



EUROPEAN
COMMISSION

GMES Bureau

Recent progress on Global Monitoring for Environment and Security and its Atmosphere Service

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European Environment Agency





GMES - Why?

- Citizens' expectations
- New environmental pressures
- New approaches to regulation
- Global issues and international commitments
- Changing technologies



GMES – where?

IN A BROAD FRAMEWORK

- Access to information (Aarhus, INSPIRE...)
- Identification of priority information needs
- Streamlining of information requirements
- Organisational development
- Technical solutions (including GMES)



GMES - what?

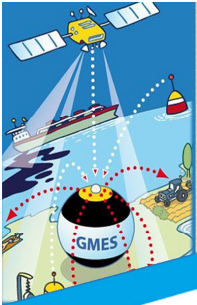
- A European capacity providing *information services* using Earth observation techniques
 - To serve **European policies**: environment, agriculture, climate...
 - To meet **international commitments**: protocols and conventions
 - To support **sustainable development**
 - To support **national** or **regional** implementation
 - To **stimulate market** development



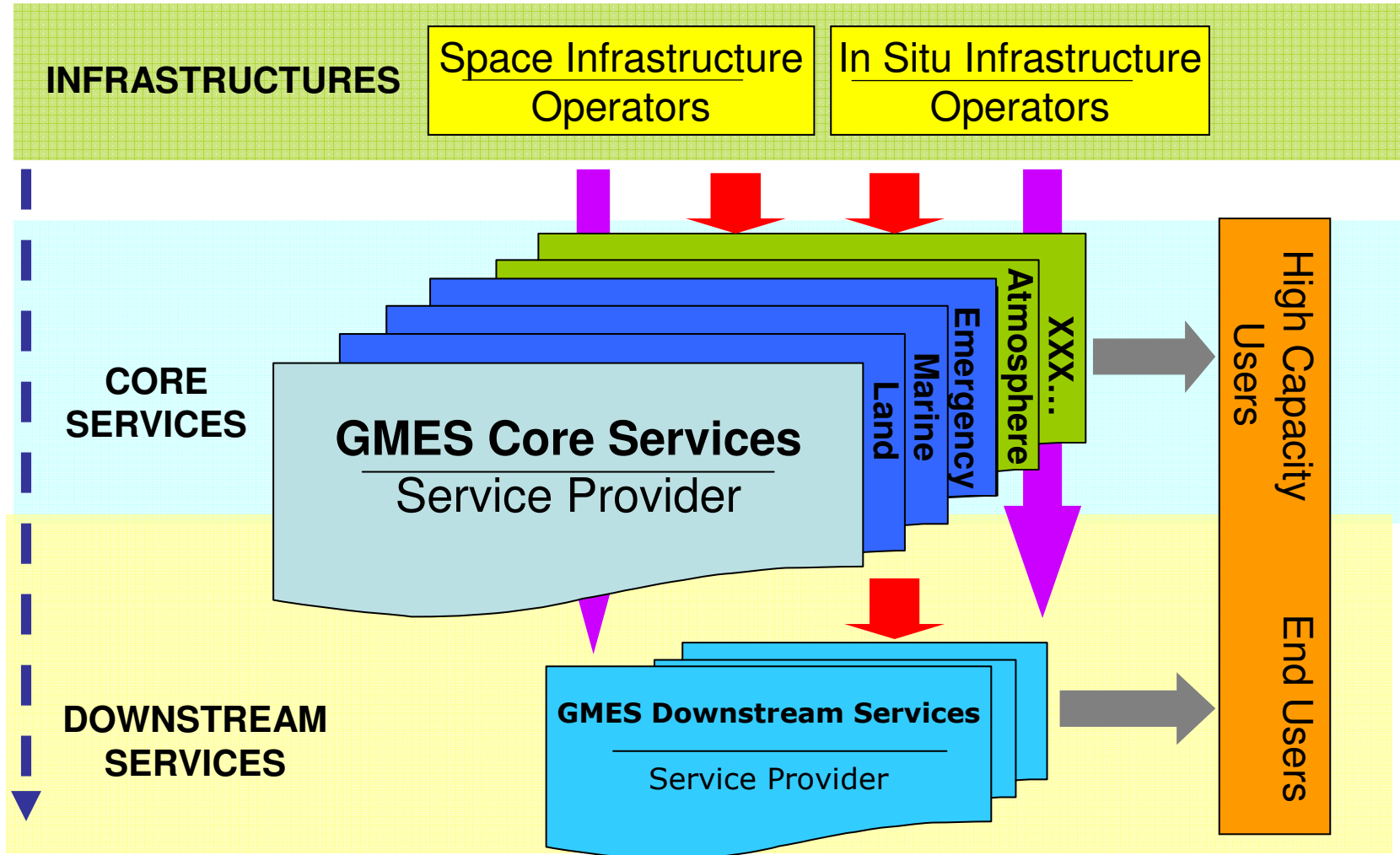
GMES - how?

