

# The Copernicus Programme

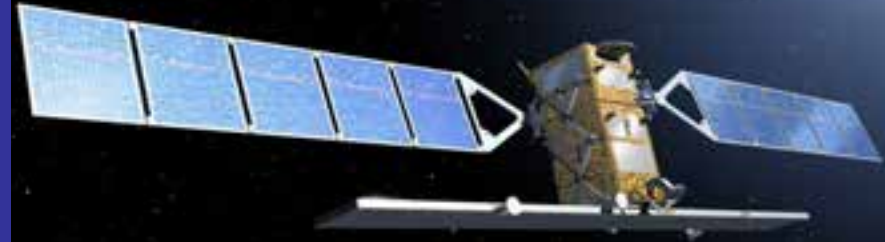
## Security Service

Peter BREGER - Deputy Head of Unit  
Rui MENESES - Security Service

European Commission  
DG GROW.I2  
Copernicus Services

Copernicus Maritime Surveillance  
Workshop  
EMSA - Lisbon,  
Nov 15, 2016

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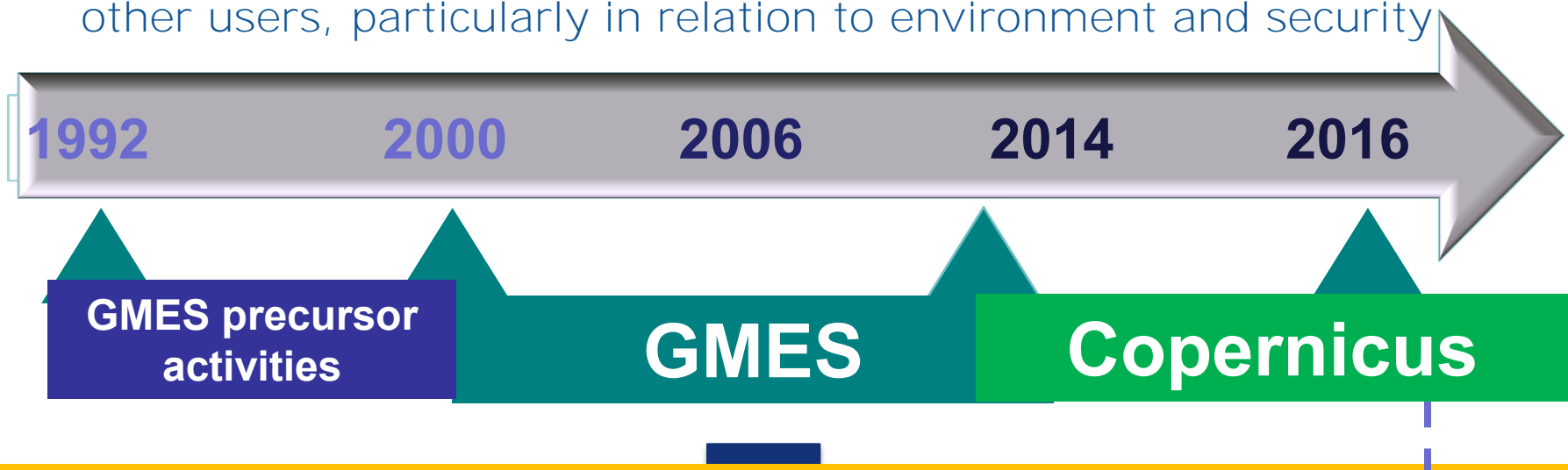
- **Copernicus Programme overview**
- **Security Service**
- **Maritime Surveillance**
- **User uptake and way ahead**



**Copernicus**, formerly known as the Global Monitoring for Environment and Security (**GMES**) is an **EU-led programme** for an autonomous and operational European Earth monitoring capacities

Developed by the European Commission in partnership with the European Space Agency with an envelope of around €4.3billion for the period 2014-2020.

It aims at **providing relevant information** to policy-makers and other users, particularly in relation to environment and security



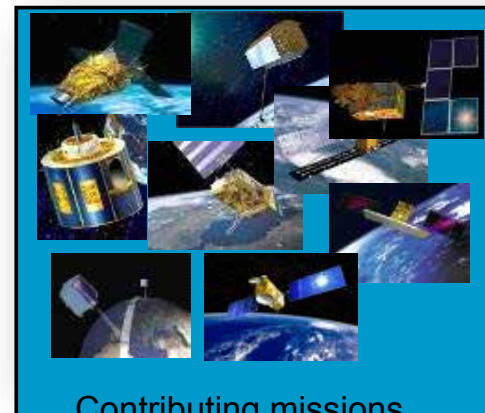


## Sentinels (EU-funded Satellites)

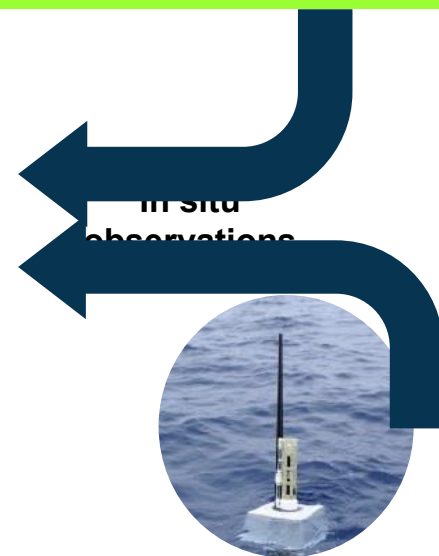
**Six services use Earth  
Observation data to  
deliver added value  
information for:**



