European Commission

DG ENTR

COPERNICUS - GMES

European Commission

COPERNICUS Vision

- A source of information for policymakers, scientists, business and the public at large
- A European response to information needs to manage the environment, to understand and to mitigate the effects of climate change and to ensure civil security
- A user-driven programme of services for environment and security
- An integrated Earth Observation system combining space-based and in-situ data with Earth System Models and Services

COPERNICUS Overview

European Commission

USERS

Policy makers & **Public** & **Private, commercial**

Different Needs

Farming | Oil Spills | Air quality | Flood | Surveillance | Ice levels

Examples

Land | Marine | Atmosphere | Emergency | Security | Climate Change

Information Services

Space Infrastructure & **In-situ Infrastructure**

Sustainable information

OBSERVATIONS

Infrastructure

European Commission

In-situ component – Coordinated by EEA

- Observations mostly within national responsibility, with coordination at European level
- Air, Sea and Land-based systems and instruments

Space Infrastructure – Led by ESA

- Delegation Agreement with ESA
- Contributing Missions - Satellite missions built for purposes other than GMES but offering part of their capacity to GMES (EU/ESA MSs, EUMETSAT, commercial, international)
- SENTINEL - Satellite missions developed specifically for GMES

SENTINEL Missions

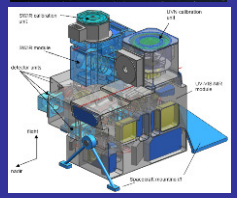
European Commission

Sentinel 1 – SAR imaging
All weather, day/night applications, interferometry
2014

Sentinel 2 – Multispectral imaging
Land applications: urban, forest, agriculture,..
Continuity of LANDSAT, SPOT, …
2014

Sentinel 3 – Ocean and global land monitoring : ocean color, vegetation, sea/land surface temperature, altimetry
2014

Sentinel 4 – Geostationary atmospheric
Atmospheric composition monitoring, trans-boundary pollution
2017



Sentinel 5 – Low-orbit atmospheric
Atmospheric composition monitoring
(S5 Precursor launch in 2014)
2014, 2019+

COPERNICUS Services

European Commission

Services monitoring Earth systems

Land

Marine

Atmosphere

Horizontal services

Emergency

Security

Climate Change

Major milestones

1998	**Initiation of GMES, Baveno Manifesto**
2001	**Gothenburg EU Summit, Heads of State and Government "to establish by 2008 an operational European capacity for GMES"**
2004	**EC Communication to EP and Council "GMES: Establishing a GMES capacity by 2008"** (Action Plan)
2005	**EC Communication "GMES : From concept to Reality"** (Priorities on initial services)
2006	**Establishment of GMES Bureau** (Fast track service delivery, governance, financial sustainability)
2007	**Space Policy Communication - GMES becomes the EO 'flagship' of the European Space Policy – EC-ESA framework agreement signed** (Space segment)
2008	**EC Communication "GMES, we care for a safer planet"** (Financing, infrastructure and management)
2009	**EC proposal for a GMES Programme Regulation** (Start of initial operations)
2010	**Adoption of GIO Regulation** (3 years)
2012	**GMES becomes COPERNICUS**
2014	**Adoption of COPERNICUS Regulation** (7 years) **& Launch of first Sentinels**

Political context

- Long political process (15 years) in parallel to service 'technical' definition process

- Necessity of a political 'positioning' of the initiative (for a long term sustainability)

- Key steps to move from a political initiative to an EU program

- Constant and official dialogue between EC and Member States (Several communications to the EP and the Council)

- Necessity to secure the Infrastructure -Space and In situ-, the Governance and the Financing strategy

