

Earth Observation for science and public use: Experiences, Rules and Plans

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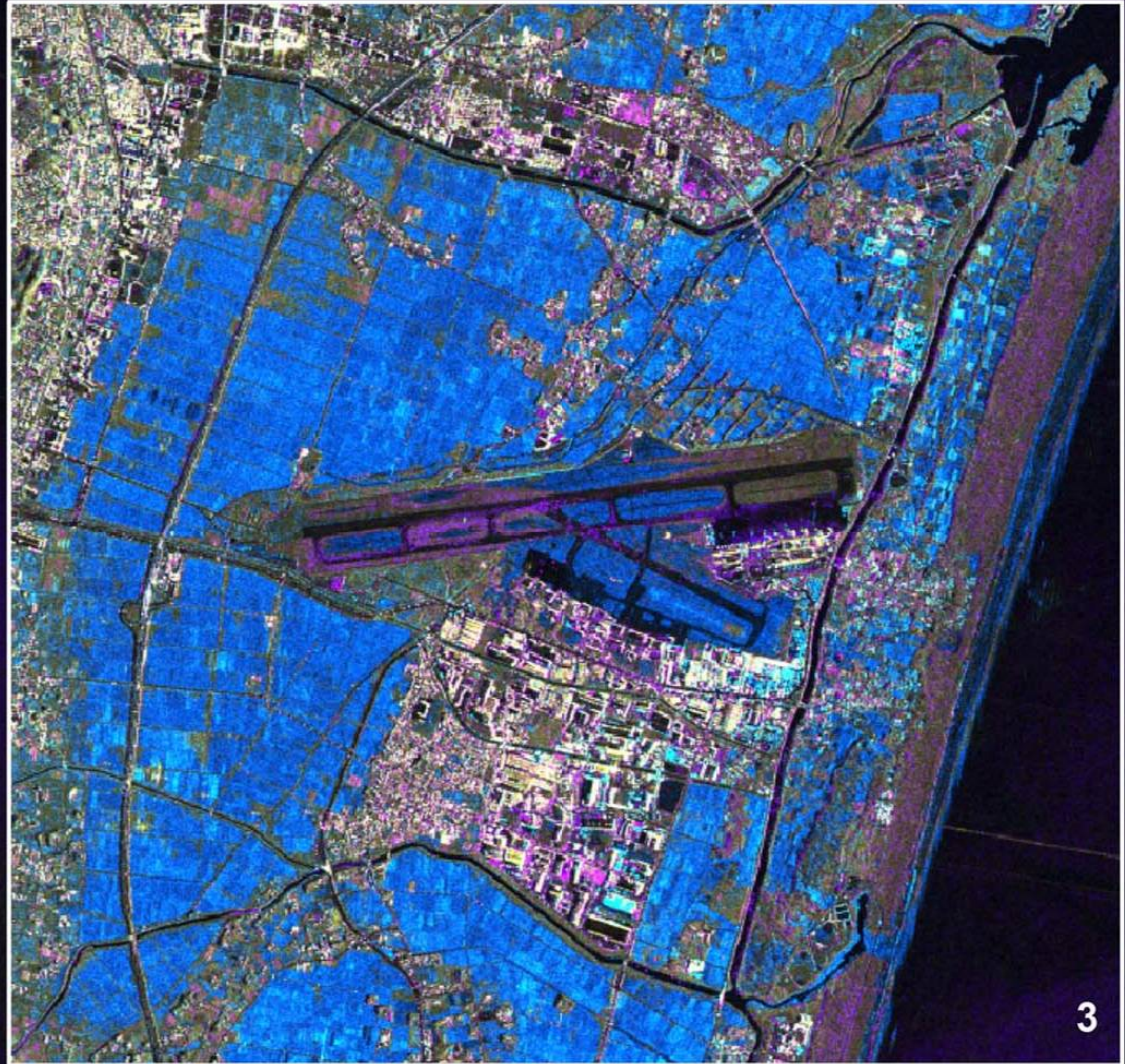
Earth Observation Forum
Tuesday 28th August 2012
‘Working together to achieve
the best use of
Earth Observation data’

