International Charter Space and Major Disasters

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Slides provided by
the International Charter

International Charter Space and Major Disasters

History and Operations

Operational Personnel Roles

Satellite Resources

Activation Examples

Recommendations

Purpose

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**
  - Fast data turn-around – priority acquisition
- **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**

Charter History

- Following the UNISPACE III conference held in Vienna, Austria in June 1999.
- ESA and CNES initiated the International Charter in July 1999.
- CSA (Canadian Space Agency) signed the Charter on October 20, 2000.
- Charter implementation by identifying and creating a number of functional units and preparing the necessary policies and plans.
- Charter declared operational as of November 1, 2000 after formal rehearsals and qualification tests.
- First activation of the Charter: Slovenian landslide November 11, 2000.

ERS and ENVISAT

SPOT

RADARSAT

POES, GOES

IRS

Charter History

- The US National Oceanic and Atmospheric Administration (NOAA), and the Indian Space Research Organization (ISRO) became members in September 2001.
- In July 2003, the Comision Nacional de Actividades Espaciales (CONAE) joined the Charter.
- Detailed operational procedures established and kept under document configuration control.
- In 2005, the Japanese Space Agency (JAXA) joined the Charter in February, the United States Geological Survey (USGS) in April as part of the US membership, and the Disaster Monitoring Constellation (DMC) Consortium in November.
- The China National Space Administration (CNSA) joined the Charter in May 2007.
- Two hundred and fourteen (214) disasters covered to date in various parts of the world.

SAC-C

ALOS

Landsat

ALSAT
BILSAT
NigeriaSat
UK-DMC
TopSat

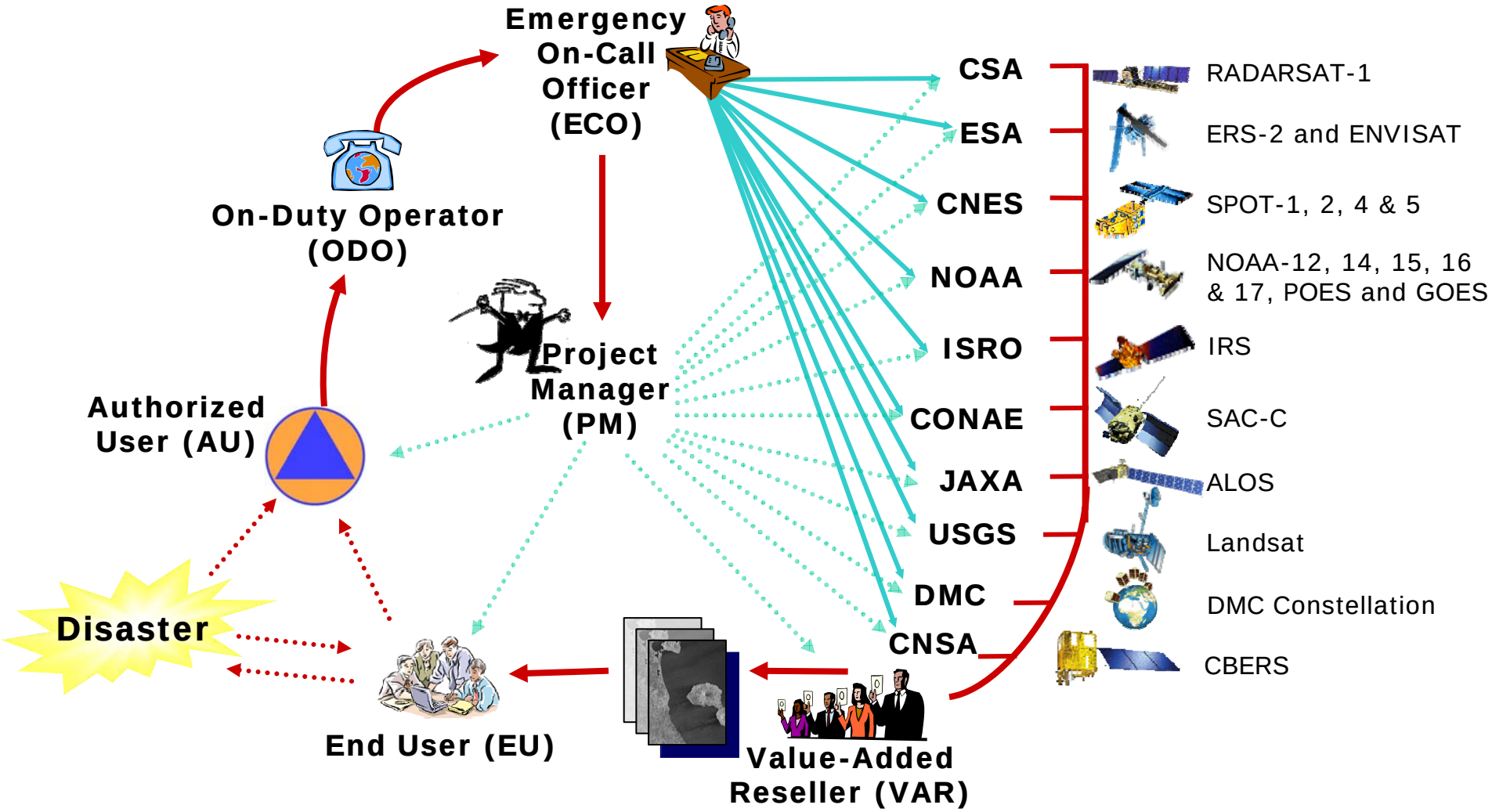
CBERS

Charter Member Agencies

Charter Functional Units

- Authorized Users (AUs)
- On-Duty Operator (ODO)
- Emergency on-Call Officer (ECO)
- Project Manager (PM)
- Data processing and distribution facilities
- Value-Added Resellers (VARs)

Charter Operational Loop



Activation Criteria

These requests should not be accepted:

1. **Non emergency situations** :

   Oil spill monitoring operations

   Ice monitoring operations except for specific event

2. **Emergencies falling out of Charter scope** :

   War or armed conflicts

   Humanitarian actions not linked to a specific disaster

   Search and rescue support not linked to a specific disaster

Activation Critera

3. **Emergencies with doubtful / no benefit from space assets**

   Droughts

   Routine epidemiological outbreaks

4. **Calls beyond emergency period**

   As a rule of thumb, a Charter activation occurring more than 10 days after the actual crisis start should be rejected.

   In addition, the duration of a Charter call should be limited to a maximum of 15 days after activation and the request should be rejected if the size of the disaster is not compatible with the resolution of the available satellites.

International Charter Space and Major Disasters

Operational Personnel Roles

AU – Authorized User

ODO – On Duty Operator

ECO: Emergency On-Call Officer

PM - Project Manager

AU: Authorized User

Authorized users are normally Civil Protection Agencies

- Only an AU can request a Charter activation.
- UNOOSA and UNOSAT have the capability to request an activation for other UN agencies.
- United States : Brenda Jones, USGS Center for Earth Resources Observation and Science (EROS)

ODO: On Duty Operator

On-Duty Operator (ODO)

- AU calls the ODO and submits the User Request Form (URF)
- ODO checks the identity of the calling AU
- ODO confirms the reception of the URF and its completeness
- The ODO is available 24 hrs/ 7 days a week
- ODO is hosted at ESRIN (ESA), Frascati (ITALY)
- He receives and records incoming calls from AU's
- He checks the consistency of the request (URF)
- He transfers the request to the on duty ECO

ODO: On Duty Operator

User Request Form

To be filled by ODO
Call ID

1. Date and time of the call

DATE_____ MONTH (Spell)_____YEAR_____

TIME_____LOCAL TIME ZONE_____UTC TIME_____

2. Name of the organization and caller

Phone
Fax
Cellular phone
E-mail
to be used for call back

3. Type of disaster

- ☐ flood
- ☐ landslide
- ☐ volcano
- ☐ hurricane
- ☐ fire
- ☐ ice
- ☐ earthquake
- ☐ oil spill
- ☐ other (specify)_____

4. Geographical location

Approximate geographical location and surface extent

Location
From

To

Extent (km2)

5. Co-ordinates

a) by center co-ordinates
Lat..... °.....
Long.....°.....

Maximum radius of 30 Km

b) by upper left co-ordinates
Lat..... °.....
Long.....°.....

Lower right co-ordinates
Lat.....°.....
Long.....°.....
Maximum 60x60 km²

6. Approximate date/time of occurrence or predicted occurrence

7. Additional information on the disaster

8. Additional instructions
(shipping instructions)

To be filled by ODO
Authorized User ☐ **Yes** ☐ **No** ☐

Emergency On-Call Officer

- The ODO calls the ECO for this week.
- If the call was made via pager or a message in a mobile phone, the ECO should respond to the ODO inside a 20 minutes period.
- If there is no response after this 20 minutes period, the ODO calls the ECO again.
- The ODO sends the URF to the ECO by fax and by E-mail.

ECO: Emergency On-Call Officer

The ECO is an operator that is available

- One week each **N** weeks (N= number of agencies providing the ECO function)
- 24 hours/day Seven days a week (Starts on Monday 12:00 UTC)
- Reviews the activation request.
- Selects the image acquisitions for this kind of scenario.
- Plans the image acquisition.
- Sends the image request (ERF) to the Order Desk of the agencies

ECO: Emergency On-Call Officer

- ECO calls the AU for information on the Disaster
- Only the ECO initiates the call and obtains the AU input
  - Geographical location of the affected area
  - Type of disaster
  - Extent of disaster
  - Type of data processing/product (if applicable)
  - Target delivery time
  - Delivery medium and address
  - Any additional information

PM - Project Manager

- PM contacts directly the ECO if required
- PM obtains further information on the requirements
- PM apprises the AU with regard to the data acquisition planning
- PM solicits AU's appraisal of the Charter activation

The PM has experience base in the following areas:

- Remote sensing satellites, their supporting ground systems;
- Data delivery networks;
- Remote sensing data application, particularly in disaster management
- Civil Protection Agencies and their mandates;
- Remote sensing data value adding;
- Project management

Project Manager Role

The Executive Secretariat designates the PM by taking into consideration the following criteria:

- Geographical region of the disaster occurrence;
- Disaster type;
- Sensor(s) used to cover the disaster;
- Availability of potential PMs among Parties/Partner Agencies;
- Fair distribution of PMs among Parties/Partner Agencies;
- Value-added processing proposal by a Party/PA according to the AU request.

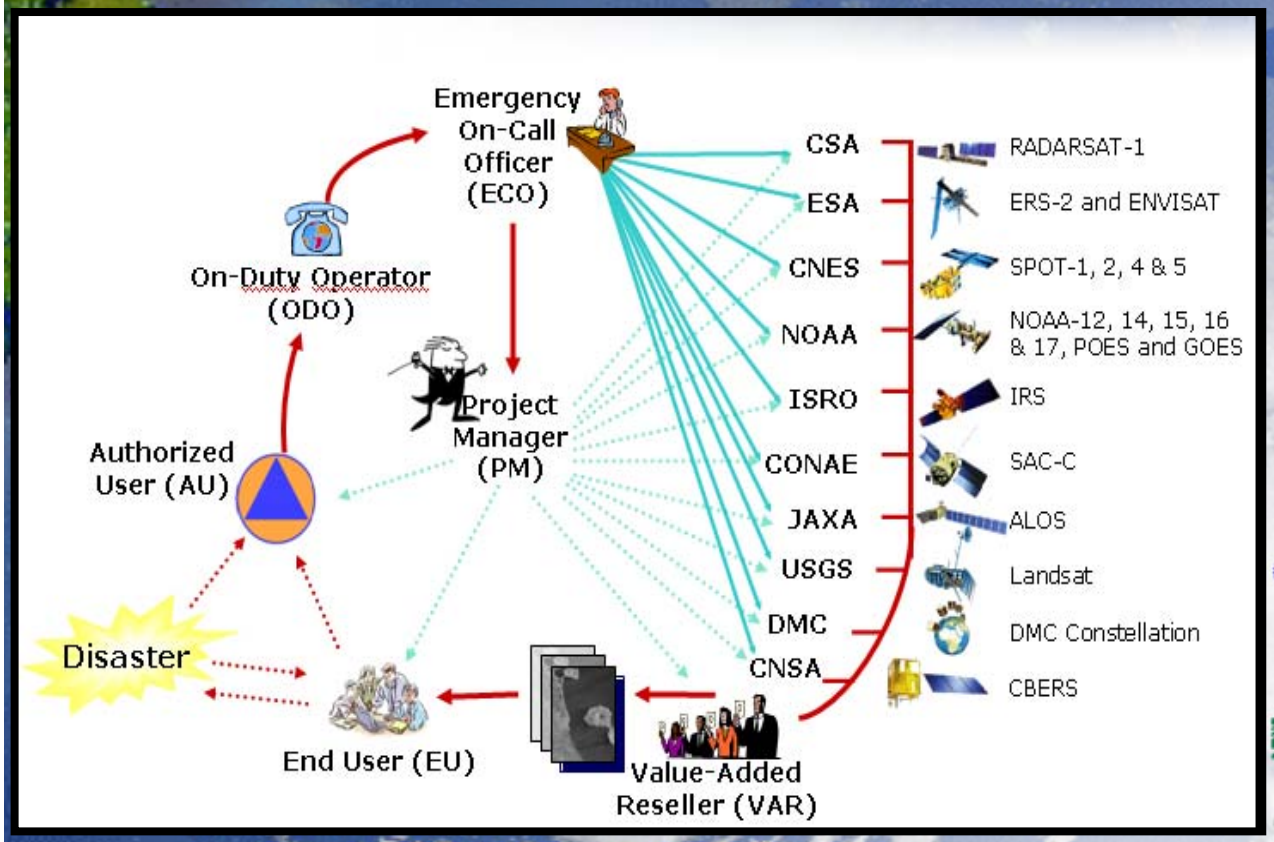
The PM receives the Dossier on the disaster from the ECO. The PM interacts with the AU on all the data and information requirements and with other parties for any required delivery of value-added products and information.

Project Manager Role

Project Manager (PM)

Project Manager (PM)

- Is identified by the Executive Secretariat when the Charter is activated
- Is available during normal working hours
- Ensures data is sent to the end user
- Confirms accuracy of data sent to user
- Is able to interpret data
- Coordinates, when required, the delivery of value-added products and information
- Completes the dossier on an activation and closes it out with a Preliminary Report and a Final Report.



Project Manager (PM) Interfaces

PM and Authorized User (AU)

- The PM contacts the AU to obtain further description of the disaster, special data and information needs
- The PM provide updated information concerning data acquisition and special data or information product delivery.

Project Manager (PM) Interfaces

PM and Emergency On-Call Officer (ECO)

- PM contacts the ECO concerning the reception of the dossier. The PM receives the Dossier of the disaster event from the ECO.

Project Manager (PM) Interfaces

PM and Executive Secretariat (ES)

- Suggests improvements, if any, in the implementation procedure of the predefined PM Scenario.
- **Writes up a final operation report - for delivery to the ES within 45 days of Charter activation - taking into account comments from participating bodies affected by the disaster**.

Responsibilities of the PM

- PM acquires an in-depth knowledge of the disaster and the data requirement.
- The PM ensures fast data, information and services delivery directly to the requestor or through the Civil Protection Agency concerned, or through such channels as those allowing quick turnaround.
- The PM builds a preliminary report of the event based on the Dossier forwarded by the ECO

Responsibility of the PM

The PM builds a final report which contains the following information:

- **An small introduction with purpose and scope**
- **A summary of the intervention:**
  - **Project details**
  - **Chronology of events**
  - **Available satellite data**
- **The assessment of the Intervention:**
  - **Main project issues**
  - **Results of value-added processing if provided**
  - **User feedback**
  - **Conclusions on the project**
  - **Recommendations for improving Scenarios**
- **In Appendixes:**
  - **General information – Map of the area**
  - **Media coverage of the disaster (national TV, radio, news agencies/papers, web sites, etc.)**
  - **User Request Form (URF)**
  - **Emergency Data Request Submission forms for the various satellites tasked**
  - **Copy of final value added products delivered**

Standard Map Product Template (on-going)

International Charter - Space and Major Disasters

FLOOD EMERGENCY DATABASE TEMPLATE

Agency	Satellite/sensor	Programmed	Archived	Suggested	Comments
CONAE	SAC-C(HSTC)				
	SAC-C (MMRS)				
	SAC-C(HRT)				
CNES	SPOT-1				
	SPOT-2				
	SPOT-3				
	SPOT-4				
	SPOT-5 (HRG)				
	SPOT-5 (HRS)				
	SPOT-5 (Veg)				
	FORMOSAT				
CNSA	CBERS(WFI)				
	CBERS(CCD)				
	CBERS(IMS)				
CSA	RADARSAT-1				
	RADARSAT-2				
DMCii	UK-DMC				
	TopSat				
	Beijing-1				
	NigeriaSat-1				
	Bilsat-1				
	Alsat-1				
ESA	ERS SAR				
	ENVISAT ASA				
	ENVISAT ME				
	A CHRIS				
ISRO	ID/P6				
	ID/P6 L				
	/ID WiF				
	6 AWiFS				
	S P4 OCM				
	Cartosat-1				
JAXA	ALOS(PRISM)				
	ALOS(AVNIR-2)				
	ALOS(PALSAR)				
NOAA	POES				
	GOES				
USGS	Landsat-5				
	Landsat-7				
	IKONOS (NGA)				
	Quickbird				
	Worldview				
	GEOEYE-1				
OUTSIDE CHARTER					
USGS					
USAF-EagleVision or SPOT direct	SPOT-1				
	SPOT-2				
	SPOT-3				
	SPOT-4				
	SPOT-5 (HRG)				
	SPOT-5 (HRS)				
	SPOT-5 (Veg)				
	FORMOSAT				
DOD	P-3				
	SCAVIEW				
NASA	ASTER				
DHS					
HSIP Freedom	Elevation data				These need to be properly identified
	NHD				once HSIP Freedom data is rec'd
	Jurisdiction Boundaries				

DRAFT

Charter Activation Cases (disaster types)

		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Sub-totals		Total
Solid Earth	*Earthquake*		*3*	*1*	*3*	*5*	*3*	*2*	*5*	*4*		26	**50**	**214**
	Landslide	*1*	*1*	*2*	*2*			*1*			*2*	9		
	Volcano		*1*	*1*	*2*	*2*	*1*	*1*	*2*	*3*	*2*	15		
Weather / Atmospheric	*Storm/hurricane***			*1*	*2*	*3*	*6*	*1*	*8*	*8*	*1*	30	**151**	
	Ice/snow hazard								*1*			1		
	*Flood/ocean wave**		*3*	*8*	*4*	*9*	*13*	*16*	*22*	*23*	*7*	105		
	Fire				*5*	*1*	*2*		*4*	*2*	*1*	15		
Technological	*Oil spill*		*3*	*2*				*4*	*3*			12	**13**	
	Others					*1*						1		
	Total / year	**1**	**11**	**15**	**18**	**21**	**25**	**25**	**45**	**40**	**13**			