- Land Monitoring
- Marine Environment
- Atmosphere
- Climate Change
- Emergency Management
- Security Applications
  - Border Surveillance
  - Support to EU External Actions
  - Maritime Surveillance










## Contributing missions



## in-situ

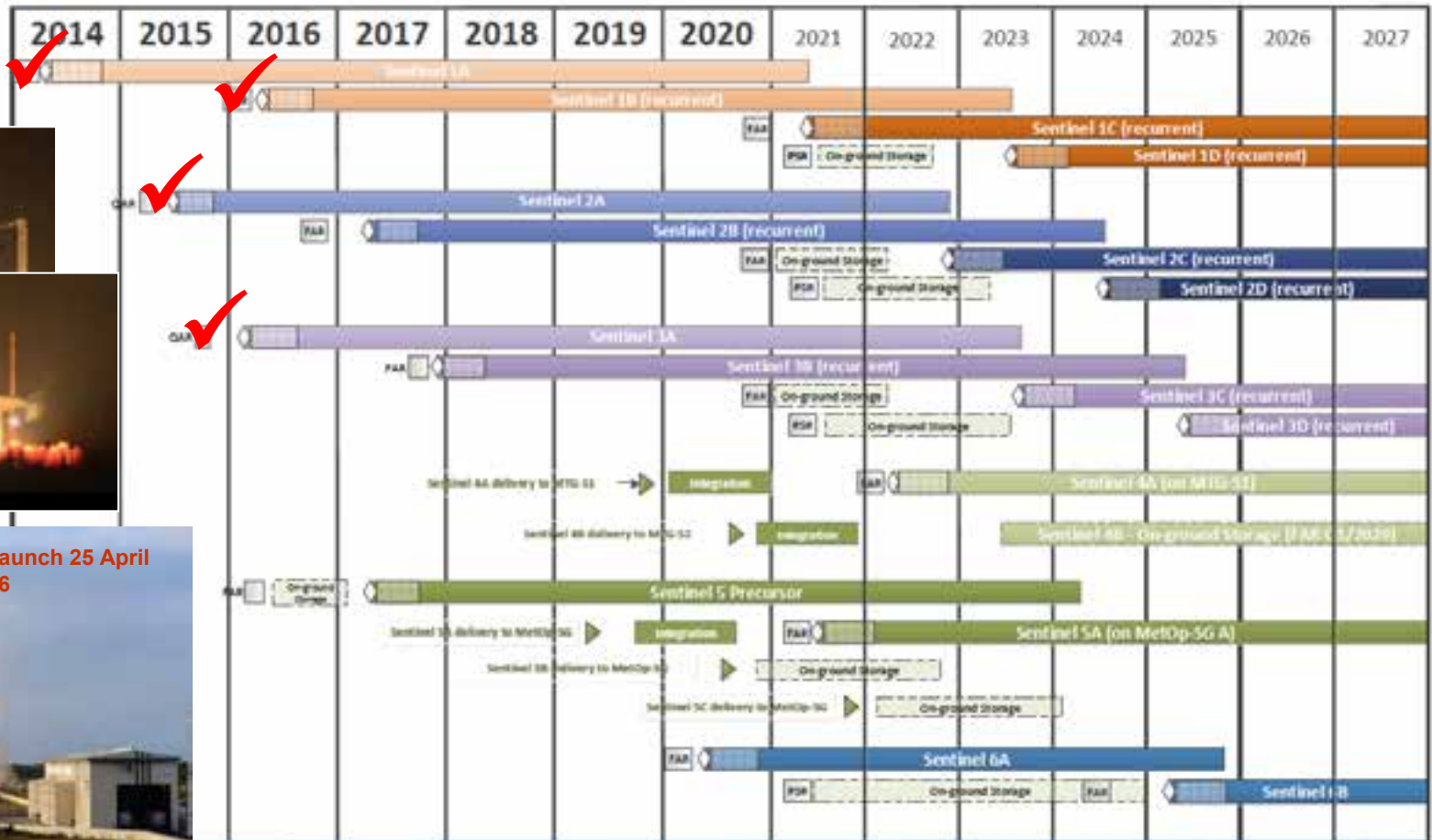
## Sentinel Mission and Status

## Key Features

	<b>SENTINEL-1:</b> 10-40m resolution, 3 day revisit at equator	<b>2 sats in orbit</b>	▶	Polar-orbiting, all-weather, day-and-night radar imaging
	<b>SENTINEL-2:</b> 10-60m resolution, 5 days revisit time	<b>1 Sat in Orbit</b>	▶	Polar-orbiting, multispectral optical, high-res imaging
	<b>SENTINEL-3:</b> 300-1200m resolution, <2 days revisit	<b>1 Sat in Orbit</b>	▶	Optical and altimeter mission monitoring sea and land parameters
	<b>SENTINEL-4:</b> 100km resolution, 60 min revisit time	<b>1st Launch in 2020</b>	▶	Payload for atmosphere chemistry monitoring on MTG-S
	<b>SENTINEL-5p:</b> 7-68km resolution, 1 day revisit	<b>Launch by end 2016</b>	▶	Mission to reduce data gaps between Envisat, and S-5
	<b>SENTINEL-5:</b> 10.5-50km resolution, 1 day revisit	<b>1st Launch in 2021</b>	▶	Payload for atmosphere chemistry monitoring on MetOp 2 <sup>nd</sup> Gen
	<b>SENTINEL-6:</b> 10 day revisit time	<b>1st Launch in 2020</b>	▶	Radar altimeter to measure sea-surface height globally



