

# ***Observing ECVs from Space – Further Examples, ESA Satellites & Concluding Remarks***

***Frank Martin Seifert, ESA***

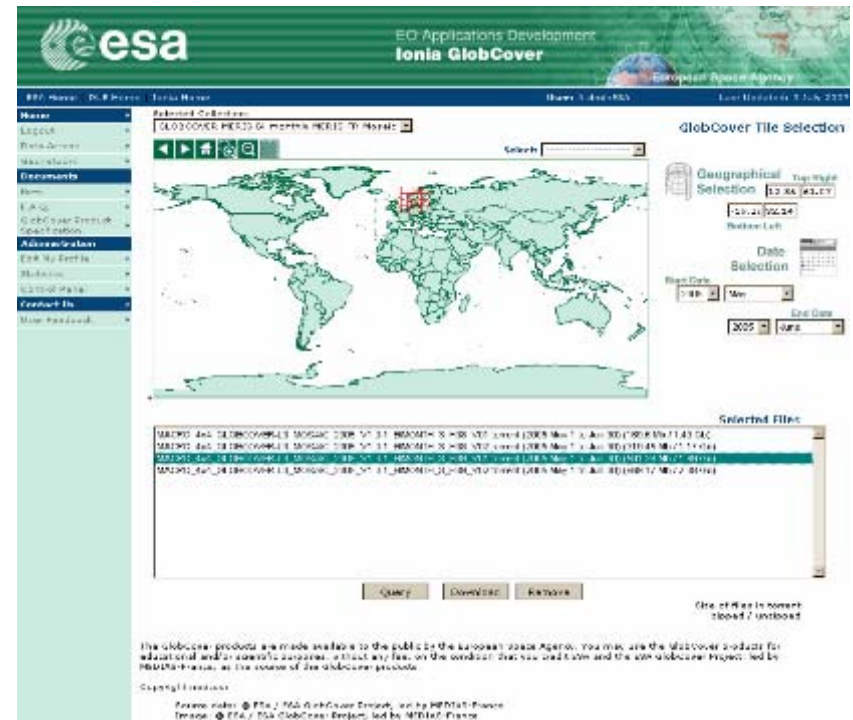
***6<sup>th</sup> December 2007***

➤ ESA Globcover Data access tool

<http://www.esa.int/due/ionia/globcover>

➤ Bit torrent / HTTP

➤ Available 6 bi-monthly Reflectance  
1 annual Reflectance


























➤ Postel/Medias-France  
GlobCover Data access tool

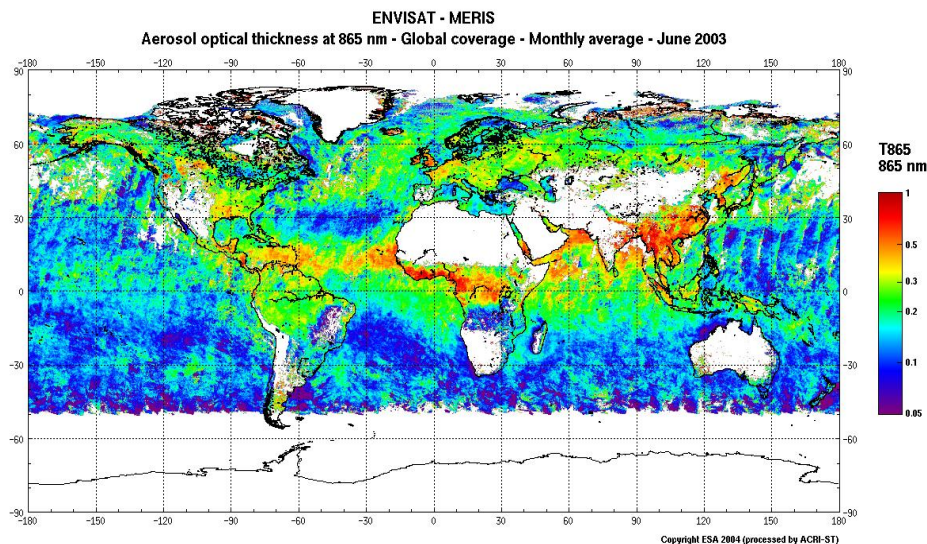
<http://postel.mediasfrance.org>

➤ HTTP



	Cultivated and Managed areas		Mosaic forest or shrubland (50-70%) and grassland (20-50%)
	Post-flooding or irrigated croplands		Mosaic grassland (50-70%) and forest or shrubland (20-50%)
	Mosaic cropland (50-70%) / vegetation (grassland/shrubland/forest) (20-50%)		Closed to open (>15%) shrubland (<5m)
	Mosaic vegetation (grassland/shrubland/forest) (50-70%) / cropland (20-50%)		Closed to open (>15%) grassland
	Closed to open (>15%) broadleaved evergreen and/or semi-deciduous forest (>5m)		Sparse (<15%) vegetation
	Closed (>40%) broadleaved deciduous forest (>5m)		Closed (>40%) broadleaved forest regularly flooded, fresh water
	Open (15-40%) broadleaved deciduous forest/woodland (>5m)		Closed (>40%) broadleaved semi-deciduous and/or evergreen forest regularly flooded, saline water
	Closed (>40%) needle-leaved evergreen forest (>5m)		Closed to open (>15%) grassland or shrubland or woody vgt on regularly flooded or waterlogged soil, fresh, brackish or saline water