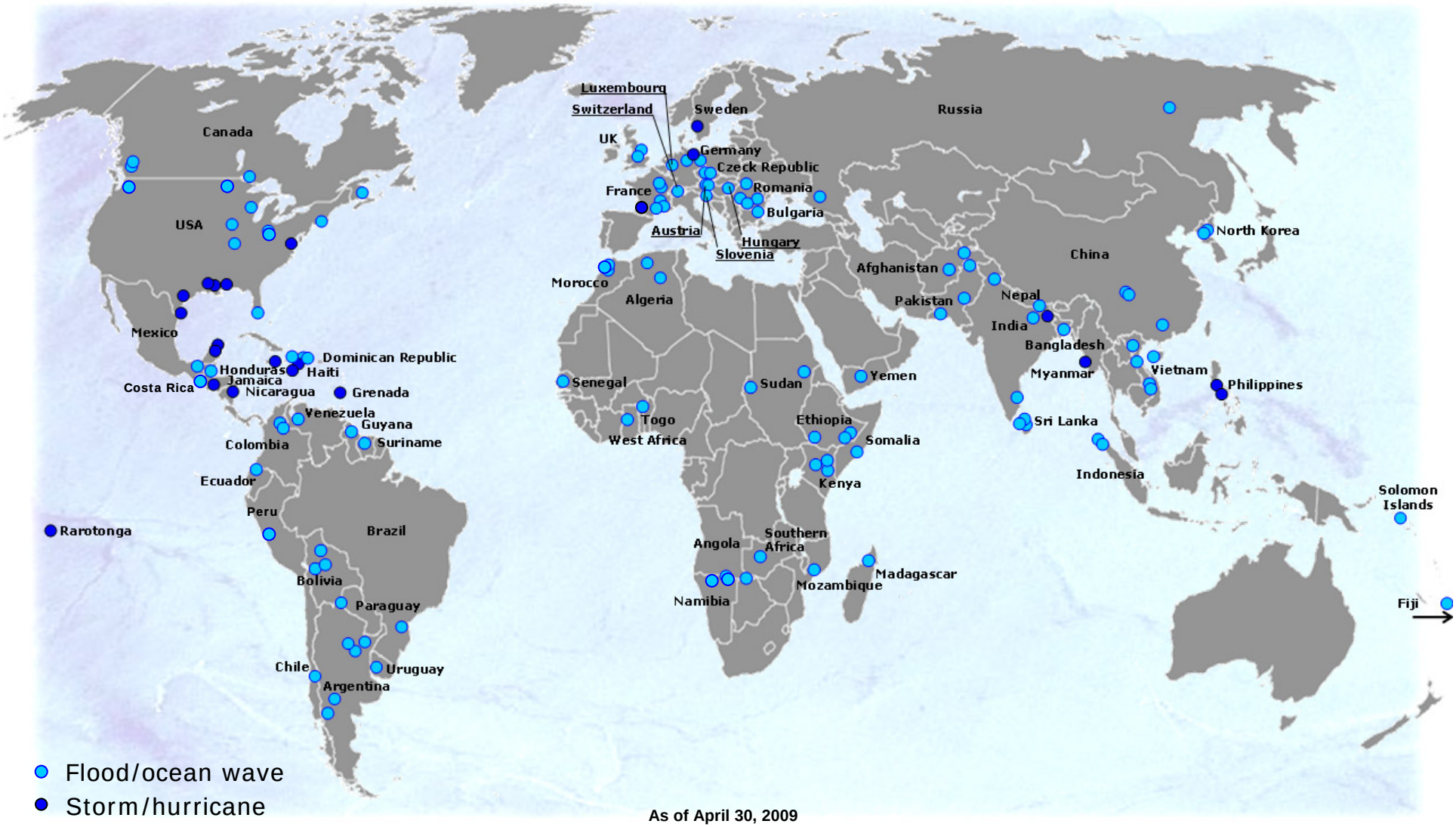
*includes solid earth related phenomenon of a tsunami

**includes all wind type storms (hurricane, cyclone, typhoon and tornado)

As of April 30, 2009

Activation Distribution

Floods and storms

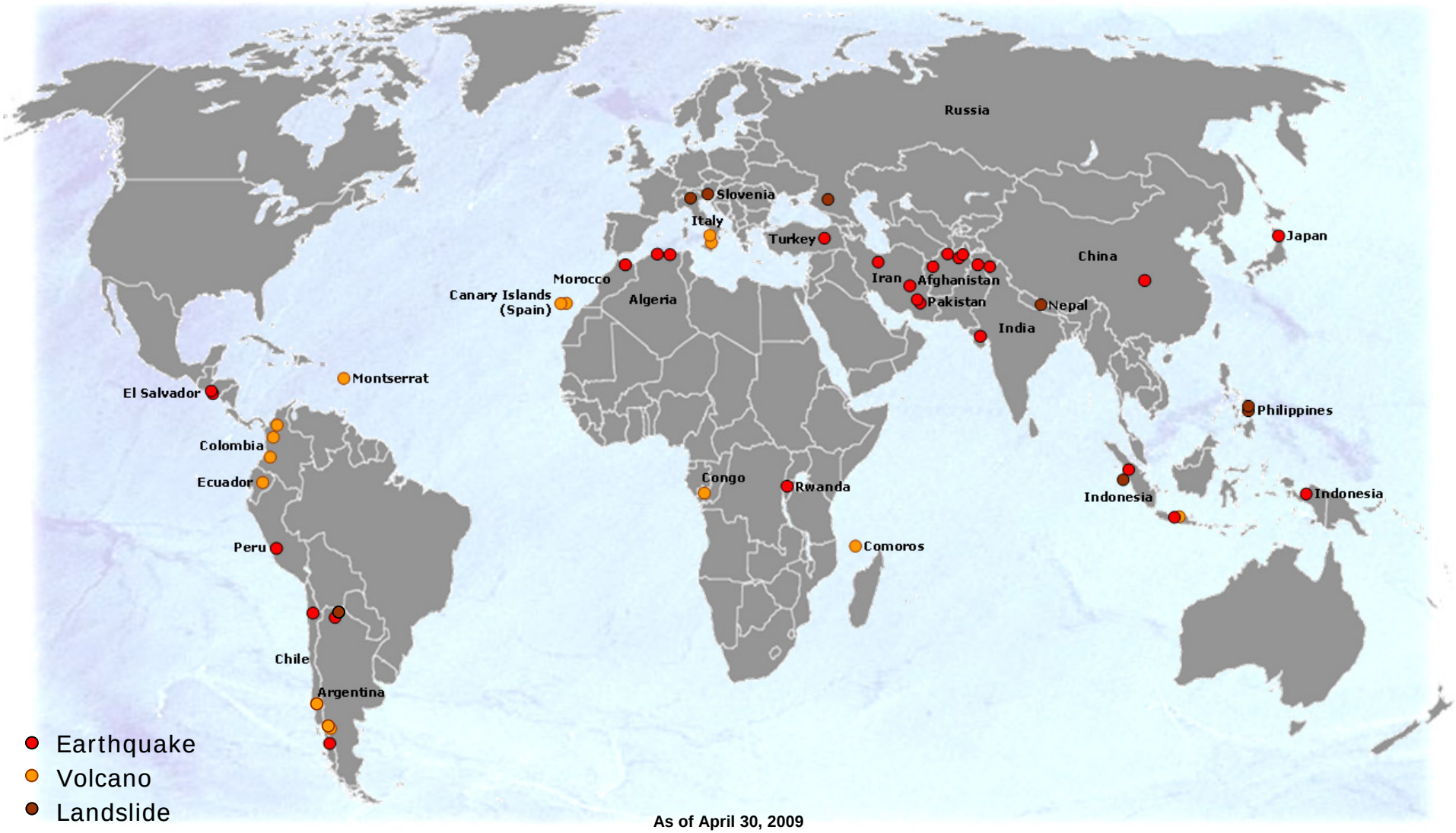


- Flood/ocean wave
- Storm/hurricane

As of April 30, 2009

Activation Distribution

Earthquakes, volcanic eruptions and landslides

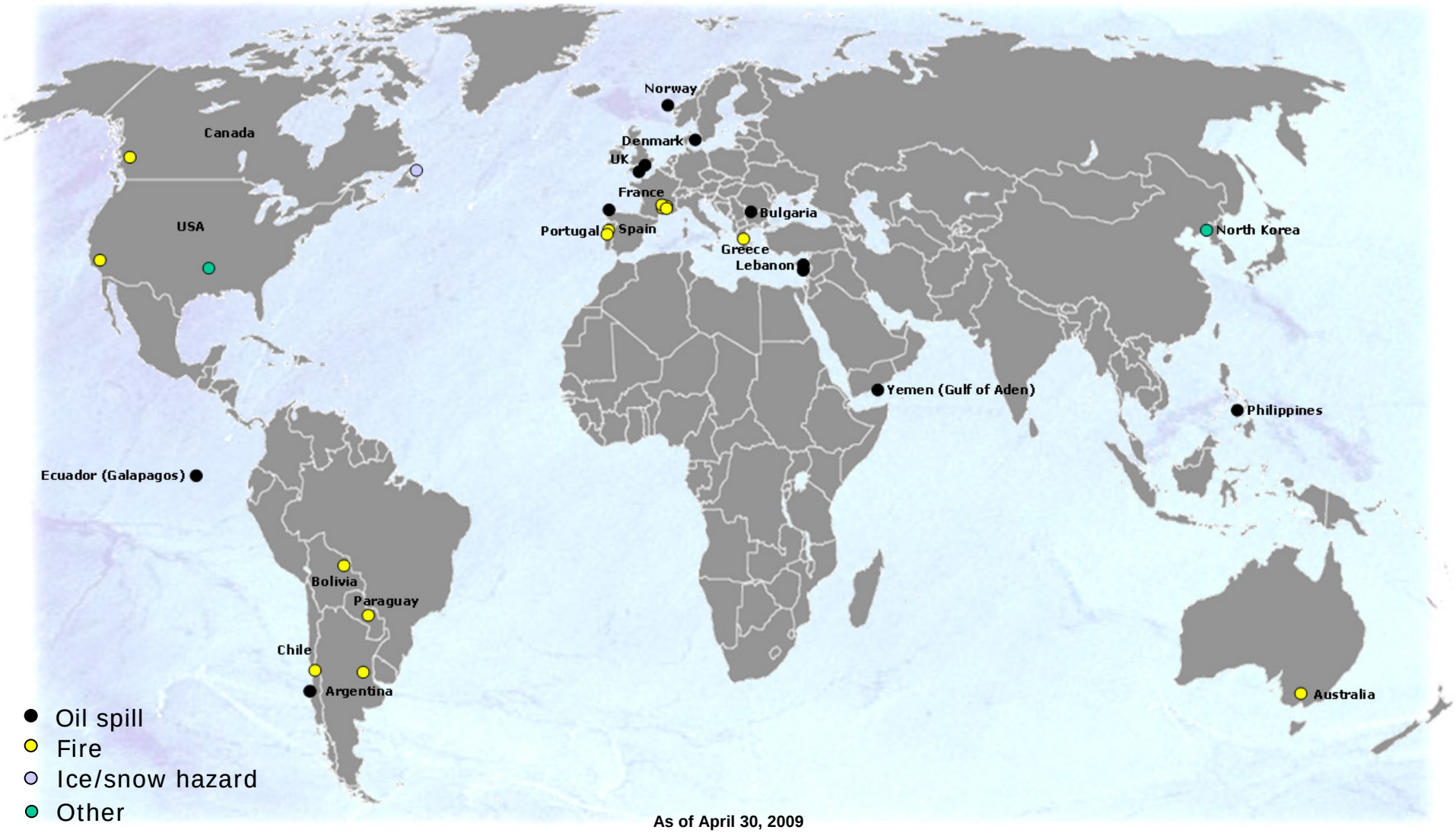


- Earthquake
- Volcano
- Landslide

As of April 30, 2009

Activation Distribution

Oil spills, forest fires and other hazards



- Oil spill
- Fire
- Ice/snow hazard
- Other

As of April 30, 2009

International Charter "Space and Major Disasters" Satellites

SAC-C

Argentina's Comision Nacional de Actividades Espaciales (CONAE)

Country: Argentina
Satellite: SAC-C

Sensor: IISTC - High Sensitivity Camera (Night View)

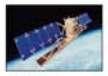
Spatial Res	Spectral Bands /Modes	Spectral Range /No Beams	Swath Width	Revisit Time
234 m	Pan	450-520 nm	900 km	

Sensor: MMRS - Multispectral Medium Resolution Scanner

Spatial Res	Spectral Bands /Modes	Spectral Range No Beams	Swath Width	Revisit Time
175 m	1	480-500 nm	360 km	
	2	540-560 nm		
	3	630-690 nm		
	4	795-835 nm		
	5	1550-1700 nm		

Sensor: HRTC - High Resolution Technological Camera

Spatial Res	Spectral Bands /Modes	Spectral Range /No Beams	Swath Width	Revisit Time
35 m	Pan	400-900 nm	90 km	



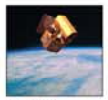
RADARSAT-1

Canadian Space Agency (CSA)

Country: Canada
Satellite: RADARSAT-1
Sensor: Advanced radar/C Band/HH Polarization

Spatial Res	Spectral Bands /Modes	Spectral Range /No Beams	Swath Width	Revisit Time
8m	Fine	15	50 x 50 km	1-3Days
25m	Standard	7	100 x 100 km	
30m	Wide	3	150 x 150 km	
50m	ScanSAR Narrow	2	300 x 300 km	
100m	ScanSAR Wide	2	500 x 500 km	
25m	Extended High	1	75 x 75 km	
35m	Extended Low	1	170 x 170 km	

Spot 1,2,3,4,5



FORMOSAT -2

Centre National d'etudes Spatiales (CNES)

Country: France
Satellite: Spot-1,2,3 (Spot-1, 3 are used for archive data only)
Sensor: HRV (x 2)

Spatial Res	Spectral Bands /Modes	Spectral Range /No Beams	Swath Width	Revisit Time
20m	1	500-590 nm	60 km (120 km)	1-3 Days
	2	610-670 nm		
	3	780-890 nm		
10m	Pan	510-700 nm		

Satellite: Spot 4
Sensor: HRVIR (x 2)

Spatial Res	Spectral Bands /Modes	Spectral Range /No Beams	Swath Width	Revisit Time
20m	1	500-590 nm	60 km (120 km)	1-3 Days
	2	610-690 nm		
	3	780-890 nm		
	SWIR	1580-1700 nm		
10m	2 - Used as Pan	610-680 nm		

Satellite: Spot 5
Sensor: HRG (x 2)

Spatial Res	Spectral Bands /Modes	Spectral Range /No Beams	Swath Width	Revisit Time
10 m	1	500-590 nm	60 km (120 km)	1-3 Days
	2	610-680 nm		
	3	780-890 nm		
20 m	SWIR	1580-1700 nm		
2.5 m -5 m	Pan	490-690 nm		

Satellite: Spot 5
Sensor: HRS

Spatial Res	Spectral Bands /Modes	Spectral Range /No Beams	Swath Width	Revisit Time
10 m	Pan	490-690 nm	120 km	1-3 Days

Satellite: Spot 4, 5
Sensor: VEGETATION

Spatial Res	Spectral Bands /Modes	Spectral Range /No Beams	Swath Width	Revisit Time
1165 m	0	430-470 nm	2250 km	Daily
	2	610-690 nm		
	3	780-890 nm		
	SWIR	1580-1700 nm		

Country: Taiwan
Company: NSPO
Distributor: SPOT-IMAGE
Satellite: FORMOSAT - 2
Sensor: IISTC - High Sensitivity Camera (Night View)

Spatial Res	Spectral Bands /Modes	Spectral Range /No Beams	Swath Width	Revisit Time
8 m	1	450-520 nm	24 km	Daily
	2	520-600 nm		
	3	630-690 nm		
	4	760-900 nm		
2 m	Pan	450-900 nm		

UK-DMC
Beijing-1
Nigeriasat-1
Alsat-1

Disaster Monitoring Constellation (DMC)

Country: UK (SSTL)
Satellite: UK-DMC
Sensor: DMC

Spatial Res	Spectral Bands /Modes	Spectral Range /No Beams	Swath Width	Revisit Time
32 m	1	520-600 nm	660 km	Daily
	2	630-690 nm		
	3	770-900 nm		

Country: China (BLMIT)
Satellite: Beijing-1
Sensor: DMC +4

Spatial Res	Spectral Bands /Modes	Spectral Range /No Beams	Swath Width	Revisit Time
32 m	1	520-600 nm	660 km	
	2	630-690 nm		
	3	770-900 nm		
4 m	Pan	500-800 nm	24 km	

Country: Nigeria (NASRDA)
Satellite: NigeriaSat-1
Sensor: DMC

Spatial Res	Spectral Bands /Modes	Spectral Range /No Beams	Swath Width	Revisit Time
32 m	1	520-600 nm	660 km	
	2	630-690 nm		
	3	770-900 nm		

Country: Turkey (BILTEN)
Satellite: Bilsat-1
Sensor: DMC

Spatial Res	Spectral Bands /Modes	Spectral Range /No Beams	Swath Width	Revisit Time
26 m	1	520-600 nm	600 km	
	2	630-690 nm		
	3	770-900 nm		
	12 m	Pan	300 km	

Country: Algeria (CNTS)
Satellite: Alsat-1
Sensor: DMC

Spatial Res	Spectral Bands /Modes	Spectral Range /No Beams	Swath Width	Revisit Time
32 m	1	520-600 nm	660 km	
	2	630-690 nm		
	3	770-900 nm		

ERS

ENVISAT

Proba

European Space Agency (ESA)

Country: 17 European members (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Norway, the Netherlands, Portugal, Spain, Sweden, Switzerland and the United Kingdom).

