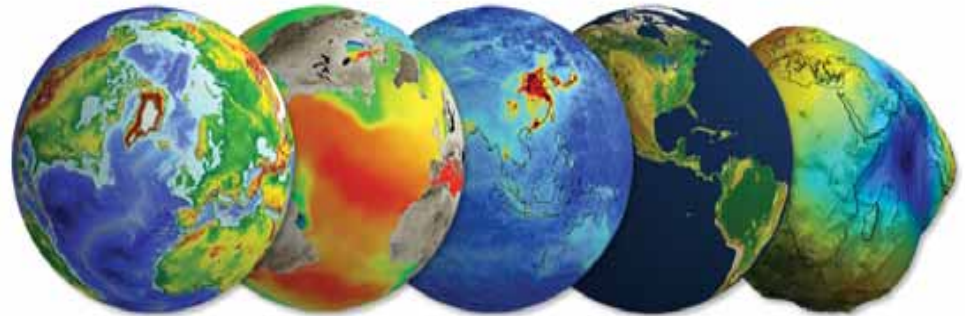


Innovation and Markets for EO Services

**Gordon Campbell,
Directorate of Earth Observation Programmes (ESA)**

08 September 2011



EO Exploitation : Paths



from Research...

New
Methods

Research Path

New
Users
& Services

Development Path

New
Providers
& Industries

Industrial Path

VAE

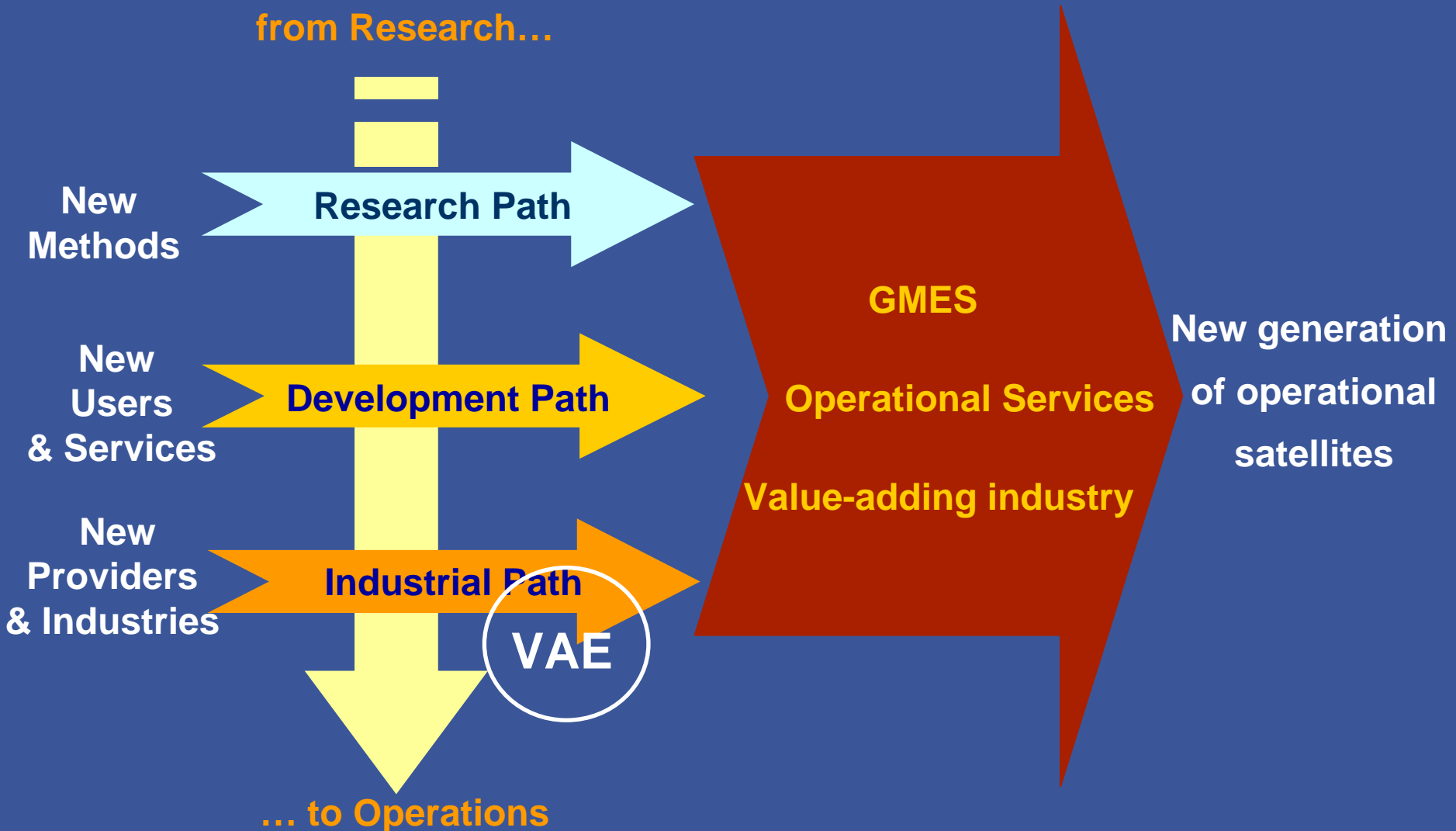
... to Operations

GMES

Operational Services

Value-adding industry

New generation
of operational
satellites



2 Main Axes of activity (EOEP-3, 2008 – 2012)

Axis 1 : Develop Service Prospects

- integrate new techniques / technologies / data
- address new and evolving market opportunities

Axis 2 : Expand Market Access

- structure/scale-up industrial demand
- explore growing non-EU markets
- raise awareness of EO Service Industry offerings

ESA EO Value Adding Element (VAE)



Support European EO Service Industry to grow use of EO-based information mainly with private-sector users.