## Copernicus Constellation Deployment Schedule



Legend:



Qualification Acceptance Review (QAR)  
Flight Acceptance Review (FAR) or  
Pre-storage Review (PSR)



Tentative launch date



In-orbit Commissioning

Status: 08 September 2016

S1A

S2A

S3A

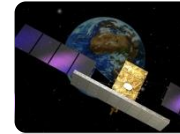
Successful S1B launch 25 April 2016

European  
Commission

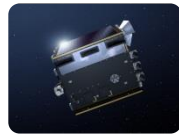
SPOT (VGT)



COSMO-Skymed



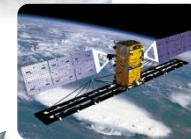
PROBA-V



TerraSAR-X  
Tandem-X



Radarsat



Cryosat



Jason



Sentinels  
complement the  
offer

Optical MR and LR  
missions

SAR missions

Optical VHR and  
HR missions

**Copernicus  
Contributing  
Missions**

Altimetry missions

Atmospheric missions

MetOp



Meteosat 2<sup>nd</sup> Gen



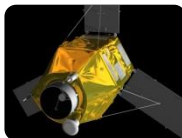
RapidEye



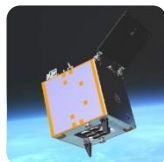
Deimos-2



Pléiades



DMC



SPOT (HRS)



## Data policy and distribution

**Rule:** Copernicus provides free and open access to data and products (pending copyrights on raw data from contributing mission).

**Exception:** Security Applications, and in some limited cases the Emergency service - products are fully customised to user's needs and subject to sensitivity checking and limited distribution.



## Monitoring the State of the Earth System Environment

...