	Closed (>40%) needle-leaved deciduous forest (>5m)		Artificial surfaces and associated areas (Urban areas >50%)
	Open (15-40%) needle-leaved deciduous or evergreen forest (>5m)		Bare Areas
	Closed to open (>15%) mixed broadleaved and needleleaved forest		Water Bodies
			Permanent Snow and Ice





- Development of a standard reference multi-year global aerosol product over land and water (1995–2005) to support the requirements of users in Climate and NWP research, Transboundary Air Pollution monitoring and Air Quality assessment.
- Preparation for operationalisation under GMES.
- Assimilation of the aerosol product in NWP and Chemistry Transport Models

**Budget:** 1 Meuro  
**KO:** Sep 2004  
**Expected End:** Dec 2007

- ✓ Strong links with research, operational, and government users.
- ✓ Development of merging of MERIS, (A)ATSR and MSG/SEVIRI data

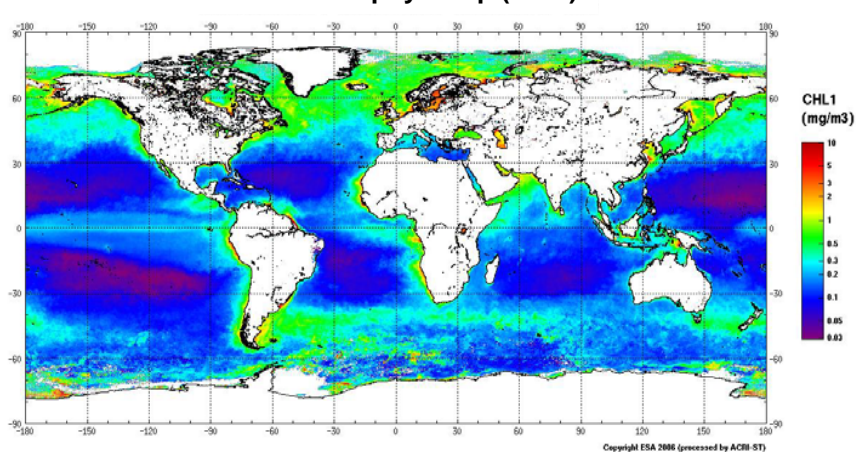
**Project Team:** GMV S.A., E

- RAL, UK
- Univ. Oxford, UK
- Lab. d'Optique Atmosphérique, F

**Users Organisations** (national and regional public authorities):

- ECMWF, Intl
- European Monitoring and Evaluation Programme, Intl
- Max Planck Institute – Meteorology, D
- Agenzia Regionale per la Protezione dell'Ambiente, I
- Landesumweltamt Nordrhein-Westfalen, D
- Ministry of Environment, GR
- Flemish Environment Agency, B

**MERIS Chlorophyll Map (2005)**



<b>Budget:</b>	1 M€
<b>KO:</b>	Nov 2005
<b>Expected End:</b>	Dec 2007

- ✓ Based on merging MERIS, SeaWIFS, and MODIS to provide the best possible coverage.
- ✓ Will test different data merging approaches
- ✓ Two user workshops planned

