



ERS and ENVISAT Missions

Remote Sensing Workshop Mexico City

22-24 April 2008

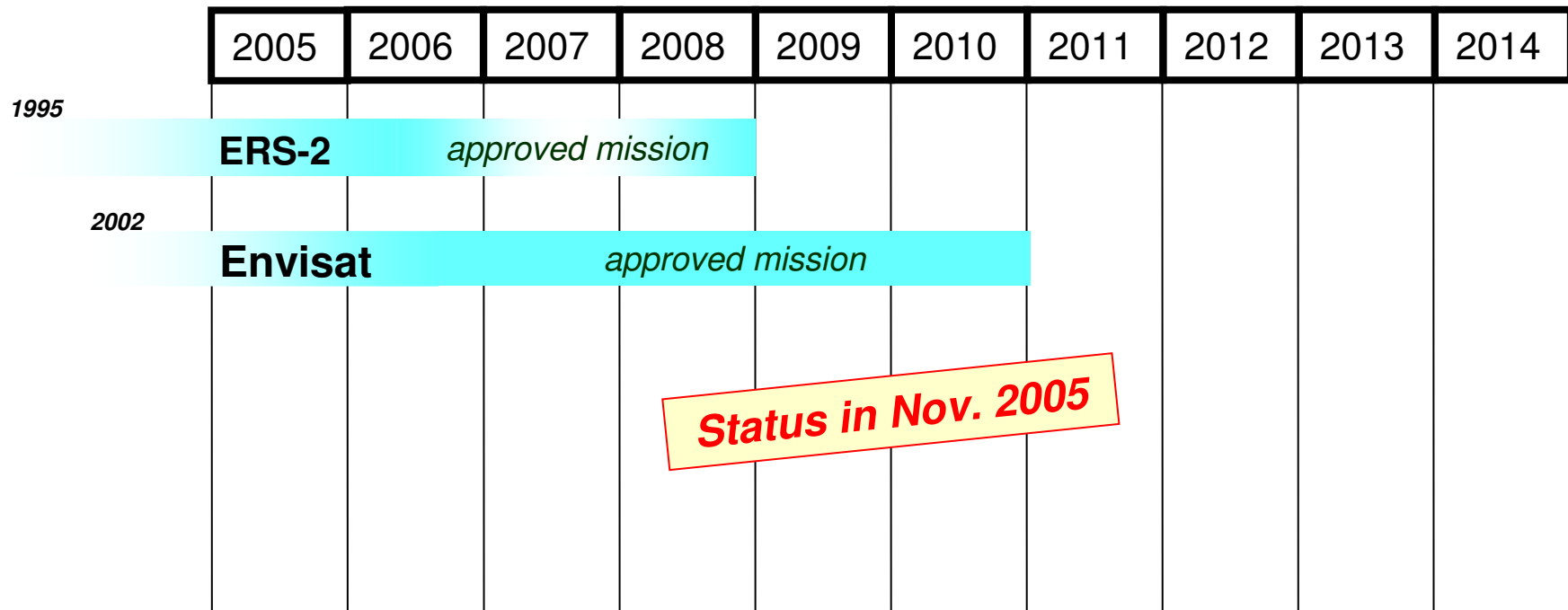
provided by ESA and presented by E. Diedrich



*European Space Agency
Agence spatiale européenne*



ESA missions embarking SAR instruments: a lot of progress and change of perspective



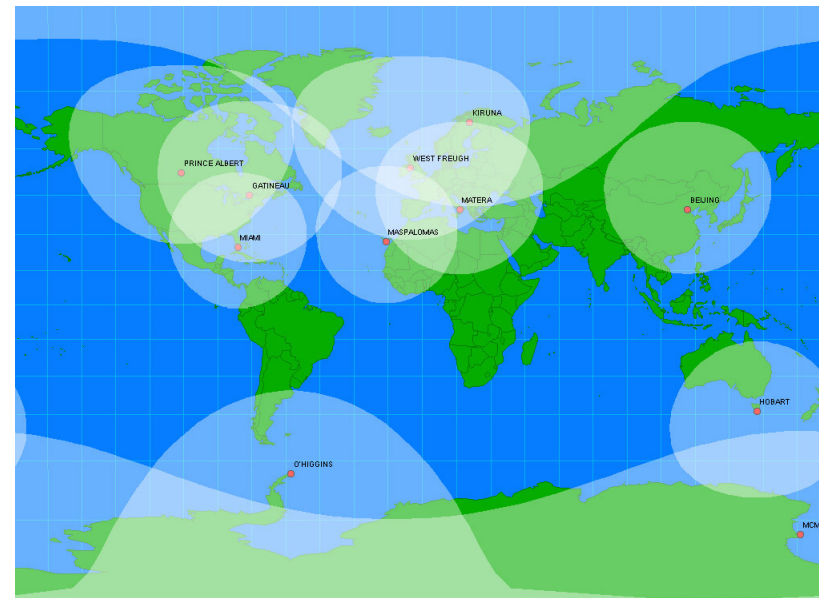
ERS-2 mission

- ❑ 16 years of ERS-1/2 SAR data in the archive
 - ❑ **ERS-2 will achieve 13 years in orbit in April 2008**
 - ERS-2 was designed for 3 years nominal lifetime !
 - ❑ **Ample hydrazine** → ~ 50% left after 12 years
 - ❑ **Platform**
 - preventive measures are implemented on the power system to compensate for ageing
 - ❑ **Instruments**
 - all instruments work satisfactorily and provide useful data
- Good prospect to operate ERS-2 mission until 2011**

