

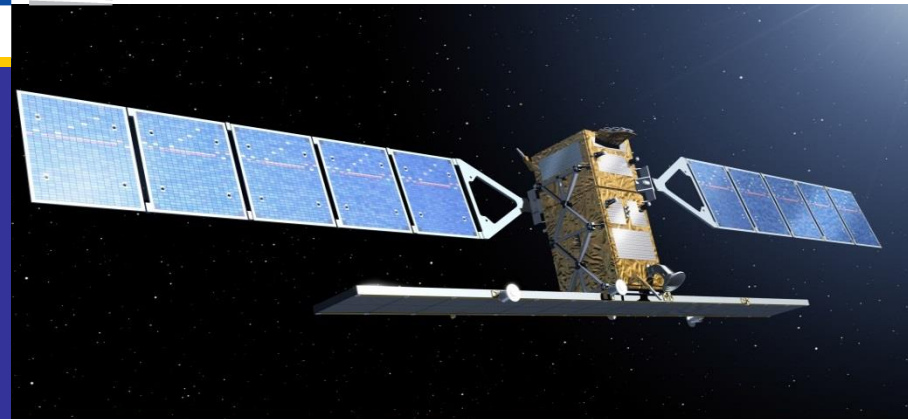
Copernicus the EU's Earth Observation Programme

**Copernicus Directorate
DG GROW**

II EU-Latin America dialogue on Raw Materials

22 and 23 September 2015, Colombia

Follow us on:





- Copernicus – an introduction
- Space Component
- Service provision
- Data management

Objectives



"The Union Earth observation and monitoring programme"

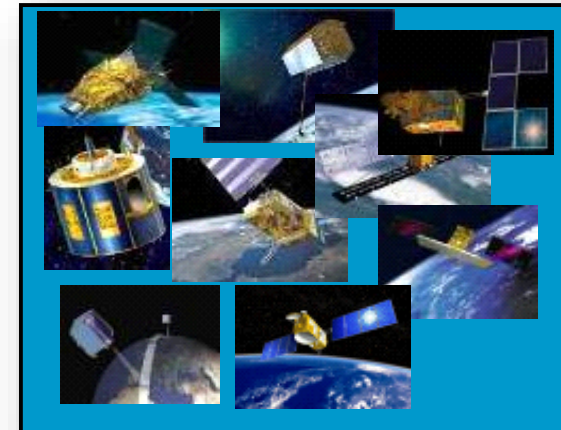
Monitor the environment



Copernicus architecture



6 services use
Earth Observation
data to deliver ...

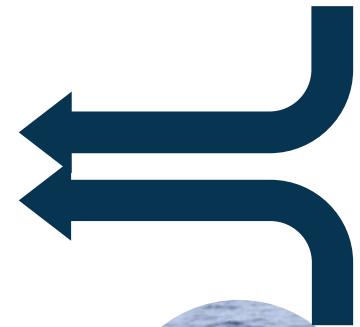


Sentinels

Contributing missions



...added-value products



in-situ

Each Sentinel is technically different to meet the needs of the 6 services



Sentinel 1 – radar imaging
All weather, day/night applications



Sentinel 2 – Optical imaging
Land applications: urban, forest, agriculture,...



Sentinel 3+6 – Ocean and global land monitoring, high precision ocean altimetry



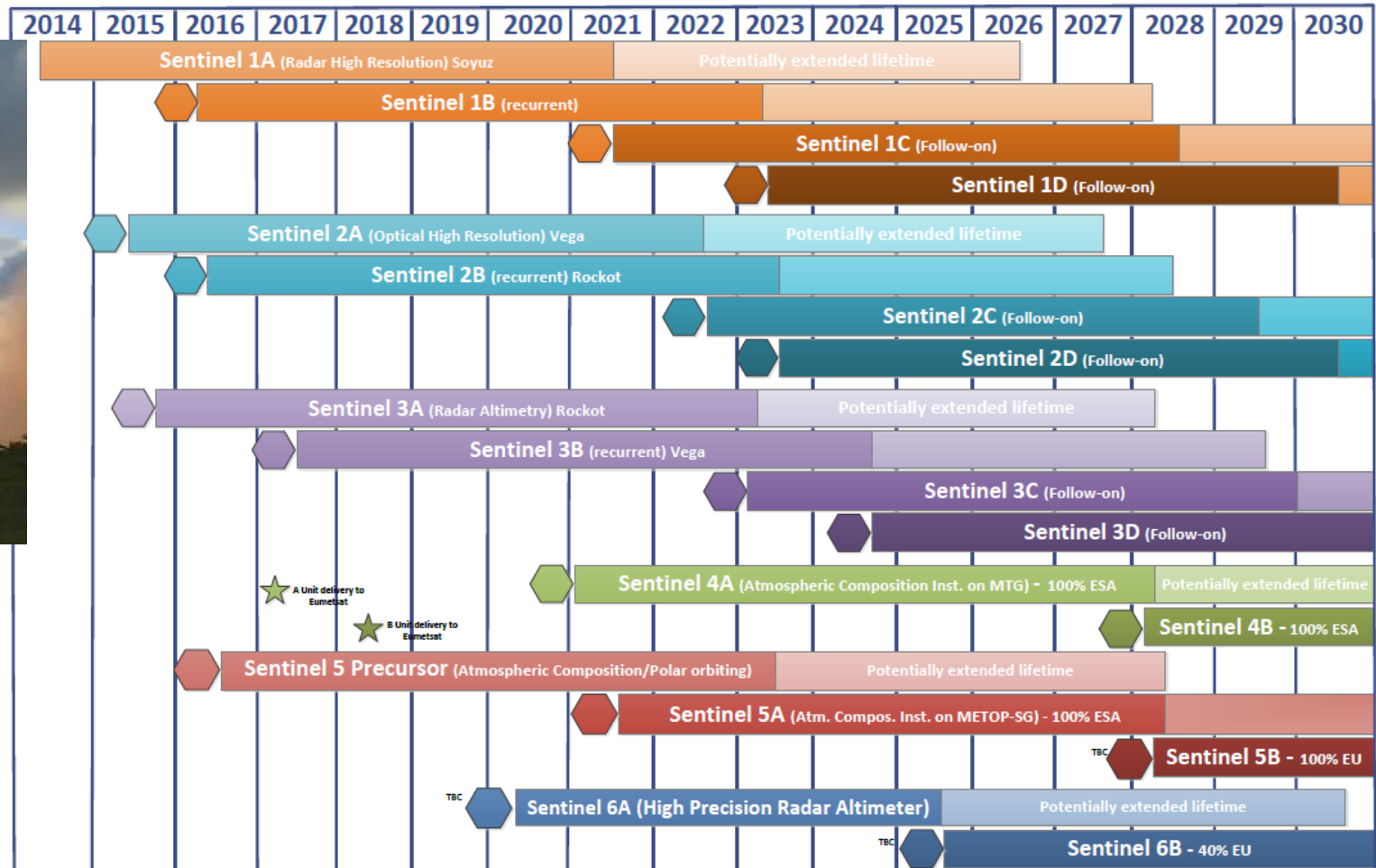
Sentinel 4+5 – Atmosphere composition monitoring, from a geostationary (-4) and a polar orbit (-5)

