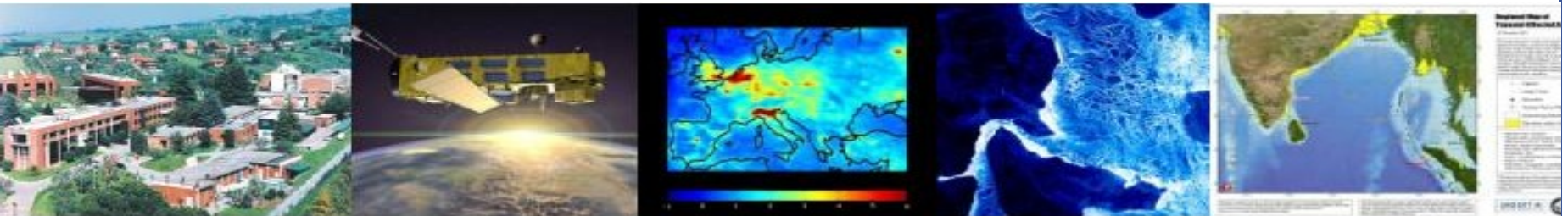
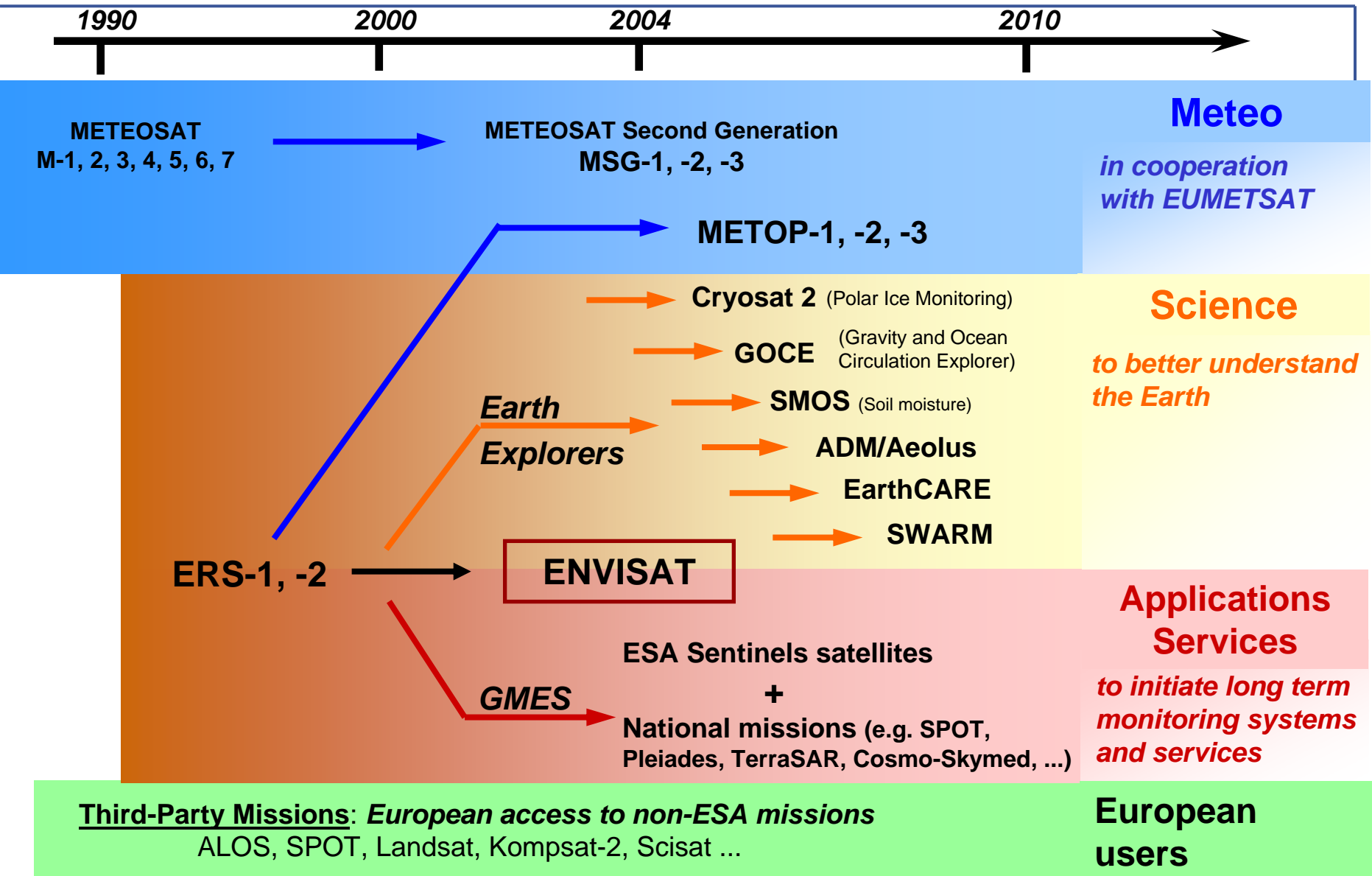


The Earth Observation Programme at ESA



24-October-2007,
International Ice Charting Working Group Meeting
Simon.Jutz@esa.int
Earth Observation Programmes Directorate
European Space Agency

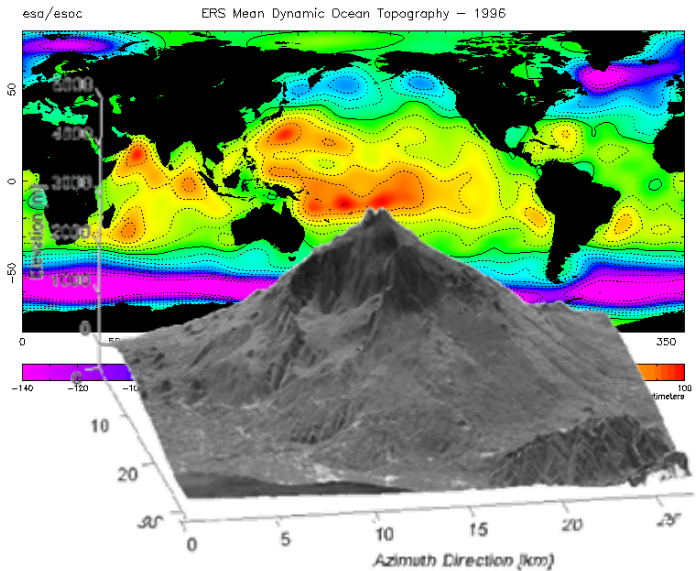


ERS 1 (1991 – 2000):
Oceans, sea ice, cryosphere, land surface & climatology

ERS 2 (1995 – still operational):
(...) *plus* global ozone & terrestrial biosphere monitoring