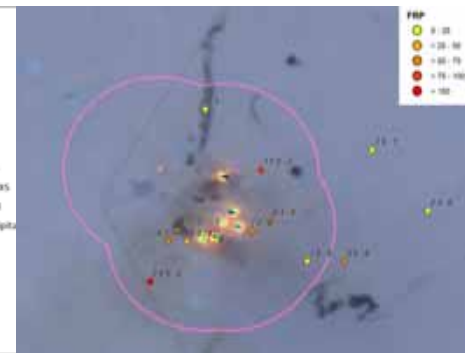
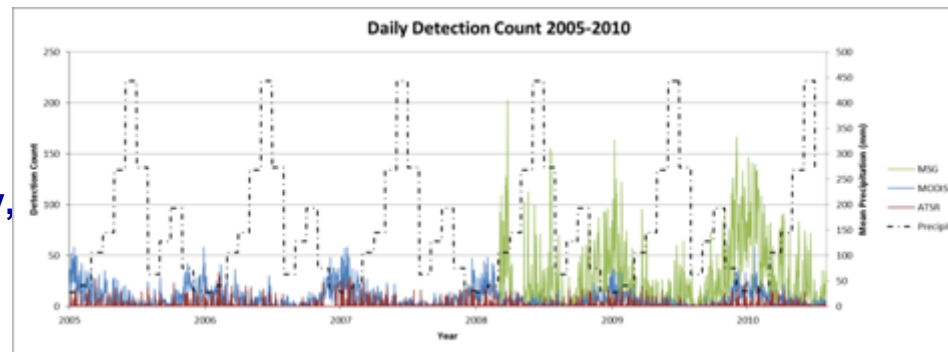
- **New EO Services (20 activities):**
 - Novel developments in EO services,
 - New European & Canadian national missions (TerraSar-X, CosmoSkyMed, RadarSat-2, Deimos-1, DMC, RapidEye)
- **New Markets (16 activities):**
 - 51 service suppliers, 57 users (75% private sector),
 - Waste management, Geo-marketing, Tourism, Media, Agro-chemical, Insurance,.....
- **Export Markets (4 activities):**
 - Investigating new prospects outside EU,
 - China, SE Asia, N. Africa, Persian Gulf.



- **35 + activities integrating New Developments (new techniques, new EO data) to produce enhanced EO Services (based on existing capabilities)**

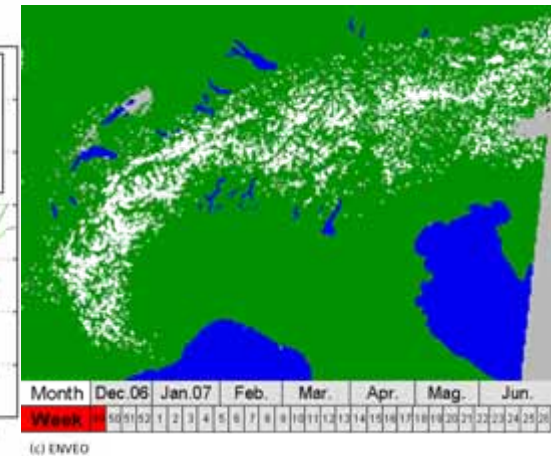
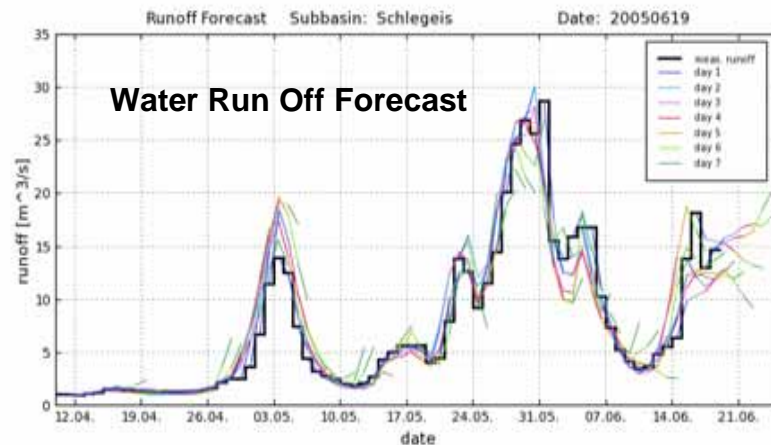
• Gas Flares

- MODIS +ATSR + MSG improved algorithms,
- Monitor at 1km res, 4xday,
- Optimisation for cold (Siberia) and warm (desert) environments,
- Fire Radiative Power (FRP) estimation.

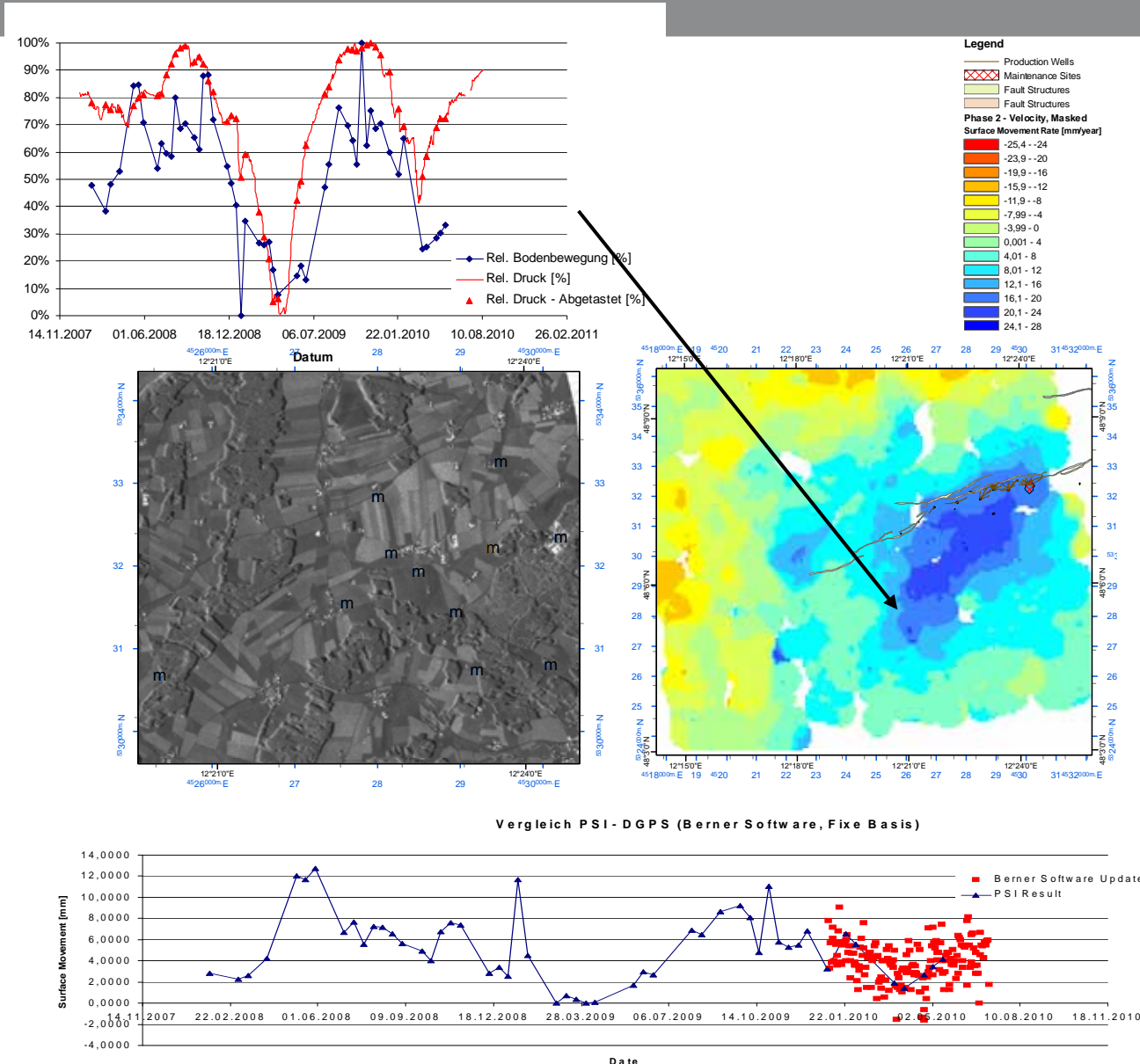


• HydroPower

- Weather Conditions (MSG) + Snow Cover + DEM + Land Cover (ENVISAT/MERIS)
- Water run-off Forecasting via Hydrological model.

