



Marine Monitoring

Introduction to the
Copernicus Marine
Environment Monitoring
Service

Workshop del Forum Nazionale – Roma, 16 April 2018

Pierre BAHUREL, Mercator Ocean, CEO



Implemented by





Marine Monitoring

1/ The *Marine Service* is
about **marine** environment
and market **uptake**



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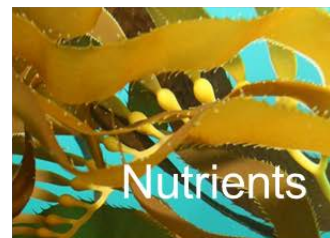




Focussed on the « marine environment »

Marine
Monitoring

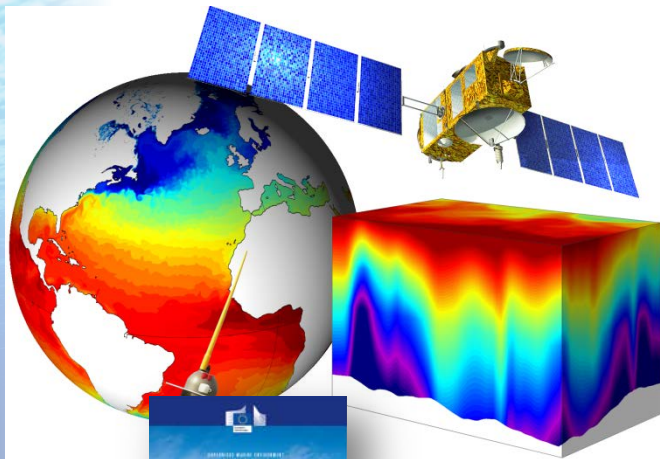
marine.copernicus.eu



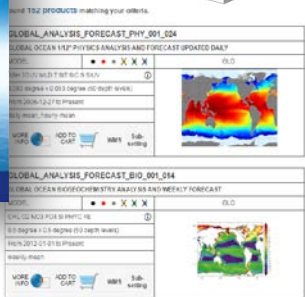
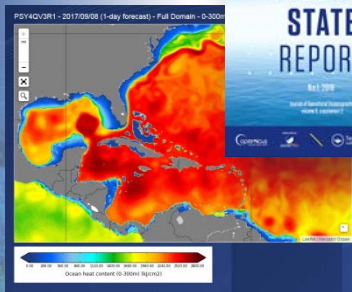


Marine
Monitoring

Combining the best sources of information



- Combining observations and 3D models
- For the globe and for European regions
- In real-time for operational forecasts
- With reanalyses for decadal trends
- From physics to biogeochemistry
- With digital data and expert information





Marine
Monitoring

and a team committed to support users



servicedesk.cmems@mercator-ocean.eu





Marine Monitoring

2/ The Marine Service is implemented by **Mercator Ocean** and a wide network of expert **stakeholders**



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M e r c a t o r O c e a n , e n t r u s t e d e n t i t y



