



## geoland - Overview

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- ❑ **FP-6 Aeronautics&Space Integrated Project - GMES addressing 'Land Cover & Vegetation'**
- ❑ **Complementing on-going activities**
- ❑ **Co-funded by European Commission, 6th Framework Programme**
- ❑ **Resources**
  - 20 M€ budget, 10 M€ EC-contribution
  - 165 Person-years
- ❑ **Partnership**
  - 46 user organisations
  - 56 consortium members
- ❑ **Duration: 3 years**

## GMES priorities addressed by geoland

- ❑ A- Land Cover Change in Europe
- ❑ B- Environmental Stress in Europe
- ❑ C- Global Vegetation Monitoring

### Policies / Directives / Conventions

Habitats  
ESDP, ESPON

Natura 2000  
Wetland Directive

Water Framework  
Directive

Soil Thematic Strategy

Sustainable Developm.  
Fight against Poverty

Global Change  
Kyoto

Global Environment  
Protection



### Service Portfolio

#### Core Services

- upstream exploitation of synergies
- 

#### Observatories

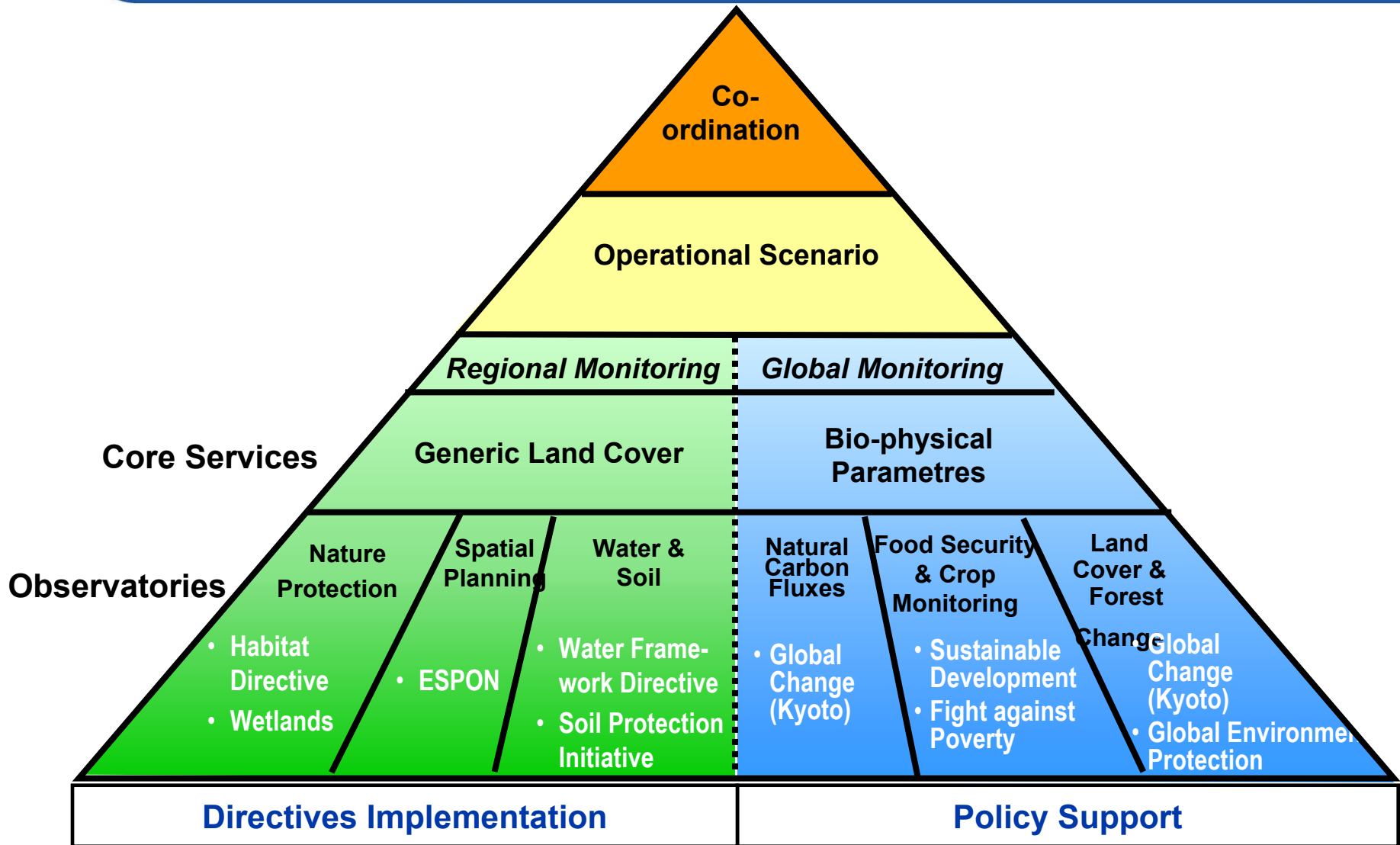
- downstream customization

## Ambition

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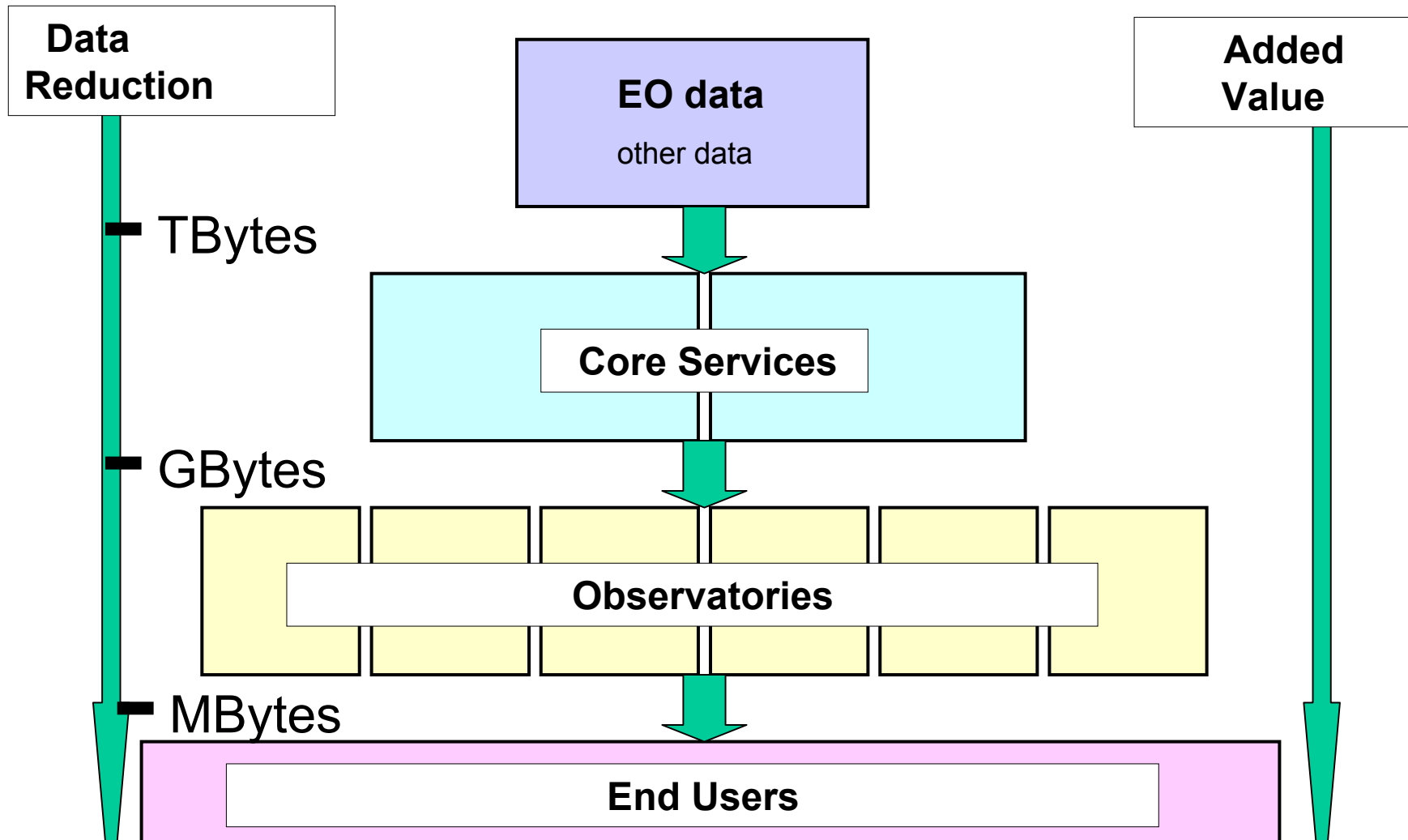
- ❑ **geoland aims at a comprehensive coverage of land cover & vegetation related GMES issues**
  
- ❑ **geoland wants to**
  - integrate existing heritage & link to other related GMES activities
  - develop & demonstrate pre-operational services on Europe areas and for larger international test-areas
  - develop a vision for an operational service infrastructure

