

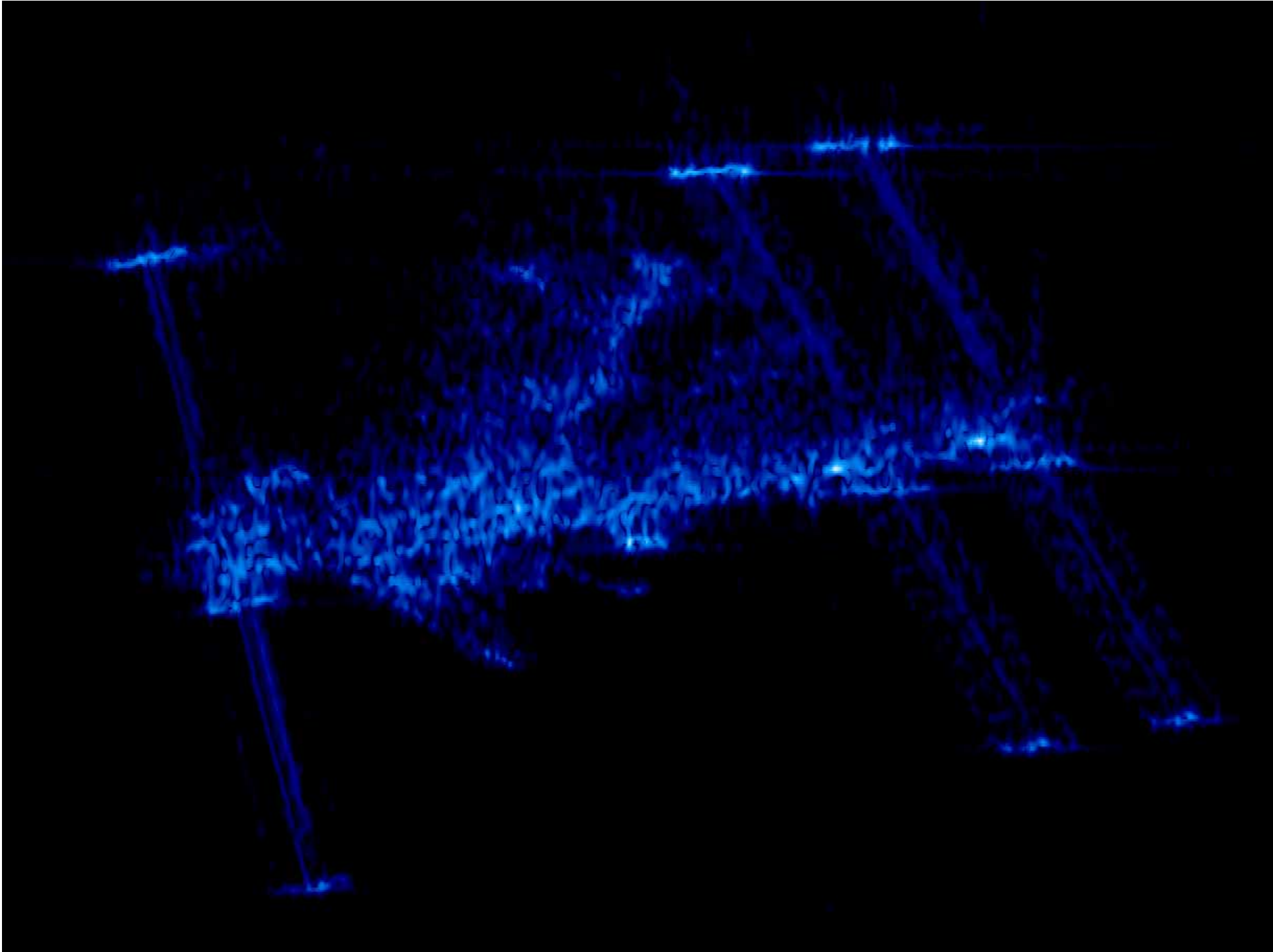


# Disaster Help from Space

Gunter Schreier

German Remote Sensing Data Center - DFD

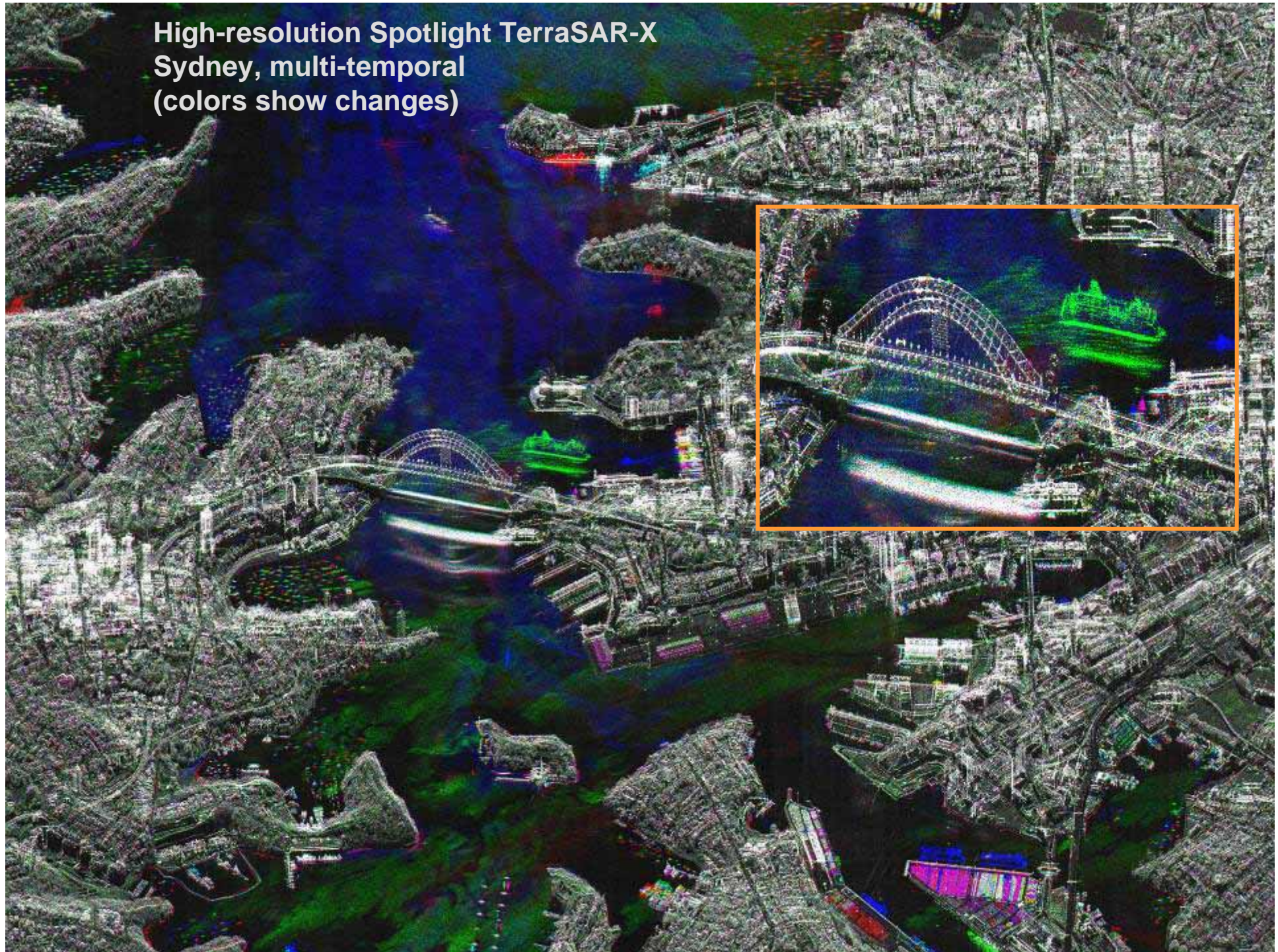
German Aerospace Center - DLR



# TerraSAR-X Satellite

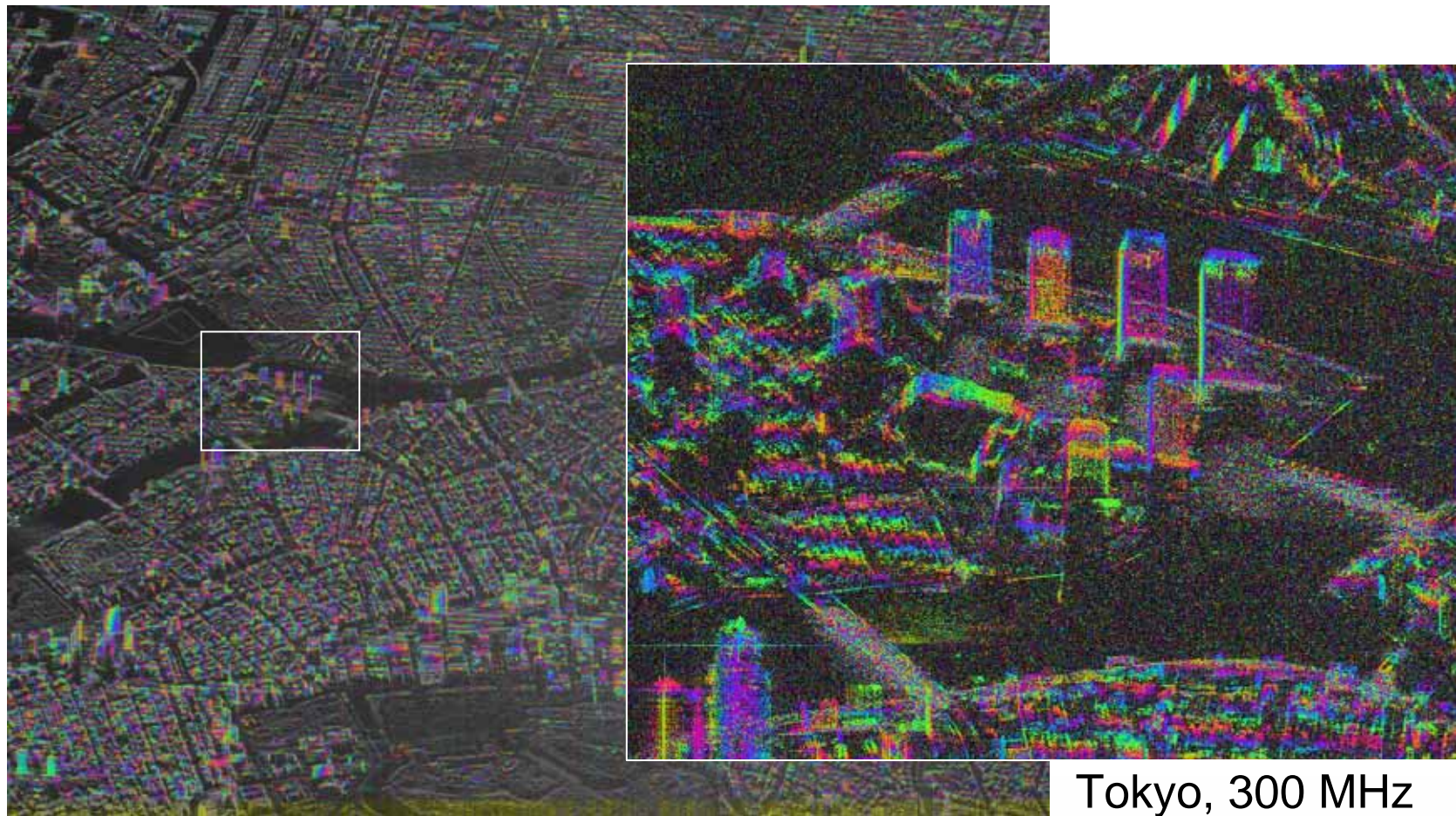


High-resolution Spotlight TerraSAR-X  
Sydney, multi-temporal  
(colors show changes)



