

Copernicus Marine Service



Marine Monitoring

How the Copernicus Marine Service meets the Fisheries & Aquaculture challenges?

Edmée Durand - Operations & Service Dpt. - Mercator Océan
Fisheries and Aquaculture Workshop, Brussels, October 2nd 2018



OCEAN PRODUCTS

160 products

Global ocean and
the European seas

In-situ and satellite
observations,
modelling products

Physical and
biogeochemical
variables

Long time series (25
years), real time
products and
forecast

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 19 APR.

SHORT-CUT TO SERVICES
REGISTER NOW!
SCIENTIFIC QUALITY
ONLINE TUTORIALS
COLLABORATIVE FORUM

LATEST NEWS FLASH
CMEMS:7324-A
New Service Release on 22 March 2018 - Status on updates
INFORMATION
ALL NEWS FLASH



OCEAN PRODUCTS

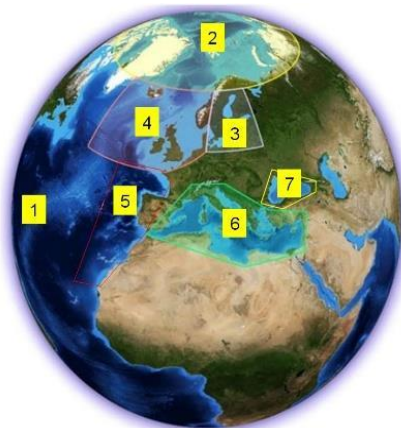
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Global ocean and
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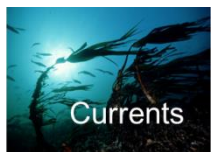
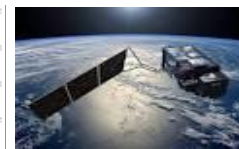
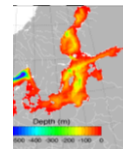
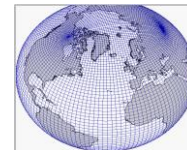
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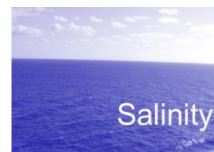
- 1. Global
- 2. Arctic
- 3. Baltic
- 4. NWS
- 5. IBI
- 6. Med Sea
- 7. Black Sea



Currents



Temperature



Salinity



Sea
surface
elevation



Oxygen



Primary
production



Sea ice



Surface
wind



Waves



Transparency
Turbidity
Reflectance



Plankton



Nutrients

A central information system to search, view and download products



CMEMS - Ocean Monitoring Indicators

marine.copernicus.eu

Marine
Monitoring

OCEAN MONITORING INDICATORS

3 first OMIs

Ocean Heat Content
Sea Level
Ice extend

Anomalies and
trends
Time series and
maps
Multi-product
approach

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OCEAN HEAT CONTENT

Ocean Heat Content Monitoring Indicator

Anomalies and trends
Time series and maps

Multi-product approach:
global reanalyses and
reprocessed observations

1993-2016

GLOBAL OCEAN



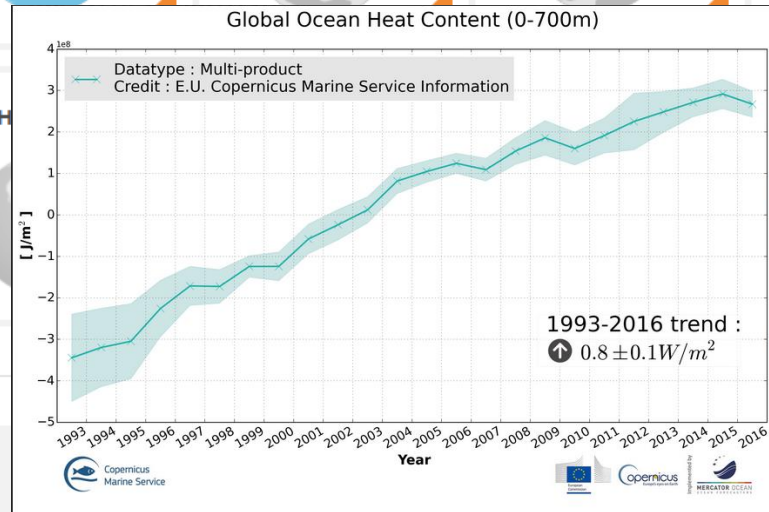
ARCTIC OCEAN



ANTARCTIC OCEAN



NORTH



SEA LEVEL

Sea Level Ocean Monitoring Indicator



CMEMS - Ocean State Report

Marine
Monitoring

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OCEAN STATE REPORT

Focus on the role of
the oceans in the
Earth's climate
system

Annual Report

80 scientific experts
from more than 25
institutions

Global ocean and
European Seas

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- ONLINE TUTORIALS 🎓
- COLLABORATIVE FORUM 💬