Team: ~70 persons

A non-for-profit company with
a multi-national governance



Ocean forecasters

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

Based in
Toulouse,
France



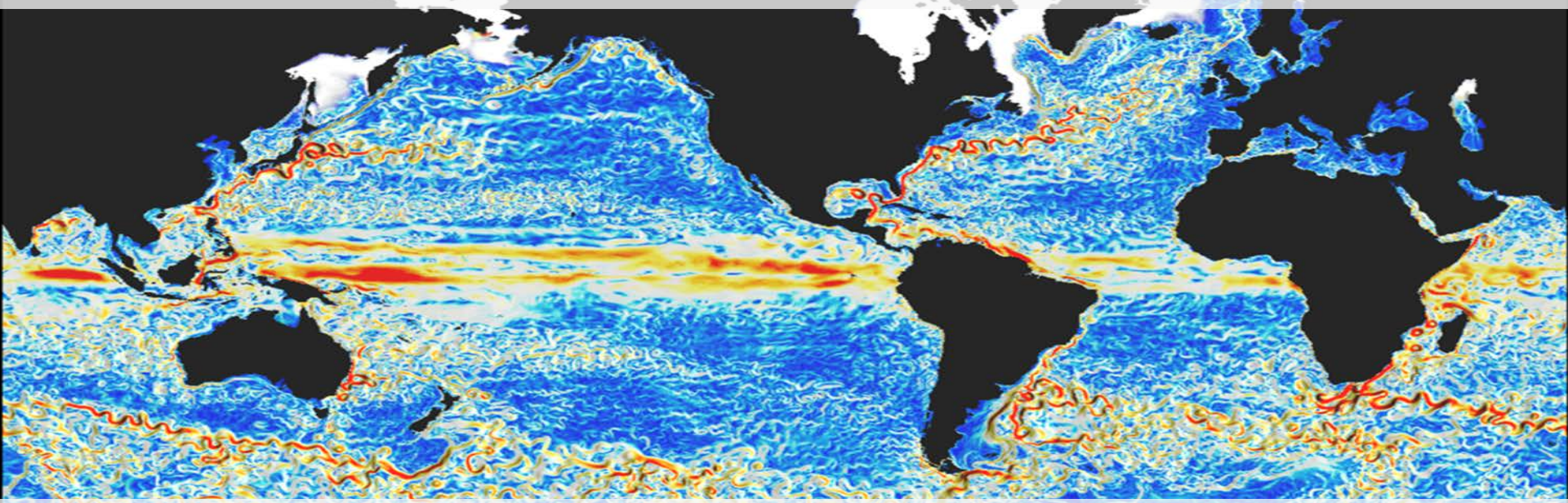
Entrusted by EU
for CMEMS

CMEMS
on Earth



European
Commission

Monitoring and forecasting the ocean worldwide



HIGH-RESOLUTION OCEAN MODELLING AND DATA ASSIMILATION FOR THE GLOBAL OCEAN





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Monitoring

Engaging a European network of producers



MODELLING



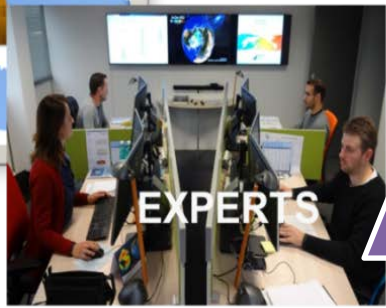
SPACE DATA