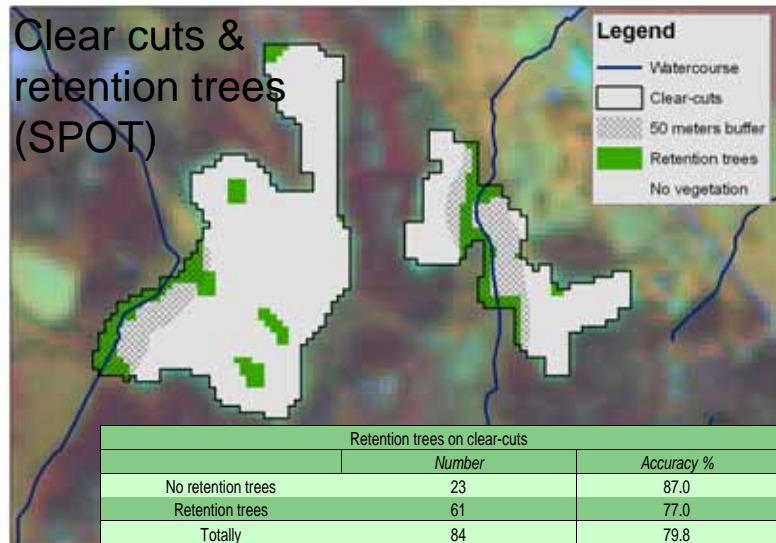


Validation Example 1 : Land Motion for Carbon Capture & Storage (CCS)



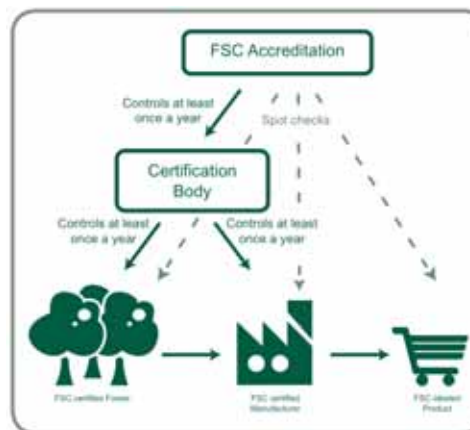
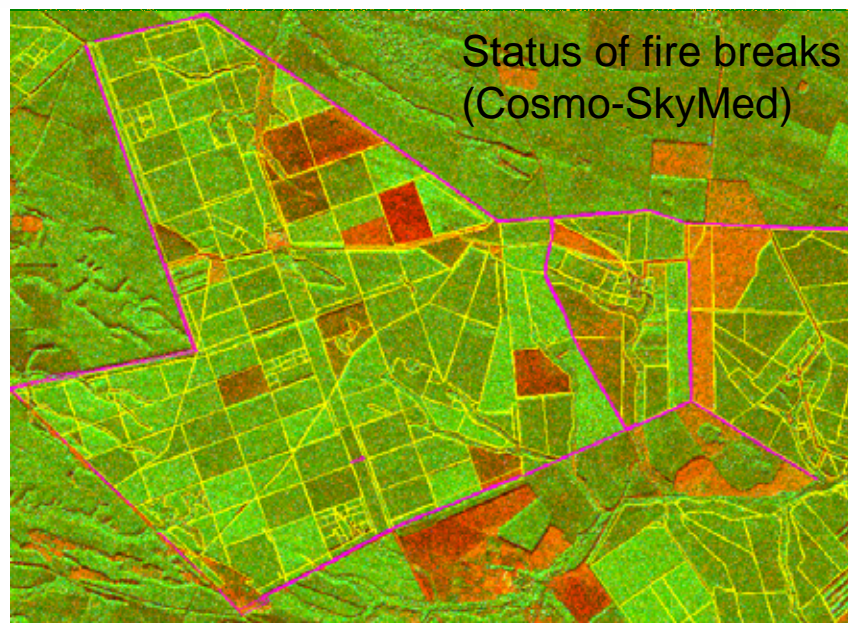
- TerraSAR-X : increased Spatial & Temporal resolution,
- Gas storage site in Germany (E.ON),
- Technically challenging – non-linear surface motion & heterogeneous surface conditions,
- Comparison with known fault structure, in-situ gas pressure and improved DGPS processing,
- EO-based land motion correlates well with known spatial & temporal in-situ,
- Complete geo-mechanical model of reservoir needed for full understanding.

Validation Example 2 : Certification of Sustainable Forest Management (FSC)



Buffer zon		
Error (m)	Number	Error (m)
-50	0	-50
-40	0	-40
-30	0	-30
-20	0	-20
-10	0	-10
0	14	0
10	16	10
20	3	20
30	3	30
40	2	40
50	1	50
Sum	39	Summa
Standard error	10.5	Standard error

- Evaluate EO “**operational best practices**” for FSC certification
- Possible integration in **FSC Principles and Criteria**
- Certification is one mechanism for the economical valuation of **ecosystem services**



Forest Stewardship Council (FSC)

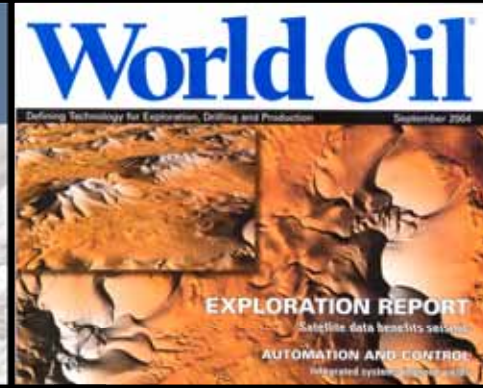
- **Voluntary certification** of sustainable forest management
- **> 130** millions ha certified
- in over **80** countries



Industry Communicates benefits of EO Services



- Trade journals / magazines / articles



The Adventure of Earth

Exploration & Geosurvey Division

Shell Canada Limited

2006 Sustainable Development Report

SPACE TECHNOLOGY OFFERS COST EFFECTIVE SERVICES FOR FSC FOREST MANAGEMENT

Resolution	Waypoint Area (km ²)	Cost Range (EUR)	GIS and GPS Analyst
250m	10000	1000 - 10000	1-2
500m	10000	1000 - 10000	1-2
1000m	10000	1000 - 10000	1-2

Business, biodiversity and ecosystem services

The interdependence story

Industry Communicates benefits of EO Services



• Press / Media releases

FINANCIAL TIMES DEUTSCHLAND

Dem Sonnenschein auf der Spur

von Ole Neugebauer

Mit Hilfe von Sunshine-Maps finden Solarprofiteure die besten Standorte für Solaranlagen. Die Daten dafür stammen von Satelliten.



