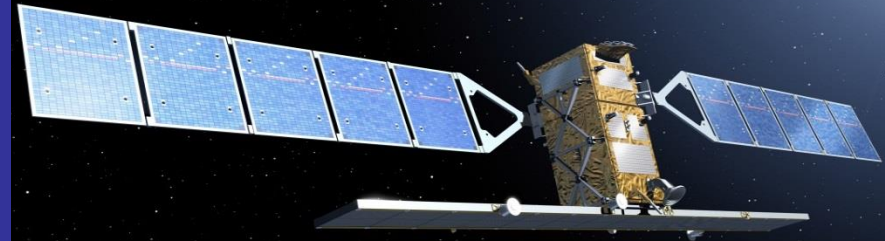


# Copernicus the EU's Earth Observation Programme

**Sara Zennaro Atre**  
Delegation of the European  
Union to Japan

*Status Overview, Sept 2016*  
*Space & Ocean Policies Seminar*  
*4 October 2016*

Follow us on:



# Objectives



## "The Union Earth observation and monitoring programme"

Monitor the environment

Foster downstream applications in a number of fields



Protect people and assets



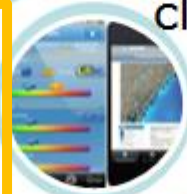
Increase general knowledge on the state of the Planet