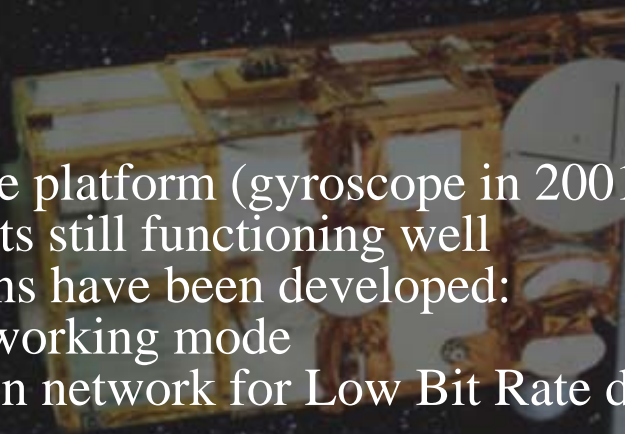
Results of 16 years ERS missions:

- basis for long-term environmental monitoring → “climate change” research results from ERS have been of relevance for IPCC
- wealth of science and application results
- consolidation of a large EO community

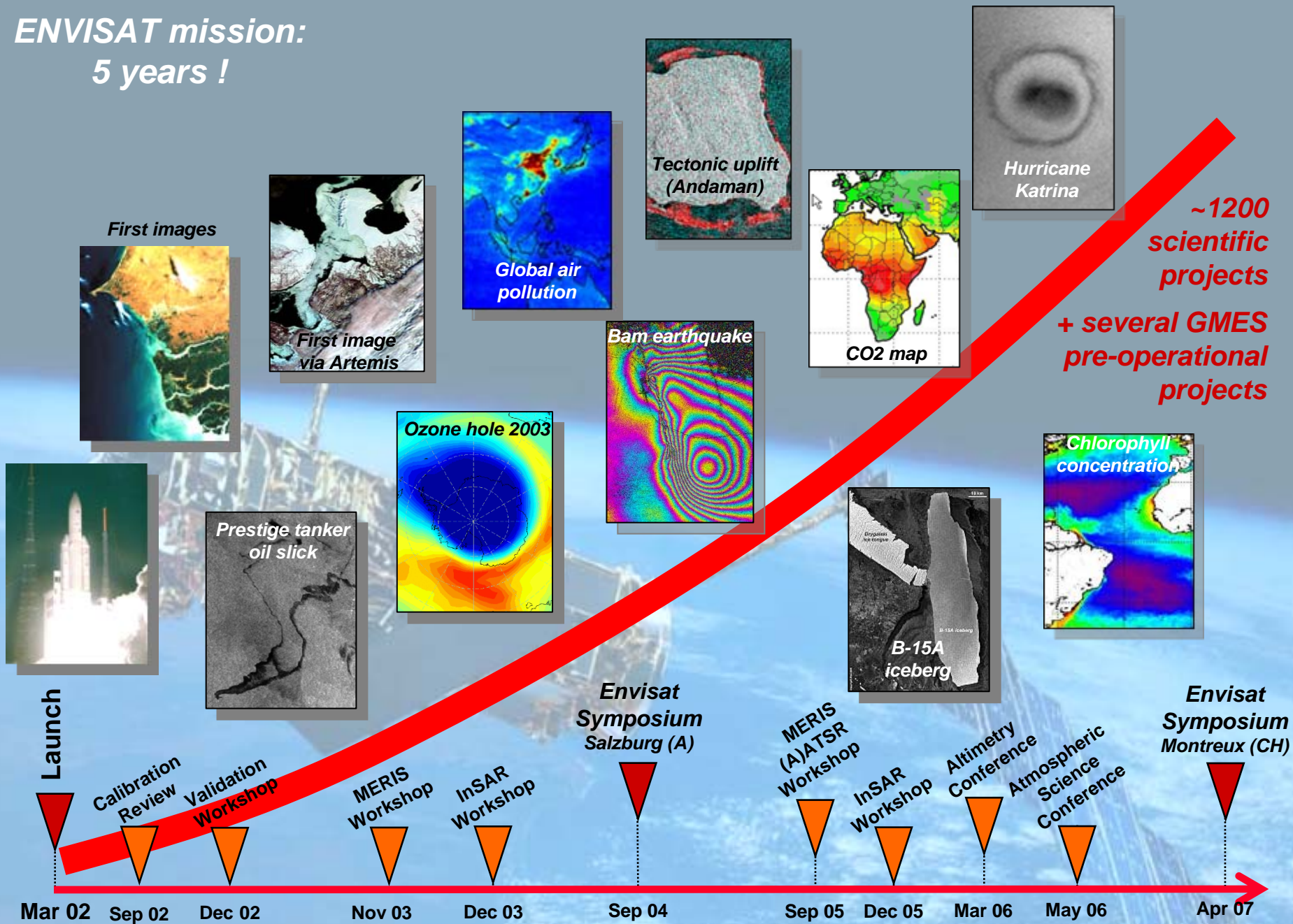


ERS-2 mission

- ERS-2 after 12 years mission:
 - ❑ technically ERS-2 is performing well, however power budget needs to be monitored
 - ❑ LBR station extension continues
 - ❑ All missions fully supported; since 2006 also the classical interferometry
 - ❑ ERS-2 SAR mission is one of the “fastest” SAR mission. Planning request in the morning results in data on disk in the evening
- Some problems with the platform (gyroscope in 2001, tape recorder in 2003) but all instruments still functioning well
 - engineering solutions have been developed:
 - new 'gyro-less' working mode
 - set up of a station network for Low Bit Rate data recovery