Satellite: ERS
Sensor: AMI SAR (archives since 1991)

Spatial Res	Spectral Bands /Modes	Spectral Range /No Beams	Swath Width	Revisit Time
25 m	C band/VV Polarization		100 km	+/- 12-20 days

Satellite: ENVISAT
Sensor: ASAR

Spatial Res	Spectral Bands /Modes	Spectral Range /No Beams	Swath Width	Revisit Time
	C Band, 5 Polarization modes (VV,HH,VV/HH, HV/HH,VH/VV)			+/- 3-5 Days
25 Image/Wave			100 km(wave 5km)	
150 m Wide			400 km	
1000 Global			400 km	

Satellite: PROBA
Sensor: CHRIS/Hyperspectral

Spatial Res	Spectral Bands /Modes	Spectral Range /No Beams	Swath Width	Revisit Time
18-36 m	19-63	400-1050 nm	14 km	+/- 7 Days

Satellite: PROBA
Sensor: HRC/High Resolution Camera

Spatial Res	Spectral Bands /Modes	Spectral Range /No Beams	Swath Width	Revisit Time
5 m	Pan		5 km	+/- 7 Days

RESOURCESAT-1

Cartosat-1

Indian Space Research Organisation (ISRO)

Country: India
Satellite: Resourcesat-1 (IRS-P6)
Sensor: LISS-4

Spatial Res	Spectral Bands /Modes	Spectral Range /No Beams	Swath Width	Revisit Time
5.8 m	2	520-590 nm		5 Days
	3	620-680 nm	23 km MSS	
	4	770-860 nm	70 km Pan	

Sensor: LISS-3

Spatial Res	Spectral Bands /Modes	Spectral Range /No Beams	Swath Width	Revisit Time
23.5 m	2	520-590 nm	141 km	24 Days
	3	620-680 nm		
	4	770-860 nm		
	5	1550-1770 nm		

Sensor: AWiFS

Spatial Res	Spectral Bands /Modes	Spectral Range /No Beams	Swath Width	Revisit Time
56 m	2	520-590 nm	740 km	5 Days
	3	620-680 nm		
	4	770-860 nm		
	5	1550-1700 nm		

Satellite: Cartosat-1 (IRS-5

Spatial Res	Spectral Bands /Modes	Spectral Range /No Beams	Swath Width	Revisit Time
2.5 m	Pan	500-850 nm	30 km	5 Days

ALOS

Japan Aerospace Exploration Agency (JAXA)

Country: Japan
Satellite: ALOS
Sensor: PRISM

Spatial Res	Spectral Bands /Modes	Spectral Range /No Beams	Swath Width	Revisit Time
2.5 m	Pan	520-770 nm	35 km triplet 70 km wide	

Sensor: AVNIR-2

Spatial Res	Spectral Bands /Modes	Spectral Range /No Beams	Swath Width	Revisit Time
10 m	1	420-500 nm	70 km	2 Days
	2	520-600 nm		
	3	610-690 nm		
	4	760-890 nm		

Sensor: PALSAR

Spatial Res	Spectral Bands /Modes	Spectral Range /No Beams	Swath Width	Revisit Time
10 m	L Band/HH or VV polarization	Fine(FBS)	70 km	2 Days
20 m	L Band/HH/HV or VV/VH polarization	Fine (FBD)	70 km	
20 m	L Band/HH or VV polarization	Direct Downlink (DSN)	70 km	
100 m	L Band/HH or VV polarization	Scan SAR	250-350 km	
30 m	L Band/HH/HV /VV/VH polarization	Polarimetric	30 km	

POES

GOES

National Oceanic and Atomospheric Administration (NOAA)

Country: United States
Satellite: POES
Sensor: AVHRR/NOAA 7,9,11,12,14

Spatial Res	Spectral Bands /Modes	Spectral Range /No Beams	Swath Width	Revisit Time
1100 m	1	580-680	2548 km	Daily
	2	725-1100 nm		
	3	3550-3930 nm		
	4	10300-11300 nm		
	5	11500-12500 nm		

Satellite: GOES
Sensor: GOES I-M

Spatial Res	Spectral Bands /Modes	Spectral Range /No Beams	Swath Width	Revisit Time
1000 m	1	550-750 nm	Full Earth Disc	Daily
4000 m	2	3800-4000 nm		
8000 m	3	6500-7000 nm		
4000 m	4	10200-11200 nm		
4000 m	5	11500-12500 nm		

Landsat 7
Landsat 5

Quickbird

IKONOS

GeoEye-1

CBERS

United States Geological Survey (USGS)

Country: United States
Satellite: Landsat 7
Sensor: ETM+ Enhanced Thematic Mapper Plus

Spatial Res	Spectral Bands /Modes	Spectral Range /No Beams	Swath Width	Revisit Time
30 m	1	450-520 nm	185 km	16 Days
	2	520-600 nm		
	3	630-690 nm		
	4	760-900 nm		
	5	1550-1750 nm		
60 m	6	10400-12500 nm		
30 m	7	2080-2350 nm		
15 m	8	520-900 nm		

Satellite: Landsat 5
Sensor: TM Thematic Mapper

Spatial Res	Spectral Bands /Modes	Spectral Range /No Beams	Swath Width	Revisit Time
30 m	1	450-520 nm	185 km	16 Days
	2	520-600 nm		
	3	630-690 nm		
	4	760-900 nm		
	5	1550-1750 nm		
120 m	6	10400-12500 nm		
30 m	7	2080-2350 nm		

Company: Digital Globe
Satellite: QuickBird

Spatial Res	Spectral Bands /Modes	Spectral Range /No Beams	Swath Width	Revisit Time
2.4 m	1	450-520 nm	16.5 km	
	2	520-600 nm		
	3	630-690 nm		
	4	760-900 nm		
60 cm	Pan	445-900 nm		

Company: GeoEye
Satellite: IKONOS

Spatial Res	Spectral Bands /Modes	Spectral Range /No Beams	Swath Width	Revisit Time
3.2 m	1	445-516 nm	11 km	1-3 Days
	2	506-595 nm		
	3	632-698 nm		
	4	757-853 nm		
.82 m	Pan	450-900 nm		

Company: GeoEye
Satellite: GeoEye 1

Spatial Res	Spectral Bands /Modes	Spectral Range /No Beams	Swath Width	Revisit Time
1.65 m	1	450-520 nm	8 km	<3 Days
	2	520-600 nm		
	3	625-695 nm		
	4	760-900 nm		
.41 m	Pan	450-900 nm	15.2 km	

China National Space Administration (CNSA)

Country: China
Satellite: CBERS
Sensor: Wide Field Imager

Spatial Res	Spectral Bands /Modes	Spectral Range /No Beams	Swath Width	Revisit Time
260 m	1	630-690 nm	890 km	5 Days
	2	770-890 nm		

Sensor: High Resolution CCD Camera

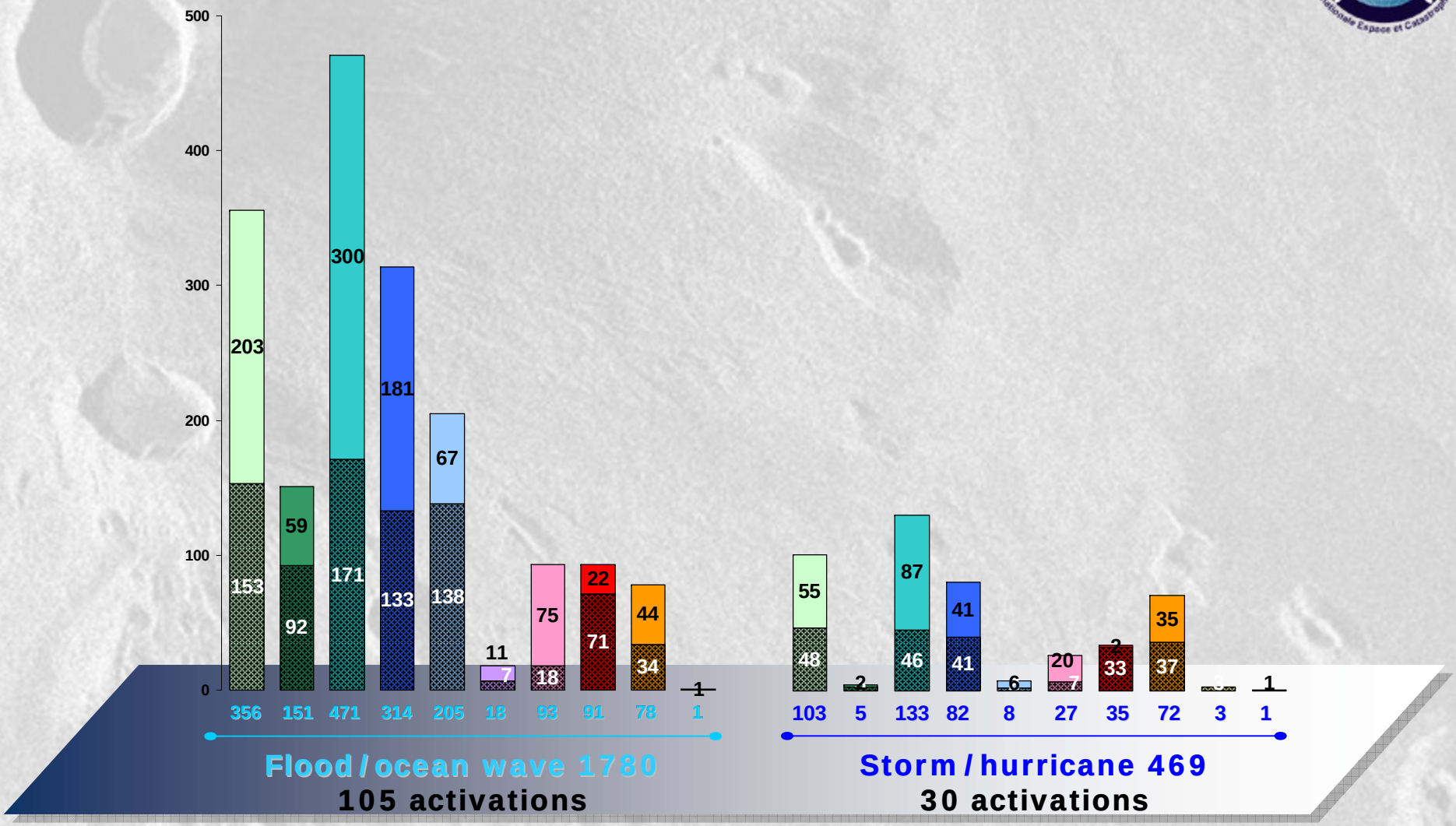
Spatial Res	Spectral Bands /Modes	Spectral Range /No Beams	Swath Width	Revisit Time
20 m	Pan	510-750 nm	113 km	5 Days
	1	450-520 nm		
	2	520-590 nm		
	3	630-690 nm		
	4	770-890 nm		

Sensor: Infrared Multispectral Scanner

Spatial Res	Spectral Bands /Modes	Spectral Range /No Beams	Swath Width	Revisit Time
80 m	Pan	500-1110 nm	120 km	26 Days
	1	1550-1750 nm		
	2	2080-2350 nm		
	3	10400-12500 nm		

Charter Space & Major Disasters
Charte Internationale Espace et Catastrophes Majeures

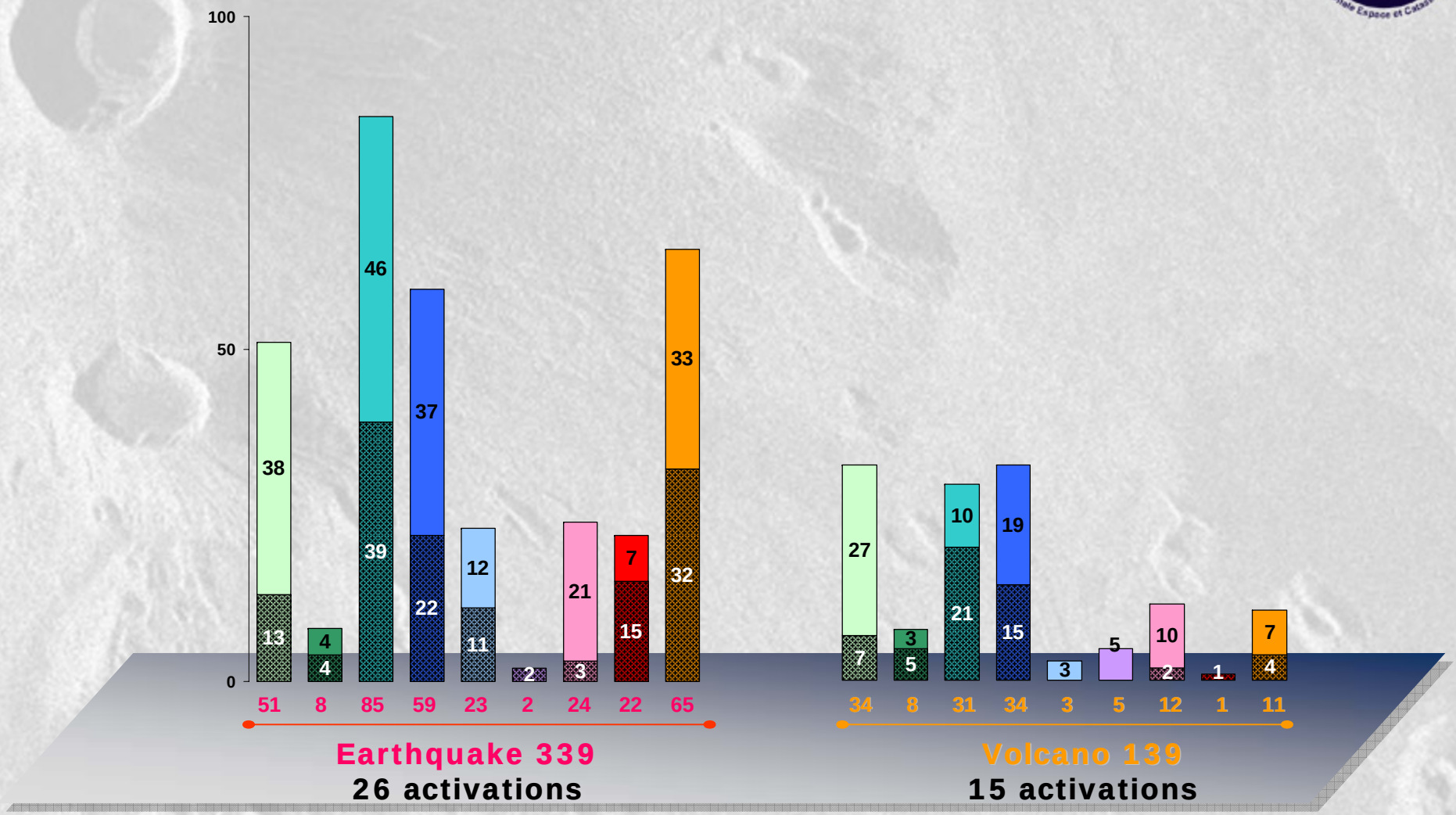
Data Units Used for Various Disasters



As of April 30, 2009

New										
ENVISAT	ERS	SPOT	RADARSAT	IRS	SAC-C	DMC	Landsat	ALOS	CBERS	POES
Archive										

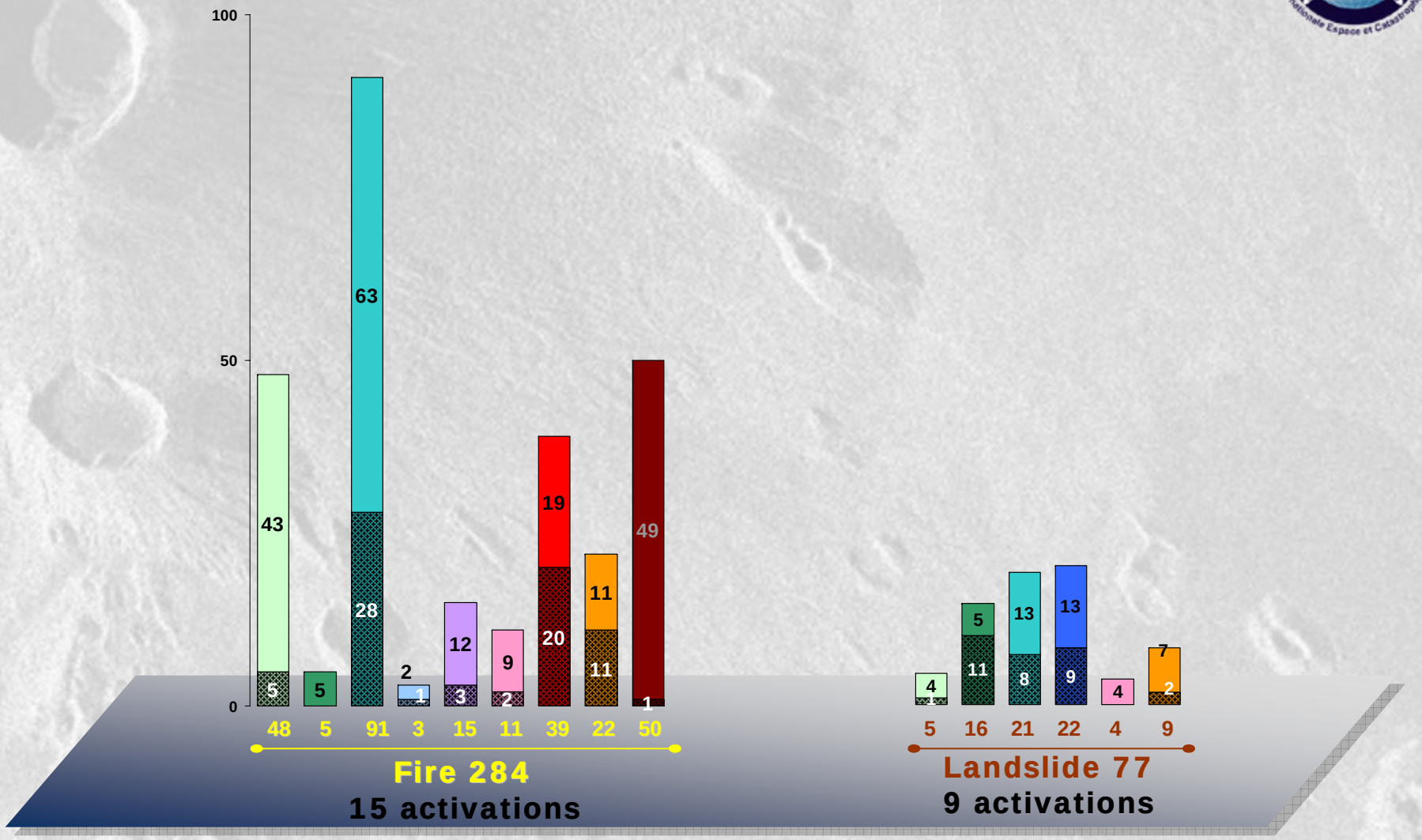
Data Units Used for Various Disasters



As of April 30, 2009

New										
ENVISAT	ERS	SPOT	RADARSAT	IRS	SAC-C	DMC	Landsat	ALOS	CBERS	POES
Archive										

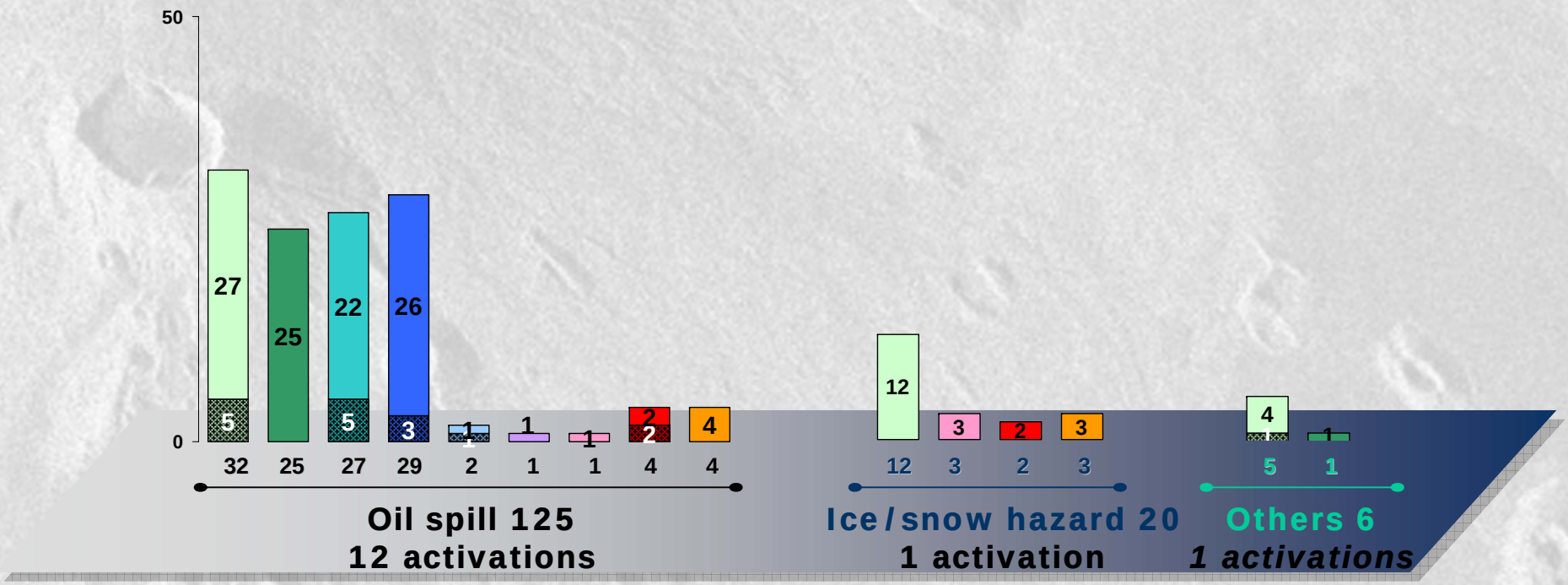
Data Units Used for Various Disasters



As of April 30, 2009

New										
ENVISAT	ERS	SPOT	RADARSAT	IRS	SAC-C	DMC	Landsat	ALOS	CBERS	POES
Archive										