# Core Services & Observatories

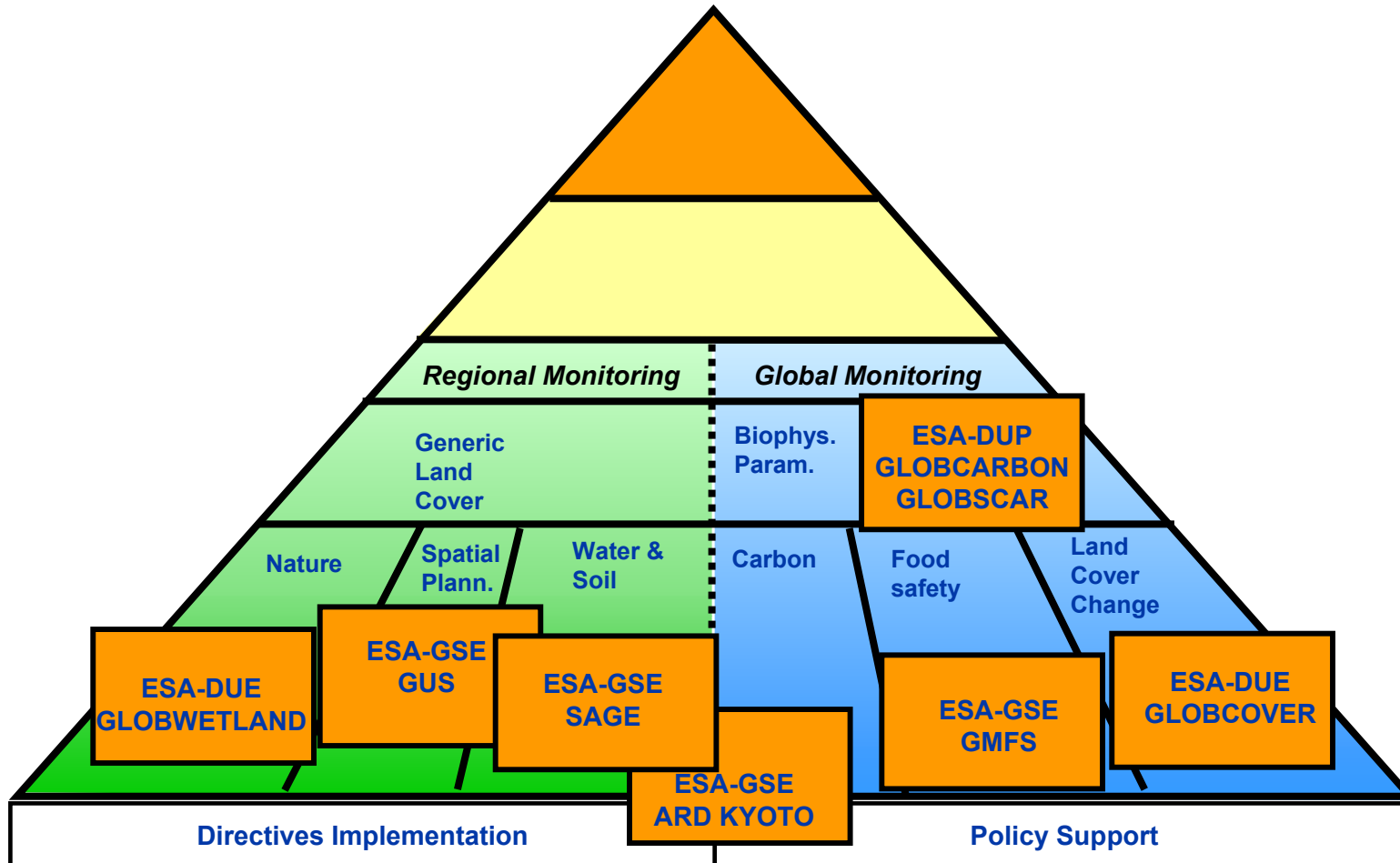




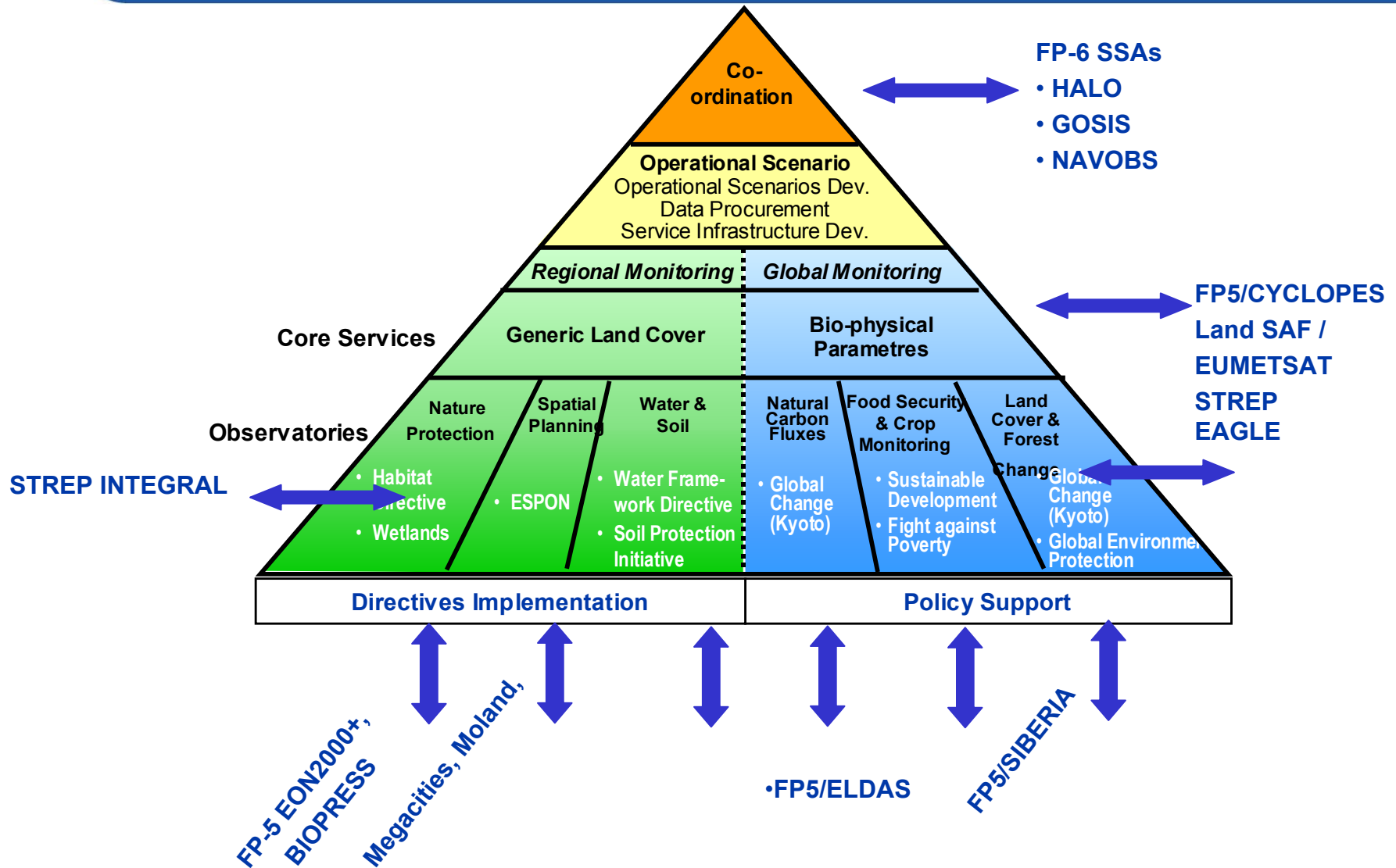
# Information chain



# FP-6 IP geoland: Specific Links to ESA Activities



# FP-6 IP geoland: Links to other Activities





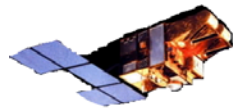


# Operational Scenario: GMES Infrastructure



## VHR

- 0.5 – 2.5 m
- Urban Coverage
- Optical (VIS, NIR)
- SAR (multi-pol., X-Band)



## HR

- 10 – 30 m
- National/Regional
- Optical (VIS, NIR, SWIR, TIR)
- *Hyperspectral??*
- SAR (multi-pol., L-Band, P-Band)



## MR

- 100 – 500 m
- Continental
- Optical
- SAR ?

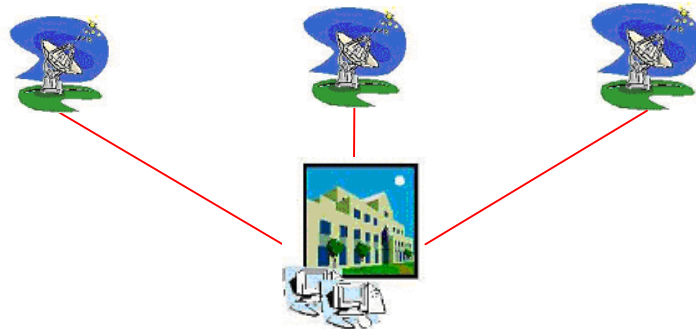


## LR

- 1 km – 2.5 km
- Continental, Global
- Optical
- Passive Microwave
- Active Microwave

**Sustainable availability of standard sensor series**

Space Segment



**Co-ordinated multi-sensor tasking to optimise use of limited space resources**

Ground Segment

**SDI Interface (network of databases/catalogues)**

**Core Services**

**Observatory Networks**

(Ordering Interface, Dissemination)

**Up-stream exploitation of Synergies (Core Services)**

**Down-stream customisation (Observatories)**

Service S.