Improve environmental policy effectiveness



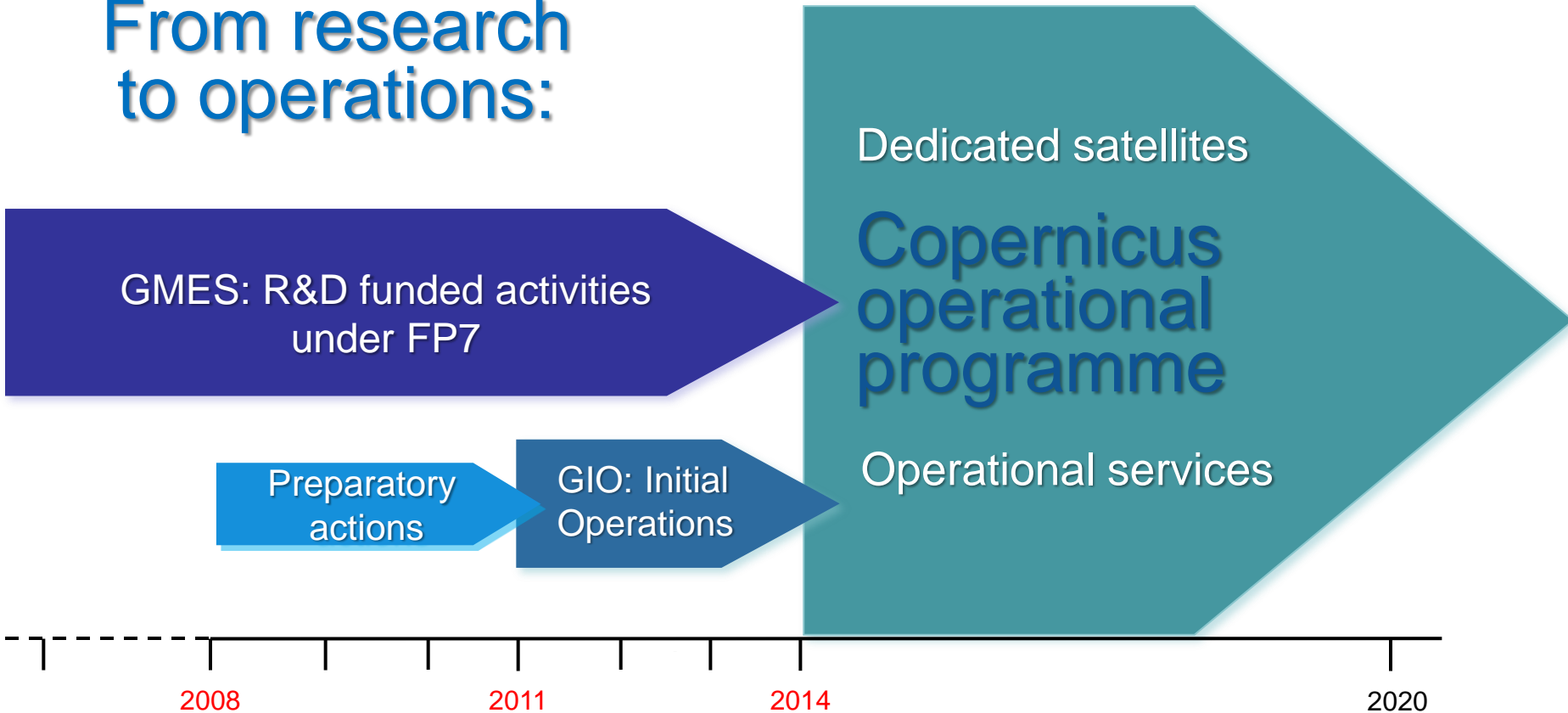
Facilitate adaptation to climate change



Help managing emergency and security related situations



## From research to operations:

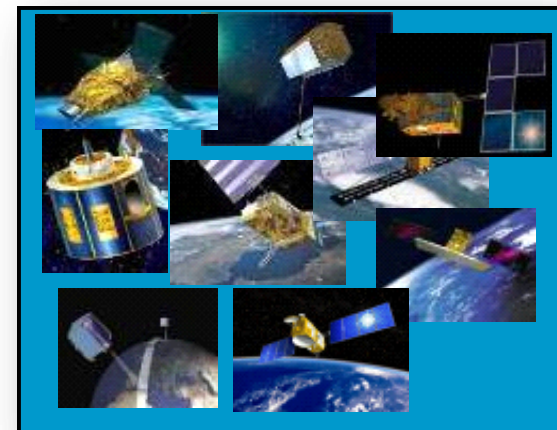


€ 1.3 Bn → € 4.3 Bn

# Copernicus architecture



6 services use Earth Observation data to deliver ...

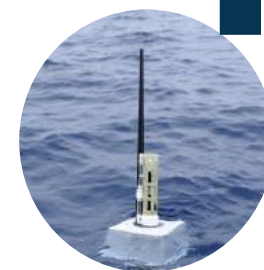
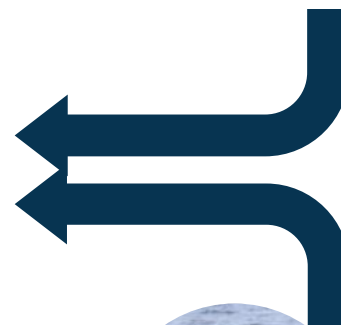


Contributing missions

Sentinels

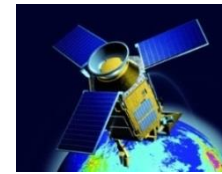


...added-value products



in-situ

# Copernicus Space Component: Dedicated Missions



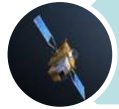
**S1:** Radar Mission



**S2:** High Resolution Optical Mission



**S3:** Medium Resolution Imaging and Altimetry Mission



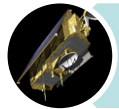
**S4:** Geostationary Atmospheric Chemistry Mission