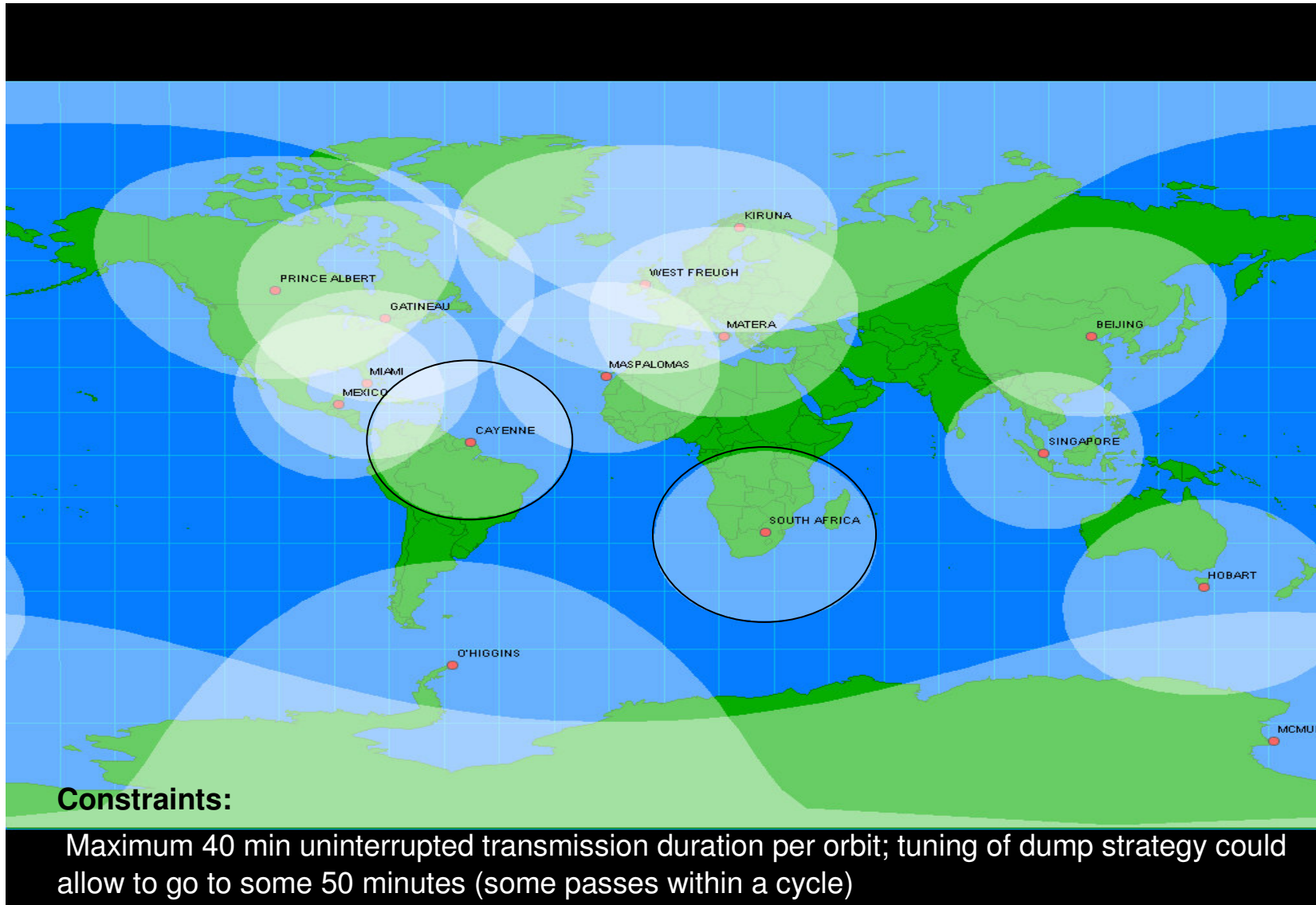
ERS-2 mission status

Life-limiting items (gyros & recorders) compensated through workaround solutions:

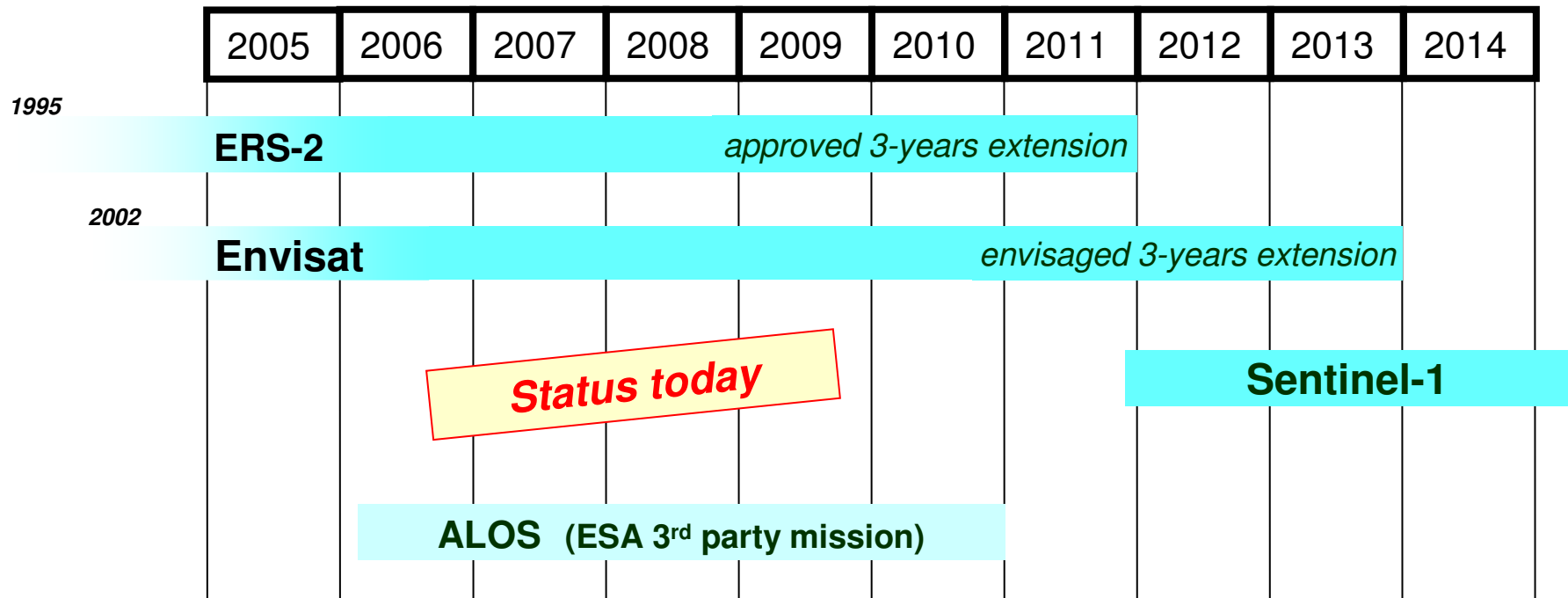
- o Network of SAR data acquisition stations provides a good coverage,
- o SAR interferometry revived: zero-gyro data are being Doppler screened removing the attitude uncertainty.



**Fast ERS-2 SAR
instrument tasking
→ 13 hours**

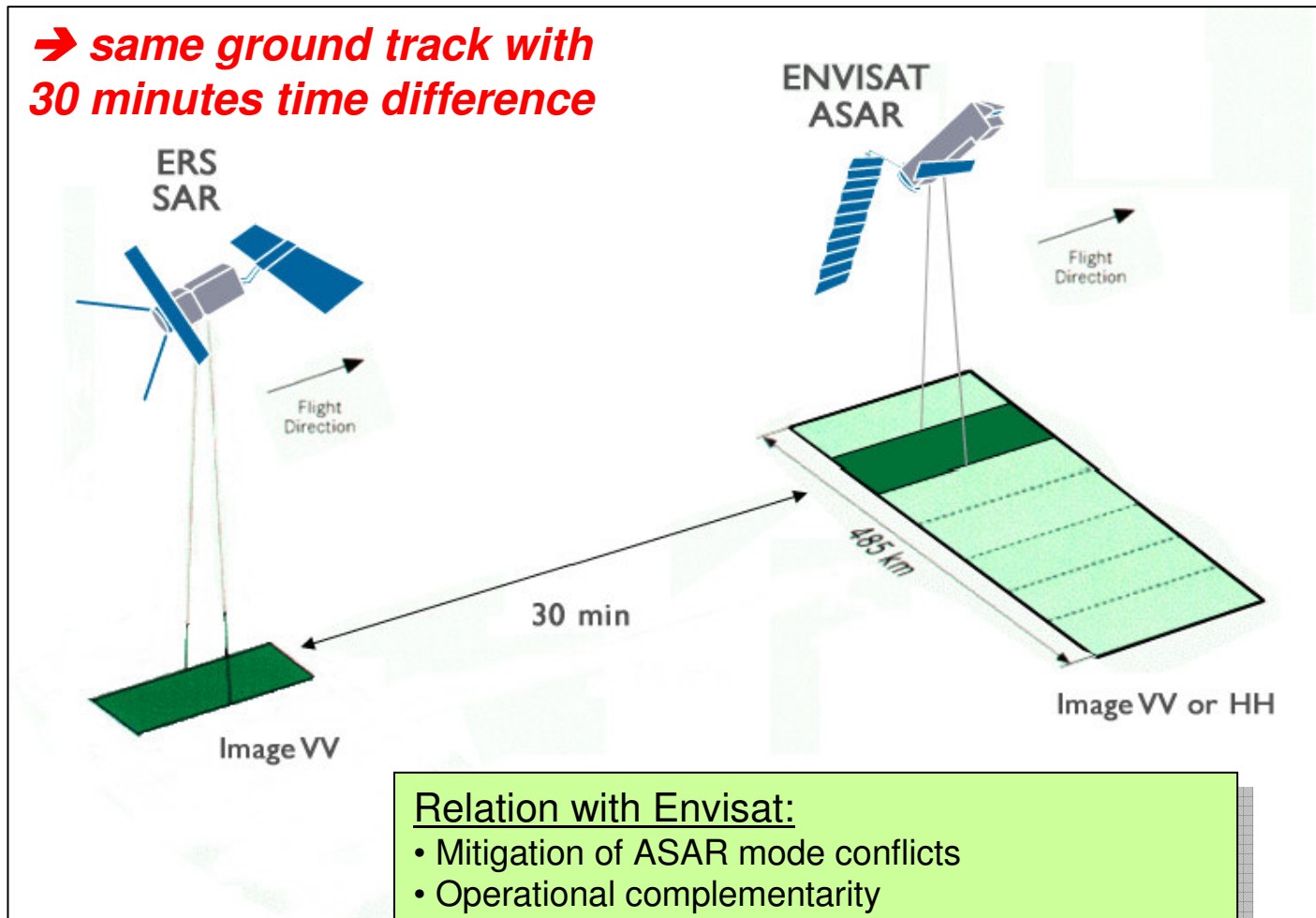


ESA missions embarking SAR instruments: a lot of progress since last SEASAR workshop in January 2008