Deployment schedule



Copernicus Constellations Deployment Schedule

Status 23 January 2015



Legend: Flight Acceptance Review

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

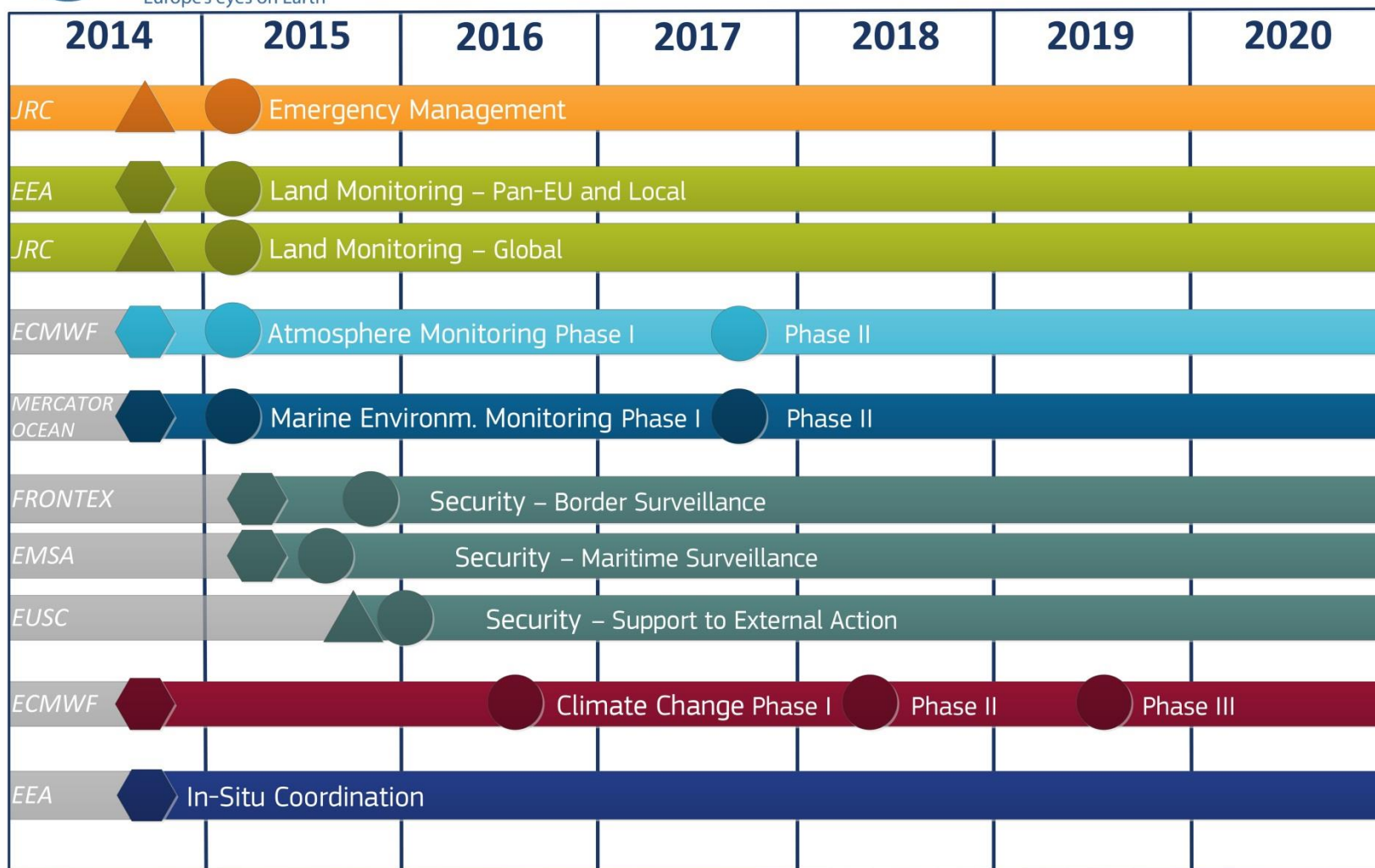
Services Deployment



Status 3 February 2015



Copernicus Services Implementation Schedule



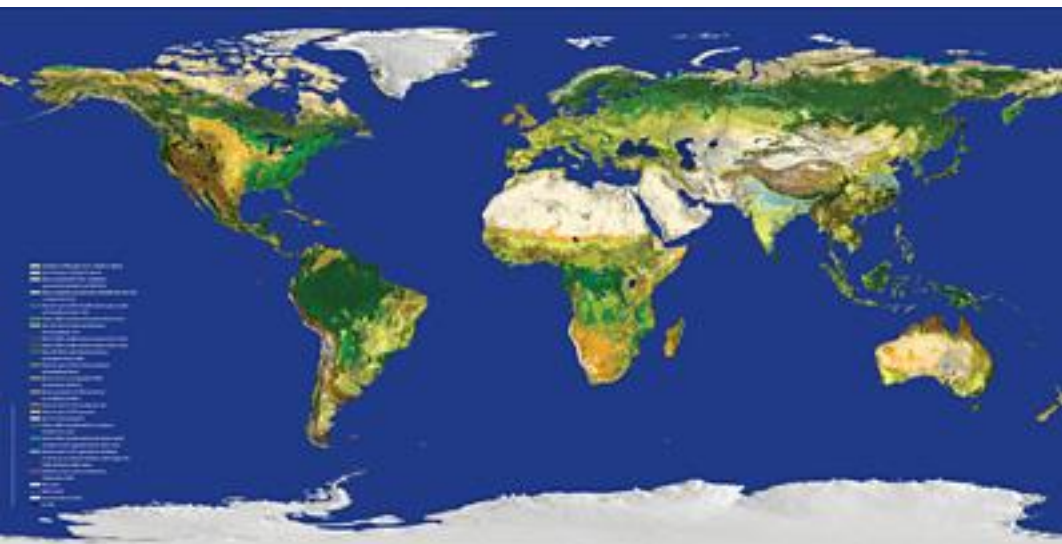
Legend: ● Delegation agreement ▲ Direct management ○ Operational phase

