

Remote Sensing for Ocean-Atmosphere interactions studies and applications

1-3 Dec. 2021



Marine Monitoring

Copernicus Marine Service portfolio

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Copernicus Marine Portfolio

Implemented by Mercator Ocean International as part of the Copernicus Programme

Resources News Events Contact Register



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

OCEAN PRODUCTS

A robust ocean data catalogue, to download or visualise data including hindcasts, nowcasts and forecasts.

EXPERTISE

OCEAN STATE REPORT

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

TRENDS

OCEAN MONITORING INDICATORS

Essential variables monitoring the health of the ocean over the past quarter of a century.

EXPLORATION

OCEAN VISUALISATION

Dive into our 4D digital oceans through our visualisation tool in the past, present and future.

Quick Links



User corner

All the info you need as a new or experienced user. Get trained, connect with the forum, get support and more.



Policy tools

Learn about EU and international maritime policies and how the Copernicus Marine Service supports them.



Services

See Copernicus Marine Use Cases, the blue markets we support, and the wide range of free and open support and services we provide.



User learning services

Find all the information you need to harness our service through workshops, trainings and online resources.

Online catalogue
marine.copernicus.eu

More than 300
scientifically qualified
products & Ocean
monitoring indicators

User driven

Common format
(Netcdf -Shapefile)

Open and Free



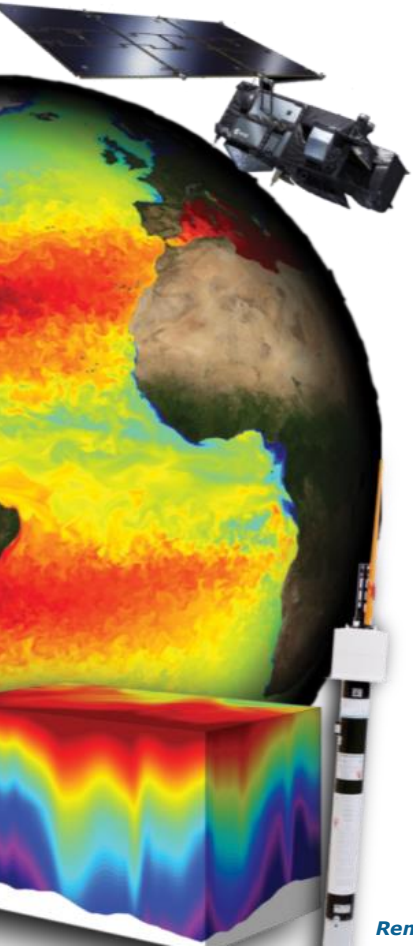
Copernicus
Europe's eyes on Earth



MERCATOR
OCEAN
INTERNATIONAL



Copernicus Marine Portfolio



DATA SOURCES

MODEL DATA

INSITU DATA

SATELLITE DATA

TEMPORAL COVERAGE

Multi-Year
~27 years

REAL-TIME
Daily, hourly, 15'

FORECAST
10 days

GEOGRAPHICAL COVERAGE

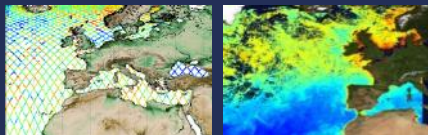
- 1 Global
- 2 Arctic
- 3 Baltic
- 4 NWS
- 5 IBI
- 6 Med Sea
- 7 Black Sea





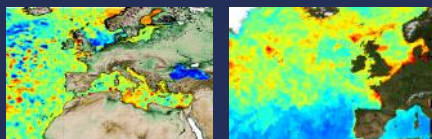
Satellite observation data

- L3** – daily composite products, single/multi sensor (Along Track or gridded product)



SSH L3 NRT Along Track products (left)
Chl-A OLCI NRT L3 (right)

- L4** – daily interpolated and weekly/monthly composites



SSH L4 NRT Gridded Products (left)
Chl-A REP L4 Copernicus Globcolour (right)

Spatial resolution: between 100 m and 25km

Near Real Time products updated daily + Multi Year Products (Long Time series): since 1993 or longer

