward a world logic where economy serves society to evolves within the safe operating space of the planet.





Marine
Monitoring

- HEAT UPTAKE & STORAGE
- CARBON UPTAKE & STORAGE
- OCEAN CURRENTS
- O₂ RESERVOIR
- H₂O RESERVOIR
- BIODIVERSITY
- SEA LEVEL
- SEA ICE
- OCEAN SPACE
- EARTH SYSTEM
- CLIMATE, WEATHER AND EXTREMES

The world ocean plays a key role in the Earth system



- FOOD SECURITY
- ADAPTATION, MITIGATION
- URBAN AND REGIONAL PLANNING
- DISASTER RISK MANAGEMENT
- ENVIRONMENTAL PROTECTION
- PUBLIC HEALTH AND RECREATION
- MARINE POLLUTION AND WASTE DUMPING GROUND
- OCEAN GOVERNANCE AND LEGAL FRAMEWORKS
- BLUE ECONOMY
- TRADE AND SHIPPING

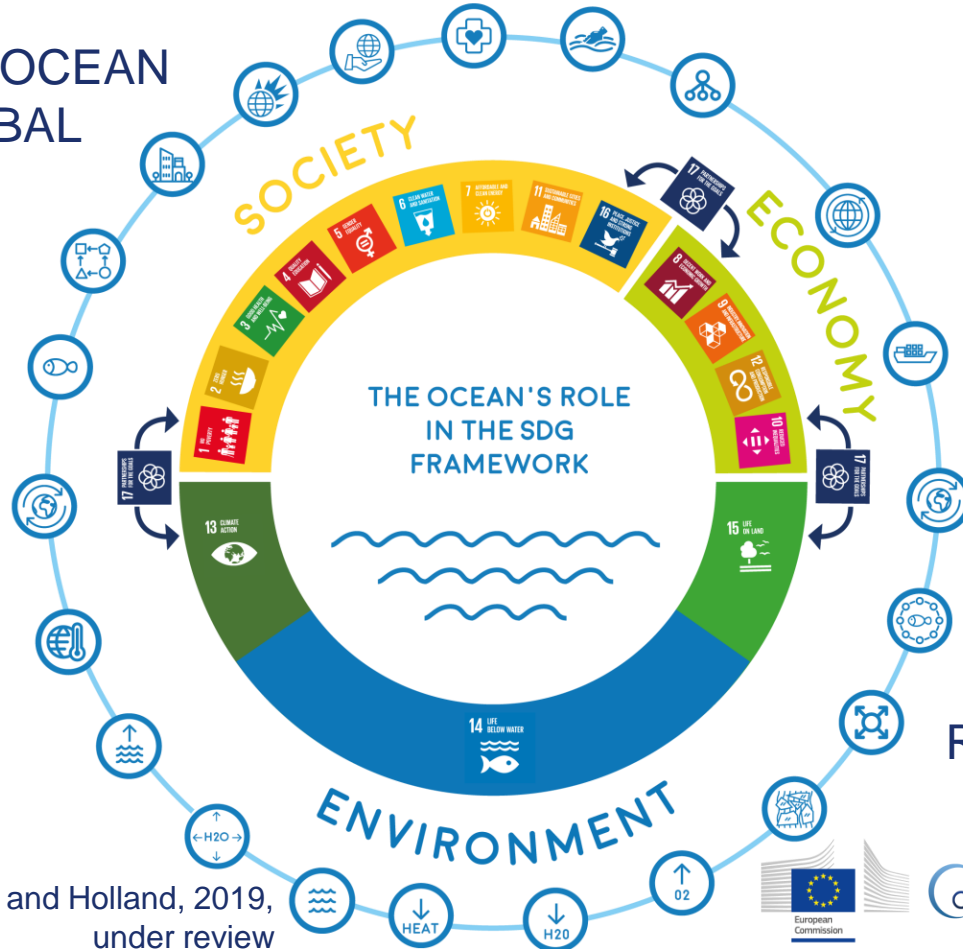




Marine
Monitoring

The oceans role in the SDG framework

THE WORLD OCEAN
DRIVES GLOBAL
SYSTEMS...