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CMEMS - Ocean State Report

Marine
Monitoring

OCEAN STATE REPORT

Focus on the role of
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system

Annual Report

80 scientific experts
from more than 25
institutions

Global ocean and
European Seas

2016

Ocean State Report 2016



2017

Ocean State Report 2017
(in progress)



IMarEST
Denny
Medal

1993-2015 decadal trends

ARCTIC SEA-ICE EXTENT
-76300 km²/year



ANTARCTIC SEA-ICE EXTENT
+44900 km²/year



SEA SURFACE TEMPERATURE
0.02 °C/year: 0.4°C total (GLOB)
0.04 °C/year: 0.9°C total (MED)
0.08 °C/year: 1.9°C total (BS)



TOTAL SEA LEVEL
3.3 mm/year (GLOB)
2.9 mm/year (MED)
3.1 mm/year (IBI)
2.6 mm/year (NWS)
3.2 mm/year (BS)



THERMOSTERIC SEA LEVEL
1.0 mm/year (GLOB)
1.5 mm/year (MED)
1.5 mm/year (IBI)
1.1 mm/year (NWS)



OCEAN HEAT CONTENT
0.6 W/m² (GLOB)
0.8 W/m² (MED)
0.9 W/m² (IBI)
0.8 W/m² (NWS)





Marine
Monitoring

CMEMS - USE CASES

COPERNICUS MARINE ENVIRONMENT MONITORING
Providing PRODUCTS and SERVICES for all marine and coastal users

European Commission

ABOUT US | MARKETS & BENEFITS | NEWS | SCIENCE & MONITORING | TRAINING & EDUCATION

MARKETS & BENEFITS dropdown menu:
- MARKETS
- **USE CASES**
- SUBMIT YOUR USE CASE
- DOCUMENTATION

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140 Use Cases

Examples of how
CMEMS data is used

marine.copernicus.eu

SHOM, Rheticus MARINE, UNIVERSIDAD DE LAS PALMAS DE GRAN CANARIA, INSTITUTO ESPAÑOL DE OCEANOGRÁFICA, METOCEA SOLUTIONS, ACTION Modellers Consulting & Technology, NOVELTIS, AARHUS UNIVERSITET, M S I, PML Plymouth Marine Laboratory

Copernicus Marine Service | USE CASES

Version 11

SUPPORTING BATHING AND AQUACULTURE WATER MANAGEMENT IN THE NORTHERN ADRIATIC SEA



USE CASE OVERVIEW

The Municipality of Chioggia, a coastal town close to Venice, Italy, represents both an important touristic zone and a fishing port influenced by Urban Waste Water Treatment Plant (UWWTP), the Po river and the mouths of the Venice Lagoon. In order to follow the dynamic of plumes released by the latter, ISPRA and OGS have developed a high resolution model of the Northern Adriatic Sea using the Copernicus Marine Service Mediterranean Sea reanalysis model as a boundary and initial conditions. They have performed a reanalysis simulation for the period 2006-today of the Northern Adriatic Sea, including the a simulation of UWWTP data. It allows to relate plumes released by UWWTPs and the measured quality of bathing waters. Each source of bacterial pollution is identified by a different passive tracer. An index will then be developed indicating possible bacterial pollution caused by a UWWTP on a bathing water body. It will help local administrations to better qualify bathing waters laying in their jurisdiction. It will also help many aquaculture farms and fishing port in the area. More here: <http://www.sintesi.sprambiente.it/faces/public/CADEAU/index.xhtml>