Seven Milestones reached:

- **Budget of € 4.3 Bn for 2014-2020**
- **Full, free and open access to data**
- **Successful launch of Sentinel 1A**
- **Programme Regulation adopted**
- **First images presented**
- **Funds delegated to ESA/EUMETSAT**
- **Four services are operational delivering 24h/7d**

Copernicus Land Monitoring Service





From global...

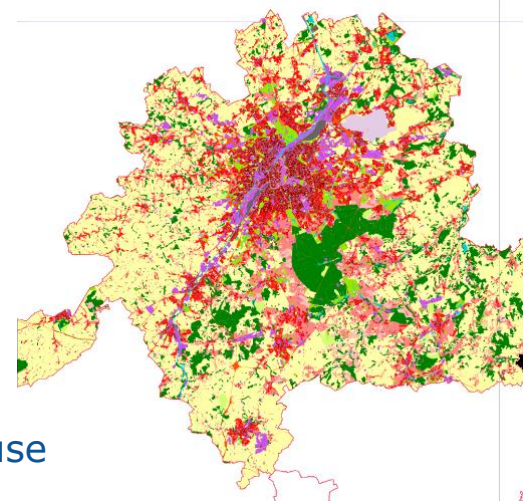
e.g. Vegetation dynamics, Bio-physical parameters, energy balance

...to pan-European...

e.g. bio-diversity, water bodies, land-use, land change



...to local
e.g. urban land-use



9 groups of products (vegetation-energy-water) providing a picture of the world every ten days

<i>Variable</i>	<i>Temporal Coverage</i>	<i>Temporal resolution</i>	<i>Spatial coverage</i>	<i>Spatial resolution</i>	<i>Sensor</i>
LAI/FAPAR/FCover	1999 – present	10 days	Global	1km	SPOT/PROBA V
NDVI/VCI/VPI	1999 – present	10 days	Global	1km	SPOT/PROBA V
Dry Matter Productivity	2009 – present	10 days	Global	1km	SPOT/PROBA V
Burnt Area	1998 – present	1 day	Global	1km	SPOT/PROBA V
TOC Reflectance	2013 – present	10 days	Global	1km	SPOT/PROBA V
Surface Albedo	1999 – present	10 days	Global	1km	SPOT/PROBA V
Land Surface Temperature	2009 – present	1 hour	Global	0.05 °	Σ Geo
Soil Water Index	2007 – present	1 day	Global	0.1 °	Metop / ASCAT
Water bodies	1999 – present	10 days	Global*	1km	SPOT/PROBA V

Current service evolution : move from 1 km resolution to 300 m (EU)

INTERNET dissemination

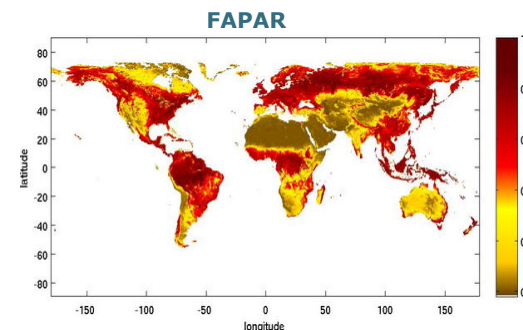
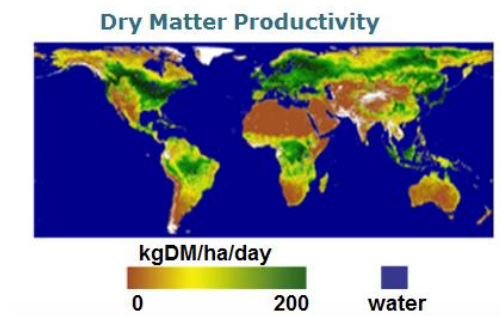
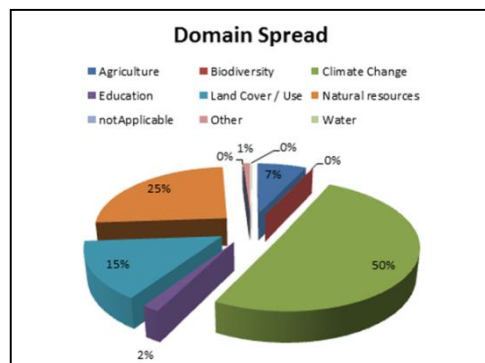
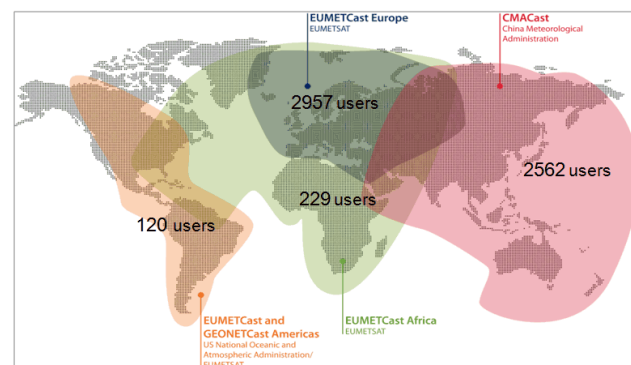
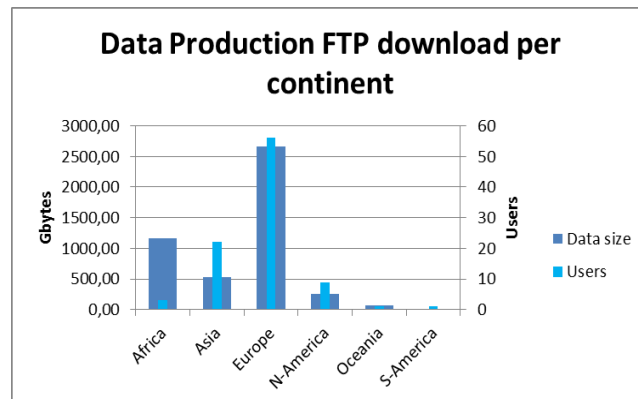
- Around 900 Gb delivered each month
- 158 countries accessed the WEB site
- Around 700 regular FTP users