# Consortium Members

46

Users

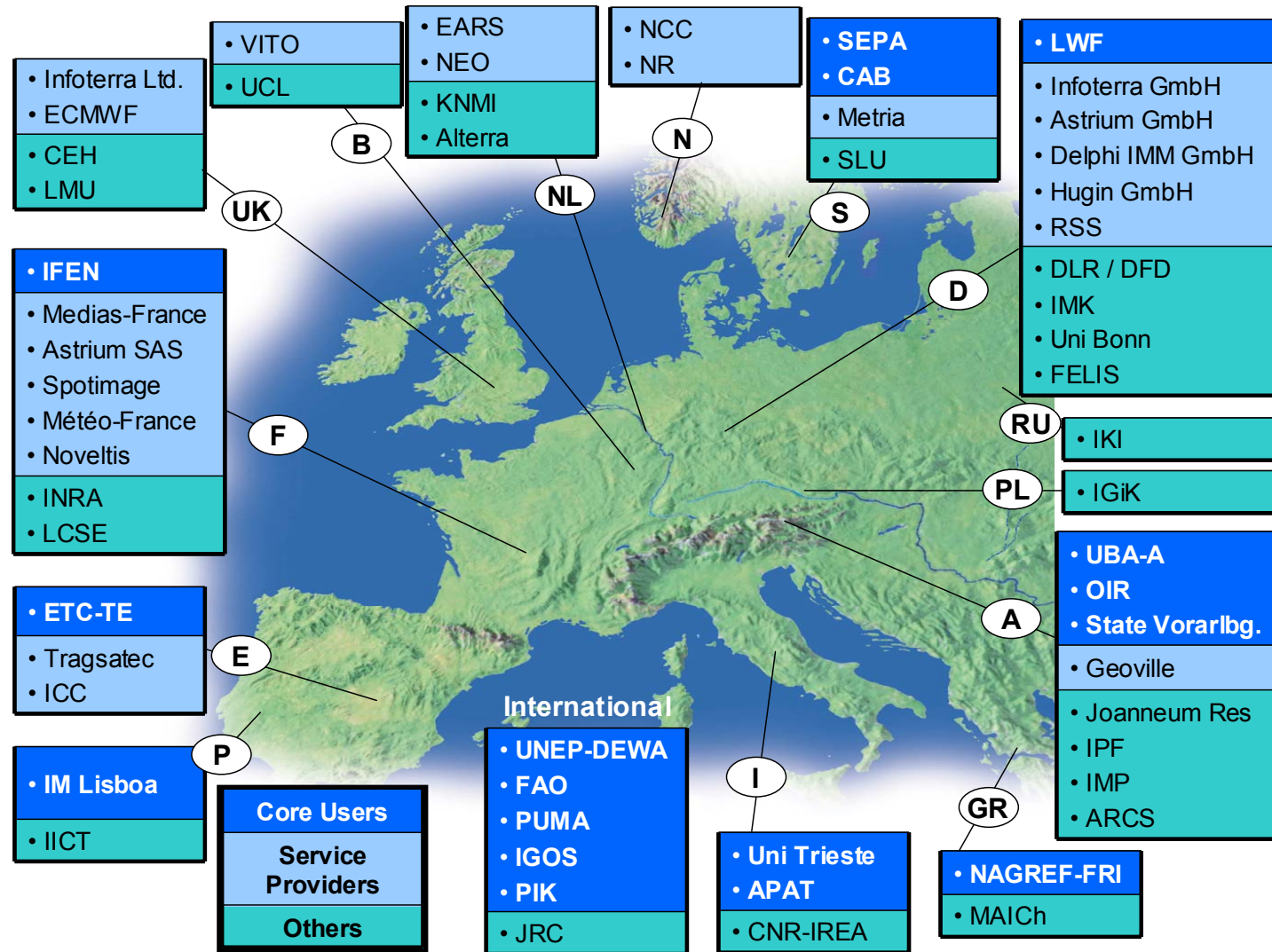
(18 consortium members, 28 letters of commitment)

56

Consortium Members

15

Nations



## Regional Observatories & Core Service

### ❑ Core Service Land Cover (CSL)

- *Products* : Nested range of local, national, continental land cover products
- *Users* : Regional observatories + additional regional & national agencies

### ❑ Observatory Nature Protection (ONP)

- *Goal* : Operationalisation of EO data for habitat monitoring and nature conservation
- *Products* : Change indicators in protected areas (mountains, protected forests, wetlands)
- *Users* : National agencies, national parks administrators

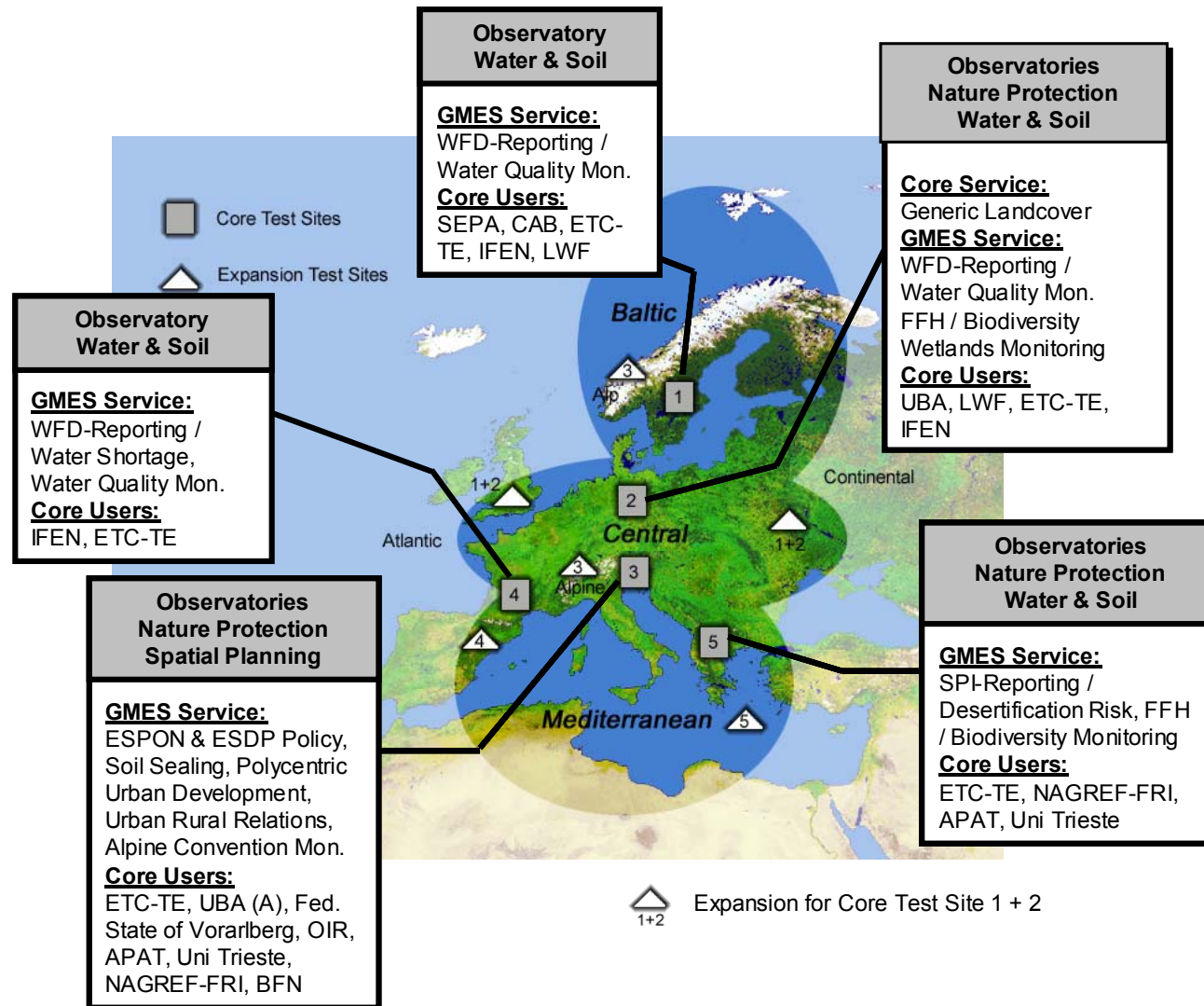
### ❑ Observatory Water & Soil (OWS)

- *Water products*: Water quality assessment
  - water pollution maps, irrigation volume maps, nutrient leakage maps
- *Soil Products* : Erosion & pollution risks
- *Users* : National & local environmental agencies, agriculture agencies

### ❑ Observatory Spatial Planning (OSP)

- *Goal* : Urban & regional planning tools and dynamic models (policy impact scenarios)
- *Products* : spatial planning indicators, urban growth, landscape transformation scenarios
- *Users* : National & local governments, ESPON Coord. Unit, DG Regio

# European Test-Sites



## Global Observatories & Core Service

### ❑ Core Service Bio-Physical Parametres (CSP)

- *Products* : Biogeophysical parameters : leaf area index, albedo, fires, soil moisture, temperature, precipitation, evapotranspiration, downwelling radiation
- *Users* : Global Observatories + International Science community