Knowledge for Tomorrow



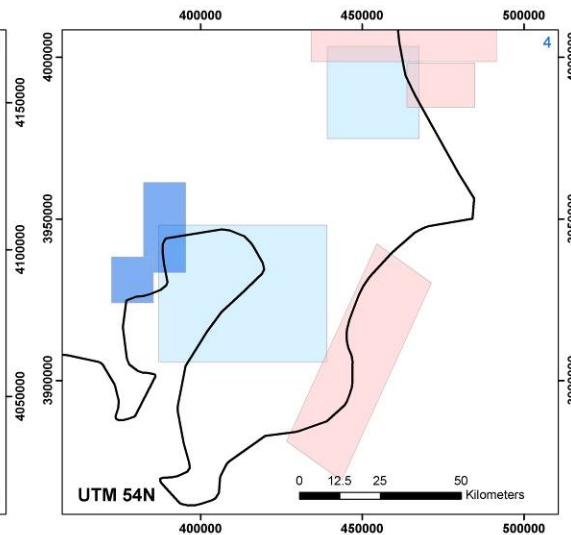
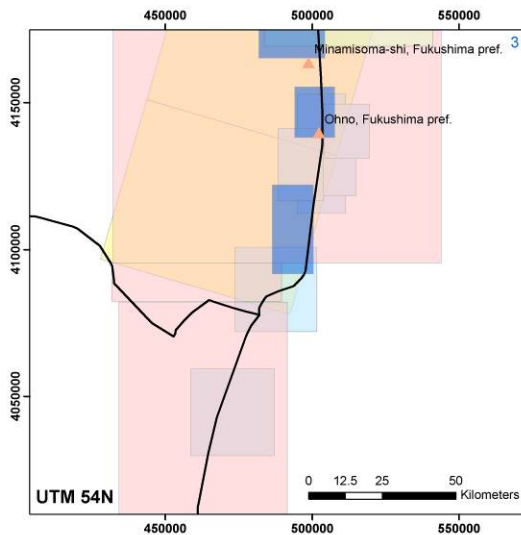
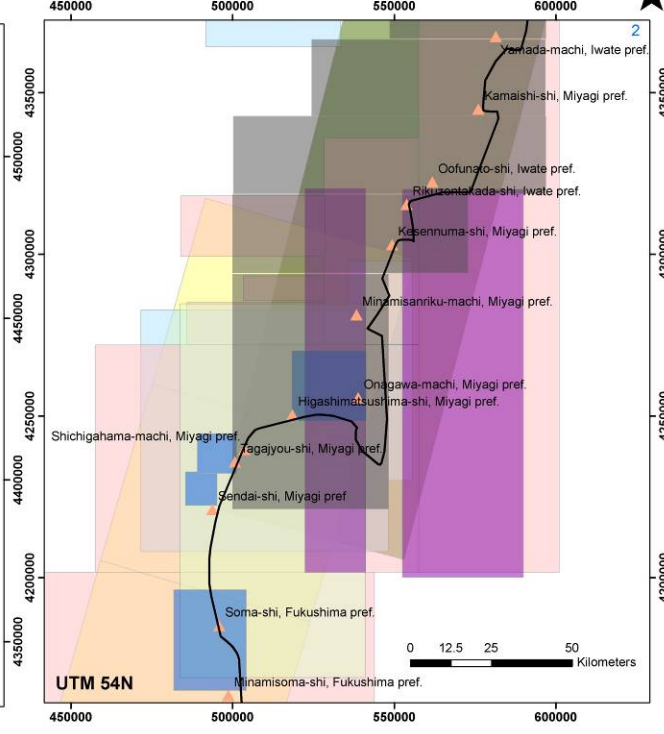
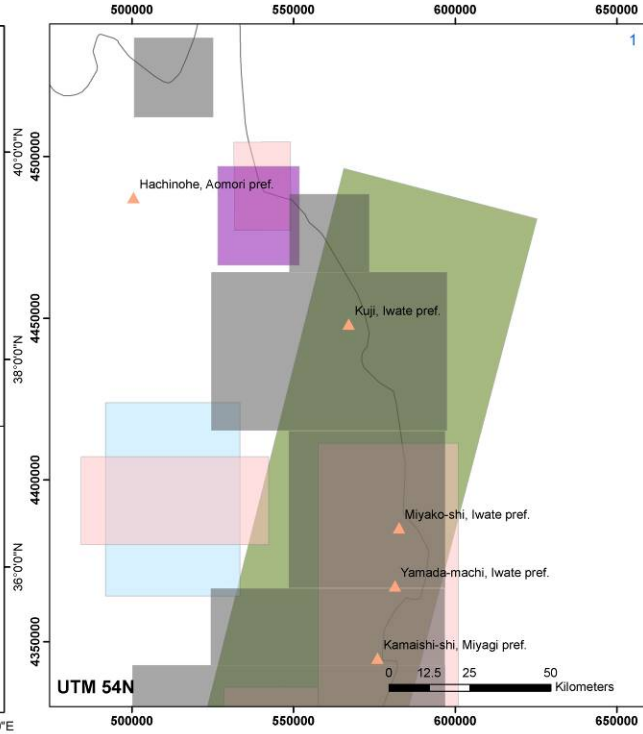
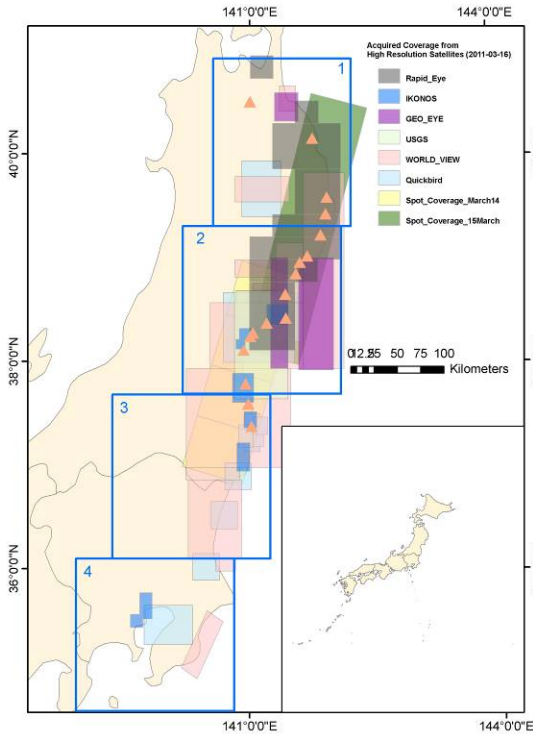


3 - Sendai Airport:
Parts of the runways of Sendai airport are flooded or covered by mud and debris. Many of the nearby buildings disappeared.



-SENDAI change map
-TerraSAR-X, March 12, 2011
-(c) DLR - ZKI

COVERAGE OF HIGH RESOLUTION IMAGERY FOR EARTHQUAKE/Tsunami AFFECTED AREA, JAPAN (2011-03-16)



On Friday, March 11, 2011 at 05:46:23 UTC, a massive earthquake measuring 9 on the Richter scale hit near the east coast of Honshu, Japan. It caused a massive tsunami with widespread destruction of human lives and property. The map shows the coverage of high resolution images acquired by different satellite till March 16, 2011 of the affected area.

Map produced by Geoinformatics Center, AIT on 2011-03-16
 web: <http://www.geoinfo.ait.ac.th>



International Charter on Space and Major Disasters

An International agreement among Space Agencies to support with space-based data and information relief efforts in the event of emergencies caused by major disasters.

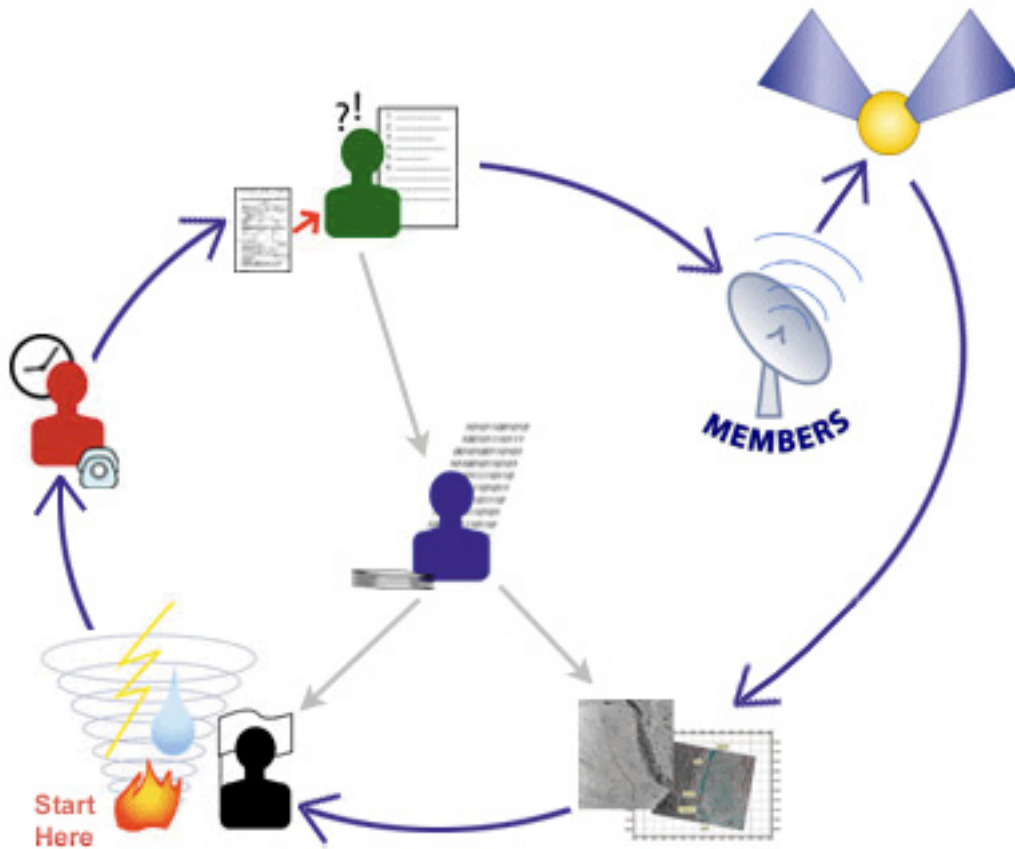
- **Disaster response**
- **Multi-satellite data acquisition planning**
- **Archive retrievals and spacecraft tasking**
- **Data processing at pre-determined level**
- **Space Agency contribution in image/data**
- **Space Agency initiative for value-added-data fusion**