Top ten user countries:

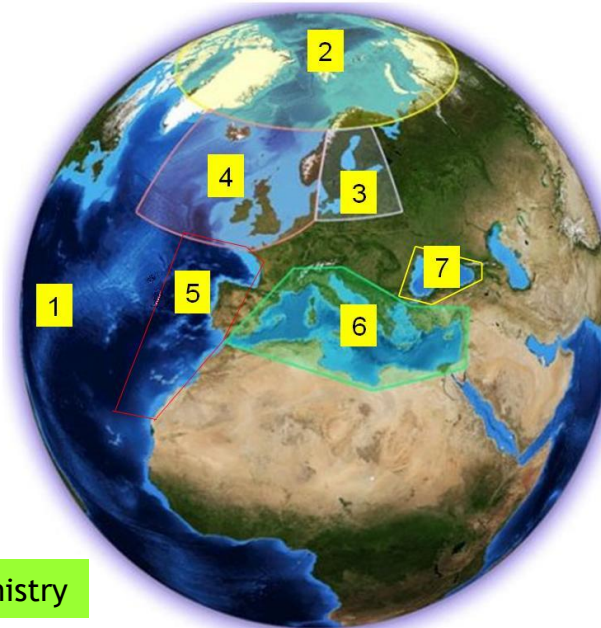
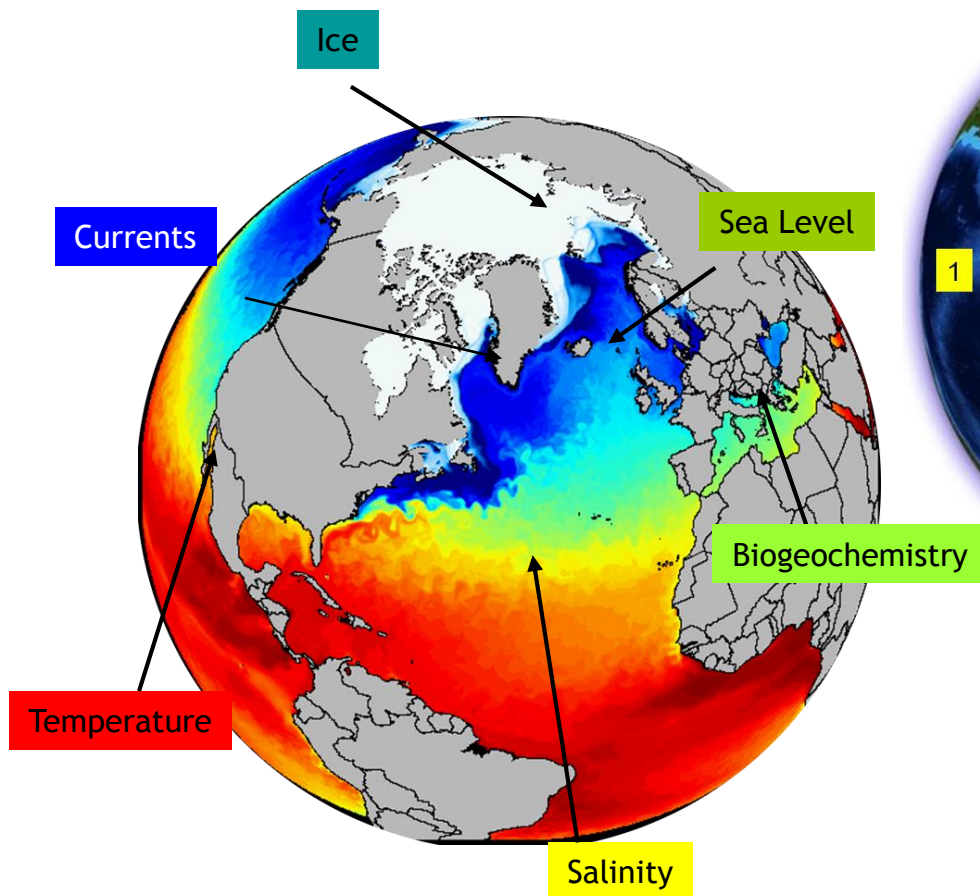
Italy, Spain, France, China, Germany,
Netherlands, US, Poland, Austria, Belgium

EUMETCAST delivery

- 550 users registered
- More than 250 receiving stations and 300 regular users in Africa
- 56 organizations registered in South America



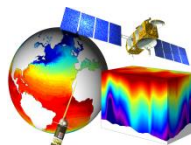
Copernicus Marine Environment Monitoring Service



- 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

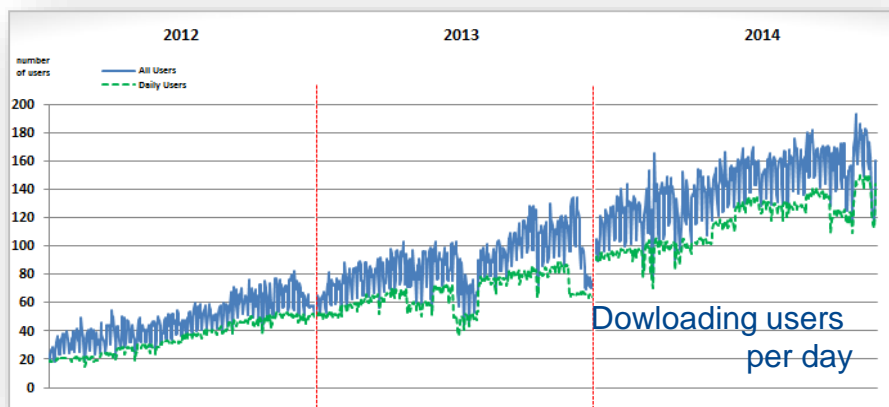


Service portfolio: 11 product groups with ~120 data products covering Ocean state