PRINCIPLES

- GMES is based on **user's needs**
 - Overall information chain: **from observations to information** requested by the users
- GMES is based on an **integrated system approach**
 - **System of systems**: integrating existing assets
- GMES is **Global** and has a service area
 - Within **Europe**
 - **World-wide**



Architecture





OBSERVATION INFRASTRUCTURE

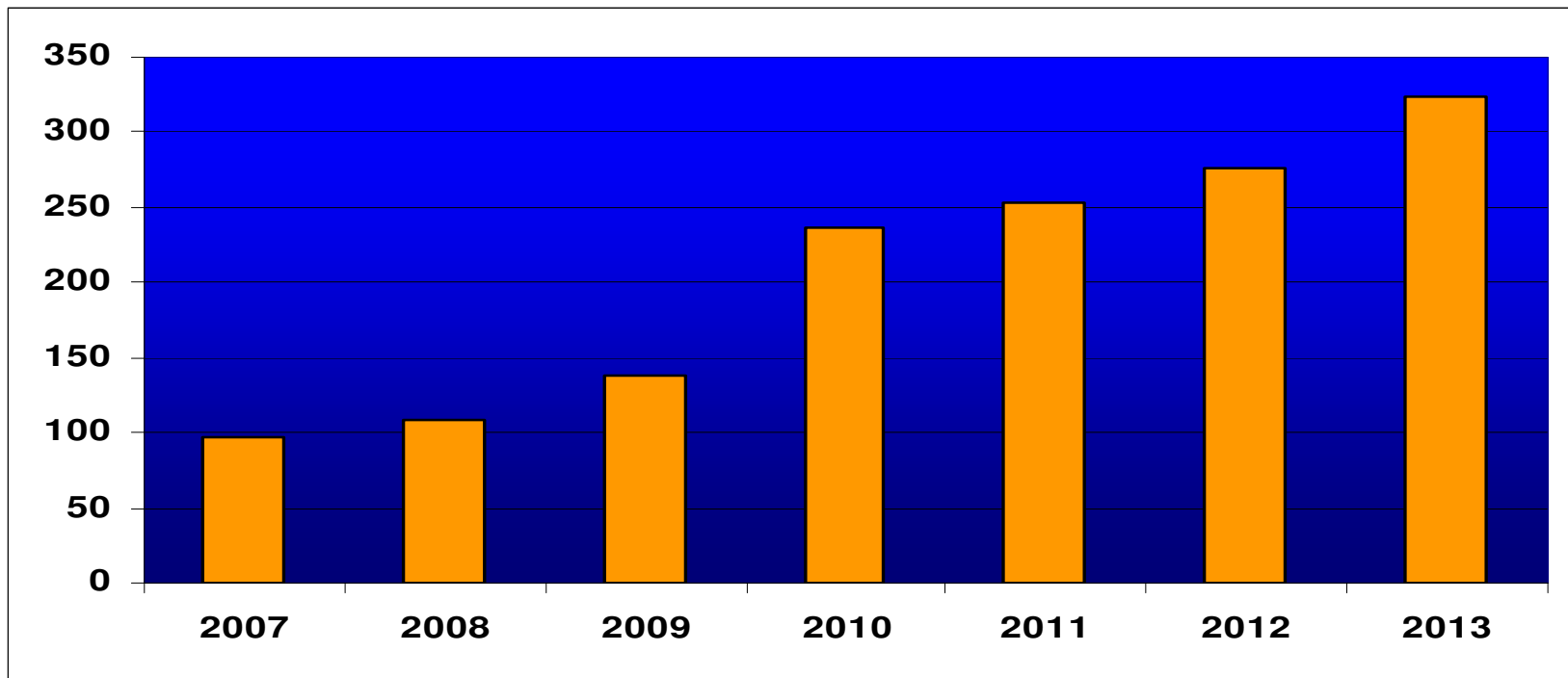
- **In-situ** observation infrastructure: air-, sea- and ground-based systems and instruments
 - (e.g. airborne, balloons, floats, ship-borne, measuring stations, seismographs, etc)
- **Space** infrastructure component for GMES: different missions co-ordinated at European level
 - Dedicated GMES missions: the ESA Sentinels
 - Contributing missions: EU National, EUMETSAT and third parties