Initiated by ESA and CNES in 1999

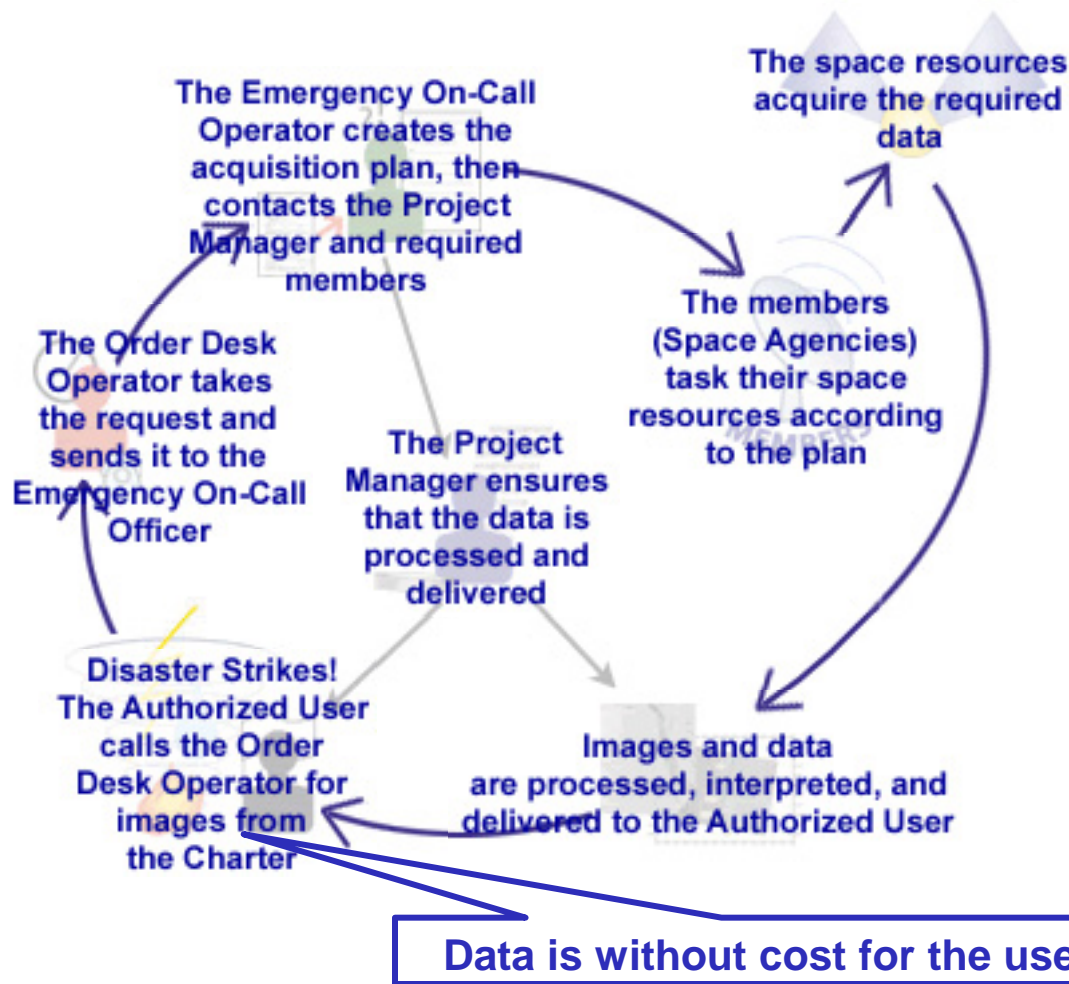
15 full members (as of August 2012)



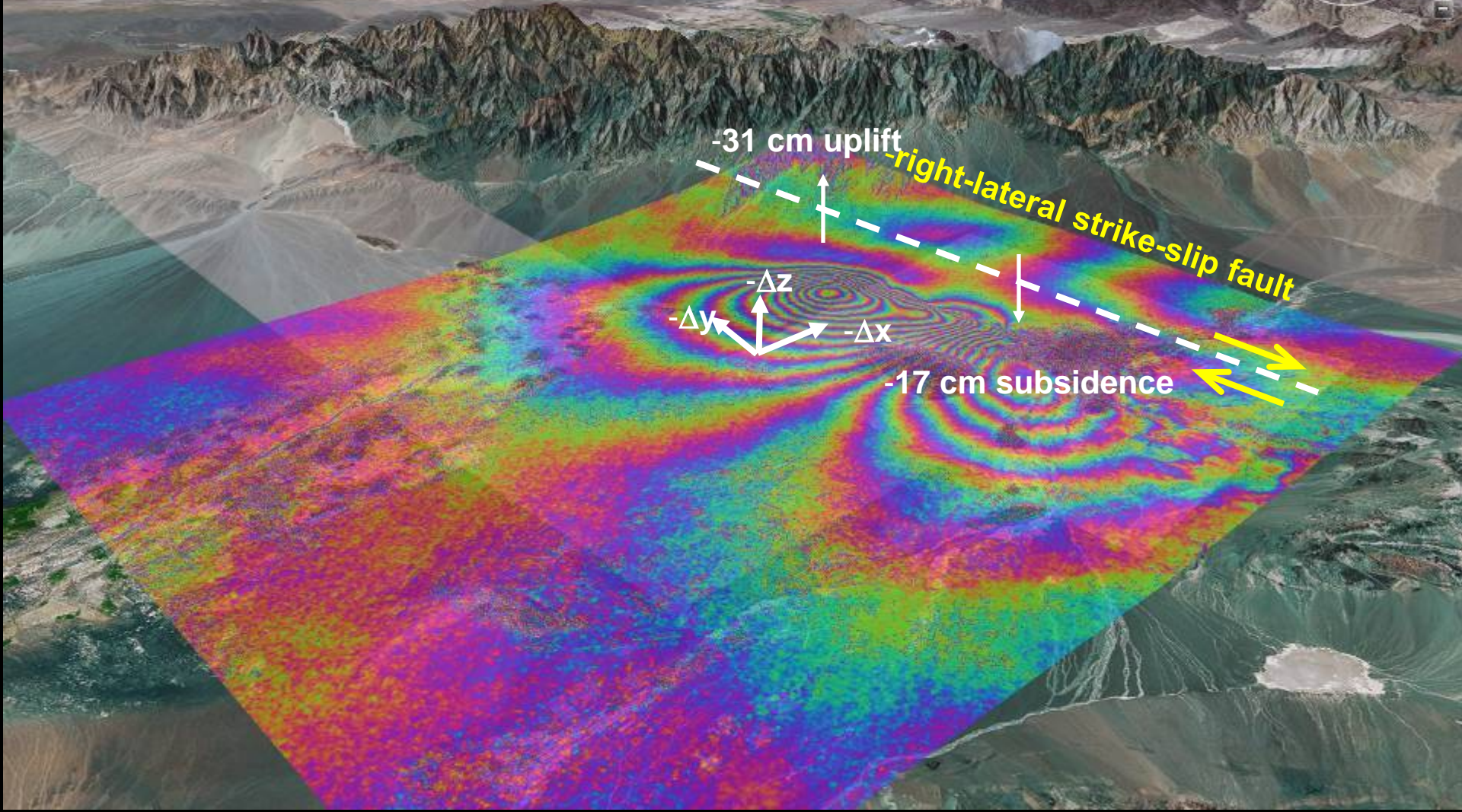
International Charter on Space and Major Disasters