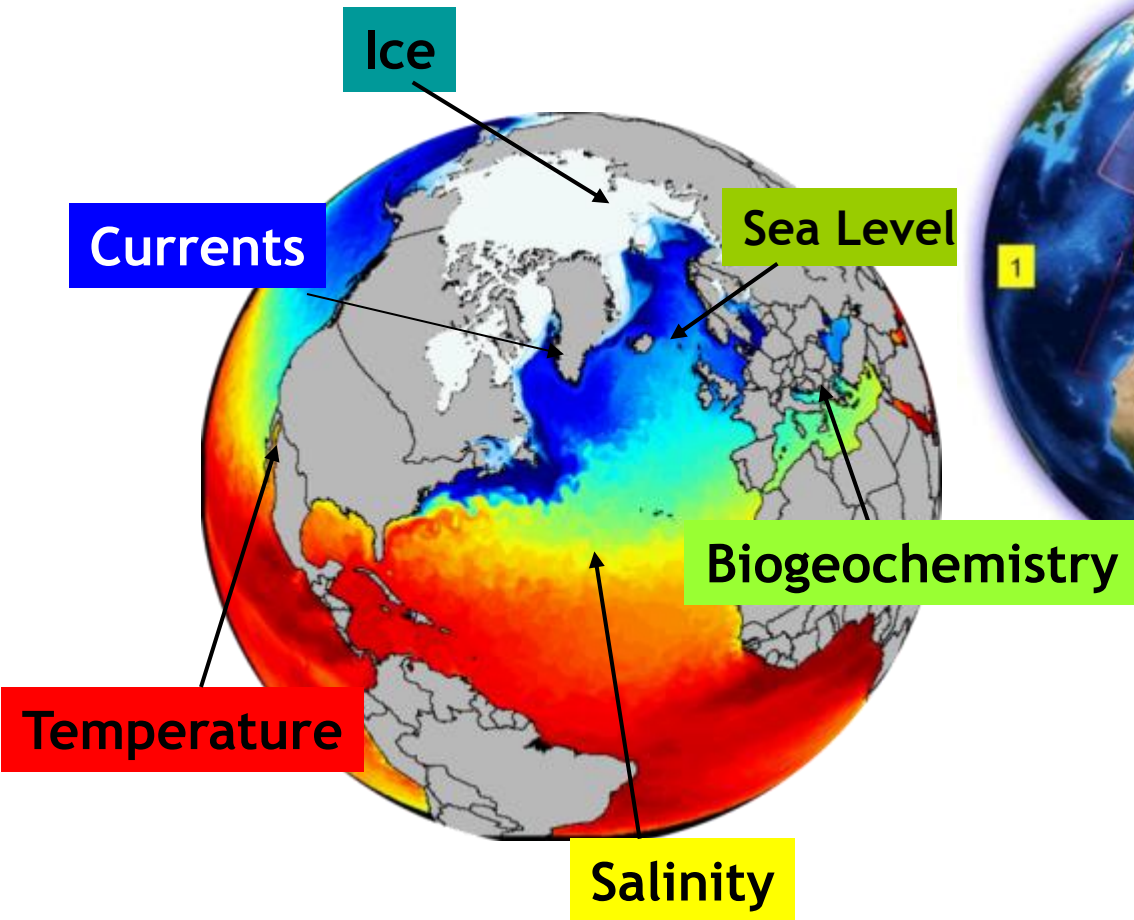
✓ = operational  
✓ = in ramp up

... cross-cutting Thematic Services

## Example 1

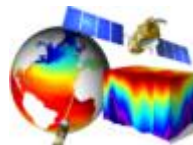
# Marine Environment Monitoring Service





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

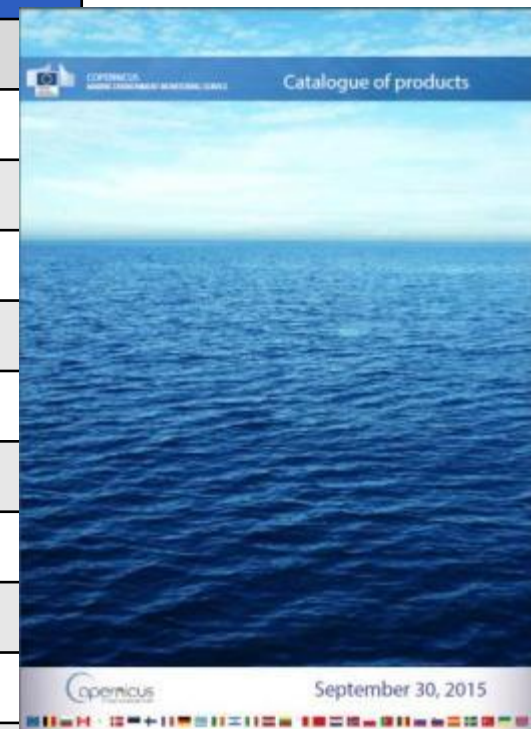
**A 3D and consistent  
estimation of the ocean**



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

**Service portfolio: 11 product groups with ~140 data products covering Ocean state**

Product groups	
<b>Analysis and Forecast</b>	Global Ocean
	Arctic Ocean
	Baltic Sea
	Atlantic-European North West Shelf Ocean
	Atlantic-Iberian Biscay Irish Ocean
	Mediterranean Sea
	Black Sea
<b>Observation</b>	Sea Level
	Ocean Colour
	Sea Surface Temperature, Sea Ice, Wind
	In-situ (Temperature, Salinity, Bio)



**<http://marine.copernicus.eu/>**



**Example 2:**

**Emergency  
Management Service**







## Flood and forest fire risk forecasts



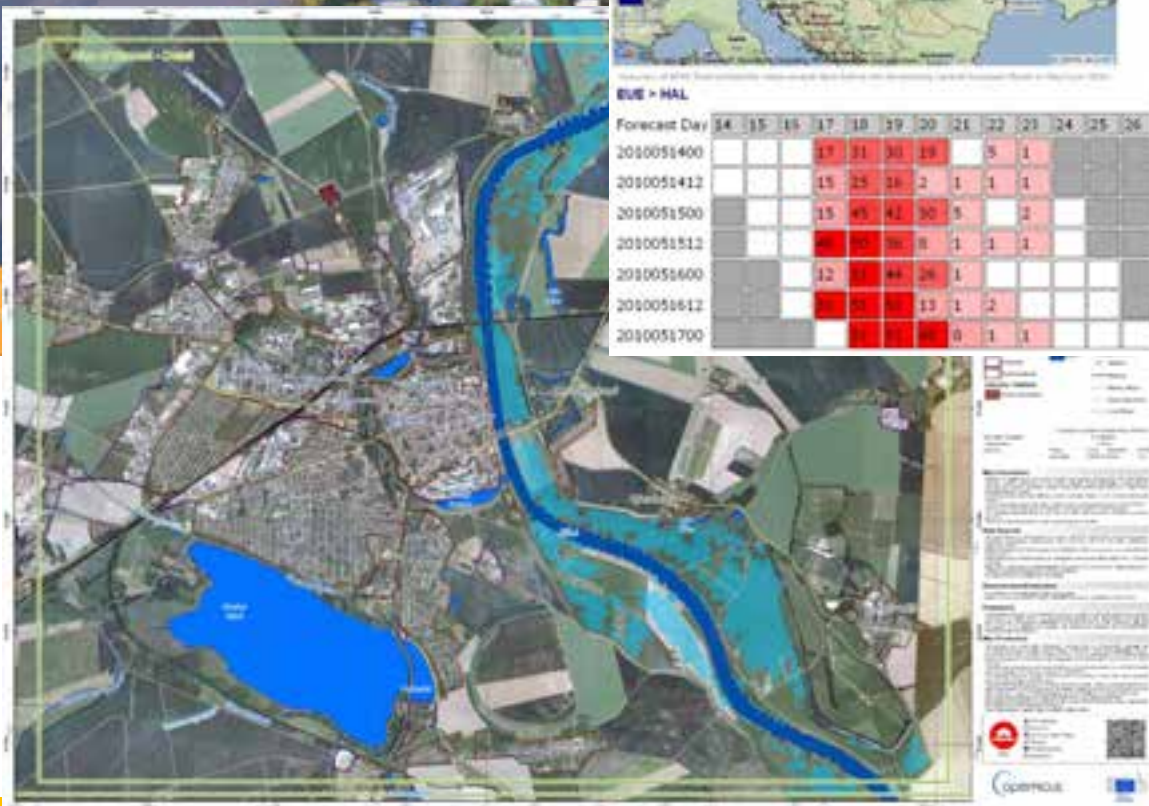
**BLUE - HAL**

Forecast Day

	14	15	16	17	18	19	20	21	22	23	24	25	26
2010051400				13	31	30	18		5	1			
2010051412				15	25	24	2	1	1	1			
2010051500				15	45	42	30	5		2			
2010051512				20	70	70	8	1	1	1			
2010051600				12	3	44	26	1					
2010051612				20	70	70	13	1	2				
2010051700				20	70	70	0	1	1				