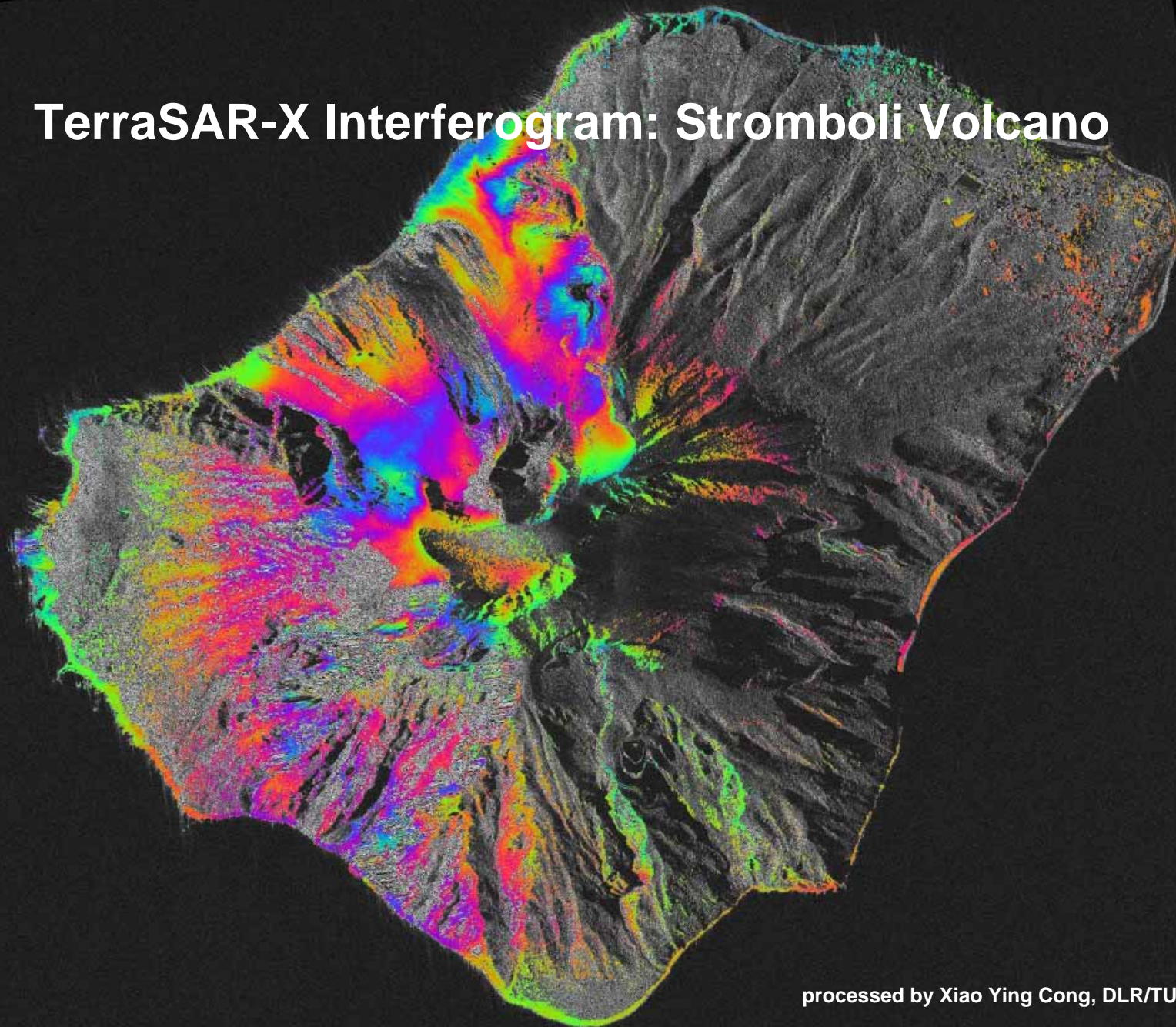


# TerraSAR-X: High Resolution Interferometry



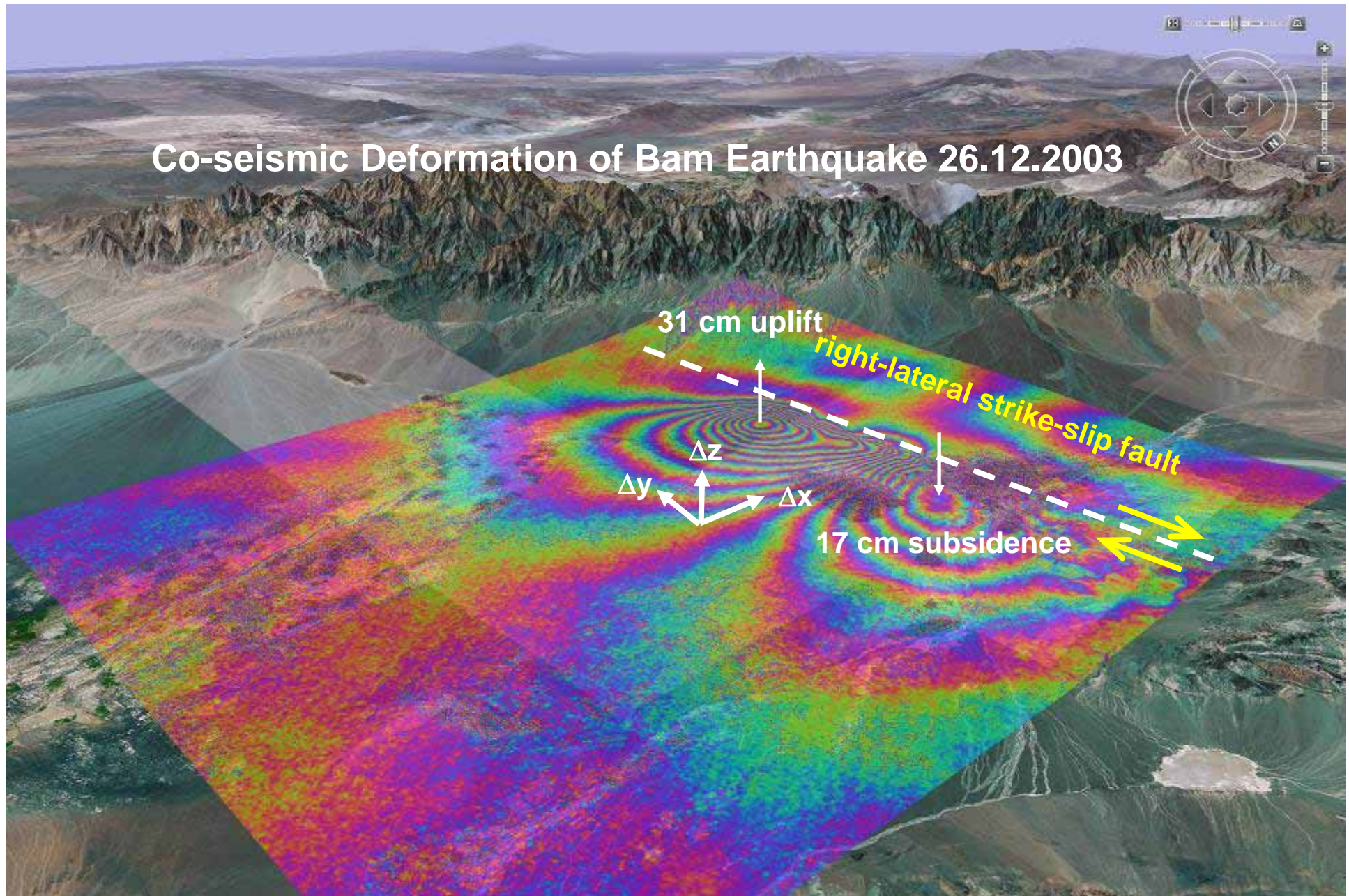
Tokyo, 300 MHz

# TerraSAR-X Interferogram: Stromboli Volcano



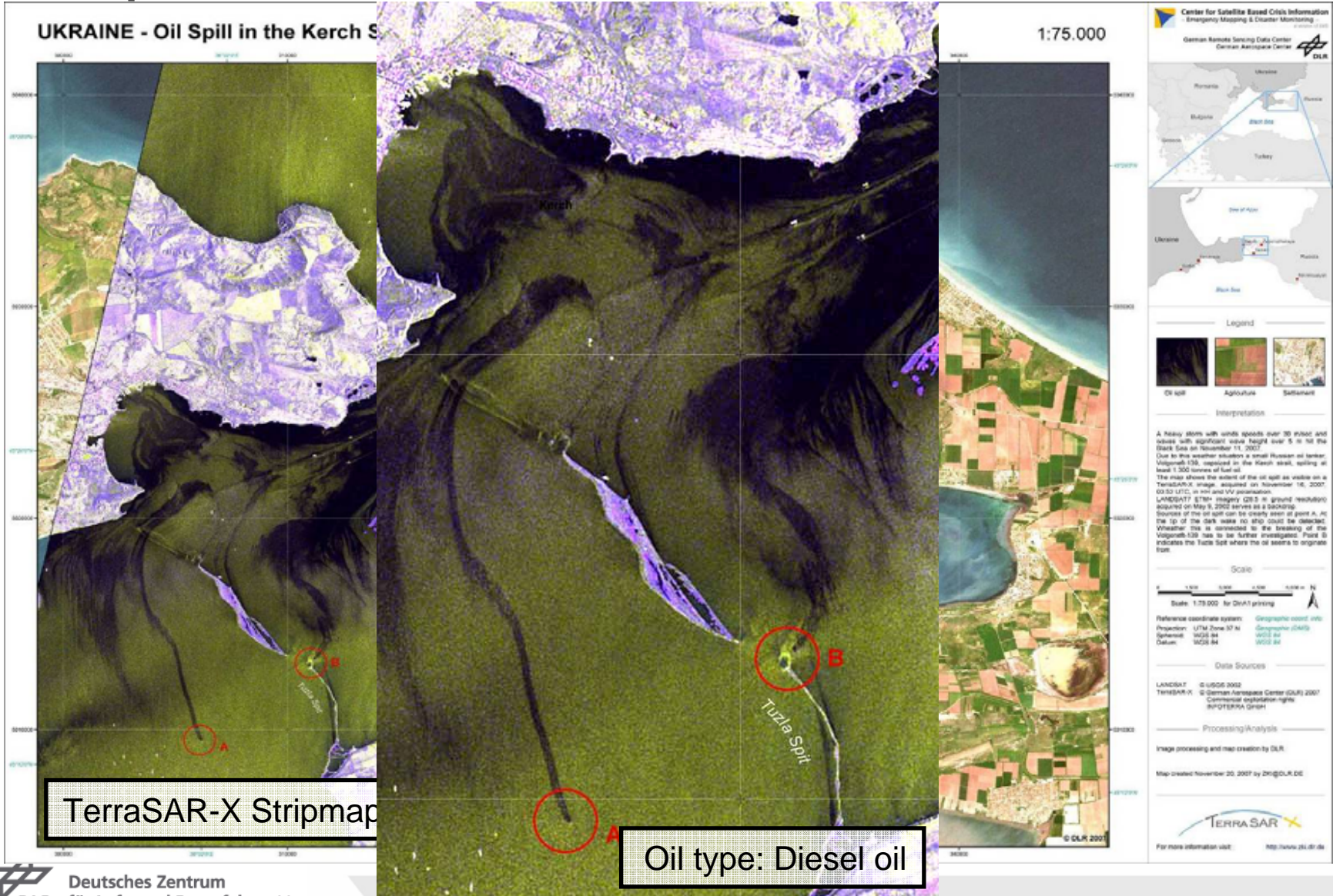
processed by Xiao Ying Cong, DLR/TUM

# Co-seismic Deformation of Bam Earthquake 26.12.2003



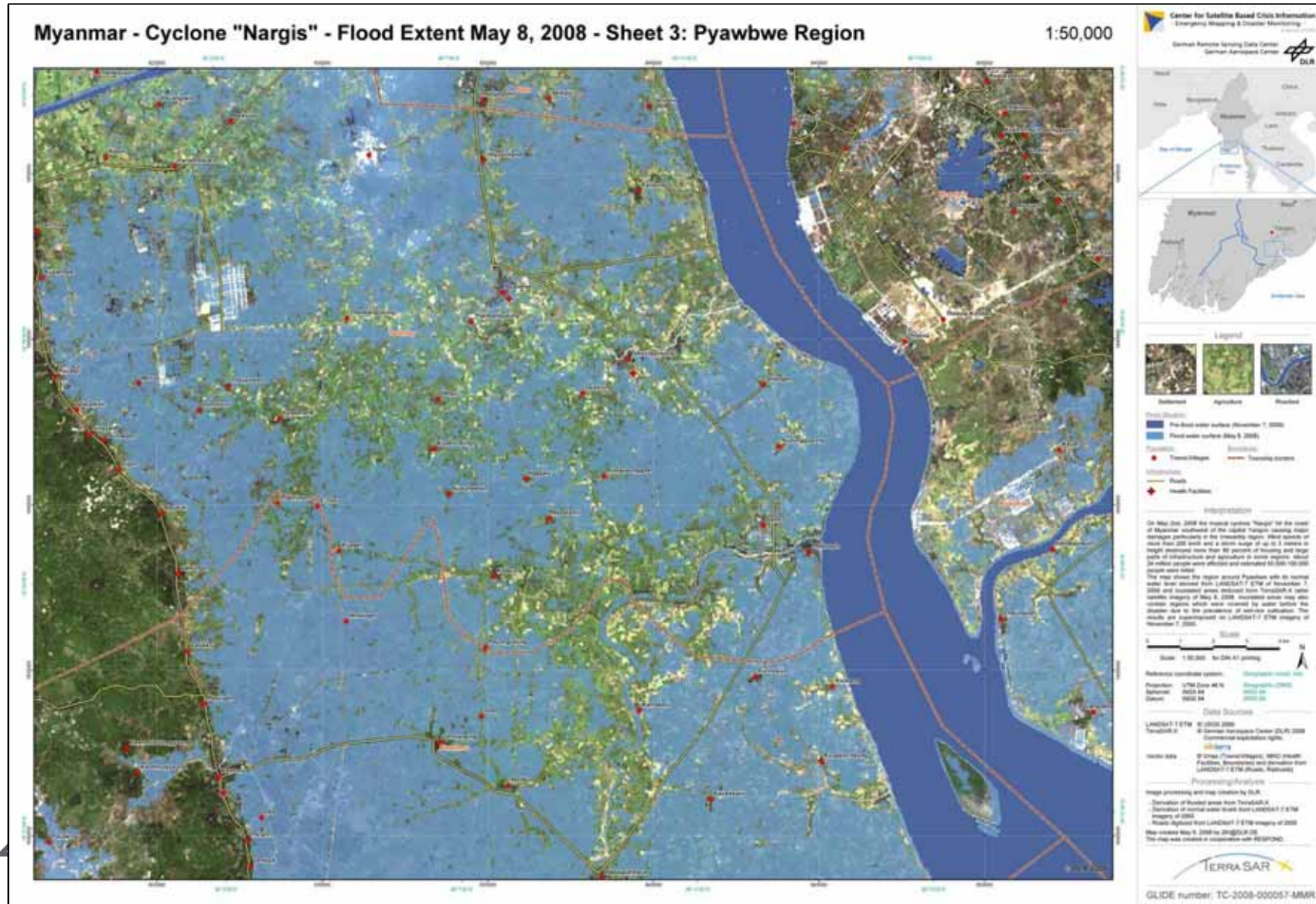


# Oil spill Kerch Strait, November 2007





# Cyclone „Nargis“ Myanmar, May 2008 – TerraSAR-X





**GREECE - Northern Grammatiko  
Disaster Extent**  
Burnt Areas - August 26, 2009  
Scale 1:15,000

Land cover class	Burnt area (ha)	Burnt area (%)
Agriculture	1481	36.1
Forest / shrubland	2611	63.8
Settlement	3	0.1
<b>Total (map extent)</b>	<b>4095</b>	<b>100</b>

Location Diagrams



Legend

Satellite image information

Analysis layer

- Burnt area
- Infrastructure
- Major road
- Minor road

Topography

- Contour line

Interpretation

Several forest fires occurred since August 21, 2009 in the prefecture Attica, north-eastern of Athens, Greece. Many residents had to be evacuated from their