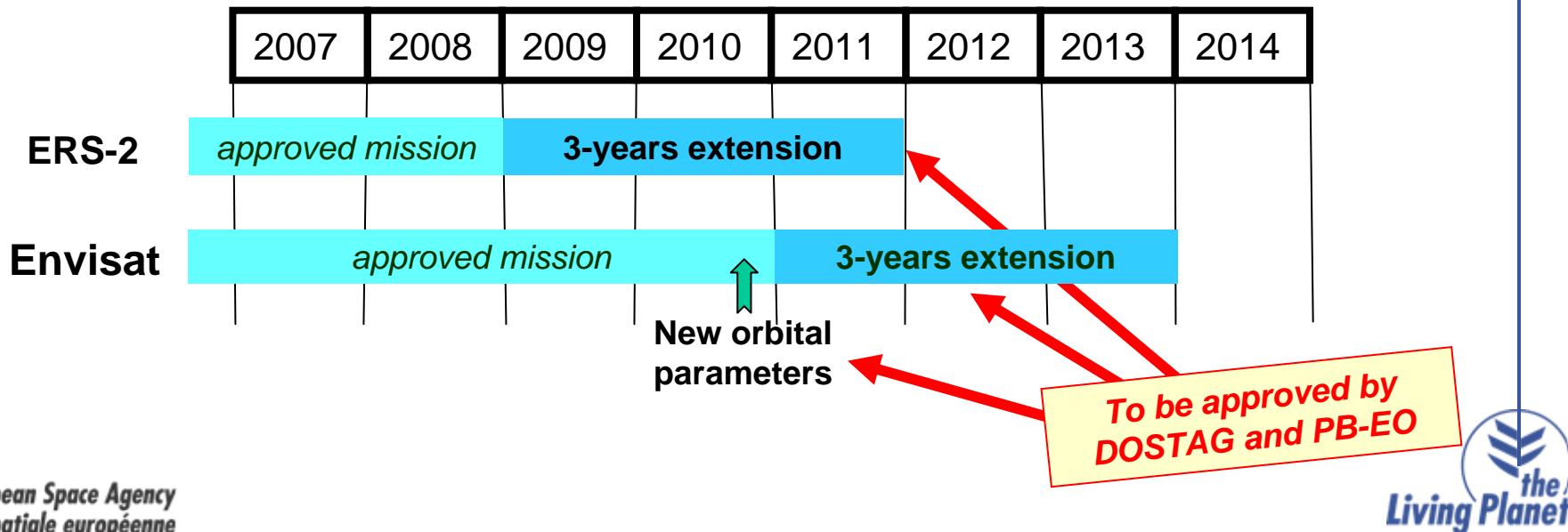


ENVISAT mission: 5 years !

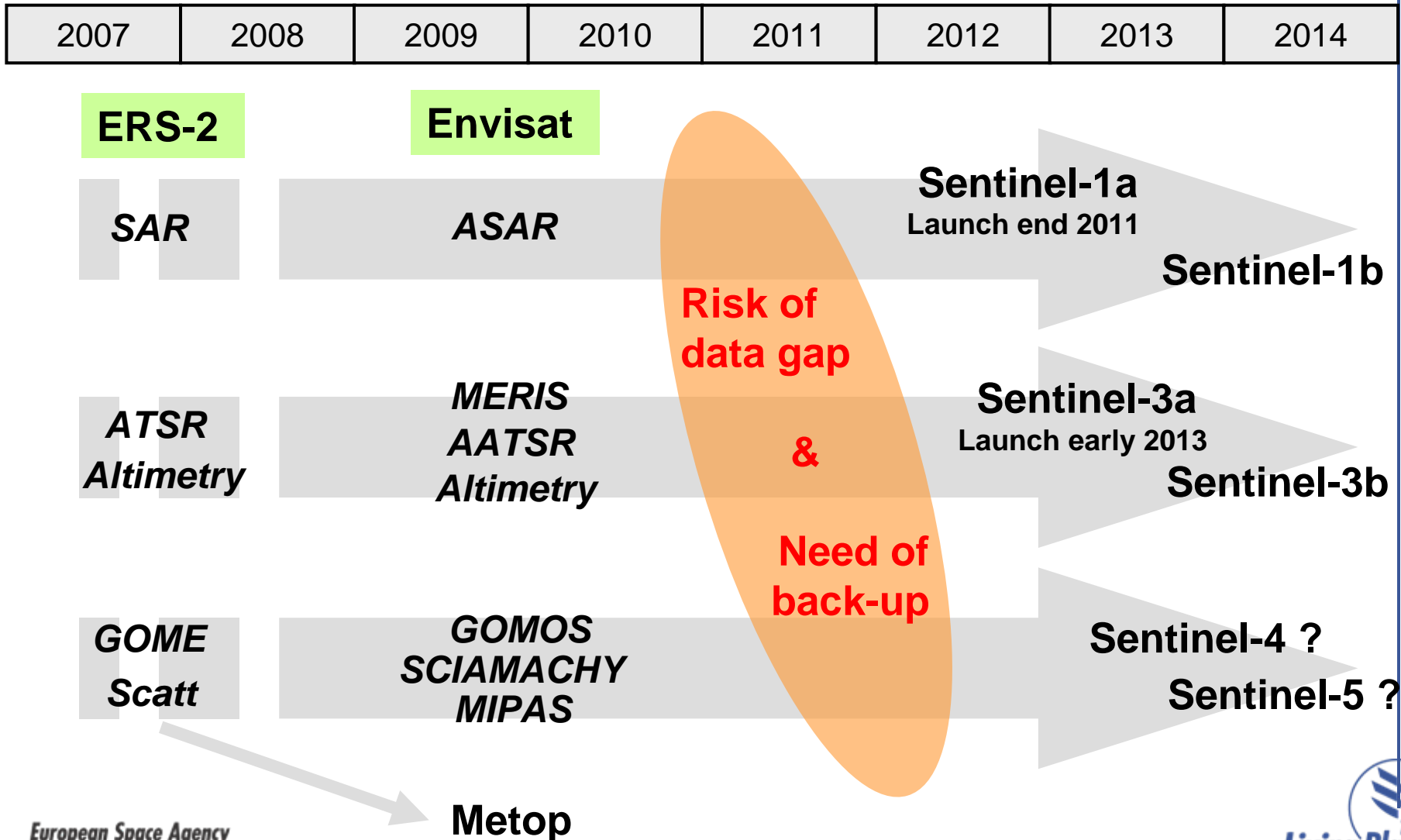


- ❑ Envisat operations funding until 2010
- ❑ 78 different types of ESA Envisat data products
- ❑ 280 Gigabytes of data products generated per day at ESA
→ 500 Terabytes to date
- ❑ Envisat mission: <http://envisat.esa.int>
- ❑ Category 1 use registration or proposal:
<http://eopi.esa.int>
- ❑ ESA web portal: <http://www.esa.int>
- ❑ Envisat images: <http://earth.esa.int/earthimages>
<http://miravi.eo.esa.int>

- The proposal for the EO Envelope Programme – 3rd Period (2008-2012) includes, in its Development and Exploitation component, the provision for operating the ERS-2 satellite until 2008 and the Envisat satellite until 2010.
- The current spacecraft status allows to further extend the operations of both missions by 3-years in order to respond to the user communities demand, i.e. until 2011 for ERS-2 and until 2013 for Envisat.
- The Envisat 3-years extension requests a modification of the orbital parameters in 2010 as the on-board hydrazine will be almost completely consumed by 2010.