- Development and demonstration of an EO-based service supporting global ocean carbon cycle research.
- Provision of a long time-series (1997-2006) of consistently calibrated global ocean colour information, according to requirements specified by the global ocean colour user community
- Demonstration NRT service for operational users

### Project Team: ACRI-ST, F

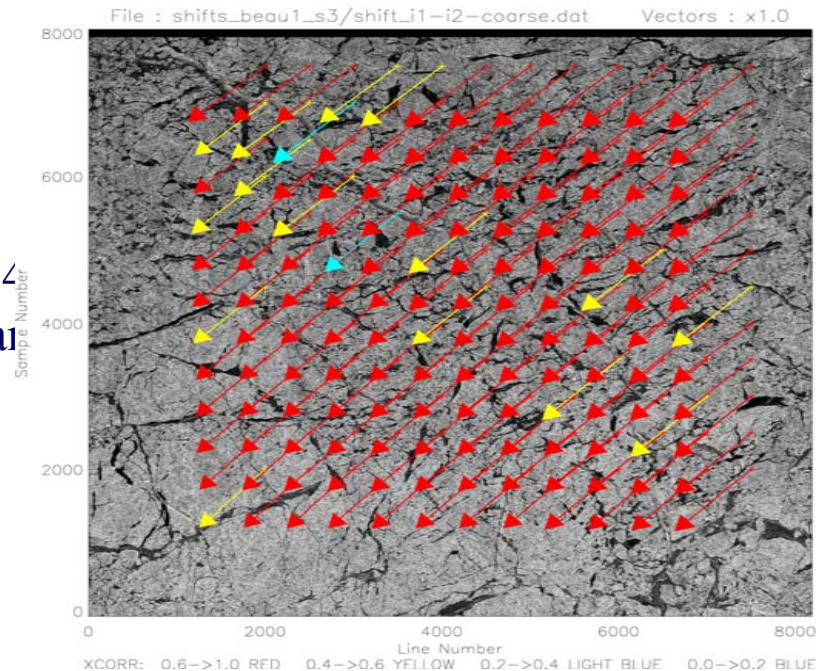
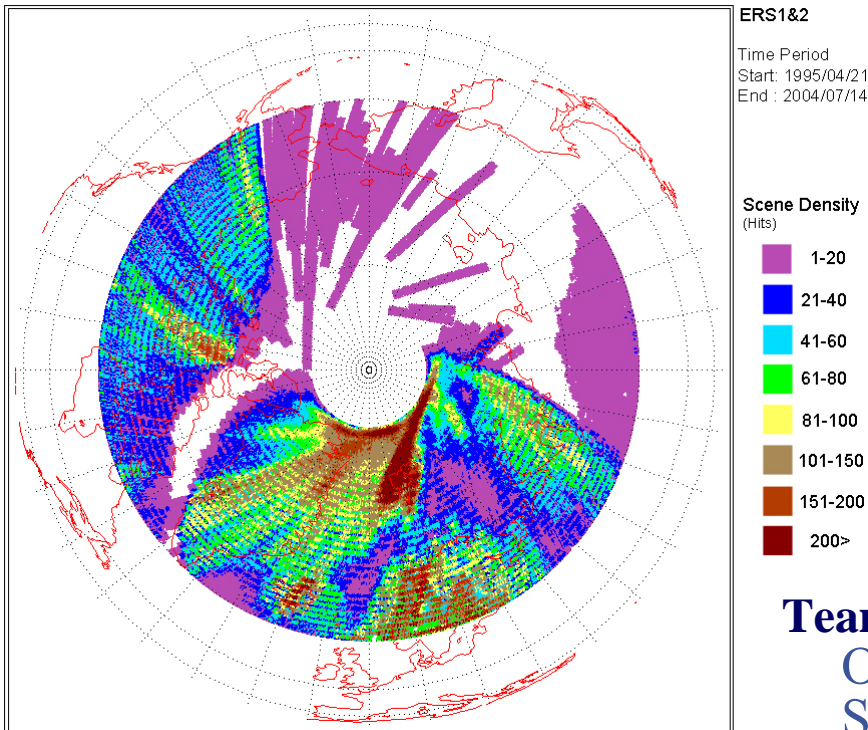
- Brockmann Consult, D
- Univ. Plymouth, UK
- NIVA, NO
- LOV, F
- DLR-IMF, D