**S5P:** Low Earth Orbit Atmospheric Chemistry Precursor Mission



**S5:** Low Earth Orbit Atmospheric Chemistry Mission



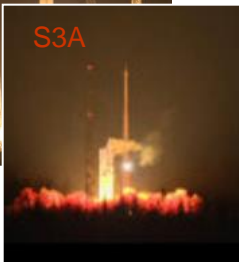
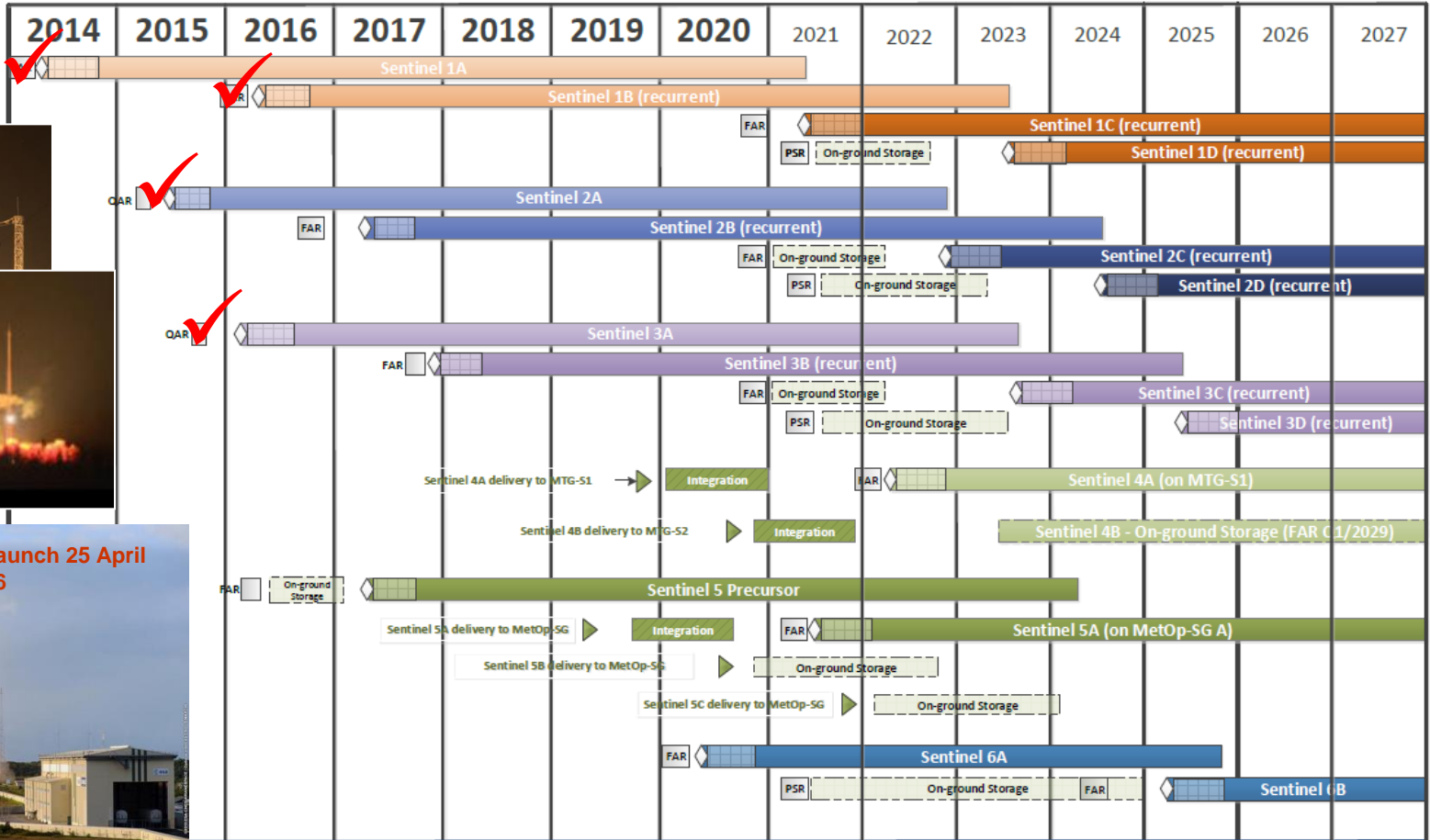
**S6 (Jason-CS):** Altimetry Mission

*first launches*  
-1A: 3.04.2014  
-1B: 25.04.2016  
*first launch*  
-2A: 23.06.2015  
*First launch*  
-3A: 16.02.2016

# Continuity until 2030



## Copernicus Constellation Deployment Schedule



Legend:

- Qualification Acceptance Review (QAR)
- Flight Acceptance Review (FAR) or PreStorage Review (PSR)
- On-ground Storage
- Tentative launch date
- In-orbit Commissioning

Status: 08 September 2016

## Sentinel-1A & 1B now at Full Operational Capacity

This interferogram combines a **Sentinel-1A** radar scan from 9 June 2016 over southern Romania with a **Sentinel-1B** acquisition from 15 June over the same area