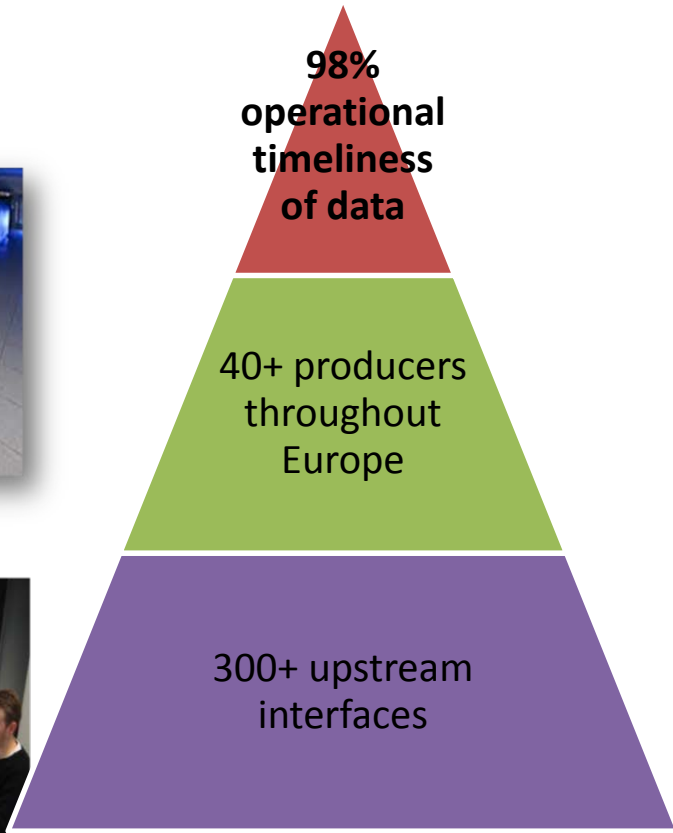
COMPUTING



IN SITU DATA



EXPERTS

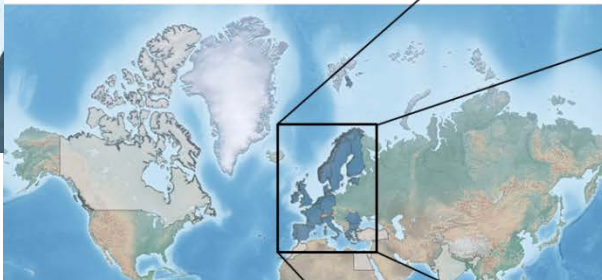




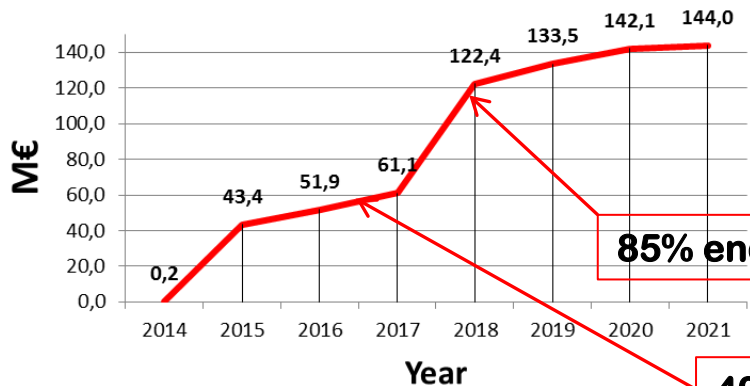
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Mercator Ocean, implementing the budget

150+ procurement contracts widely spread since the beginning of CMEMS



Cumulated Commitment



85% end of 2018

40% mid 2017



Marine
Monitoring

Implementing operations and innovation

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
Thematic Assembly Centers (Obs)
Monitoring and Forecasting Centres (Models)
Central Information System