### User Organisations:

- Intl. Ocean Colour Coordinating Group (IOCCG), Intl
- Intl. Ocean Carbon Coordination Project (IOCCP), Intl
- UK MetOffice, UK



- Sea ice motion and deformation mapping
- Seasonal cycle of sea ice in the Arctic
- Long-term changes in the cryosphere e.g. extent, volume and flux of sea ice, based on 14 year archive of ERS and ENVISAT (more than 500 000 SAR scenes)

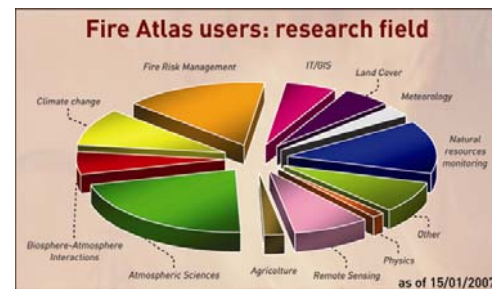


### Users Organisations:

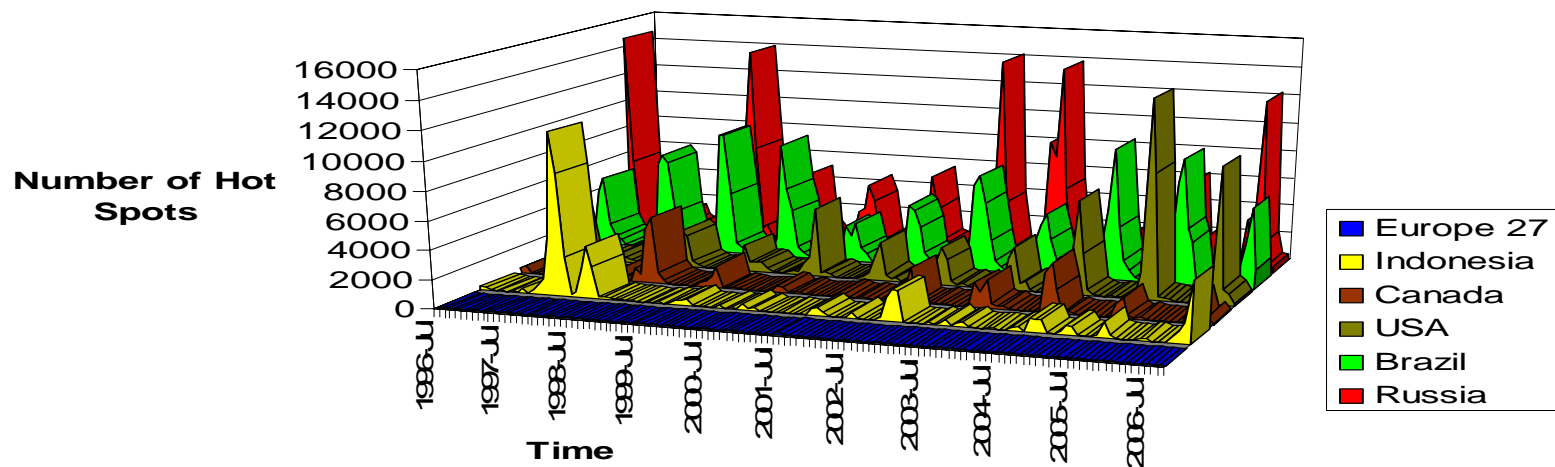
- CliC
- IGBP, WCRP
- Scientific communities

**Team:** UCL, Kongsberg Spacetec, UK Met Office, AWI, IFREMER, JPL, Polar Science Centre, Planetary Visions

12 years of consistent data  
100 paper published  
900 registered Users  
250 replies to Users survey