**Providing support to  
emergency response  
services**

**Situation maps, reference  
information**





## EMSR125: Earthquake in Nepal

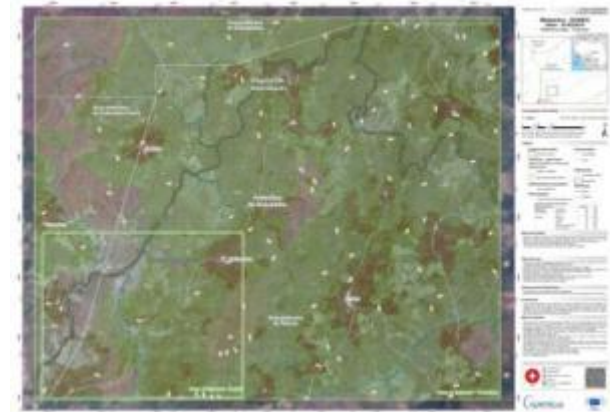
Event Time (UTC): 2015-04-25 11:45  
Event Time (LDC): 2015-04-23 16:45  
Event Type: Earthquake  
Activation Time (UTC): 2015-04-25 12:20  
Reference maps: 4  
Delineation maps: 0  
Grading maps: 4  
Activation Status: Open  
Affected Countries:  
Federal Democratic Republic of Nepal  
Area Descriptor: Kathmandu, Bhatu, Pokhara, Bharatpur  
Authorized User:  
EC Services (DSI, ECHO)  
Activation Reason:  
An earthquake in Nepal with a magnitude of 7.8M, 10km depth occurred with at least one consequent aftershock of 7.1M, 10km depth. The epicenter is located between the capital Kathmandu and the city of Pokhara, and was also felt in northern parts of India. Extensive damage to buildings and injuries have been reported.  
Requested Product: Reference and Grading Maps



Earthquake, Nepal



Tropical Cyclone, Vanuatu



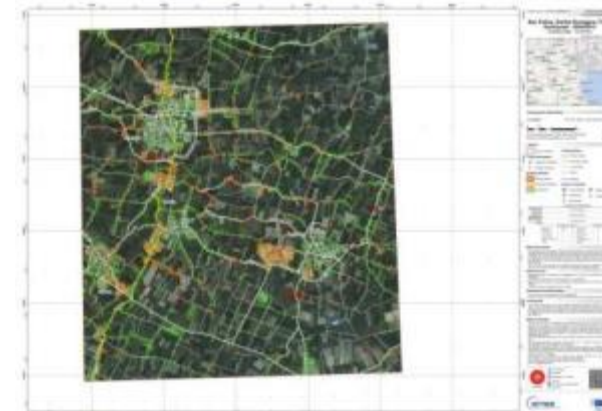
Ebola epidemic, Guinea



Refugee Camp, Al Mafraq Jordan



Floods, Ostlandet, Norway



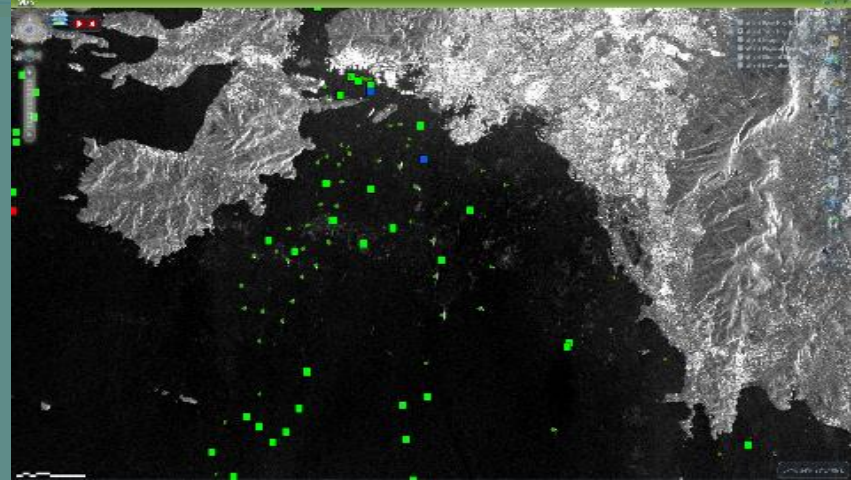
Earthquake, San Felice sul  
Panaro Italy

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

## Security Service

### 3 application areas:

- Border Surveillance
- Maritime Surveillance
- Support to EU External Actions



## Security Service

- **Border Surveillance**
- Support to EU External Actions
- Maritime Surveillance