Exploitation of the synergy between ERS-2 and Envisat

→ same ground track with
30 minutes time difference



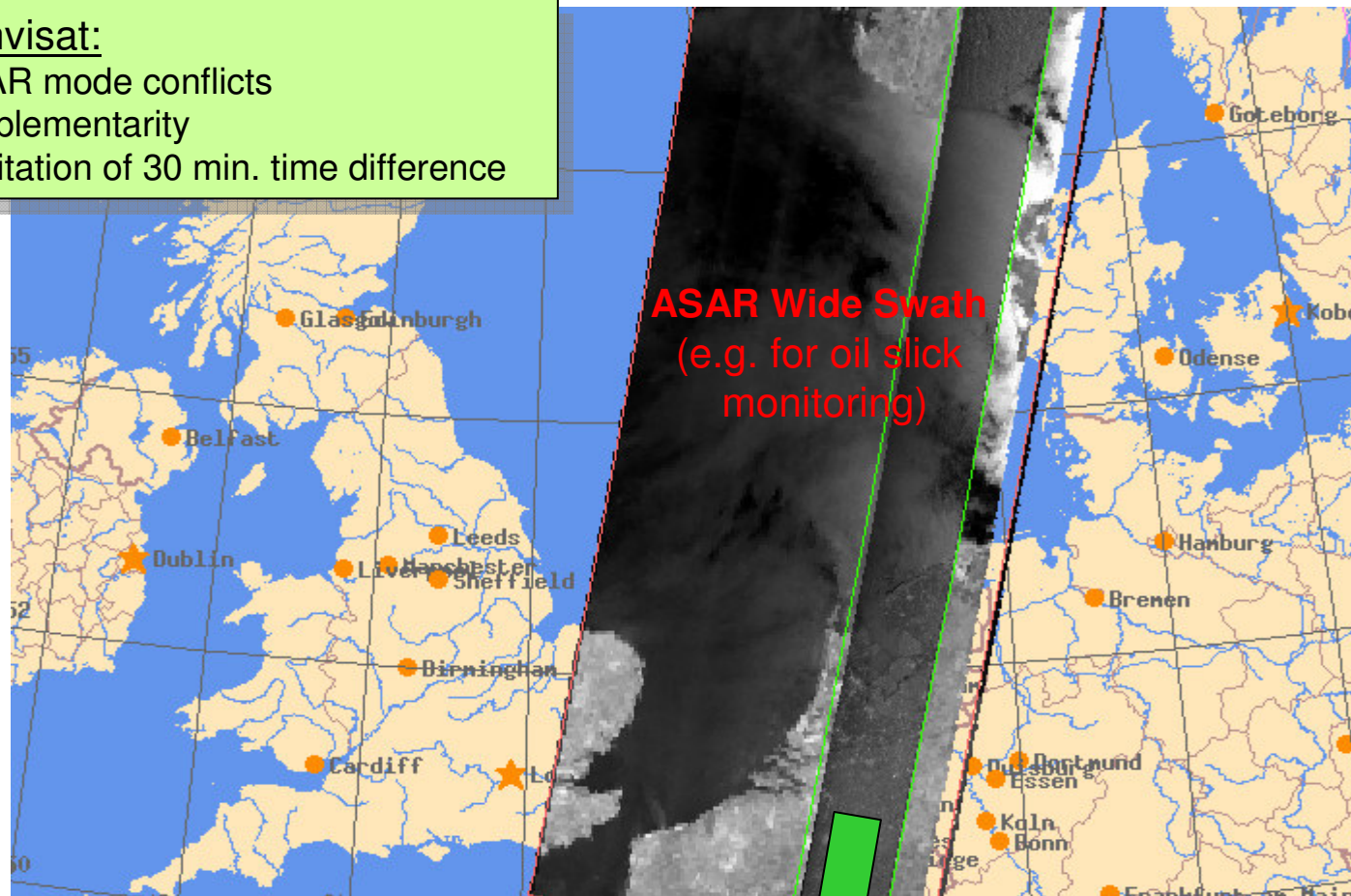
Relation with Envisat:

- Mitigation of ASAR mode conflicts
- Operational complementarity
- Synergetic exploitation of 30 min. time difference
- Partial backup

Synergy ERS-2 / Envisat → exploiting SAR mode differences

Relation with Envisat:

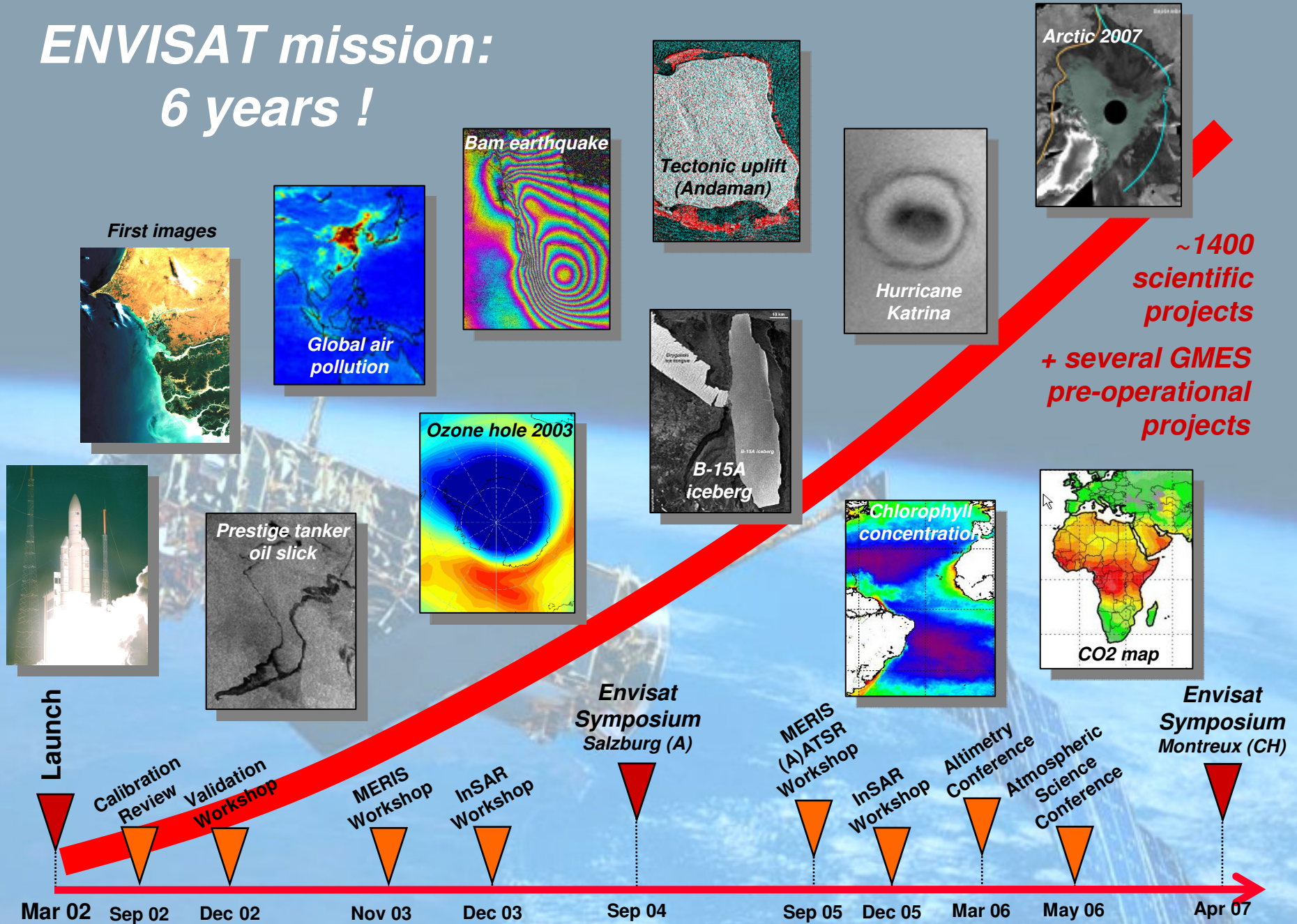
- Mitigation of ASAR mode conflicts
- Operational complementarity
- Synergetic exploitation of 30 min. time difference



ASAR Wide Swath
(e.g. for oil slick
monitoring)

ERS-2 (e.g. for InSAR)

ENVISAT mission: 6 years !