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)

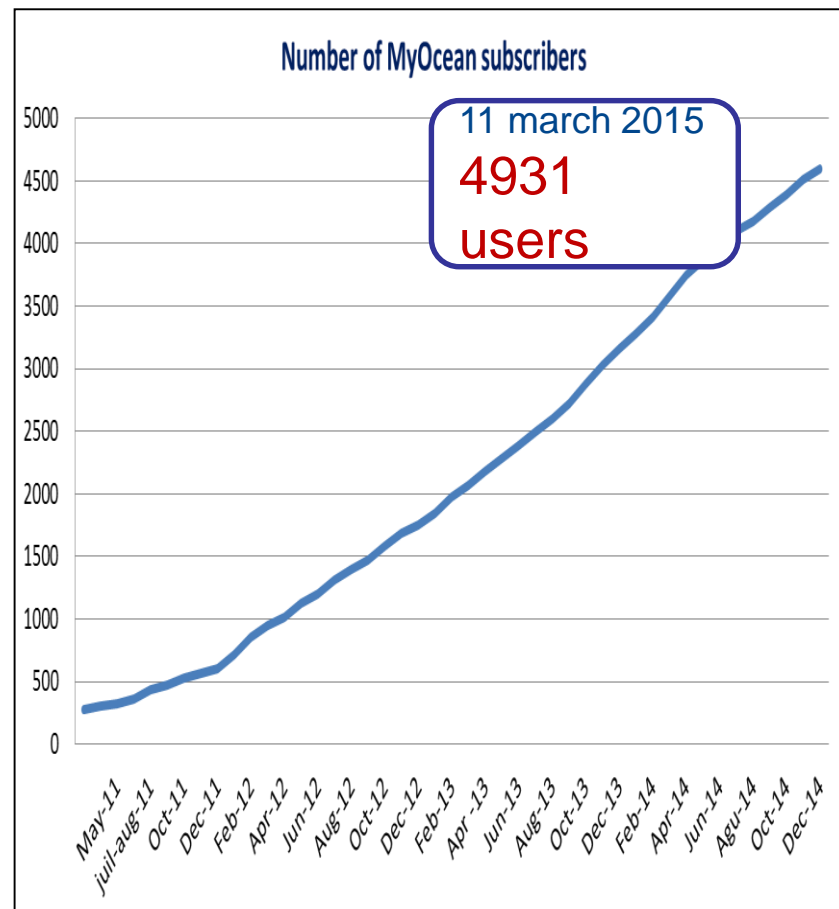
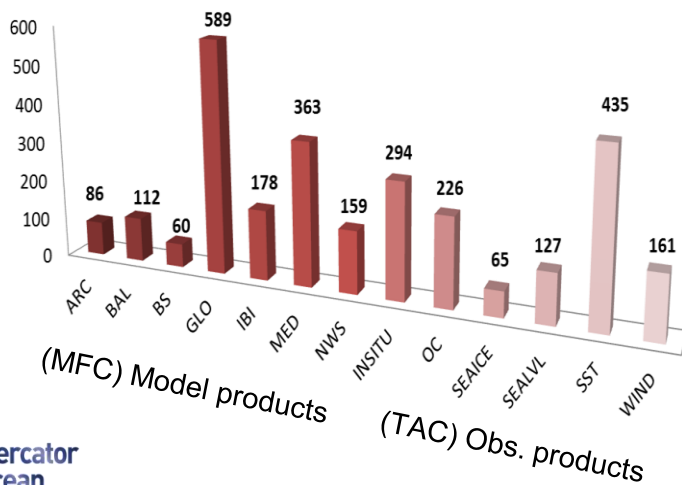
- ❑ Details in: *MyOcean catalogue of PRODUCTS, Mercator Ocean / November 2014*
- ❑ Future: *Product Portfolio = Baseline document of operational service*

Key Performance Indicators illustrated with MyOceanFollowOn operations (H2020, pilot phase)



MyOcean - 2014

Number of users per product family (MFC & TAC)