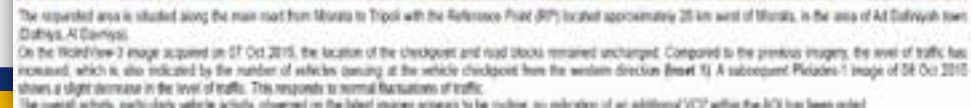
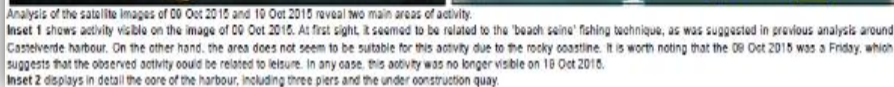
To support the European Union's external border surveillance system, in particular EUROSUR, an initiative based on an EU-level approach to reinforcing Member States' control over the Schengen border.

### Delegation of Operations to



Since Nov 2015







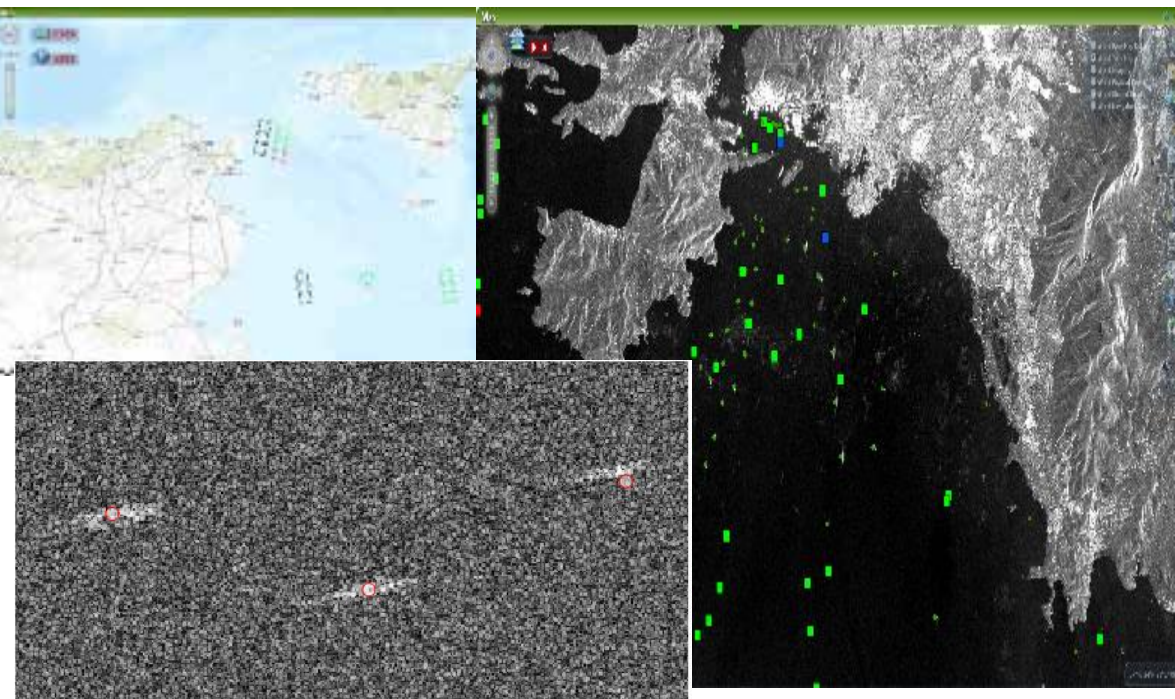


## EUROSUR FUSION SERVICE



**In cooperation with  
EMSA under Copernicus**

**example**



## Success story

- 6 October 2015 – 3 boats rescued – 370 ppl on board, incl. 48 women & 9 children
- Cooperation: Frontex – EMSA – Italy – EUNAVFOR MED

## Security Service

- Border Surveillance
- **Support to External Actions of the EU (SEA)**
- Maritime Surveillance



To assist the EU in supporting operations outside the EU territory, in particular providing decision makers with geo-information on remote, difficult to access areas, where security issues are at stake.

### Delegation of Operations to

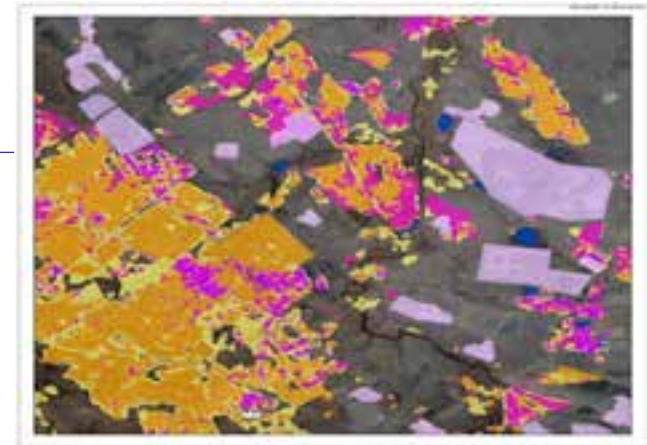


**Since Oct 2016  
(operations as from April 2017)**

## SEA - Service Portfolio

### Products

- Reference Mapping
- Road Status Assessment
- Conflict Damage Assessment
- Critical Infrastructure Analysis
- Support to Evacuation Plans
- Crisis Situation Mapping
- Border Mapping
- Camp Analysis & Monitoring
- Activity Reports



