



Copernicus

IOCS

Lisbon, 15 May 2017

Richard Gilmore

European Commission

DG GROW/Copernicus programme



Space



Copernicus EU



Copernicus EU



Copernicus EU



www.copernicus.eu



Copernicus

Table of contents

Introducing the Copernicus Programme

- ★ History, main components
- ★ OCS-relevant aspects



Space Component

COPERNICUS HISTORY

Long-term commitment to develop EO env. monit. services using & developing European skills & tech.

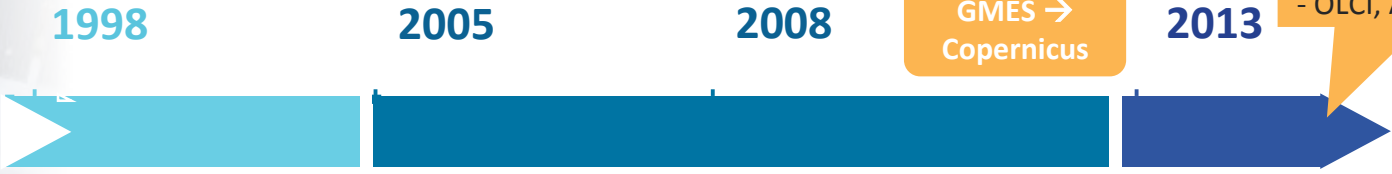
1998
Baveno Manifesto

2005
GMES – Flagship of EU Space

2008
EC-ESA Agreement on GMES

2013
Copernicus Regulation and Data Policy

OCS-relevant developments:
- Loss MERIS, Apr 2012
- S3a, Feb 2016
- OLCI, Apr/May 2017



GMES → Copernicus

2001
Gothenburg EU Summit

2006
EC - GMES Bureau

2011
Start of GMES GIO

2014
Start of Full service operations

GIO = GMES Initial Operation





Copernicus

COPERNICUS FUNDING

From research to operations

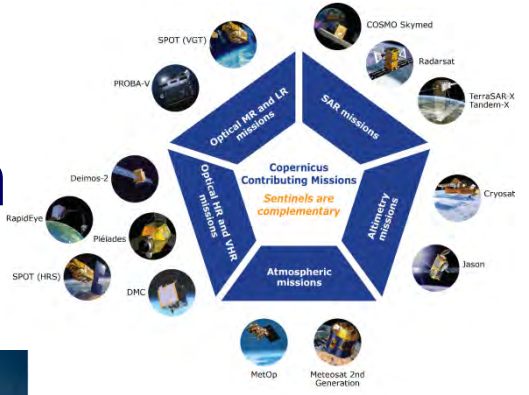
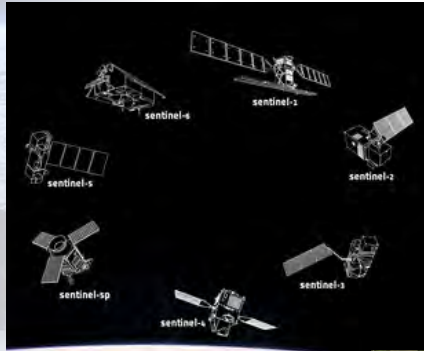




Space Component

COPERNICUS ARCHITECTURE

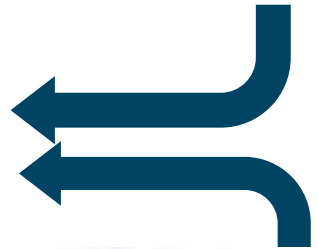
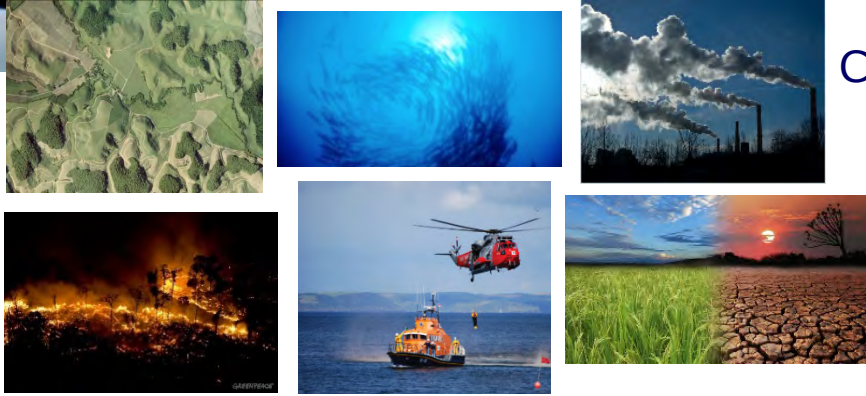
6 services use Earth Observation data to deliver ...