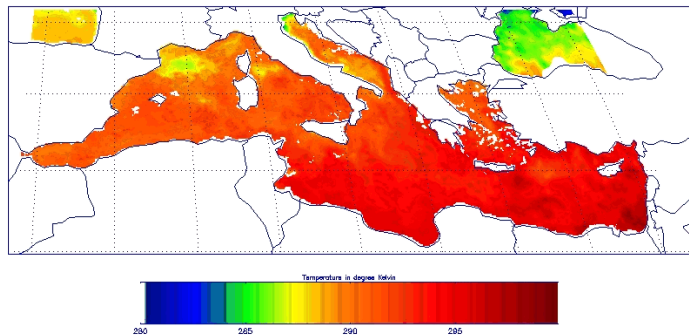


**ATSR WFA Hot Spots (ALGO2)**





SST L4 23/11/2004



- **Service Demonstration**: The Medspiration project is providing a European RDAC service to the GHRSSST-PP during 2004-2007 by generating and disseminating European, Atlantic and global area SST data products according to the GHRSSST-PP Detailed Processing Model .
- **User Consultation Meetings**: Medspiration service responds to the request for Ocean forecasting model for operational oceanography. Feedback from user community are presented during the UCMs each 6 months.

**Budget:** 1.1 M€  
**KO:** January 2004  
**Expected End:** May 2007

**Project Team:** NOCS, UK

- IFREMER, F
- CMS Meteo, F
- Met No, NO
- CLS, F
- CNR, I
- VEGA, UK

**Users Organisations** (national and regional public authorities):

- DMI, Denmark
- FOAM, Met Office, UK
- MERCATOR, France
- MET.NO, Norway
- NPI, Norway
- TOPAZ, International
- ECMWF, European
- GHRSSST-PP, Intl
- NOAA/NODC, USA
- MFC, Norway
- RDANH, Denmark
- BOOS, International

- ✓ Global products derived from AATSR.
- ✓ Daily services
- ✓ Operational oceanography
- ✓ Strong European and international User community

### User Organisations:

- WGMS
- GLIMS
- MPI-Met
- NVE
- WC2N (UNBC)
- IMAU
- SED

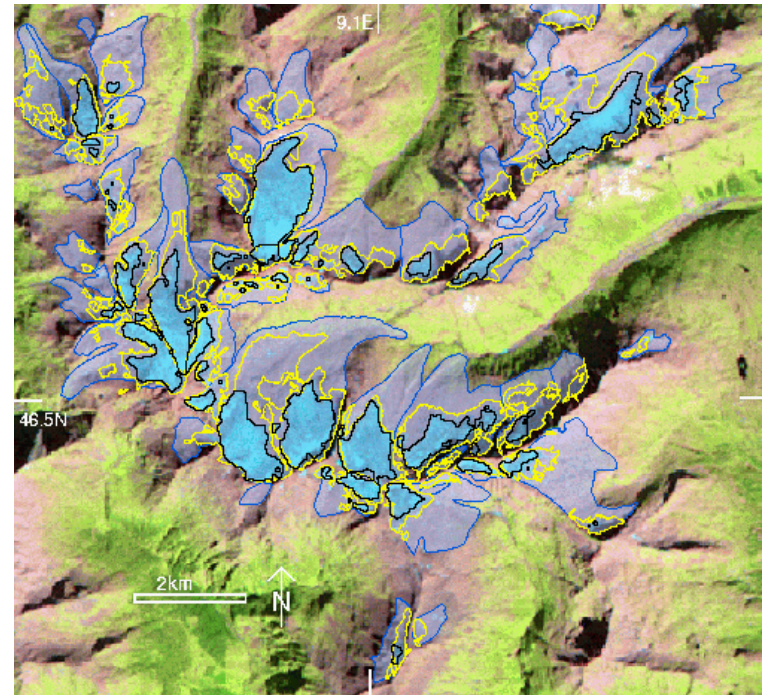
<b>Budget:</b>	1 M€
<b>KO:</b>	Apr 2007
<b>Expected End:</b>	May 2009

### Products:

- ✓ Area
- ✓ Snowline
- ✓ Terminus
- ✓ Topography
- ✓ Elevation change
- ✓ Velocity