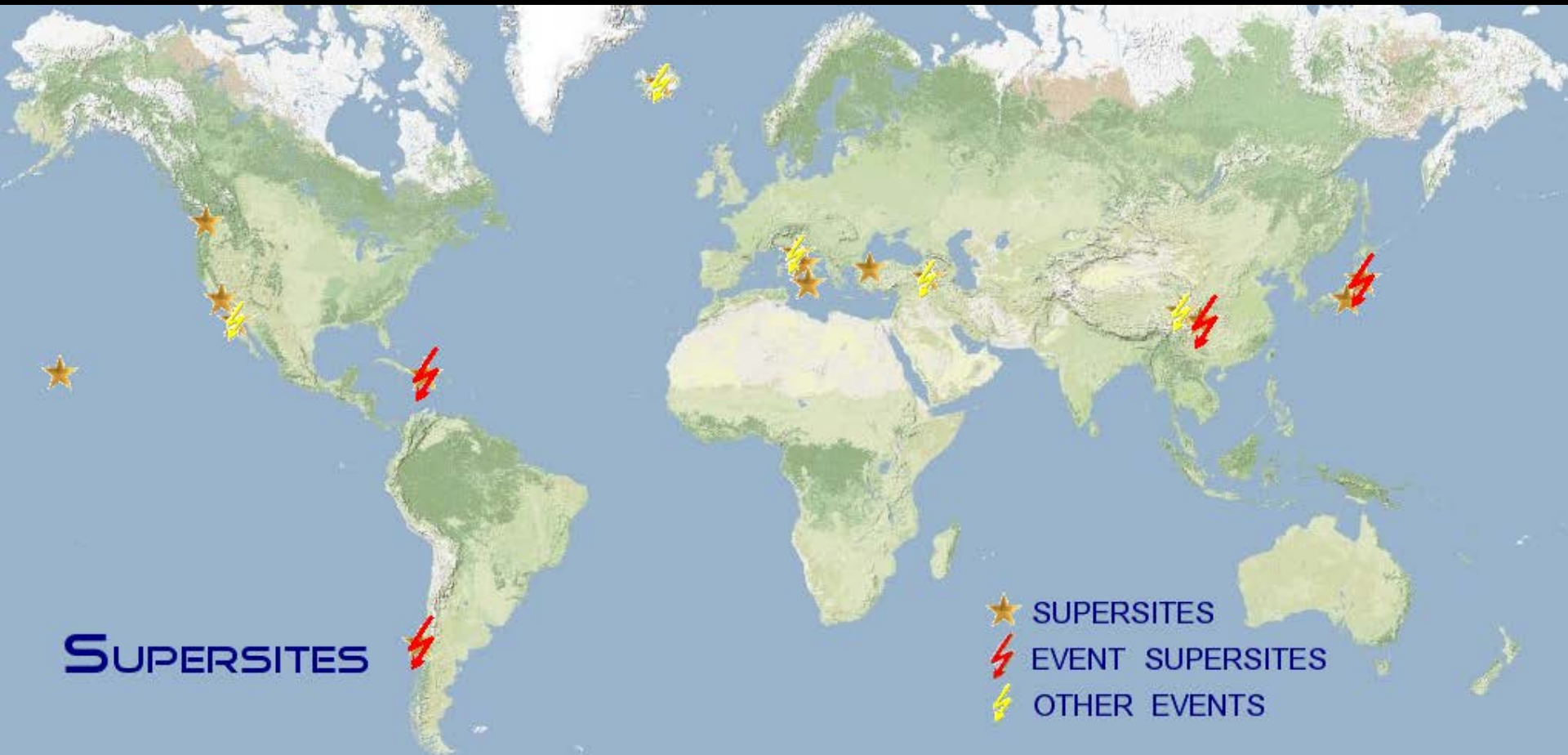
International Charter on Space and Major Disasters



Co-seismic Deformation of Bam Earthquake 26.12.2003



GEOSS Supersites



<http://supersites.earthobservations.org/>

Data for preserving our cultural heritage



Looting and trading of archaeological artefacts

- Are systematically done since 2002
- Are a big international business
- Destroy the archaeological context
- Are hard to be monitored and often impossible to prevent



The ancient city of Uruk, Iraq



- Ancient capital founded in 4000 B.C.
- Gilgamesch Epos
- Major site for German Archaeological Institute
- Endangered by looting during Iraq conflict