... AND PLAYS A
FUNDAMENTAL
ROLE IN THE SDG
FRAMEWORK

von Schuckmann and Holland, 2019,
under review





Marine
Monitoring

Increasing & pressing ocean monitoring needs

... recognized at the highest levels



G7 INITIATIVE ON EARTH
OBSERVATION AND
INTEGRATED COASTAL
ZONE MANAGEMENT

CHARLEVOIX BLUEPRINT
FOR HEALTHY OCEANS,
SEAS AND RESILIENT
COASTAL COMMUNITIES

OCEAN
PLASTICS
CHARTER

G7 Science and Technology
Ministers' Meeting
Tsukuba, Ibaraki

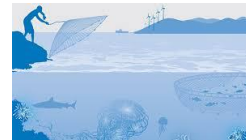
Tsukuba Communiqué
G7 Science and Technology Ministers' Meeting in Tsukuba, Ibaraki
15-17 May 2016



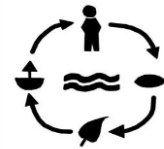
To understand and
predict the evolution of
our weather and
climate



For an increasing number
of ocean services and the
development of the blue
economy



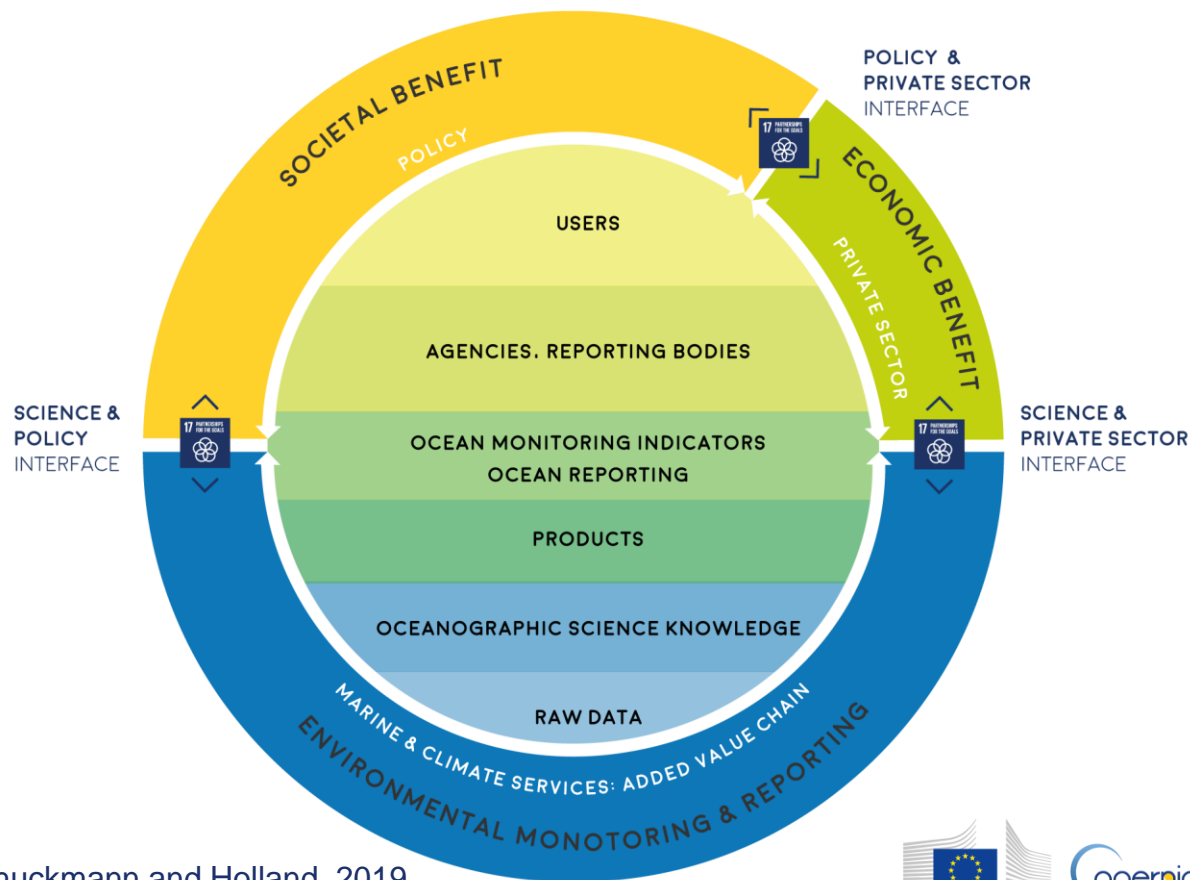
Better and sustainable
management of the
oceans and its
resources.