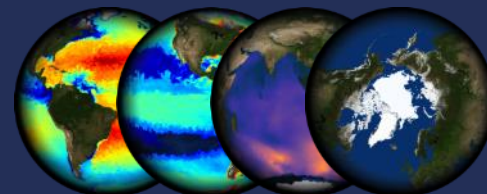
InSitu observation data

From different networks and platforms



Model data

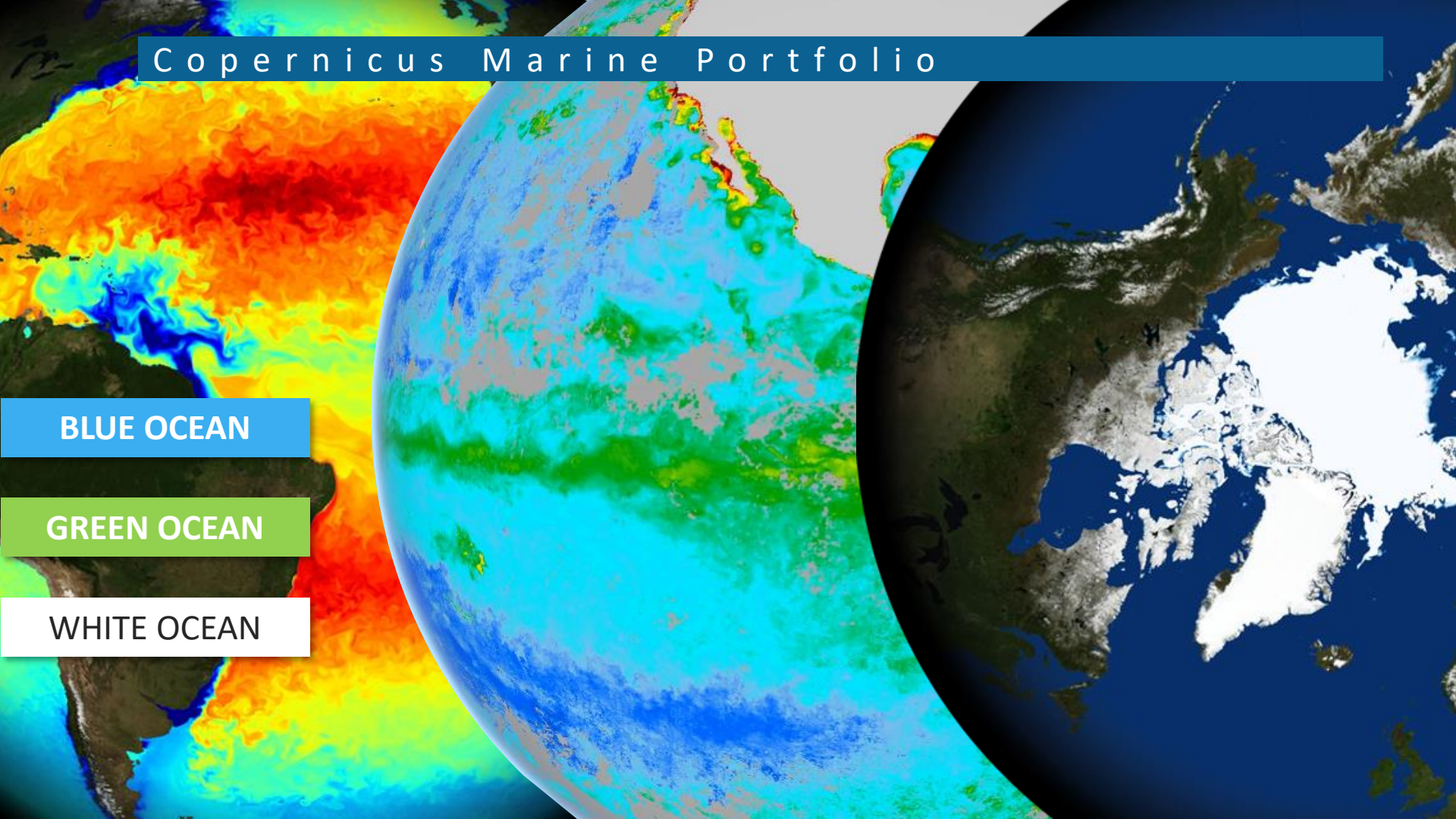
From 3D numerical representation of the ocean with an assimilation of « real » data