homes. The map shows detailed damage information for the region around Grammatiko derived from IKONOS satellite data acquired on August 26, 2009. Streets have been digitized on the basis of Open Street Map data and do not show the entire road network. All information is superimposed on a natural colour image of the IKONOS image from August 26, 2009.

Cartographic Information

Local projection: UTM Zone 34 North, Datum: WGS 84  
Scale: 1:15,000 for A1 prints

Data Sources

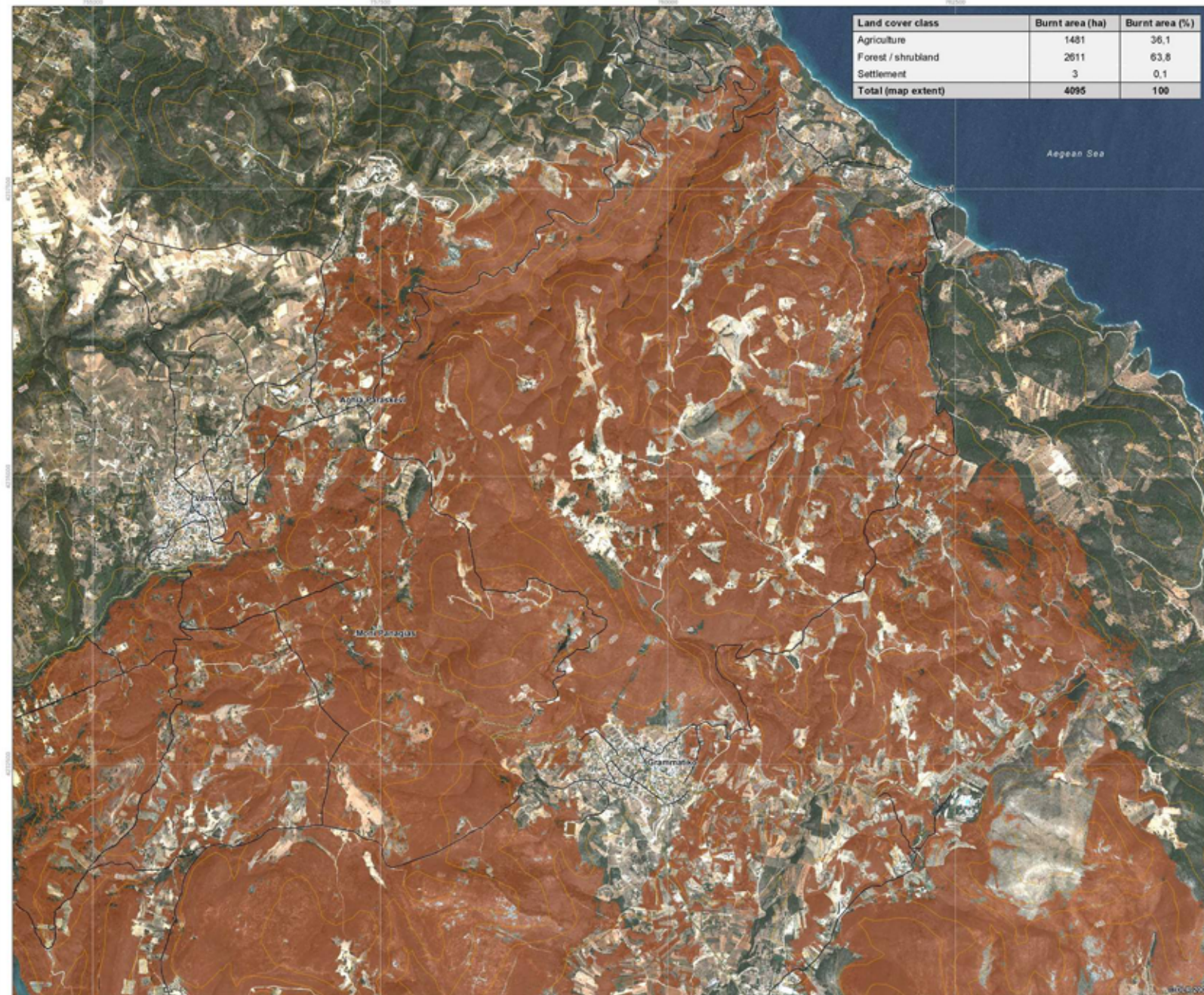
IKONOS © e-GEOS (2006), provided under EC/ESA GSC-04  
SRTM C-BAND © USGS 2000  
Vector Data © Open Street Map, Google Earth 2009  
CORINE Land Cover © KVM 2004

Framework

The products elaborated for this Rapid Mapping Activity are related to the best of our ability, within a very short time frame, during a crisis, optimizing the material available. All geographic information has limitations due to the scale, resolution, date and interpretation of the original source materials. No liability concerning the content or the use thereof is assumed by the producer.