Copernicus Atmosphere Monitoring Service

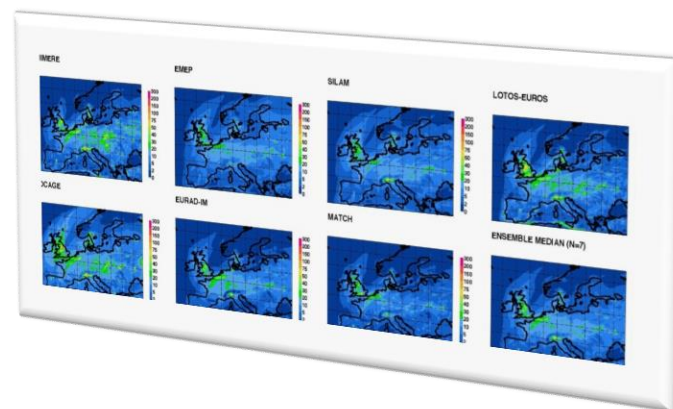
Atmosphere Monitoring service



European
Commission

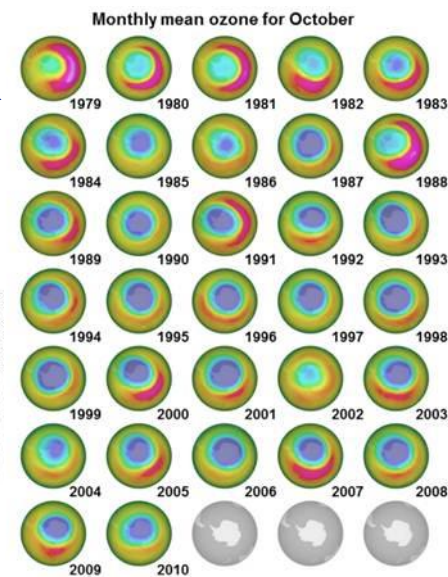


Air Quality
forecast
and
(Re-)Analysis



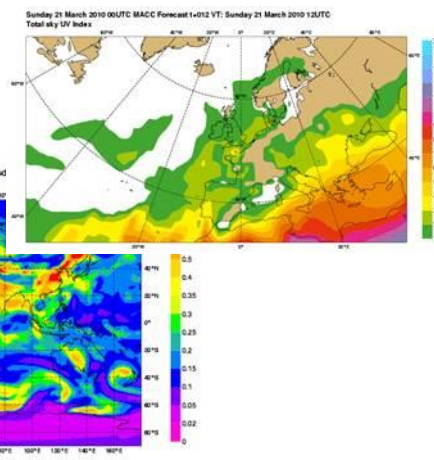
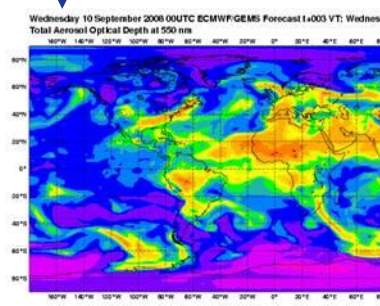
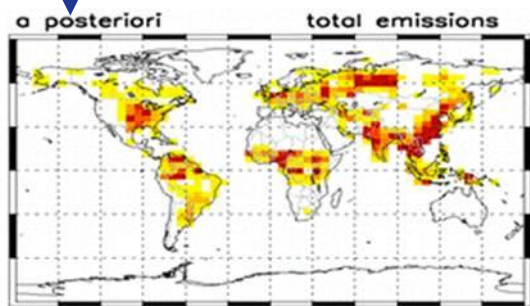
Stratospheric
Ozone

UV Information



Emissions

Global
Forecasts



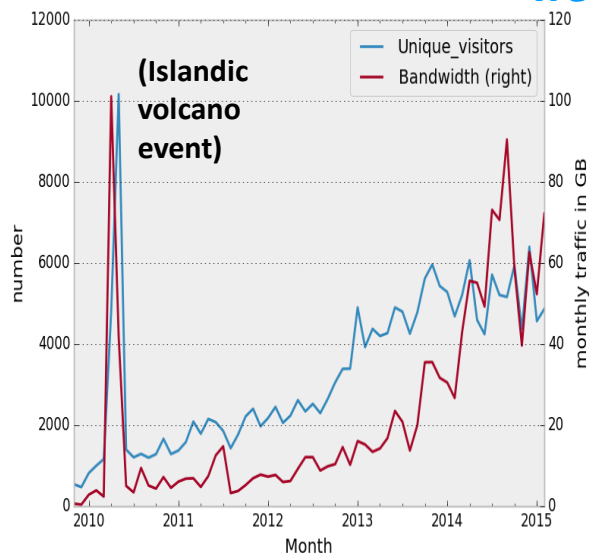
Product groups	
Regional products	European AQ NRT analysis and forecast
	European AQ reanalysis
Global products	Atmospheric composition NRT analysis and forecast (troposphere and stratosphere)
	Atmospheric composition reanalysis (troposphere and stratosphere)
Supplementary products	Policy support
	Solar radiation
	Greenhouse gas fluxes
	Climate forcing
Emissions products	Anthropogenic emissions
	Fire emissions

☐ Current details:
MACC - Product and Service Specifications Document V2, ECMWF / July 2014

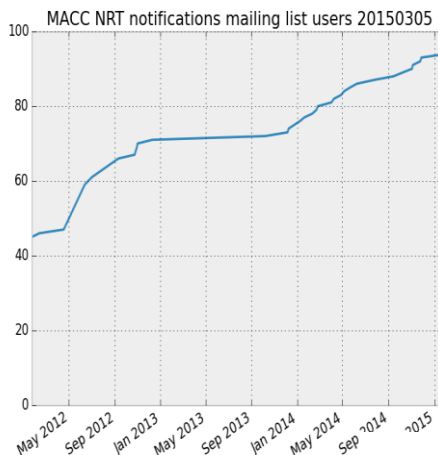
☐ Future:
Product Portfolio = Baseline document of operational service

atmosphere.copernicus.eu

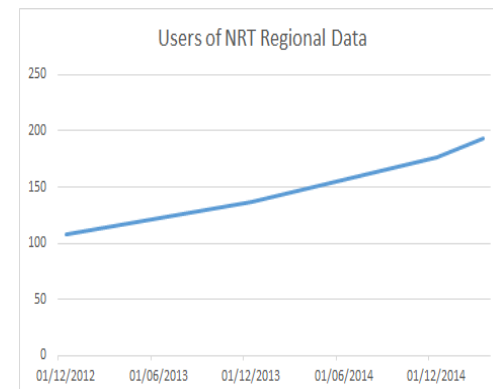
web



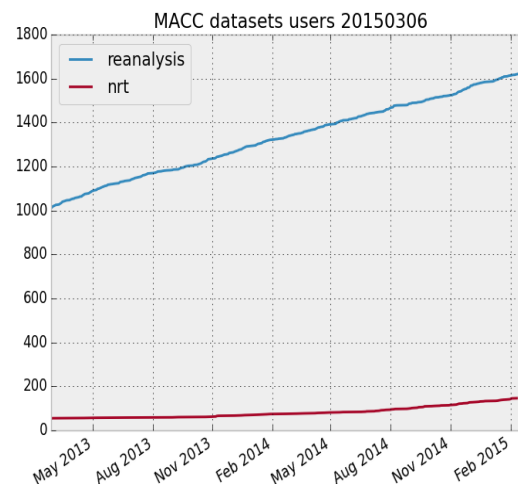
Daily time-critical users of Global Services



Daily time-critical users of Regional Services



Users of the global re-analysis



Service	Number of Users/ Requests for data
Global NRT Analyses & Forecasts	~225 users
Regional NRT Analyses & Forecasts	155 users
Global Reanalysis	1600 users
GHG flux inversions	40 users
Solar Radiation	~1000 requests/year
Global ftp	~ 40 users
Emissions, fire	1773 users (716 institutes)

Copernicus Climate Change Service





★ Objectives:

- ★ Monitor the climate system
- ★ Detect climate change behaviours to allow projections
- ★ Assess impacts of, and support adaptation to climate variability & change

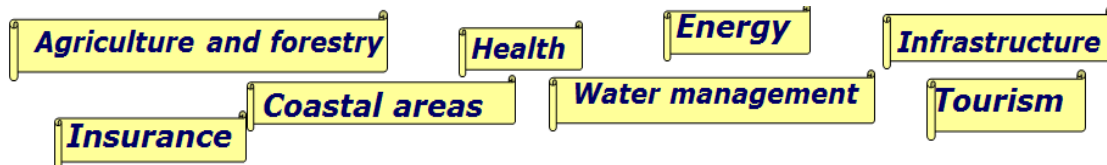
Space & in-situ
Observations

Climate data & re-
analyses

Climate model
projections

★ Consistent Climate Data Store

★ Sectoral Information System



Copernicus Emergency Management Service

Mapping Component

*Early Warning
Component*



Emergency Management service



Flood and forest fire risk forecasts



Overview of EFAS flood probability maps several days before the devastating Central European floods in May/June 2017.