MUCH ALREADY EXISTS



INVESTMENT

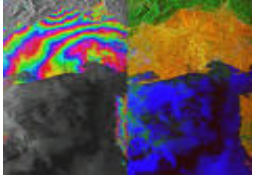
Planned Space research spend on GMES under
FP7: 1.2 bn euro



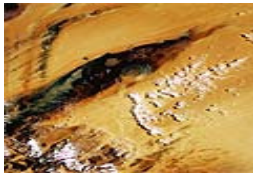
***THIS IS THE TIP OF THE ICEBERG; also
ESA, INFISO, member state funding.....***



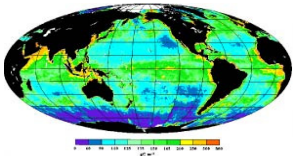
the ESA Sentinels



Sentinel 1 – High-resolution SAR imaging
All weather, day/night applications, interferometry



Sentinel 2 – High-resolution multispectral imaging
Continuity of Landsat, SPOT & Vegetation-type data



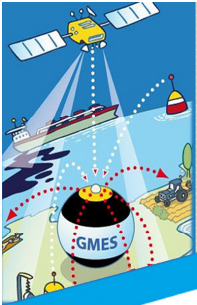
Sentinel 3 – Medium-resolution Ocean monitoring
**Wide-swath ocean color and surface temperature sensors,
altimeter**