### ❑ Observatory Natural Carbon Fluxes (ONC)

- *Goal* : Global assimilation of remote sensing for monitoring water & carbon fluxes on land
- *Products* : CO<sub>2</sub> & water flux, biomass, carbon storage, leaf area index
- *Users* : Int'l organisations in charge of assessing the Carbon Balance and consulting political decision makers (IGBP, IGOS-P, PIK, GCP)

### ❑ Observatory Food Security & Crop Monitoring (OFM)

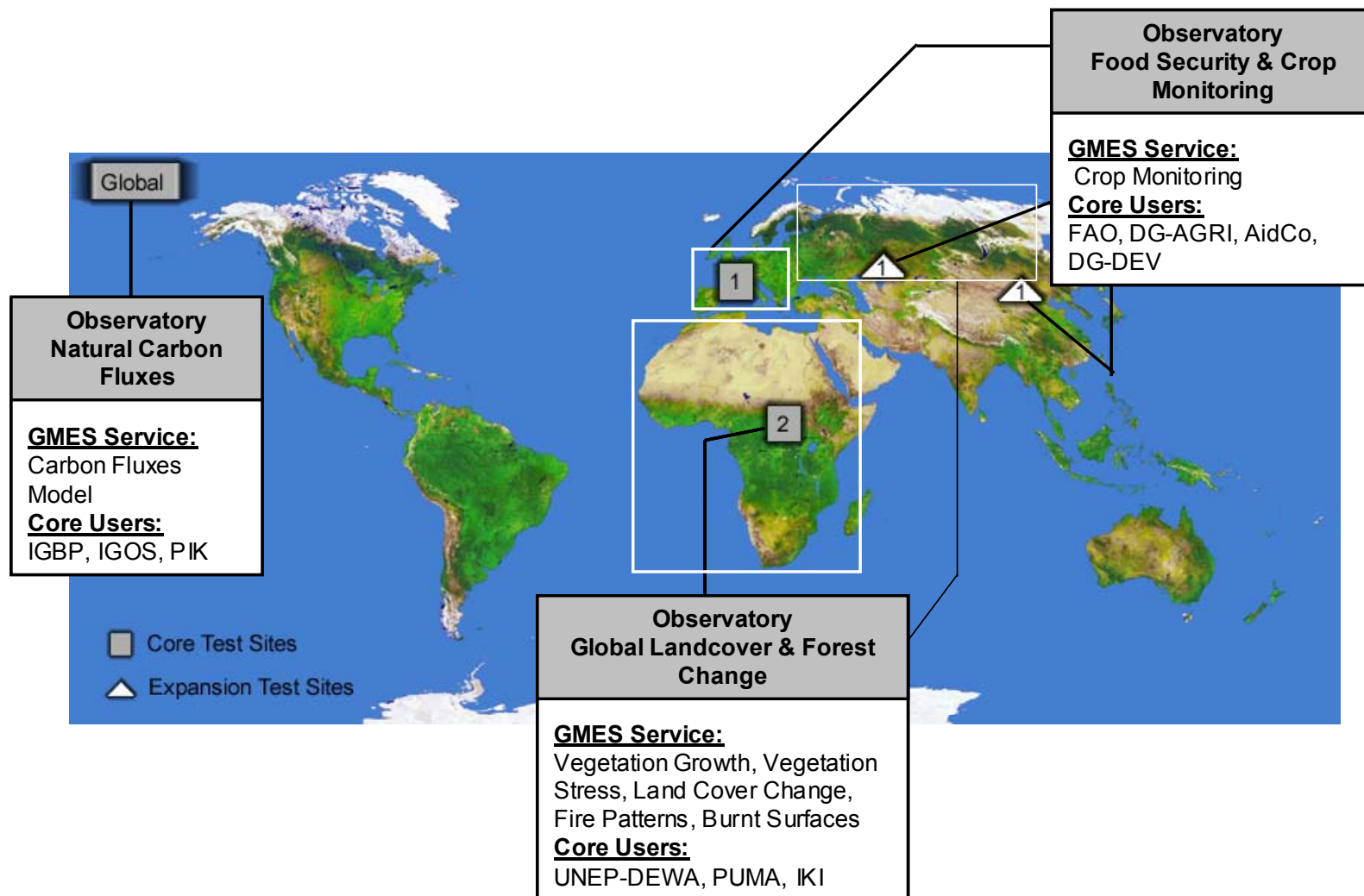
- *Goal* : Input to Food Security Services and trade policies
- *Products* : Crop Production Assessment for Europe, Central Asia, China
- *Users* : FAO, DG Agri, DG Aid Co

### ❑ Observatory Land Cover & Forest Change (OLF)

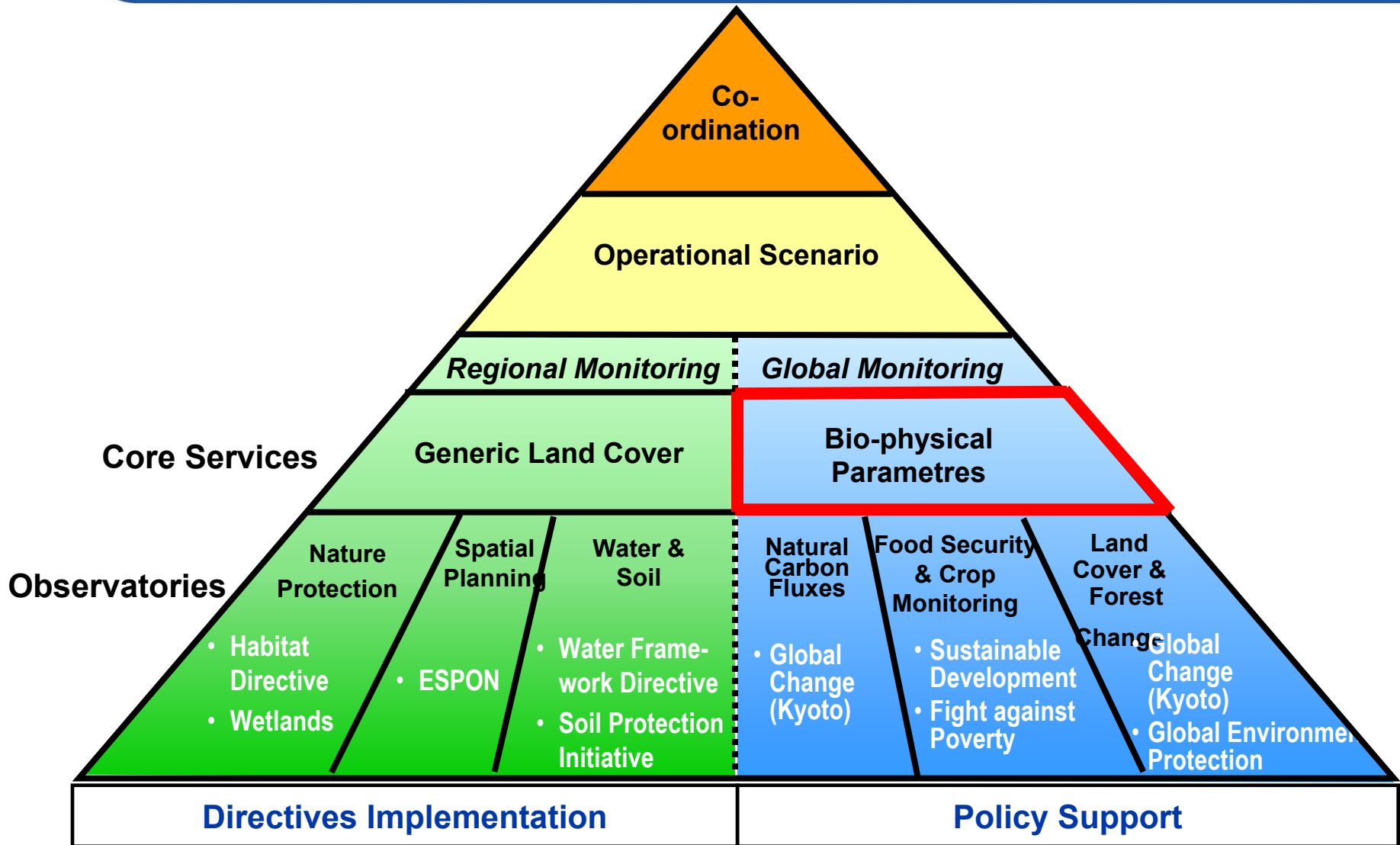
- *Products* : decadal-seasonal Indicators for change and degradation of land cover & forests
- *Users* : International partners of the EU that implement their own environmental monitoring system (FAO, UNEP)
- *Additional Users* : decision makers for services with responsibilities in policy orientation, project management and environmental reporting in the regions covered by the observatory (DG Aid Co, PUMA, IKI)



# Test areas



# The Biogeophysical Parameter Core Service (CSP)



## CSP Objectives

- To set up a network visible at European level to serve the future GMES services in biogeophysical parameters
  - To demonstrate pre-operational capabilities of production of a series of biogeophysical parameters
    - **vegetation**
      - LAI, fAPAR, fCover, burnt areas
    - **radiative budget**
      - temperature, albedo, shortwave & longwave flux
    - **hydrology**
      - soil moisture, water bodies, precipitation
- for :
- **global observatories**
  - **international science community**
- To define & propose an operational scenario for the future