### Team:

- ✓ University of Zurich + subs

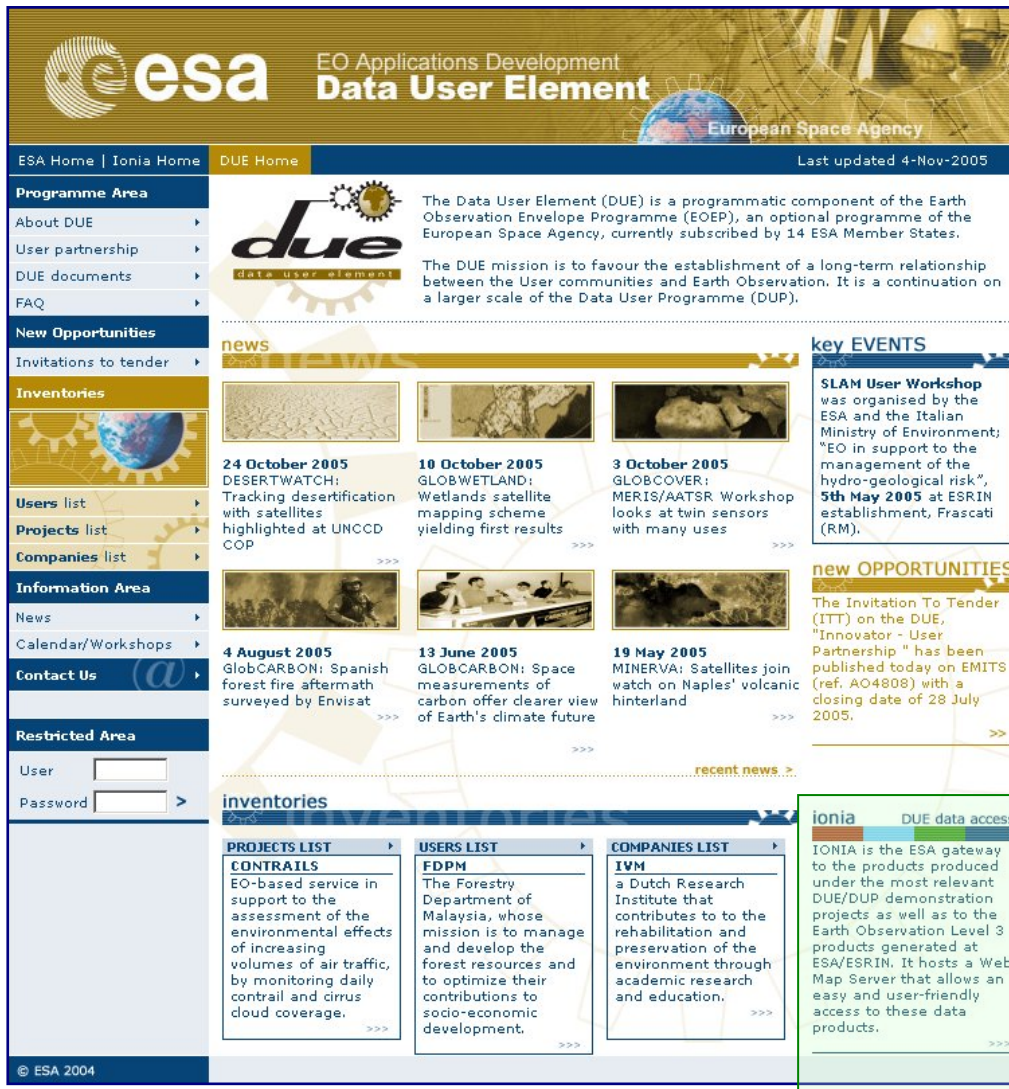


Glacier changes in the Rheinwald region: 1850 (blue line), 1973 (yellow line) and 1999 (black line).

### Objective:

**Monitoring of selected glacier regions from all over the world over time going back 10 to 20 years. ECV of the CEOS response to GCOS requirement endorsed by UNFCCC.**





The screenshot shows the DUE Web Portal interface. At the top, it features the ESA logo and the text "EO Applications Development Data User Element European Space Agency". Below this is a navigation bar with links for "ESA Home", "Ionía Home", "DUE Home", and "Last updated 4-Nov-2005". The main content area is divided into several sections: "Programme Area" (About DUE, User partnership, DUE documents, FAQ), "New Opportunities" (Invitations to tender), "Inventories" (Users list, Projects list, Companies list), "Information Area" (News, Calendar/Workshops), "Contact Us", "Restricted Area" (User, Password), "news" (24 October 2005: DESERTWATCH; 10 October 2005: GLOBWETLAND; 3 October 2005: GLOBCOVER), "key EVENTS" (SLAM User Workshop), "new OPPORTUNITIES" (The Invitation To Tender (ITT) on the DUE), and "inventories" (PROJECTS LIST, USERS LIST, COMPANIES LIST). The "news" section includes details about DESERTWATCH, GLOBWETLAND, and GLOBCOVER. The "key EVENTS" section mentions the SLAM User Workshop. The "new OPPORTUNITIES" section describes the Invitation To Tender (ITT) on the DUE. The "inventories" section lists various projects, users, and companies.