CMEMS EVOLUTION

Service Evolution
User Uptake

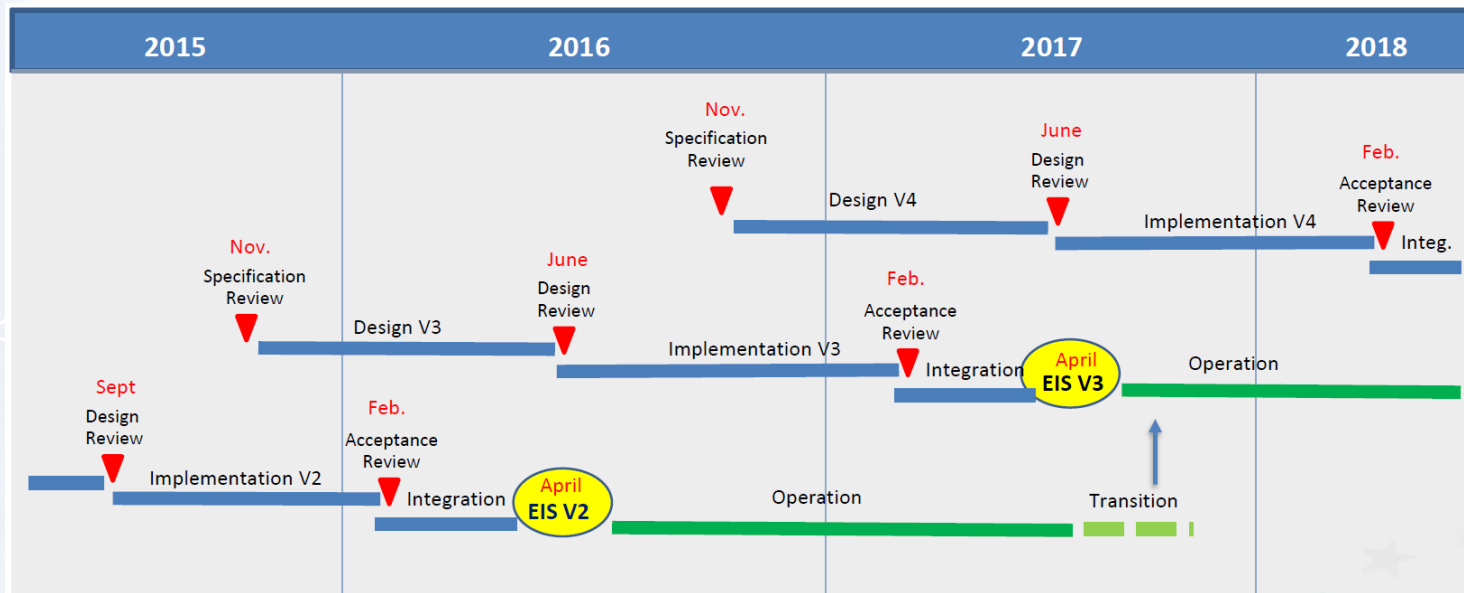
Service Evolution User Uptake

- SL TAC
- OSI TAC
- OC TAC
- IS TAC
- GLO MFC
- ARC MFC
- BAL MFC
- NWS MFC
- IBI MFC
- NED MFC
- BS MFC
- CIS



Ensuring continuous service improvement

- ❖ System versioning. A main version every year and intermediate updates
- ❖ Prepare the next version while continuing operating the previous one
- ❖ A formal review process to manage the development and entry into service.





Marine Monitoring

3/ The *Marine Service* has already reached **thousands of users** from public and private organizations, all targeted sectors, worldwide



Copernicus
Europe's eyes on Earth

Implemented by

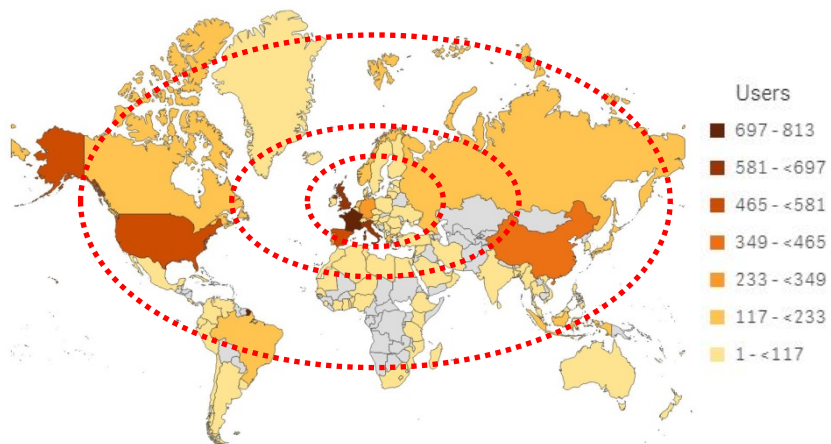
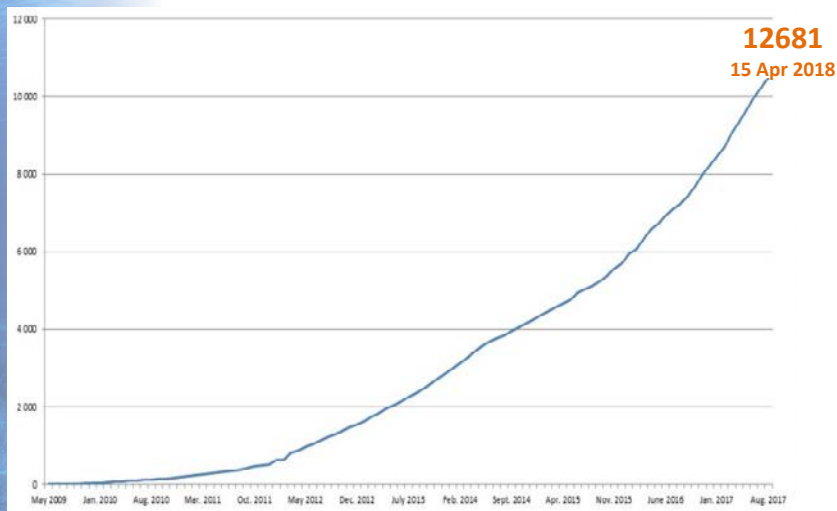




Marine
Monitoring

A constant growth of subscribers worldwide

More than **12 000 subscribers**
(~ + 200 new subscribers/month)