Scheint die Sonne aus dem Fernen Osten zu kommen, ist die Luft genau und vertiefen sich in die All, in so ger

Hergestellt von der europäischen Nachfrage nach Informationen über die europäischen Unternehmen in Deutschland 600 Mio. Euro erhöht die schätzungsweise auf 2,5 Mrd. Euro erhöht die Daten für die Sunshine-Maps kommen

Wo es auf der Sunshine-Map leuchtet, ist es warm und sonnig

Maps. Laut einer Studie der Schweizer Unternehmen in Deutschland 600 Mio. Euro erhöht die schätzungsweise auf 2,5 Mrd. Euro erhöht die Daten für die Sunshine-Maps kommen

Die Daten für die Sunshine-Maps kommen



Beep, beep: you're burning

» Sunburn might not be your biggest concern at the end of year, but come summertime it won't be the last. That's getting roasted. A new, personalised text message service has been developed to warn you when you're about to turn into crackling.

The HappySun Mobile service from Italian company sends UV data based on atmospheric readings from Meteosat-8 and Envisat satellites directly to your mobile phone. You fill in an online questionnaire to log your phone type, and then simply text which beach you're on and the factor sunscreen you're wearing to the system. Its role is to tell you how long you can safely sit out there.

"The data is updated every 15 minutes," Flyby's Doro Flore tells *BBC Focus*. "The rate is imposed by the availability of the satellite data, but it's almost a real-time service."

Although UV radiation is virtually constant around the world, the intensity hitting different parts of the world depends on factors such as ozone concentration and cloud cover. Flyby can calculate UV intensity to a resolution of one square kilometre.

The service is up and running in Sardinia and Tuscany and is planned for the whole of the Mediterranean.

www.happysun.it

18 BBC Focus December 2006



NEWS Spaceman A blog about space by the BBC's Jonathan Amos

When the 'expert testimony' comes from space

Jonathan Amos | 18:27 UK time, Wednesday, 6 October 2010

Comments

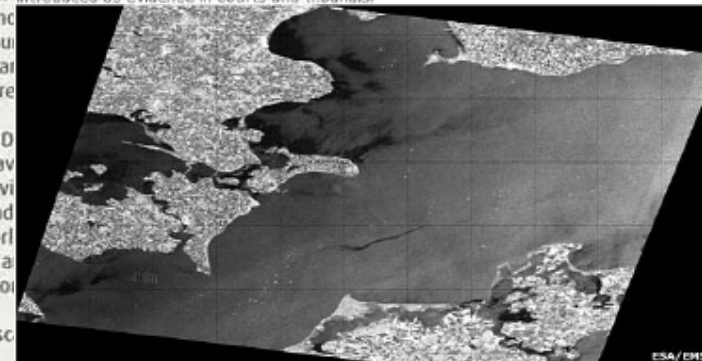
It may have been the 53rd anniversary of Sputnik this week but satellites are still a relatively new phenomenon.

They're not quite all pervasive - although it's fast heading in that direction. As I posted recently, the average number of spacecraft launched per year this decade is expected to exceed 120, up significantly on the 77 per year during the 2000s.

More and more, what these "birds" do and see is going to impact our daily lives.

This was very evident from the fascinating workshop [100kb PDF] I attended this week organised by the London Institute of Space Policy and Law.

Increasingly, Earth observation (EO) data acquired by satellites is being introduced as evidence in courts and tribunals.



About this blog



I'm Jonathan Amos, BBC science correspondent. Come here for a European and UK focus on space.

European Space Agency

ESA/EMSA

Links to non-EO (Industry) Research Networks / Groups



- 22 Universities, Institutes,
- risk models, science of extreme events,
- Technology, theoretical, socio-economic R&D.



- 15,000 members,
- geophysics, petroleum exploration, geology, reservoir engineering, mining and civil engineering.



- World's leading private and state-owned oil & gas companies,
- Share best practices to achieve improvements in every aspect of health, safety, the environment, security, social responsibility, engineering and operations.

- To improve acceptance of EO through integrating into existing research practices & communities

Where should we be chasing?



World's ten fastest-growing economies*

Annual average GDP growth, %

2001-2010†		2011-2015‡	
Angola	11.1	China	9.5
China	10.5	India	8.2
Myanmar	10.3	Ethiopia	8.1
Nigeria	8.9	Mozambique	7.7
Ethiopia	8.4	Tanzania	7.2
Kazakhstan	8.2	Vietnam	7.2
Chad	7.9	Congo	7.0
Mozambique	7.9	Ghana	7.0
Cambodia	7.7	Zambia	6.9
Rwanda	7.6	Nigeria	6.8

Sources: *The Economist*; IMF

GDP growth, unweighted annual average, %



*Excluding countries with less than 10m population and Iraq and Afghanistan †2010 estimate ‡Forecast



World trade in commercial services by category, 2009

(Billion dollars and percentage)

	Value	Share				
	2009	2000	2005	2007	2008	2009
Exports						
All commercial services	3350	100.0	100.0	100.0	100.0	100.0
Transportation services	700	23.4	23.3	22.9	23.7	20.9
Travel	870	32.1	27.7	25.7	25.1	26.0
Other commercial services	1780	44.5	49.0	51.4	51.1	53.1
Imports						
All commercial services	3145	100.0	100.0	100.0	100.0	100.0
Transportation services	835	28.7	29.1	29.0	30.0	26.6
Travel	790	29.8	27.1	25.6	24.4	25.1
Other commercial services	1520	41.5	43.8	45.4	45.5	48.3