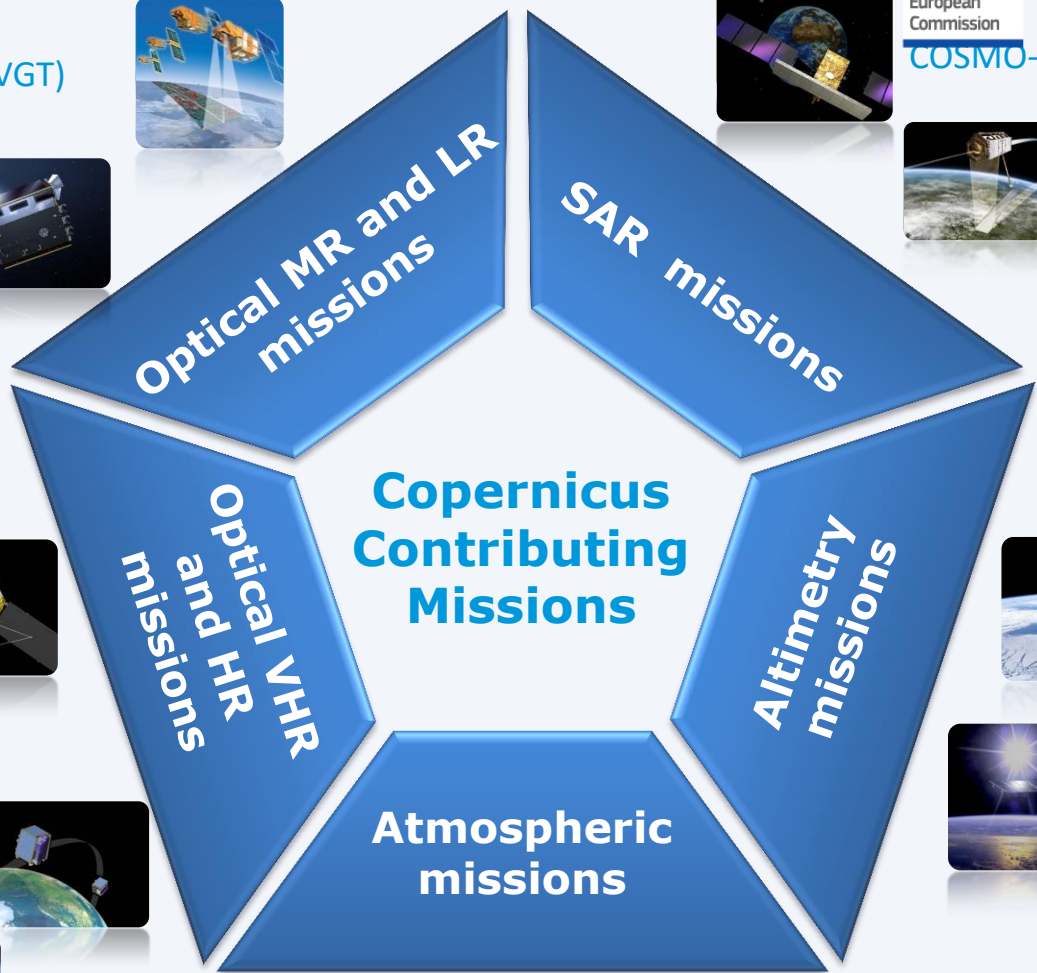
## Sentinel-2A

Observation plan is published online ahead of every repeat cycle as kml at <https://sentinels.copernicus.eu/web/sentinel/missions/sentinel-2/acquisition-plans>

## Sentinel-3A

now in its **operational qualification (ramp-up) phase**. Expected to be completed at IOCR+9 months, i.e. spring 2017

# Copernicus Contributing Missions

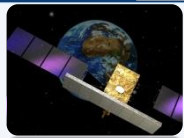


SPOT (VGT)

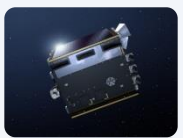


European Commission

COSMO-Skymed



PROBA-V

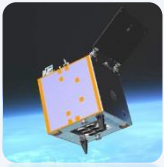


TerraSAR-X  
Tandem-X

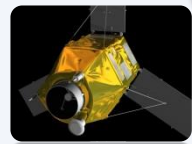


Radarsat

DMC



Pléiades

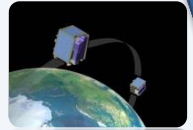


Cryosat

Deimos-2



RapidEye



Jason

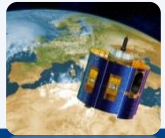
SPOT (HRS)



Atmospheric missions



MetOp



Meteosat 2<sup>nd</sup> Generation

Sentinels complement the offer



# Access to satellite data – see Copernicus.eu

<http://www.copernicus.eu/main/data-access>

## Access to Copernicus satellites data (general)

Users interested in data coming directly from the Copernicus space component (the Sentinels satellites) can access them through the [Sentinel Online](#) portal operated by the European Space Agency (A specific section is dedicated to "Data Access" on this portal).

EUMETSAT will provide access to the Sentinel-3 [marine](#) products - and, in future, products from Sentinel-4, -5 and -6 - via EUMETCast [satellite/terrestrial](#) or via Online Data Access or the Earth Observation [Portal](#).

## Contributing Missions

In addition to the data produced by the Sentinels satellites, Copernicus users can also have access under certain conditions to the data produced by other satellite missions referred to as "[Contributing Missions](#)". Contributing Missions have been classified into [five groups](#) that reflect the characteristics of the main types of missions.

Most data provided by the different contributing missions are distributed by the European Space Agency (ESA). They take the form of datasets and are delivered to users through data access services. The delivery process relies on an operational system called the "[Copernicus Space Component Data Access](#)" (CSCDA).