Downloads (2017) : 290 000+
Downloaded Volume (2017) : 371 Tb, 33%
by business companies
User satisfaction (2017) : 4,7/5

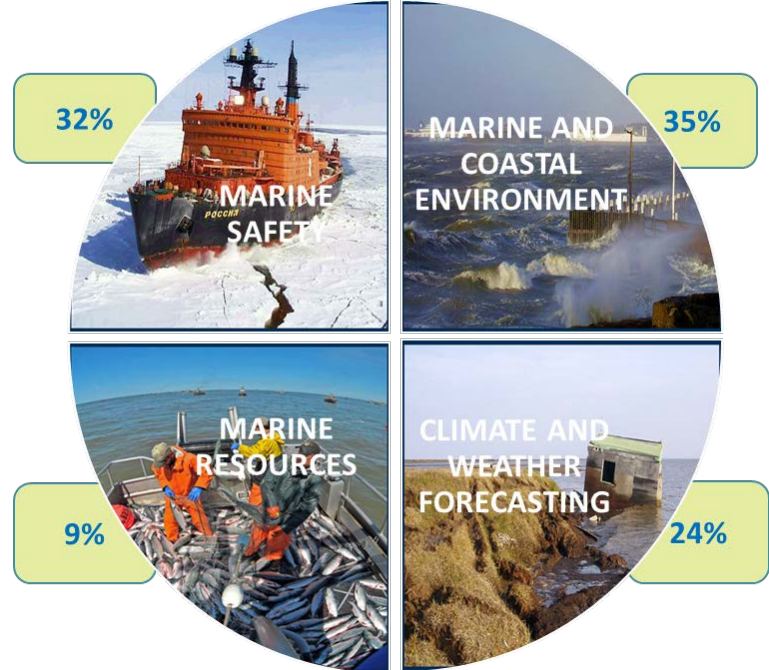
A fair response of all application sectors, with a stronger momentum from private



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<p>COASTAL & MARINE ENVIRONMENT</p>	<p>MARINE RESOURCES</p>
<p>Copernicus Marine Service contributes to coastal management and environmental impact assessment</p> <p>COASTAL DOWNSCALING Thanks to a modeling method called "Downscaling" the Copernicus Marine Service can be used for coastal management. For example, harbor authorities can model pollution by mud and sediments during dredging operations in ports</p> <p>WATER POLLUTION The European Marine Strategy Framework Directive (MSFD) has set up an agenda for achieving clean marine waters in Europe by 2020. In this context, sea water eutrophication can be monitored by each European Member State using the Copernicus Marine Service.</p> <p>OFFSHORE ENERGY Several technologies have emerged to harness the energy of the seas. The Copernicus Marine Service ocean models provide key input to estimate the ocean energy resources, minimize the risks and help with the mandatory environmental monitoring of offshore sites.</p>	<p>Copernicus Marine Service contributes to the sustainable management of marine resources</p> <p>SUSTAINABLE FISHERY MANAGEMENT A new sustainable strategy for fisheries is becoming possible thanks to numerical modelling of the marine ecosystem and its food chain from small organisms to top predators. The Copernicus Marine Service products are used in modelling of fish habitats</p> <p>AQUACULTURE FARM SITING AND MANAGEMENT The selection of appropriate siting of aquaculture farms is crucial for their long term sustainability and depends on many parameters. Copernicus Marine Service products are used to provide support to water quality monitoring in such areas.</p> <p>COMBAT AGAINST HARMFUL ALGAE BLOOM Anoxic waters and Harmful Algae Bloom (HAB) affect most biota negatively, including fishes. The Copernicus Marine Service products provide precious input to monitor water quality and potential HAB.</p>
<p>MARITIME SAFETY</p>	<p>WEATHER, CLIMATE & SEASONAL FORECASTING</p>
<p>Copernicus Marine Service supports safety at sea and pollution response</p> <p>COMBAT AGAINST OIL SPILLS When assisting emergency teams responding to offshore marine oil spills, government agencies use oil spill drift-forecast models to predict the potential oil spread. Copernicus Marine Service products allow forecasting the oil spread and better plan for the emergency response.</p> <p>SHIP ROUTING Ship routing allows maritime shipping companies to reduce fleet navigation risks, save fuel and reduce CO₂ emissions. The Copernicus Marine Service products provide input conditions for ship routing software for safer navigation routes including ice covered areas.</p> <p>SEARCH AND RESCUE The principal mission of Search and Rescue Coast Guards is to reduce risks at sea. The Copernicus Marine Service products provide input for search and rescue software and met-ocean dashboards to reduce risk at sea.</p>	<p>The Copernicus Marine Service synthesizes the ocean state and health for the preceding 20 years and helps improve seasonal forecasting</p> <p>OCEAN STATE REPORT The Copernicus Marine Service 'Ocean State Report' synthesizes the Global Ocean and European Seas state and health for the preceding 20 years. It furthers knowledge for the Intergovernmental Panel on Climate Change (IPCC), the ocean scientific community as well as for policy and decision makers.</p> <p>SEASONAL FORECAST At seasonal time scales, predictability of atmospheric behavior mainly depends on the state of the ocean, especially for tropical zones. The Copernicus Marine Service provides data for the seasonal prediction of events such as El Niño/La Niña.</p> <p>MULTI MODEL ENSEMBLE UNCERTAINTIES Multi model ensembles using a combination of the Copernicus Marine products with other data allow computing the spread of forecasts with associated uncertainties.</p>