Spatial resolution: between 2 and 25km

Real Time products updated daily & 10-day Forecast + Multi Year Products (Long Time series): since 1993 or longer

Copernicus Marine Portfolio

The image features three overlapping satellite maps of the ocean. The leftmost map is a color-coded temperature map, showing a gradient from blue (cooler) to red (warmer). The central map is a chlorophyll-a concentration map, with colors ranging from blue to green to yellow. The rightmost map is a sea ice map, showing landmasses in dark blue and ice in white. The maps are arranged in a way that they appear to be different views or layers of the same oceanic data.

BLUE OCEAN

GREEN OCEAN

WHITE OCEAN



Copernicus Marine Portfolio

Temperature Salinity

Temperature
bottomT
Salinity
Sea surface density
Mixed Layer Depth

Currents

Geostrophic velocity
Barotropic velocity
Stokes drift
Tidal velocity (current tides)
Vertical velocity

Waves

Significant wave height
Mean wave period
Mean wave direction
Stokes drift
Wind wave (period, height, direction)
Primary swell wave (p., h., d.)
Secondary swell wave (p., h., d.)

Sea Surface Elevation

Sea surface height ab. geoid
Sea surface height ab. sea level
Mean Dynamic Topography

Surface Wind

Wind speed
Stress

Sea Ice

Sea ice concentration
Sea ice thickness
Sea ice velocity
Sea ice drift
Sea ice edge
Snow iceberg
Sea ice age
Ice Surface Temperature

Primary Production

Chlorophyll-a
Primary production
Phytoplankton
Phytoplankton Functional Types
Phytoplankton Sizes

Transparency Turbidity Reflectance

RRS: Reflectance
Transparency Turbidity
Absorption coefficient
Back scattering coefficient
Light attenuation
Secchi depth
Suspended matter

Oxygen

Dissolved oxygen

Low & mid- trophic levels

Zooplankton
Micronekton

Carbonate system

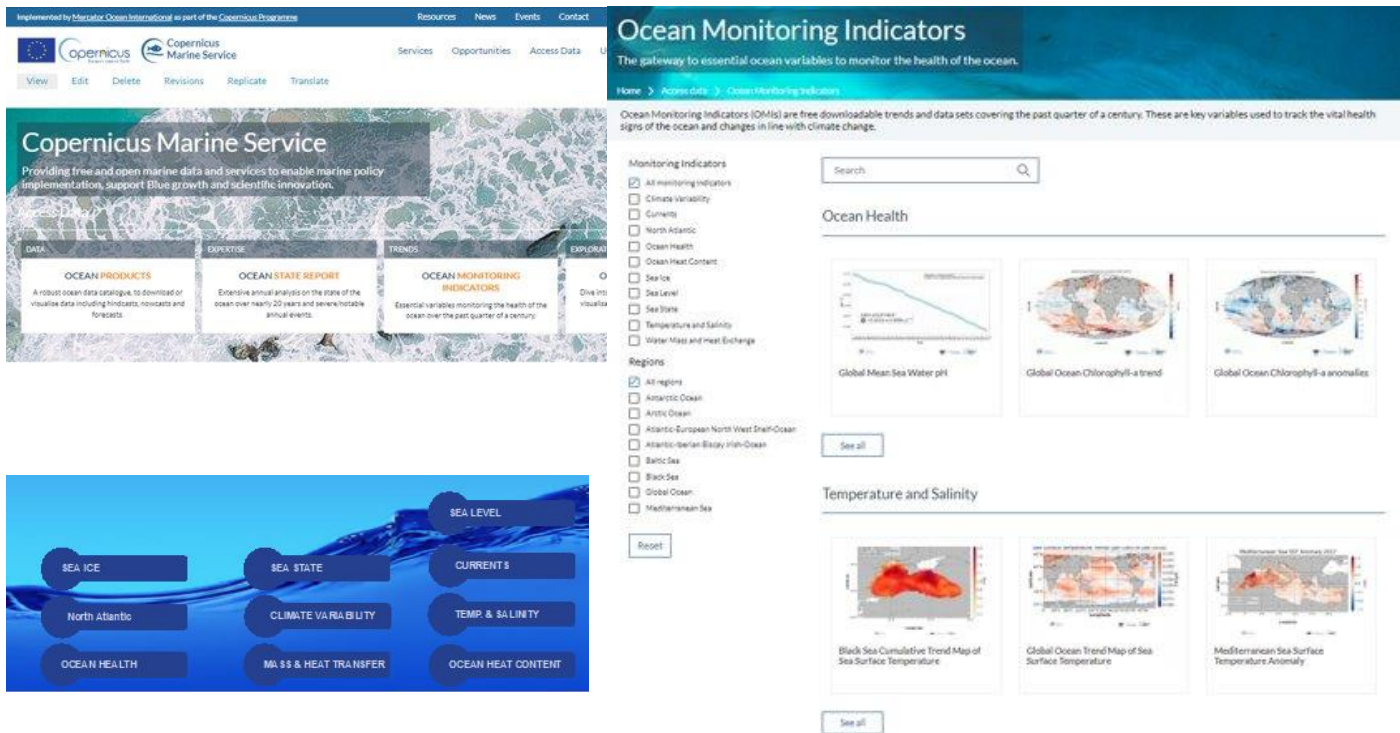
Potential Hydrogen
Surface partial pressure of CO₂
Surface flux of CO₂
fugacity of CO₂
Dissolved Inorganic Carbon
Alkalinity