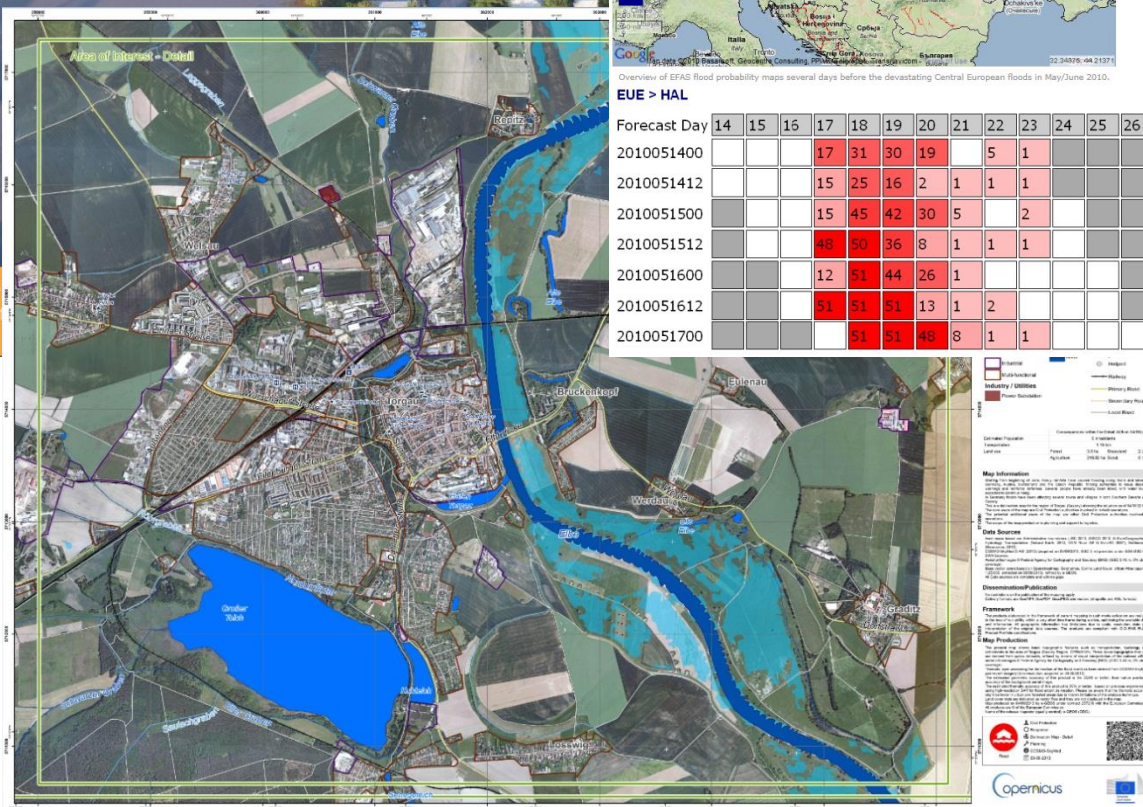
EUE > HAL

Forecast Day

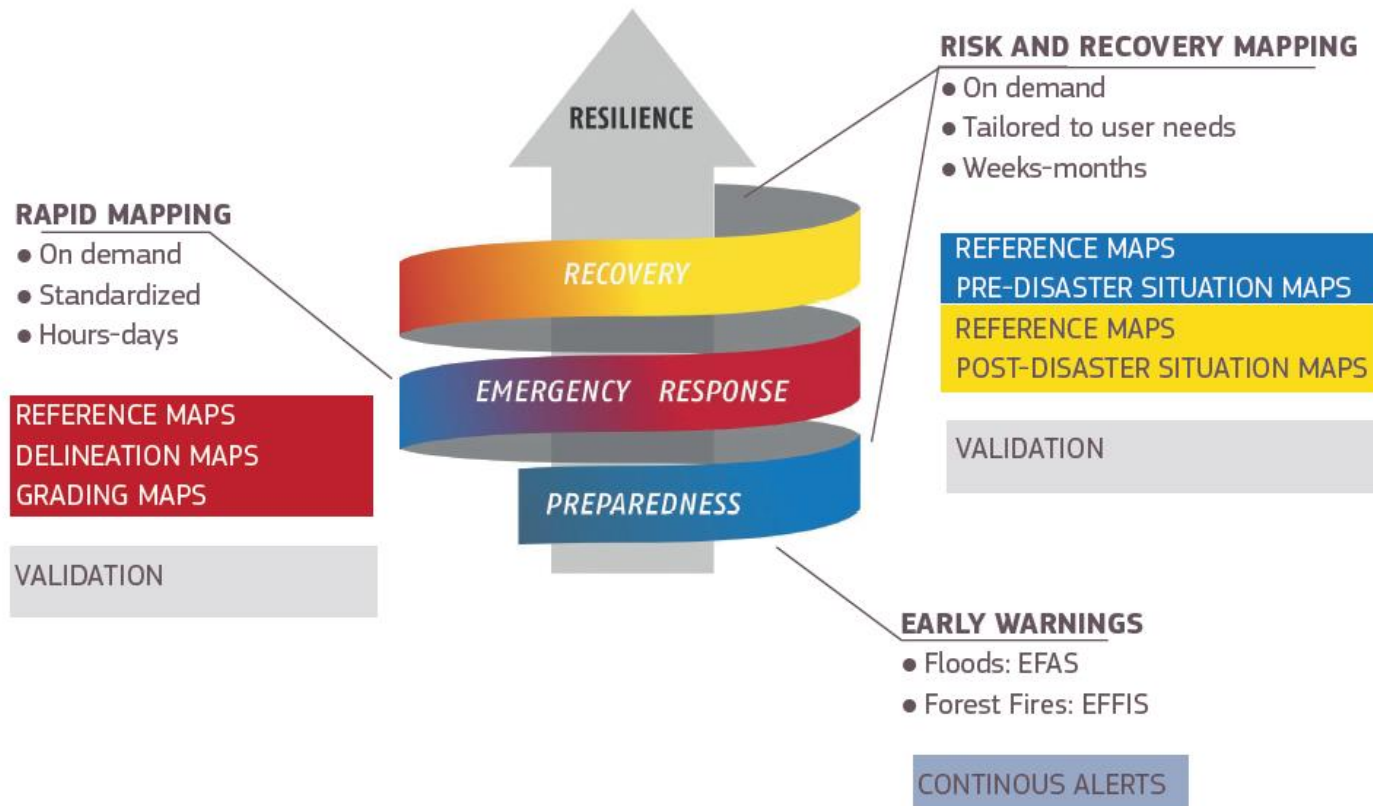
	14	15	16	17	18	19	20	21	22	23	24	25	26
2010051400				17	31	30	19		5	1			
2010051412				15	25	16	2	1	1	1			
2010051500				15	45	42	30	5		2			
2010051512				48	50	36	8	1	1	1			
2010051600				12	51	44	26	1					
2010051612				51	51	51	13	1	2				
2010051700				51	51	43	8	1	1				