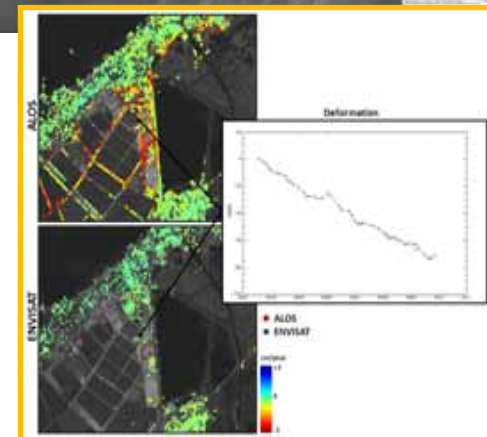
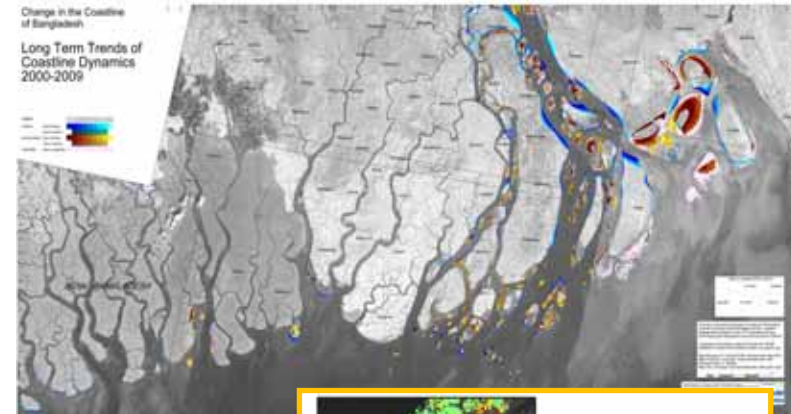
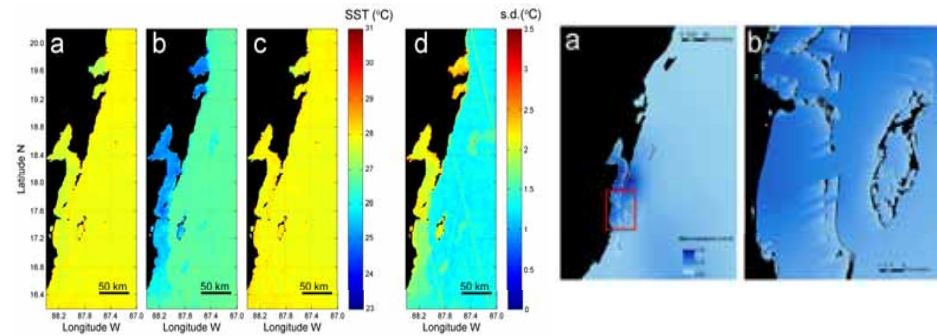
Note: For more information on asymmetries, see the Metadata.

World Bank

- initial demonstrations



- 6 initial small-scale demonstrations done in 2009/10
 - Water quality : Lake Titicaca
 - Coral reef health & stress : Caribbean
 - Coastline change : Bangladesh
 - Urban subsidence : Alexandria & Tunis
- Now begin more substantial demonstrations across a wider range of (12) Bank projects in 2011,
- Focus on European Missions, European specialist service providers, technical oversight by ESA.