Other third party space-based data are provided by the French Space Agency ([CNES](#)) and the European Organisation for the Exploitation of Meteorological Satellites ([EUMETSAT](#)).

# 6 operational Services



Monitoring the State of the Earth System Environment ...

✓ ✓  
Copernicus Land Monitoring Service

✓  
Copernicus Marine Environment Monitoring Service

ECMWF ✓  
Copernicus Climate Change Service

ECMWF ✓  
Copernicus Atmosphere Monitoring Service

✓  
Copernicus Emergency Management Service  
Mapping Component  
Early Warning Component

✓ ✓ ✓  
Copernicus Security Service

... cross-cutting Thematic Services






✓ = operational  
✓ = in ramp up

# Access to service data – see Copernicus.eu

<http://www.copernicus.eu/main/data-access>

## Access to Copernicus services data

Data are available through the web portals operated by the various Copernicus service lines:

-  Land Monitoring <http://land.copernicus.eu/>
-  Atmosphere Monitoring <http://atmosphere.copernicus.eu/>
-  Marine Environment Monitoring <http://marine.copernicus.eu/>
-  Emergency Management <http://emergency.copernicus.eu/>
-  Climate Change <http://climate.copernicus.eu/>

# Copernicus Marine Environment Monitoring Service

# Marine/Maritime significance of Sentinels

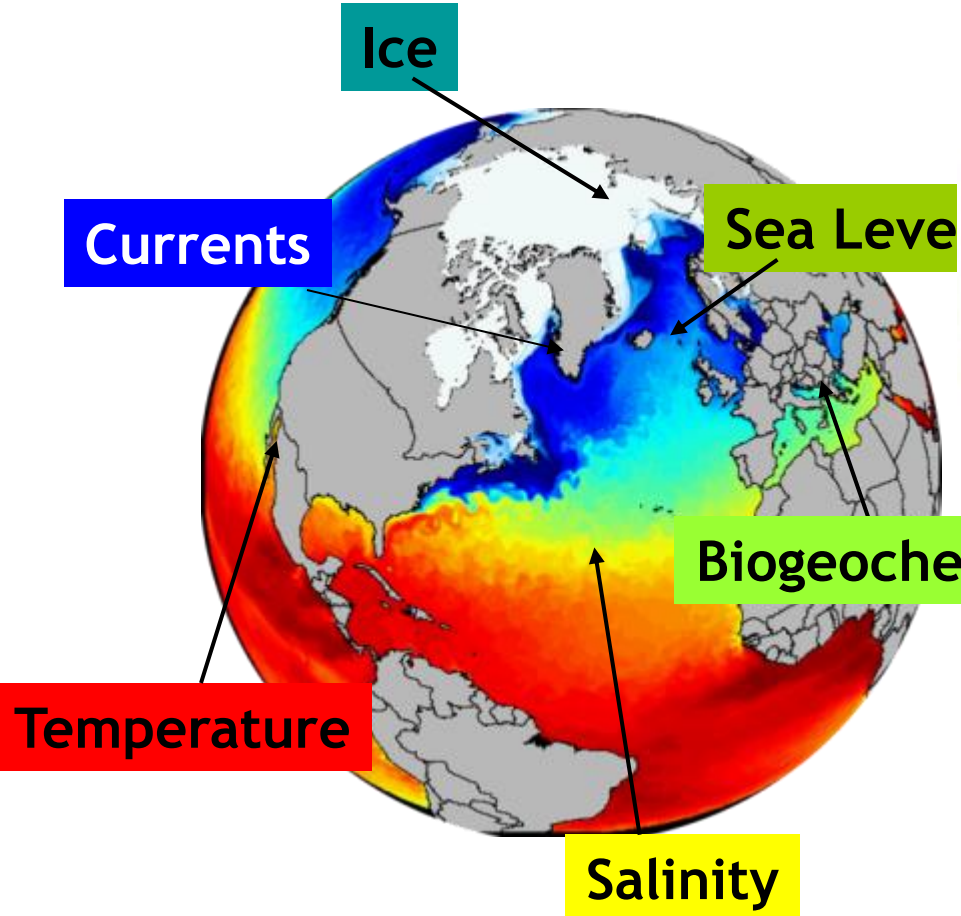
## ★ Sentinel 1 (A & B)

- ★ With its SAR capabilities exploited in QRT, it allows rapid detection of maritime vessels and identification of sources of oil-slicks
- ★ SAR images provide sea-ice mapping to seafarers