For more Information:  
<http://www.esa.int/due/>



Ionía  
 an internet gateway for easy  
 access  
 to DUE demonstration products.  
<http://www.esa.int/due/ionia/>



# ***Earth Observation - ESA's Satellites***

## GOCE

Earth gravity field  
and Geoid  
measurements

Launch: 2008



## SMOS

Soil moisture and  
ocean salinity  
measurements

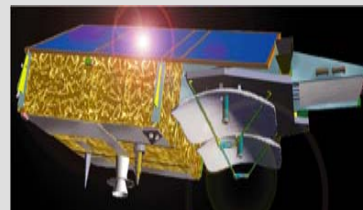
Launch: 2008



## Cryosat-2

Ice elevation and  
ice thickness  
measurements

Launch: 2009



## ADM-Aeolus

Windspeed  
vectors  
measurements

Launch: 2009



## SWARM

Earth magnetic  
field & Earth core  
dynamics meas.

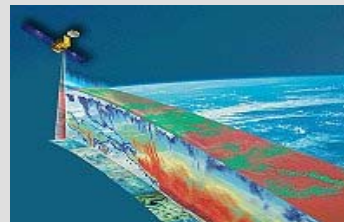
Launch: 2010



## EarthCARE

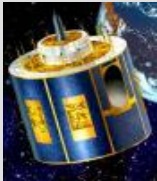
Clouds, Aerosols  
& radiation  
measurements

Launch: 2012+



## Meteosat

Since '78, 9 ESA developed Meteosat satellites have been launched



MSG-1

29.8.2002

MSG-2

21.12.2005

## MetOp

Europe's first polar orbiting satellite for op. meteorology

Launch: 19.10.2006



*and now*

**GMES**

**Sentinel-1**

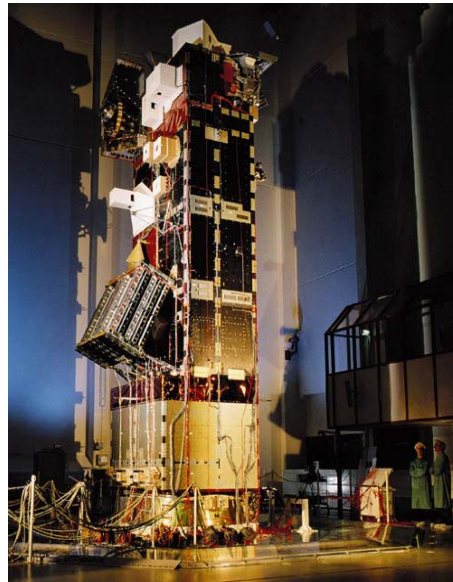
**Sentinel-2**

**Sentinel-3**

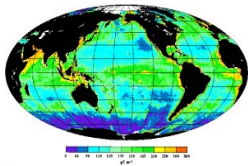
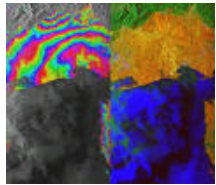
**ERS-1 1991**

