# Copernicus Marine Service Status

Marine Monitoring

P.Y. Le Traon, Mercator Ocean International

CMEMS / EMODnet coordination meeting
April 17, 2019

European Commission
Copernicus
Implemented by
MERCATOR OCEAN

# MERCATOR OCEAN INTERNATIONAL



## 4 new shareholders

- CMCC (IT), NERSC (NO), Met Office (UK), Puertos del Estado (ES)

## In 2019, at least two additionnal ones

- BSH (DE) and CNR (IT)

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# CMEMS organisation

Marine Monitoring

ESA - Eumetsat

EuroGOOS and EEA

Other Copernicus Services (ECWMF, EEA, EMSA, etc)

Marine Environment Monitoring

Entrusted entity: MERCATOR OCEAN INTERNATIONAL

Scientific and Technical Advisory Committee

Champion Users Advisory Committee

CROSS-CUTTING COORDINATION
CENTRAL USER SERVICE

System | Service | Outreach | Science

## CMEMS OPERATIONS PRODUCTION AND SERVICE

**Service desk and service operations**
**Central Information System**

**Monitoring and Forecasting Centres (Models)**

| ARC | BAL | BLACK | IBI | MED | NWS | GLO |
|---|---|---|---|---|---|---|

**Thematic Assembly Centres (Obs)**

| SEA LEVEL | IN SITU | OCEAN COLOR | SST | SEA ICE | WIND | Multi OBS | WAVE |
|---|---|---|---|---|---|---|---|

## CMEMS EVOLUTIONS AND USER UPTAKE

Additional activities complementing CMEMS operations

Service Evolution

User Uptake

Marine Monitoring

# The Copernicus Marine Service

**MULTI-YEAR**
10 to 45 years

**REAL-TIME**
Daily, hourly

**FORECAST**
2 to 10 days


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

## *ESSENTIAL MARINE VARIABLES*

- Physics
- Sea-ice
- Waves
- Biogeochemistry

**OBSERVATIONS**
In-situ & Satellites

**NUMERICAL MODELS &**
data assimilation

**Open and Free access**

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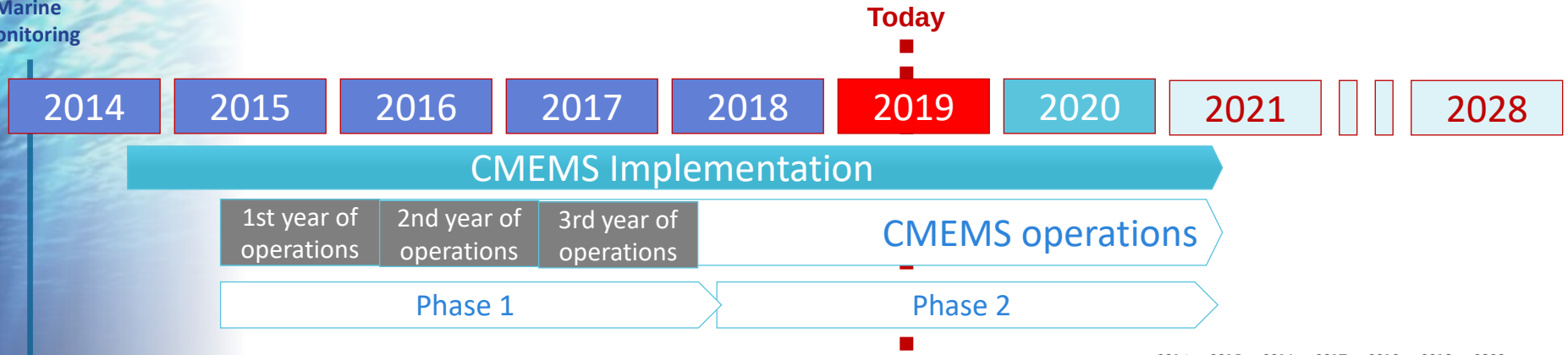
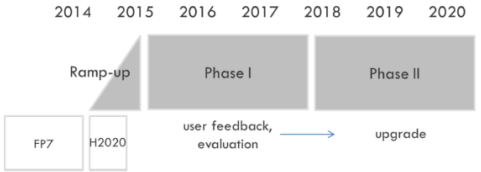
# TIMELINE

Marine Monitoring




April 2019 :

- a 5th annual cycle for CMEMS implementation
- 2nd year of CMEMS phase 2 (April 2018-April 2021)