BENEFITS



Marine
Monitoring

Marine.copernicus.eu

ACCESS TO DATA & INFORMATION

Free and open access to
worldwide Ocean information
marine.copernicus.eu

• SEARCH
& BROWSE



• DISCOVER
& VISUALISE



• REGISTER



• DOWNLOAD



• COMPUTE



• JOIN UP



INSPIRE
Compliant





Listening to users



- **Collect** feedback and suggestions from:
 - meetings & EU User Forums
 - projects
 - *1 annual* questionnaire
 - face to face user workshops
 - any users including **standard users & major accounts** (EU agencies)
- **Ideas**
 - Sent to service desk
 - Collected over a 5 year period
 - Analysed every 12-18 months
 - Represent more than 1500 users' request

We have an overview of the improvement of the service expected today by the users



Marine
Monitoring

CMEMS USER UPTAKE

ESA

EEA - EuroGOOS

ECMWF (C3S)

Eumetsat

MERCATOR OCEAN
Entrusted entity



**Scientific and
Technical
Advisory
Committee**

CROSS-CUTTING COORDINATION - CENTRAL USER SERVICE

System

Service

Outreach

Science

CMEMS OPERATIONS PRODUCTION AND SERVICE

Service operations

Central Information System

Thematic Assembly Centres
(Observations)

Monitoring and Forecasting Centres
(Models)

SL TAC

In Situ TAC

OC TAC

SST TAC

Sea Ice TAC

Wind TAC

Multi Obs TAC

Wave TAC

ARC MFC

BAL MFC

NWS MFC

IBI MFC

MED MFC

BS MFC

GLO MFC

**CMEMS
EVOLUTION**

Service Evolution

User Uptake

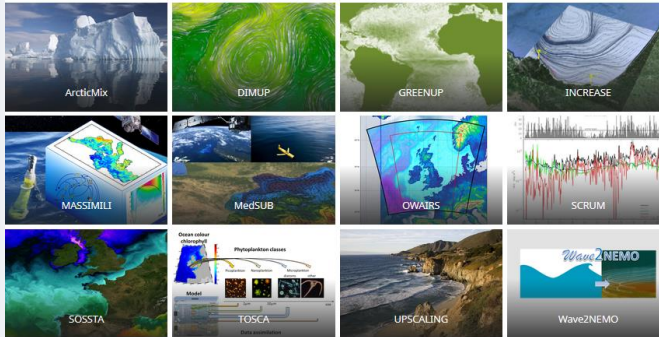


Objectives:

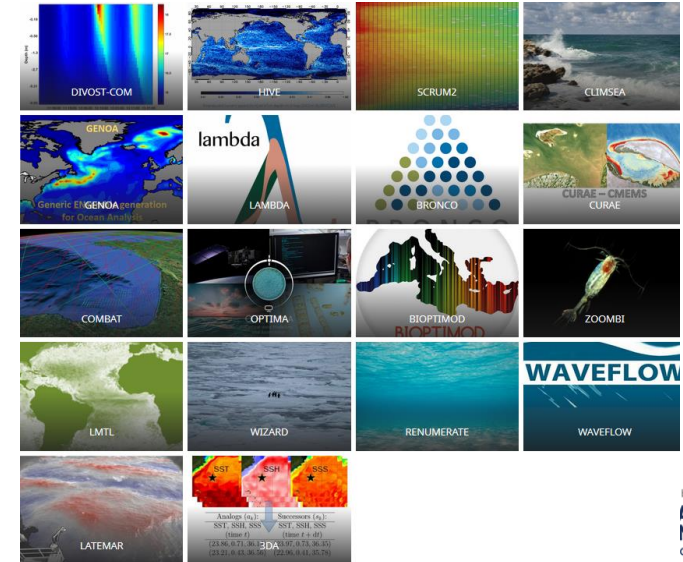
With the support of the CMEMS Science and Technological Advisory Committee (STAC):

- ❑ To take into account scientific and technological advances relevant for CMEMS
- ❑ To prepare CMEMS **R&D priorities** (→ 2025 + focus on next 4 years)
- ❑ To improve CMEMS **products**

1st call (2016) - 12 R&D projects



2nd call (2018) - 18 R&D projects



Several projects deal with the coastal zone:
HF radars, coupling with downstream coastal
models, river inputs...