## Service Portfolio (1/2)

Products	2004				2005				2006				Time Res.	Space Res.	Sensor	Users
	3	6	9	12	3	6	9	12	3	6	9	12				
LAI, fAPAR, fCover	GLOBAL, 2002 - 2003												10 days	1 km	VGT	ONC OLF OEM
	GLOBAL, 1998 - 2003															
Surface Albedo	GLOBAL, 2002 - 2003												10 days	1 km	VGT	ONC
	GLOBAL, 1998 - 2003															
	EUROPE + AFRICA, 1993 - 2003												1 day to 1 year	5 km sub- satellite	Meteosat	
	ASIA, 1999 - 2003															
Surface Reflectance	AFRICA + Boreal EURASIA, 2002-2003												3 months	1 km	VGT	OLF
	AFRICA + Boreal EURASIA, 1998 - 2003															
Short Wave radiation	EUROPE + AFRICA 3 months 2000												4 to 10 times per day	50 km	Meteosat + GMS	ONC OEM
	GLOBAL, whole 2000															
	EUROPE + AFRICA, 1993 - 2003												10 days	5 km sub- satellite	Meteosat	
	ASIA, 1999 - 2003															
Long Wave radiation	EUROPE + AFRICA, 2000												4 times per day	50 km	Meteosat + AVHRR	ONC OEM
	EUROPE + AFRICA, 1997 - 2003															
	EUROPE + AFRICA, 1993 - 2003												10 days	5 km sub- satellite	Meteosat	
	ASIA, 1999 - 2003															

\* The date of delivery is indicated by the left border of the coloured cell.

## Service Portfolio (2/2)

Products	2004				2005				2006				Time Res.	Space Res.	Sensor	Users
	3	6	9	12	3	6	9	12	3	6	9	12				
Surface Temperature													1/2 hour	10 km	Meteosat (IR)	ONC OLF OEM
													10 days			
													1 month			
													daily	5 km	Meteosat	
Soil Moisture													7-10 days	50 km (grid-25 km)	ERS	ONC OEM
													1 month			
													1 week	100 km	AMSR	
Precipitation													1 day	1°	Multi-sensor	OEM
													1 day to 1 year	5 km sub-satellite	Meteosat	
Evapotranspiration													10 days	5 km sub-satellite	Meteosat	OEM OLF
Burnt Areas													1 month	1 km	VGT ATSR AATSR MERIS	OLF
Water Bodies													10 days	1 km	VGT	OLF

\* The date of delivery is indicated by the left border of the coloured cell.

## Product status

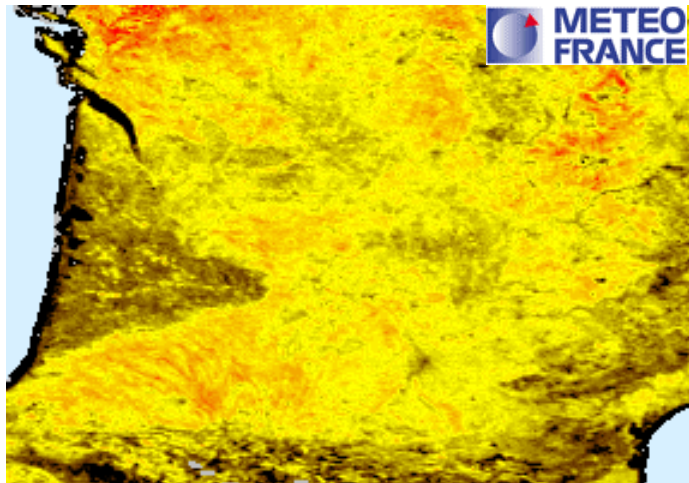
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- ❑ All CSP products existed already at some stage of development at the beginning of geoland
  
- ❑ However, methodological improvements have been undertaken within geoland
  - Novel methods developed for
    - shortwave radiation
    - temperature
    - soil moisture (passive)
    - precipitation
  
  - For all product lines, strong emphasis on customization



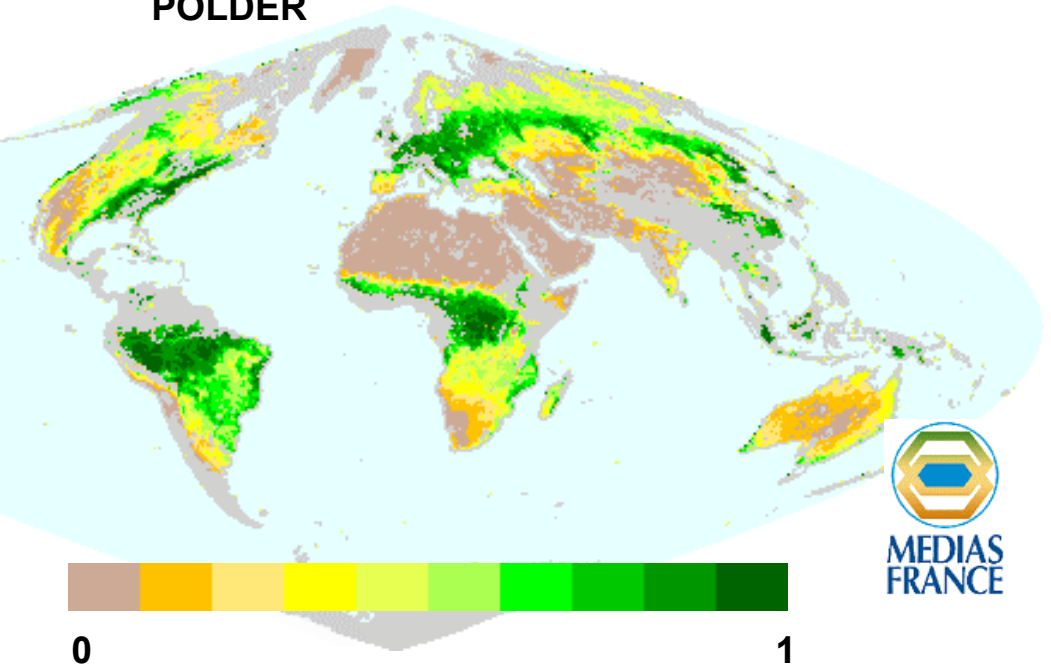
# Vegetation & albedo

geoland added value :  
integration, customization

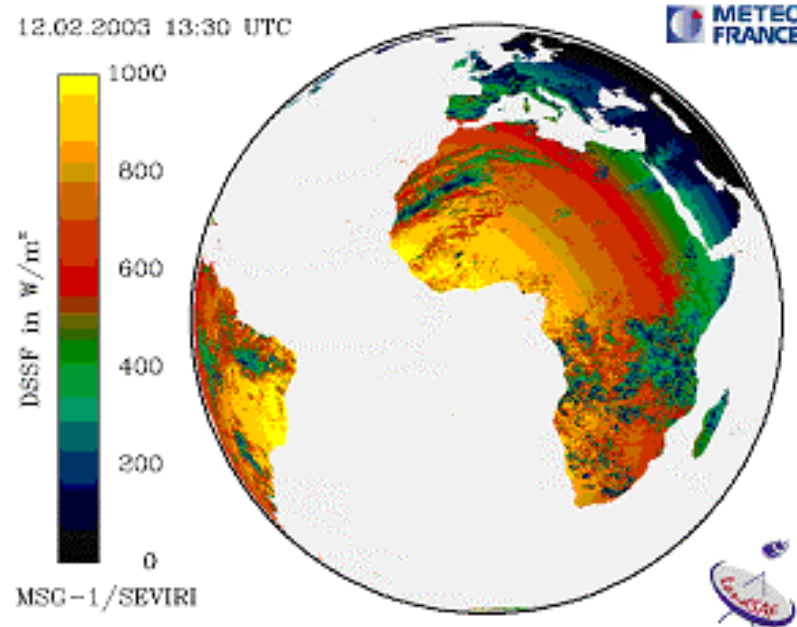


Albedo, 13 August 2000, VEGETATION

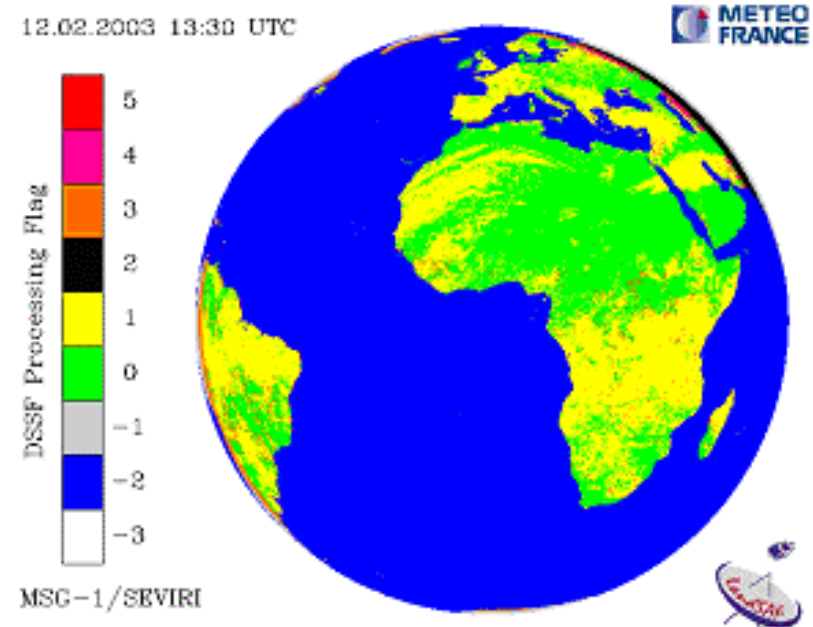
Fraction of Vegetation Cover, 15 June 1997, POLDER