Marine
Monitoring


Added value chain: high value for the SDG framework



von Schuckmann and Holland, 2019,
under review







COPERNICUS MARINE ENVIRONMENT MONITORING SERVICE

Providing PRODUCTS and SERVICES for all marine applications

[ABOUT US](#)
[MARKETS & BENEFITS](#)
[NEWS](#)
[SCIENCE & MONITORING](#)
[TRAINING & EDUCATION](#)
[SERVICES PORTFOLIO](#)

ACCESS YOUR OCEAN INFORMATION

[GETTING STARTED](#)

OCEAN PRODUCTS

Ocean product catalogue, to download or visualize data across more than 10 variables, including historic, current and forecasted data.

[DATA](#)

OCEAN MONITORING INDICATORS

Essential variables monitoring the health of the ocean

[TRENDS](#)

OCEAN STATE REPORT

Extensive annual analysis on the state of the ocean over nearly 20 years and severe/notable annual events

[EXPERTISE](#)

2018
22 MAR.

LATEST NEWS FLASH

CMEMS-7324-A
New Service Release on 22 March 2018 - Status on updates

INFORMATION

[ALL NEWS FLASH](#)

28 MAR.

EVENTS AGENDA

PARTNERS AND STAKEHOLDERS


FOCUS ON


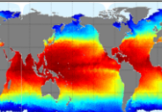


TRAINING AGENDA

OUR OCEAN STATE REPORT AWARDED THE DENNY MEDAL

We are delighted to announce that the Ocean State Report produced by the Copernicus Marine Service has been awarded the Institute of Marine Engineering, Science and Technology (IMarEST) Denny Medal, an annual award for the most worthy paper published with the Journal of Operational Oceanography (JOO).

[READ MORE](#)



GLOBAL_ANALYSIS_FORECAST_PHY_001_024			
GLOBAL OCEAN 1/12° PHYSIC S ANALYSIS AND FORECAST UPDATED DAILY			
MODEL	<input type="radio"/> ● <input type="radio"/> ● <input checked="" type="radio"/> X <input type="radio"/> X <input type="radio"/> X <input type="radio"/> X	GLO	
SSH 3DUV MLD T SIT SIC S SIUV 			
0.083 degree x 0.083 degree (50 depth levels)			
From 2006-12-27 to Present			
daily-mean, hourly-mean			
MORE INFO 	ADD TO CART 	WMS	Sub-setting

GLOBAL_ANALYSIS_FORECAST_BIO_001_014

GLOBAL OCEAN BIOGEOCHEMISTRY ANALYSIS AND WEEKLY FORECAST

MODEL

● ● ●

✕ ✕ ✕

✕

GLO

CHL_O2_NO3_PO4_SI_PHYC_FE


①

0.5 degree x 0.5 degree (50 depth levels)


From 2012-01-01 to Present

weekly-mean

MORE INFO

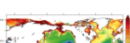


ADD TO CART



WMS

Sub-setting





Marine
Monitoring

Mercator Ocean International: entrusted entity



Team: ~80 persons

A non-for-profit company with
a European governance



Ocean forecasters

- Developing global Ocean 3D models
- Running operational marine forecasts
- Delivering public interest service