The context



Extension scenario

. End of phase E3 (i.e. nominal mission): *(56 kg ± 15 kg remaining fuel)*
~ October 2010

. Altitude change: -17.4 km *(~34 kg needed fuel)*

. Phase E4 (i.e. “extended” mission): *(22 kg ± 15 kg available fuel)*

- . Repeat cycle: 30 days / 431 orbits
- . Orbit control: altitude only, inclination drift
- . MLST variation: first, 22:00 to 22:10, then 22:10 to 21:50
- . Artemis availability expected up to 2013 (to be confirmed with Artemis team)

. End of phase E4: ~ mid 2014 *(00 kg ± 15 kg remaining fuel)*

Global Monitoring for Environment and Security (GMES)



European independence in data sources for
environment and security monitoring

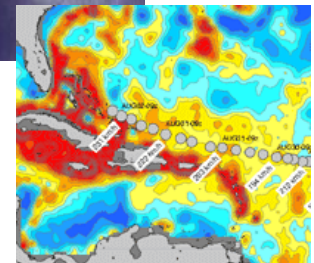
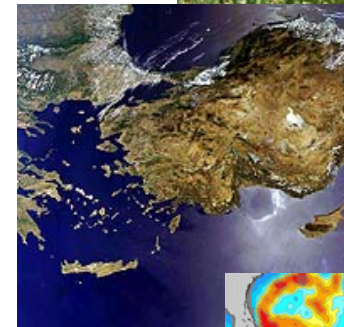
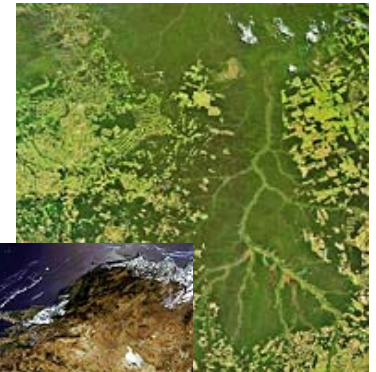
and

The European contribution to the Global Earth
Observation System of Systems (GEOSS)

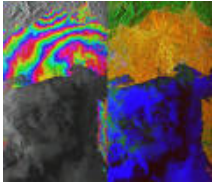
Content of the GMES Space Component Programme

- **Development, launch and IOV of the Sentinels**
 - Sentinel 1
 - Sentinel 2
 - Sentinel 3
 - Sentinel 4 (*instrument on MTG, tbc*)
 - Sentinel 5 (*instrument on Post-EPS, tbc*)

- **Ground Segment**
 - Access to EO data for ESA, Eumetsat, Member States' missions and TPM for GMES services (Fast Track)
 - Development of Sentinel GS

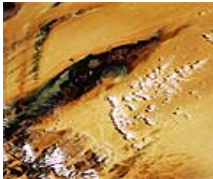


The GMES Sentinels



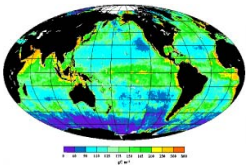
Sentinel 1 – SAR imaging

All weather, day/night applications, interferometry



Sentinel 2 – Superspectral imaging

Continuity of Landsat, SPOT & Vegetation-type data



Sentinel 3 – Ocean monitoring

Wide-swath ocean color and surface temperature sensors, altimeter



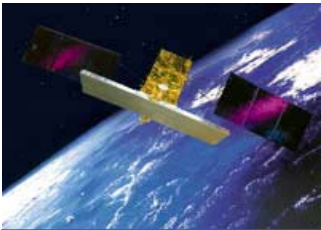
Sentinel 4 – Geostationary atmospheric

Atmospheric composition monitoring, trans-boundary pollution

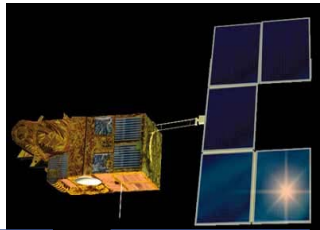
Sentinel 5 – Low-orbit atmospheric

Atmospheric composition monitoring

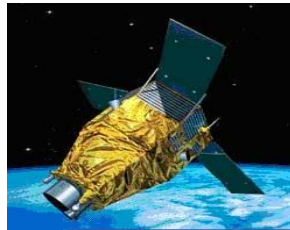
National, Eumetsat and Third Party Missions for GMES (excerpt)