# Copernicus Marine Service – Phase 2 - 2018

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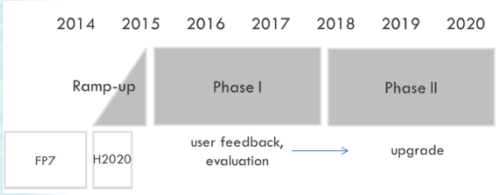
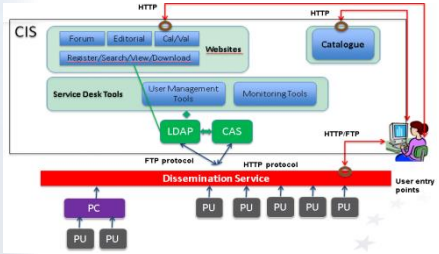
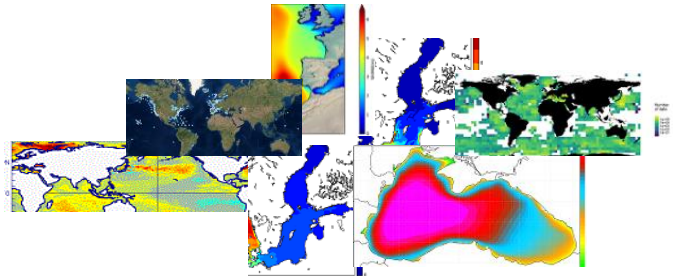



**CMEMS Phase-2 started in January 2018**
**14 contracts (production); 2 contracts (Distribution)**

**New distribution system (Cloud Based)**



**Several service releases : April, July and November 2018**

- New **Multiyear** products (reanalyses ocean/ice/wave, bio, reprocessing in-situ/satellite)
- Uptake of **Sentinel-3** data (sea level, SST and ocean colour).
- High resolution **NWS** system (1.5 km)

**Preparation evolutions : CMEMS Design (2019) & Specification Reviews (2020)** held in June 2018

**Service Evolution R&D programme: 18 new contracts started in April 2018**

**User Uptake programme : 10 new contracts started in May 2018**

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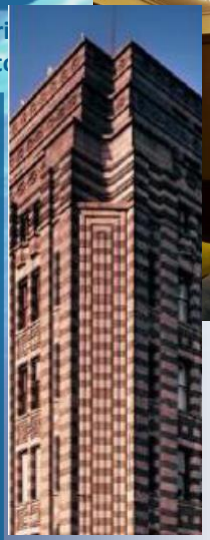
# CMEMS Annual Operation Review (AOR)



**Formal review organized every year by Mercator Ocean with its contractors (CMEMS operators) to assess the past 12 months of operations and improve the service.**

- Held on 5-7 Feb 2019, Amsterdam, Nederland
- 80 participants

Review of:

1. **Operational performance** for production and service
2. **Service Development** for real-time and multi-year information
3. **Product quality** for real-time and multi-year information

*Main outcome*

- ***First year of CMEMS phase 2 (2018-2021) was technically very challenging with the switch to a centralised cloud-based dissemination system but achieved thanks to the strength of CMEMS technical community and the very good collaboration between all the CMEMS contractors.***

*Lessons of these past 12 months:*

- Success of the technical working group and collaborative tools implemented

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# Technical milestones

- 16th April 2019 : New Service Release

**The main characteristics of this release will be:**

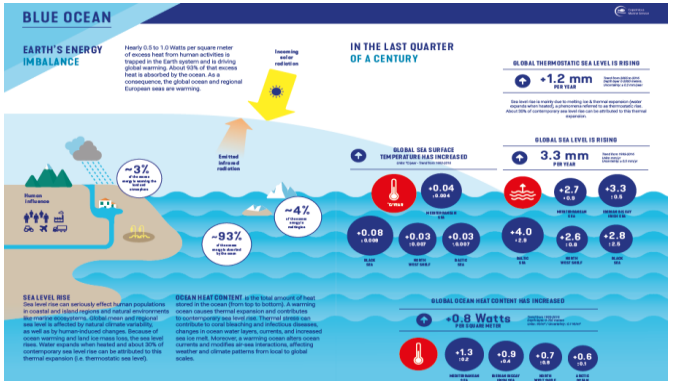
- **Surface carbon (pCO2, pH) observation based products** (multi-observations and in situ) global products
- Introduction of Sentinel-3B data in satellite **Sea Level** and **Waves** satellite products
- **Surface currents from High Frequency Radars** in all regional Near Real Time in situ products.
- Surface currents from global MFC with stokes drift (waves) and tidal currents.
- **Phytoplankton Functional Type** variable in ocean colour Mediterranean product
- **Nutrients** in multi observations products (Argo extended profiles / neural network)
- Extension of Multiyear products

# CMEMS Ocean State Reports

**Publication of**

- Ocean State Report (OSR #2) in *Journal of Operational Oceanography,*
- OSR#2 High Level summary,
- Associated Ocean Monitoring Indicators (OMIs)






- Release of the Ocean State Report Summary #3 will be published in May 2019.
- Release of the Full Ocean State Report #3 in Fall 2019.
- Preparation of the Ocean State Report #4 on going.