Contributing missions



Sentinels



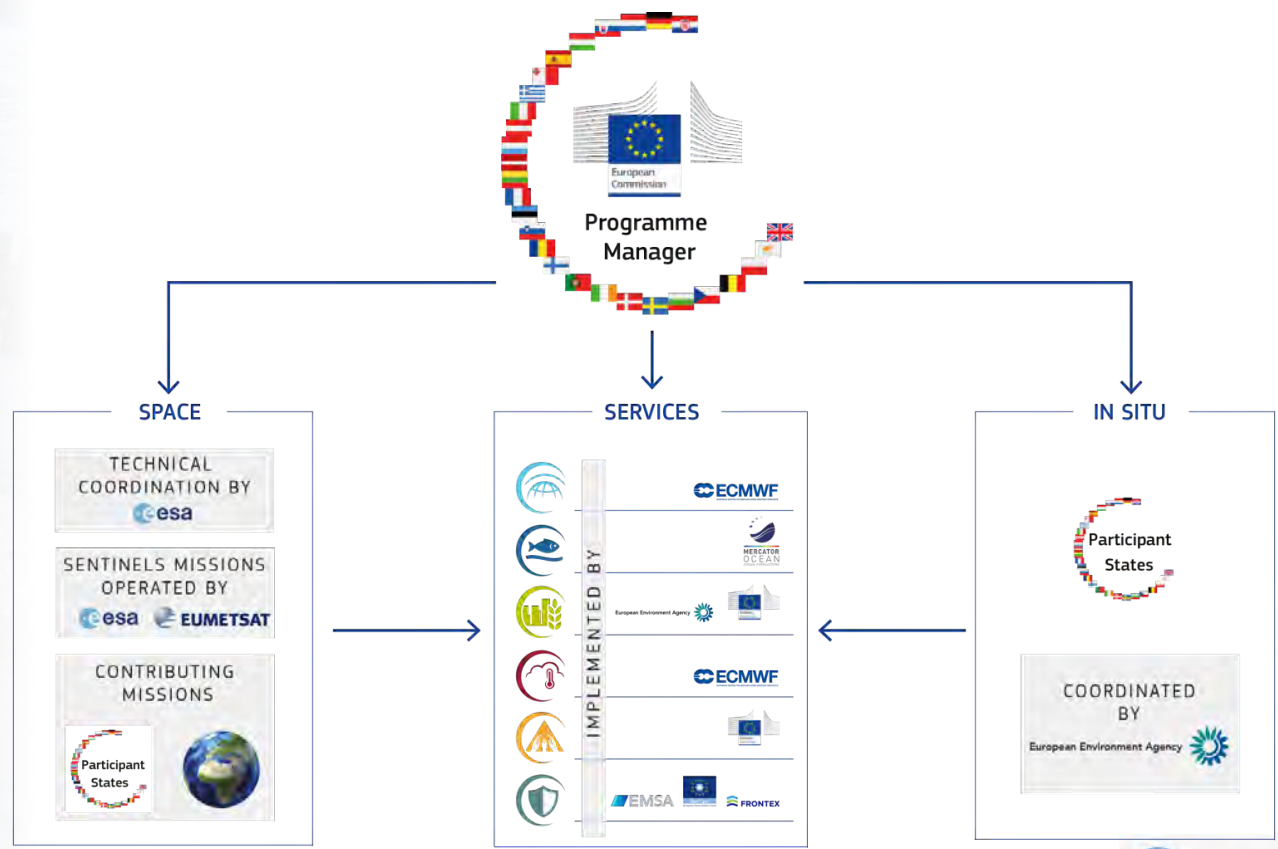
...added-value products





Space Component

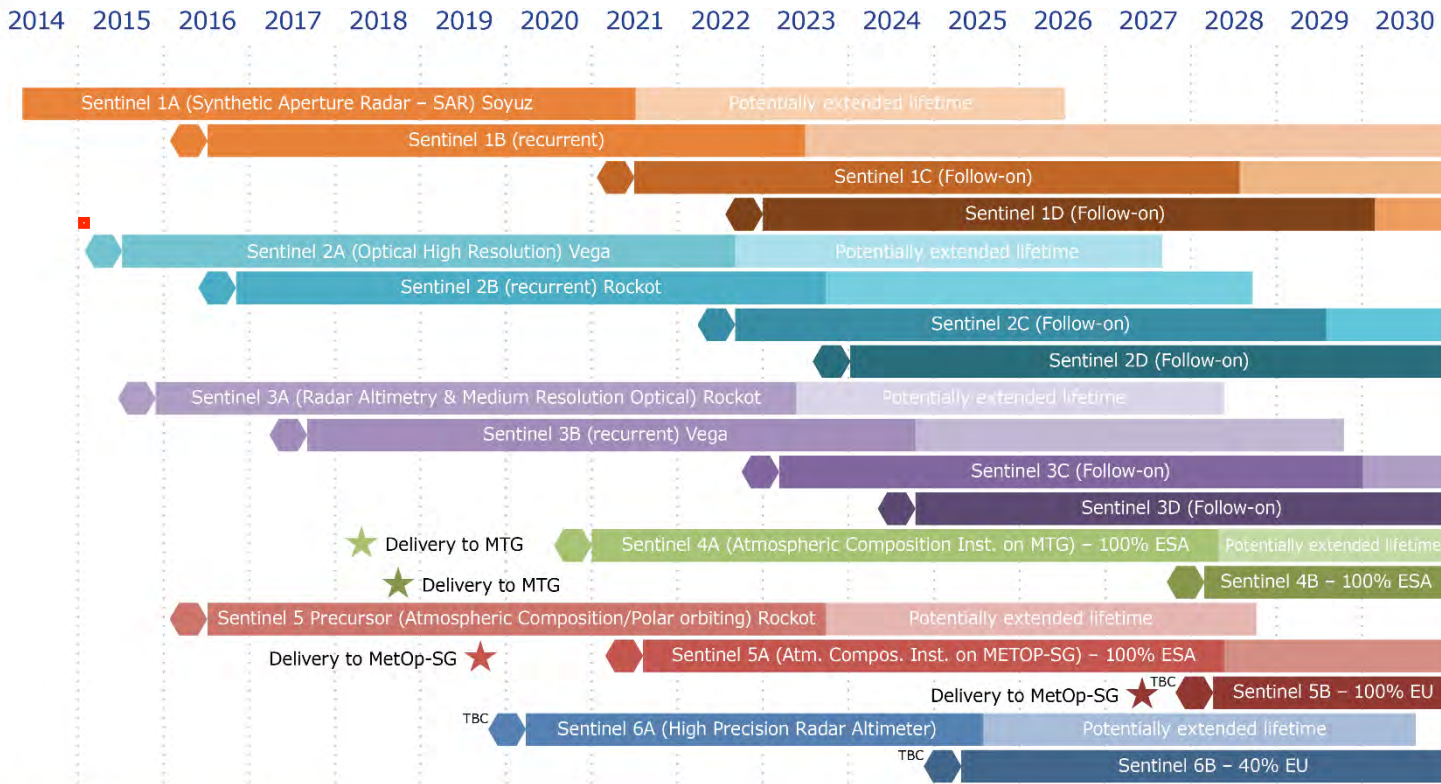
COPERNICUS GOVERNANCE





Space Component

SENTINEL FAMILY DEPLOYMENT SCHEDULE



Legend: ⬡ Flight Acceptance Review



Space Component

The Six COPERNICUS SERVICES

FULL, FREE AND OPEN

Monitoring the State of the Earth System Environment ...