Commercial Applications (2017)



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Placing Users as leaders and ambassadors



More than 80
use cases
available
on line

USE CASES

See examples of how CMEWS data is used. You can also download all use cases.

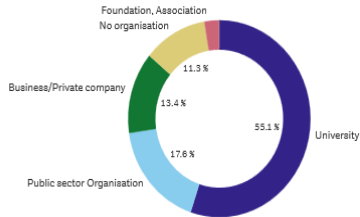
Geographical Area	Area of benefit	User typology	Product in use
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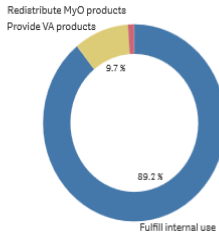
Monitoring the market uptake

Users metadata

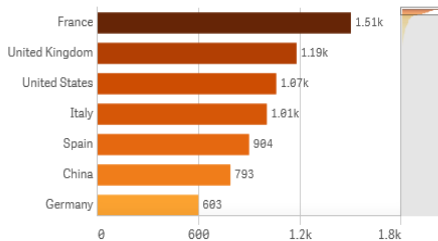
Organisation details



Objective with Products



Most Representative Countries by Subscribers



Year Creation

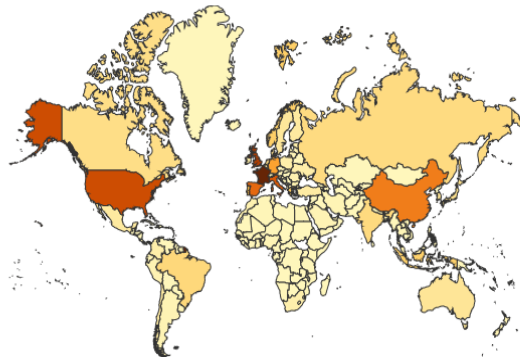
Month Creation

User Type

Organisations: 2 794
 Active Users*: 8 553
 Regular Users*: 2 069
 Countries*: 150

All CMEMS accounts

12 681



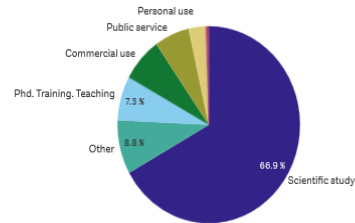
Country

Continent

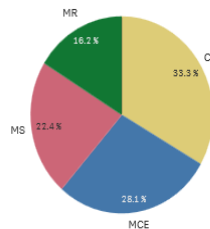
Regular Users*

150 countries (all)