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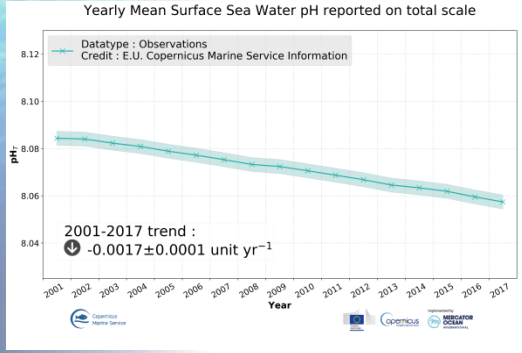
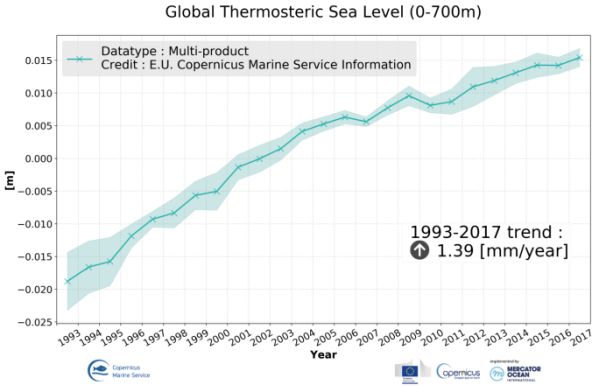
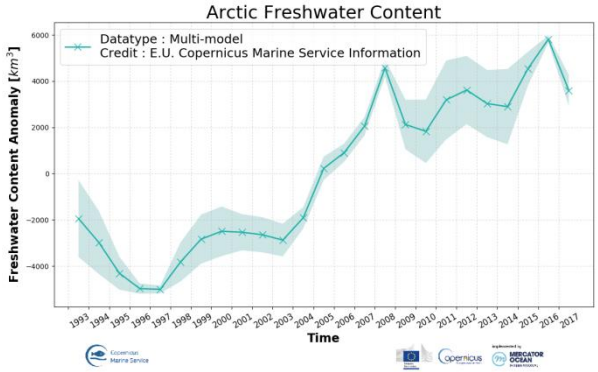
# Selected highlight of production

***A set of new Ocean Monitoring Indicators released in February 2019***




**The acidity of the ocean has been continuously increasing since 2001** (i.e. decrease of **pH**)

SDG 14 indicator (EUROSTAT)

**Water expands when heated. This contributes to 30% of total sea level rise.**

**Arctic Freshwater Content has been increasing since 1993.**

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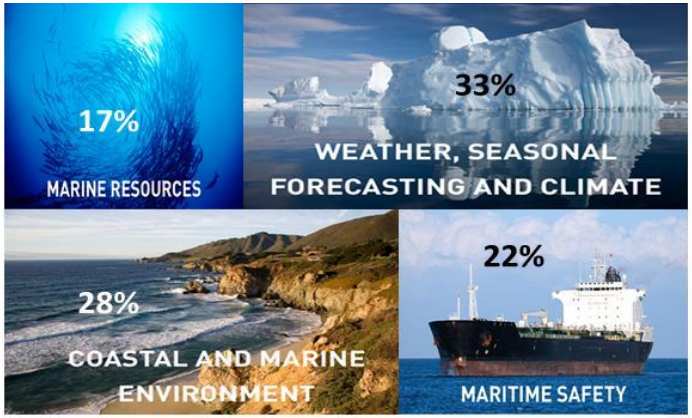
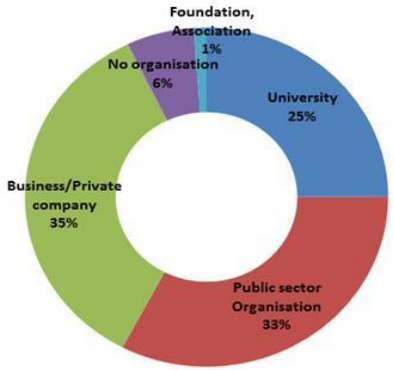
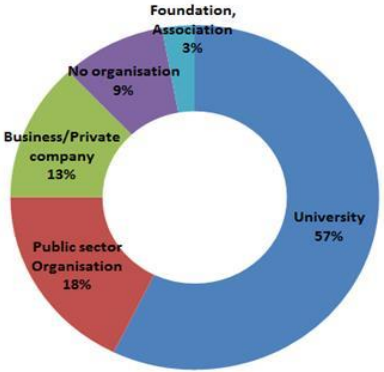
# Copernicus Marine Service applications and users