Land Monitoring

Marine Environment Monitoring

Climate Change

Atmosphere Monitoring

Emergency Management

Security

✓ = operational
✓ = in ramp up

... Six cross-cutting Thematic Services



Copernicus

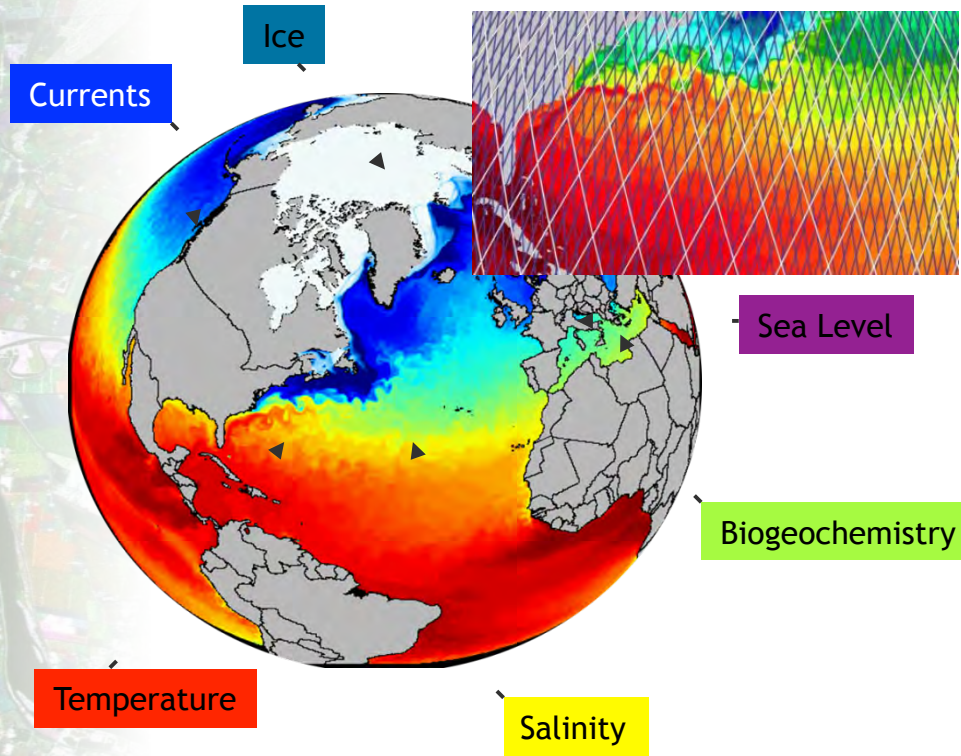
Why is the marine sector so important?

- ★ “Blue Economy”, 5 million jobs, gross added value almost €500bn/year
- ★ 90% of international trade is maritime
- ★ Half of the world's population lives within 100 km of coast
- ★ EU coastline (where many human and economic activities take place) is 7 times longer than US, 4 times longer than Russia
- ★ Global potential ocean energy resources exceed present and projected future energy needs
- ★ The ocean plays a critical role in the climate system
- ★ Therefore a major policy priority (International Ocean Governance, Blue Growth, Marine Strategy Framework Directive, EU Water Framework Directive, UN Sustainable Development Goals...)



Copernicus

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**

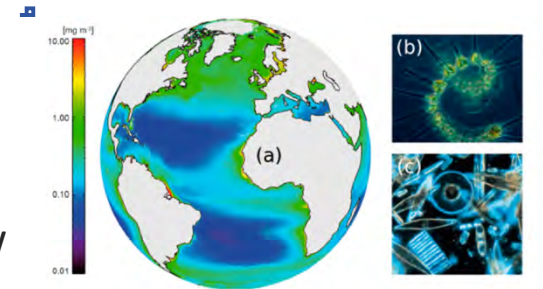
A 3D and consistent estimation of the ocean



Copernicus

Marine Service, key milestones

- CMEMS is fully operational since 2015, builds on the MERSEA/MyOcean research & pre-operational development heritage
- Copernicus Entrusted Entity: Mercator Océan
- Currently V3 running, 152 products, new release on 19 APR with waves
- V4 in preparation (in particular will bring improvements to biogeochemistry parameters, inclusion of Ocean Monitoring Indicators)
- Close to the 10k user mark
- Mainly EU, but also strong international use (America 16%, Asia 16%)
- 1st Ocean State Report published this year, will now be published annually (e.g., global chlorophyll):



Climatology of chlorophyll concentration in the Atlantic and Arctic Oceans. See text for more details on data use.