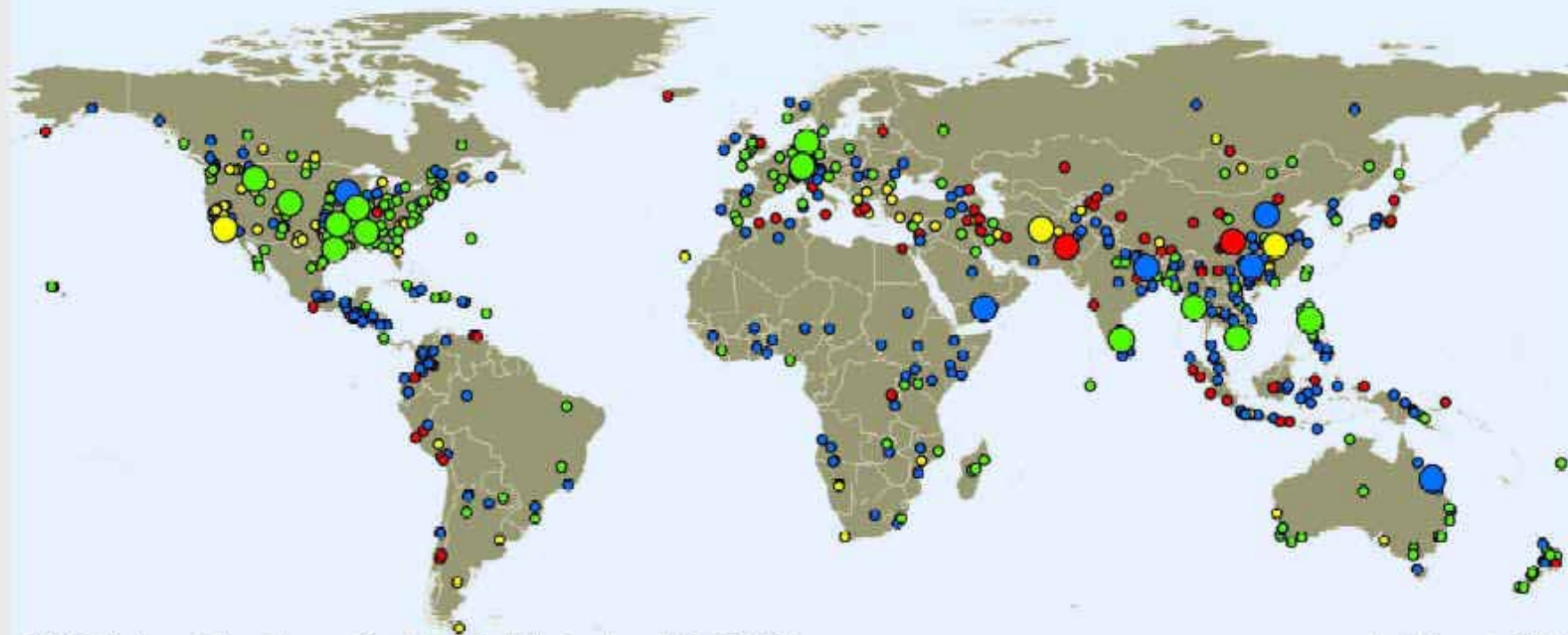
Map produced August 27, 2009 by ZKI  
© DLR 2009  
zki@dlr.de  
<http://www.zki.dlr.de>

Center for Satellite Based Crisis Information  
- Emergency Mapping & Disaster Monitoring -  
a member of ZKI



# Natural disasters 2008

## World map



© 2008 Münchener Rückversicherungs-Gesellschaft, GeoRisikoForschung, NatCatSERVICE

As at: December 2008

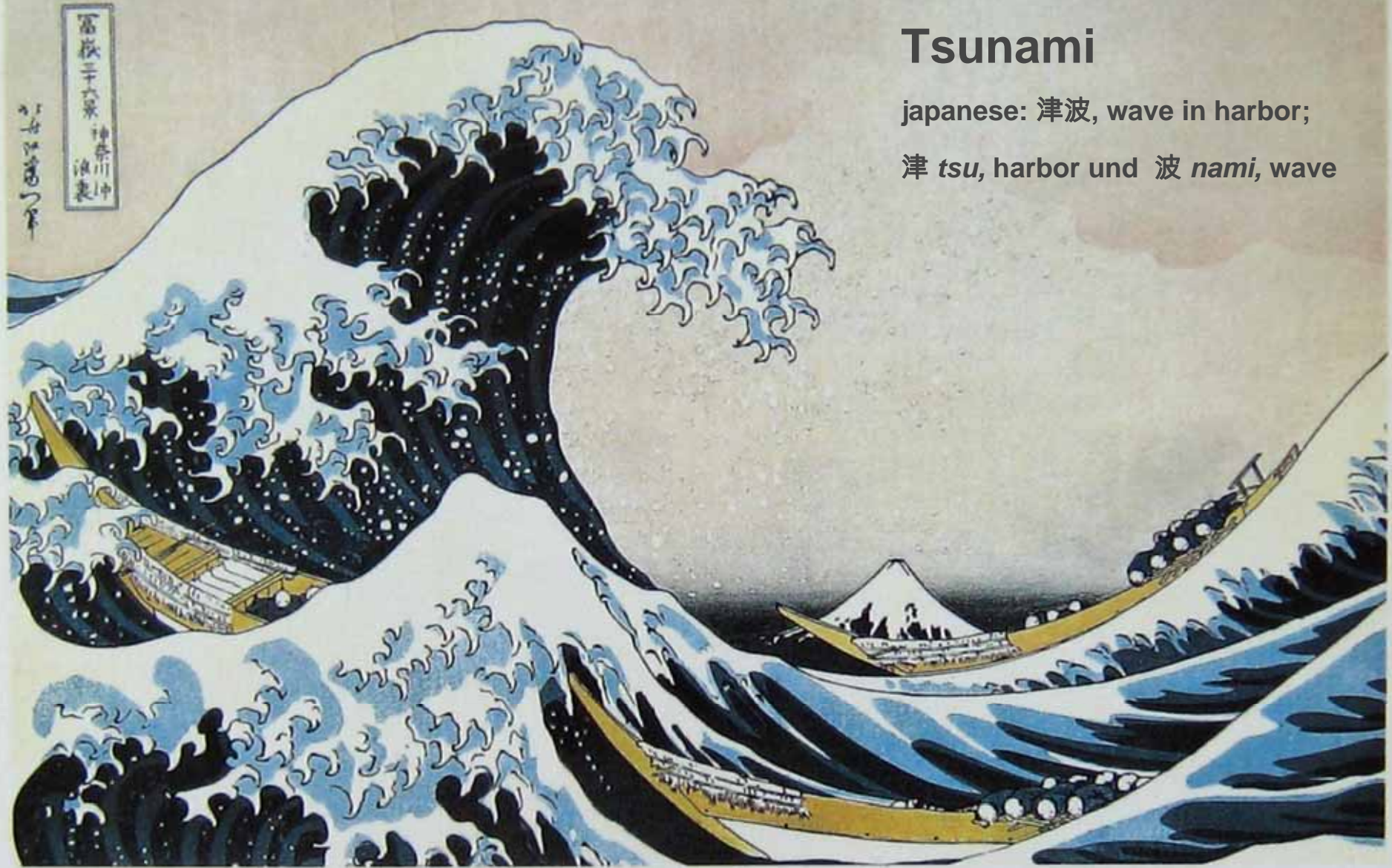
- 750 natural hazard losses
- Costliest/Deadliest events

- **Geophysical**  
(earthquake, tsunami, volcanic activity)
- **Meteorological** (storm)
- **Hydrological**  
(flood, mass movement)
- **Climatological**  
(extreme temperature, drought, wildfire)

# Tsunami

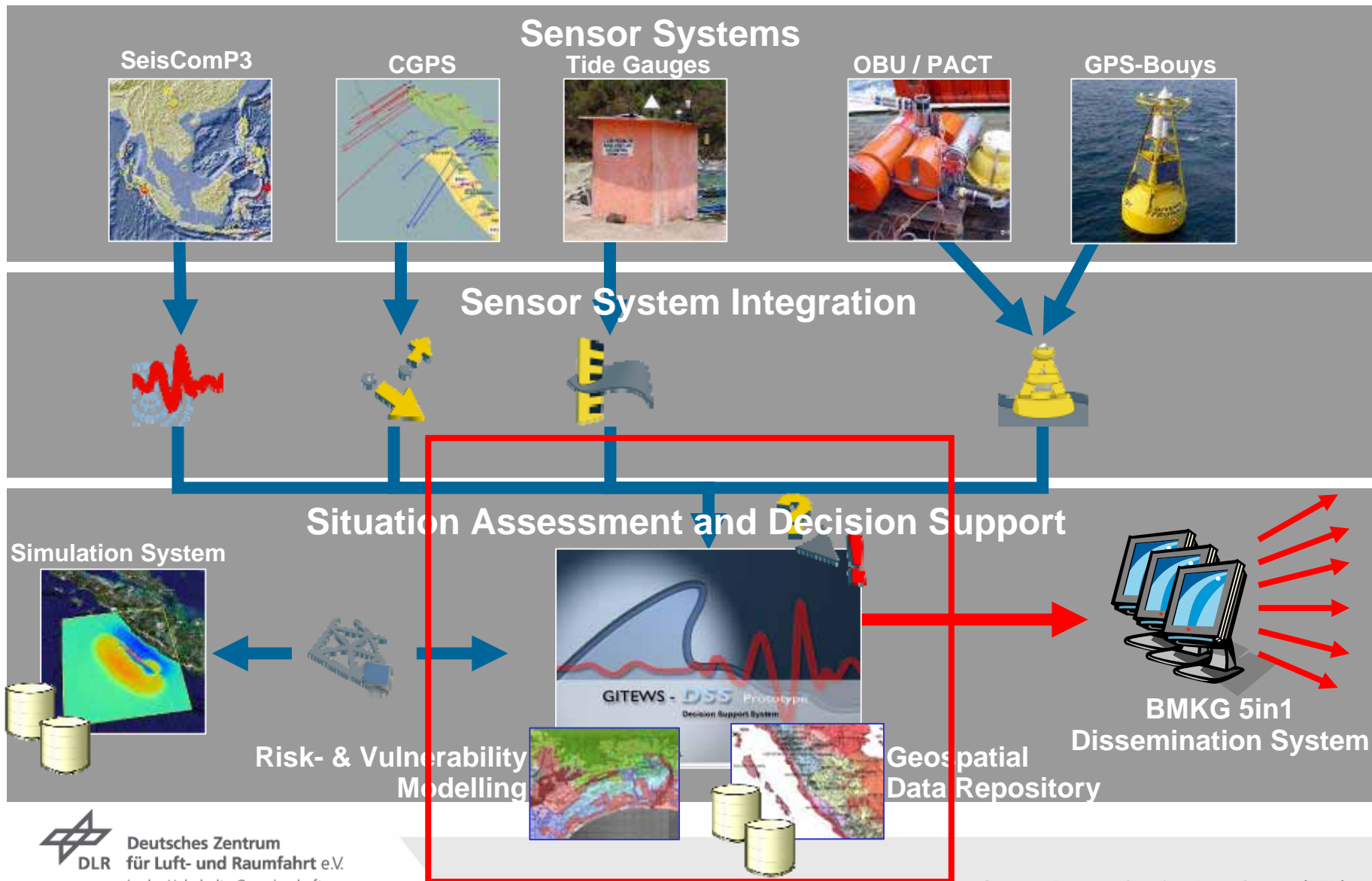
japanese: 津波, wave in harbor;