User statistics: based on number of downloads




User statistics : based on number of users

**More than 17 000 subscribers**

**Steady increase of users (+ 300 per month)**

**Business companies = 1/3 of downloads**

Marine Monitoring

# http://marine.copernicus.eu/markets/

## MARKETS

**Copernicus Marine Service supports all sectors of the blue economy**

1. SEA ICE MONITORING
2. MARINE CONSERVATION & POLICIES
3. SCIENCE & CLIMATE
4. NATURAL RESOURCES & ENERGY
5. WATER QUALITY
6. COASTAL MONITORING
7. SOCIETY & EDUCATION
8. MARINE FOOD
9. MARINE NAVIGATION
10. SAFETY & DISASTER




how Copernicus Marine service is used

[Use cases page]

[Use cases books]

[Use cases demo page]

# CMEMS User Uptake Activities

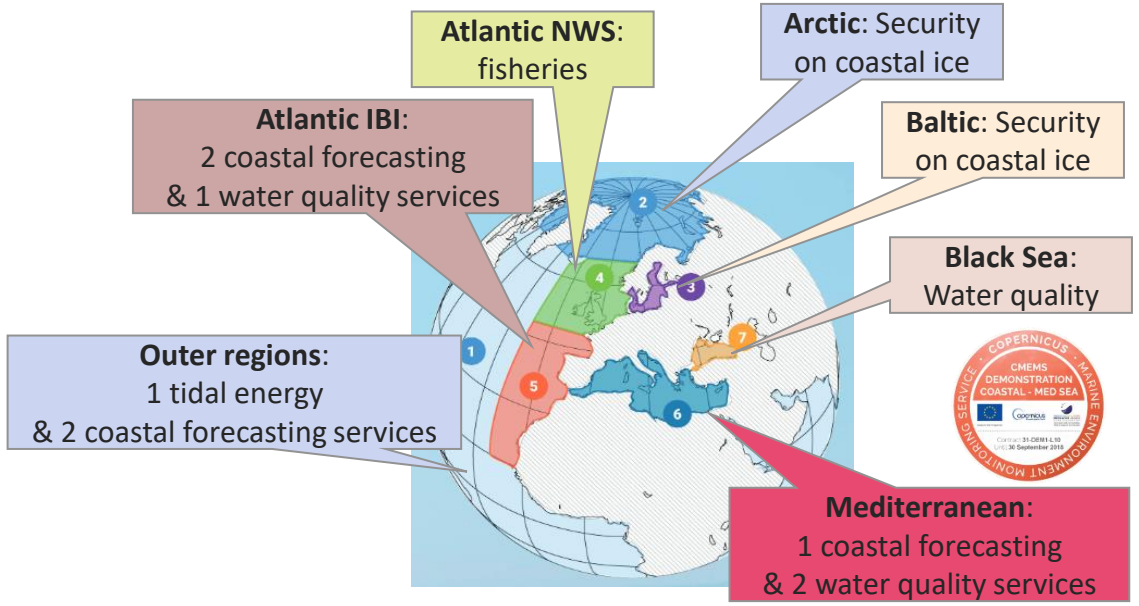
Marine Monitoring

**1st batch of User Uptake contracts in March 2017**
- ❑ 17 projects

**2nd batch of contracts in May 2018**
- ❑ 10 projects

**3rd batch of contracts in May 2019**

**COASTAL PILOT SERVICES USING CMEMS (1st call)**




**Overall objectives :**
- ❑ To show the integration and the impact of the Copernicus Marine Service products and services for downstream applications.
- ❑ To encourage intermediate users to develop their own (private or public) downstream operational systems based on CMEMS.
- ❑ Strong focus on the coastal downstream sector.