## SEA - Service Portfolio

### Other application domains



– humanitarian crisis



– natural resources



– land conflicts situation awareness



– border surveillance (outside EU borders)



– illicit crops



– monitoring of nuclear sites and activities

## Security Service

- Border Surveillance
- Support to EU External Actions
- **Maritime Surveillance**



**To provide enhanced observation capacities for the surveillance of human activities at sea, with a special focus on security, safety and environmental (pollution, fisheries) issues.**

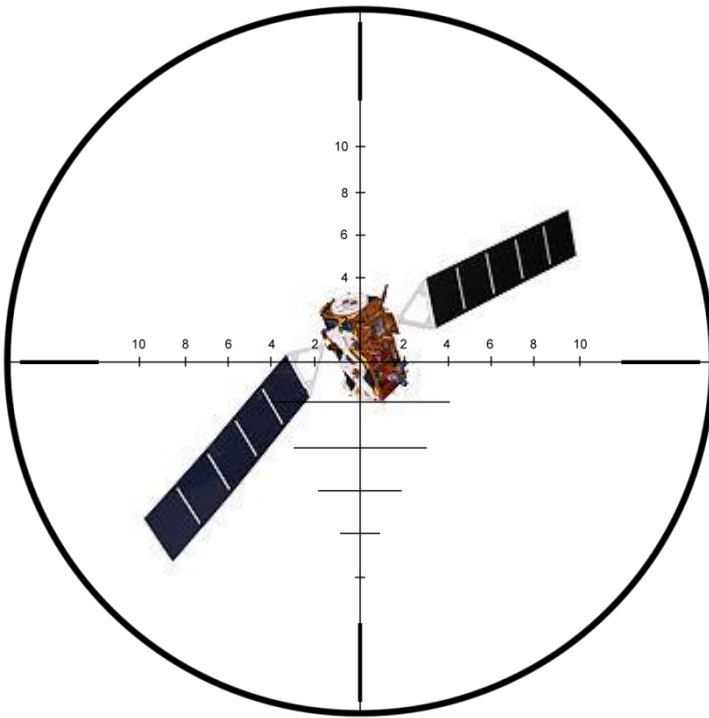
**Delegation of Operations to**



**Since Dec 2015**



## How were the services defined ?



**User-Centric approach**

## Maritime Surveillance Service

### User-Driven approach



- **R&D activities :**
  - Mariss (ESA), Nereids, Dolphin, Sagres (FP7), MS projects - worked as demonstrators – The added value of space for maritime awareness
- **Working Groups** – User mobilisation , requirements definition
  - Working Group on Copernicus Maritime Surveillance 2013-14  
Report of the WG (May.14) available on request  
Led to the definition of a **Service Portfolio**
- **Additional consultation in Ad-hoc Fora**
  - *Copernicus User Forum*
  - Regulatory Committee for Maritime Security (MARSEC)
  - *Common Information Sharing Environment* (CISE) initiative –Tag
  - *Stakeholder Advisory Group on Maritime Security* (SAGMaS)
  - Ad-hoc meetings
  - User uptake and requirements Workshop – EMSA (today)

## What can be done ?

**A Service Portfolio is available for each of the Services and included as a Technical Annex to the Delegation Agreement between the Commission and the operators (EMSA for MS) .**

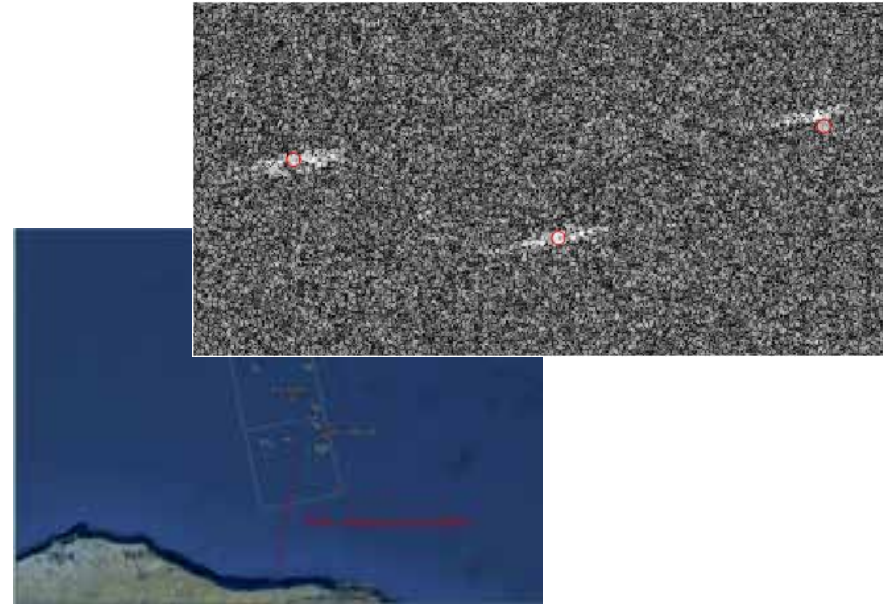
**Service Portfolios have been defined through the user aforementioned consultation process .**