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CMEMS User Uptake activities

Services on Atlantic NWS:

- 1 fisheries
- 2 water quality
- 2 marine pollution
- 1 ocean noise

Services on Arctic Ocean:

- 2 security on coastal ice

Services on Baltic Sea:

- 1 security on coastal ice
- 1 marine pollution
- 1 aquaculture

Services on Black Sea:

- 1 water quality
- 1 aquaculture

Services on Atlantic IBI:

- 3 coastal modelling
- 1 water quality
- 1 search and rescue
- 1 wave energy

Services on Outer regions:

- 1 tidal energy
- 2 coastal modelling

Services on Mediterranean Sea:

- 1 coastal modelling
- 3 water quality
- 2 aquaculture

4 calls for tender - 27 contracts

CMEMS geographical areas

Objectives:

- To show the **integration**, the **usefulness** and the **impact** of the Copernicus Marine Service and products in the **downstream applications** carried out by the CMEMS users
- To encourage intermediate users to **develop** their own **downstream operational systems** based on **CMEMS**



CMEMS datasets - fisheries and aquaculture

Marine
Monitoring

	Variables	CMEMS Products
Physical variables	Temperature Salinity Currents Sea Level Waves	Modelled and observed hydrographic conditions Global Ocean or Regional Seas GLOBAL_ANALYSIS_FORECAST_PHY_001_024 GLOBAL_REANALYSIS_PHY_001_025 GLOBAL_ANALYSIS_FORECAST_WAV_001_023 GLOBAL_REP_PHY_001_021 INSITU_GLO_NRT_OBSERVATIONS_013_030 SST_GLO_SST_L4_NRT_OBSERVATIONS_010_014
Biogeochemical variables	Nutrients Oxygen Chlorophyll-a	Modelled and observed concentrations Global Ocean or Regional Seas GLOBAL_ANALYSIS_FORECAST_BIO_001_014 GLOBAL_REANALYSIS_BIO_001_018 OCEANCOLOUR_GLO_CHL_L4_NRT_OBSERVATIONS_009_033 OCEANCOLOUR_GLO_CHL_L4_REP_OBSERVATIONS_009_082 INSITU_GLO_NRT_OBSERVATIONS_013_030

NRT: near real time product / REP: reprocessed product



Marine
Monitoring

Coastal downstream service for fisheries or aquaculture



Rheticus® Marine Services
Seawater quality
Italy

<http://marine-medsea.rheticus.eu>

- Provides continuous monitoring of coastal seawater quality and marine resources.
- Supports national and regional authorities in fulfilling environmental reporting obligations (e.g. WFD and MSFD), and private actors involved in marine resource exploitation activities.
- Satellites Observations from CMEMS:
Chlorophyll-a, temperature and reflectance



Technical
University of
Denmark

OCEBIS

OCEan Biological Information Service
Danemark

http://ocebis.org/cmems_dedicated_web_page

- Provides open real-time and historic oceanographic data driving biological activity.
- Useful for fishery industry sector. Ex: fish aggregation predictions or early life stages locations of marine organisms survive.
- Model products from CMEMS:
Physical and biogeochemical variables



Marine
Monitoring

Coastal downstream service for fisheries or aquaculture



ISPRA

Istituto Superiore per la Protezione
e la Ricerca Ambientale



CADEAU

Seawater quality
Italy

<http://www.bio.isprambiente.it/cadeau/>

- Produce an annual environmental bulletin on the marine environmental state and the water quality in the Italian coastal area of the Northern Adriatic Sea in support of the application of the MSFD.
- Satellite product, biogeochemical models and in-situ data from CMEMS: Chlorophyll, Temperature, Currents



Coastal downstream service for fisheries or aquaculture

TERRASIGNA™



SkyFish
Seawater quality
Romania

- SkyFISH is a service for water quality monitoring for sustainable fishing and aquaculture in the Romanian coastal area.
- The platform will display static and real-time ocean data and indexes on fishes' habitat conditions and implementation of aquaculture farms.
- Model and satellite products from CMEMS: Temperature, Salinity, Currents, Chlorophyll, Sea Level, Waves, Winds