# Shortwave Radiation



Shortwave Radiation (W/m<sup>2</sup>)

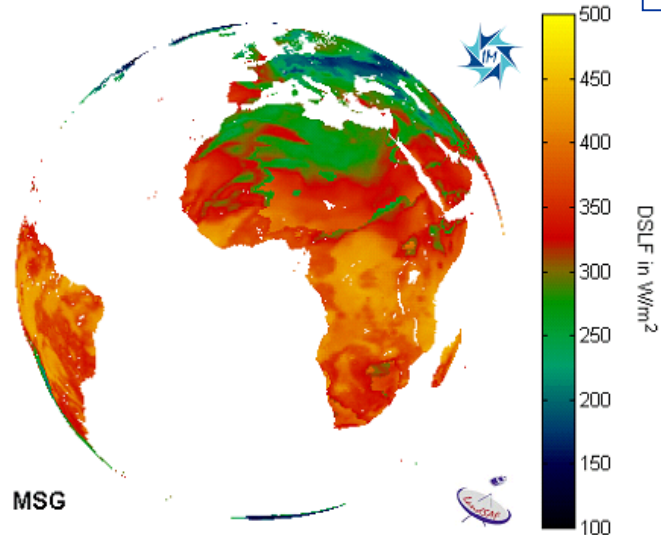


Quality Assurance flag

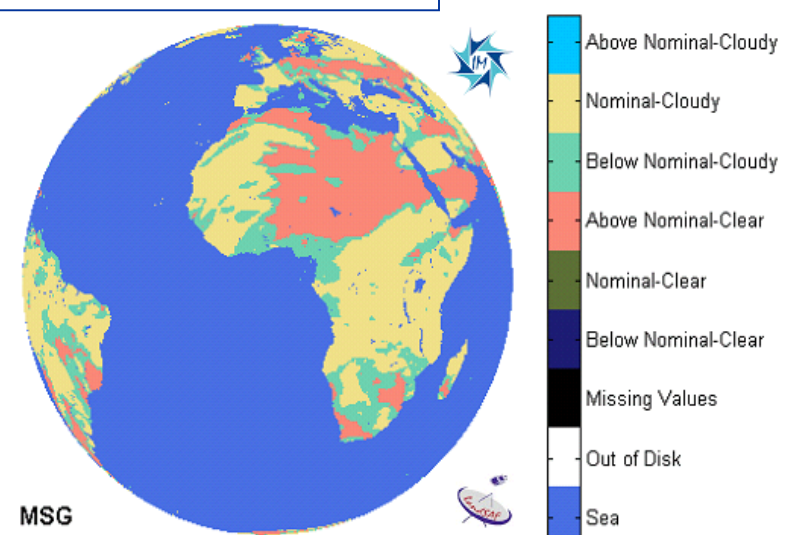
**geoland added value : global fields through merging of polar & geostationary satellites**

# Longwave Radiation

geoland added value :  
customization



(a)

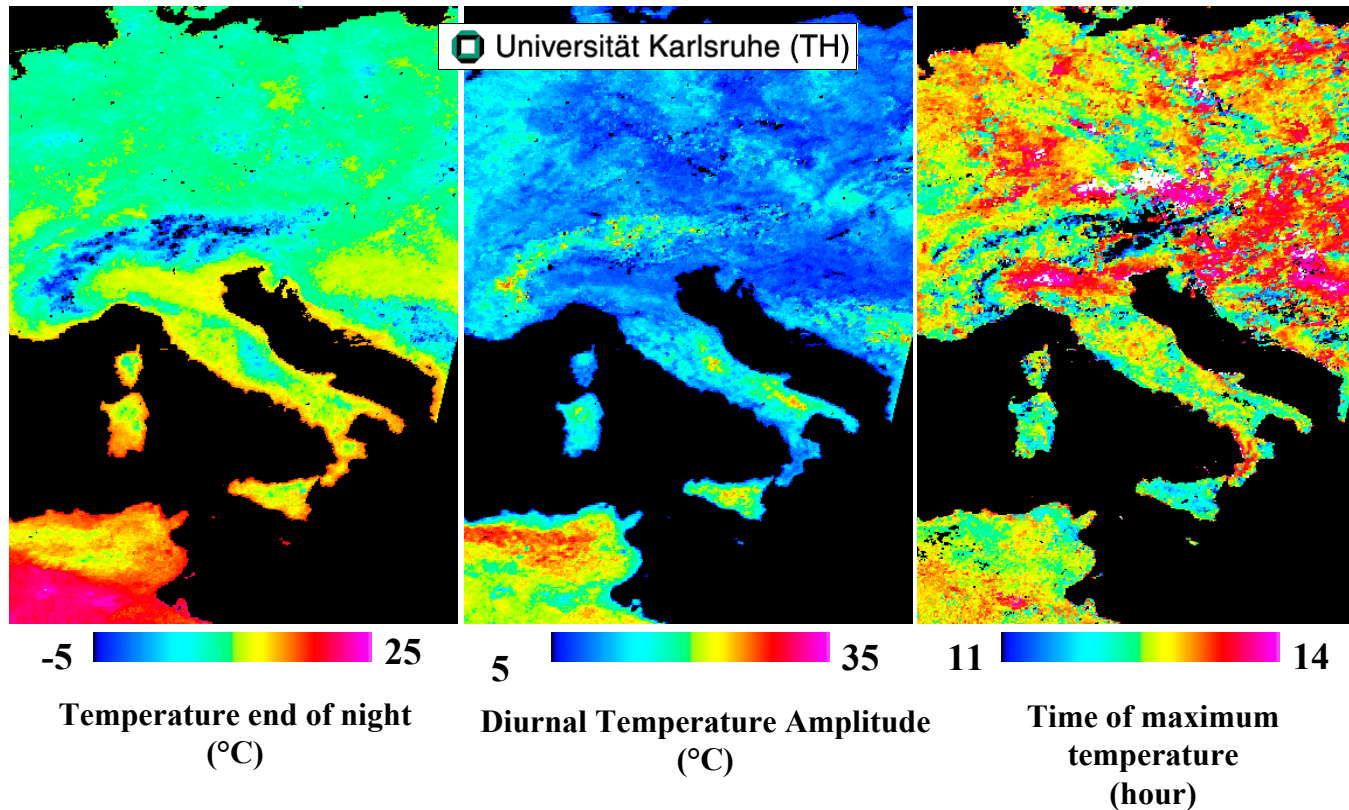


(b)

Example of LSA SAF DSLF output product for MSG full disk 12.02.2003 - 12 UTC: (a) DSLF ( $W m^{-2}$ ); (b) QC information.

# Surface Temperature

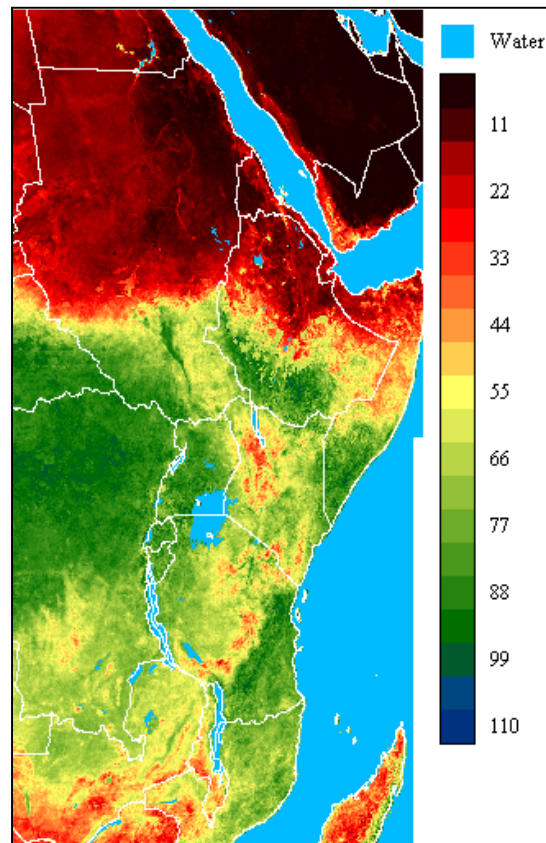
Land Surface Temperature indicators, representatives of August 1996, METEOSAT



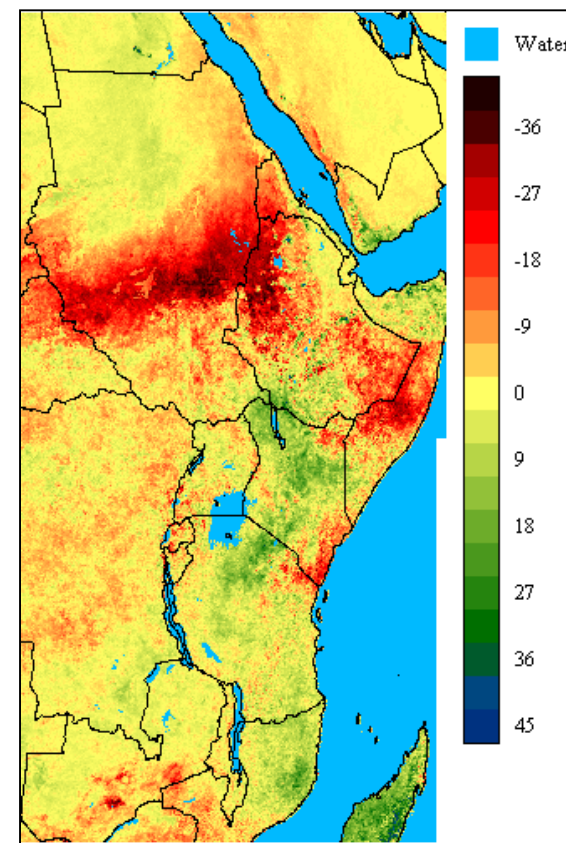
**geoland added value : novel approach to adapt to space & time constraints of users**