**ERS-2 1995**

**ENVISAT 2002**



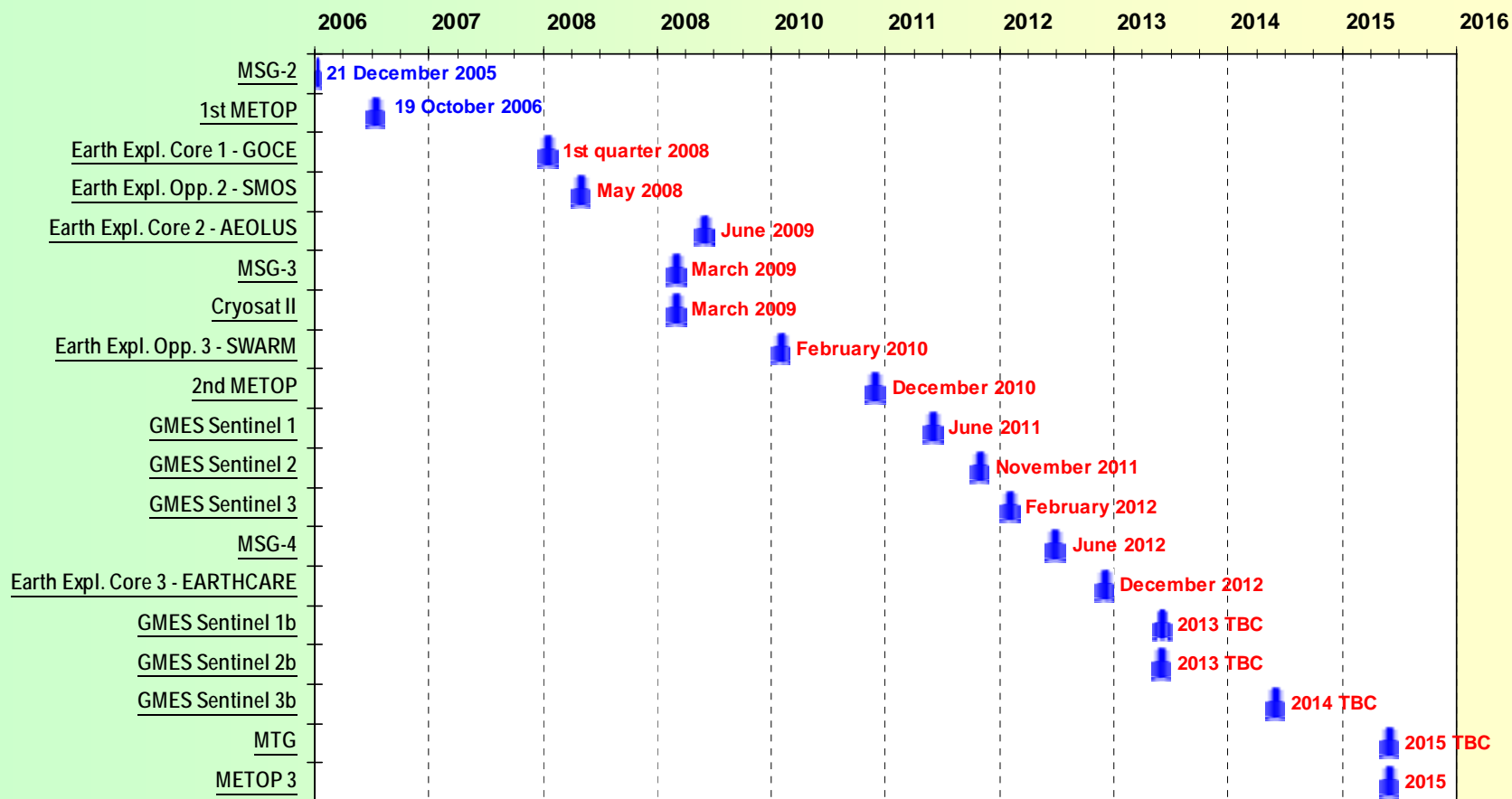




- **Sentinel 1 – SAR imaging**
  - All weather, day/night applications, interferometry, ocean/ice/land
- **Sentinel 2 – Superspectral imaging**
  - Continuity of Landsat, SPOT - type of data for land mapping
- **Sentinel 3 – Ocean monitoring**
  - Wide-swath ocean color, surface temperature and land mission & radar altimeter
- **Sentinel 4 – Geostationary atmospheric**
  - Atmospheric composition monitoring, trans-boundary pollution
- **Sentinel 5 – Low-orbit atmospheric**
  - Atmospheric composition monitoring

**Sentinels provide continuity of ERS, ENVISAT, SPOT missions for the next decades**

## D/EOP Overall Launch Schedule



**Earth Explorer Nr. 7, Sentinel-4 and -5: launch dates tbd**

- **ESA is in dialogue with users**
  - Scientific communities
  - Environmental conventions
  - Institutions (operational) → GMES
  
- **Space Agencies have taken the charge of UNFCCC**
  - To link space-based capabilities with global climate observing requirements
  - To provide systematic and continuous monitoring capabilities from space now and in the future
  - To demonstrate methodologies in pilot projects (e.g. REDD)
  - To investigate and deliver ECVs to the climate change scientific communities
  - To improve access to space-based climate observations to all interested Parties