Based in
Toulouse,
France



Entrusted by EU
for CMEMS

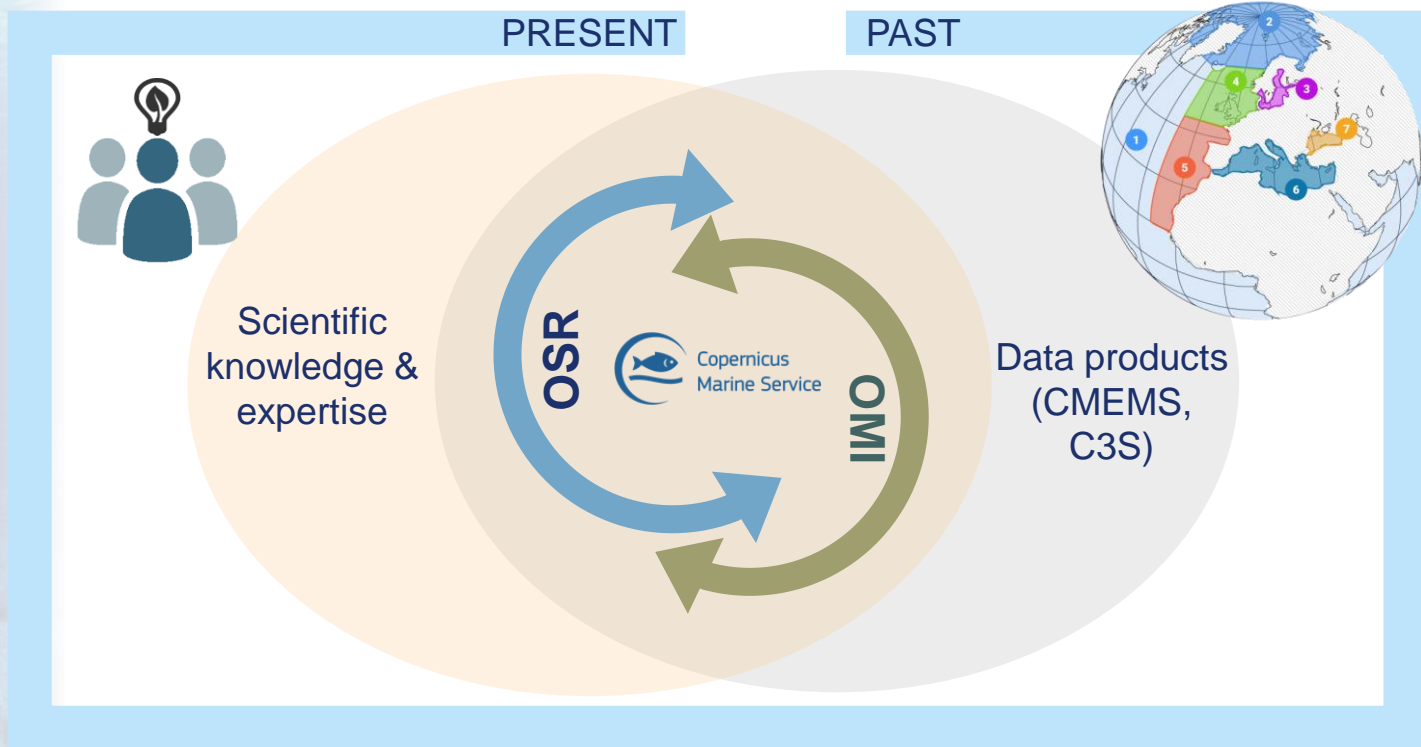




Marine
Monitoring

Copernicus Marine Ocean Reporting

Objective: Develop a fundamental source of Copernicus Marine value-added information and indicators for the reporting of the European regional seas and the global ocean state, variability and change from the past to the present.

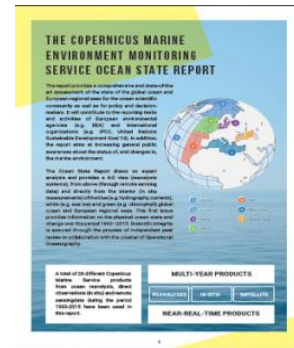




Marine
Monitoring

The Copernicus Marine Ocean State Report

- ❖ Collaboration of more than 100 scientific experts
- ❖ Collaboration of more than 25 European institutions
- ❖ Fundamental step forward into the development of regular Copernicus Marine Service regular reporting



Scientific
community

Policy and
decision
makers,
Blue
Economy

European and
international
agencies and
organisations,
Regional Sea
Conventions

General
public
awareness

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



The Copernicus Marine Ocean State Report

ISSUE #1:

- ❖ Published in the Journal of Operational Oceanography: Open access
- ❖ Summary for policy makers
- ❖ Mentioned as Copernicus achievement 2017
- ❖ Chair & team medal award
- ❖ More than 8000 views since publication

ISSUE #2:

- ❖ Published in the Journal of Operational Oceanography: Open access
- ❖ Summary for policy makers
- ❖ More than 8000 views since publication

ISSUE #3:

- ❖ Revision process

ISSUE #4:

- ❖ Draft development

The Copernicus Marine Ocean State Report

ISSUE #1:

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- ❖ Chair & team medal award
- ❖ More than 8000 views since publication

NEW: Specific task at the
science/society &
science/economy
interface

ISSUE #2:

- ❖ Published in the Journal of Operational Oceanography: Open access
- ❖ Summary for policy makers
- ❖ More than 8000 views since publication

ISSUE #3:

- ❖ Revision process

ISSUE #4:

- ❖ Draft development

The Copernicus Marine Ocean State Report summary

WHITE OCEAN

Over the past quarter of a century sea ice volume and extent have drastically changed across the southern and northern hemisphere polar regions and the Baltic Sea. In 2016, global sea ice melted at a pace far faster than ever observed since our earliest records dating back to the 1980s.