## ★ Sentinel 3 (A)

- ★ Copernicus' medium resolution land and ocean mission combining OLCI colour, SLSTR temperature, SRAL altimeter, and radiometry with precise orbit determination, giving access to
- ★ ocean colour data (continuation of MERIS)
- ★ sea surface temperature (continuation of AATSR)
- ★ sea-surface and sea-ice topography

# Marine Environment Monitoring Service



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

- **Global and Regional**
- Real time and **Reanalyses**
- **Satellite & In Situ** obs. and **Models**

**A 3D and consistent estimation of the ocean**



**Service portfolio: 11 product groups with ~140 data products covering Ocean state, Physical & Biogeochemical variables of long time series**

## Product groups

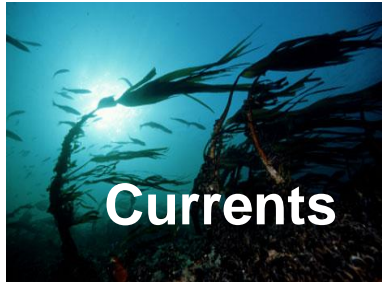
### Analysis and Forecast

- Global Ocean
- Arctic Ocean
- Baltic Sea
- Atlantic-European North West Shelf Ocean
- Atlantic-Iberian Biscay Irish Ocean
- Mediterranean Sea
- Black Sea

### Observation

- Sea Level
- Ocean Colour
- Sea Surface Temperature, Sea Ice, Wind
- In-situ (Temperature, Salinity, Bio)



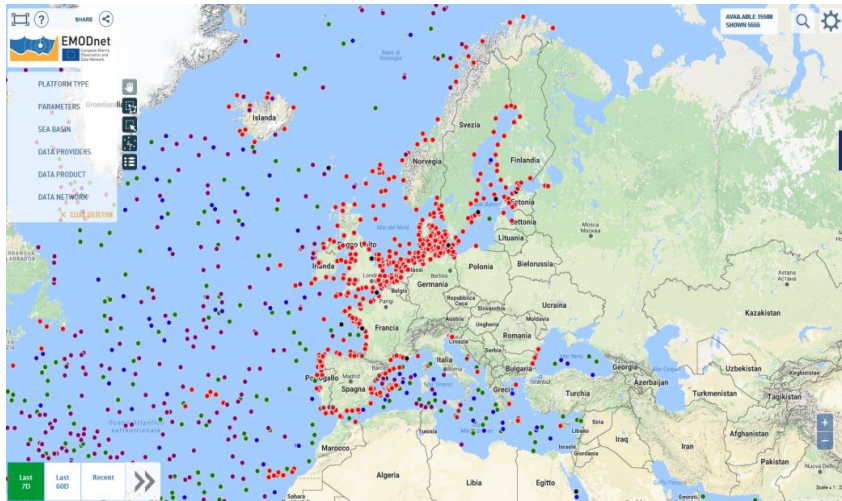






## EMODnet physics DG-MARE

## CEMEMS



In situ  
products



### Products by platform

### Product by EU basins

→ Unlock access to in situ data

→ Quality controlled products

→ Customised service

- Viewing of the products
- Detailed information about producers (credit to data originators)
- Extract platforms from CEMEMS products to answer user needs

→ Operational service

- Discovery & distribution of product
- Detailed data policy (commitments, licence)
- Service desk support
- Service monitoring