**Service are evolutionary in nature and can be adapted to User needs .**

**Requests for additional services - not defined in the original portfolio - will need to be approved by the Copernicus User Forum / Committee**

## Service areas addressed

**Fisheries control**  
**Maritime safety and Security**  
**Customs**  
**Law enforcement**  
**Marine environment**  
**Defence [tbd]**



**Service provision started mid-2016 for Fisheries Control and Law Enforcement**

**More information in subsequent presentations**

## Can I get what I need ?

**CASE 1) Your needs are foreseen (possibly with customisation) in the service portfolio.**

**Service delivery possible – technical details to be agreed with EMSA , dependent on service roll-out plans**

**CASE 2) Your needs are not contemplated in the service portfolio .**

- Submit your requirements
- Request to be analysed under a policy perspective by the Commission
- Feasibility and prioritisation analysis will follow

**In both cases you may want to inform your National representative to the Copernicus User Forum / Committee**



## Who is responsible for Service implementation ?

The Copernicus Services Unit in Commission's DG-GROW, steered by the **Copernicus Committee** and the **Copernicus User Forum**

## Who operates the Security Services ?

**Delegated** to operational regulatory/operational Agencies:

Maritime Surveillance



Dac  
2015

Border Surveillance



Nov  
2015

Support to EU External Actions



Oct  
2016



Inter-Agency cooperation

## Can I get what I need from Space?

**Today:** Your requirements will drive the acquisition of suitable space data, whether through the Copernicus data warehouse or through dedicated Near-Real-Time capacities put in place by EMSA.

**Future:** Space capabilities are constantly improving:

- The User consultation in 2013-14 fed two ESA studies on the evolution of the Copernicus space segment.
- The Commission is compiling a user requirements database based on the 6 services requirements, which will drive the next generation of the Copernicus observation capacities to be developed by ESA. The breakout session on 'New satellite technologies' will feed this on-going exercise.

## Status

**Extensive work has been done to mobilize communities and identify their needs. A Copernicus Maritime Surveillance (CMS) service portfolio defined early 2014.**

**Delegation of CMS operations to EMSA (Nov 2015), supported by Industrial capacities.**

**Operations as from 2016 has been focussing on fisheries control and law enforcement.**

**User up-taking and mobilization throughout 2016 :**

- **Regional Workshop Maynooth Ireland, 22.April.16**
- **Workshop Nov.15 2016 – EMSA Lisbon**
- **Training sessions at EMSA (so far: Fisheries and Law enforcement)**

**Other services in the portfolio will roll-out during 2017 based on user demand.**

**This workshop is an opportunity to enrol users and define service priorities for 2017 and beyond.**

## Way ahead

**We aim at a long-term sustainable cooperation with Maritime user communities**

**Objectives for this event :**

- **User identification and registration**
- **Mapping and refinement of requirements**

**In addition**

- **Initiate bilateral discussions for the next steps in service provision, as needed**
- **Discuss user up-taking activities for 2017 (bilateral meetings, regional /thematic events, etc.)**



**Recall => User up-take is key for Copernicus so do contact also Copernicus and your User Forum representative if you want to discuss your involvement in Copernicus – Maritime Surveillance**

- [DG-GROW Copernicus – copernicus.mss@ec.europa.eu](mailto:copernicus.mss@ec.europa.eu)

Thank you for your interest

Looking forward to a long-term cooperation

## More Information

<http://copernicus.eu>

## Contact

### **Copernicus Security Applications**

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DG-GROW.12 – Copernicus Services  
[Copernicus.mss@ec.europa.eu](mailto:Copernicus.mss@ec.europa.eu)



<b>Austria</b>	Austrian Ministry for Transport, Innovation and Technology
<b>Belgium</b>	NFP-Belgium (EEA-EIONET) Belgian Interregional Environment Agency (IRCEL-CELINE)
<b>Bulgaria</b>	Department of Meteorology and Geophysics, University of Sofia
<b>Czech Republic</b>	Czech Ministry of the Environment
<b>Denmark</b>	Danish Ministry of Environment
<b>Estonia</b>	Tartu Observatory
<b>France</b>	Ministère de l'Environnement, du Développement durable et de l'Energie
	Institut national de l'information géographique et forestière
	Space Security, Space Situational Awareness, Space Debris, Maritime Surveillance
	Ministère de l'Environnement, du Développement durable et de l'Energie
<b>Finland</b>	Finnish Meteorological Institute (FMI)
<b>Germany</b>	BKA
	DLR
<b>Greece</b>	Planetek Hellas LTD
<b>Italy</b>	Italian Space Agency (ASI)
	ISPRA
<b>The Netherlands</b>	Netherlands Space Office
<b>Norway</b>	Norwegian Space Centre

<b>Poland</b>	Ministry of Science and Higher Education
<b>Portugal</b>	Laboratorio Nacional de Energia e Geologia
<b>Romania</b>	Meteo Romania
<b>Slovak Republic</b>	Slovak Hydrometeorological Institute
<b>Spain</b>	Instituto Geografico Nacional
<b>Sweden</b>	Swedish Maritime Administration
	Swedish Agency for Marine and Water Management
	Swedish Meteorological and Hydrological Institute (SMHI)
	Landmateriet, Swedish mapping, cadastral and land registration authority
<b>United Kingdom</b>	Department for Environment, Food and Rural Affairs (DEFRA)