Data Units Used for Various Disasters



As of April 30, 2009

New										
ENVISAT	ERS	SPOT	RADARSAT	IRS	SAC-C	DMC	Landsat	ALOS	CBERS	POES
Archive										

Lena river flood, Russia

Activation information

Activation 09

- Authorized User: **Foreign Office (Auswaertiges Amt)**
- Date of activation: **May 22, 2001**
- Emergency On-Call Officer of that week: **CSA**
- Project Manager: **ESA-ESRIN**
- Value-Added Reseller: **GAF, Germany**
- End User: **Foreign Office**
- Data Used: **RADARSAT-1**: 1 archive (S6), 4 new

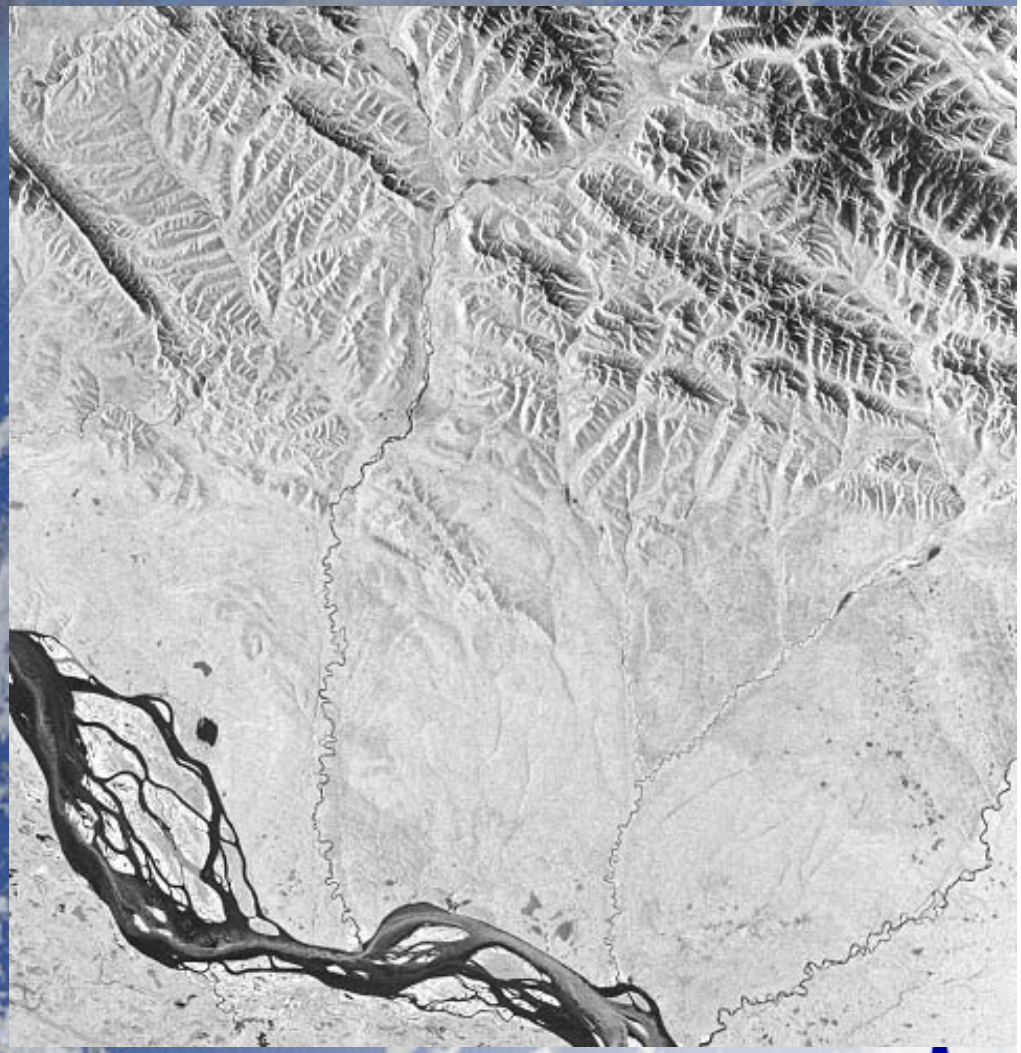
  SPOT-1: 6 new (P)

Lena river flood, Russia

Chronology

- On May 22, the Charter was activated following the spring flooding of the Lena river in Siberia.

- The disaster located mainly in the Siberian region of Yakutia. The city of Yakutsk, which has ~ 200,000 residents, was most affected.

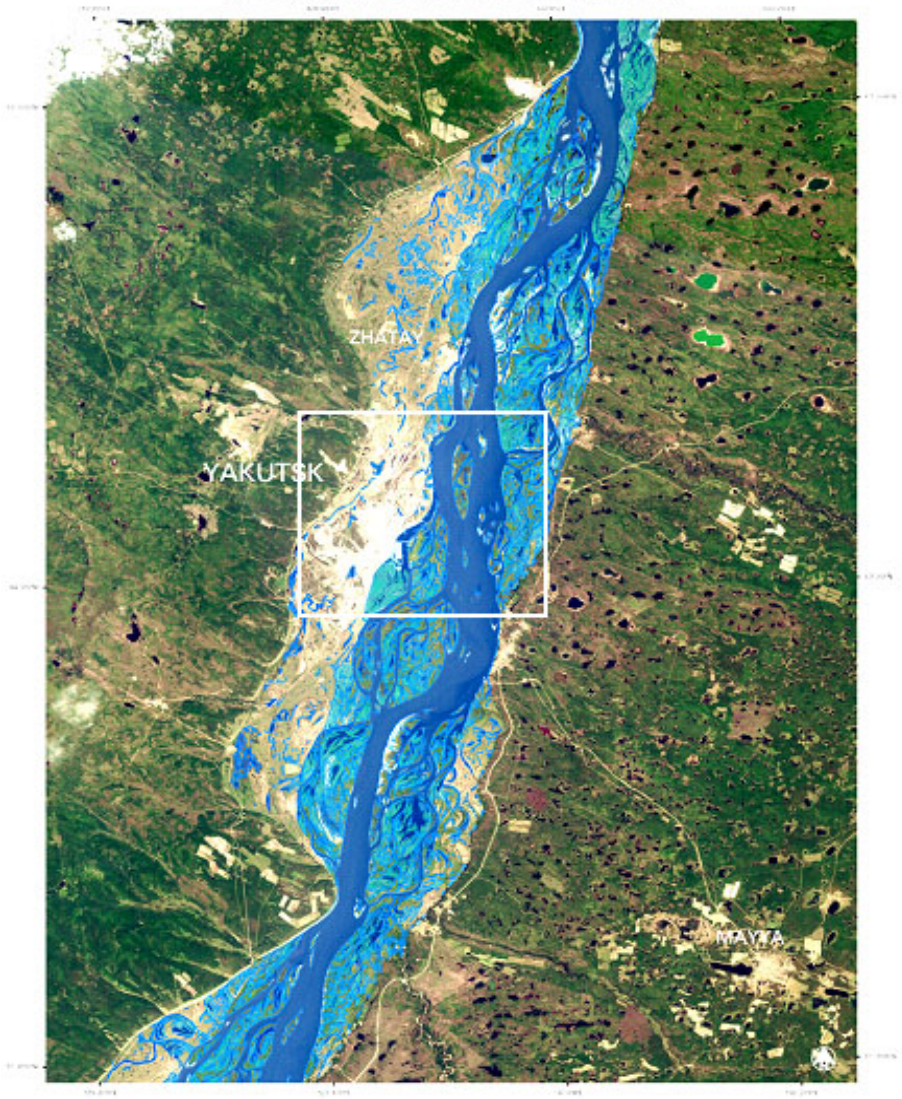


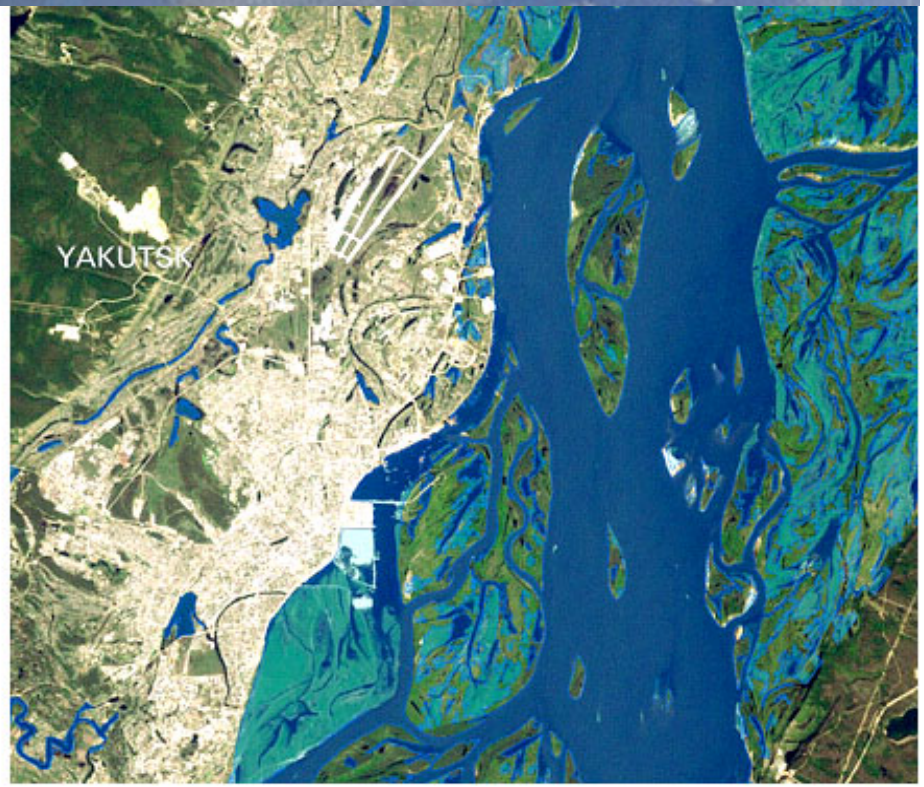
RADARSAT-1 S6 image acquired on May 23, 2001

Lena river flood, Russia

Flooded area extracted from RADARSAT and SPOT

YAKUTSK FLOOD ON 24th OF MAY 2001





0 5 10 Kilometers

1 : 170.000

Flooded area extracted from Radarsat and SPOT acquired on 24th of May 2001

Legend:

- Urban Area
- Water Body
- Forest
- Agriculture
- Area covered by water

Data Source: Landsat ETM 121/18, 121/17, 19.06.00
Radarsat 24.05.01, SPOT image 24.05.01
© CNES and Spotimage for SPOT 2001
© CSA for Radarsat 2001
© EDC 2000

Cartography: GAF 2001 GAF

Nyiragongo volcanic eruption, R.D. of Congo

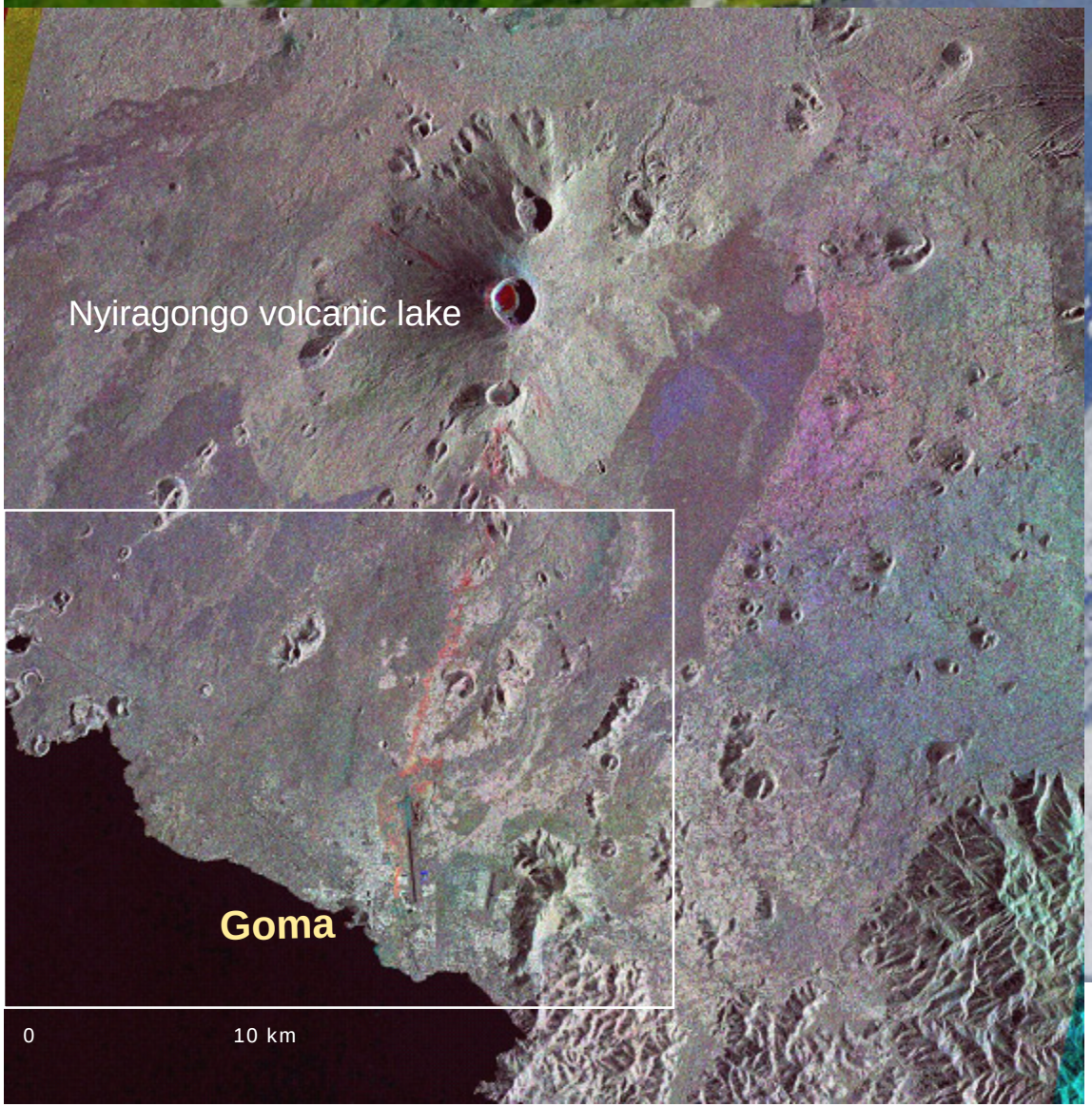
Activation information

Activation 13

- Authorized User: **CPA Belgium**
- Date of activation: **January 21, 2002**
- Emergency On-Call Officer of that week: **CNES**
- Project Manager: **CNES**
- Value-Added Reseller: **SERTIT, France**
- End User: **MRAC, Tervuren, Belgium**

- Data Used: **RADARSAT-1**: 5 archive (S6, F5F)
  SPOT-2: 2 archive (P & XS)
  ERS-2: 2 archive