津 *tsu*, harbor und 波 *nami*, wave





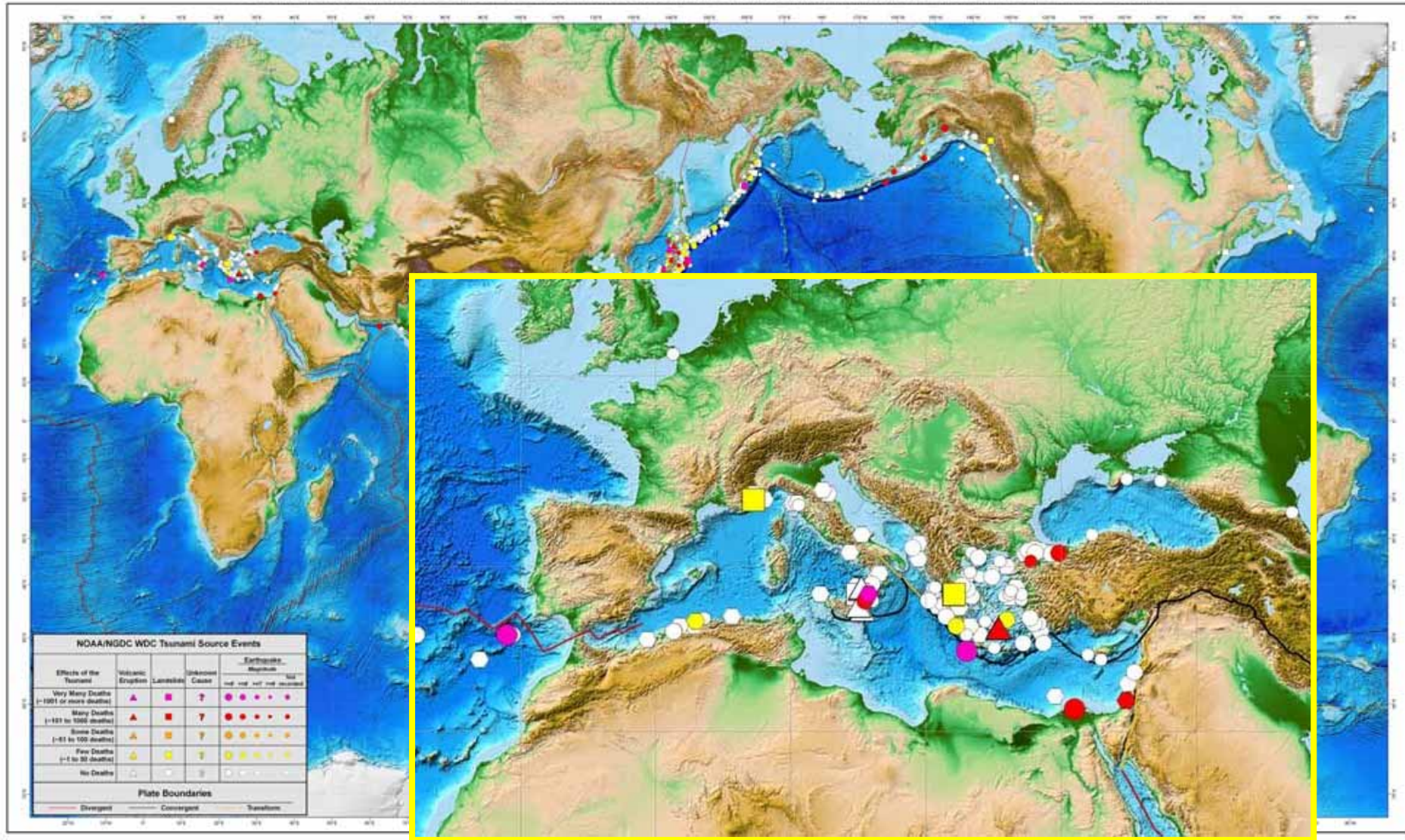
# GITEWS Tsunami Early Warning & Mitigation System







Global Tsunami Sources 1650 B.C. to A.D. 2008 from Earthquake, Volcano, Landslide, and Other Causes





***Global  
Monitoring of  
Environment and  
Security***





# GMES FP7 Core Services



FP6 closing projects:





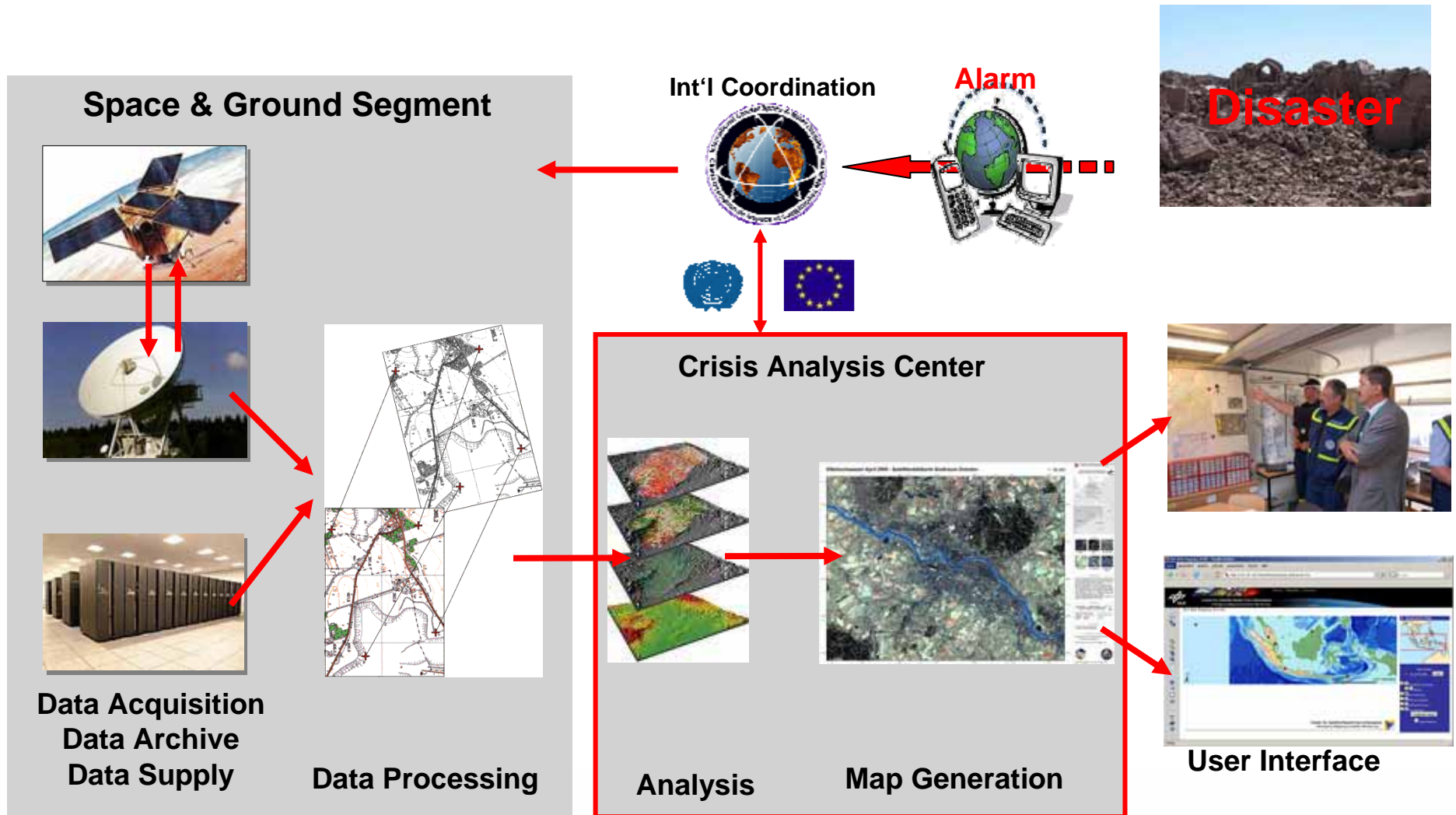
# SAFER

*GMES Emergency  
Response Service*

- 3 years project
- 54 partners from 16 countries
- strategic management board:  
InfoTerra, DLR, eGEOS



# Rapid emergency response with EO data





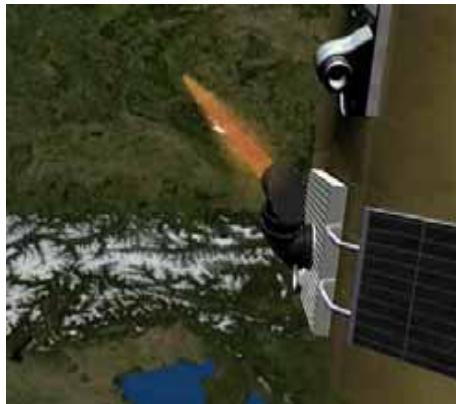
# Polar Ground Stations for ...



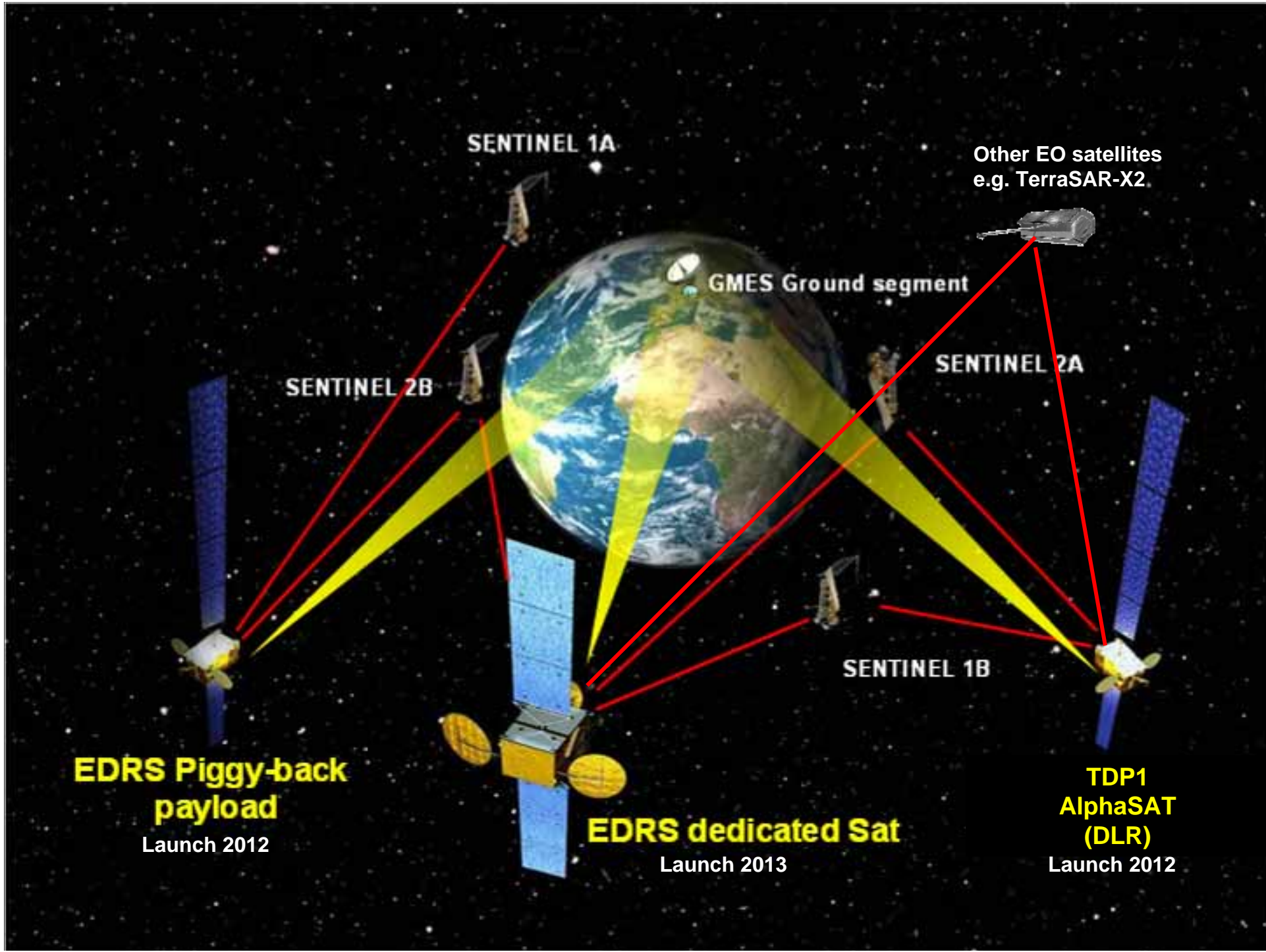
# ... Polar orbiting Earth Observation Satellites