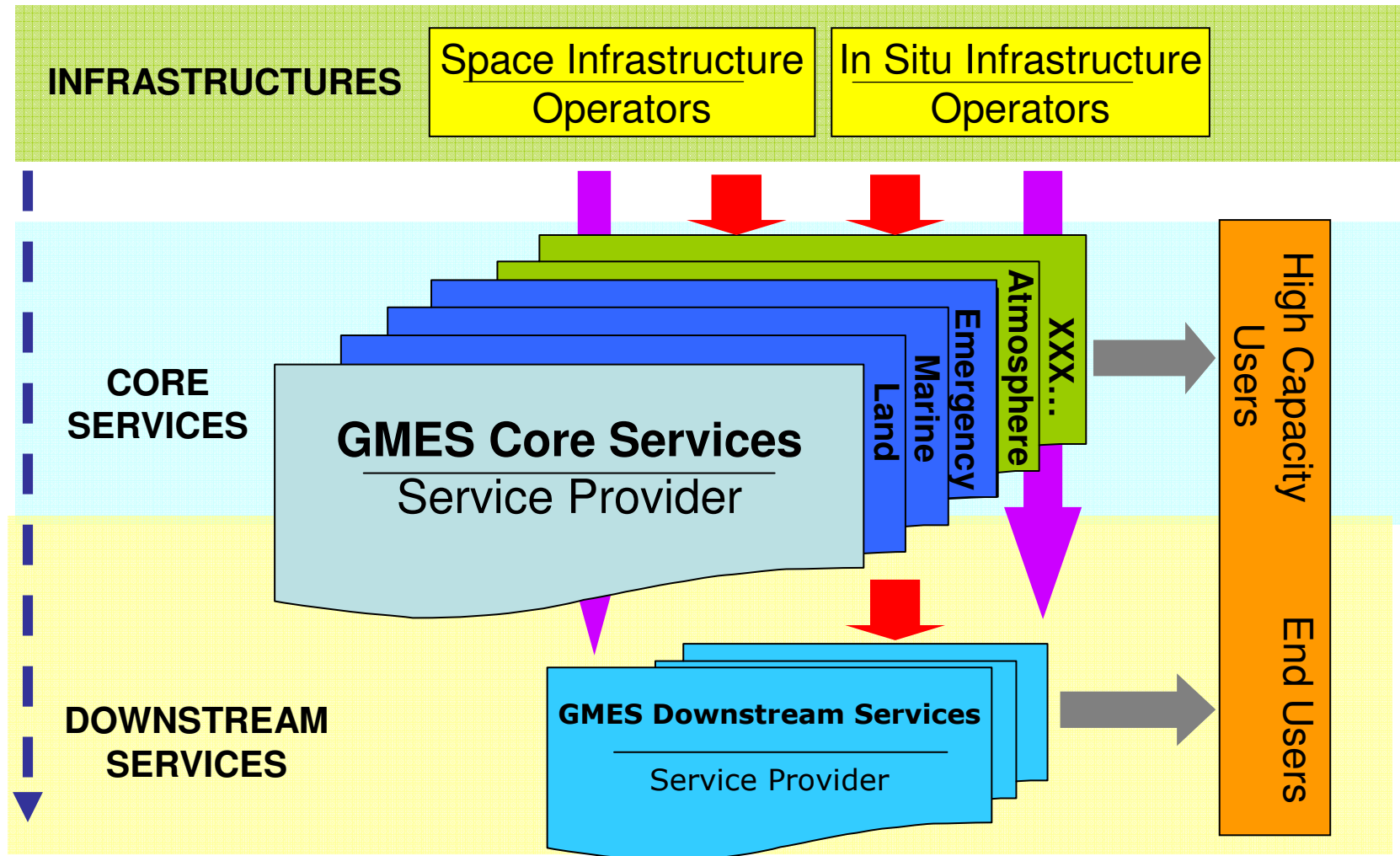
Sentinel 4 – Geostationary atmospheric
Atmospheric composition monitoring, trans-boundary pollution

Sentinel 5 – Low Earth Orbit atmospheric

18 June 2007: contract signed for building of GMES Sentinel-1 satellite



Architecture





Fast Track Services

Areas addressed by fast tracks

- **Emergency Response:** rapid mapping
Precursors: Preview / Risk_EOS / Respond /
- **Land Monitoring:** European land cover & urban spots
Precursors: Geoland / SAGE / Forest Monitoring
- **Marine Monitoring:** sea state & ecosystem characteristics over global ocean & European regional seas
Precursors: MERSEA / MarCoast / Polar View



Preparation of operational services

GMES is a **user-driven initiative**

Development steps for **each GMES service..**

1. User Workshops

2. Implementation groups

3. Service preparation and validation

4. Operational phase



Fast Track Development

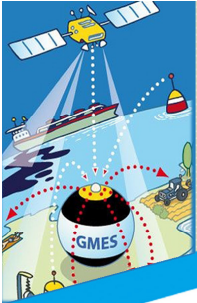
- Fast Tracks are entering the preoperational **validation phase** in the framework of FP7 calls for proposals (closure June 2007).
→ by end-2008, **real services and products** will start to be delivered to **real users**.