Nyiragongo volcanic eruption, R.D. of Congo

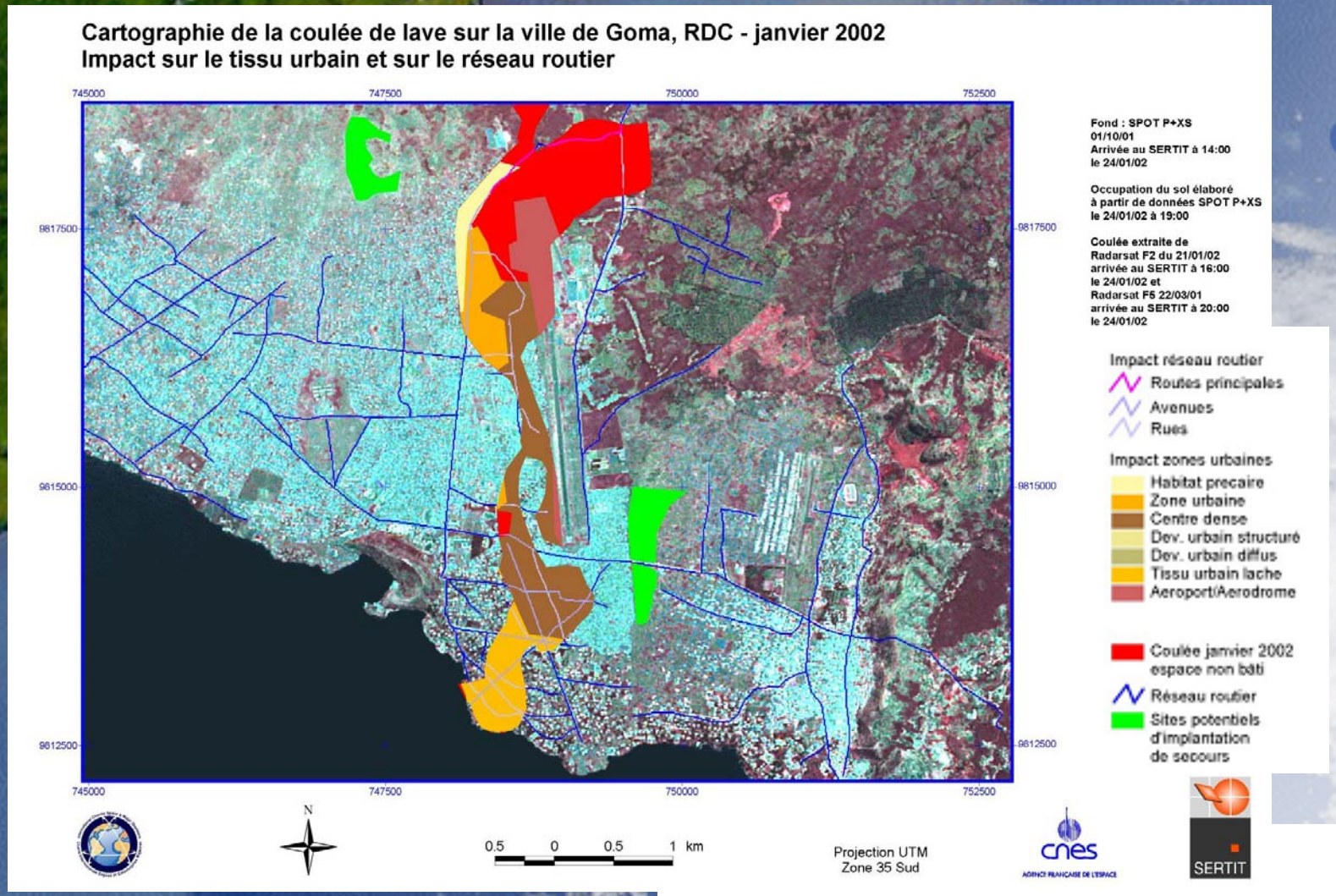


RADARSAT-1 F5F Multi-Temporal Composite

March 22, 2001
January 28, 2002
March 17, 2002

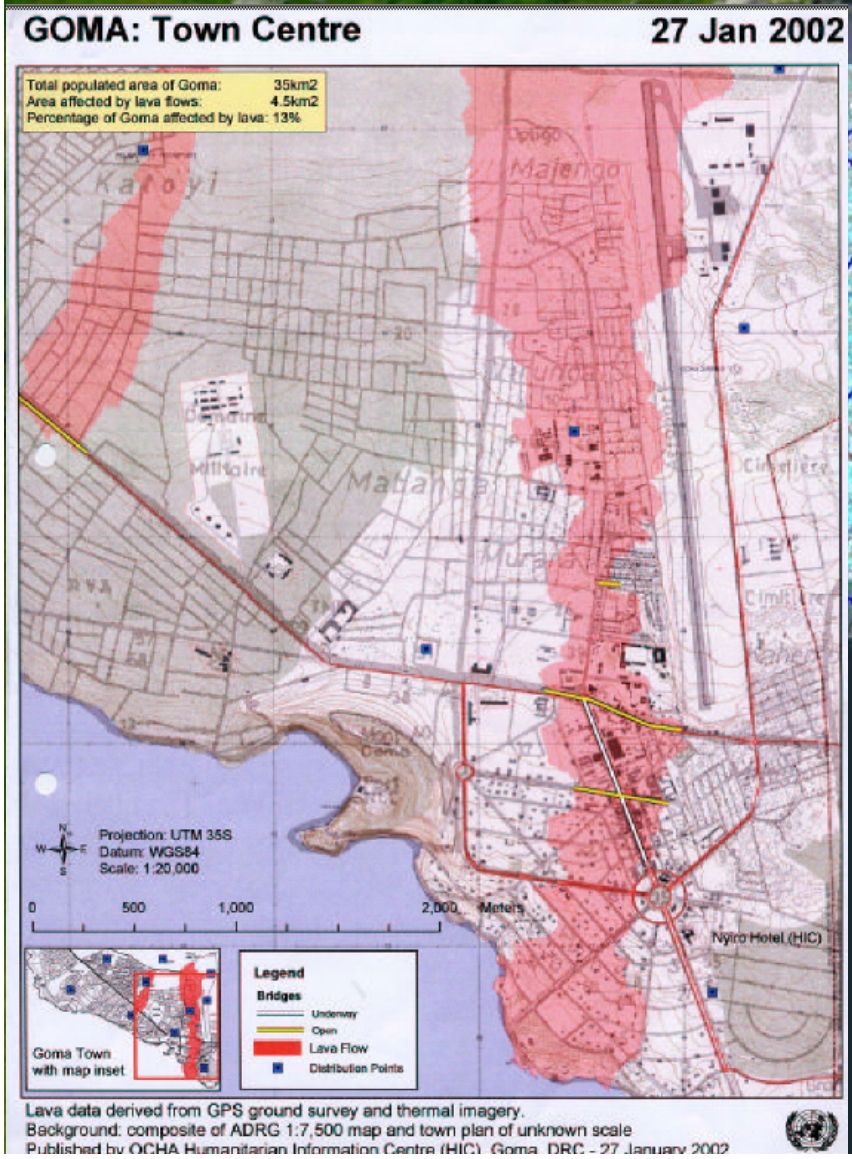
Nyiragongo volcanic eruption, R.D. of Congo

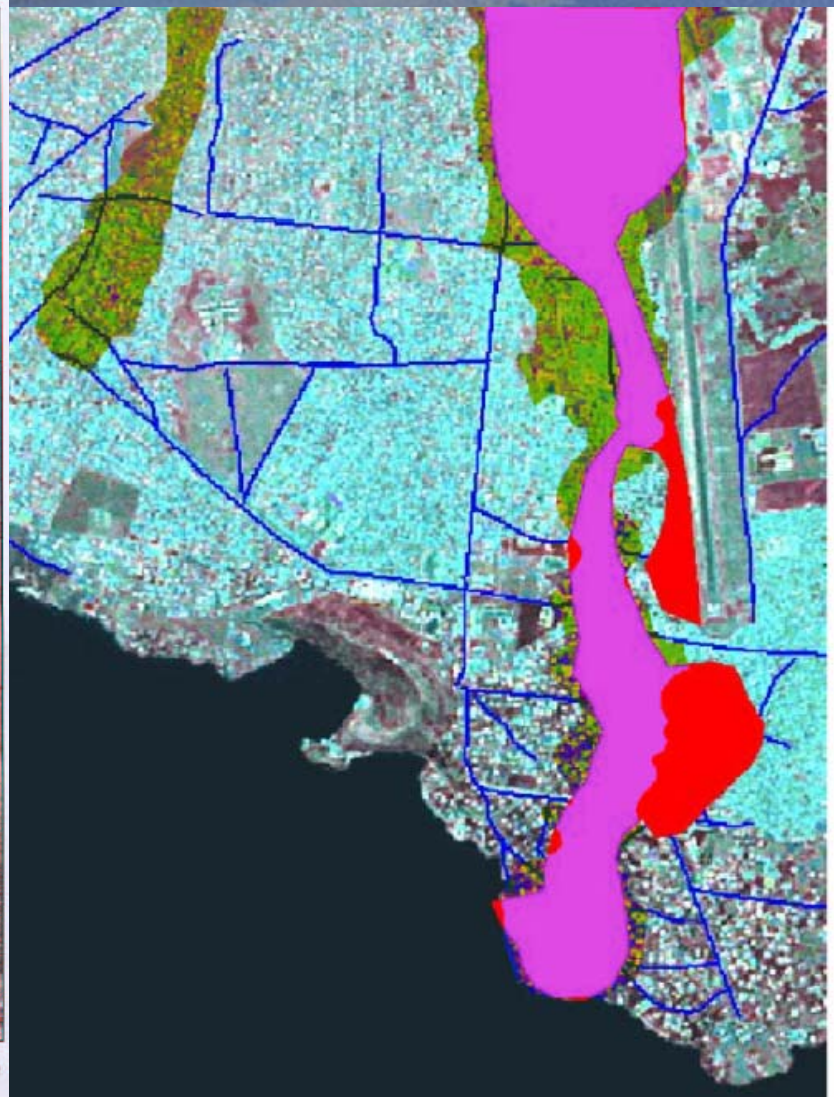
Lava flow mapping over Goma



Nyiragongo volcanic eruption, R.D. of Congo

Validation using ground data





Detection Error

Good Detection

False Alarm

Manitoba flood, Canada

Activation information

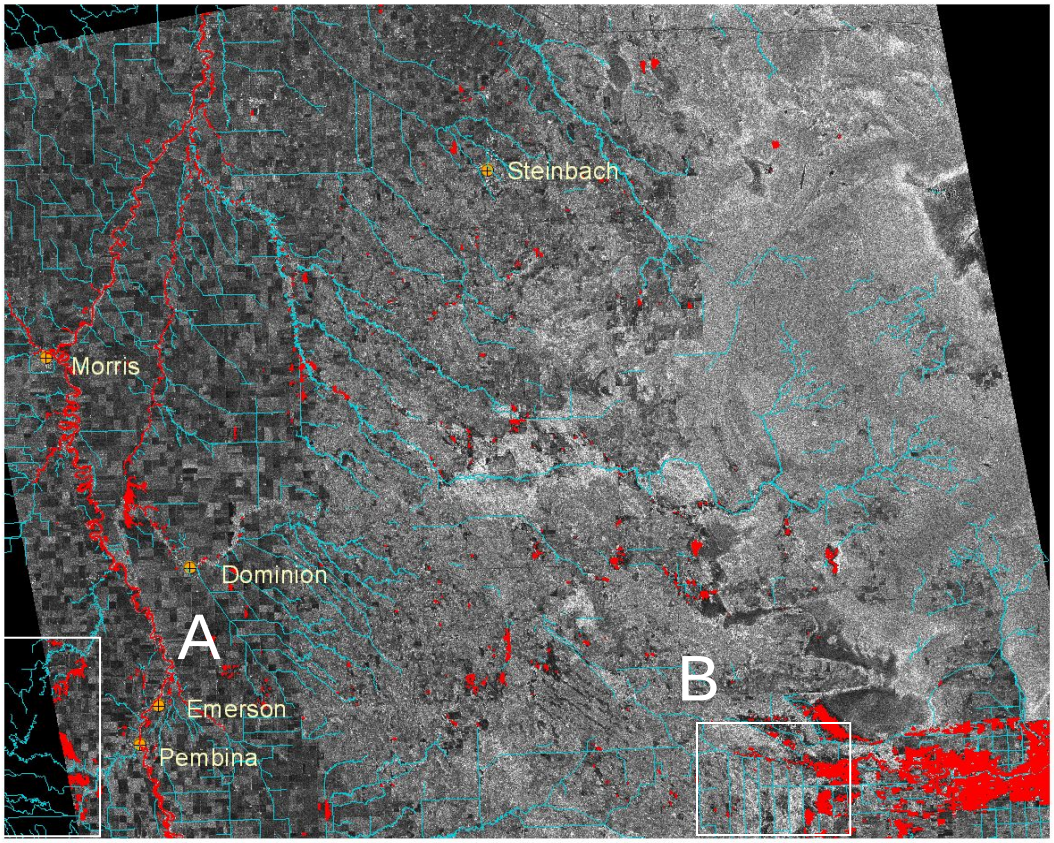
Activation 16

- Authorized User: **OCIPEP Canada**
- Date of activation: **June 13, 2002**
- Emergency On-Call Officer of that week: **ESA**
- Project Manager: **CSA**
- Value-Added Reseller: **Vantage Point International, Canada**
- End User: **Manitoba Conservation, Canada**
- Data Used: **RADARSAT-1**: 2 archives (W2, W1), 3 new (S5, S6, W1)

  SPOT-2: 4 new (XS)

Manitoba flood, Canada

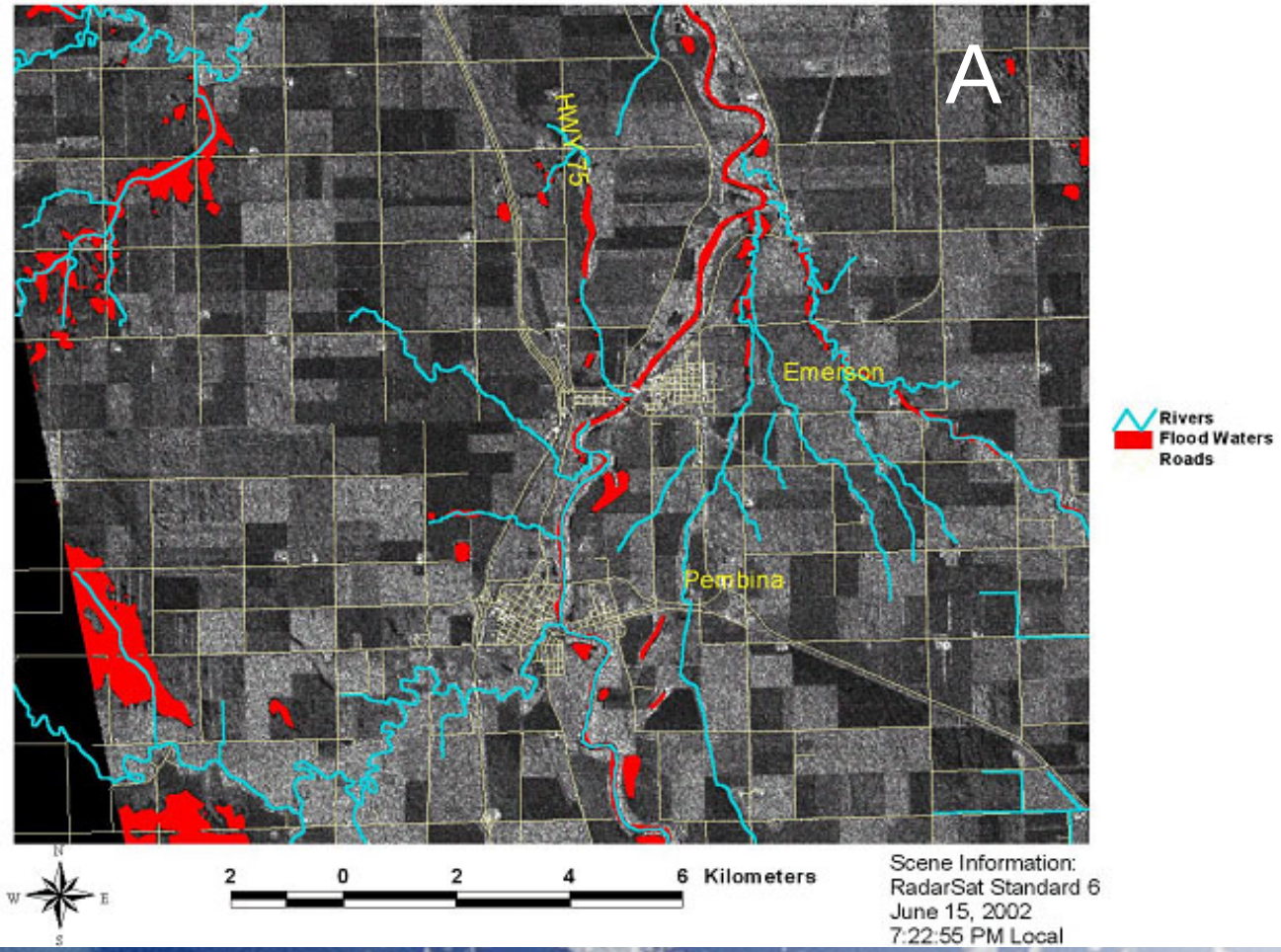
Flood mapping



Scene Information:
RadarSat S6
June 15, 2002
07:23 PM Local Time

Manitoba flood, Canada

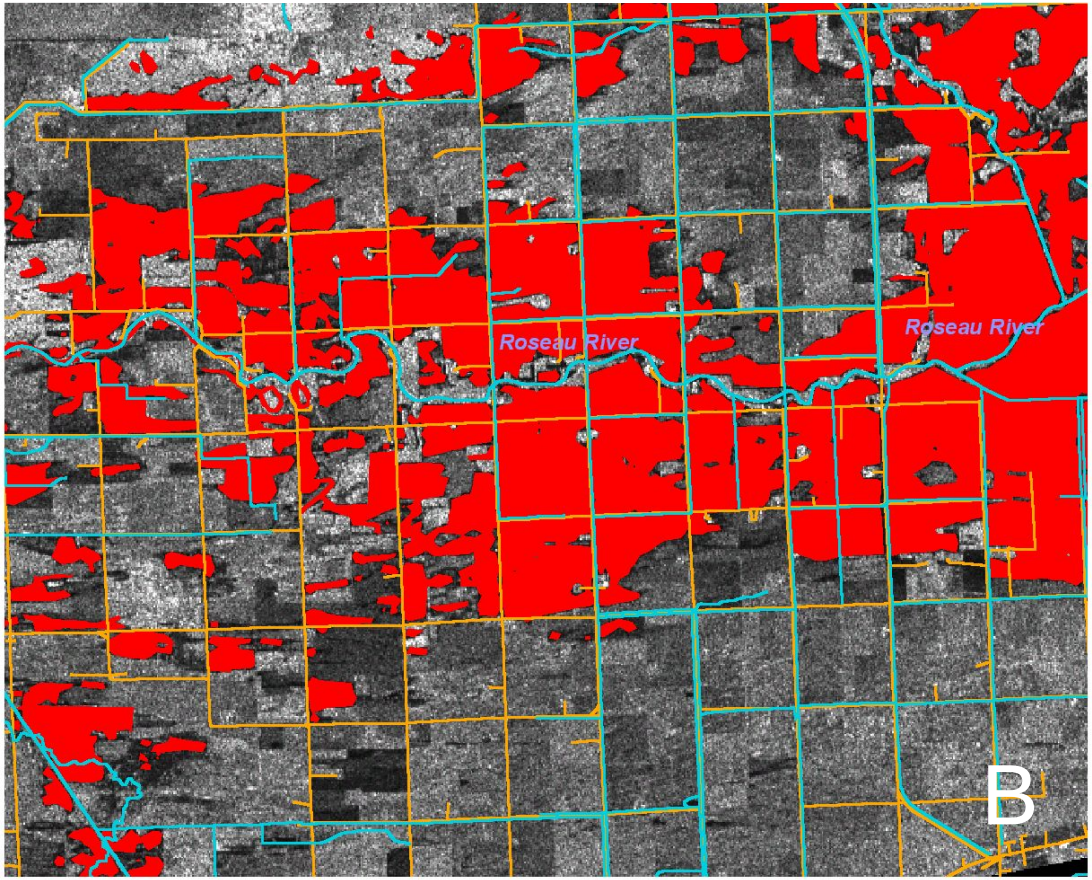
Flood mapping



Manitoba flood, Canada

Flood mapping

June 15, 2002



Rivers
Roads
Flood Waters

N
W E
S

2 0 2 4 6 Kilometers

Scene Information:
RadarSat S6
15 June 2002
7:23 PM Local

Southern France flood, France

Activation information

Activation 22

- Authorized User: **CIRCOSC of Valabre (French Civil Protection Agency)**
- Date of activation: **September 9, 2002**
- Emergency On-Call Officer of that week: **CNES**
- Project Manager: **CNES**
- Value-Added Reseller: **SERTIT, France**
- End User: **CIRCOSC of Valabre, France**

- Data Used: **RADARSAT-1**: 2 archive (S3 & S7), 1 new (S6)

  SPOT-2: 1 new (P + XS)

  SPOT-4: 2 new (M + XI)

  SPOT-5: 2 archive (M + XI)