CosmoSkymed



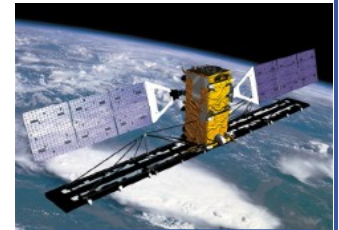
SPOT



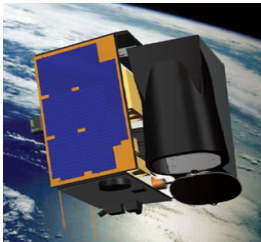
Pleiades



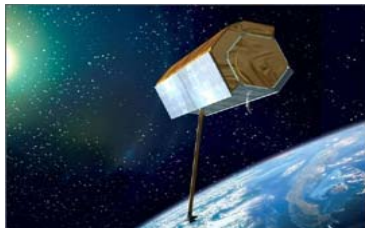
Jason-2



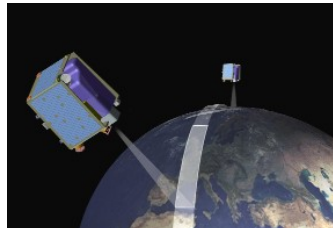
Radarsat



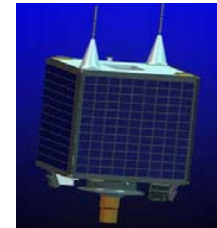
TopSat



Terrasar-X



Rapideye



UK-DMC

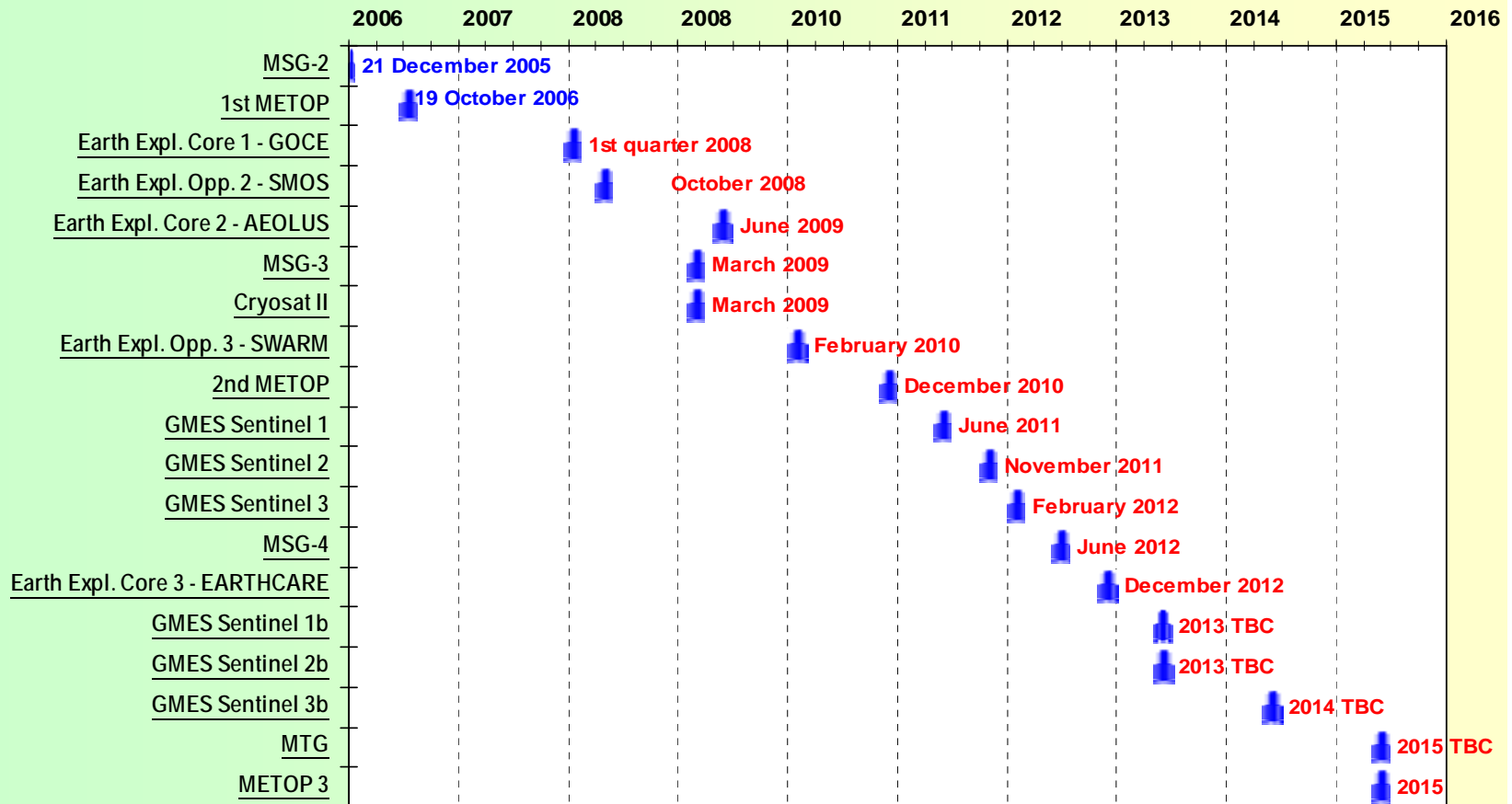


METOP

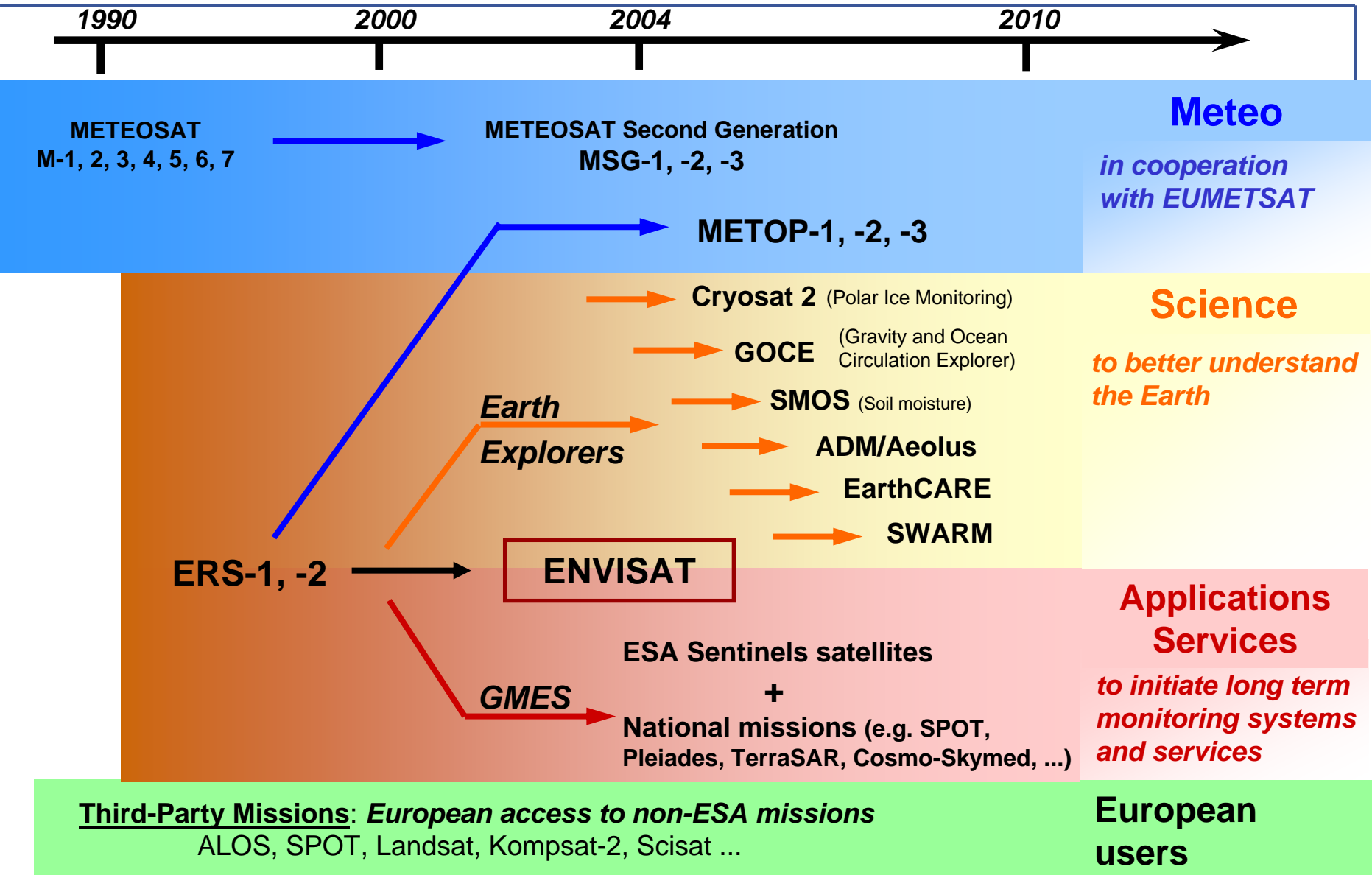
Mission		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Operator
Sentinel 1	ERS (C)	◆	█	█	█	█	█							ESA
	ENVISAT ASAR (C)	◆	█	█	█	█	█	█	█					ESA
	Radarsat-1	◆	█	█	█	█								CSA
	Radarsat 2 (C)					█	█	█	█	█	█	█		CSA/MDA
	TerraSAR-X (X)	◆			█	█	█	█	█					DLR/Infoterra
	Cosmo-Skymed (X)									█	█	█		ASI
	ALOS PALSAR (L)	◆			█	█	█	█	█					ESA/JAXA
	HJ-1C (S)					█	█	█	█					CNSA
	RISAT (C)									█				ISRO
	KOMPSAT-5 (X)							█	█	█	█	█	█	KARI
	Tandem-X (X)	◆							█	█	█	█		DLR/Infoterra
	SAOCOM 1A/1B (L)	◆								█	█	█	█	CONAE
	ALOS-2/PALSAR-2	◆								█	█	█	█	JAXA/ESA
	Radarsat-Constellation (C)	◆									█	█	█	CSA
	Sentinel 1 (C)	◆									█	█	█	ESA