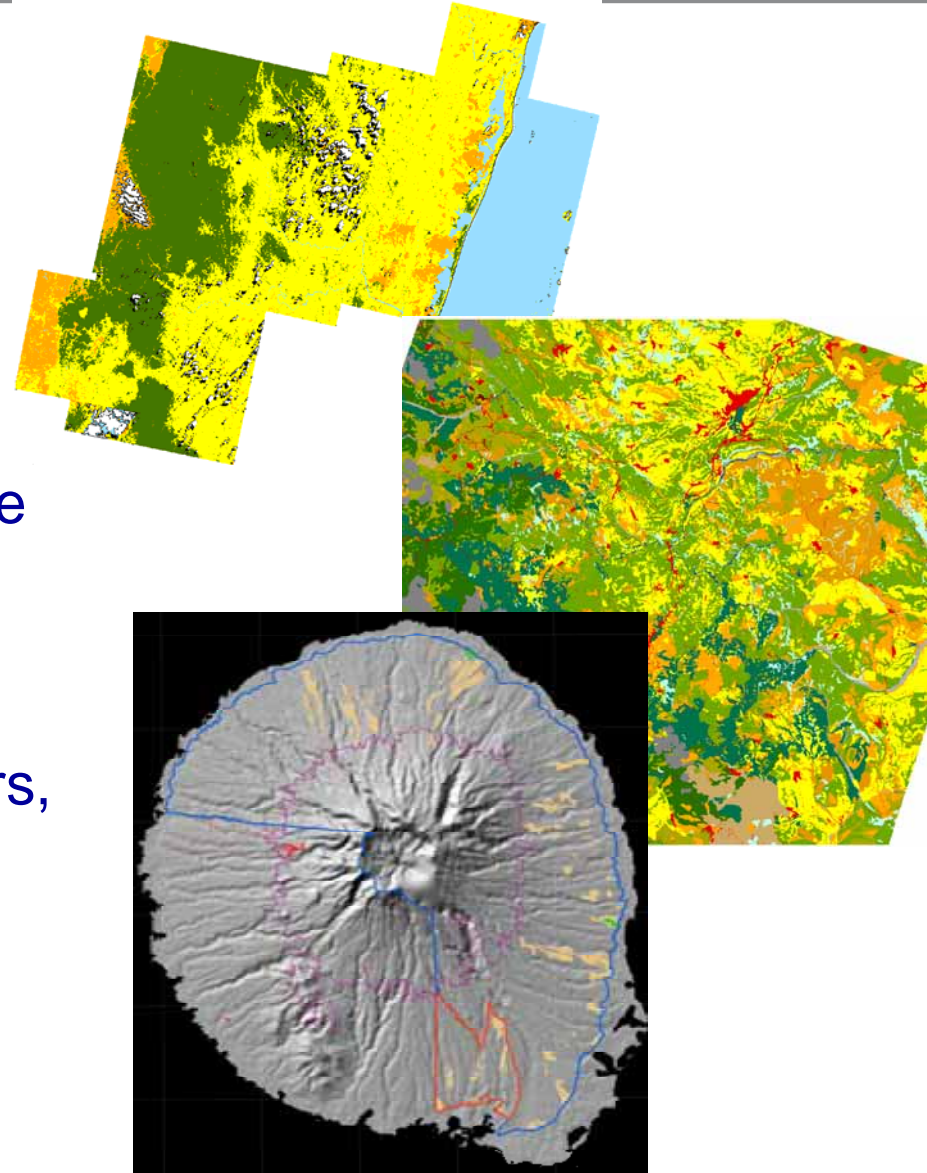


European Investment Bank

– initial demonstrations



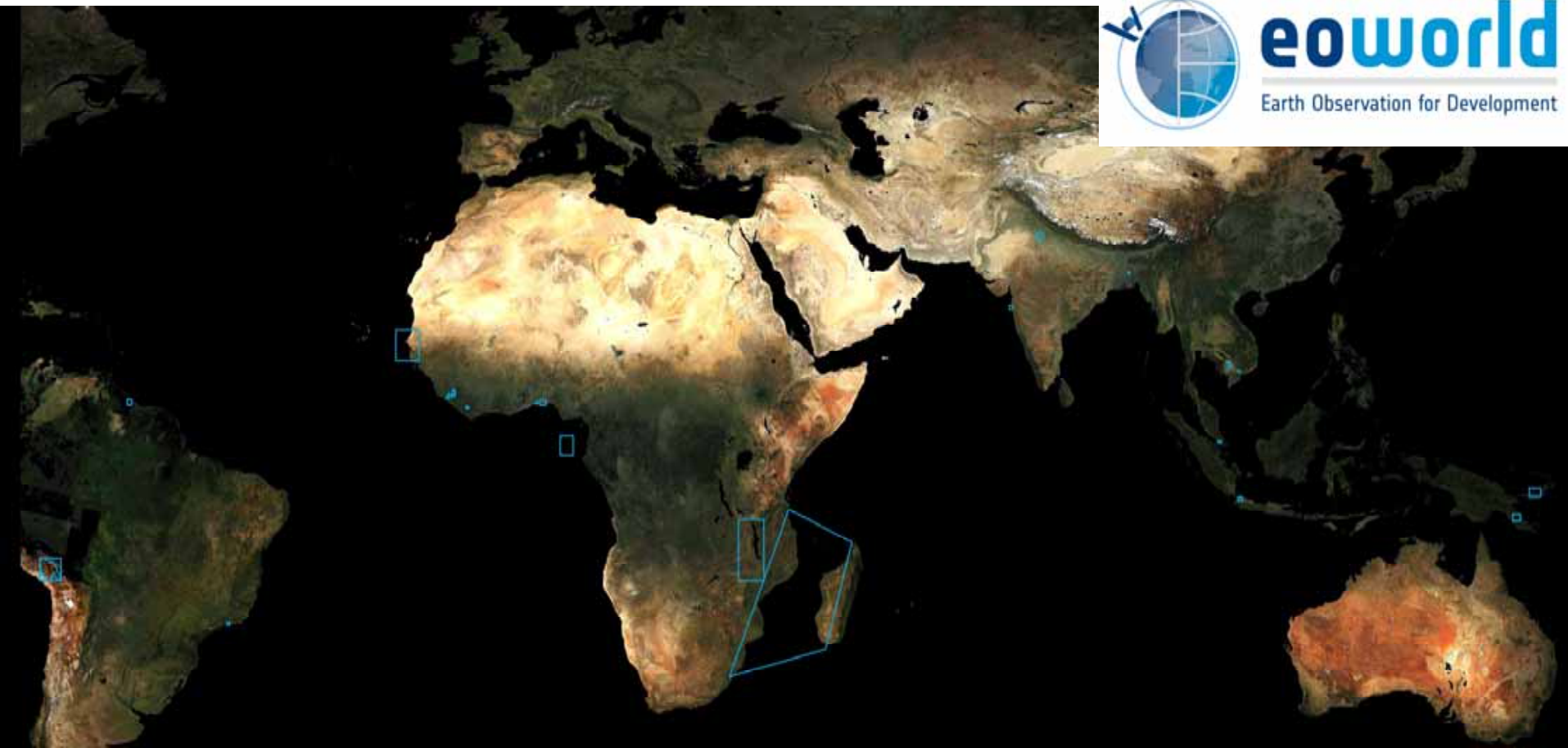
- 3 initial small-scale demonstrations done in 2009/10
 - Forest Monitoring : Madagascar
 - Habitat Monitoring : Greece
 - Forest Re-plantation : Soloman Islands
- Now begin more substantial demonstrations across a wider range of (11) Bank projects in 2012,
- Focus on European Missions, European specialist service providers, technical oversight by ESA,
- Local 'Technical Agent' (LuxSpace) for EIB requirements definition.



12 World Bank Projects now starting (www.worldbank.org/earthobservation)



- **Land** (Urban Infrastructure, Land Cover, Forest, Crops, Soil erosion, In-land Water)
- **Marine** (Oil-spill, Coral Reef, Coastal Change, Sea-level Height, Ocean Currents)
- **Risk** (Land Motion Histories)



European EO Services Industry profile

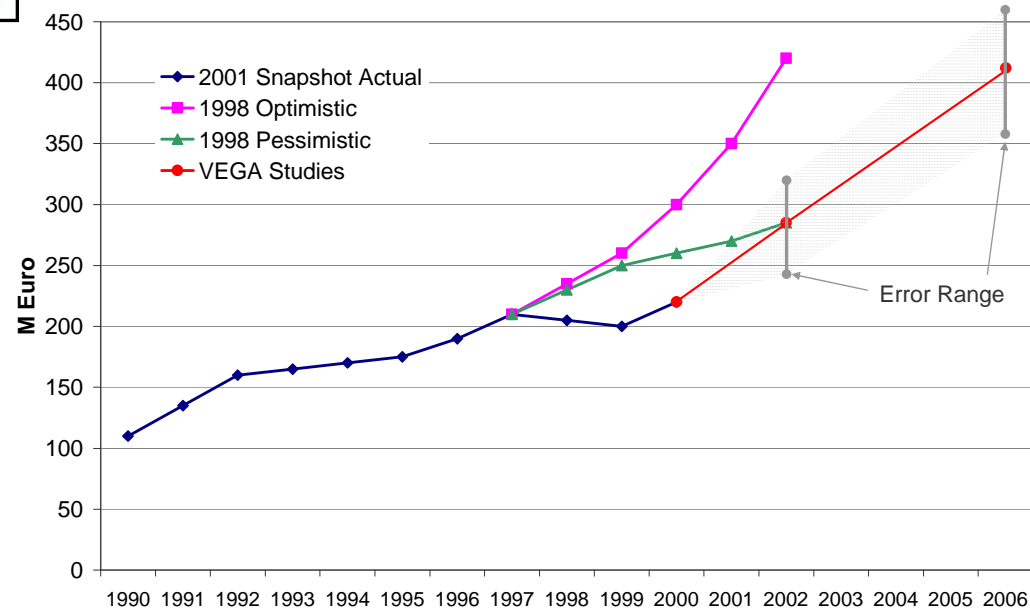


- Unique, in-depth survey of European EO Services industry capabilities, constraints, issues
- Baseline 2003, Updated 2006, Update for 2010 in progress
- Cited by Euro-Consult, OECD

- 2006 Revenues estimate :
412 M€ (services + data)
306 M€ (services only)
Growing at 8% CAGR

- ~ 3000 employees

- 2010 rough figure ~ 600 M€
 (EARS : includes S/W, GIS, Data)

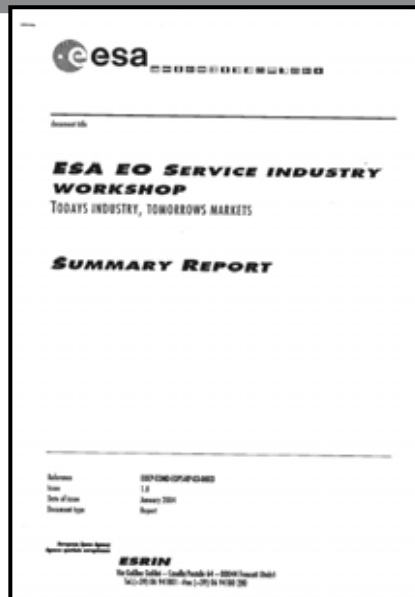


EO Service Industry sets priorities



Oct 2001

EOEP-1 (2000-2002)