# Evapotranspiration



**Relative evapotranspiration (%)**  
**May 2002**



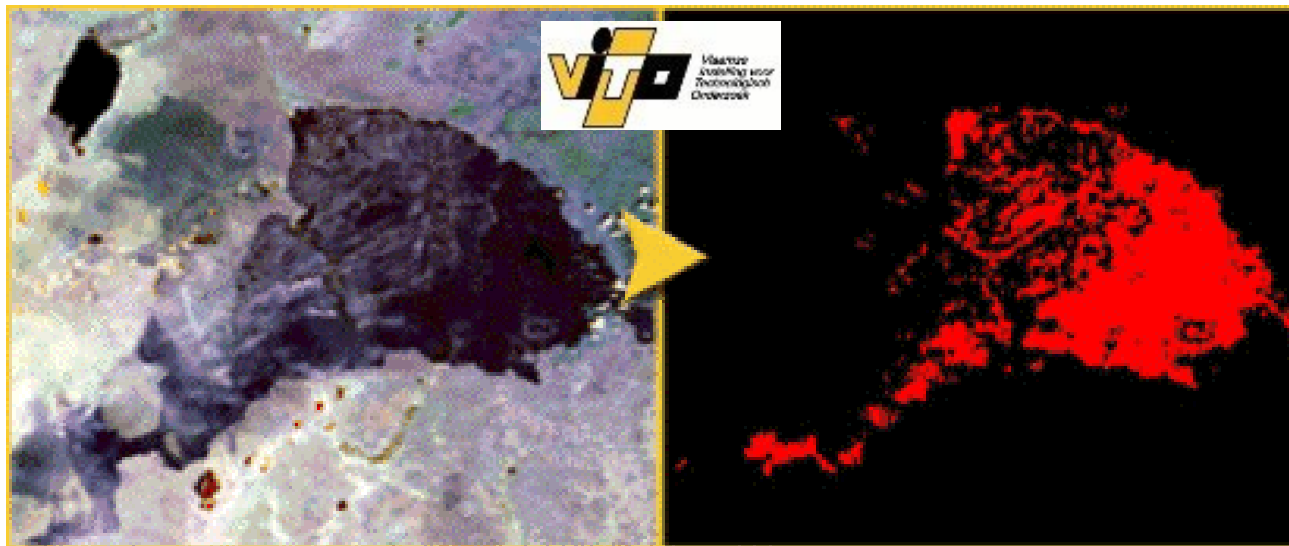
**Difference with 5yr average (%)**



Relative evapotranspiration is the ratio evapotranspiration / net radiation

## Fires

geoland added value : improve  
space & time resolution

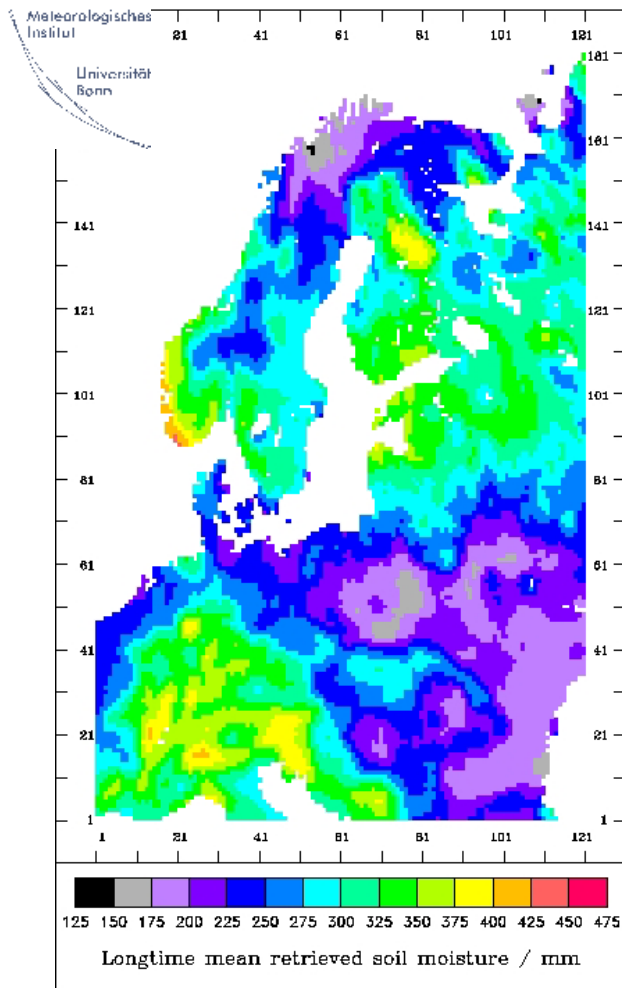


**Burned areas**

**Burns scars detected in Mongolia on 11/5/2000, left: ATSR image (RED, NIR, SWIR) and right: burn scar map**

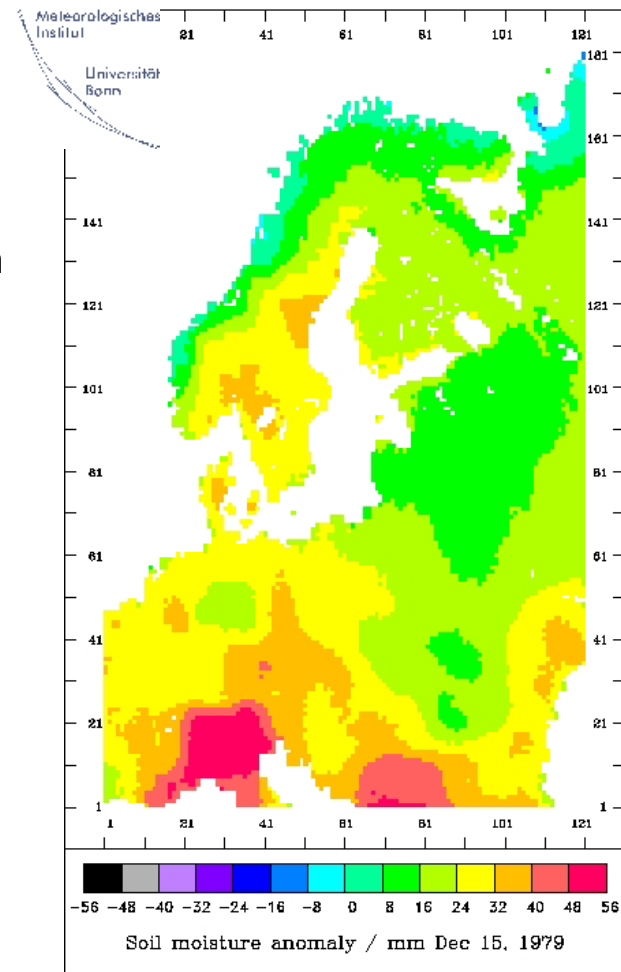


# Soil Moisture (1/2)



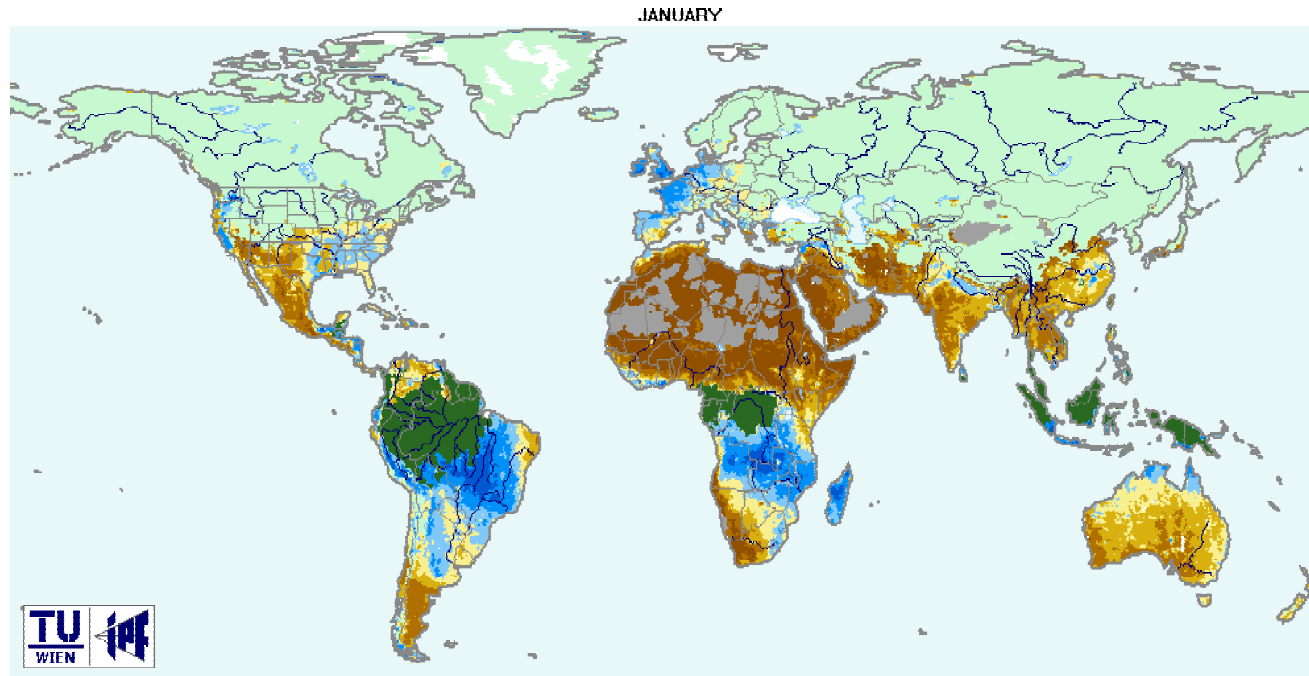
Left. Longterm mean soil moisture as derived from SMMR (1978 –1987)