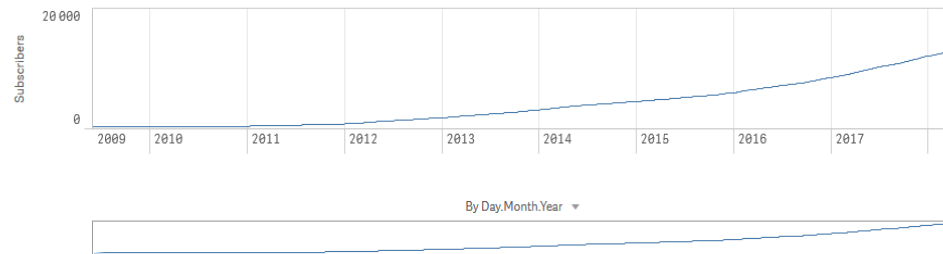
Subscribers' application



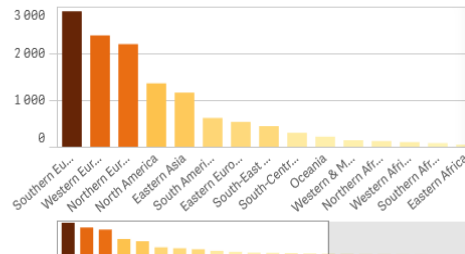
Areas of benefits



Number of new Subscribers over time



Most Representative Regions by number of Subscribers

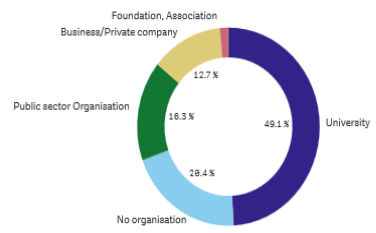




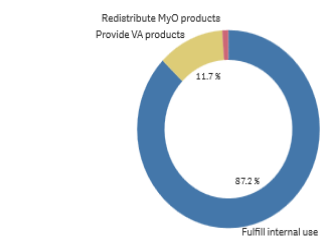
2000 organizations worldwide / 200 in Italy

Users metadata

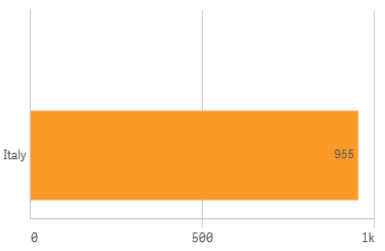
Organisation details



Objective with Products



Most Representative Countries by Subscribers



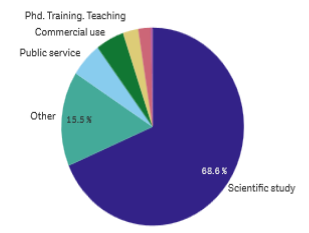
All CMEMS accounts
955

Organisations	Active Users*	Regular Users*	Countries*
192	Active Users 663	Regular Users 162	Number of country 1