Nutrients

Nitrate
Phosphate
Silicate
Iron
Ammonium



• Ocean Monitoring Indicators



pH
Ocean Acidification
(Seawater pH)

Ocean Heat

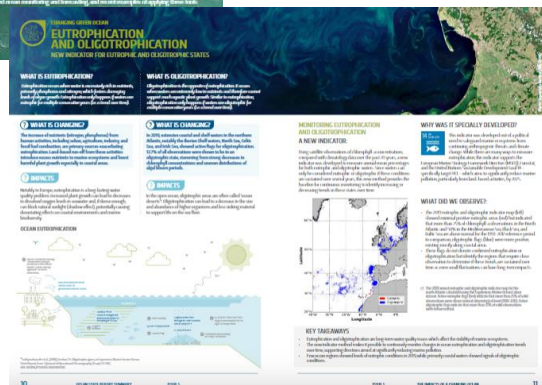
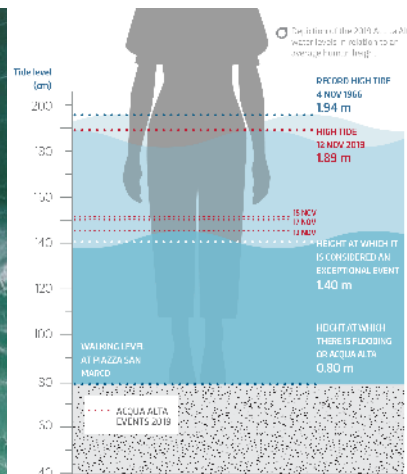
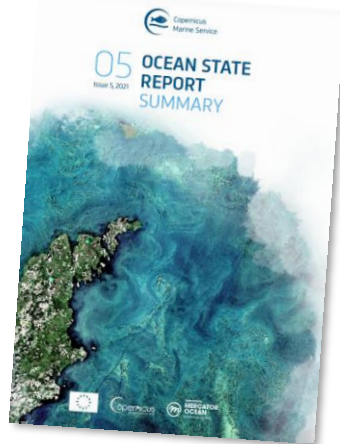
Sea Level
including
Thermosteric Rise

Sea Ice Extent

Arctic
Freshwater



OCEAN STATE REPORT – PUBLICATION 5





- **General information** to describe the products (the geographical and temporal coverage, the variables, processing level, temporal resolution...)
- **Associated documentation:** Product User Manual + Quality Information Document
- **Download services** with different possibilities and protocols available like the WMS, FTP, Opendap, Erddap, Subsetter...
- **Real time notifications** to stay informed about the evolution of the products and their provision (general information, new improvements, incident and maintenance)



Dec. 2021 Portfolio Evolution

BLUE OCEAN : WAVE PRODUCTS



2 New WAVE Multi Year satellite products [2002-2020]

GLOBAL OCEAN L3 SIGNIFICANT WAVE HEIGHT

L3 (7km inst.)