TerraSAR-X Spotlight Dual-Pol Image:
November 16, 2008



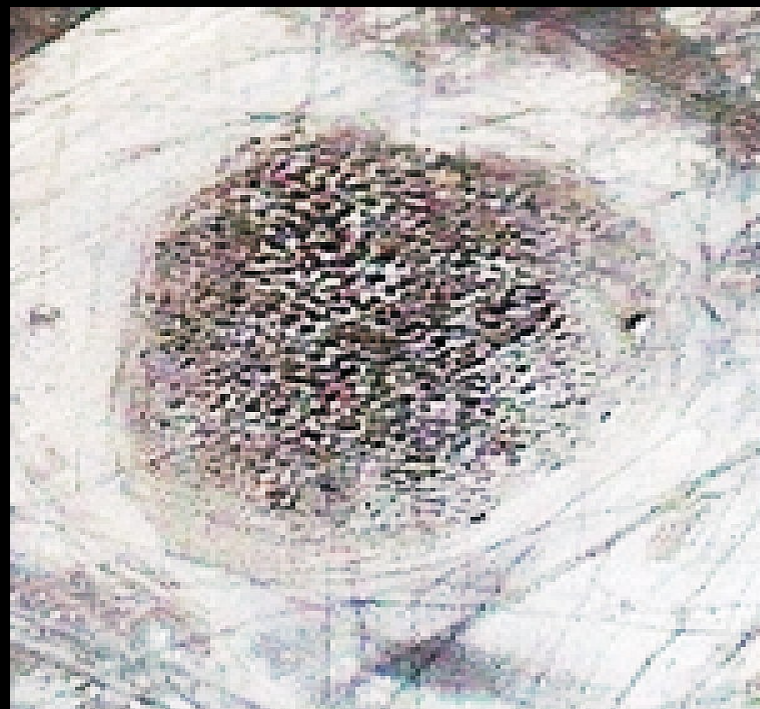
IKONOS © European Space Imaging

Change detection using IKONOS Data to identify looting; near Uruk, Iraq

Unclassified Subset 2001



Unclassified Subset 2005



Ancient city of Palmyra, Syria Archaeological site

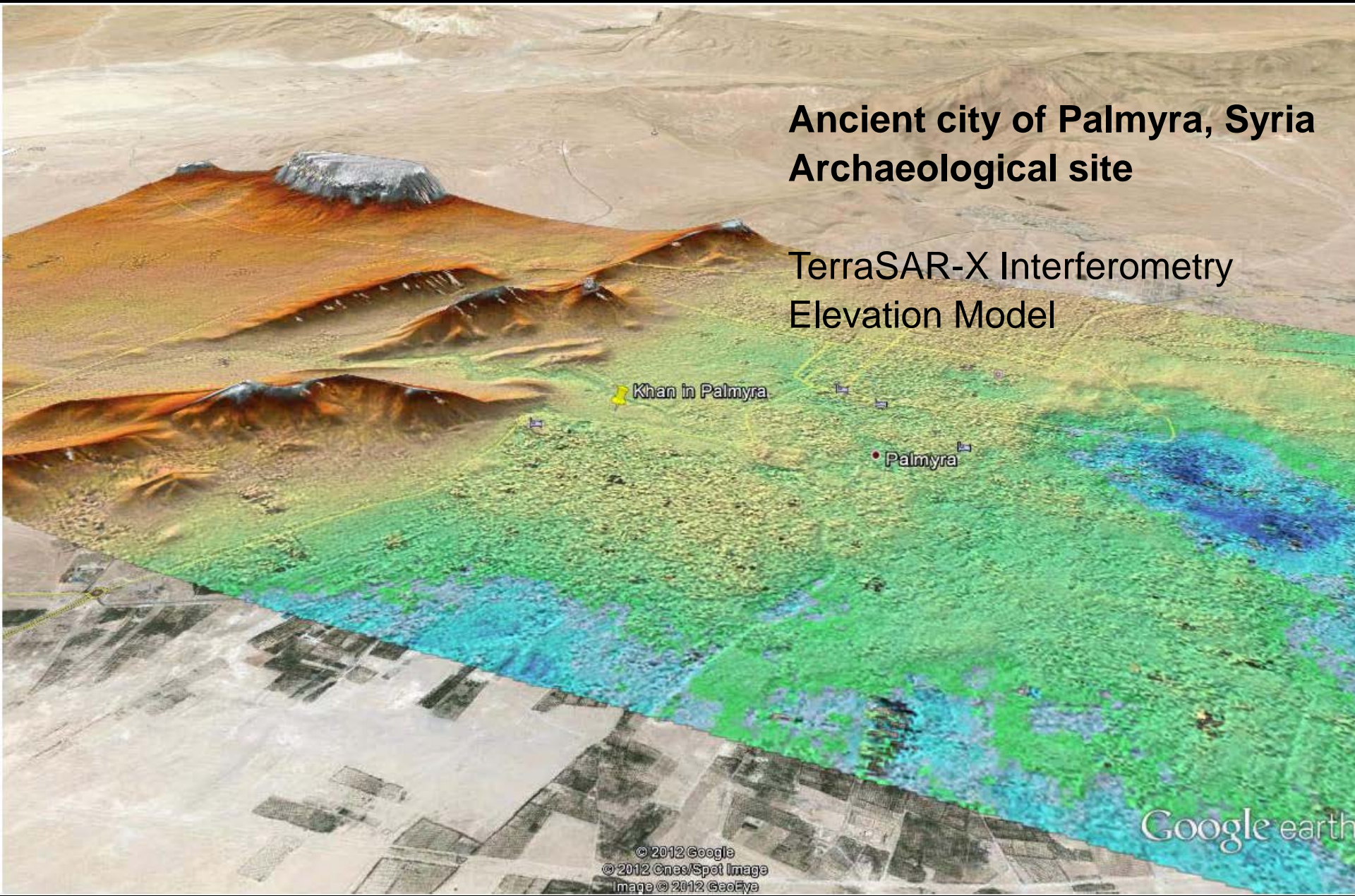
TerraSAR-X Interferometry
Elevation Model

Khan in Palmyra

Palmyra

Google earth

© 2012 Google
© 2012 Cnes/Spot Image
Image © 2012 GeoEye



Earth Observation and Archaeology for the public: TERRA-X TV feature

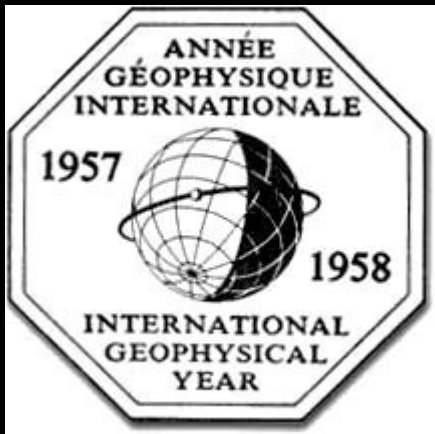
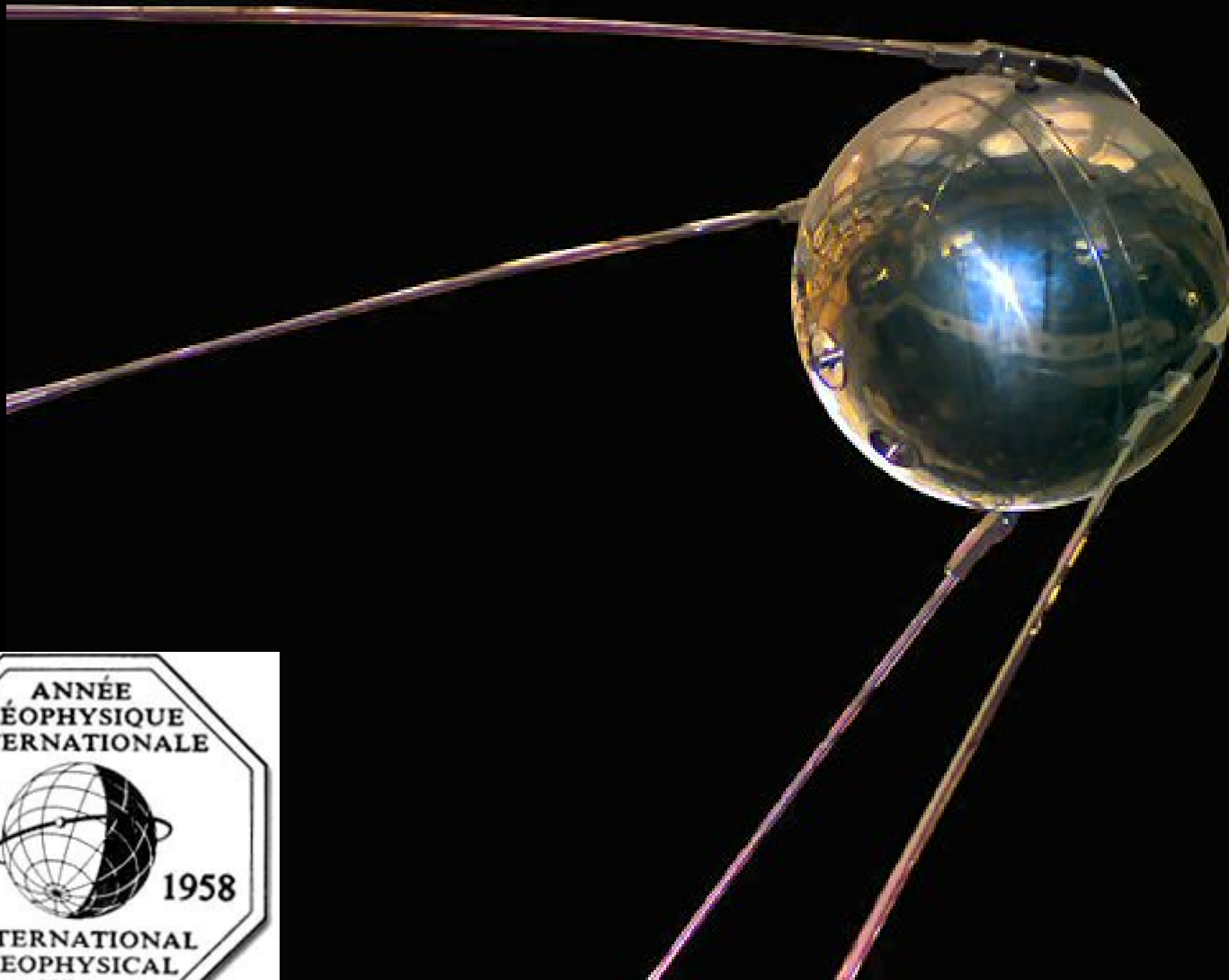