# Areas of benefits



**Coastal & marine environment**



**Marine resources**

**Weather, climate & seasonal forecasting**



**Maritime safety**

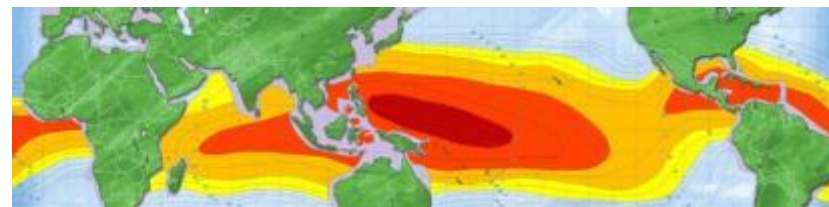
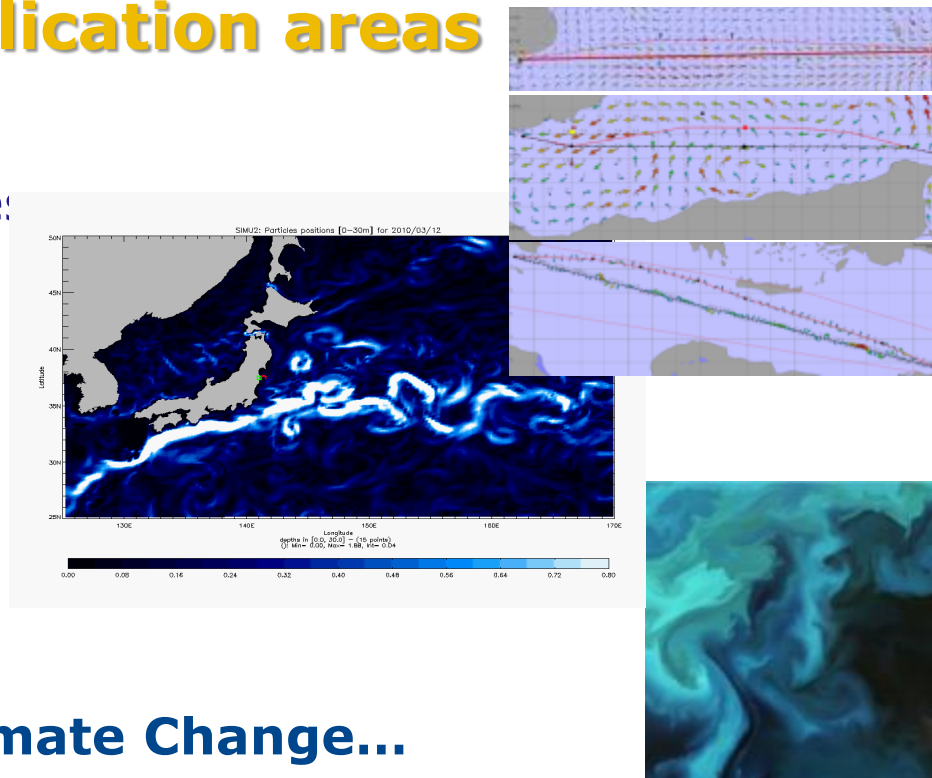


## Examples of Marine application areas

- ★ Ship routing
- ★ Support to offshore activities
- ★ Coastal management
- ★ Oil-drift forecasting
- ★ Search and rescue
- ★ Fisheries
- ★ Algal bloom
- ★ Water-quality management
- ★ ...

**But also Climate Change...**

- ★ Sea-level rise (one of the main indicators for Climate Change)
- ★ ...



# Saving Fuel / Shipping Company

To reduce fuel consumption for ecological & economical reasons

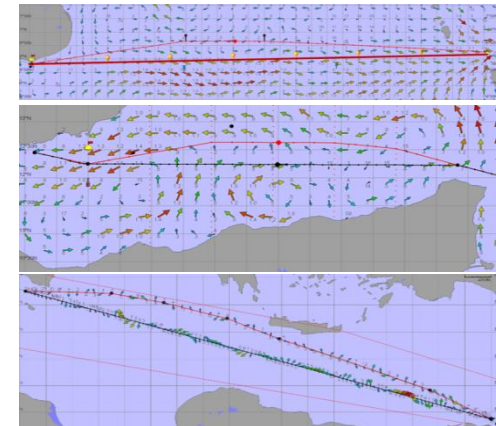
## 3 options:

- ✓ Optimize engines, propellers, hulls...
- ✓ Improve organization...
- ✓ Take benefit of Meteorology/ Operational Oceanography( **current observations and forecast**)