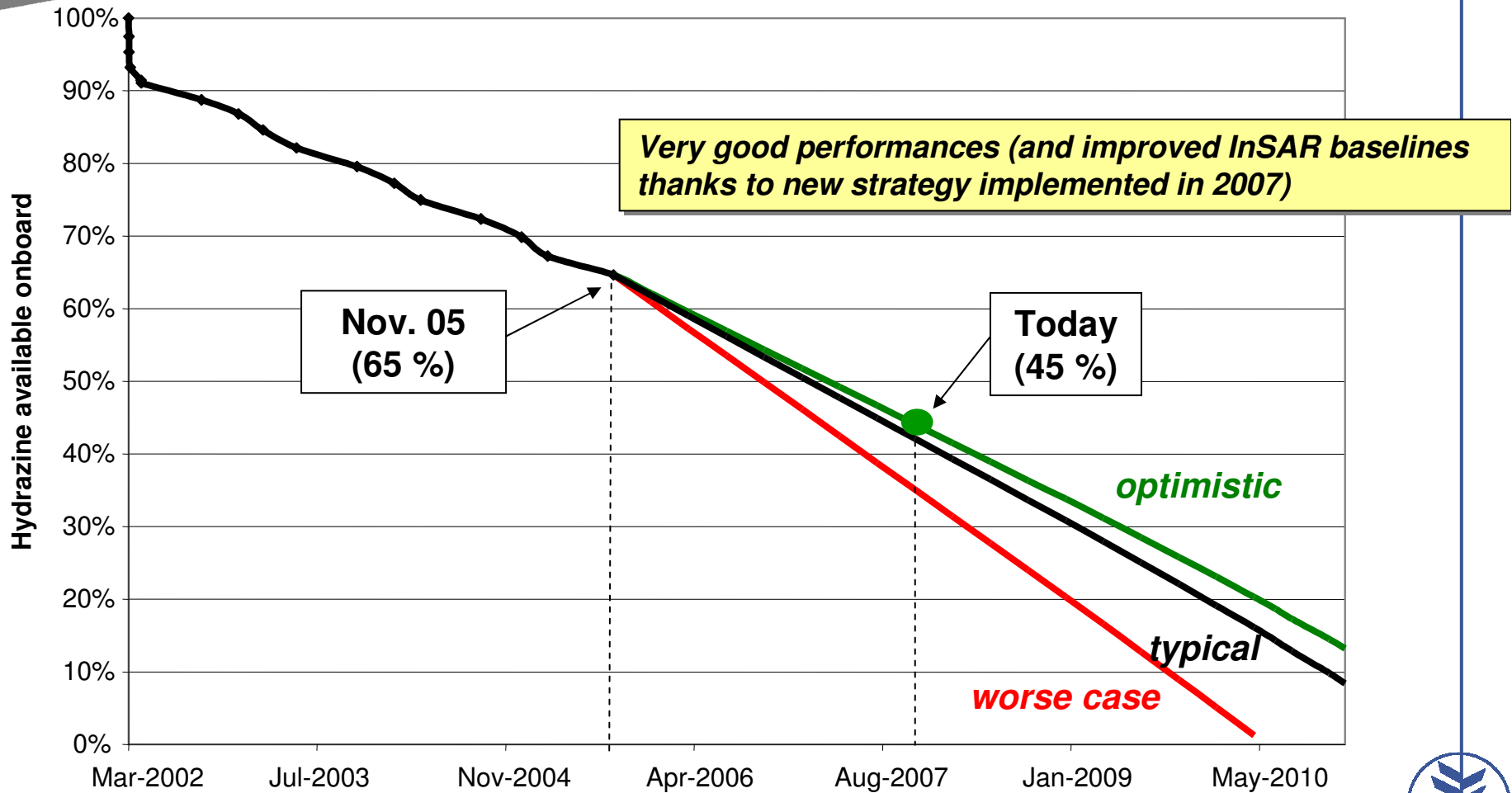
Envisat satellite status - Overview

Mission elements	Current performances	Expected evolution	Comments
MERIS	Excellent	Excellent	
AATSR	Excellent	Excellent	
ASAR	Good	Fair	Sub-system on redundant side
RA-2	Fair	Good	S-band failure (TBC)
MWR	Good	Good	
DORIS	Excellent	Fair	Instrument on redundant side
SCIAMACHY	Excellent	Good	
MIPAS	Good	Fair	Mechanical degradation in non redundant part (currently stopped)
GOMOS	Fair	Fair	Instrument on redundant side
Service Module	Excellent	Excellent	
Payload Equip. Bay	Excellent	Excellent	
Hydrazine	Excellent	Fair then Bad	Main limiting factor of the mission