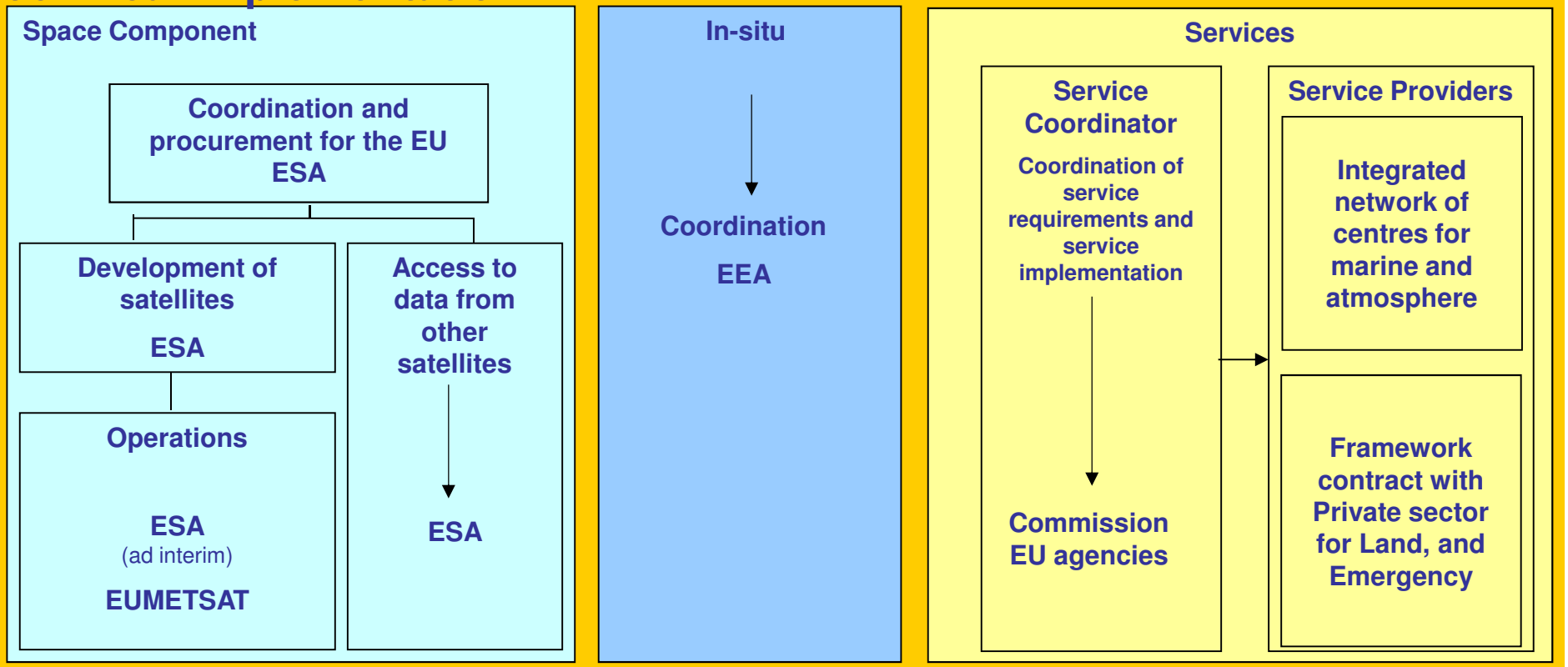
- Establishment of GMES Bureau to 'lead' the process at EC level

Governance

Political Coordination

European Commission
+
GMES Committee (MS), Programme Committee (DG's)
User Forum (MS)

Technical Implementation



Implementation

- GMES from 2010-2013, COPERNICUS from 2014-2020
- Land and Emergency Services implemented first, other services later
- Dialogue with User Community and Member States maintained through the quarterly GMES User Forum and the regular GMES Committees
- Operational activities supported by Research projects (FP7 and Horizon 2020)

	COPERNICUS	GMES and Africa
- Origin	Baveno, 1998	Maputo, 2006
- Background	JRC, FP projects, ESA, EUMETSAT …	AGRHYMET, SADC, RCMRD, CSE …
- EC Precursor	GEOLAND, SAFER MyOcean …	EAMNET, GARNET-E, PUMA, AMESD, MESA …
- Services	Services (6)	GMES & Africa Action Plan (8)
- Definition	Working Group	Thematic meetings (2012-13)
- Impl. Start	GIO Oct 2011	…
- Satellite Seg.	Contributing missions and SENTINEL	…
- In Situ Seg.	EEA Network	…
- MS Invol.	User Forum	…
- Data Policy	DIP	…
- Dissemination	On going	…
- Governance	On going	

Research support

		Land	Marine	Atmosphere	Emergency	Security	Cl. Change
FP7 Projects	*Core*	GEOLAND2	MYOCEAN* MYOCEAN2	MACC* MACCII	SAFER*	GMOSAIC*	
	Service Evolution / R&D	BIO_SOS MS.MONINA ISAC MYWATER SIRIUS GLOWASIS IMAGINES** LOTUS** GLASS** SenSyF**	MYWAVE OPEC OSS2015 SANGOMA	NORS	LAMPRE** IncREO** SENSUM** PREFER**	G-SEXTANT** G-NEXT** SAGRES** LOBOS** NEREIDIS DOLPHIN SIMITYS	EURO4M MONARCH-A CARBONES ReCOVER REDDAF
	Downstream applications	CRYOLAND FRESHMON EUFODOS	FIELD AC AQUAMAR ASIMUT COBIOS SeaU SIDARUS OPERR	PASODOBLE ENDORSE	EVOSS DORIS SubCOAST PANGEO GeoPICTURE*		
	Inter. Coop	WATPLAN MALAREO	EAMNET		GARNET-E *		REDDINESS REDD-Flame
GIO	*Operational Services*	Pan EU Land Global Land Local Land			EMS-Mapping EFAS		