Right. Anomaly for a particular day



geoland added value : novel approach for soil moisture

## Soil Moisture (2/2)

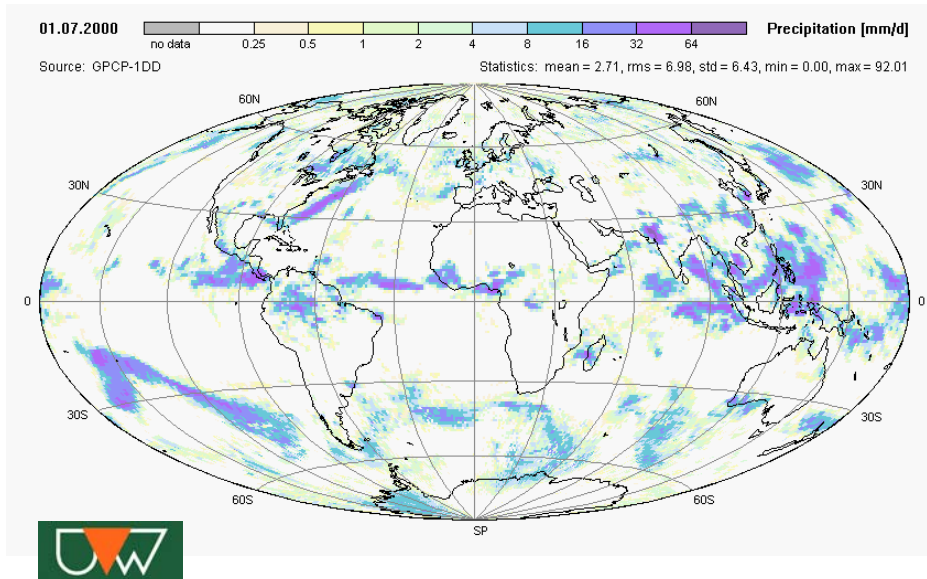


**Global monthly Soil Water Index derived from  
ERS / Scatterometer (1992-2000)**

**geoland added value :  
intercomparison, customization**

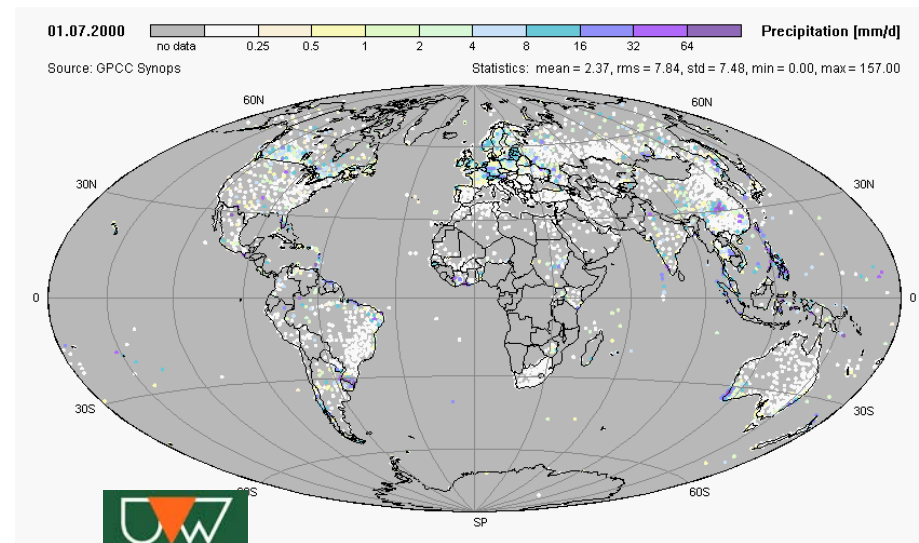
# Precipitation

geoland added value : merge multisatellite product with data from rain gauge network



left. GPCP-1DD multi-satellite estimates of precipitation (mm) for July 01, 2000.

right. GPCP bias corrected rain gauge measurements (mm) from about 6000 synoptic stations, July 01, 2000.



## CSP Operational scenario considerations

### □ The Eumetsat / SAF model seems adequate

- operational time series of satellite data over the long term
- established networks Research & Service Providers

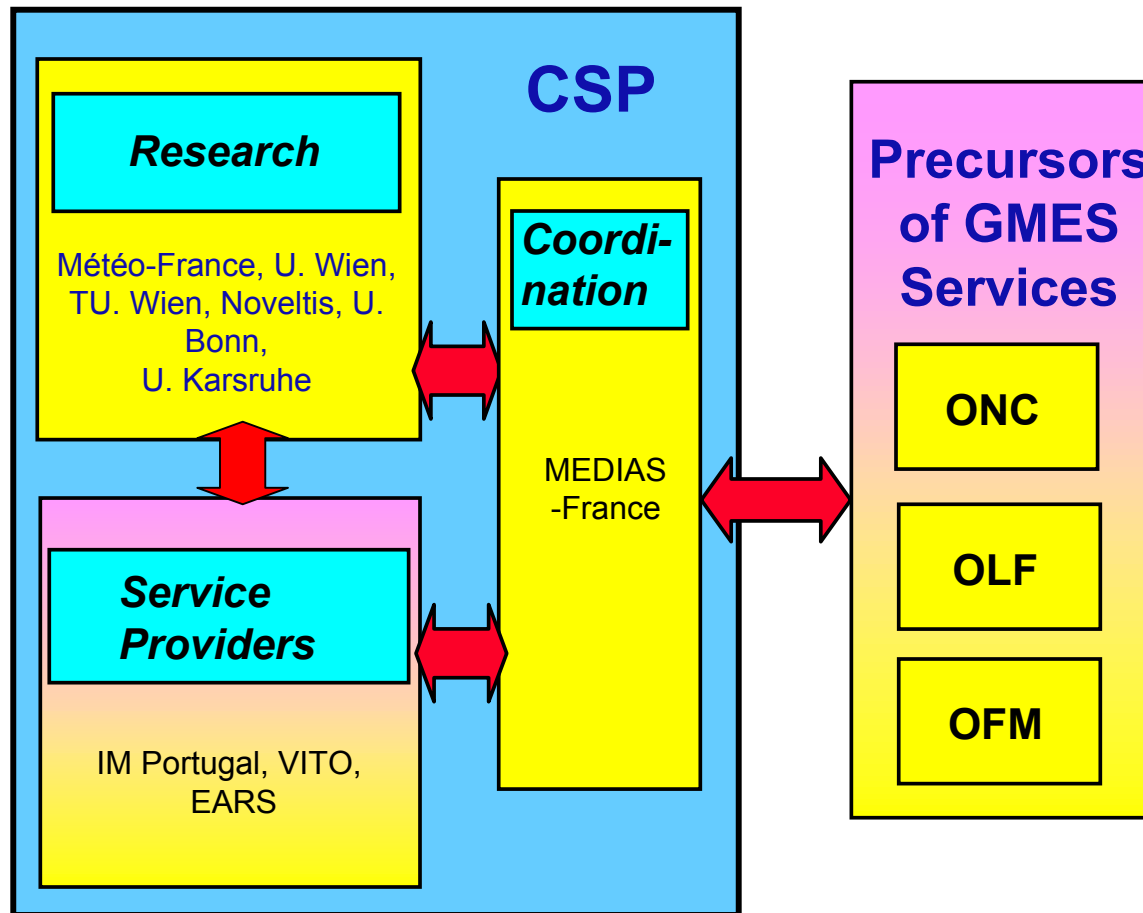
### □ Land SAF

- products adapted to real time operational meteorology needs
- centered on the operational application of meteorological sensors : MSG, EPS

### □ CSP

- products adapted to GMES Services needs
  - Food safety
  - Carbon flux
  - Land & Forest degradation
- emphasis on differed time products (i.e. historical series)
- multisensor character

# CSP Preoperational organisation



## Role of Coordination

- define Service Portfolio
- synthesize needs
  - customization of existing products
  - design of new products
- coordinate with R&D network
- list product catalog
- coordinates quality assessment
- provide access to products through Web interface