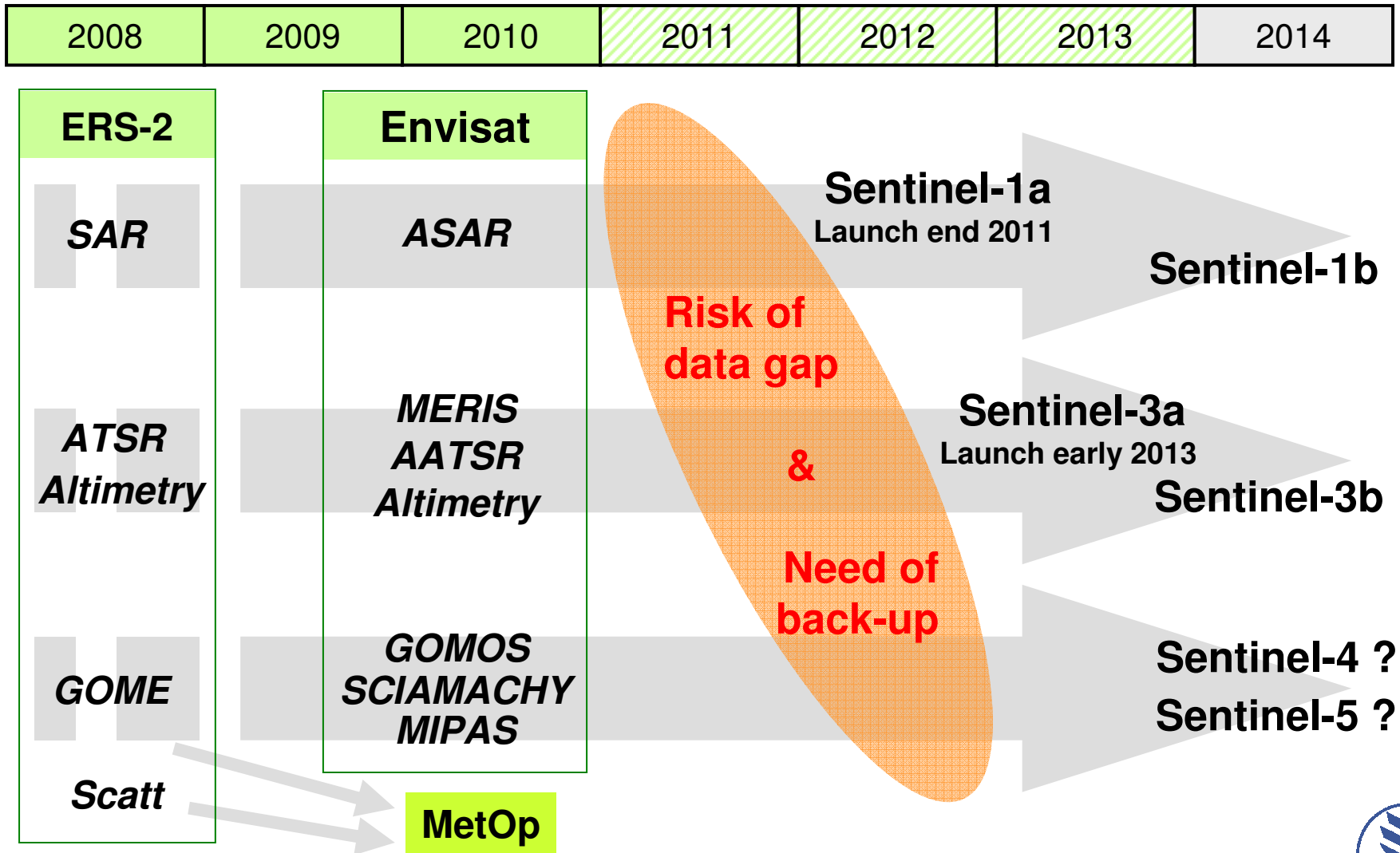


Hydrazine consumption: very good performances, but ...

Current orbit control (+/- 1km) means about 35 kg / year

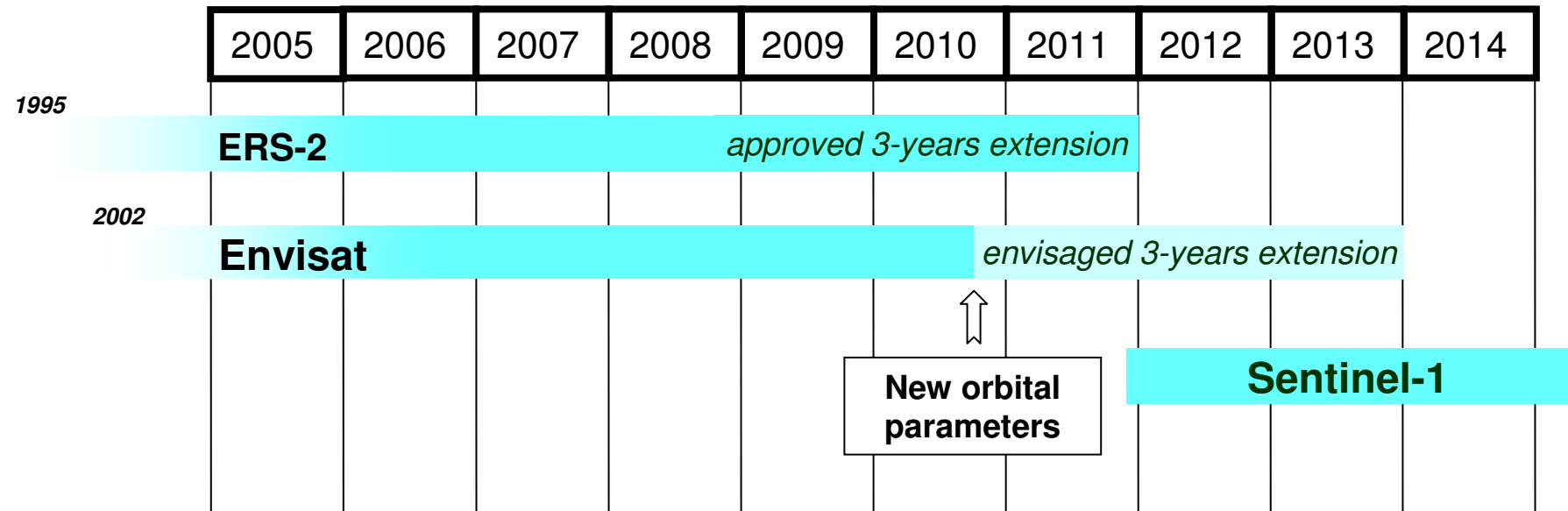


Envisat 3-years extension [2011-2013]: the context

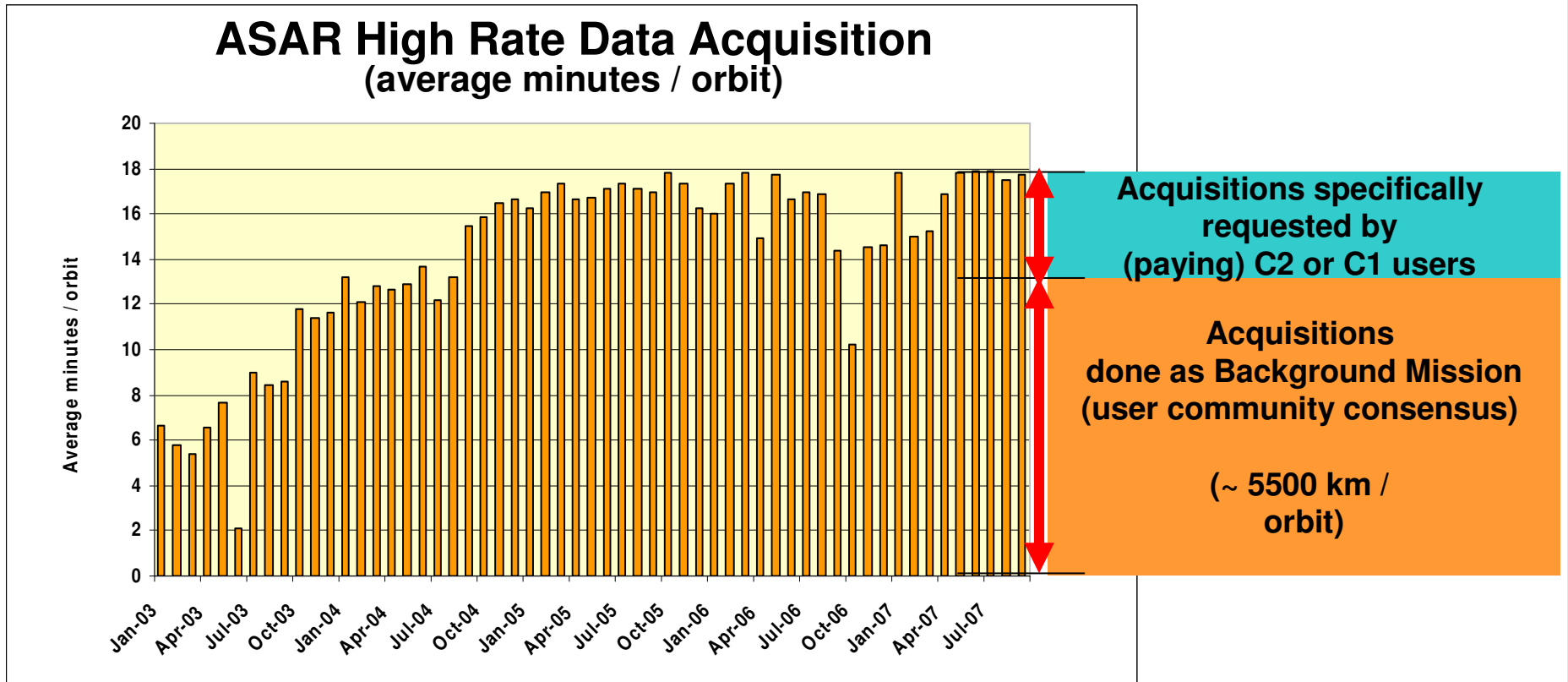


The following criteria were used to find a solution for extending Envisat beyond 2010:

- to keep the current nominal mission for as long as possible (i.e. until 2010),
- to extend the mission well beyond 2010,
- to ensure the continuity of the max. number of Envisat applications beyond 2010,
- to follow the mitigation rules for space debris risk at end of mission.