IH cantabria
INSTITUTO DE HIDRÁULICA AMBIENTAL

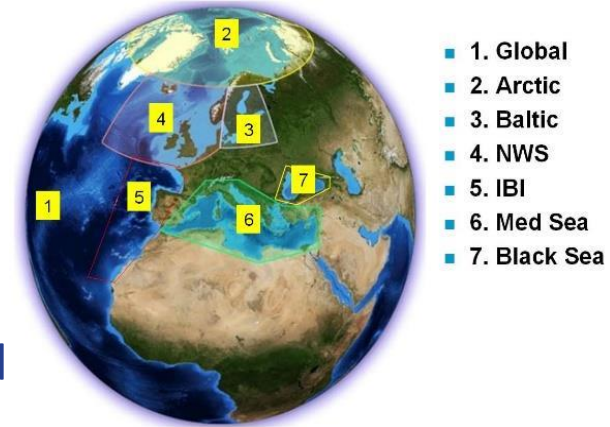
RENAQUA-DSS
Renewable Energy and Aquaculture
Decision Support System
Spain

- Multi-use platforms (MUPs) for both marine energy production and aquaculture activities.
- Identify opportunities for the co-location of marine energy production and aquaculture activities
- Model and satellite products from CMEMS: Temperature, Salinity, Currents, Chlorophyll, Sea Level, Waves, Winds, Oxygen



CONCLUSION

- ✓ CMEMS is an open, free, validated, operational and long-term service.
- ✓ CMEMS is a core service
 - with physics and biogeochemistry observation (in-situ & satellite) and modelling products.
 - with real time and multi-year products (reprocessing/reanalysis).
- ✓ CMEMS has allowed the development of an great number of downstream applications and services.



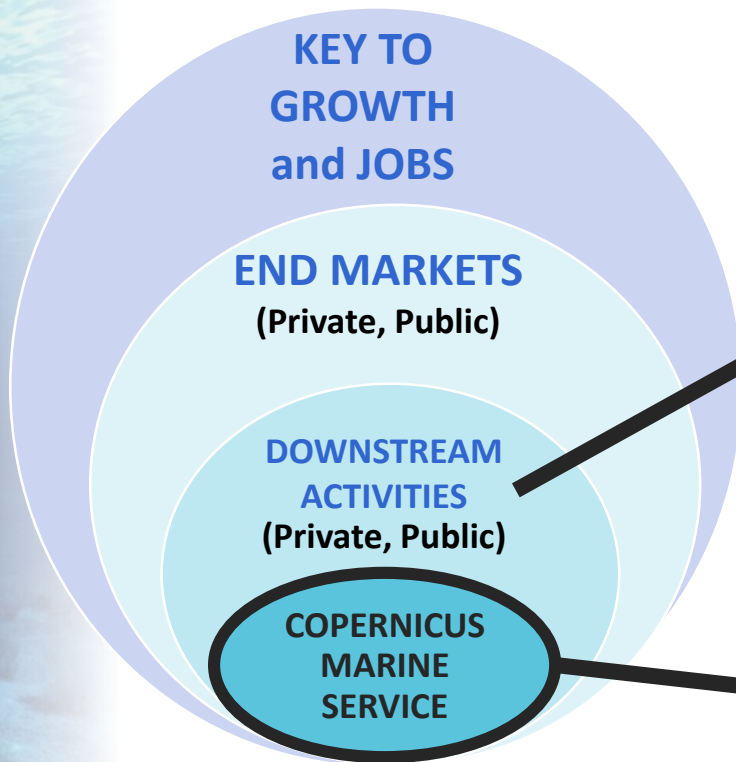


Marine
Monitoring

CONCLUSION

2 possibilities for using CMEMS

<http://marine.copernicus.eu/markets/use-cases/>



ASK CMEMS USERS (value added)

DIRECTLY (free)



Marine
Monitoring

CONCLUSION

CMEMS strives to fit user needs:



- **We work** to improve the satellites, the In-Situ and the modelling products (temporal and spatial resolution, data harmonisation, coastline, bathymetry...)

- **We need your feedback to better suit your needs:**
 - Policy makers
 - Member States
 - Agencies in charge of fish stock management and aquaculture industry
 - Conventions / ICES / Projects



Marine
Monitoring

T h a n k y o u

Contacts for feedback and request

- ➔ **Web portal** marine.copernicus.eu
- ➔ **Service Desk's email** servicedesk.cmems@mercator-ocean.eu
- ➔ **Collaborative forum** <http://forum.marine.copernicus.eu>