◆ = already Cat-1 approved

e D / E O P Overall Launch Schedule



More missions are in the planning, yet not included due to not yet defined launch dates: Sentinel-4, Sentinel-5 and the 7th Earth Explorer



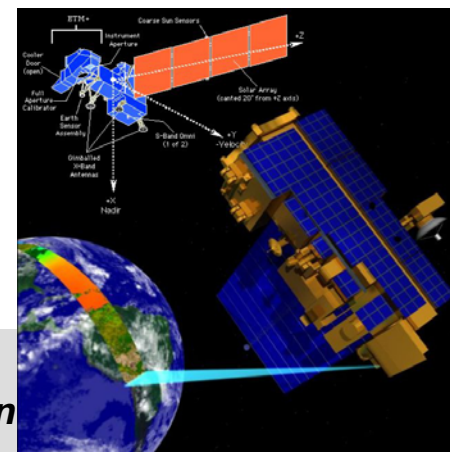
The Earthnet Programme

Objectives:

- Serving European users with **non-ESA / non-European data**
- Fostering European user communities and science competence
- Synergistic use and joint exploitation of ESA and Third Party data
- Complementing existing ESA Earth Observation Missions
- Setting up Ground Segment co-operation (e.g. contingency agreements, joint mission planning)

- **Long-term commitment:**

EARTHNET has been established 30 years ago!



The historical JERS-1 mission

Third Party Missions

- Missions **not operated by ESA**
- for which ESA assumes some **responsibility** / contributes financially (*sharing of Ground Segment facilities or operations cost*)
- for which ESA assumes a **data distribution responsibility**, mainly towards the European Scientific User Community



	Missions	Sensor	Data Coverage	Time coverage	Today available on
Historic	IRS-P3	MOS	Maspalomas station circle	1998-2004	on-demand, media
	JERS-1	OPS	European station coverage	1992-1998	on-demand, media
		SAR			
NIMBUS	CZCS	European station coverage	1978-1986	on-demand, media	
Operational	Proba	CHRIS	Global	2001-today	systematic online, ftp
		HRC	Global		
	Landsat	MSS, TM, ETM	European coverage	~1990, ~2000	systematic online, ftp
	KOMPSAT-1	EOC	European cities	1999-2004	systematic online, ftp
	SCISAT-1	FTS	Global	2003-today	systematic online, ftp
		MAESTRO	Global		
	Terra/Aqua	MODIS	Europe/North Africa	2001-today	on-demand, media
	NOAA	AVHRR	Europe/North Africa	1984-today	on-demand, media
	QSCAT	SeaWinds	Global	2000-today	systematic online, ftp
Orbview	SeaWifs	Europe/North Africa	1998-2004	on-demand, media	

			Data	Time	Today
	Missions	Sensor	Coverage	coverage	available on
	SPOT: Opening of online L1A SPot2-SPot4 archive on 19-Mar-2007 with > 11.000 products!! • 10m pan • 20m multispectral + capacity for new acquisition planning				
	SPOT-1,-2,-3,-4*	HRV(IR)	additional cost)	today	access
		PALSAR			
		AVNIR-2			
	ALOS	PRISM	Worldwide	Oct 2006 - today	Media, ftp, on-demand
	KOMPSAT-2	MSC	Europe, Africa, some	TBD	on-demand, FTP (default), media (on request)

Access to ESA Earth Observation data

(past and current missions)

EOLI-SA: ESA multi-mission catalogue

Available at <http://eoli.esa.int>

Navigation: Catalogue, ShopCart, Orders, UserSet

Tools: Navigate, Set Area, Footprints

On Line Collections:

- ENVISAT
 - ASAR
 - ASAR Global Monitoring
 - ASAR Wave Mode
 - ASAR Image Mode
 - ASAR Alternating Polarisation
 - ASAR Wide Swath
 - ENVISAT MERIS
 - ENVISAT AATSR
 - ENVISAT MIPAS
 - ENVISAT SCIAMACHY

Query Mode: Standard

Date: 22-Jul-2005 to 26-Jul-2005

Area: Center Lat/Lon (35:27:55, 126:29:39) / Height/Width (2960.20, 3053.23)

34 item(s) in Catalogue (34 out of 34 from last Query) - 1 item(s) selected

Id	Product	Mission	Sensor	Start	Swath	Tree
17	ASA_IM	Envisat	ASAR/IM	2005-07-26 02:58:45.85	I2	204
18	ASA_WS	Envisat	ASAR/WS	2005-07-22 01:48:15.22	WS	146
19	ASA_WS	Envisat	ASAR/WS	2005-07-23 02:55:41.40	WS	161
20	ASA_WS	Envisat	ASAR/WS	2005-07-23 14:08:41.62	WS	168
21	ASA_WS	Envisat	ASAR/WS	2005-07-24 12:00:31.37	WS	181
22	ASA_WS	Envisat	ASAR/WS	2005-07-25 14:46:03.26	WS	197
23	ASA_APU	Envisat	ASAR/AP	2005-07-22 12:59:22.04	I2	153

Submit Query

Results

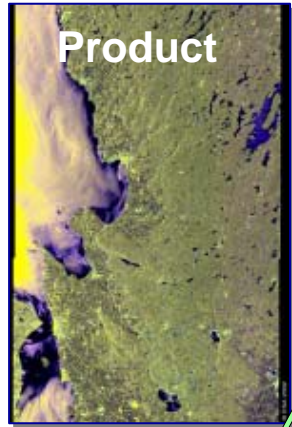
19M/15M

A constant objective:

→ ease access to Earth Observation data

- ❑ **Common objective for all missions data handled by ESA:**
Envisat, ERS, Earth Explorers,
and Third Party Missions (e.g. ALOS, SPOT-4, PROBA, ...)
- ❑ **Simplified data application procedures for Category 1 use**
- ❑ **Internet access to all Near Real Time (NRT) data**
- ❑ **Internet access to archived data gradually implemented (new dataset, new access systems)**
- ❑ **Development of alternative ways to provide data (e.g. processing on demand, toolboxes)**

→ the recent results of Envisat Symposium demonstrated that ESA EO data access has largely improved during the last years.