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.



*Envisat ASAR use: some 18 minutes /orbit
(i.e. about 7200 km per orbit in average)*

Worldwide acquisition thanks to on-board recorders and to ESA data relay satellite **Artemis** (60% of ASAR High Bit Rate data transmitted through Artemis).

Remaining acquisitions in Low Bit Rate:
Global Monitoring Mode over land and sea ice, Wave Mode over oceans.

The ASAR Background Regional Mission

Defines planning of ASAR when there is no specific user acquisition request

Acquisition priorities defined by the High Level Operation Plan

Low priority

High priority

Emergency

Cat. 2

Category 1

Background Regional Mission (BRM)

(implemented with the aim to minimize conflicts with existing user requests)

Archive built by **specific** user acquisition requests

Data acquisition confirmed to users

25%

Archive built by **BRM**

Data acquisition **NOT** confirmed to any user group

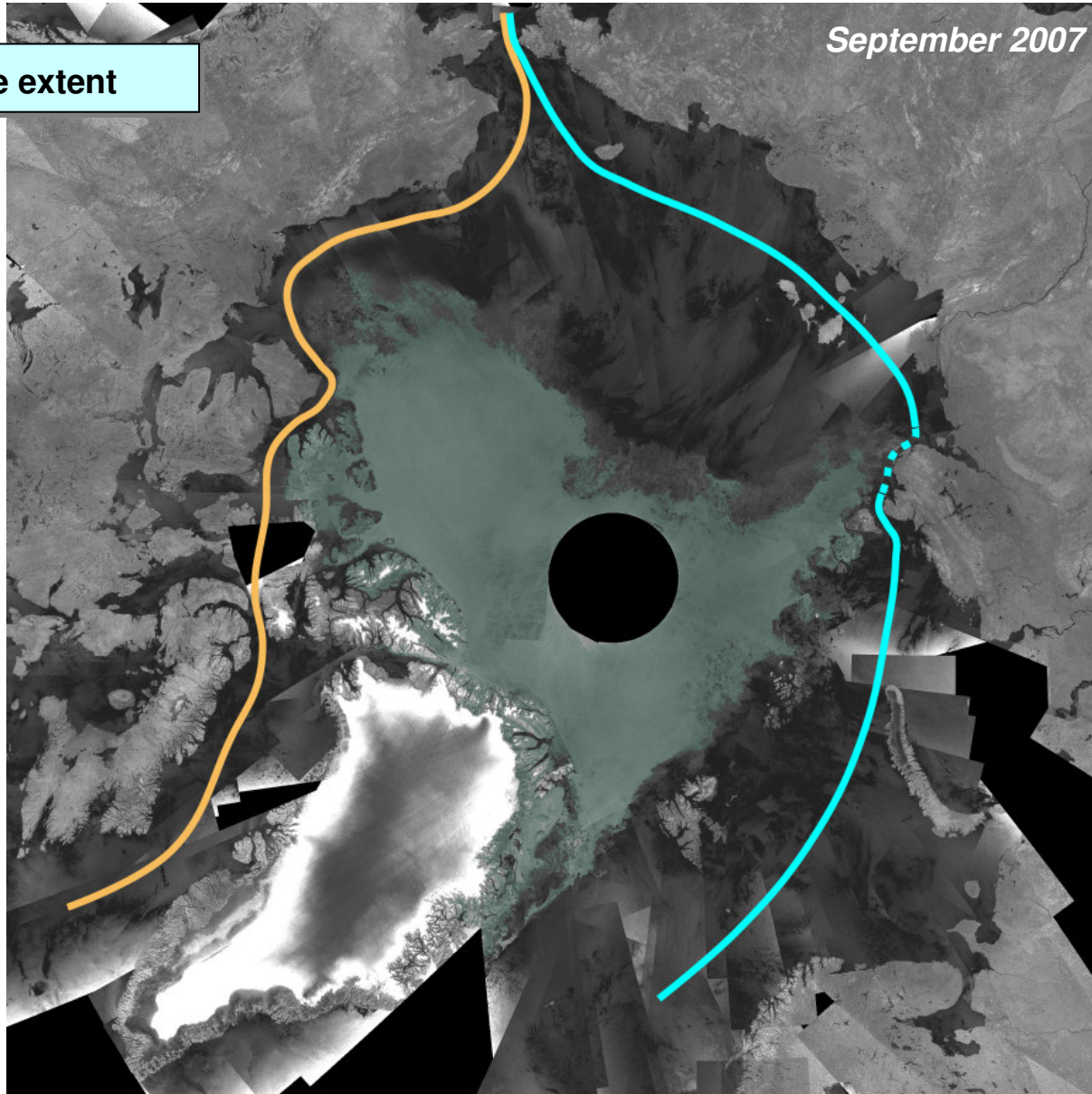
75%

SeaSAR'06 recommendations for ASAR Background Mission are implemented

ENVISAT ASAR archive

September 2007

Arctic sea ice extent



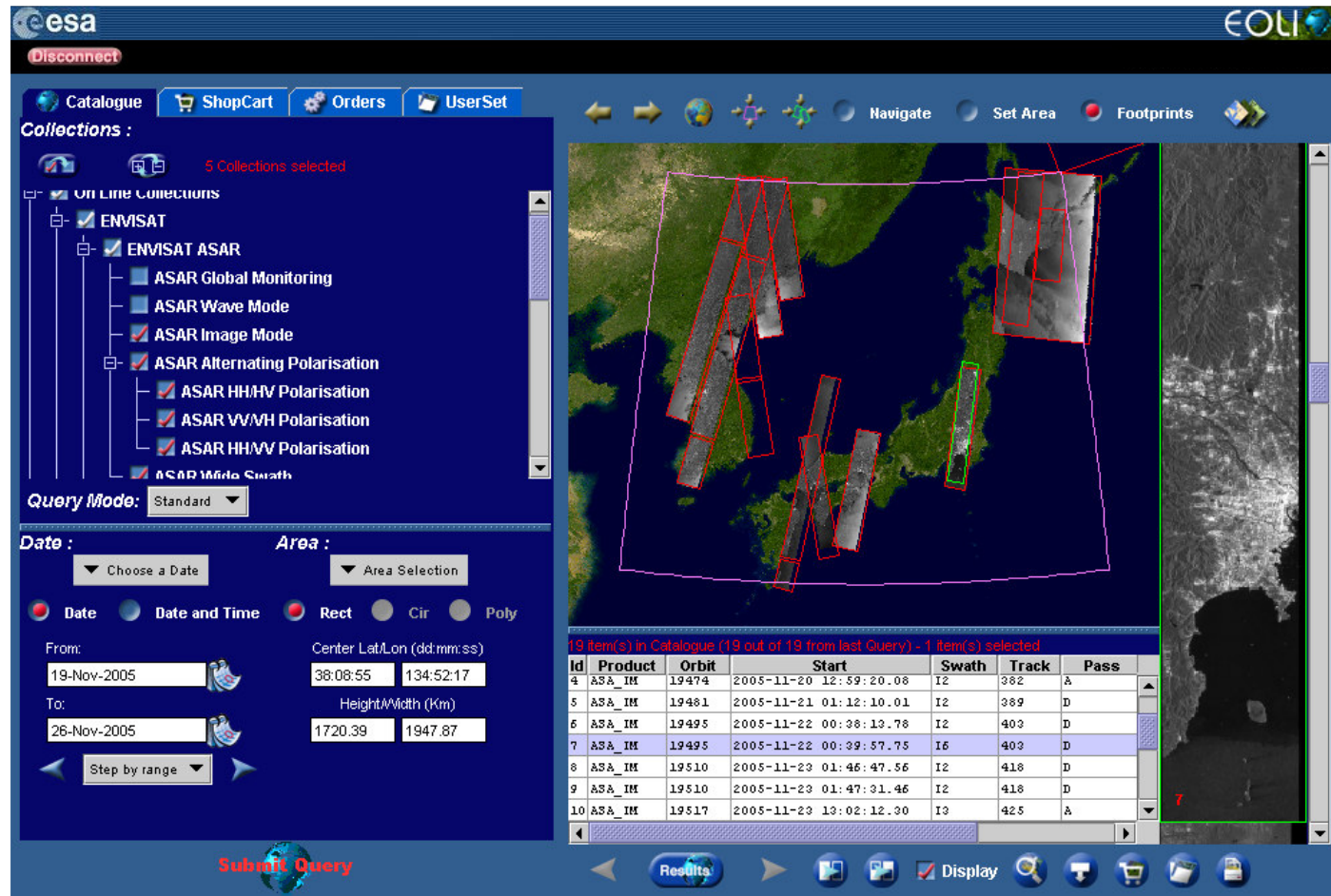
EOLI Stand Alone (EOLI-SA): the ESA multimission EO data catalogue