Southern France flood, France

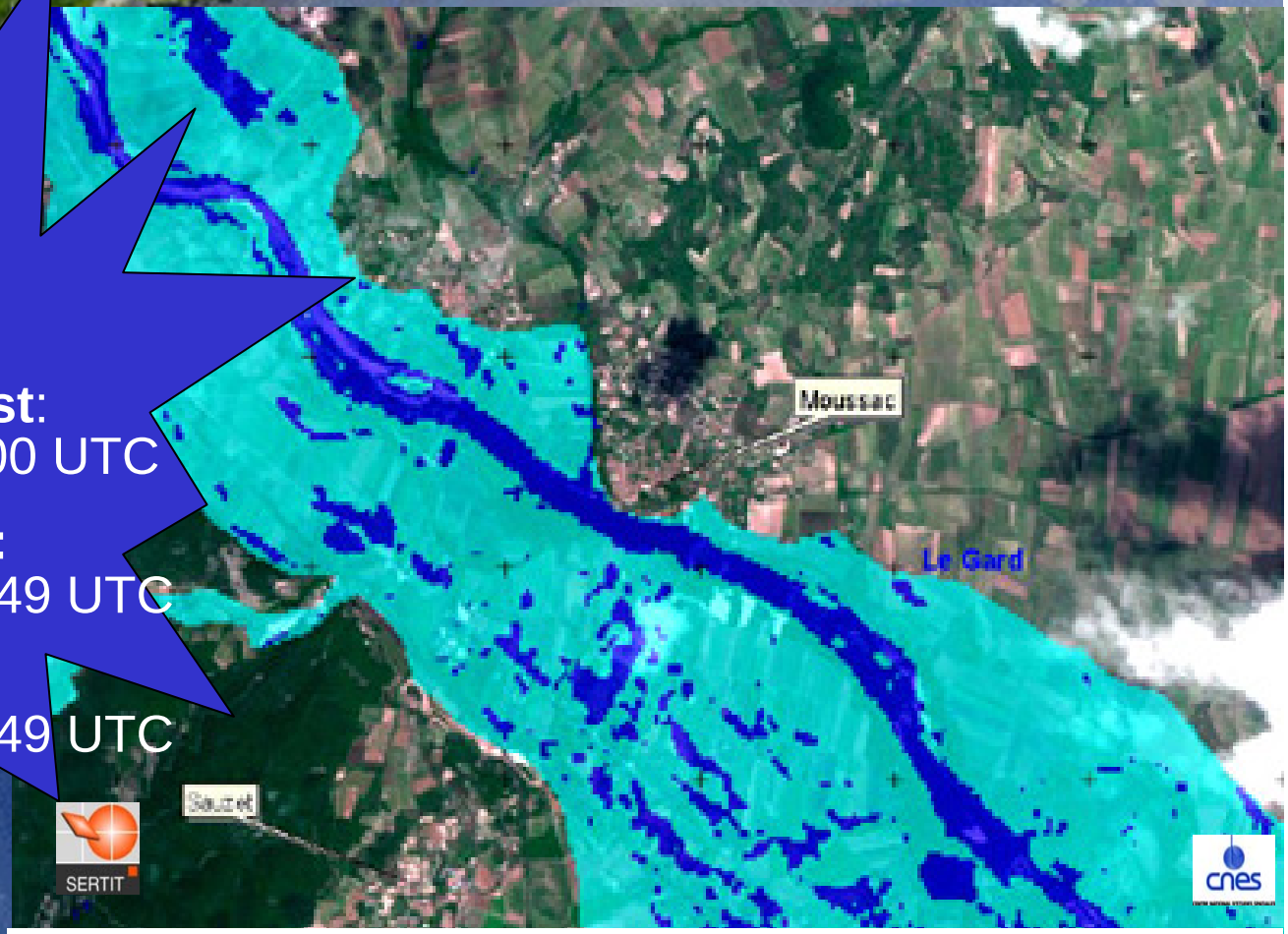
Flood maps of Gard Department

Event:
8/09/2002

Charter request:
9/09/2002 12h00 UTC

Data acquired:
10/09/2002 10:49 UTC

Map provided:
10/09/2002 23:49 UTC



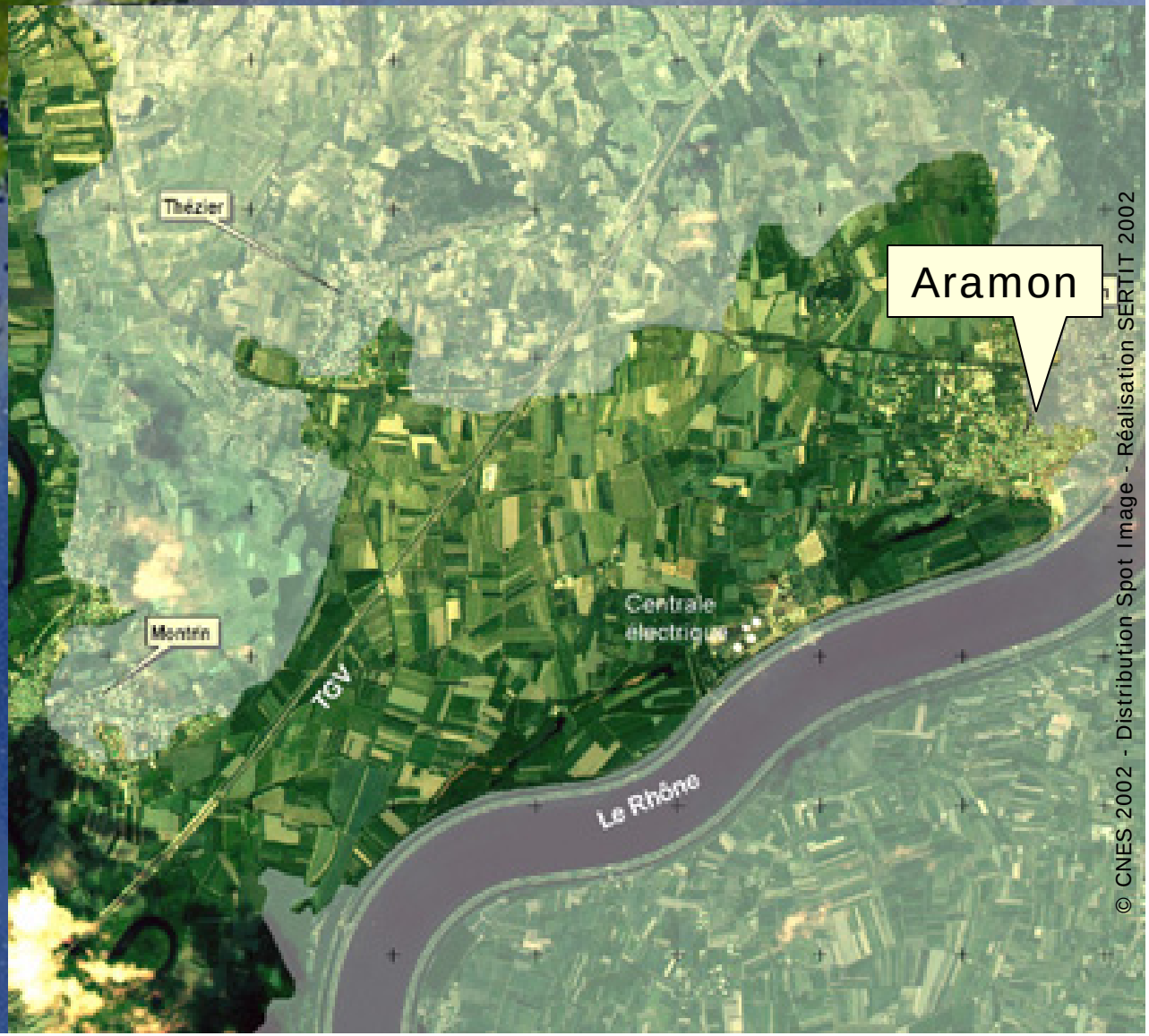
Map produced using SPOT-4 image acquired on September 10th, 10:49 UTC and SPOT-5 archive data

Southern France flood, France

Flood maps of Gard Department

Map of the impacted area near Aramon

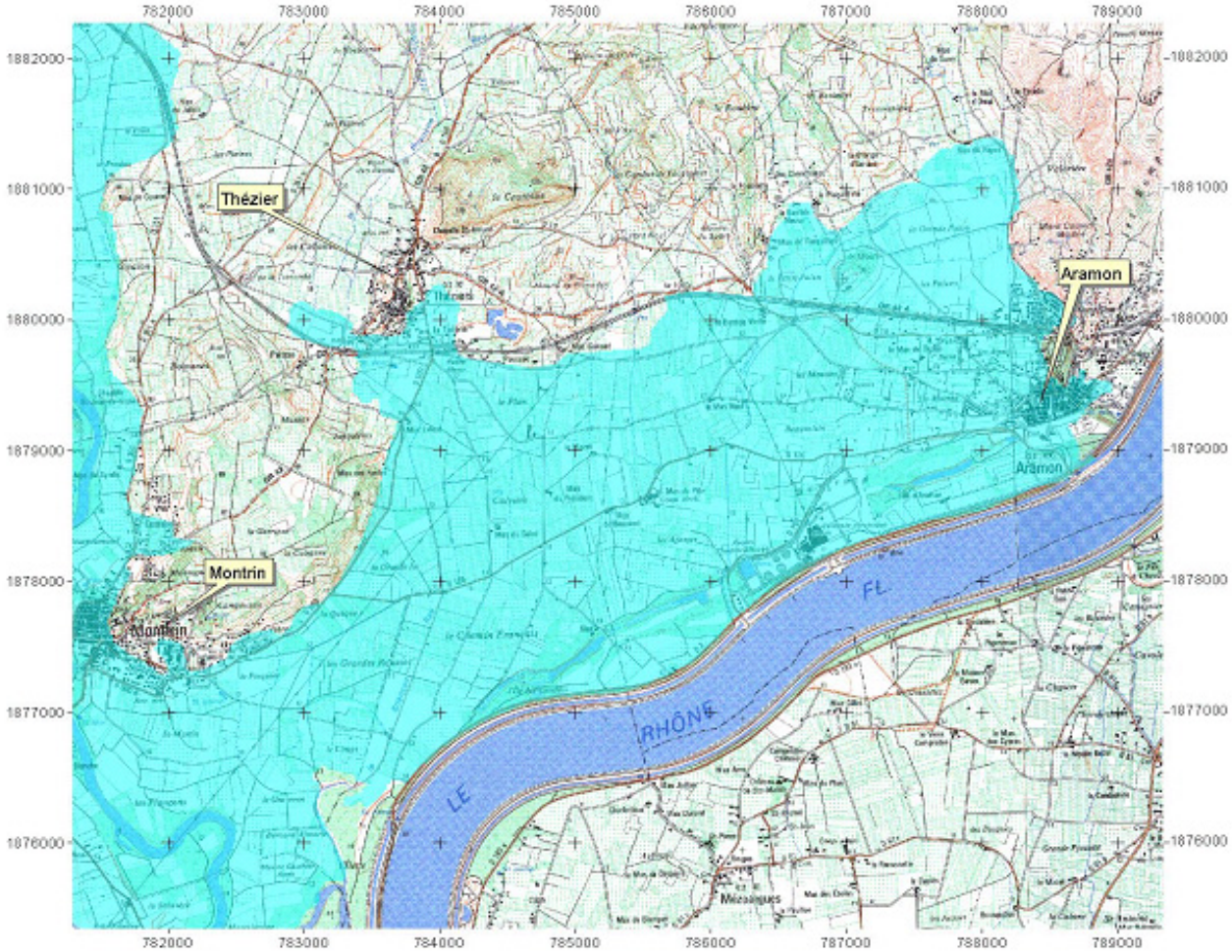
Produced using stamp of flooded area (in dark green) extracted from SPOT-4 data superimposed on accurate SPOT-5 image (2.5 m resolution)



© CNES 2002 - Distribution Spot Image - Réalisation SERTIT 2002

Southern France flood, France

Flooded area near Aramon on a topographic map



Données sources :

Champ d'inondation
image SPOT 2 du
11 septembre 2002 12 h 58.

Fond de référence
SCAN 25 IGN

extension de la crue

N

0.5 0 0.5 1 km

Projection Lambert II étendu

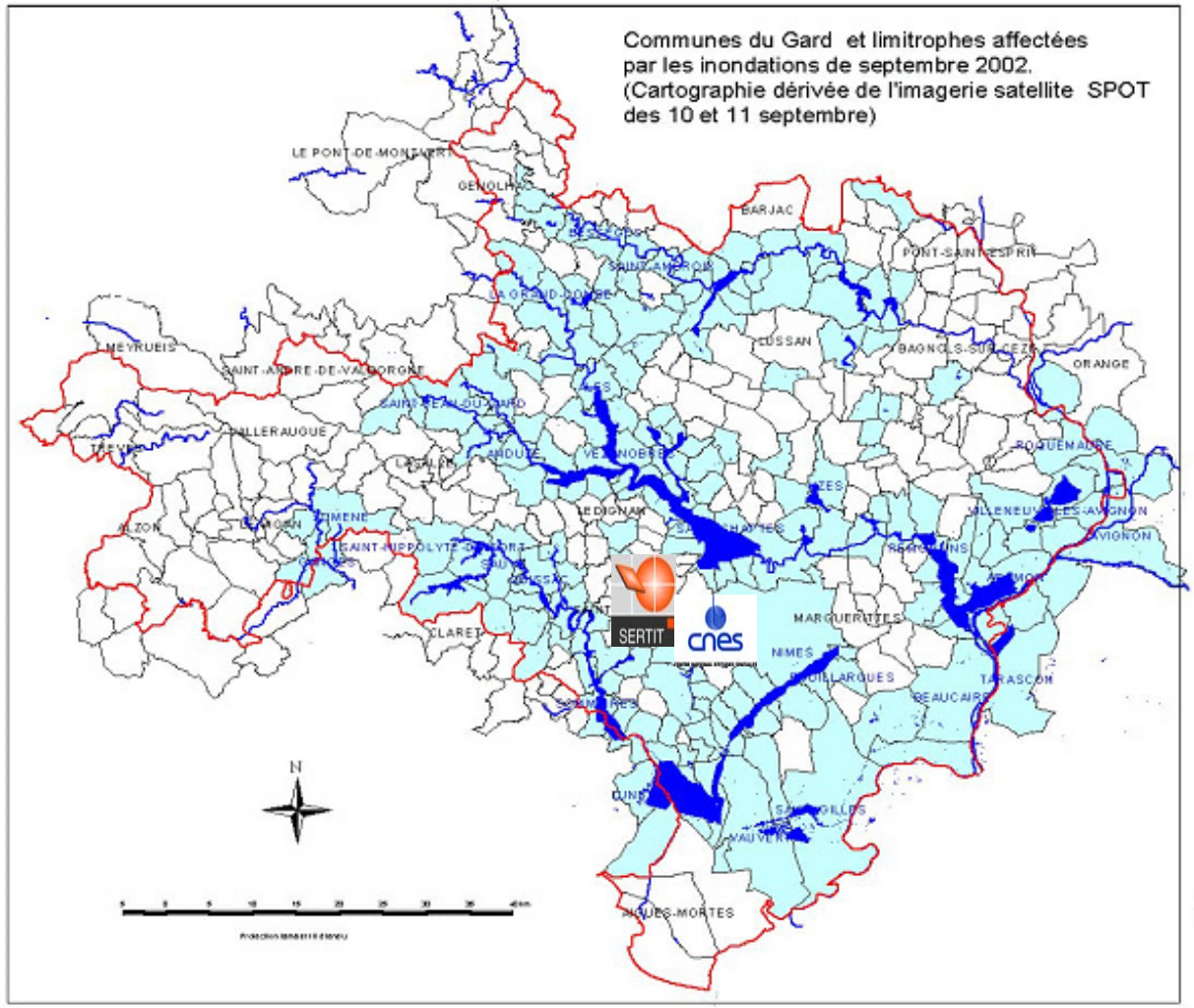
Source Imagerie SPOT

© CNES 2002
Distribution SPOT Image
Réalisation Sertit 2002

© CNES 2002 Distribution SPOT Image, Réalisation Sertit 2002

Southern France flood, France

Flooded surfaces on top of town boundaries



cnes
AGENCE FRANÇAISE DE L'ESPACE

SERTIT

Données sources

2 Images SPOT 4 du 10 septembre
1 Image SPOT 4 du 11 septembre
1 Image SPOT 2 du 11 septembre

Données acquises dans le cadre de la Charte Internationale Espace et Catastrophes Majeures.

Fond carthographique : BD carto

- Département du Gard
- Surfaces inondées
- Cours d'eau principaux
- Surface affectée < 1%
- Surface affectée 1 à 5%
- Surface affectée 5 à 10%
- Surface affectée 10 à 30%
- Surface affectée > 30 %
- Pas d'inondation visible sur l'image satellite

Galicia oil spill, France

Activation information

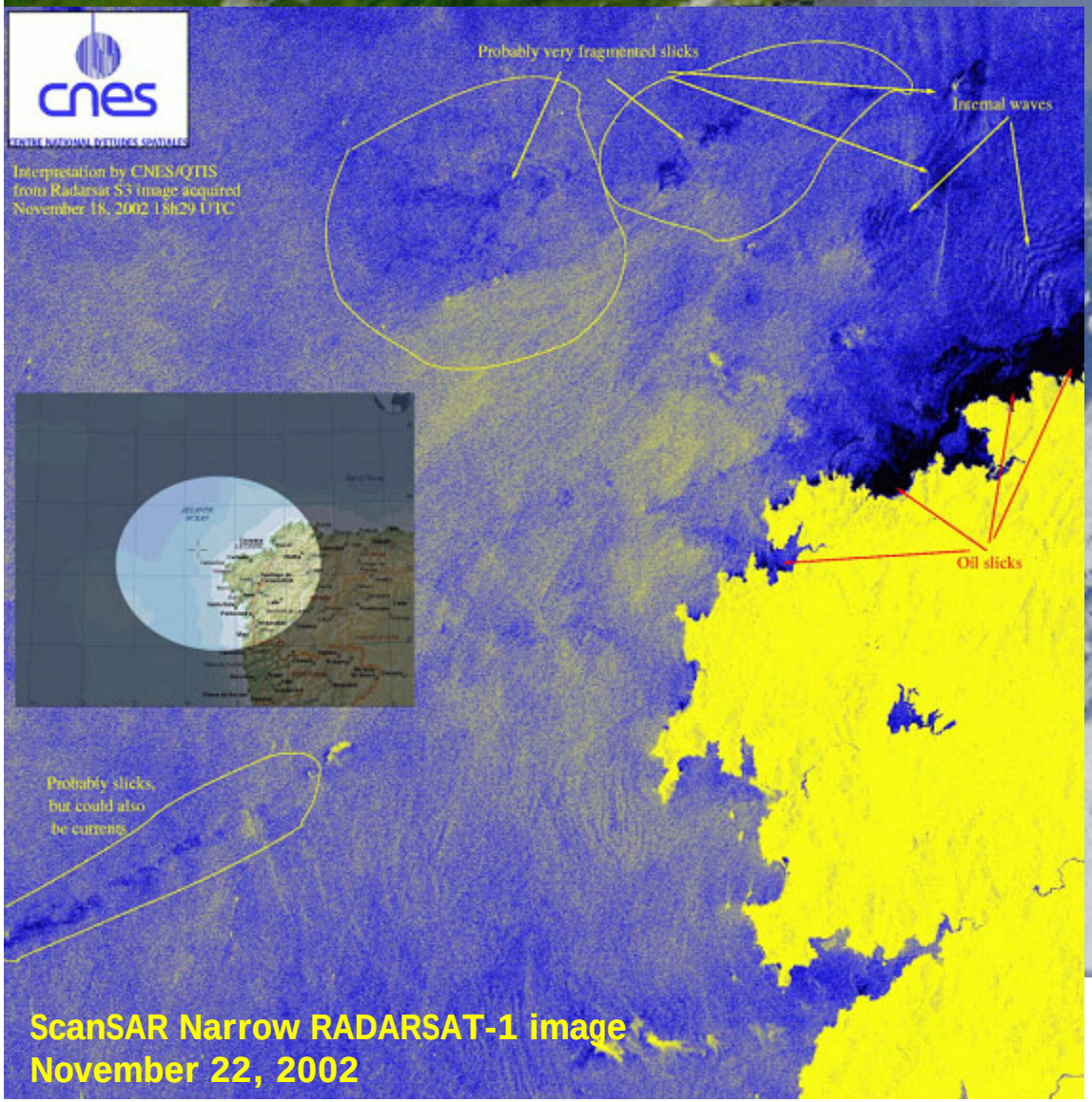
Activation 26

- Authorized User: **European Commission (DG-ENV)**
- Date of activation: **November 14, 2002**
- Emergency On-Call Officer of that week: **ESA-ESRIN**
- Project Manager: **CNES**
- Value-Added Reseller:
- End User: **Delegacion Gobierno, Spain**