## Faster Data Downlinks: Laser Communication Technologies



- Laser Communication Terminal (LCT)
  - Data rate up to 5,6 Gbps (BPSK)
  - Space-to-space & Space-to-ground
  - Tesat-Spacecom, Germany
- LCT on SENTINEL-1 & SENTINEL-2
- European Data Relay Satellites (EDRS) equipped with Laser Communication Terminal (LCT)
  - Ka-Band to ground



SENTINEL 1A

Other EO satellites  
e.g. TerraSAR-X2

GMES Ground segment

SENTINEL 2B

SENTINEL 2A

SENTINEL 1B

**EDRS Piggy-back  
payload**

Launch 2012

**EDRS dedicated Sat**

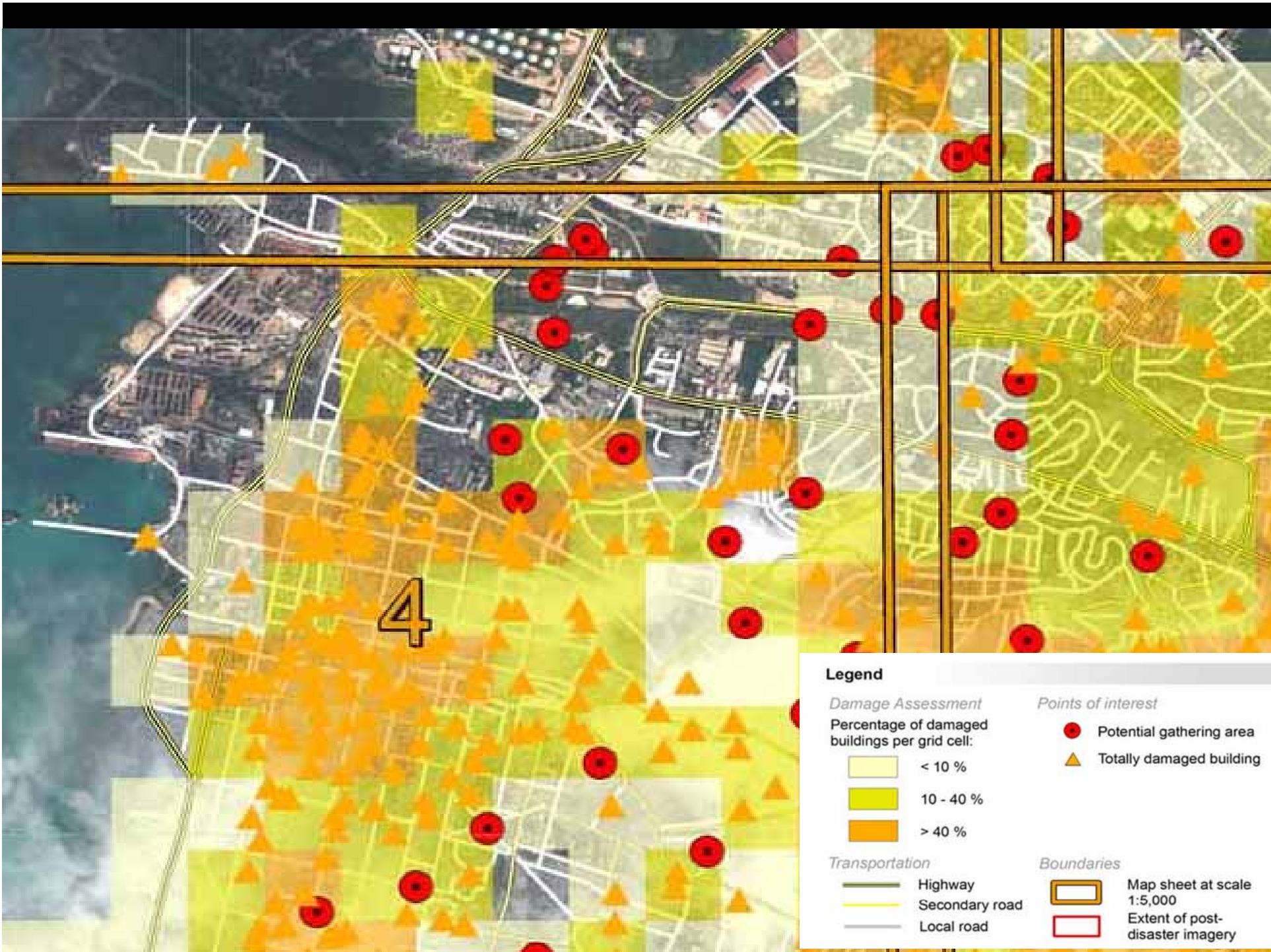
Launch 2013

**TDP1  
AlphaSAT  
(DLR)**

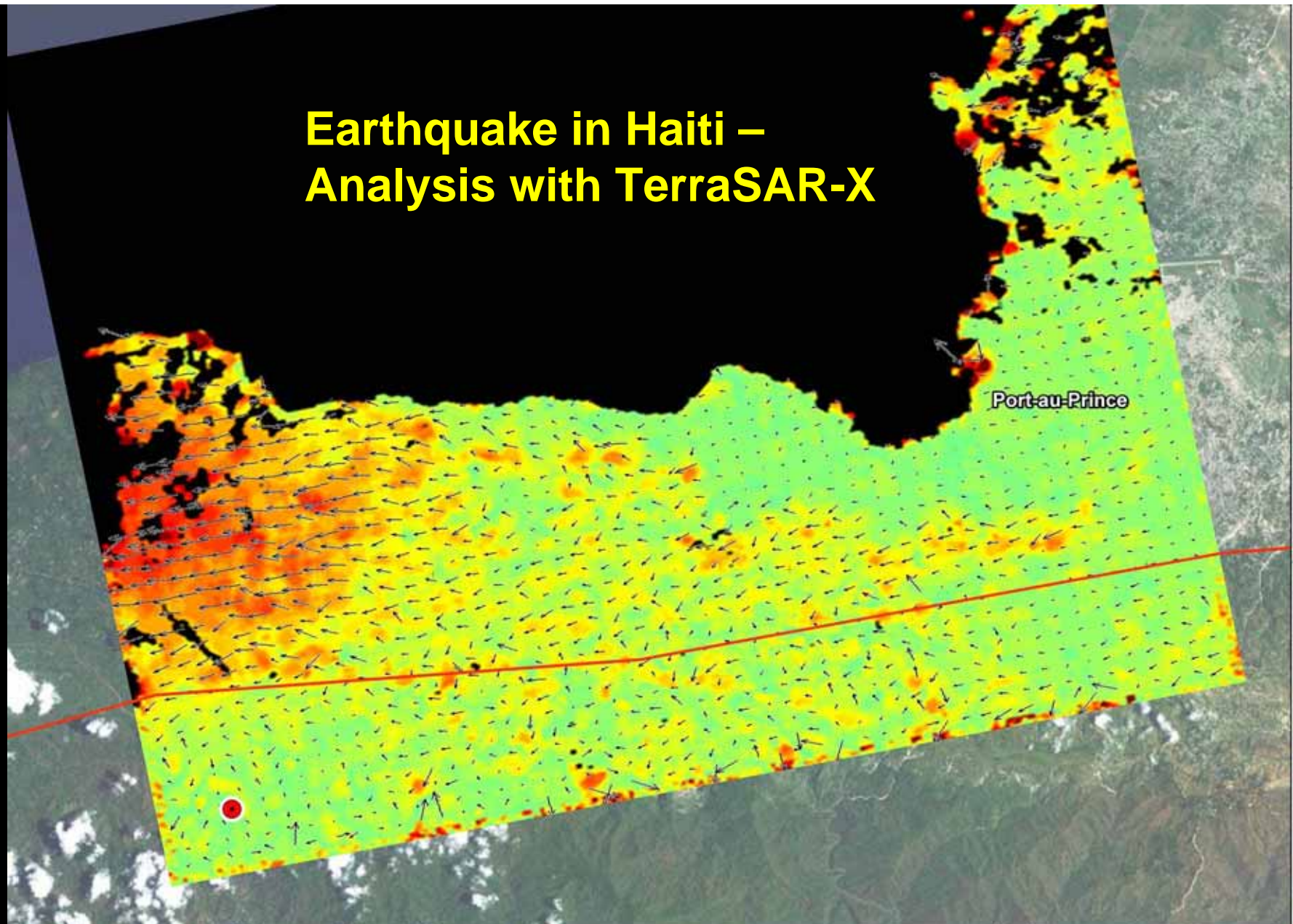
Launch 2012







# Earthquake in Haiti – Analysis with TerraSAR-X



Remote Sensing Technology Institute  
German Aerospace Center



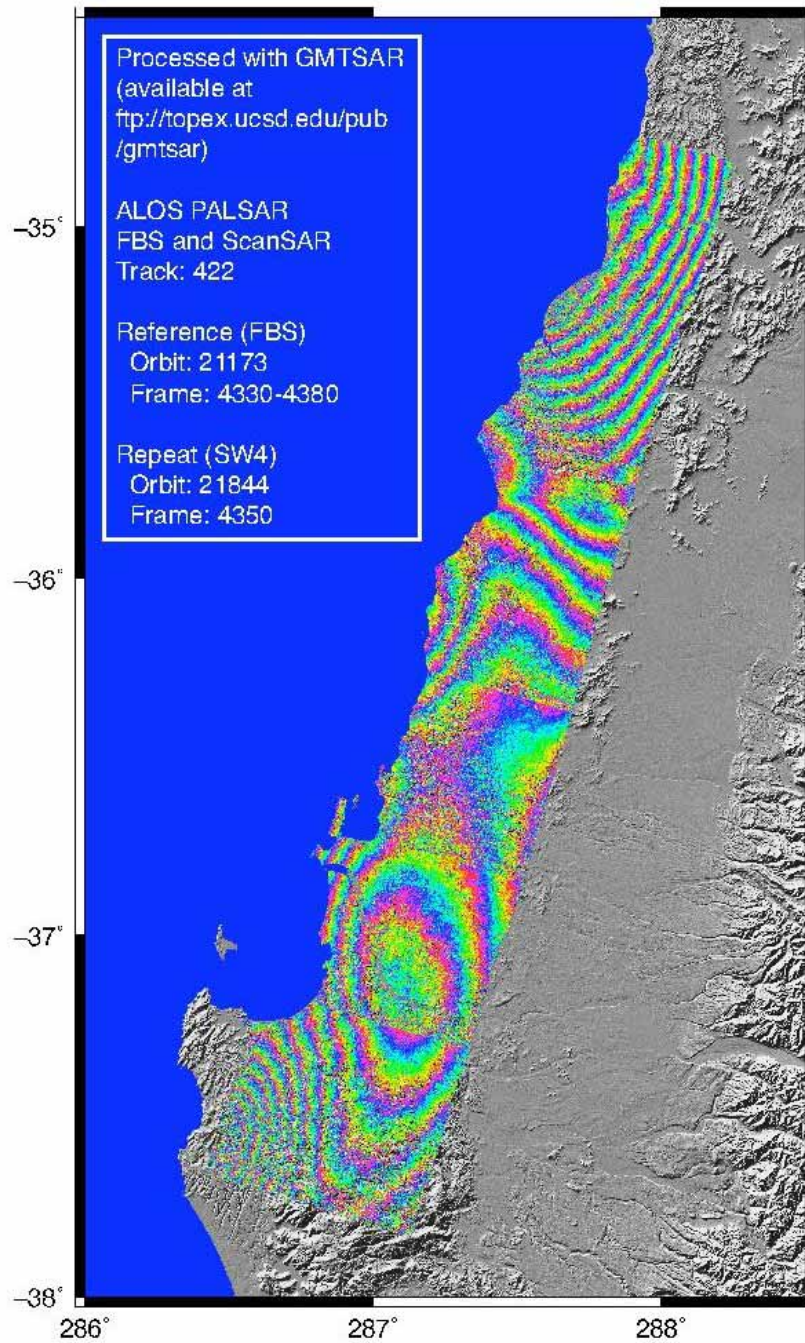
Center for Satellite Based Crisis Information  
– Emergency Mapping & Disaster Monitoring –