GMES Pilots

BESIDES FAST TRACKS, TWO OTHER PILOT INITIATIVES:

- Contribution to **security** issues
 - Security: complex issue at EU level (inter-pillar aspects)
 - Dedicated user workshop in 16 March 2007 (Paris), organised by ISS together with EC
 - Action plan under definition
- **Atmosphere**; one year later



ATMOSPHERE SERVICE

Objective: addressing **atmosphere composition** (complementing information supplied by meteo services)

(i) Air Quality (ii) Climate Forcing (iii) Ozone, UV

Global component: ozone & UV-radiation, greenhouse gases, aerosols

European component: air quality, CO₂ sources

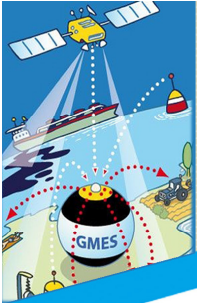


Potential users:

- EU institutions/agencies
- International bodies/conventions
- National/regional agencies, environmental agencies
- National meteorological services
- Science, Modellers, research
- Citizens
- Health services
- NGOs
- Developing countries
- Private sector

→ Core service products will be **publicly available**

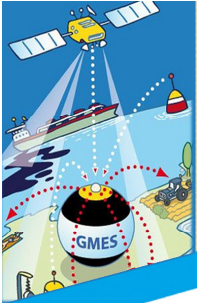
→ Important for acceptance of service: **ease of access, added value of services**



Air quality

Proposed scope of the Core Service:

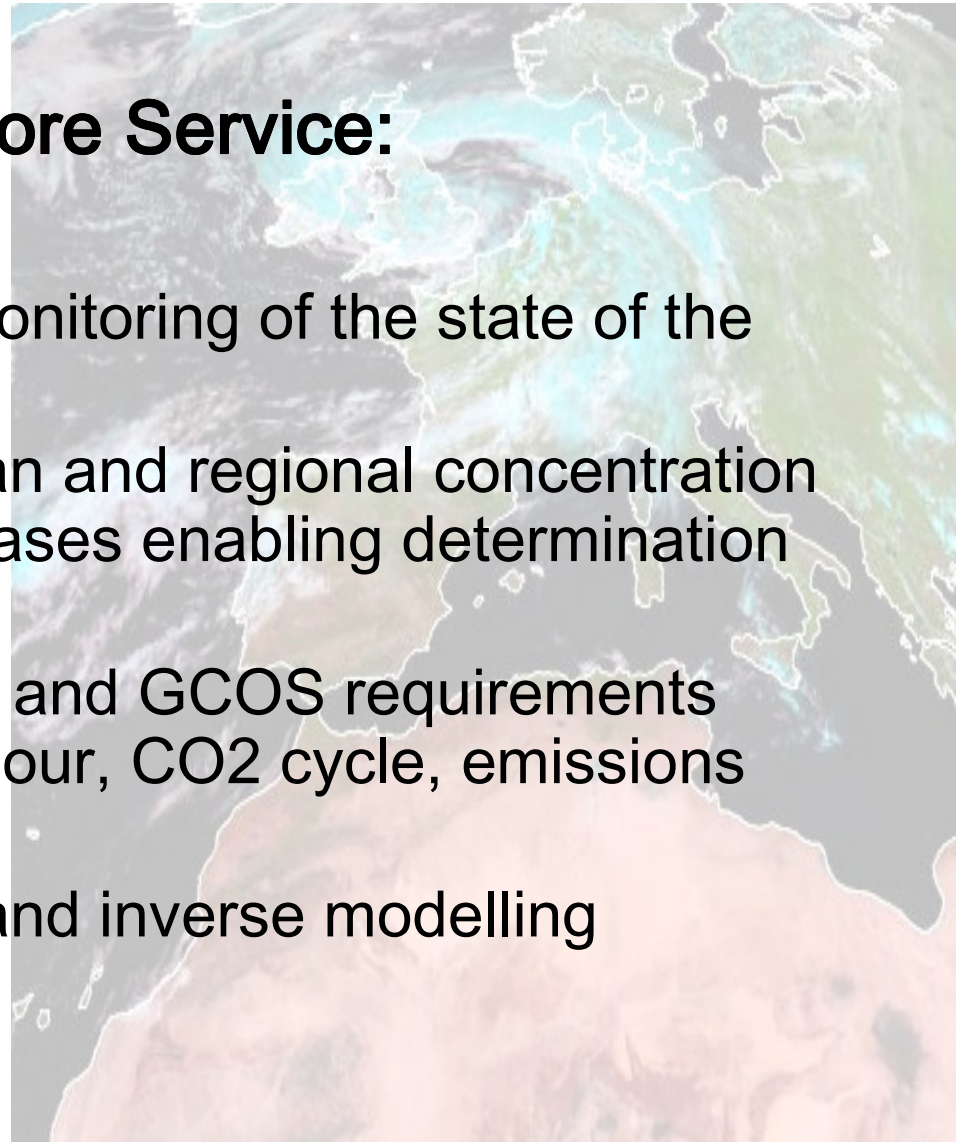
- Day-by-day analysis of the atmosphere at various space and time scales (reactive gases and aerosols)
- Long range transport of atmospheric pollutants
- Integrated global and European air quality forecast;
- Historic records of Global and European atmospheric composition
- Modelling toolbox for scenario analysis (impact of air quality strategies)
- Toolbox for background to deposition patterns, natural contributions