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# CMEMS SERVICE EVOLUTION R&D Component

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2nd Call open from Aug. to Oct. 2017

42 projects submitted

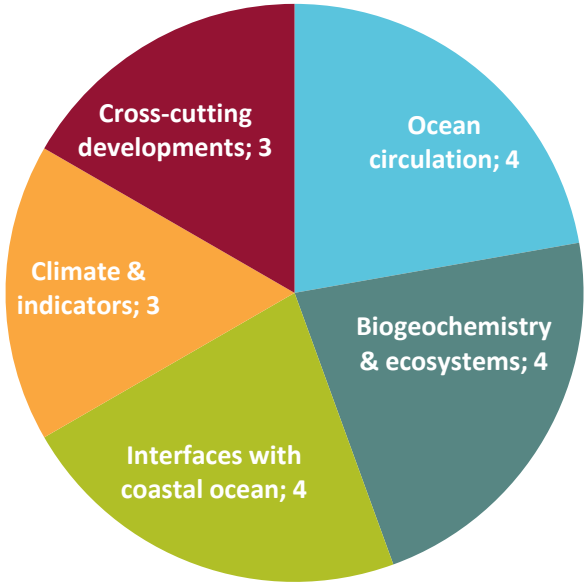
Evaluation (CMEMS STAC + external reviews)

**18 projects selected to start in April**

*Brings Innovation to the service on the **upstream** production side*


PIs from 10 EU countries

Key words of covered thematics:
- Ocean circulation
- Biology: high trophic levels
- Coastal interfaces / rivers
- Climate & Ocean Monitoring Indicators
- Cross-cutting developments (e.g. advanced assimilation methods)




*Distribution by overarching R&D topics of the 18 projects selected in the frame of the 2nd Call for Service Evolution R&D projects*

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# The essential role of observing systems

CMEMS offer is highly dependent on the satellite and in-situ observing capabilities (validation, assimilation).

CMEMS has defined its present/future requirements both for in-situ (working with EuroGOOS&EOOS) and satellite observations (Sentinel and extensions: polar missions).



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# EVENTS ORGANISED by CMEMS / 1st semester





EGU General Assembly

OceanPredict '19

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# EVENTS ORGANISED by CMEMS / 1st semester


**MAY 20-24 2019, Brussels**

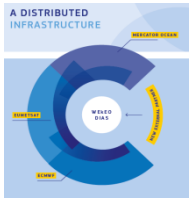
**COPERNICUS Marine Service General Assembly**

Round table EMODnet / CMEMS interactions (May 20th)

# DIAS / WEkEO achievements

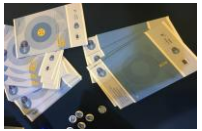
Marine Monitoring

## EUMETSAT/ECMWF/MERCATOR OCEAN DIAS platform : WEkEO (wekeo.eu)




- **Launching** the WEkEO DIAS Platform
- Baveno, June 20-21 2018

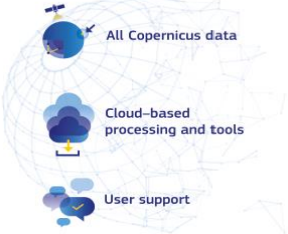
- **Serving** pilot users:




WEkEO by COPERNICUS

The Copernicus Dias Service implemented by EUMETSAT, ECMWF and MERCATOR OCEAN.

- **Awareness**: conferences,demos,Hackaton


- **Launching** new releases
- Dec 2018 release with new data (Sentinel-1 and 2)

wekeo.eu

- Plugging the CMEMS **Marine cloud** to WEkEO

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# Post 2021 Service priorities

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*Service priority*
Op.support for Arctic & **global env. info**

IMO, IMP, open ocean

Arctic policy, Marine Knowledge

MARE, Fisheries

*Service priority*
**Biology** Information for higher trophic levels





*Service priority*
EU support to **MS coastal actions**

ENV, Marine Strategy MFSD

IMP, Energy, Coastal economy

**CO2/Blue Carbon**, UN/SDG14

*Service priority*
**Impact assessment** of long-term changes on the ocean

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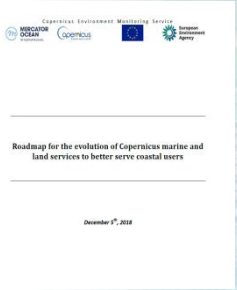
Marine Monitoring

Land Monitoring

# Roadmap for the evolution of Copernicus marine and land services to better serve coastal users

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Copernicus Europe's eyes on Earth

European Environment Agency