* Finished
** Under negotiation

Africa Research support

WATPLAN : Water management (Mozambique, South Africa, Swaziland)

MALAREO : Use of EO for the Malaria monitoring (South Africa, Swaziland)

EAMNET : Linking EO information providers, users and centres of excellence in Europe and Africa in the coastal and marine area (Tanzania, Ghana, Egypt, South Africa)

GARNET-E : Development of 'GMES Emergency Response in Africa' agenda (Ethiopia, Morocco, Kenya, South Africa, Cape Verde, Nigeria)

REDDINESS : Strengthening the national forest monitoring centres for the REDD+ mechanism (Gabon, Congo)

REDD-Flame : Logging Assessment & Forest Monitoring demonstrations using high-resolution radar data (Mozambique)

COPERNICUS support

Products from GMES Land – Global component

- Ten-daily biophysical parameters (1 Km - 300 m resolution) available on NRT and covering Africa
- E.g. Top of Canopy Reflectance, NDVI, LAI, Albedo, Land Surface Temperature, DMP, Burnt area, Soil Moisture, Water Bodies …
- Applications : crop monitoring, drought assessment, water management …

Products from GMES Emergency : rush mode and reference mapping

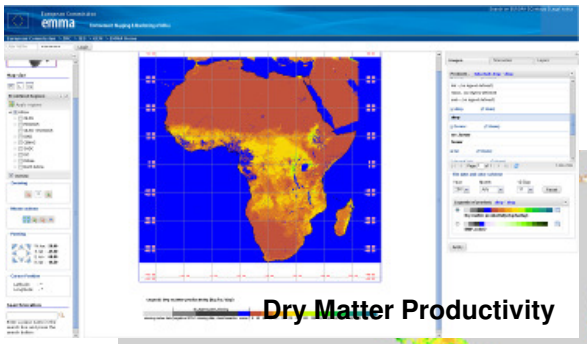
Products from GMES Marine (MyOcean) and Atmosphere (MACC)

Satellite data from SENTINEL system post 2013, mainly S1 (RADAR), S2 (Optical HR) and S3 (Optical MR)