Climate Change/Forcing

Proposed scope of the Core Service:

- Improved and sustained monitoring of the state of the climate system;
- Integrated Global, European and regional concentration fields of key greenhouse gases enabling determination of sources and sinks.
- Essential climate variables and GCOS requirements (ambition to incl. water vapour, CO₂ cycle, emissions (shipping, volcanoes))
- Routine data assimilation and inverse modelling





Ozone / UV radiation

BASCOE v2B41 4D-VAR MIPAS assimilation O₃ column

Proposed scope of the Core Service:

- Global: to improve the long-term record of total ozone column and vertically resolved ozone information.
- Global: improved and sustained monitoring of the current status and trends in stratospheric ozone depletion;
- European: routine provision of updated ozone, UV and solar radiation maps and forecasts; historic UV and solar radiation records.

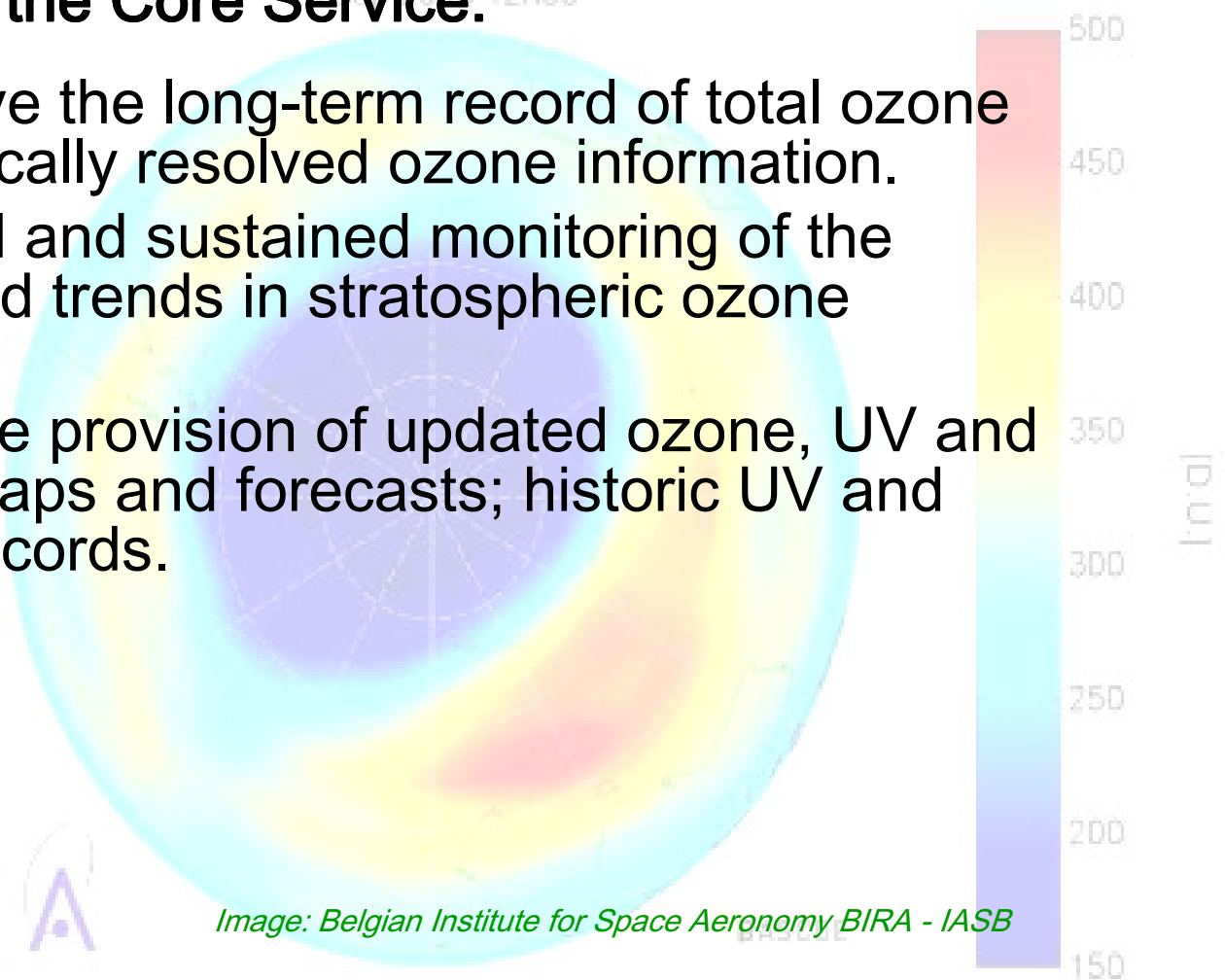
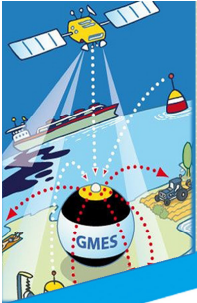


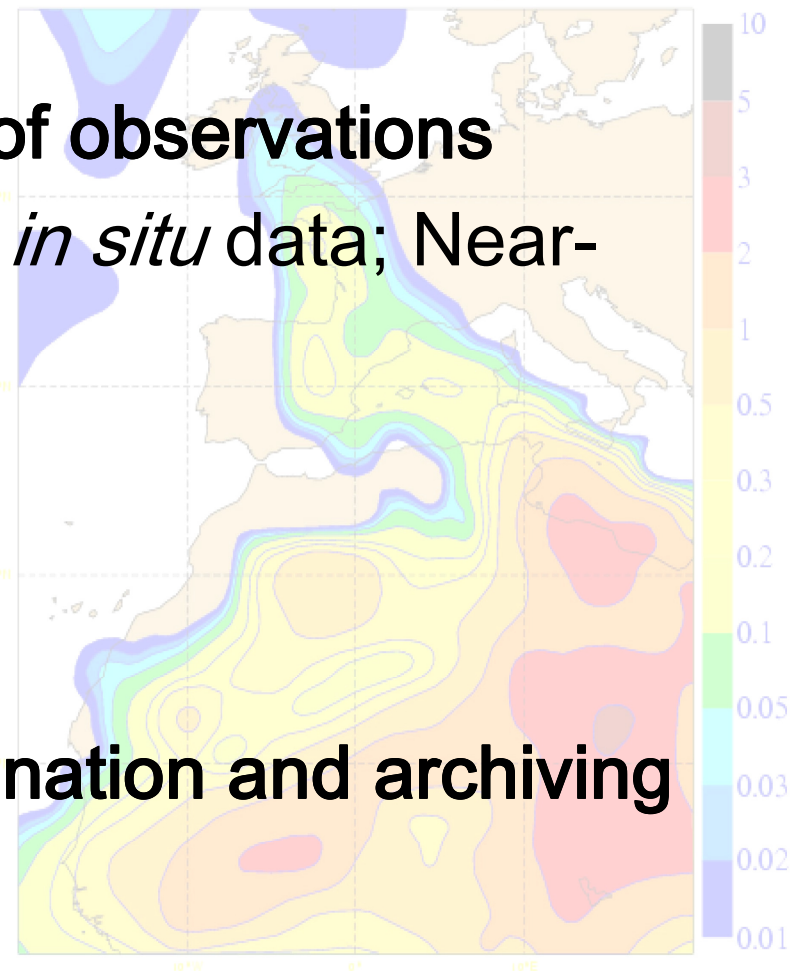
Image: Belgian Institute for Space Aeronomy BIRA - IASB