NORTHERN HEMISPHERE

ARCTIC

-6.2%
sea ice extent loss at a rate per decade (1993-2016)

-780 000 km²
per decade of sea ice extent loss (1993-2016)
Uncertainty: $\pm 70\ 000\ \text{km}^2/\text{decade}$

SOUTHERN HEMISPHERE

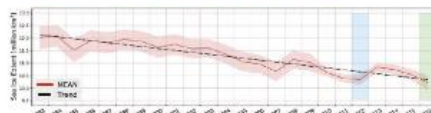
ANTARCTIC

+1.6%
sea ice extent gain per decade trend (1993-2016)

+200 000 km²
per decade of sea ice extent gain (1993-2016)
Uncertainty: $\pm 100\ 000\ \text{km}^2/\text{decade}$

Sea ice extent at record lows in 2016 in both poles.

Northern Hemisphere Sea Ice Extent Average by Year



Ten of the lowest Arctic summer sea ice extent values took place in the last ten years.*

*Even observed on record by satellites

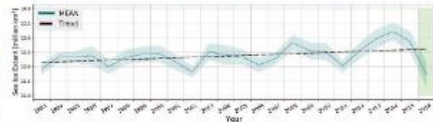
The figure shows the annual mean sea ice extent (1993 to 2016) averaged over the northern hemisphere as expressed in kilometers squared (km²). Evaluated from ocean reanalysis. Source: CMEMS Ocean Monitoring Indicators (OMI) marine copernicus.eu/ocean-monitoring-indicators/catalogue

Since 1993, there has been an accelerated sea ice extent loss of nearly 780 000 km² per decade (with an uncertainty of 70 000 km²/decade) due to contemporary global warming.

There was a record low sea ice extent in the Antarctic in 2016.*

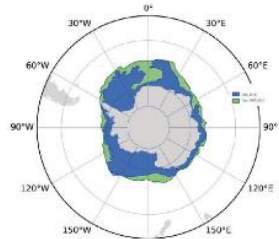
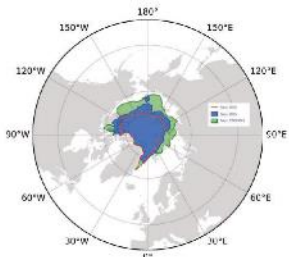
*Even observed on record by satellites

Southern Hemisphere Sea Ice Extent Average by Year



The figure shows the annual mean sea ice extent (1993 to 2016) averaged over the southern hemisphere as expressed in kilometers squared (km²). Evaluated from ocean reanalysis. Source: CMEMS Ocean Monitoring Indicators (OMI) marine copernicus.eu/ocean-monitoring-indicators/catalogue

Aside from the large sea ice extent drop in 2016, the Antarctic sea ice extent had been slowly but steadily expanding with a record high in 2014 that lasted several months. Over the past decades the Antarctic has been growing at a rate of 1.6% sea ice extent increase per decade and by 8.8% sea ice volume increase per decade from 1993 to 2016. Possible reasons for the large contemporary variations of sea ice extent and losses in the Antarctic have not been fully understood, for example, changes in ocean hydrography and variations at the air-sea interface such as wind-driven processes. Understanding the precise role and interplay between those different processes remains an area of active research.





Marine
Monitoring

The Copernicus Marine Ocean Monitoring Indicators

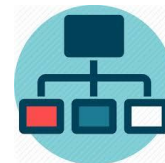
VISUALISATION



DOCUMENTATION



DATA DISTRIBUTION



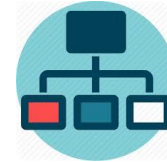
<http://marine.copernicus.eu/science-learning/ocean-monitoring-indicators/>



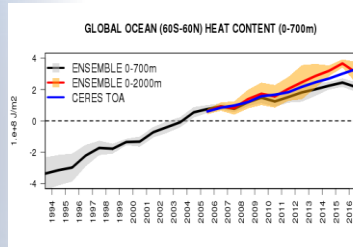


The Copernicus Marine Ocean Monitoring Indicators

IMPLEMENTED SINCE 2018 IN THE CMEMS CATALOGUE



OCEAN HEAT CONTENT



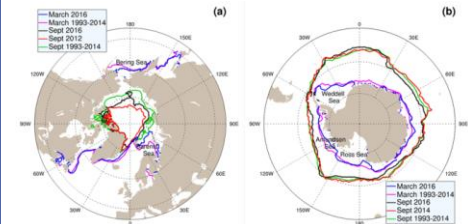
- IPCC
- GCOS in support of UN SDG framework
- Climate research
- Climate variability (e.g. ENSO, hurricanes)