1- Physical media

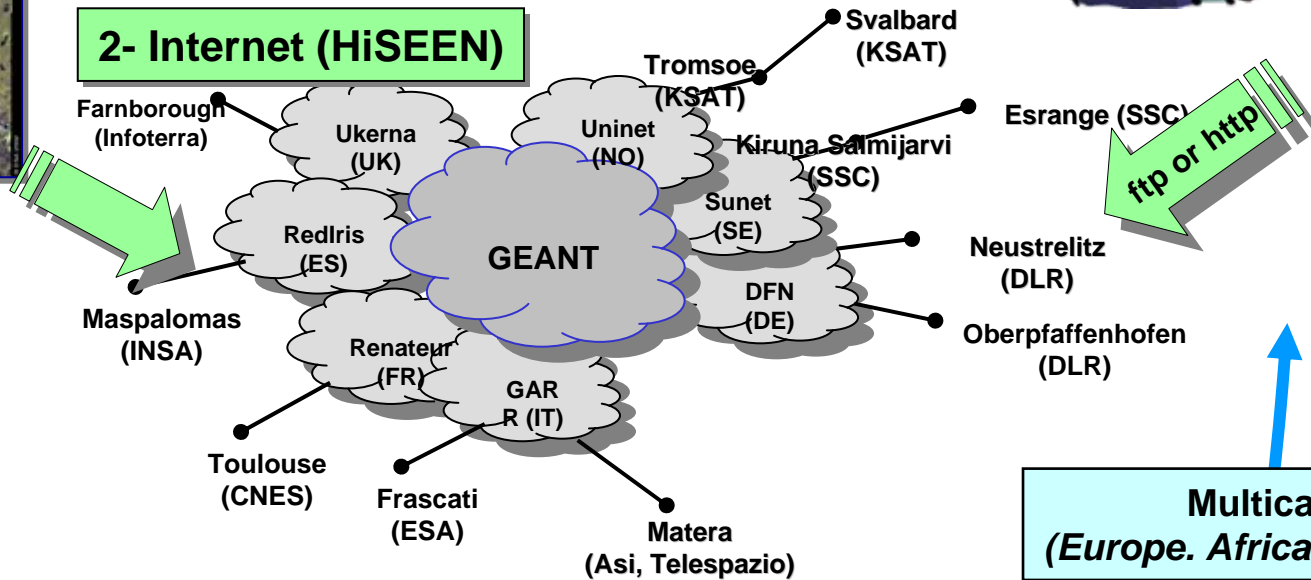


CD-ROM, DVD-ROM, Discs...



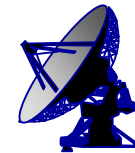
USERS

2- Internet (HiSEEN)



3- DDS

Satellite-based Dissemination



Multicast
(Europe, Africa, America)

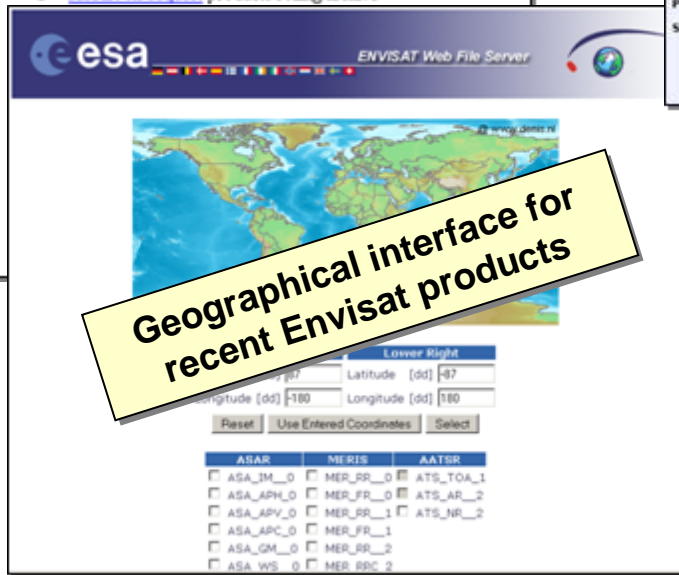
Currently different systems and interfaces providing direct access to EO data for download:



Rolling archive of recent products

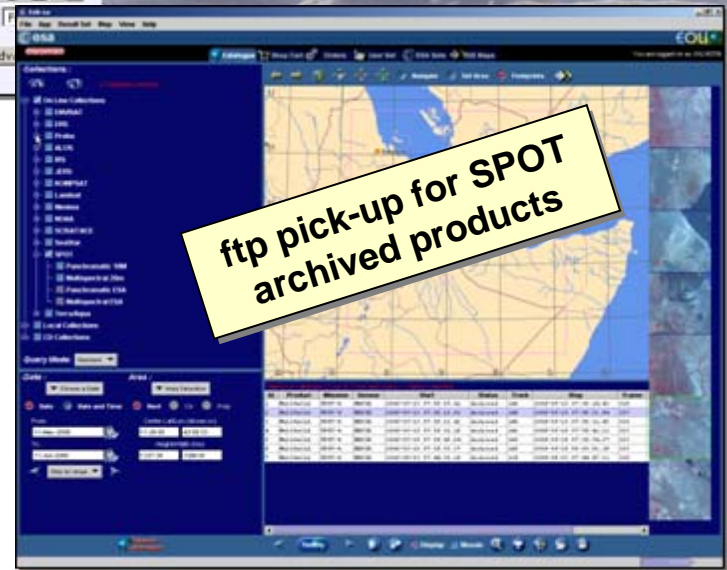


Geographical interface for MERIS/ATSR archived products



Geographical interface for recent Envisat products

ASAR	MERIS	AATSR
<input type="checkbox"/> ASA_IM_0	<input type="checkbox"/> MER_RR_0	<input type="checkbox"/> ATS_TOA_1
<input type="checkbox"/> ASA_APH_0	<input type="checkbox"/> MER_FR_0	<input type="checkbox"/> ATS_AR_2
<input type="checkbox"/> ASA_APV_0	<input type="checkbox"/> MER_RR_1	<input type="checkbox"/> ATS_IR_2
<input type="checkbox"/> ASA_APC_0	<input type="checkbox"/> MER_FR_1	
<input type="checkbox"/> ASA_GM_0	<input type="checkbox"/> MER_RR_2	
<input type="checkbox"/> ASA_WS_0	<input type="checkbox"/> MER_RRC_2	