Key functions of core service

- **acquisition and processing of observations**
both space-based data and *in situ* data; Near-Real-Time (NRT), historic
- **analysis and forecasting**
- **product generation, dissemination and archiving**

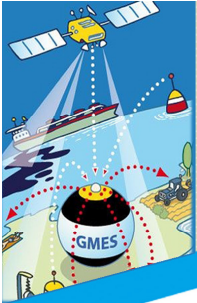
Thursday 4 May 2006 12UTC ECMWF Forecast 4-12 VT: Friday 5 May 2006 00UTC Surface: **
env1:Tau550:SumSS3b+DD3b: TLI59L60 CY30R2_ae01





GMES Challenges

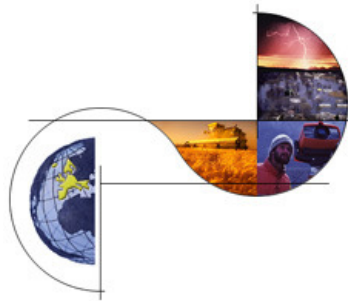
- From research projects and development towards pre-operational, then operational status
- Observation continuity and operational capacities, development of new capacities if needed
- Coordination and harmonisation of existing Capacities
- Identifying and prioritising user needs
- Identifying concrete contributions to GEOSS and other international collaborations



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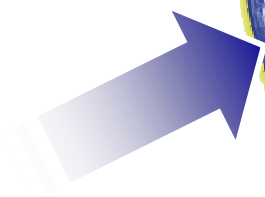
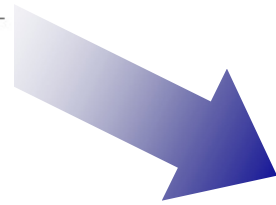
GMES... “the main European contribution to GEOSS”



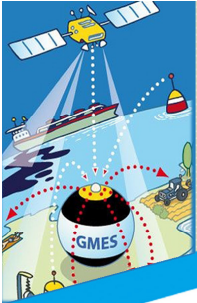
GMES



U.S. IEOS

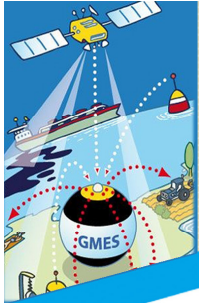


GEOSS



European approach to the GEOSS

- **Europe fully supports the GEO vision and will actively contribute to the 10-year implementation plan**
- **The EU's participation in the GEOSS through the GMES initiative - and other earth observation actions within the main EU organisations (ESA, EUMETSAT, EEA, EMSA, ECMWF, etc.), as well as National activities - will:**
 - facilitate data exchange with international partners
 - encourage the increased use of Earth Observation
 - support the development of a System of worldwide observation systems



GEO - Global dimension of GMES

- GMES will:
 - represent a coherent European approach in GEO
 - help to leverage other contributions to GEO cooperate in the identification of complementary capabilities; will pursue actions at global level, to avoid duplication/fill gaps
 - contribute to GEOSS system-of-systems philosophy, to the long-term availability of a set of interoperable EU capabilities
 - foster the development of value-added services collaborate on GEOSS architecture definition, interoperability and standardisation efforts (e.g. INSPIRE and GEONETCast are examples of tools to be considered in the global approach)



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Further information

- www.gmes.info
- www.eea.europa.eu

European Environment Agency