TERRA SAR X



# Supersites on geologically active regions



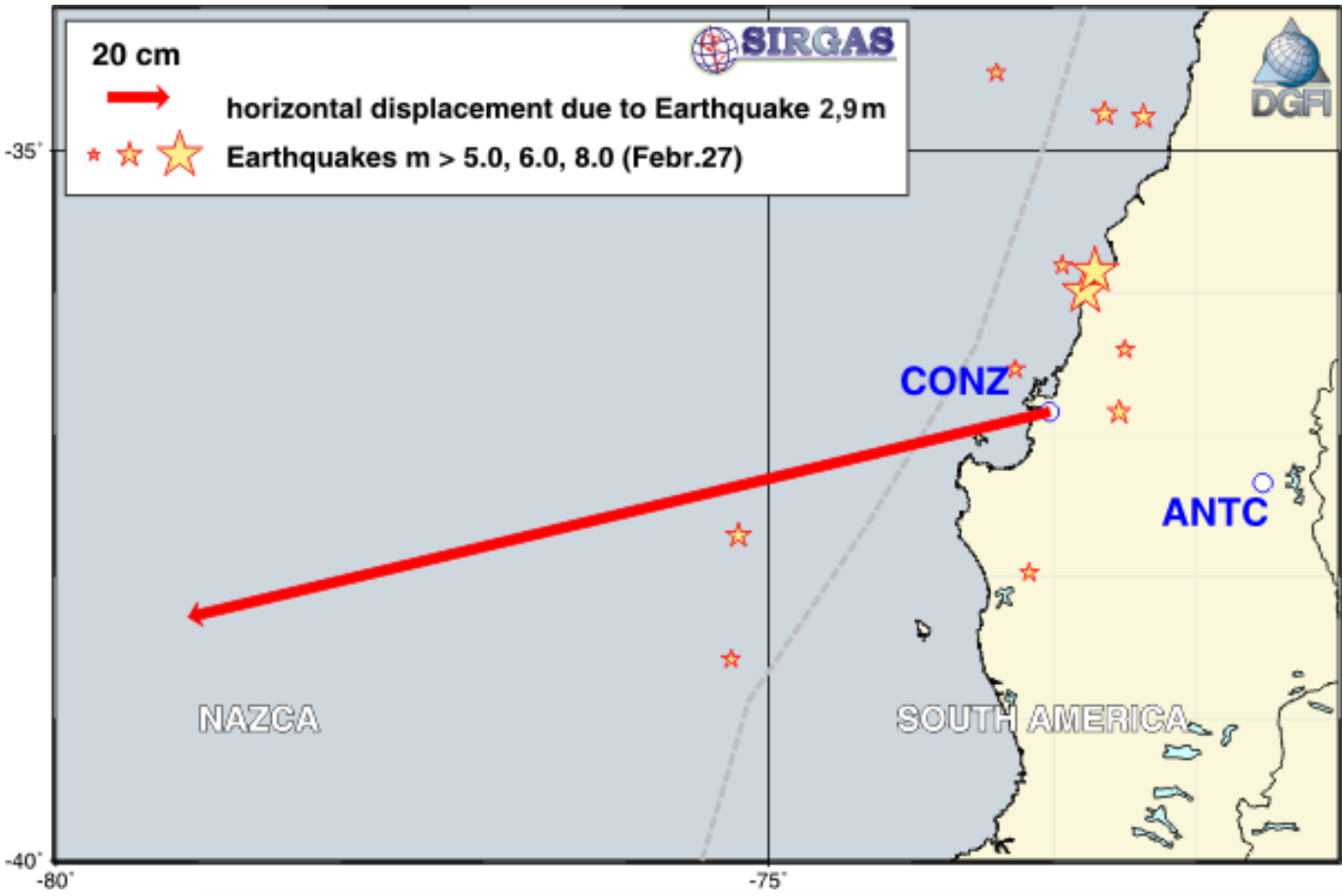


## Displacements:

### ALOS PALSAR Interferometry



# Displacements: GPS



# International Charter on Space and Major Disasters



Deutsches Zentrum  
für Luft- und Raumfahrt e.V.  
in der Helmholtz-Gemeinschaft

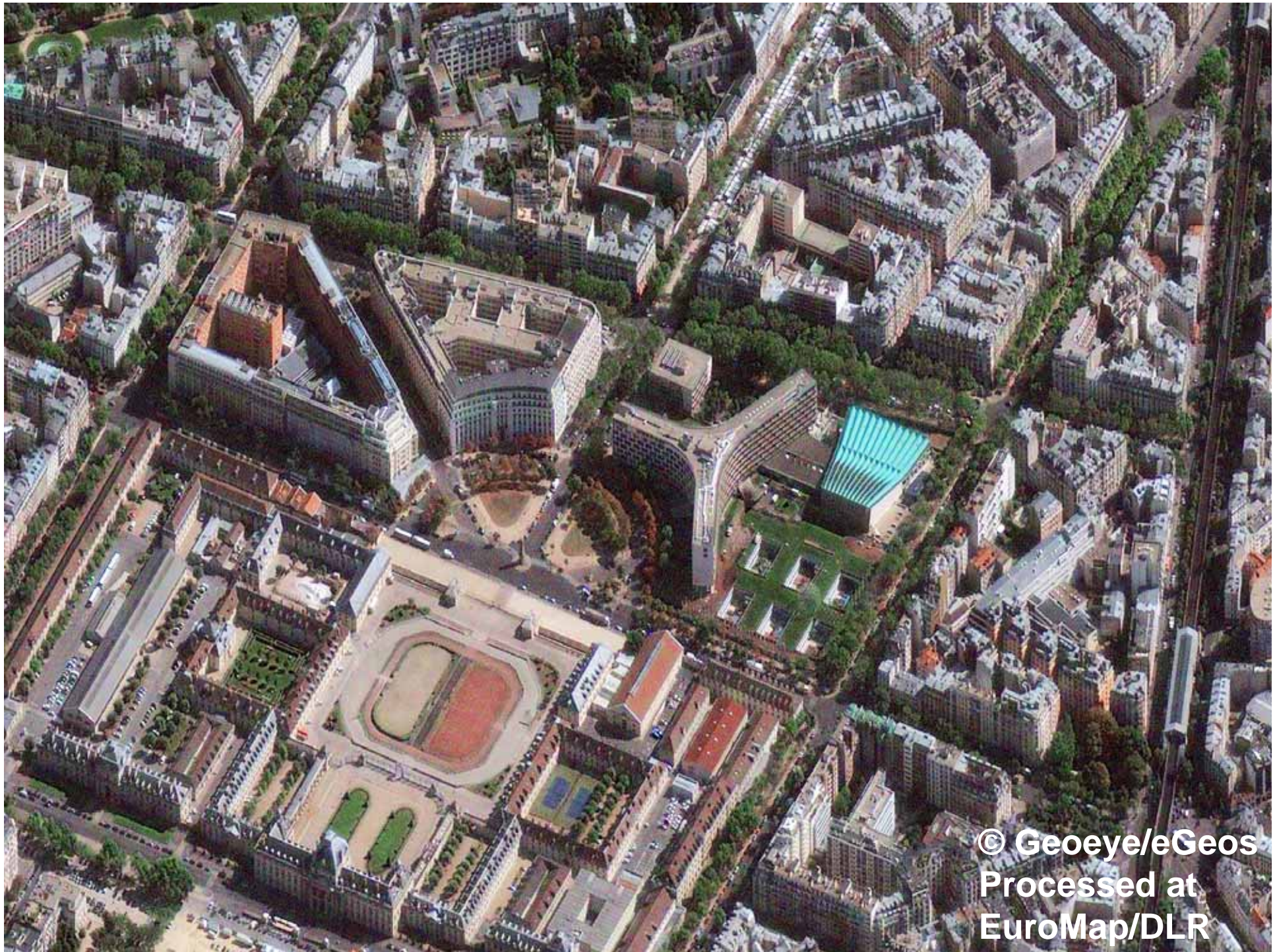
since 2000 providing a unified system of space data acquisition and delivery to those affected by natural or man-made disasters through Authorized Users. Such as:

- Civil Protection & Relief Organisations
- National & international (UN)