- ESA Sea State Climate Change Initiative data products (version 2)
- CFOSAT altimeter L2P Products (DT)



GLOBAL OCEAN L4 SIGNIFICANT WAVE HEIGHT

L4 (2 ° daily-mean) based on

- Global Ocean Sea Ice Concentration Time Series REPROCESSED (OSI-SAF)
- L3 SWH (7km)



GLOBAL OCEAN L3 SPECTRAL PARAMETERS FROM NRT SATELLITE MEASUREMENTS:

L3_SPC_NRT(discrete inst. till -3H)

- integration of CFOSAT dataset in addition to S1A&B datasets (In particular over the European coastal zone, filling the gap with Sentinel-1 wave measurements)



GLOBAL OCEAN L4 SPECTRAL PARAMETERS FROM NRT SATELLITE MEASUREMENTS:

(1° 3H till -3H)

- Implementation of a new chain to compute multi-mission L4 gridded spectral parameters from SARs L3 spectral wave products (S1A, S1B and CFOSAT) based on WAV_L3_SPC_NRT_



New Black Sea Waves Analysis and Forecast product

BLKSEA_MULTIYEAR_WAV_007_006

- 1/40° and 121 z vertical levels model
- taking into account interannual variability of the Danube River discharge
- better representation of the Danube Delta and the Bosphorus Strait





BLUE OCEAN



Full reprocessing of the Sea Level multiyear satellite products



Update of the Sea Level Global Mean Dynamic Topography satellite product now combining regional Mediterranean & Black Sea Mean Dynamic Topographies



- New twice-daily delivery for the Global Analysis and Forecast Wave model product



- New hourly datasets in the North-West Shelf Physics Reanalysis model product



Dec. 2021 Portfolio evolution

WHITE Ocean & GREEN Ocean

WHITE OCEAN

Two new multiyear satellite products



- 1) Antarctic Ocean Sea Ice Drift [31km 2Daily-mean]:
SEAICE_ANT_PHY_L3_MY_011_018
 - Antarctic sea ice displacement during winter from medium resolution sensors since 2003-10/2020



- 2) Baltic Sea ice concentration, extent, and classification [1km Daily-mean] time series since the winter 1981-05/2021

GREEN OCEAN



- New Baltic Sea Ocean Colour satellite product** [300m monthly-mean] L4 Near Real Time Chlorophyll-a since 01/2021 to -1Month
OCEANCOLOUR_BAL_BGC_L4_NRT_009_332

THANK YOU!



Marine Monitoring

Website : marine.copernicus.eu

[Copernicus Marine Free Registration](#)

Video: [The Copernicus Marine Offer](#)

Ocean State Report:

- ✓ [Issue 5 – Promotion Video](#)
- ✓ [Web Article – 22 September 2021](#)
- ✓ [Download Summary](#)
- ✓ [Download Full Report](#)

Ocean Monitoring Indicators

Copernicus Marine products - Data Catalogue

- ✓ [Direct Access](#) ([Free registration](#) required)
- ✓ **Tutorial:** [How to search the Copernicus Marine Products?](#)
- ✓ **Tutorial:** [How to download Copernicus Marine Products?](#)
- ✓ **Tutorial:** [Discover Product Information Page](#)

The Intergovernmental Panel on Climate Change

- ✓ [Special Report on the Ocean and Cryosphere in a Changing Climate](#)
- ✓ [Working Group I assesses the physical science of climate change](#)

My Ocean Viewer:

- ✓ [Web Article: Discover the latest special features on MyOcean Viewer](#)



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