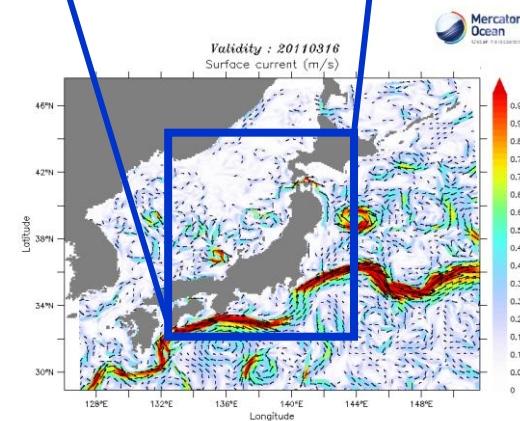
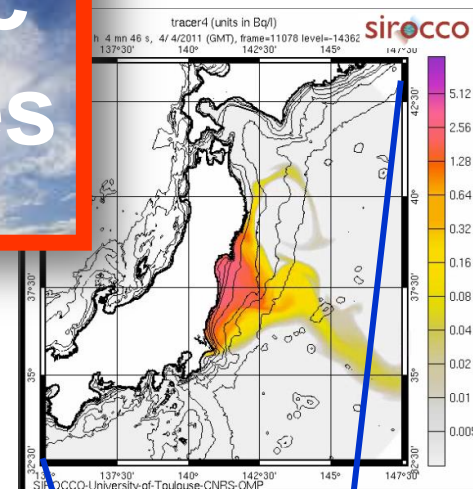
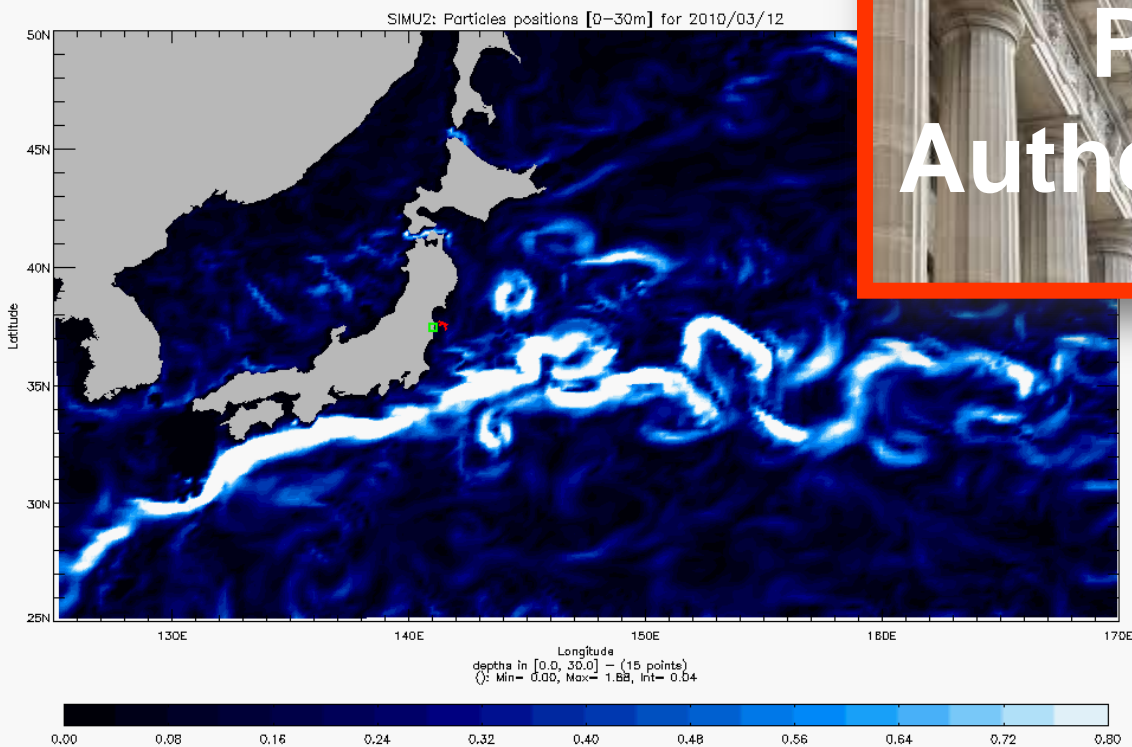
**0,4 % = Average level of savings thanks to « current routing »**  
(Line Europe-China Q2 2015)

**Target** : To save 1% thanks « current routing » ( current forecast reliability) would lead to 60 000t fuel saving for the whole CMA-CGM fleet so as 180 000t CO<sub>2</sub>.



# Contributing to Risk Mitigation Plan (Fukushima)

## Immediate overview of the pollution drift



# Feeding Harmful algal bloom warning system



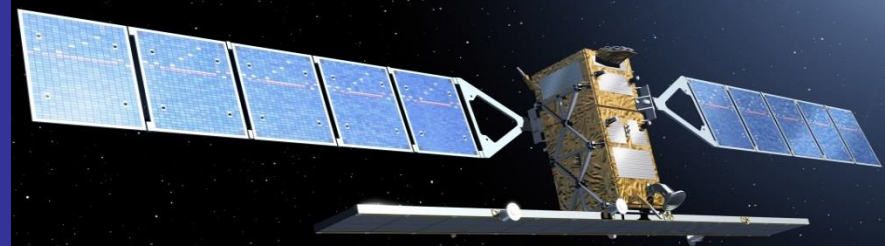
## End Users:

- Fish Farmers,
- Biotoxin national monitoring organisations,
- Scientists,
- Regulators,
- Environmental NGOs,
- Community groups.



# Thank you for your attention!

<http://www.copernicus.eu/>



Follow us on:



Space

**Copernicus**  
Europe's eyes on Earth