## Members:

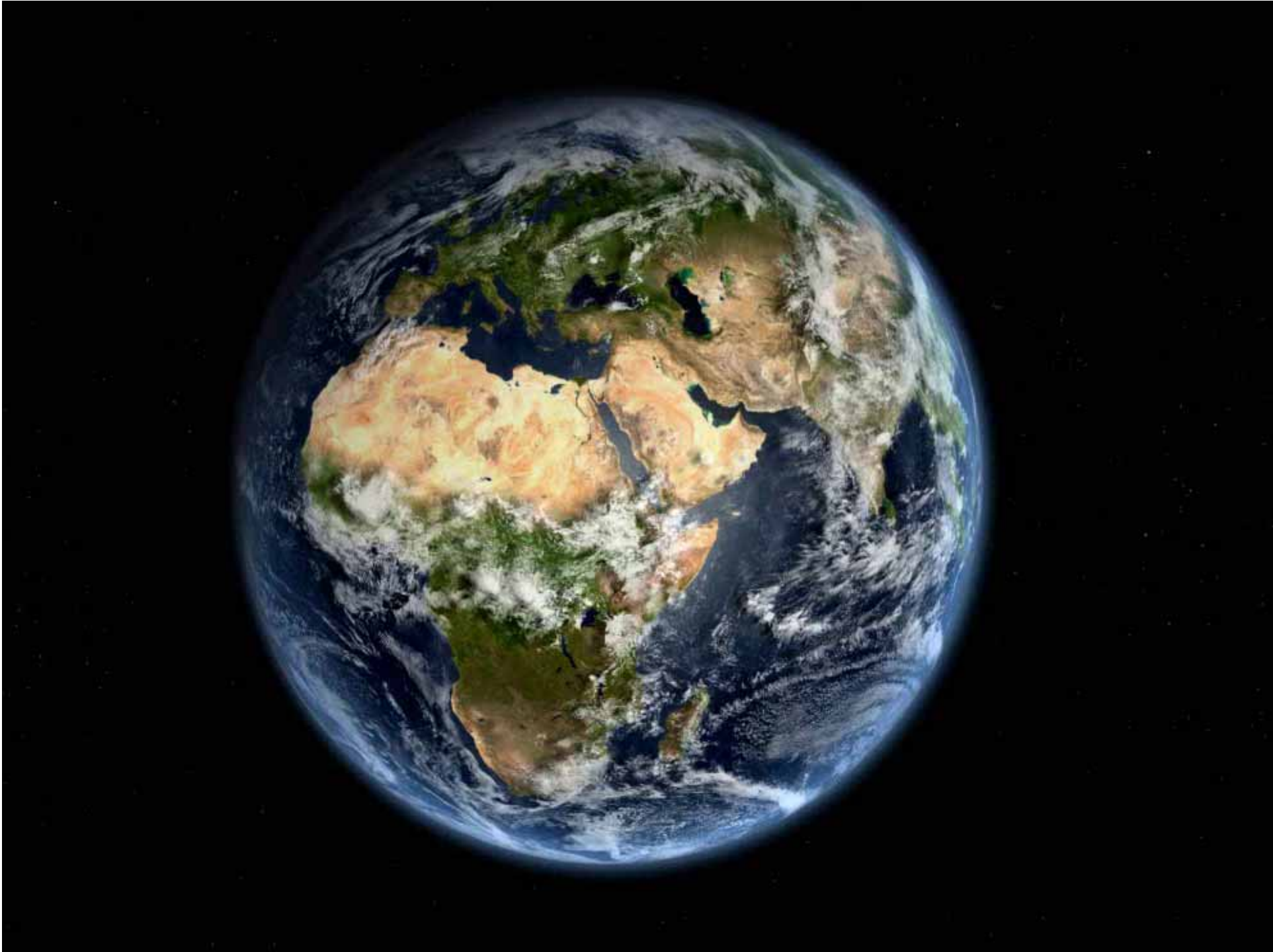
- Space Agencies & Satellite Operators

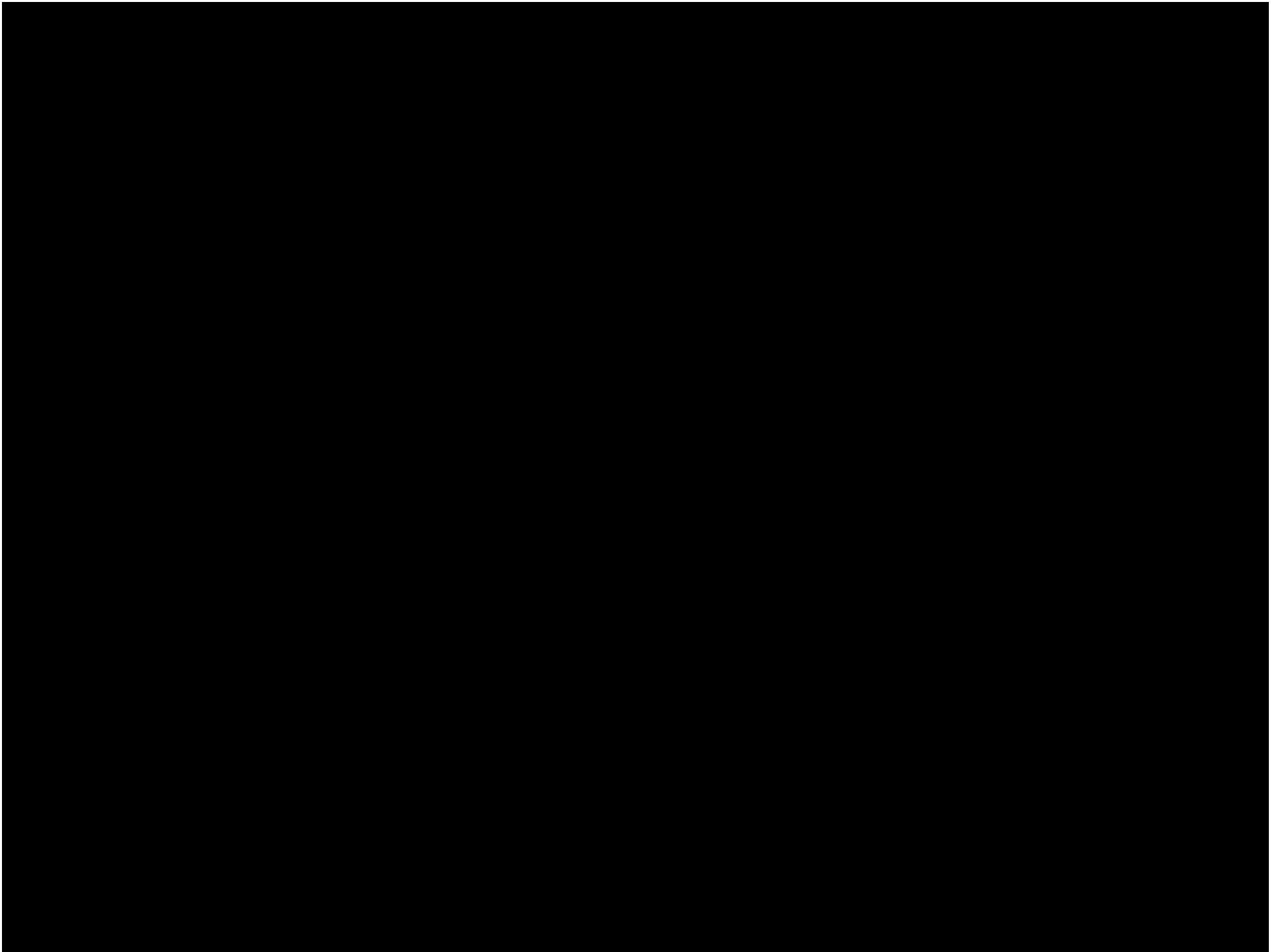




© Geoeye/eGeos  
Processed at  
EuroMap/DLR



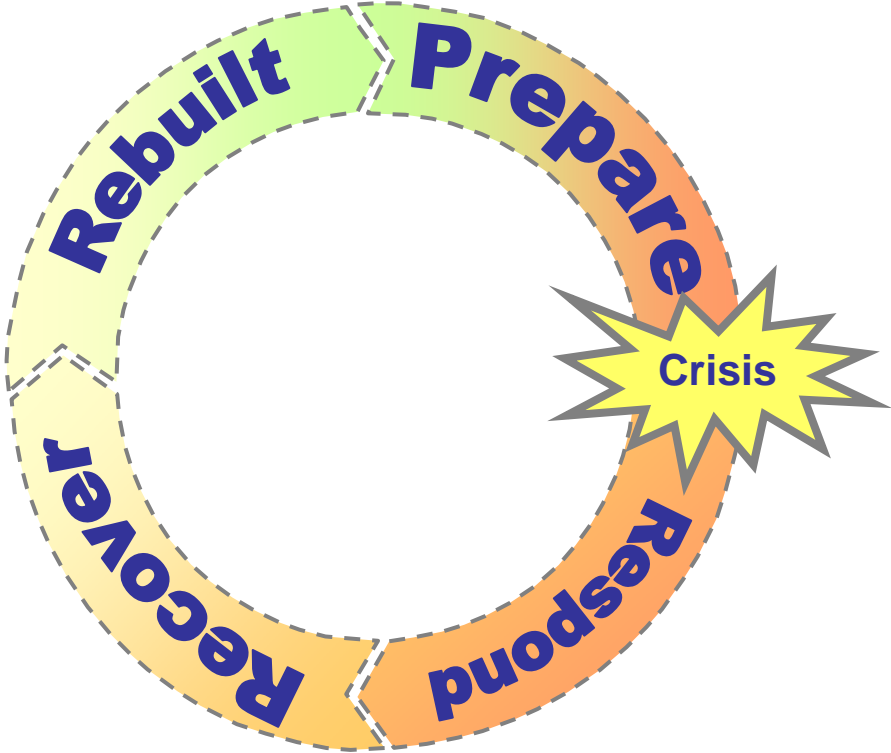




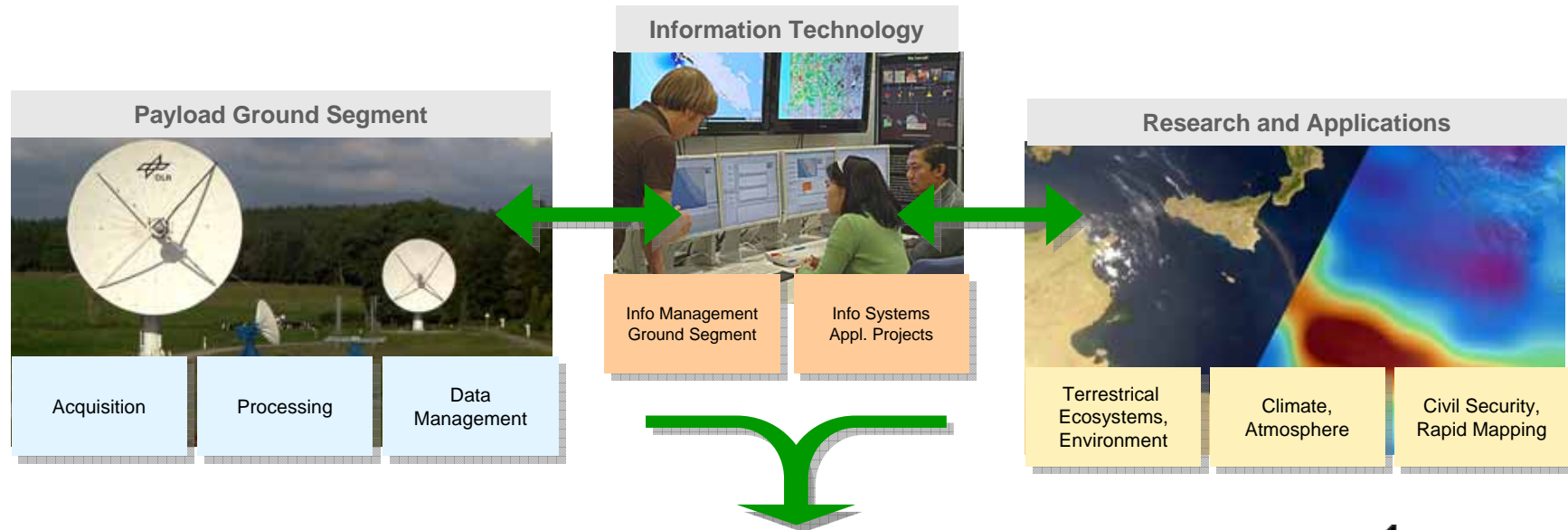




# The Disaster Cycle



# Rapid Emergency Response at DLR German Remote Sensing Data Center



**Center for Satellite Based Crisis Information**  
– Emergency Mapping & Disaster Monitoring –

*a service of DFD*



**DLR**