Providing support to emergency response services

Situation maps, reference information



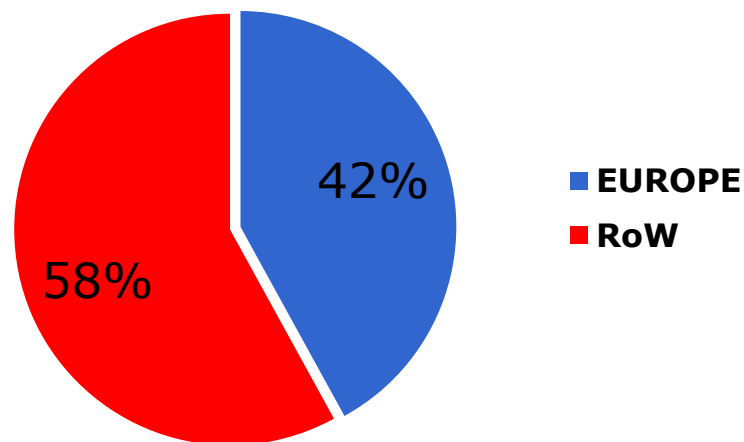
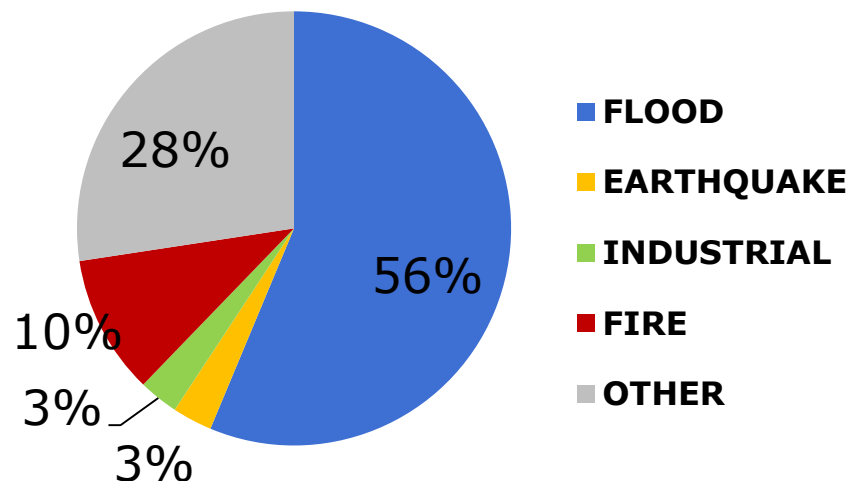
Service covers all phases of disaster management



- ★ Service is provided on the basis of activation via Authorised Users
- ★ In case of non-EU states **via the EU Delegation**

Earthquake, San Felice sul Panaro Italy

- ★ How many activations?
 - ★ 135 in total since April 2012:
 - ★ 69 within Europe, 66 outside
- ★ Which kind of disaster?
 - ★ 14 Fires, 76 Floods, 4 Earthquakes, 4 Industrial accidents, 37 Other
 - ★ In Europe: mostly floods
 - ★ Outside Europe: many humanitarian
- ★ Who is activating?
 - ★ Activations are received by:
 - ★ MS Civil Protection,
 - ★ European Services or UN agencies via DG ECHO



Two complementary approaches:

- ★ *Bringing the data to the user:*
web portal, mirroring of the data – high bandwidth connection needed (e.g. Géant)
- ★ *Bringing the user to the data:*
cloud computing ('hosted computing') – upgrade of the Copernicus core ground segment needed

Sentinel Data Access



Full, free
and open
Access for
everybody



Copernicus Space Component
Data Access Portal

sentinels.copernicus.eu

Copernicus
Services
Access

Scientific / Other
Access Hub

Collaborative
Access Hub

International
Agreements
Access Hub

Next steps with Latin America:

- ★ *Preparation of workshop for users:*
exploring the use cases in Latin American countries for Copernicus
=> Need for institutions and contacts engaged in use of Earth observation data
- ★ *Access to Copernicus data:*
dedicated access via international hub on the basis of an Cooperation Arrangement with the EU

Interest in Copernicus cooperation – as of January 2015:

- Australia
- Brazil
- Chile
- Colombia
- South Africa
- United States

Chile

EU - Chile S&T Agreement signed - 2003

Document :

Letter of Intent on Cooperation on Copernicus between the Copernicus Programme of DG GROW and the Superintendence of Environment of the Government of the Republic of Chile

Signed in June 2015

Opportunities for cooperation:

- ★ Pilot project on using Copernicus data and services for raw materials/mining industry
- ★ Planned cable project between Brazil – Portugal to facilitate Earth Observation related data transfer to and from Latin America.
=> data dissemination for Latin America

Thank you for your attention!

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



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