both an on-line and off-line multimission EO data catalogue

on-line ordering

a copy of the on-line inventory can be downloaded for off-line work

visualisation of quick-looks



The screenshot shows the EOLI-SA web interface. On the left, there is a 'Collections' tree with 'ENVISAT ASAR' selected. Below it, search filters for 'Date' and 'Area' are visible. The 'Date' filter is set from '19-Nov-2005' to '26-Nov-2005'. The 'Area' filter is set to 'Area Selection' with coordinates '38:08:55 134:52:17' and '1720.39 1947.87'. A 'Submit Query' button is at the bottom of the filter section. The main area displays a map of Europe with several red-outlined ASAR swath footprints. To the right of the map is a vertical strip showing a zoomed-in view of one footprint. Below the map is a table of search results.

19 item(s) in Catalogue (19 out of 19 from last Query) - 1 item(s) selected						
Id	Product	Orbit	Start	Swath	Track	Pass
4	ASA_IM	19474	2005-11-20 12:59:20.08	I2	382	A
5	ASA_IM	19481	2005-11-21 01:12:10.01	I2	389	D
6	ASA_IM	19495	2005-11-22 00:38:13.78	I2	403	D
7	ASA_IM	19495	2005-11-22 00:39:57.75	I6	403	D
8	ASA_IM	19510	2005-11-23 01:46:47.56	I2	418	D
9	ASA_IM	19510	2005-11-23 01:47:31.46	I2	418	D
10	ASA_IM	19517	2005-11-23 13:02:12.30	I3	425	A

SAR products distribution

Archived data

Archived data	availability	period	coverage
Envisat ASAR	On request (CD-Rom or DVD-Rom)	Whole mission since 2002	Worldwide coverage
ERS-1/2 SAR		Whole mission since 1991	Within ERS station masks

FTP distribution service for archived data, priority to emergency and Cat.2 requests

Near Real Time data

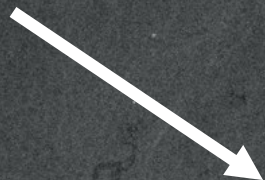
NRT data	availability	period	coverage
Envisat ASAR Medium Resolution (75 m) [e.g. Wide Swath Mode image] Global Monitoring (1000 m)	Systematic (i.e. processing of all data) Product available 3 hours after acquisition	Rolling archive of last 7days	Worldwide coverage
Envisat ASAR Full Resolution (12.5 m) [e.g. IMS, APS]	On request (i.e. limited number, priority to emergency and Cat.2 requests)	Few hours after acq.	Worldwide coverage
ERS-2 SAR Full Resolution (12.5 m)	On request (i.e. limited number)	Few hours after acq.	Southern Europe

Internet



Seoul

Envisat ASAR
11 December 2007
Hebei Spirit tanker
oil pollution



Envisat ASAR WSM products
are freely available in NRT

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>)

<http://eopi.esa.int>



07-May-2007 UT

Contact us

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



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.

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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


Cat 1 Proposal for Mexican and German Science Use

Title of Proposal

“Mapping flooded areas, assessing biomass quantity in dry forests and shrublands and detecting deforestation using C-Band SAR imagery of the sensors ERS-2 and ASAR in Mexico and Central America“

Investigators

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Team

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02-May-2007 UT

Data Access	<p>Products systematically available on Internet</p> <p><u>Free of charge products</u></p> <p>Fast registration required, with no deadline for submission. ESA Terms and Conditions to be signed. Click the logo for more information</p>
ESA Data Policy	
How to get data	
Open AOs	
Previous AOs	
Update & Reporting	Fast registration to get access to the data
Results & News	
Results	<p>Products available on specific request</p> <p>(e.g. i.e. specific instrument tasking, products not generated systematically, products not available Internet)</p> <p>Available at cost of reproduction (ENVISAT, ERS and Third Party Missions)</p> <p>Project proposal required, with no deadline for submission, to be evaluated by the Category-1 Scientific Advisory Group</p> <p>Specific restrictions to the use of data may apply for Third Party Missions</p> <p>If accepted by ESA, Terms and Conditions to be signed</p> <p>Click the logo for more information</p>
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Products systematically generated and available via fast registration - release April 3 2007

Mission	Sensor	Product	Internet		DDS Europe
			Archived or Reprocessed	NRT and Recent	NRT
ENVISAT	ASAR	ASA_WSM_1P		last 14 days	
		ASA_IMM_1P		last 14 days	
		ASA_APM_1P		last 14 days	
		ASA_GM1_1P		last 7 days	
		ASA_WVS_1P	Full mission	last 7 days	
	ASA_WVV_2P	Full mission	last 7 days		
	MERIS	MER_RR_1P	Full mission	last 7 days	NRT
		MER_RR_2P	Full mission	last 7 days	NRT
		MER_RRC_2P	included in MER_RR_2P	last 7 days	NRT
		MER_RRV_2P	included in MER_RR_2P	last 7 days	NRT
		MER_LRC_2P	included in MER_RR_2P	last 7 days	
		MER_FRS_1P (European coverage)		last 14 days	
	AATSR	ATS_TOA_1P		last 7 days	NRT
		ATS_NR_2P		last 7 days	NRT
		ATS_AR_2P		last 7 days	NRT
	Altimeter	ATS_MET_2P		last 7 days	
		RA2_FGD_2P		last 7 days	
		RA2_IGD_2P	Full mission		
		RA2_GDR_2P	Full mission		
		RA2_MWS_2P	10 days of archive		
	Atm. Chemistry	RA2_WVV_2P	Full mission	last 7 days	
		SCI_NL_1P	Full mission	last 7 days	
		SCI_NL_2P	Full mission until Nov. 2004		
		SCI_OL_2P	Full mission from Nov. 2004		
		MIP_NL_1P			
MIP_NL_2P			last 7 days		
DORIS	GOM_VV_2P	Full mission	last 7 days		
	GOM_RR_2P	Full mission	last 7 days		
	DOR_DOP_1P	Full mission			
	DOR_POR_AX	Full mission	last 3 months		
	DOR_VOR_AX	Full mission	last 3 months		
ERS	SAR	WSC.UWM	From 21/09/2003 onwards	NRT	
		SWM.UWA	From 16/11/2006 onwards	NRT	
	GOME	GOME.LVL13	From March 2005		
		GOME.LVL21	Full mission		
	ALTIMETER	ALT.URA	From 16/11/2006 onwards	NRT	
Orbit		ORB.PRC	Full mission		
		ORB.PRL	Full mission		
TPM	Chris. HRC (Proba)	PROBA.CHRS.1A	All available data, including recent		
		PROBA.HRC.1A	All available data, including recent		
	TM (Landsat)	LANDSAT.TM.SOPR	European coverage		
	EOC (Komsat-1)	KOMP.EOC.ECD	City dataset		
	POLS. MAESTRO (ACE-Scisat)		ACE_FTS_L2V1.0	Full mission	
			ACE_FTS_L2V2.2	Full mission	
			ACE_MAESTRO_L2V	Full mission	
MODIS (Terra/Aqua)	MODIS.NRT.Level1B (European coverage)		Last 30 days		
SeaWinds (QuikSCAT)		QSCATT.Level 2A	Full mission		
		QSCATT.Level 2B	Full mission		