- Data Used: **RADARSAT-1**: 2 new (ScanSAR Narrow)
  SPOT-2: 1 new (XS)
  SPOT-4: 2 new (XS)
  SPOT-5: 1 new (XS)
  ERS-2: 4 new

Galicia oil spill, France

Oil spill detection



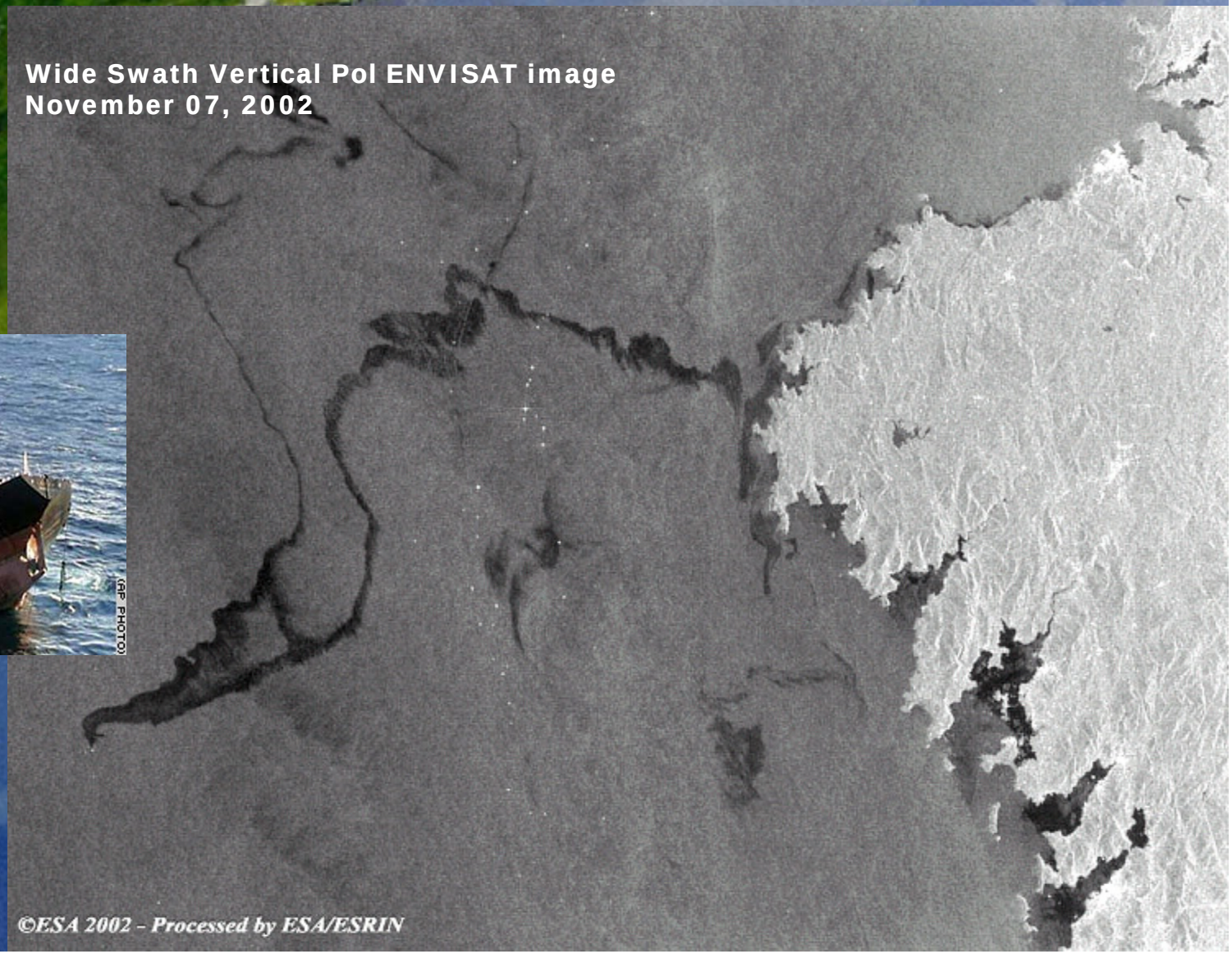
ScanSAR Narrow RADARSAT-1 image
November 22, 2002

Prestige oil tanker spill disaster

From Libération

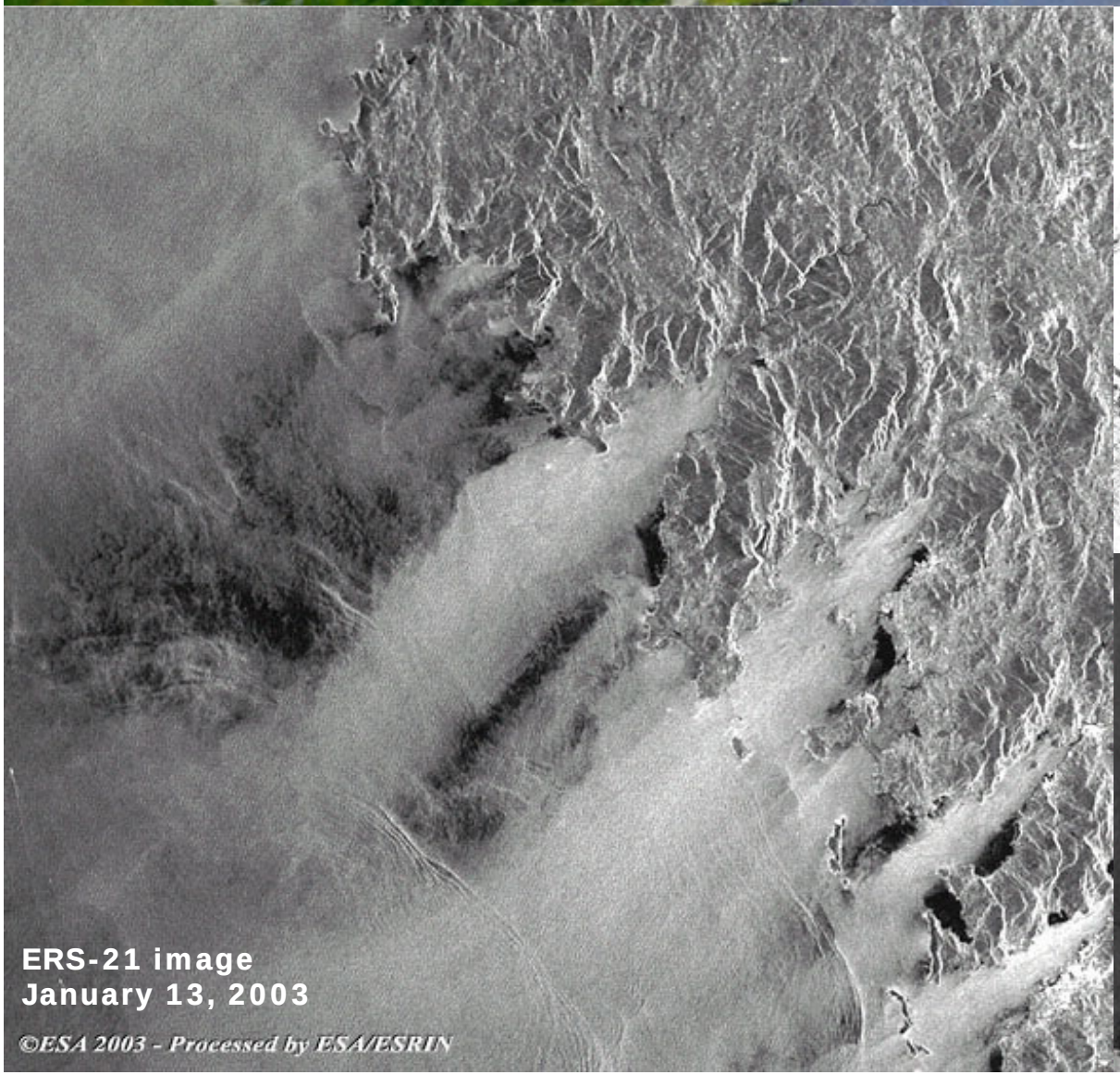
Galicia oil spill, France

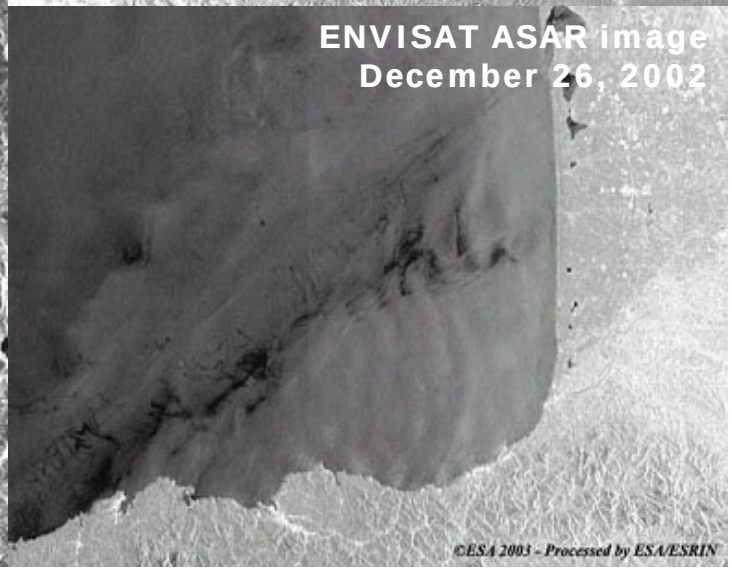
Oil spill detection



Galicia oil spill, France

Oil spill detection





Algiers earthquake, Algeria

Activation information

Activation 32

- Authorized User: **COGIC – Direction de la Défense et de la Sécurité Civiles**
- Date of activation: **May 22, 2003**
- Emergency On-Call Officer of that week: **CNES**
- Project Manager: **CNES**
- End User: **COGIC – Direction de la Défense et de la Sécurité Civiles**

- Data Used: **SPOT-4**: 1 new (P+XI)
  SPOT-5: 3 archive, 1 new (P,XI)
  ENVISAT: 1 archive, 1 new
  ERS-2: 1 archive, 1 new

Algiers earthquake, Algeria

Boumerdes Damages

Building Change

Structural Anomaly

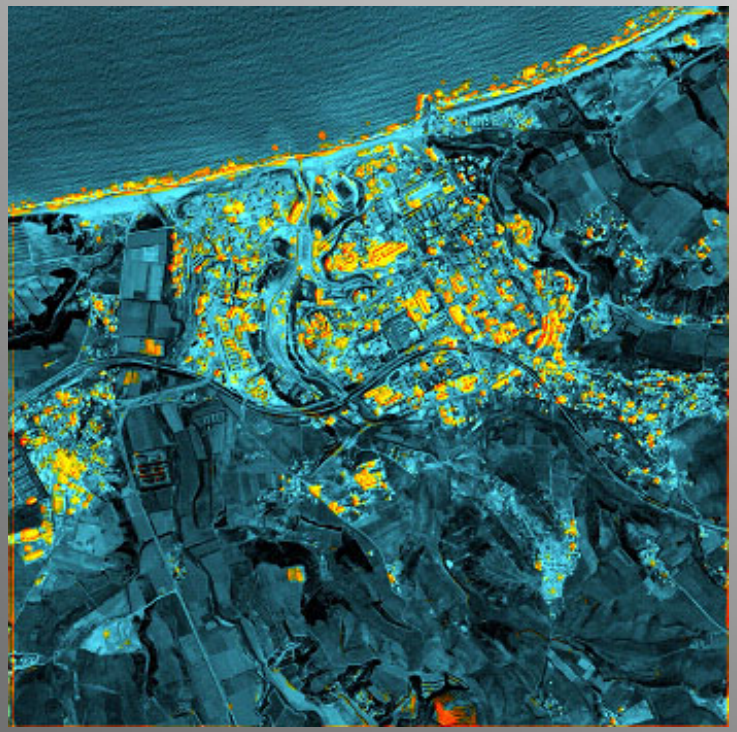
Imagerie Spot © CNES 2003 distribution Spot Image, réalisation Sertit

Document produit le 28 mai à 2h 30 à partir de données Spot 5 THR (résolution = 2.5 m)

Algiers earthquake, Algeria

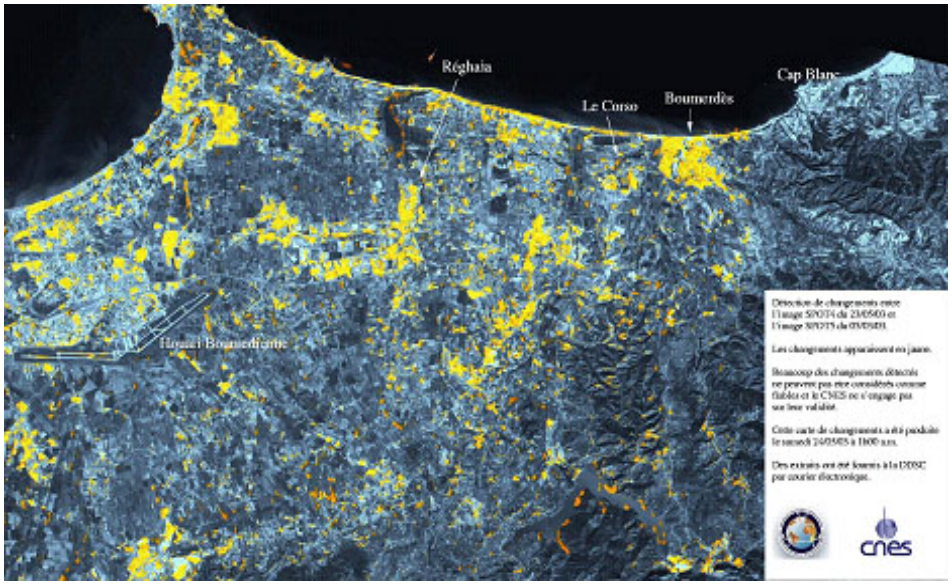
Change maps

Boumerdes Region



Changes appear in yellow

Algiers Region



Change detection maps produced using SPOT 4/5 images.

British Columbia Forest Fire, Canada

Activation information

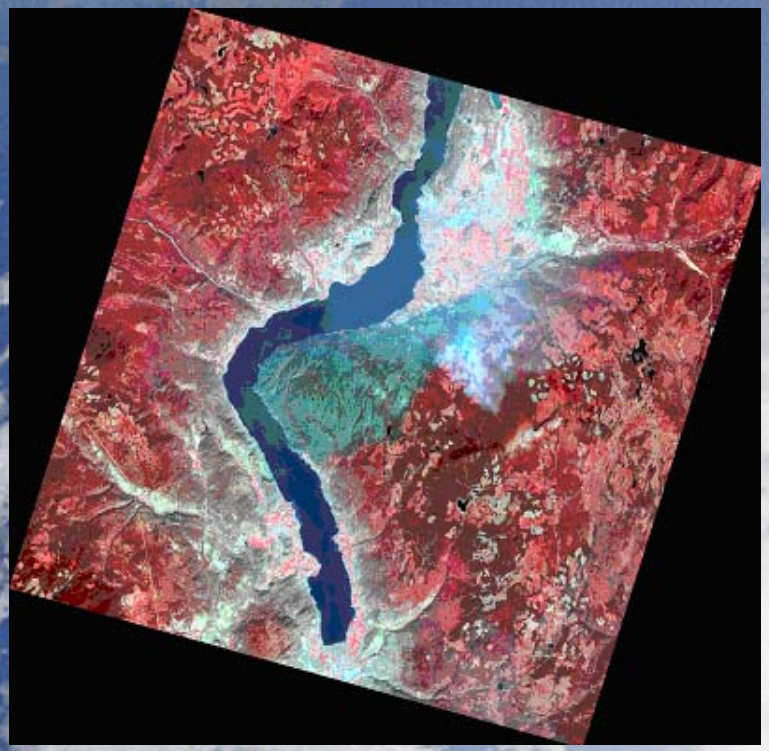
Activation 38

- Authorized User: **OCIPEP, Canada**
- Date of activation: **August 7, 2003**
- Emergency On-Call Officer of that week: **CSA**
- Project Manager: **CSA**
- Value-Added Reseller: **Dendron Resource Surveys**
- End User: **British Columbia Forestry Services**
- Data Used: **SPOT-4**: 5 new
  SPOT-5: 5 new
  NOAA sats: 35 new
  ENVISAT: 1 new (ASAR), 1 new (MERIS)