The UNESCO Open Initiative



Data for global change research



4 Oct 1957

ICSU World Data Centers

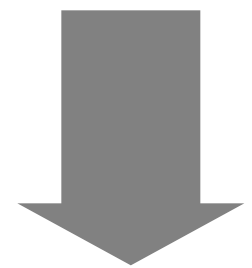
WDC Activity System
click on country to zoom

Oberpfaffenhofen

[BELGIUM \(2\)](#)
[CHINA \(9\)](#)
[DENMARK \(1\)](#)
[FRANCE \(1\)](#)
[GERMANY \(3\)](#)
[INDIA \(1\)](#)
[JAPAN \(8\)](#)
[NETHERLANDS \(1\)](#)
[RUSSIA \(5\)](#)
[UKRAINE \(1\)](#)
[UNITED KINGDOM \(3\)](#)
[USA \(15\)](#)

[Atmospheric Trace Gases \(1\)](#)
[Aurora \(1\)](#)
[Biodiversity \(1\)](#)
[Climate \(1\)](#)
[Cosmic Rays \(1\)](#)
[Earth Tides \(1\)](#)
[Geoinformatics and Sustainable Development \(1\)](#)
[Geology \(1\)](#)
[Geomagnetism \(4\)](#)
[Glaciology \(1\)](#)
[Ionosphere \(1\)](#)
[Land Cover Data \(1\)](#)
[Marine Environmental Sciences \(1\)](#)
[Marine Geology and Geophysics \(1\)](#)
[Meteorology \(3\)](#)
[Nuclear Radiation \(1\)](#)
[Oceanography \(3\)](#)
[Paleoclimatology \(1\)](#)
[Remote Sensing \(1\)](#)
[Rockets and Satellites \(3\)](#)
[Rotation of the Earth \(1\)](#)
[Seismology \(2\)](#)
[Soils \(1\)](#)
[Solar Activity \(1\)](#)
[Solar Radio Emissions \(1\)](#)
[Solar Terrestrial Physics \(4\)](#)
[Solid Earth Geophysics \(1\)](#)

WDC	Uptime	Sta
www.mtk.nao.ac.jp/wdc.html	92%	OF



The Group on Earth Observations (GEO)

GEO's current Members include 88 countries and the European Commission

THE GLOBAL EARTH OBSERVATION
SYSTEM OF SYSTEMS



**Improve data access
and data exchange**

**Identify requirements
and gaps capacity
building**



GEO Data Sharing Principles

- Full and Open Exchange of Data ...
Recognizing Relevant International Instruments
and National Policies and Legislation
- Data and Products at Minimum
Time Delay and Minimum Cost
- Free of Charge or Cost of
Reproduction for Research and
Education



National Policies & Legislation

Germany



TerraSAR-X & TanDEM-X

Launched June 15, 2007 &
June 21, 2010

TerraSAR-X, a National Science Mission with Commercial Potential



Public Private Partnership

DLR



- Project Management
- G/S Development & Ops
- Science Coordination
- System Engineering Support

EADS Astrium

- Platform Development
- Instrument Development
- Launch on Dnepr-1



Infoterra

- Service Infrastructure
- Information Products
- Commercial Exploitation

Main Mission Goals:

- Provision of TerraSAR-X data and products for **scientific applications** → **public interest**
- **Commercial exploitation** of remote sensing data → **by industry**



TerraSAR-X Science Portal



Search

You are here : **Home**

For registered users only
Username:
Password:

Entry Points
→ Investigator
→ Evaluator
→ Coordinator

User Access
→ Investigators Registration
→ Change Password

Proposals
→ General
→ TSX-Archive-2012
→ CSA-DLR-2010
→ Pre-launch

Open Calls
→ AO TSX-Archive-2012
→ AO DRA-2010

4. TSX Science Team Meeting
→ Mission Overview
→ Oral Presentations
→ Poster Presentations
→ Conference program

Documentation
← 2009

© DLR 2004-2009

TerraSAR-X Science Service System

The TerraSAR-X Science Service System allows for the submission and evaluation of proposals, as well as for the submission of reports.

- New interested scientists need to **register** before submitting proposals .
- Registered principal **investigators** of TerraSAR-X data may enter new and maintain existing proposals. A general proposal submission is possible at any time. The required language is English.
- Anybody may receive information about accepted proposals and review the corresponding executive summaries. Currently available are **pre-launch** and **general** proposals.
- The pdf document: **How to submit a TSX proposal** gives a short description of the corresponding procedure.
- Usually investigators will get the data for the costs of fulfilling the user request. Discounts will be applied for larger order volumes, and for dedicated research programs and institutions contributing to the TerraSAR-X mission, especially by financial or operational support. Special conditions might be applied to dedicated calls. The current **COFUR pricelist** is applicable to proposals presented to the permanent submission interface.
- The download of TerraSAR-X data requires special security regulations which are described in the **FAQ** document. There are also some remarks on ordering in EOWEB in it.
- All relevant documents are available in the **documentation** section.
- For any questions please send an email to the science coordinator **tsx.science@dlr.de**.

Open calls for proposals:

Type of call	Description	Open until
AO FOR UTILIZATION OF THE TERRASAR-X ARCHIVE (TSX-Archive-2012)	Provision of archived TerraSAR-X data (data must be older than 18 months at the time of ordering).	01.06.2012 to 30.09.2012
AO FOR EXPERIMENTAL PRODUCTS (DRA-2010)	Data provision of the dual receive antenna campaign 2010 (11.04.2010 to 13.05.2010).	unlimited

- Proposal submission: <http://sss.terrasar-x.dlr.de>

- Documentation etc: http://www.dlr.de/tsx/start_en.htm



German Satellite Data Security Act of 2007 “Satellitendatensicherheitsgesetz” (SatDSiG)

The permit ... must be granted if the dissemination of data in the individual case does not harm the vital security interests of the Federal Republic of Germany, does not disturb the peaceful coexistence of nations and does not substantially impair the foreign relations of the Federal Republic of Germany.