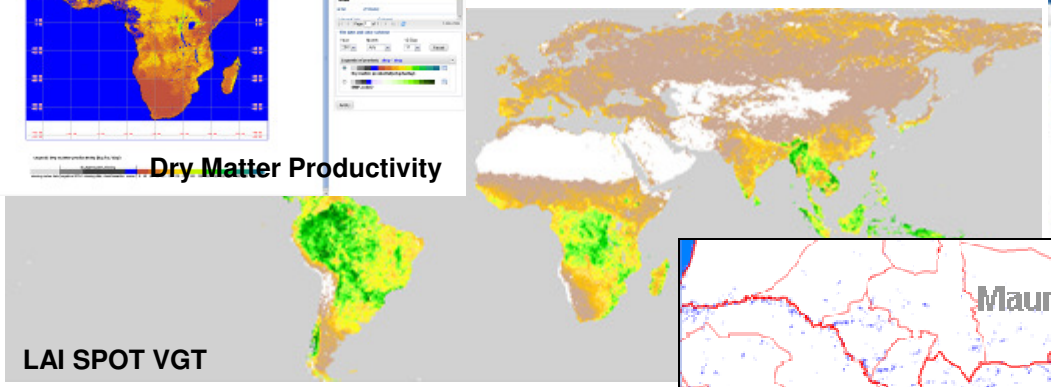
Copernicus Land Products - Examples

European Commission

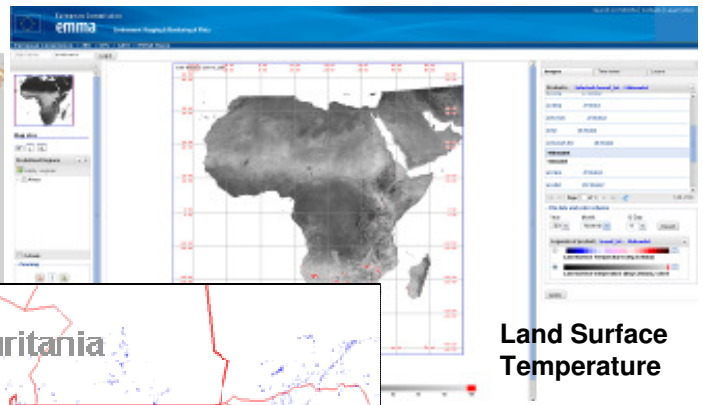
Product	NRT / Off-line	Spatial Resolution	Spatial coverage	Temporal Resolution	Sensor (back-up)
LAI, fCover, fAPAR, DMP, NDVI, Phenology	NRT	1 km	Global	10-days	VGT (MODIS)
Time series of vegetation products	Off-line	4 km	Global	10-days	AVHRR + VGT
Burnt areas + seasonality	NRT	1 km	Global	Daily	VGT
MERIS FR biophysical products	NRT	300 m	Europe	10-days	MERIS
HR biophysical products	Off-line	10 m	Pilot Areas	4 times/year	SPOT/ RapidEye



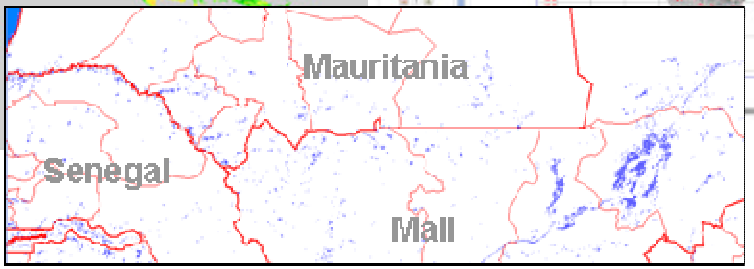
Dry Matter Productivity



LAI SPOT VGT



Land Surface Temperature



Small Water Bodies

FP7 Geoland2

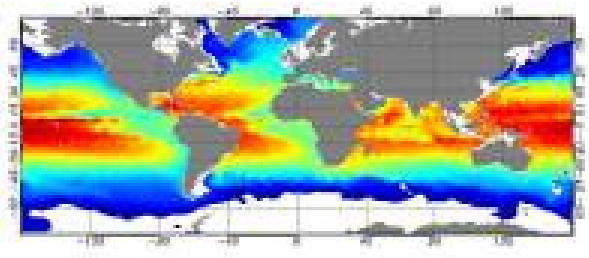
Copernicus Marine Products - Examples

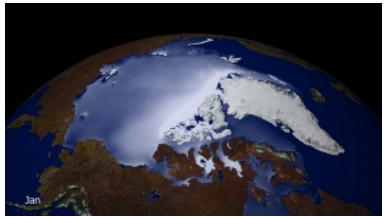
European Commission

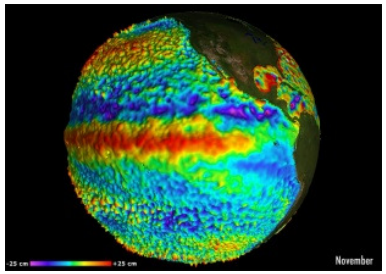
Objective: To provide information on the state of physical ocean and marine ecosystems for the global ocean and the European regional areas.

Monitoring and forecast, plus re-analysis of past years on

- **Currents**
- **Temperature**
- **Salinity**
- **Sea ice**
- **Sea level**
- **Surface winds**
- **Biogeochemistry**







Copernicus Atmosphere Products - Examples

GMES regulation:

… air quality, atmospheric chemistry and composition

… essential element for climate change monitoring and the future provision of ECVs …

… on a regular basis and at regional and global levels…

NRT analysis and forecast, re-analysis of past years

- **Air Quality for Europe**
  O3, NO, NO2, CO, SO2, PM10, PM2.5
- **Global Atmospheric composition**
  Greenhouse gases, reactive gases, aerosol, stratospheric O3
- **Climate Forcing**
  CO2, CH4, monitoring and reanalysis of fluxes
- **Solar Energy, UV**
  Ozone records, ultraviolet radiation

Data Policy

- GMES: a public good. The goal is to provide free and open access to data and information with minimum restrictions

- Need to distinguish between data policy for Sentinel satellite, Contributing missions, and Copernicus service products

- Security restrictions may apply

Conclusions

- COPERNICUS can support African institutions
- GMES-COPERNICUS Data Policy is defined to make satellite data and GMES Service products available to African partners without restriction
- EU and COPERNICUS are fully supporting the “GMES and Africa” initiative




Pictures BIOPAMA / DG DEVCO – DG JRC

European Commission

Thank you for your attention

Michel.massart@ec.europa.eu