Updated list available at : <http://eopi.esa.int>

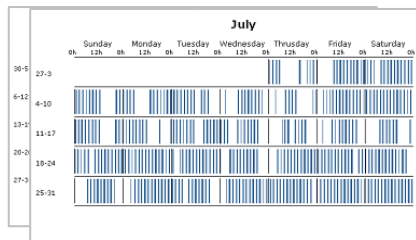
Products systematically available on Internet: example with Envisat

Envisat <u>NRT & recent data</u>		availability	Period	coverage
DDS ←	MERIS Red. Resolution (1200 m) ASAR Medium Resolution (75 m) ASAR Global Monitoring (1000 m)	Systematic (i.e. processing of all data)	Rolling archive of last 7 days	Worldwide coverage
DDS ←	AATSR Altimetry	Product available within 3 hours from acquisition (95%)		
DDS ←	SCIAMACHY, GOMOS			Fast registration
	MERIS Full Resolution (300 m) <i>Europe coverage</i>	Systematic	Rolling archive of last 20 days	Europe coverage
	MERIS Full Resolution (300 m) ASAR High Resolution (12.5 m)	On request	Few hours after acquisition	According to ins. planning Full proposal
Internet	Envisat <u>archived data</u>		period	coverage
	MERIS Red. Resolution (1200 m) Altimetry SCIAMACHY, MIPAS, GOMOS AATSR (<i>end 2007</i>)	Systematic (i.e. for each re-processing of the data)	Whole mission since mid-2002	Worldwide coverage Fast registration
	MERIS Full Resolution (300 m) ASAR High Rate	On request	Whole mission since mid-2002	Worldwide coverage Full proposal

Data from ESA ERS and Third Party Missions are also available on Internet

New alternative way to access to EO data:
 → Grid Processing-on-Demand (G-POD)

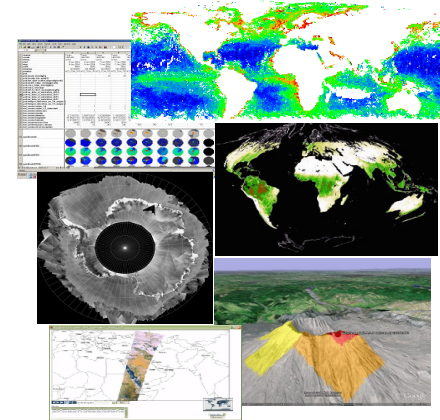
- Promote the development of new algorithms requiring large data and computing resources: “bring the user’s algorithms to the data”
- Build network of competences, promote e-collaboration and sharing of tools, easier transition from science algorithms to new user products ...
- 10 projects selected in mid-2006
- Applications received at <http://eopi.esa.int>



on-line data archives



user triggers and controls from the G-POD website its own processor running on eogrid computers



innovative science products

Support for handling and processing EO data:
→ ESA EO Toolboxes

The toolboxes (Open Source tools) facilitate the handling and exploitation of EO data (e.g. experimental Level 2 algorithms).

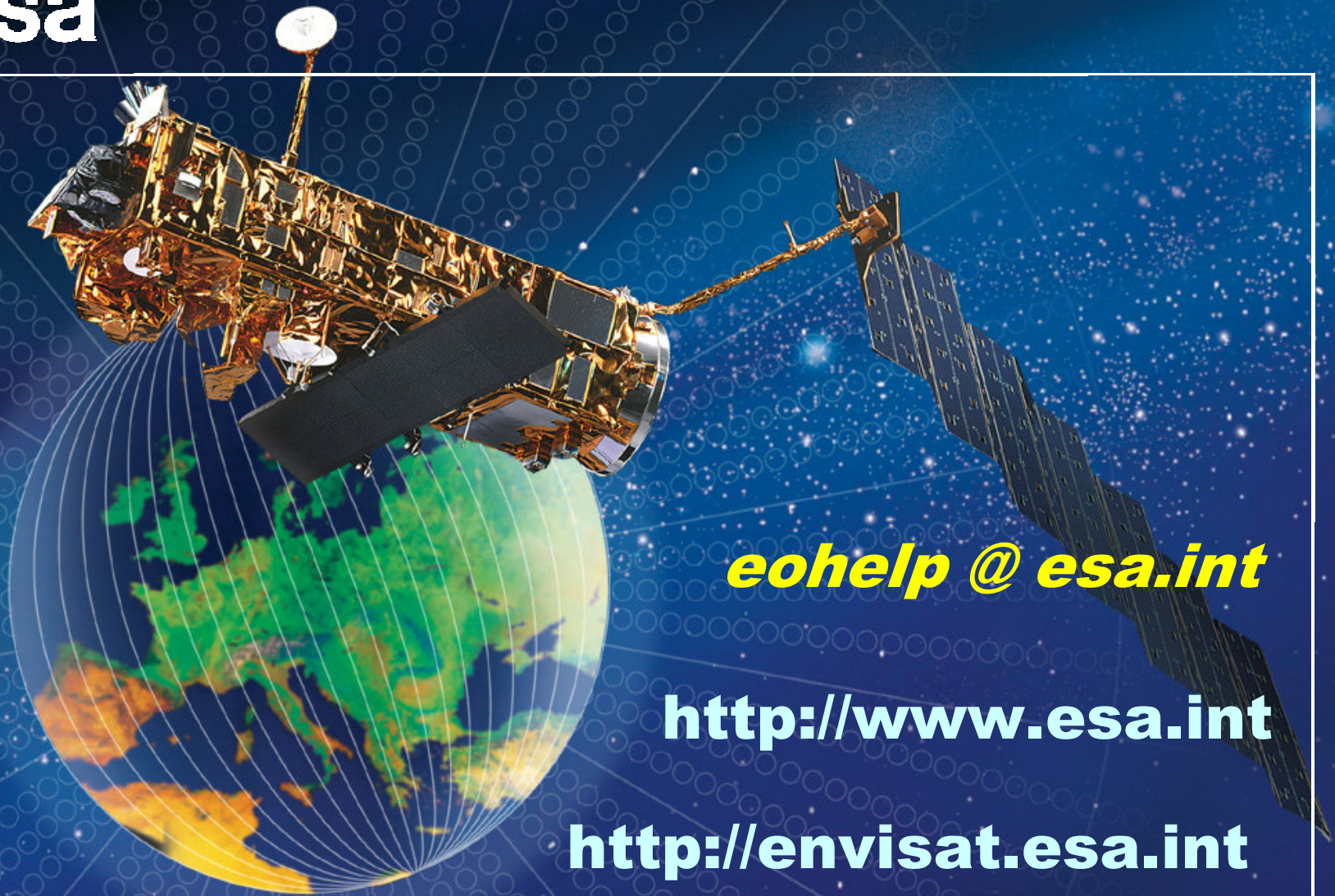


<http://earth.esa.int/resources/softwaretools/>

Conclusions

ESA is committed to continue supporting SAR data exploitation:

- ✓ ERS-2 mission extended until 2011
- ✓ Envisat mission extension until 2013 positively analysed and positive decision expected
- ✓ Overall 16 years C-band SAR data archive (ERS-1/ERS-2/Envisat)
- ✓ Access for Mexican users by a number of proposals and the new (recent) one especially related to the Antenna Chetumal
- ✓ Future development: possibility of setting up a NRT-service with Antenna Chetumal



eohelp @ esa.int

<http://www.esa.int>

<http://envisat.esa.int>

<http://earth.esa.int/ers>

European Space Agency
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ESA Earth Home Missions

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+ ASAR BRM High Resolution sub-modes

IM IS2 VV IM IS2 HH IM IS6 VV AP WS HH WS VV

+ go to ASAR BRM

ASAR Image Mode Swath 6 polarization VV

WARNING: The following plot shows the BRM planned acquisitions. Some acquisitions are sometimes cancelled due to conflicts with user planning requests, satellite resource availability and service interruption.