Jan 2004

EOEP-2 (2003-2007)



Nov 2007

EOEP-3 (2008-2012)

- **Regular Briefings/Workshops with European EO Services industry**
 - 100 + companies at each event.
 - Priorities for scales, types and implementation of support needed.
- **Bi-laterals with national activities (F, D, I, UK, N, NL, Fi, P, Gr, IRL)**

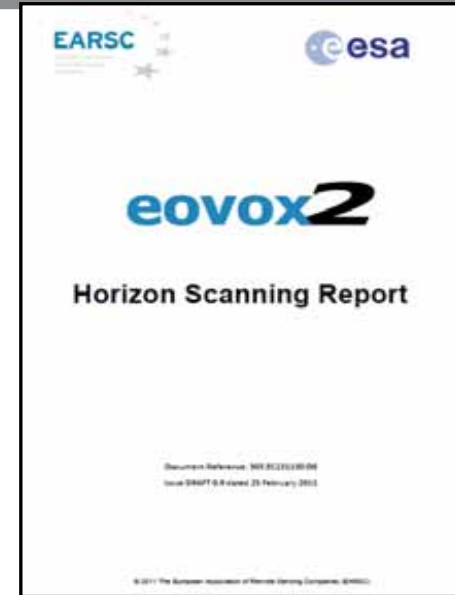
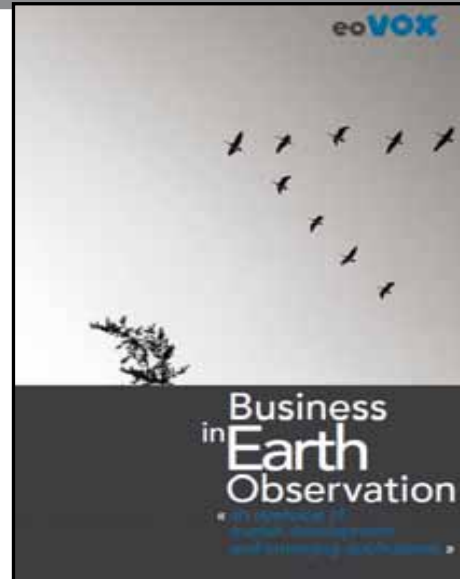
Corporate Industry & Multi-Lateral Development Banks

- Jun 2003 : **Renewable Energy Industry**
(33 companies)
- May 2008 : **World Bank Group**
- Dec 2008 : **UN International Fund for Agricultural Development**
- Dec 2008 : **European Investment Bank**
- Sep 2009 : **Insurance Industry**
(15 companies)
- Oct 2009 : **SwissRe (Flood Risk)**
- Sep 2010 : **Oil & Gas Industry**
(40 companies)



➤ **Information requirements**
(technical specs for EO services)

EO Service Industry : Future Priorities



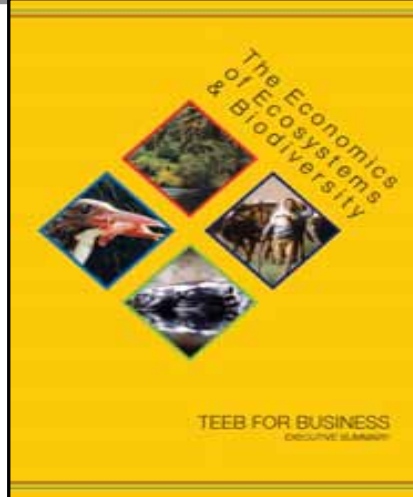
- Increased cooperation with European Industry Trade Association
- Horizon Scanning : Big Issues
Climate Change, Sustainable development, Mobile technology, Standards, GMES IO framework, ...
- Detailed Position Papers
(GMES operations, International Development,)

EARSC

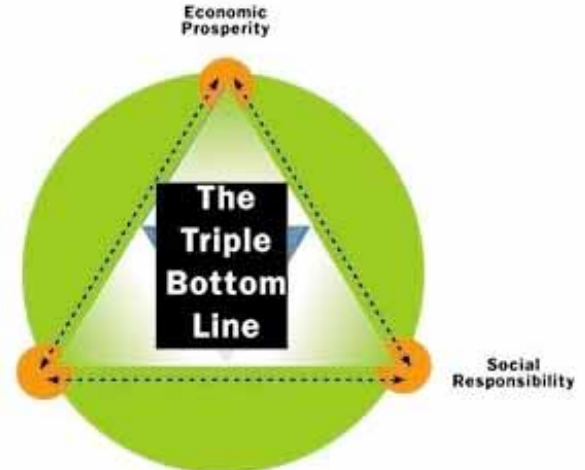
European Association
of Remote Sensing
Companies



