

Copernicus Marine Service



Marine Monitoring

**How the Copernicus
Marine Service meet the
water challenges?**

Edmée Durand - Dept. Operations & Service - Mercator Océan
Water Management Workshop, Brussels, 28th May 2018



Marine
Monitoring

CMEMS – On-line catalogue of products

marine.copernicus.eu

OCEAN PRODUCTS

157 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

Search terms OK

SHORT-CUT TO SERVICES

- REGISTER NOW!
- SCIENTIFIC QUALITY
- ONLINE TUTORIALS
- COLLABORATIVE FORUM

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.

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



OCEAN PRODUCTS

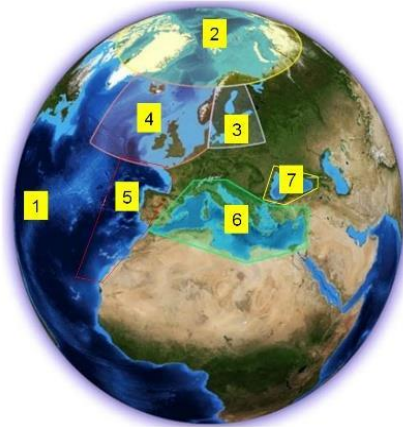
157 products

Global ocean and
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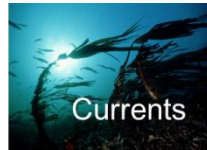
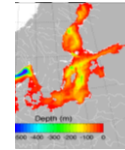
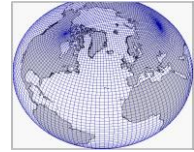
In-situ and satellite
observations,
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Long time series (25
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products and
forecast



- 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



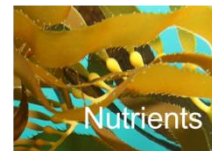
Waves



Transparency
Turbidity
Reflectance



Plankton



Nutrients

A central information system to search, view and download products



CMEMS - Ocean Monitoring Indicators

marine.copernicus.eu

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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Multi-product
approach

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



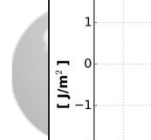
ARCTIC OCEAN



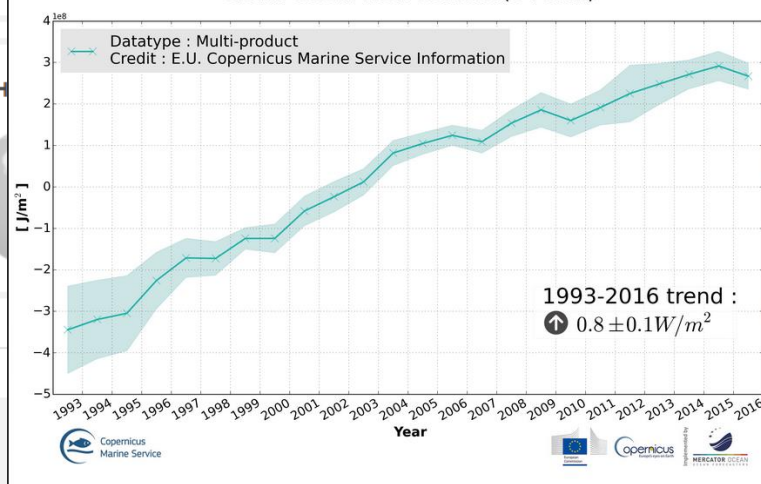
ANTARCTIC OCEAN



NORTH



Global Ocean Heat Content (0-700m)



SEA LEVEL

Sea Level Ocean Monitoring Indicator



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CMEMS - Ocean State Report

marine.copernicus.eu

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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CMEMS - Ocean State Report

OCEAN STATE REPORT

Focus on the role of
the oceans in the
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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)





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CMEMS - USE CASES

marine.copernicus.eu

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

European Commission

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MARKETS & BENEFITS

- MARKETS
- USE CASES**
- SUBMIT YOUR USE CASE
- DOCUMENTATION

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

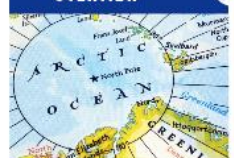
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EXPERTISE →



GREENLAND COMMUNITY ICE INFORMATION SERVICE

USE CASE OVERVIEW



For northern communities, the ability to monitor the ice is an essential part of culture, community and tourism. The challenge of traveling in the changing climate. The Greenland service provides local hunters, tourism communities, and search and rescue services with information to safely over the sea ice in coastal waters. The service will be in the community of Qaanaaq, where the service, Sentinel-1 satellite imagery, determine the ice conditions around the coast. The service is created delineating conditions as "Slow", and "No Go". The satellite imagery combined with Copernicus Marine Service data, sea ice concentration, sea ice thickness, and Greenland ice charts are available to users through a website. More here: <http://floodice.polaris.no>

BENEFITS FOR USER

Decision-making support tool

135 Use Cases

Examples of how
CMEMS data is used



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



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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



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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



European
Commission

copernicus
Europe's eyes on Earth

Implemented by

MERCATOR OCEAN



Marine
Monitoring

CMEMS Service Evolution activities

Objectives:

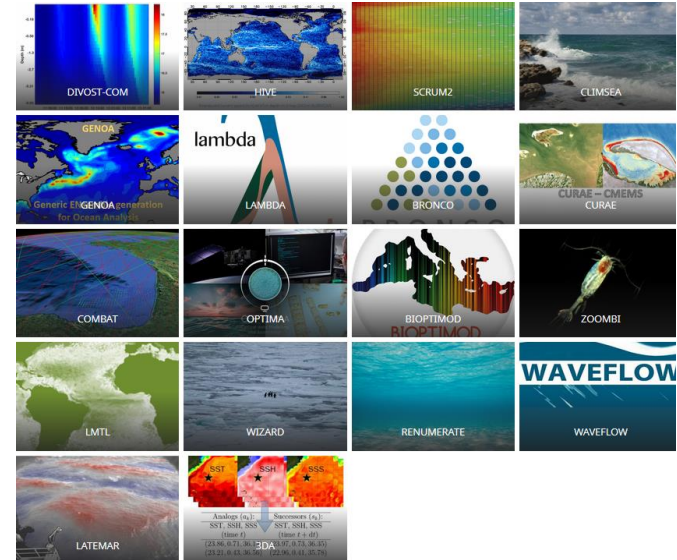
With the support of the CMEMS Science and Technological Advisory Committee (STAC):

- ❑ 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**



European
Commission





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CMEMS datasets for MSFD

Descriptors	Variables	CMEMS Products
D5	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
D1, D7, D8, D10, D11	Temperature Salinity Currents Sea Level Waves	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_ANALYSIS_PHYS_001_020 GLOBAL_REP_PHY_001_021 INSITU_GLO_NRT_OBSERVATIONS_013_030



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Coastal downstream service for MSFD



Quonops Online Services

Ocean noise
MSFD - Descriptor 11
France

qos.quiet-oceans.com/Copernicus_Marine_Service/index.html

- Operational ocean noise forecast service to deliver a spatio-temporal estimation of noise levels due to human activities at sea
- Modelling CMEMS products:
Temperature, salinity and waves

Deltares

MSFD-EUTRO

Eutrophication
MSFD - Descriptor 5
Netherlands

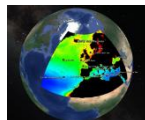
deltares.nl/en/projects/msfd-eutro

- MSFD-EUTRO: Web portal to help policy advisors & policy makers to understand, use and appreciate ocean colour data for the MSFD - Blended Chl-a products.
- Observation CMEMS products:
Chlorophyll-a and reflectance



Marine
Monitoring

Coastal downstream service for MSFD



CHLO4MSFD

Eutrophication

MSFD - Descriptors 1, 5, 7, 8
Spain

chlo4msfd.azti.es

- Web portal on satellite-derived Chlorophyll-a products. Dedicated to enhance the use of these data and derived products by MSFD actors in their activities.
- Satellite product, biogeochemical models and in-situ data from CMEMS: Chlorophyll.



CefMAT

Marine resources

MSFD - all descriptors then focus on 1 on 2
United Kingdom

- Tool to assess the capability and limitation of CMEMS products to answer to MSFD descriptors.
- Satellite product, biogeochemical models and in-situ data from CMEMS

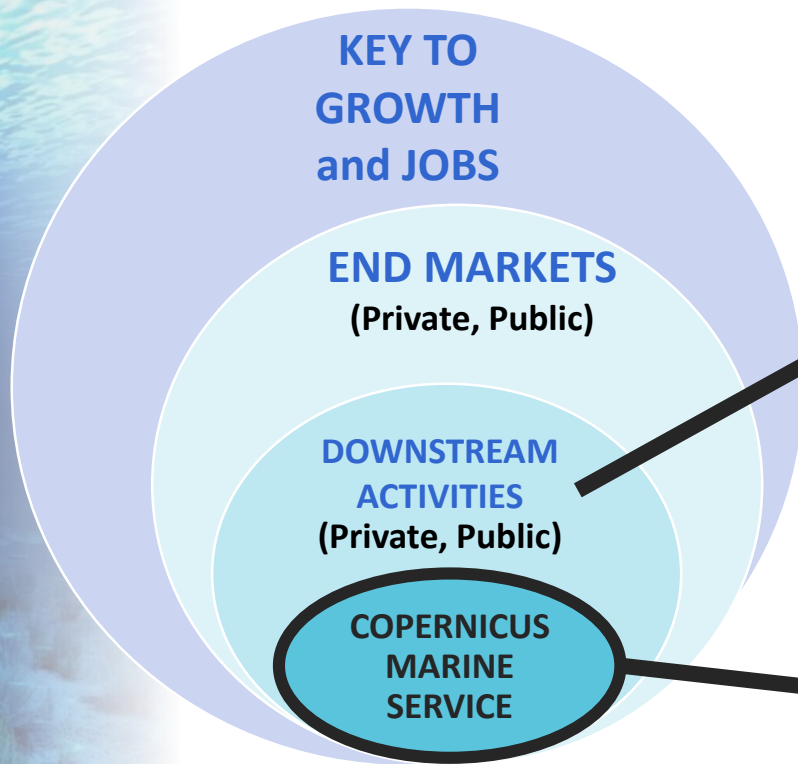


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CONCLUSION

2 possibilities for using CMEMS

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



ASK CMEMS USERS (value added)

DIRECTLY (free)



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CONCLUSION

CMEMS strives to fit MSFD needs (among others):



- **We work with other Copernicus Service** to improve satellites products and modelling products near the coast (rivers, coastline, bathymetry...)
- **We need your feedback to better suit your needs:**
 - Policy makers
 - Member States
 - Conventions / ICES / Projects
- **In 2019 we plan to provide you with following:**
 - User Uptake MSFD demonstrations
 - CMEMS products recommendations (MSFD dedicated catalogue on web portal)
 - Dedicated MSFD training planned in 2019



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Thank you

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>