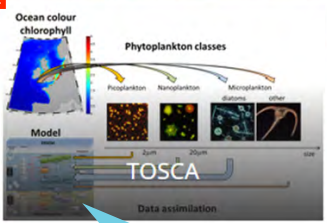
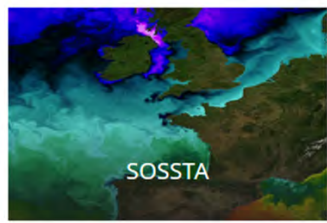
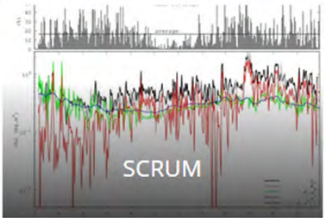
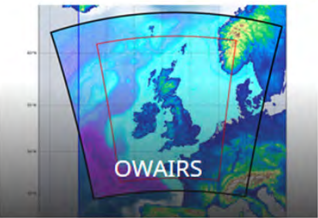
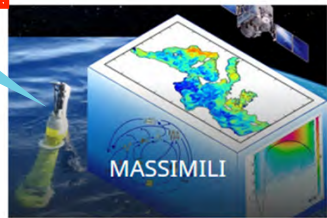
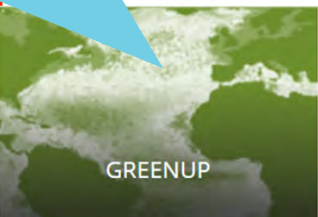
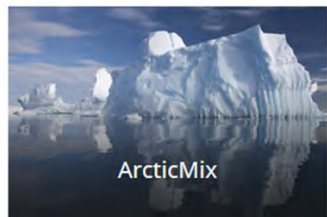


Copernicus

H2020 research support

Micronekton distribution simulation, marine-resource mgmt

Assimilation of bio-Argo data



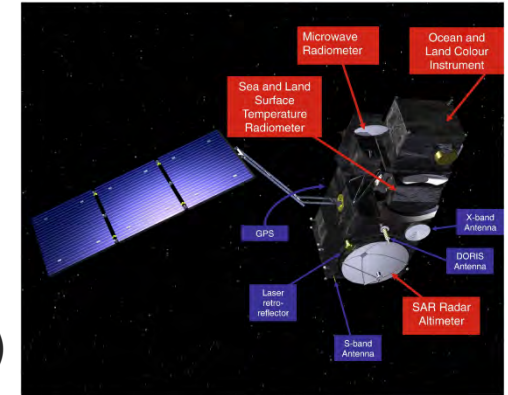
Size-class chlorophyll assimilation



Copernicus

Sentinel support to ocean colour

- Sentinel 3a (soon joined by 3b, < 2-day revisit time)
- OLCI instrument, designed for both Ocean and Land acquisition, operated by Eumetsat
- OLCI builds on MERIS heritage (21 spectral bands, better S/N, on-board processing, 5 cameras, sun-glint attenuation)
- Complements other OC missions (SeaWiFS, MODIS, VIIRS)
- Sentinel 2a/b: hi-res multispectral designed for land cover
- Currently investigating potential to observe coastal regions
- Complementary to S3 thanks to high resolution (potential to look at coastal features such as river plumes, impact of wind farms...)
- Sentinel data is available freely and openly





Copernicus

Marine Service use of ocean colour

- OLCI L2 data assimilated to give L3 & L4 OC products.
- Product portfolio includes biogeochemistry products (global 4km/regional 1km, multiyear model [15-30 yrs], nowcast/forecast, multiyear obs. [30 yrs], NRT obs. from satellites and in-situ).
- Improvement expected with V4.
- All available in one place.
- R&D continues in this area:
 - H2020, Space/EO/Copernicus evol./Cross-cutting coastal area to be addressed, Q4 2017.
 - CMEMS Service Evolution call: Q4 2017.

Bio			
CHL :	Chlorophyll-a	Si :	Silicate
O2 :	Dissolved Oxygen	NH4 :	Ammonium
N :	Nitrate	RadFlux :	Radiative Flux
P :	Phosphate	Eup :	Depth of Euphotic Zone
Phyto :	Phytoplankton	pCO2 :	Carbon dioxide partial pressure
Zoo :	Zooplankton	pH :	Ocean acidity
PP :	Primary Production	SST	Sea Surface Temperature
Fe :	Iron		No product available



Thank you
for your
attention



Space
Component

C O P E R N I C U S I N B R I E F

- **The Copernicus programme** ([REGULATION \(EU\) No 377/2014](#)) is a cornerstone of the European Union's efforts to monitor **the Earth**, its environment and ecosystems using **Earth Observation**.
- Provide policy makers, public authorities, scientists, businesses and citizens with **accurate and timely information** to better manage the environment.
- Provide data and information on a **full, free and open basis**.
- Foster **economic development**.