Next Few Years Green Business



World Business Council for Sustainable Development

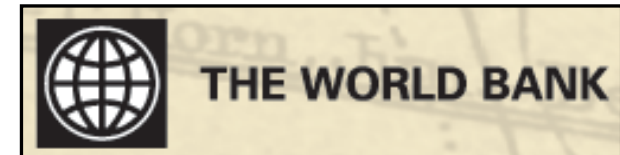


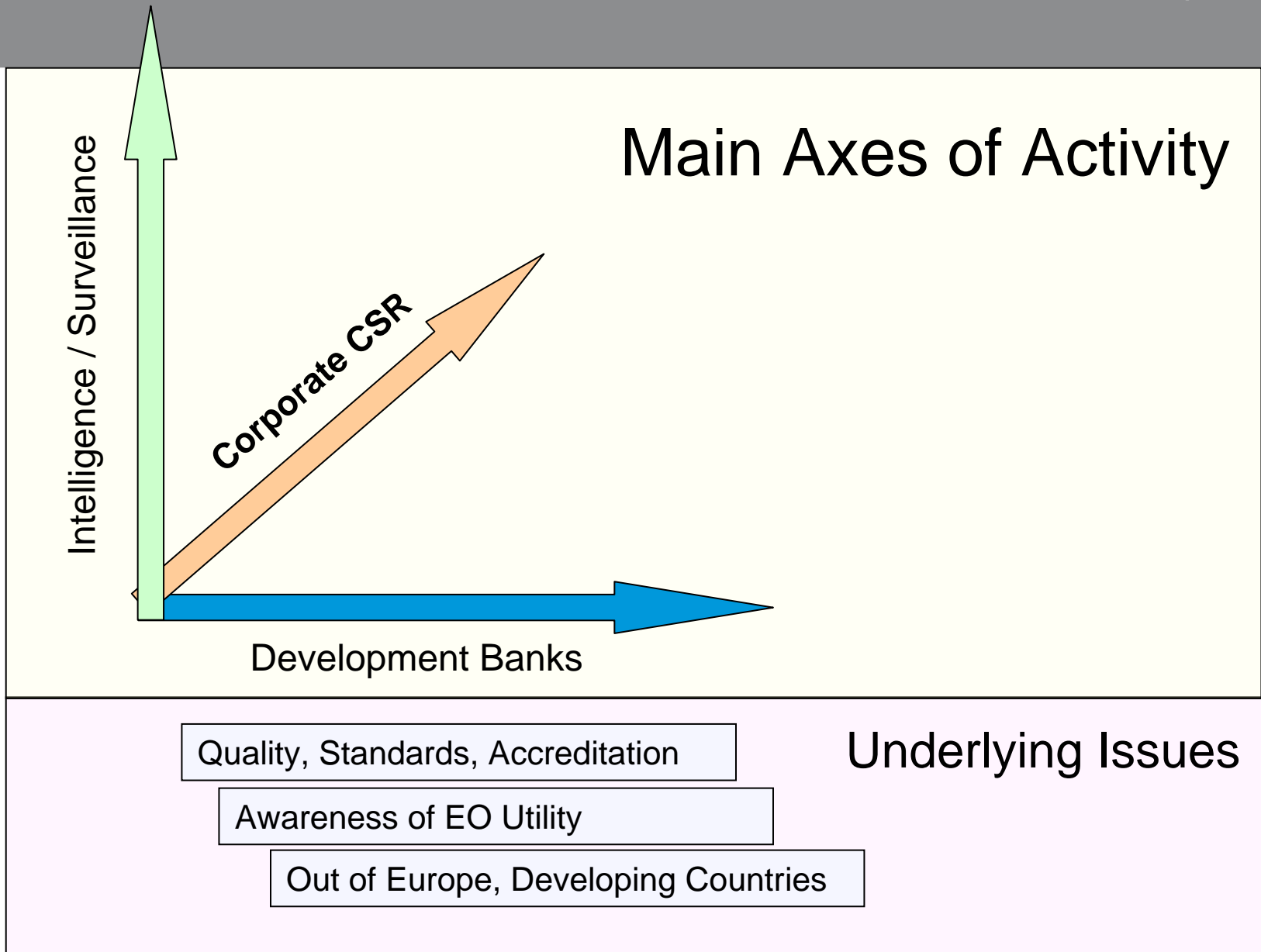
- Large Corporate Industry, NGO's,
- Sustainable Development, Social Responsibility, Environmental Impact, Eco-Systems Services,...

Next Few Years Green Development

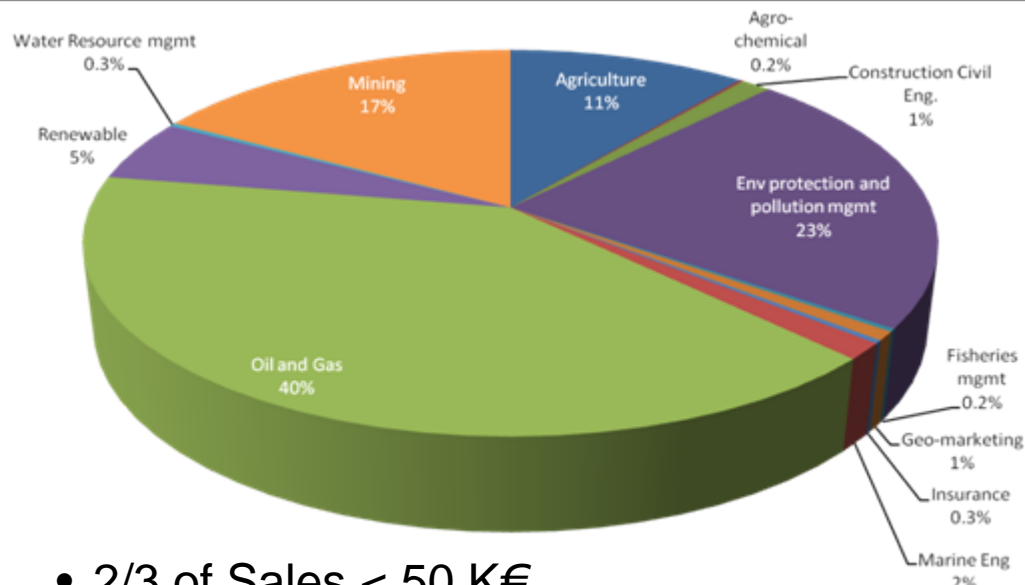


- Multi-Lateral Development Banks, NGO's
- Climate Change Adaptation, Mitigation,
- Strategic Climate Fund, Green Climate Fund,





Improving the competitive position of the European EO Services industry

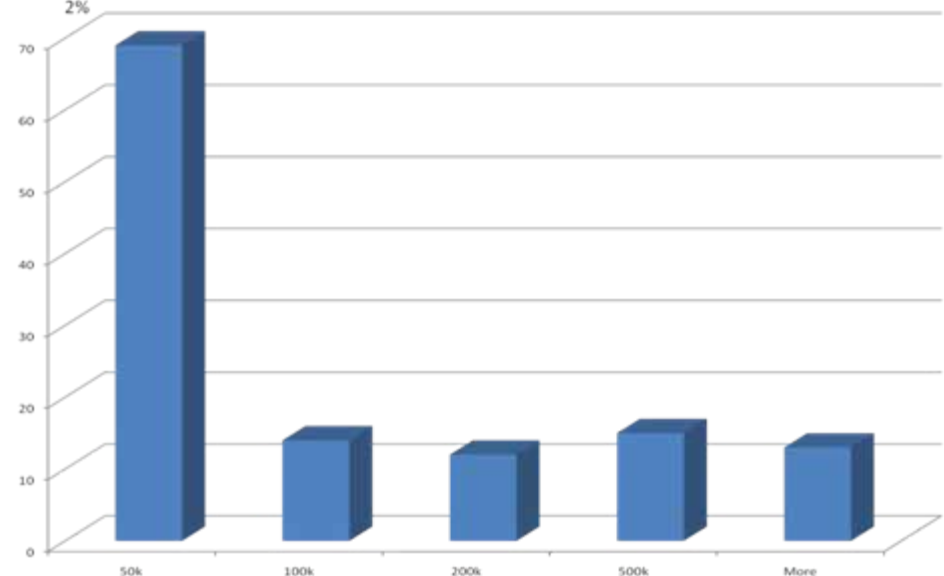


- **48.2 M€** Total Service Sales (to date; is evolving)

- Following ESA contract,

- 1€ spent -> 2€ generated

- 2/3 of Sales < 50 K€,
- Largest single sales (both out of EU)
 - Oil & Gas market (> 10M€, 5 years)
 - Agriculture market (> 4 M€, 3 years)
- Marine & Coastal Surveillance largest commercial service sector (ice, oil spill, vessels, bathymetry)
- Sales can take > 5 years to realise after initial demonstrations.



For further Info : www.esa.int/eomd



Thank You !

**The ESA Earth
Observation
programmes**

*... understanding our planet
... securing our environment
... benefiting our economy*