To ensure reliable basis for commercial operations and data distribution



2590 Bundesgesetzblatt Jahrgang 2007 Teil I Nr. 58, ausgegeben zu Bonn am 28. November 2007	2590 Federal Gazette (BGBl.) Year 2007 Part I No. 58, issued in Bonn on 28 November 2007
Gesetz zum Schutz vor Gefährdung der Sicherheit der Bundesrepublik Deutschland durch das Verbreiten von hochwertigen Erdfernerkundungsdaten (Satellitendatensicherheitsgesetz — SatDSiG)	Act to give Protection against the Security Risk to the Federal Republic of Germany by the Dissemination of High-Grade Earth Remote-Sensing Data (Satellite Data Security Act — SatDSiG)
Vom 23. November 2007	of November 23, 2007 Unofficial Translation
Der Bundestag hat das folgende Gesetz beschlossen:	The Federal Parliament (Bundestag) has passed the following Act:
Inhaltsübersicht	Outline of contents
Teil 1	Part 1
Anwendungsbereich	Scope of Application
§ 1 Anwendungsbereich § 2 Begriffsbestimmungen	Section 1 Scope of Application Section 2 Definition of Terms
Teil 2	Part 2
Betrieb eines hochwertigen Erdfernerkundungssystems	Operation of a high-grade earth remote sensing system
§ 3 Genehmigung § 4 Genehmigungsvoraussetzungen § 5 Dokumentationspflicht § 6 Anzeigepflicht § 7 Auskunftspflicht § 8 Betretens- und Prüfungsrechte § 9 Maßnahmen der zuständigen Behörde § 10 Erwerb von Unternehmen und Unternehmensbeteiligungen; Betriebsübernahme	Section 3 Operator license Section 4 Operator license requirements Section 5 Obligation of documentation Section 6 Obligation of notification Section 7 Obligation to provide information Section 8 Rights of entry and inspection Section 9 Measures of the responsible authorities Section 10 Acquisition of enterprises and participating interests in enterprises; business takeovers
Teil 3	Part 3
Verbreiten von Daten	Dissemination of data
Kapitel 1	Chapter 1
Allgemeine Voraussetzungen	General requirements
§ 11 Zulassung § 12 Zulassungsvoraussetzungen § 13 Anzeigepflicht § 14 Auskunftspflicht § 15 Betretens- und Prüfungsrechte § 16 Maßnahmen der zuständigen Behörde	Section 11 Dissemination license Section 12 Dissemination license requirements Section 13 Obligation of notification Section 14 Obligation to provide information Section 15 Rights of entry and inspection Section 16 Measures of the responsible authorities
Kapitel 2	Chapter 2
Verfahren des Verbreitens von Daten	Process of data dissemination

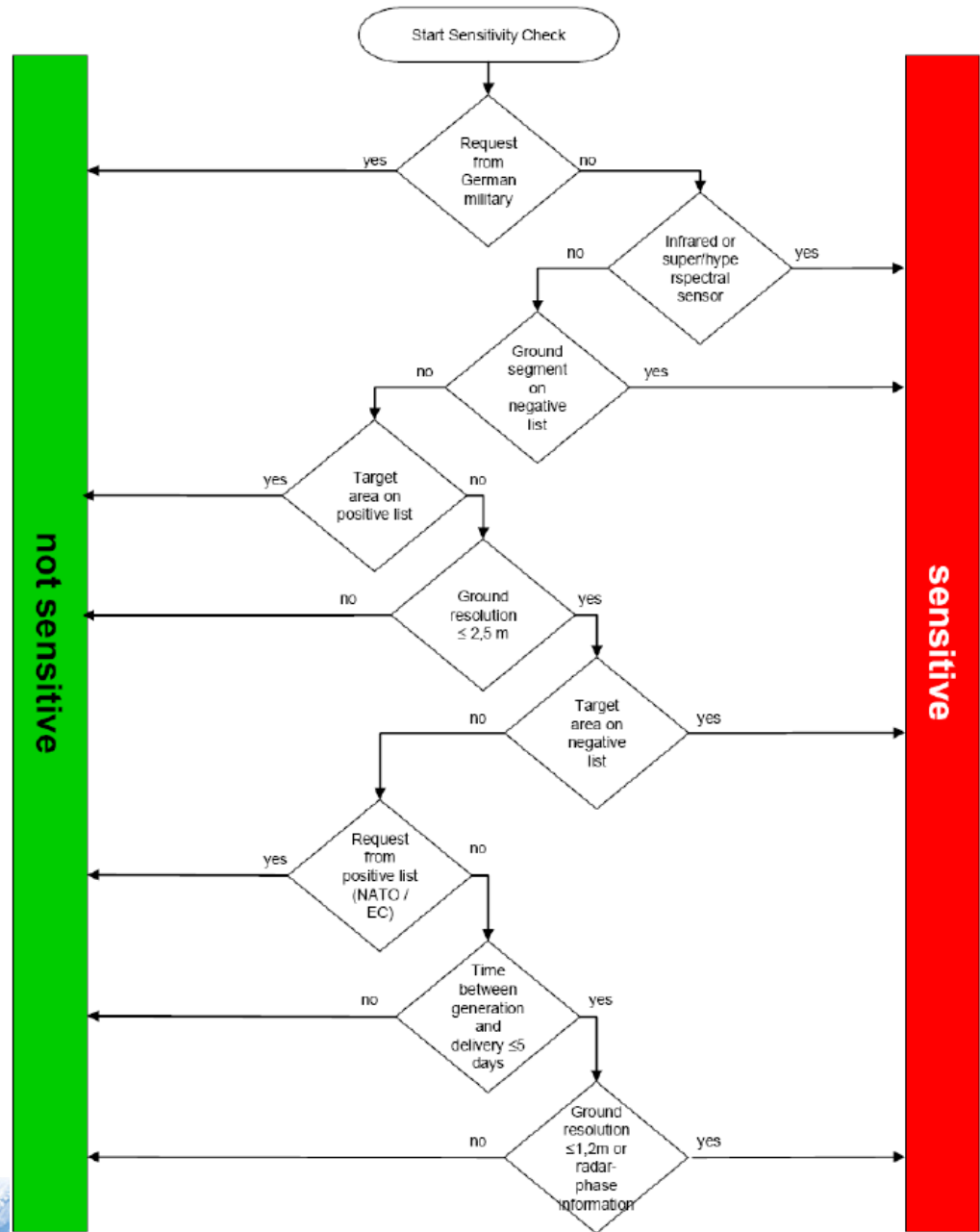
SatDSiG Check

- Special users and sensors?
- Area Sensed?
- Resolution and Phase. < 2,5 m/ 1,2 m (SpotLight Mode)?
- User?
- „Sensitive“ does not deny the access, but requires individual check by BAFA

Applicable in Germany for:

- TerraSAR-X
- TanDEM-X

.. Not for:
 RapidEye, EnMAP...
 Non German VHR optical data
 received and distributed from
 Germany



Canada



L/S/X-Band Antenna in Inuvik, NWT, Canada

Inuvik Satellite Station Facility (ISSF)

- DLR antenna complements northern European stations for TanDEM-X reception
- Major investment of Germany/DLR in partnership with European and Canadian entities
- Canada Center for Remote Sensing (CCRS) owns site, supports & develop Inuvik Satellite Station Facility (ISSF)




© C.Broja



Inuvik Satellite Station Facility (ISSF) – Legal issues

- Canadian Remote Sensing Space Systems Act
- Controls any EO activity of Canadian satellites and for any EO satellites from Canadian territory
- The case: German EO station receives German EO satellite in Canada
- German SatDSiG: no foreign access to TerraSAR-X data
- Canadian RSSSA: permit requires Canadian access to foreign EO data
- → bilateral intergovernmental agreement



CANADA

CONSOLIDATION	CODIFICATION
Remote Sensing Space Systems Act	Loi sur les systèmes de télédétection spatiale
S.C. 2005, c. 45	L.C. 2005, ch. 45
Current to July 8, 2012	À jour au 8 juillet 2012
Last amended on April 5, 2007	Dernière modification le 5 avril 2007
Published by the Minister of Justice at the following address: http://laws-lois.justice.gc.ca	Publié par le ministre de la Justice à l'adresse suivante : http://lois-laws.justice.gc.ca



LANDSAT

Four Decades of Earth Observation
1972–2012

"Because Landsat enables us to see Earth's surface so clearly, so broadly, so objectively, we gain invaluable insights about the complexity of Earth systems and the condition of our natural resources."