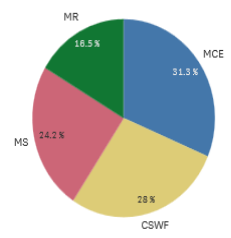


Italy only

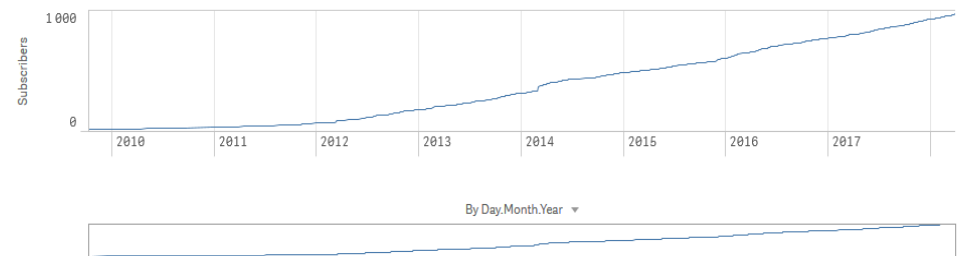
Subscribers' application



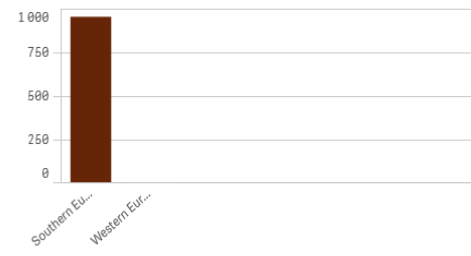
Areas of benefits



Number of new Subscribers over time



Most Representative Regions by number of Subscribers





Marine Monitoring

Dias, Coastal and Conclusion



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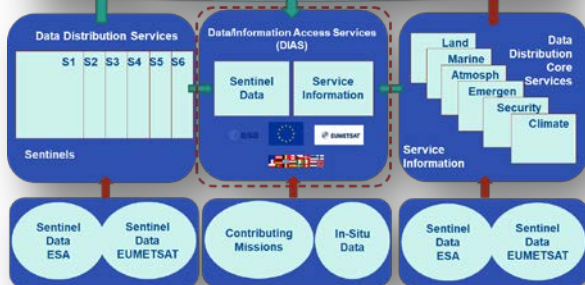


Marine Monitoring

DIAS - Data and Information Access Service



CMEMS



DIAS

DIAS, a new component of the Copernicus program, aiming at facilitating access to data & information

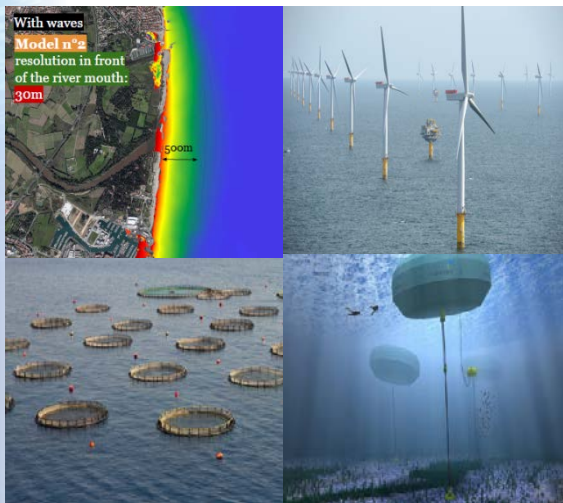
Mercator Ocean teamed up with Eumetsat and ECMWF to implement one of the 5 DIAS platforms

Our ambition is to combine CMEMS & DIAS assets to stimulate further the service uptake.



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Coastal – A priority area of benefits



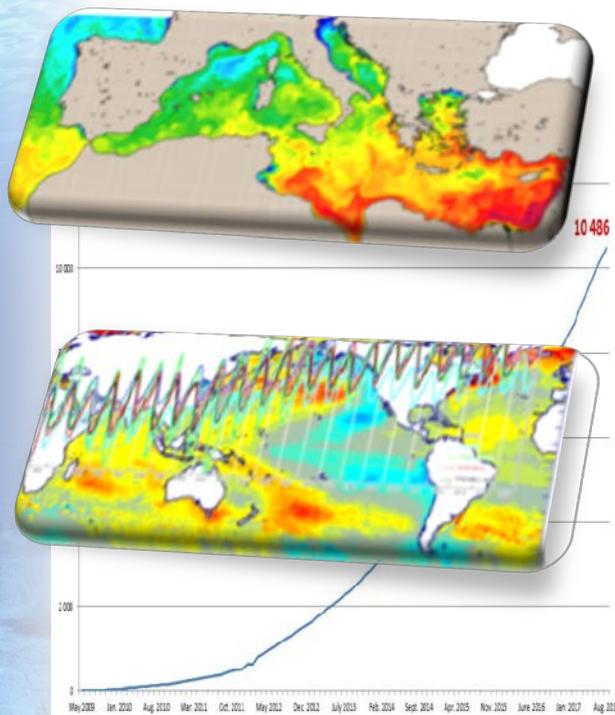
land
marine

- Coastal is one of the 4 historical areas of benefits for CMEMS
- A successful bridging of European and national core services has a powerful leverage effect
- Mercator Ocean (marine) and EEA (land) invited Member States experts to feed common plans



Marine
Monitoring

Conclusion



- CMEMS, free & open service, operated and verified by marine experts, to support thousands of users in their own development
- Cooperation and partnership as a strategy for Mercator Ocean, with expert marine data producers, with IT facility providers, with Member States core service and economic players
- Coastal domain as a priority area to develop further the cooperative valued adding chain.