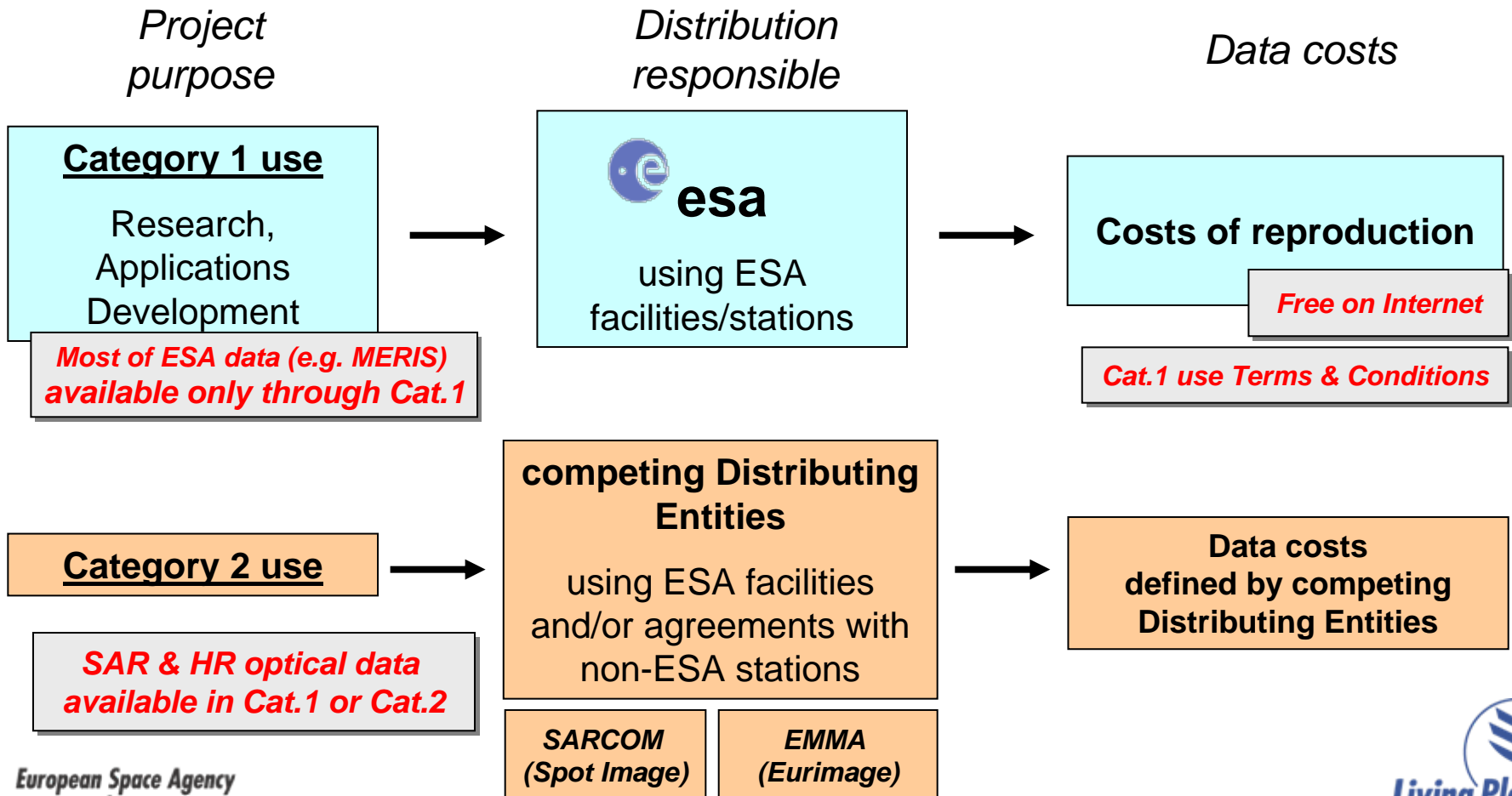


ftp pick-up for SPOT archived products

Objective: to simplify user interfaces for on-line data access

Data policy defined by ESA Member States:

- ❑ to stimulate a balanced development of Science, Public Utility and Commercial Applications, consistent with the mission objectives,
- ❑ to maximize the beneficial use of data from ESA EO satellites.



How to apply for data access within a Category 1 use framework ?

Application for Category 1 use data access can be submitted to ESA at any time using the ESA Earth Observation Principal Investigator portal (<http://eopi.esa.int>)

esa Earth Observation Principal Investigator Portal

<http://eopi.esa.int>

Data Access

- ESA Data Policy
- How to get data
- Open AOs
- Previous AOs

Principal Investigator >> **Evaluator** >> **Correspondent** >> **Contact us**

Results >>

- Surface movements in Bologna (Po Plain, Italy) detected by multitemporal DInSAR
- Towards high resolution monitoring of coastal wind, waves and currents using SAR imagery
- Ground motion induced by lake level fluctuations in western USA
- Ground movement risks identified by TerraFirma
- JERS-1 and ERS-1 comparison for sea-ice monitoring
- Envisat witnesses Earth's largest crack

Update / Report

logon
password
GO >>

Ongoing Calls >>

- SMOS
- IreLux AO
- Category-1
- Category 1 Full Proposal
- Registration
- ESA EO Campaigns
- Third Party Missions

Focus on PI >> **News** >> **PI Training** >> **Search** >>

- Prof. Dr. Richard Bamler
- 2007 ESA ENVISAT Symposium
- Advanced Training Course on Land Remote Sensing [Lisbon, Portugal, 2 to 7 September 2007]
- Main search

Living Planet

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- 02 May 2007 HT
- Data Access**
- ESA Data Policy
- How to get data
- Open AOs
- Previous AOs
- Update & Reporting
- Results & News
- Results
- News
- Search
- Focus on PI
- PI Training
- Information
- About this site
- FAQ
- Related Links
- HOME

Contact us

How to get data

Products systematically available on Internet

→ **Fast Registration**

Free of charge products

Fast registration required, with no deadline for submission. ESA Terms and Conditions to be signed.

Products available on specific request

(e.g. i.e. specific instrument tasking, products not generated systematically, products not available on Internet)

→ **Category 1 Project Proposal**

Available at cost of reproduction (ENVISAT, ERS and Third Party Missions)

Project proposal required, with no deadline for submission, to be evaluated by the Category-1 Scientific Advisory Group

Specific restrictions to the use of data may apply for Third Party Missions

If accepted by ESA, Terms and Conditions to be signed

[Register for the ESA Campaigns data](#)



Products offered within an ESA Announcement of Opportunity (AO)

Available following the specific rules set in the Main Text of the AO (normally free of charge)
Project proposal required, fitting objectives, restrictions and deadlines of the AO, to be evaluated by the AO Scientific Advisory Group

If accepted by ESA, Terms and Conditions to be signed

Click the logo for information about open AOs



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The International Charter on Space and Major Disasters

- Initiated by CNES and ESA, joined by CSA, NOAA & USGS, ISRO, CONAE, BNSC/DMCII, JAXA, and CNSA
- **Unified system of space data acquisition / delivery in case of natural or human-made disasters**
- **Data delivery to civil protection agencies, emergency & rescue services; UN cooperating body since 2003**
- Operational since 2000: 24 hrs on-duty-operator, data resources from all Charter members, 181 activations until September-2007
- *Recent Examples of Charter Activation:*
 - **Bam Earthquake 2003**
 - **Darfur Crisis 2004**
 - **Tsunami Catastrophe 2004/2005**
 - **Hurricane Katrina 2005**





<http://www.esa.int>

<http://earth.esa.int>

<http://envisat.esa.int>

<http://www.eoportal.org>

eohelp @ esa.int