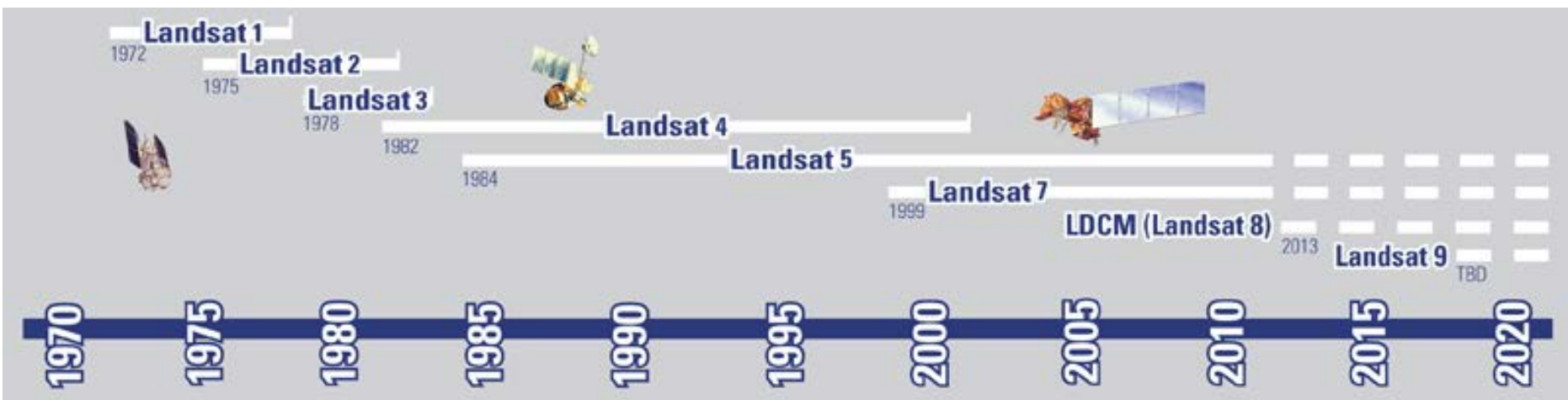
— USGS Director Marcia McNutt



40
1972
2012
LANDSAT
FOUR DECADES OF
EARTH OBSERVATION

Mexico Irrigation
Landsat 5
August 3, 2010

The Landsat missions and policies

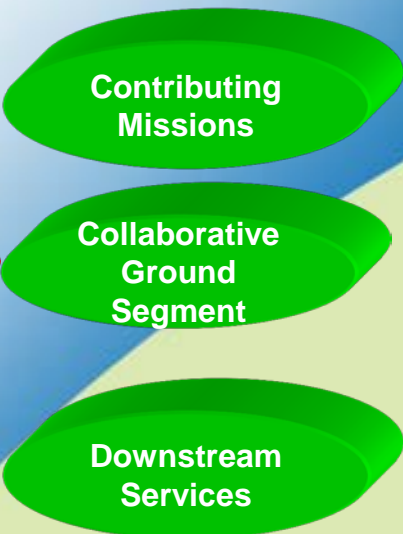
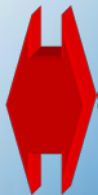
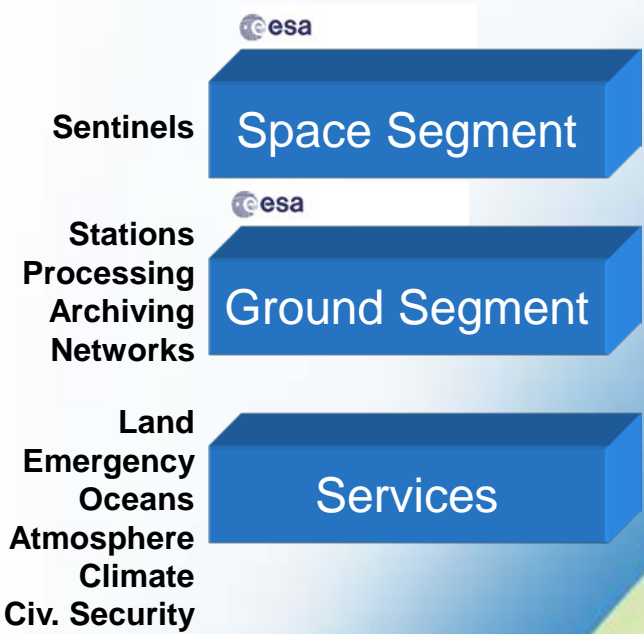


Diverse agencies in charge
Diverse data policies (incl. commercial)
Now: Free and Open Data





Global Monitoring for Environment and Security



GMES dedicated missions: Sentinels



Sentinel 1 – SAR imaging

All weather, day/night applications, interferometry

2013



Sentinel 2 – Multispectral imaging

Land applications: urban, forest, agriculture,..
Continuity of Landsat, SPOT

2014



Sentinel 3 – Ocean and global land monitoring

Wide-swath ocean color, vegetation, sea/land surface temperature, altimetry

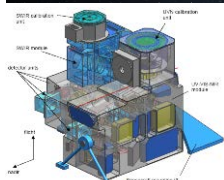
2014



Sentinel 4 – Geostationary atmospheric

Atmospheric composition monitoring, trans-boundary pollution (payload on geost. satellite)

2017+



Sentinel 5 – Low-orbit atmospheric

Atmospheric composition monitoring
(Payload on polar orbiting satellite
(S5 Precursor launch in 2014))

2015,

2019+



PDGS
(incl. Land for S3)



PDGS
(incl. Ocean for S3)



GMES Data Policy

Sentinel Satellites Data Policy

- Free and Open access to all Sentinel-data (everybody, at no cost) ^{1,2}
- Free and Open access to all GMES Core Service Products ²
- Contributing missions keep their data policy (incl. commercial). Licence for data are purchased by GMES for Core Services. Some licences may be extended for general public use

Status

- ESA member states recommend this data policy to the European Commission
- Through GMES regulation 911/2010 need to put this into a legal act
- General „Governance of GMES“ still tbc!

1: User registration required;


standard off-line products; standard internet access

2: Security restrictions may apply. E.g. Security Services

Conclusions

- Earth Observation Data required to cope with societal challenges
Beyond commercial drivers.
- Harmonize national policies in granting/denying access to data
Towards an international solution?
- Get sustainable and stable conditions for long term observations
Don't forget the historical data!





“Man must rise above the Earth, to the top of the clouds and beyond, for only thus will he fully understand the world in which he lives.”

- Quote attributed to Socrates

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EOC · Earth Observation Center
DFD · German Remote Sensing Data Center

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