SEA LEVEL



- Agencies
- IPCC & climate science
- Flooding
- Impact on land use
- Coastal erosion

SEA ICE



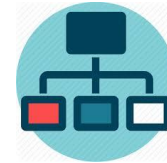
- Agencies
- IPCC & climate science
- Shipping routes



Marine
Monitoring

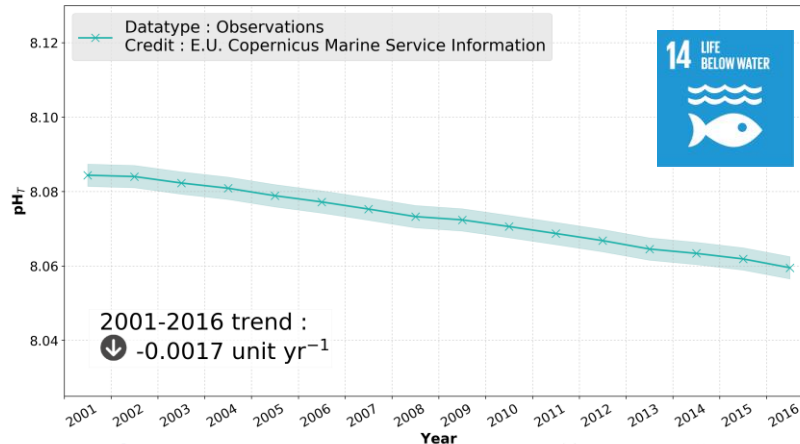
The Copernicus Marine Ocean Monitoring Indicators

NEXT STEPS ...



OCEAN ACIDIFICATION

Yearly Mean Surface Sea Water pH reported on total scale



- OCEAN HEALTH
- OCEAN TEMP. & SAL.
- CLIMATE VARIABILITY
- NORTH ATLANTIC MONITORING
- WATER & HEAT EXCHANGE
- CURRENTS
- EXTREME EVENTS



Marine
Monitoring

FOSTER GLOBAL INITIATIVES



CMEMS side event at the first UN Ocean Conference.
CMEMS Ocean PH and acidity to be used at EU reporting from end 2018/2019 onward (Eurostat).



CMEMS leadership for operational oceanography recognized by GEO sec.
CMEMS to foster deep integration and visibility in GEO Work Programme (Blue Planet , EuroGEOSS/GEOSS)



CMEMS involved in the strong upstream observation network coordinated by Intergov. Ocean Commission
CMEMS involved in IOC Outreach activities.



CMEMS contributor to OECD SPACE and OCEAN WORKSHOPS related to INNOVATION and VALUING OCEAN OBSERVATION



CMEMS Ocean Monitoring Indicators and scientific expertise



THE
**OCEAN
CONFERENCE**
UNITED NATIONS, NEW YORK, 9-10 JUN 2021





Marine
Monitoring

THANK YOU

The screenshot shows the homepage of the Copernicus Marine Environment Monitoring Service. At the top, there's a header with the European Commission logo and the service name. Below this is a navigation bar with links like 'ABOUT US', 'MARKETS & BENEFITS', 'NEWS', 'SCIENCE & MONITORING', 'TRAINING & EDUCATION', and 'SERVICES PORTFOLIO'. The main content area features a large banner with the text 'ACCESS YOUR OCEAN INFORMATION' and a 'GETTING STARTED' button. Below the banner are three main sections: 'OCEAN PRODUCTS', 'OCEAN MONITORING INDICATORS', and 'OCEAN STATE REPORT'. Each section has a brief description and a 'DATA', 'TRENDS', or 'EXPERTISE' button. On the right side, there's a 'SHORT-CUT TO SERVICES' sidebar with links to 'REGISTER NOW!', 'SCIENTIFIC QUALITY', 'ONLINE TUTORIALS', and 'COLLABORATIVE FORUM'. At the bottom, there's a 'LATEST NEWS FLASH' section and a '4TH GEO BLUE PLANET SYMPOSIUM IN TOULOUSE' announcement.



Discover on <https://www.facebook.com/MercatorOcean>



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Contact : servicedesk.cmems@mercator-ocean.eu

Knowing more about :
the program
the service
the entrusted entity

copernicus.eu
marine.copernicus.eu
mercator-ocean.eu