British Columbia Forest Fire, Canada

Multi-spectral, multi-date images acquired over Okanagan Mountain

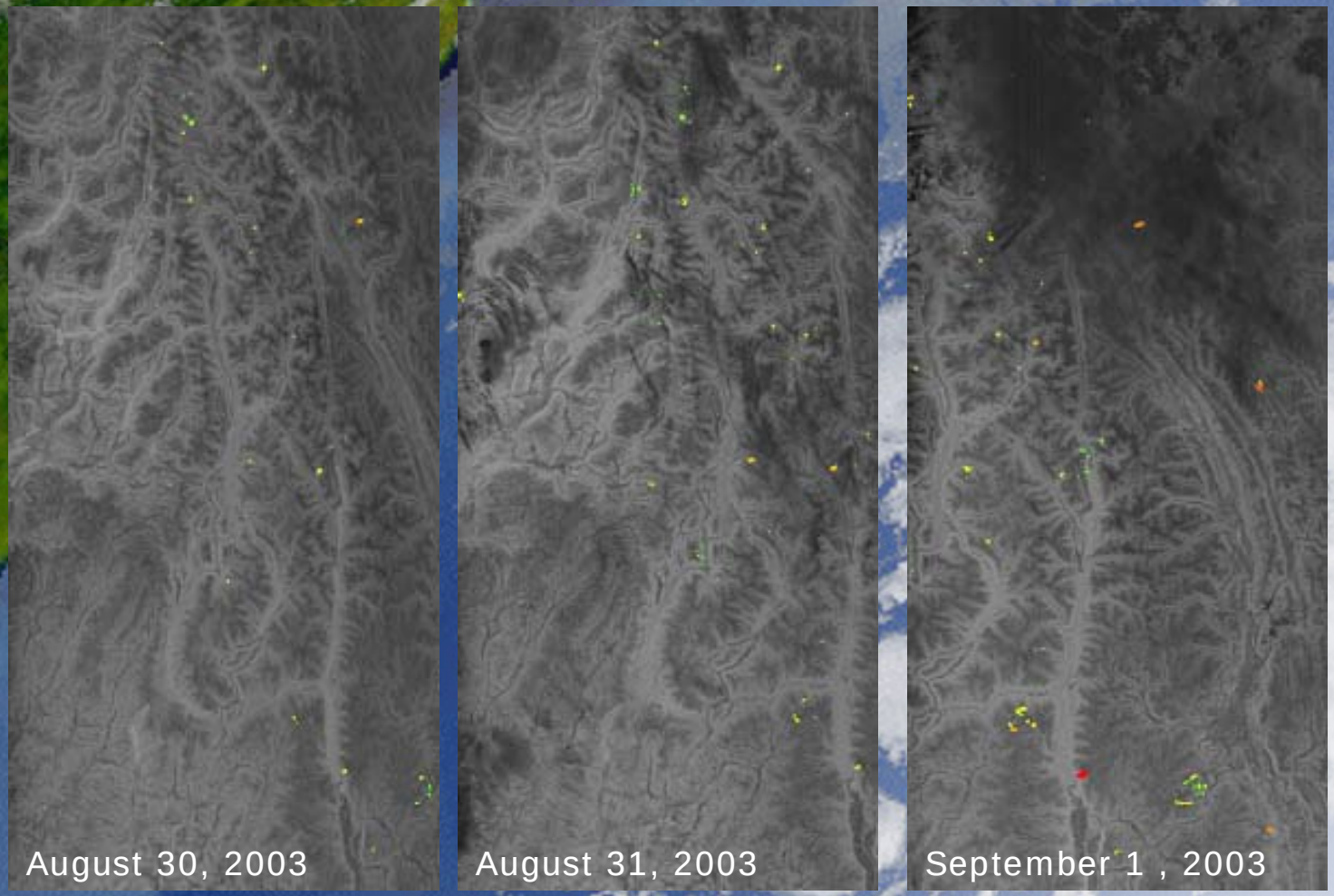
August 29, 2003



August 30, 2003

British Columbia Forest Fire, Canada

Night time BIRD images acquired over Okanagan Mountain



1 10 100 1000 MW

Tsunami, India

Activation information

Activation 64

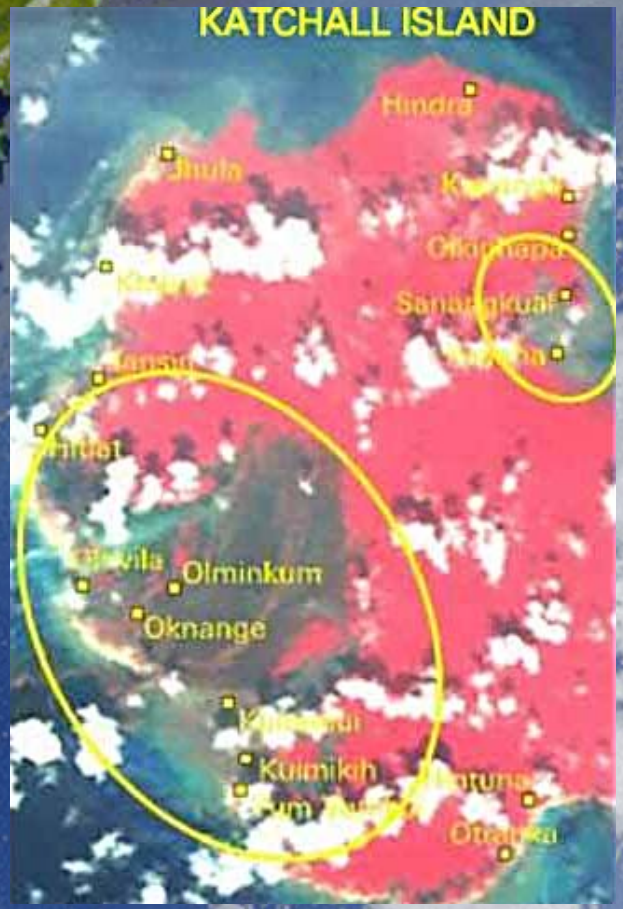
- Authorized User: **ISRO**
- Date of activation: **December 26, 2004**
- Emergency On-Call Officer of that week: **ISRO**
- Project Manager: **ISRO**
- Value-Added Reseller:
- End User: **ISRO – Director DMS**

- Data Used: **IRS-1D**: 2 archive, 2 new
  IRS-1C: 1 new
  IRS-P6: 4 archive, 12 new
  IRS-P4: 1 new
  ENVISAT: 2 new
  RADARSAT-1: 4 archive, 4 new
  SPOT-5: 3 new

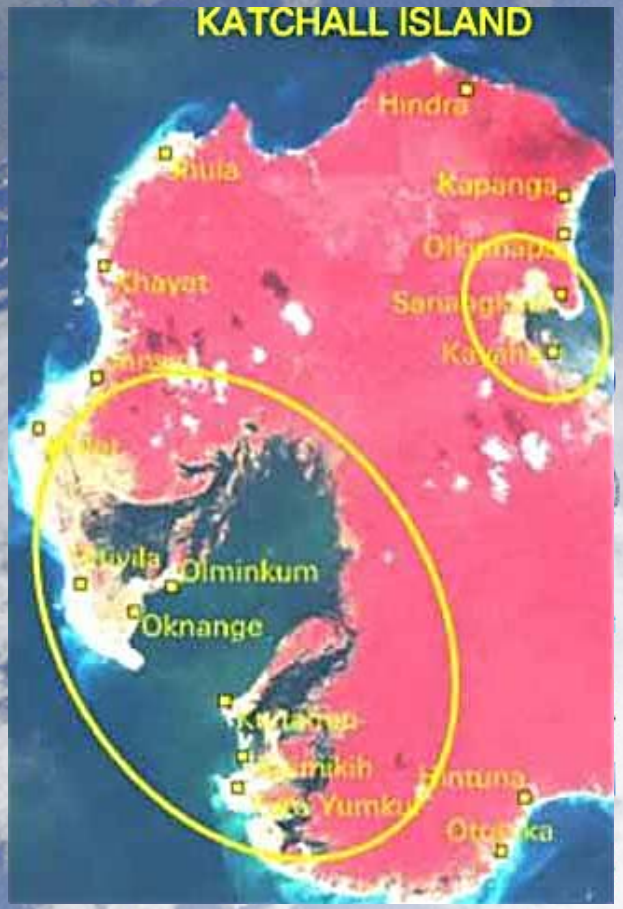
Tsunami, India

A Close View of Katchall Island

IRS-P6 AWiFS
December 21, 2004



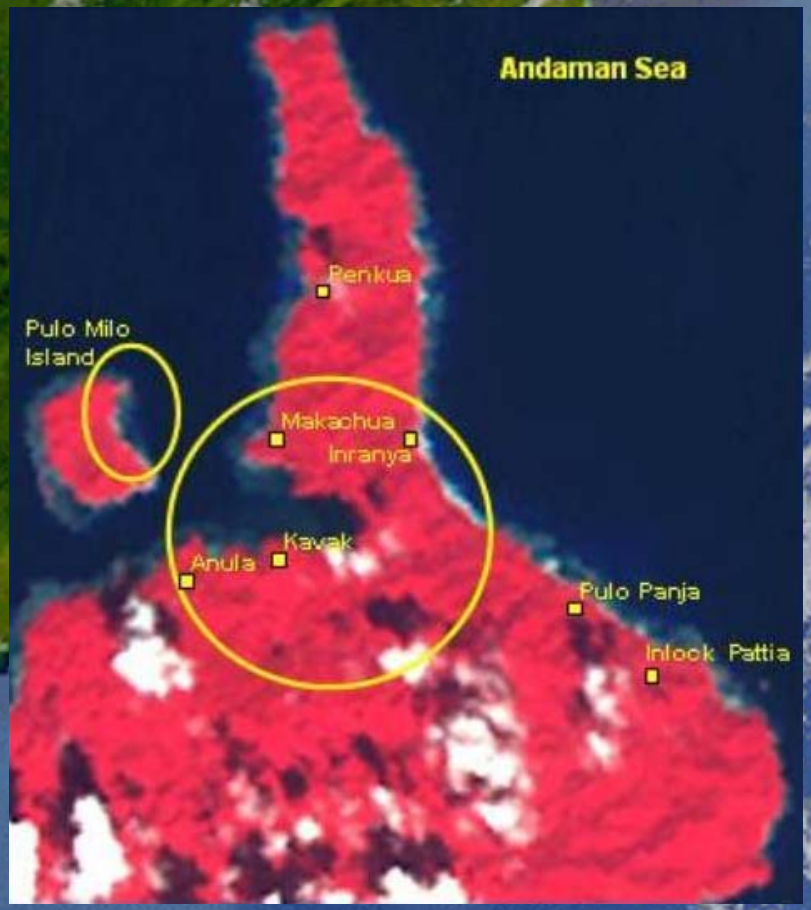
IRS-P6 AWiFS
December 26, 2004



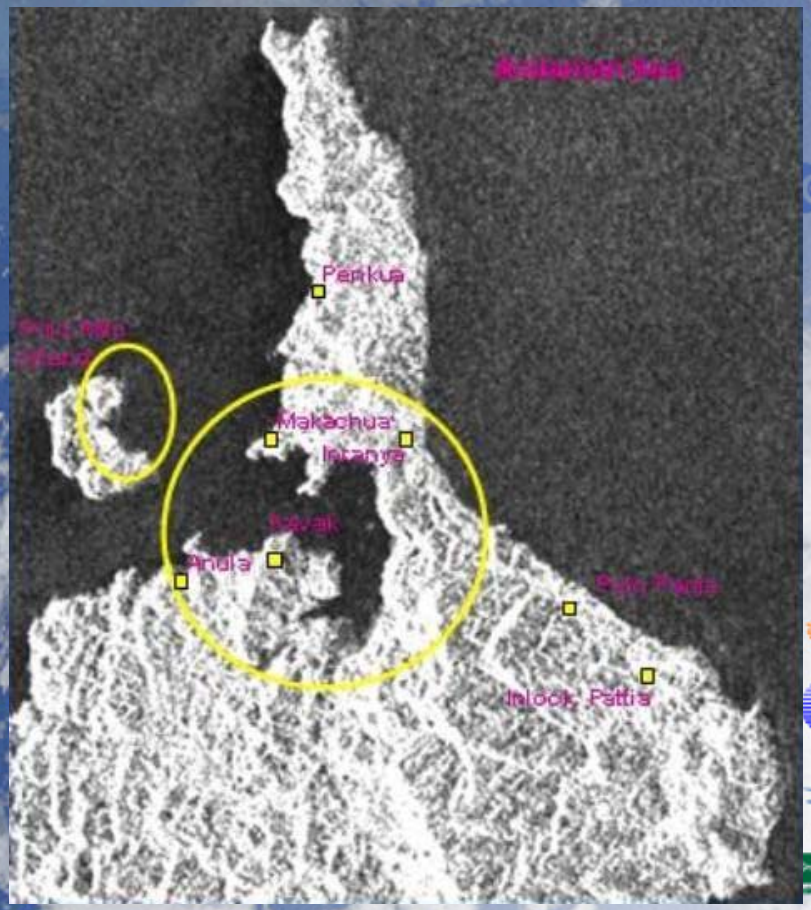
IRS-P6 LISS-III
January 04, 2005

Tsunami, India

A Close View of Little Nicobar Island



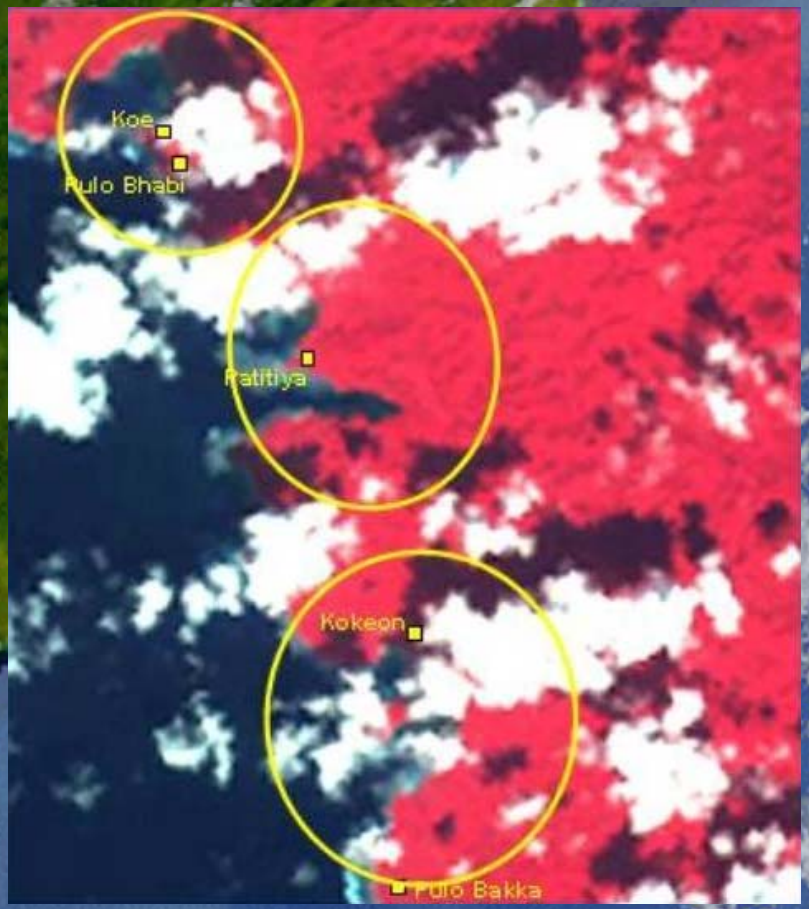
IRS-P6 AWiFS
December 21, 2004



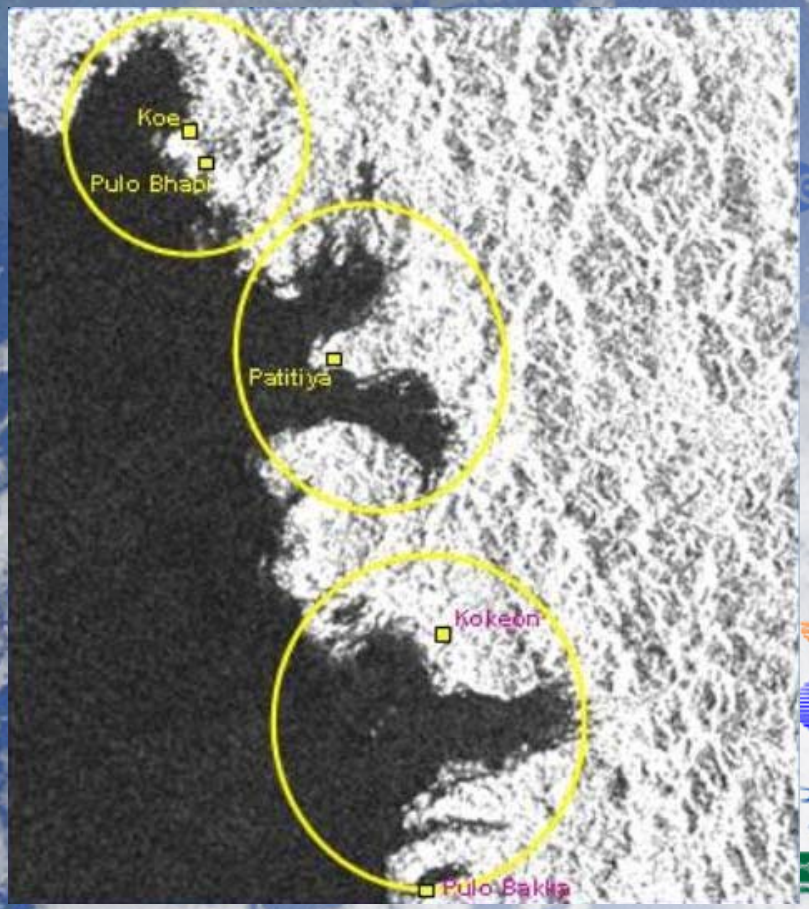
RADARSAT-1
December 31, 2004

Tsunami, India

A Close View of Great Nicobar Island



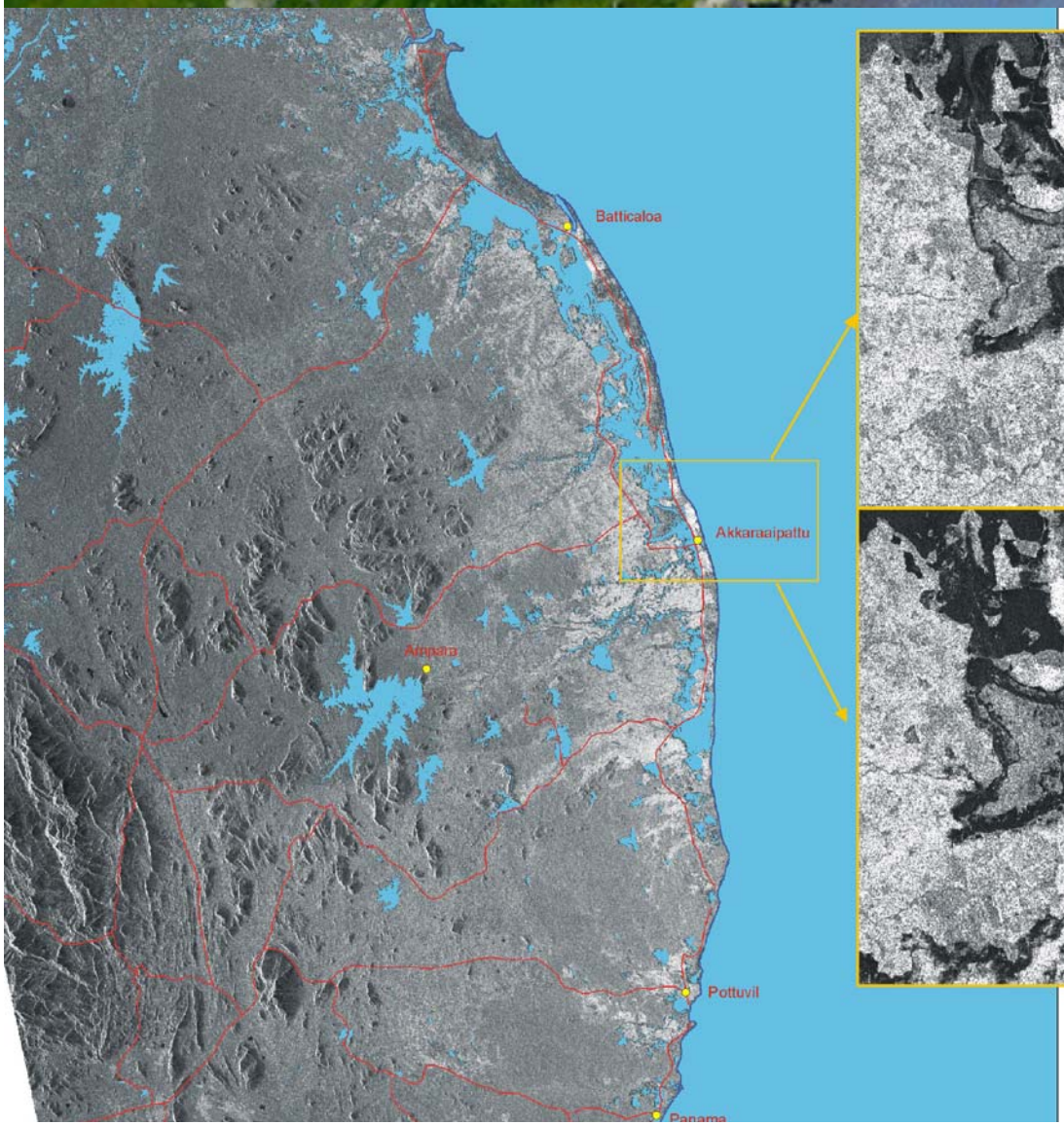
IRS-P6 AWiFS
December 21, 2004

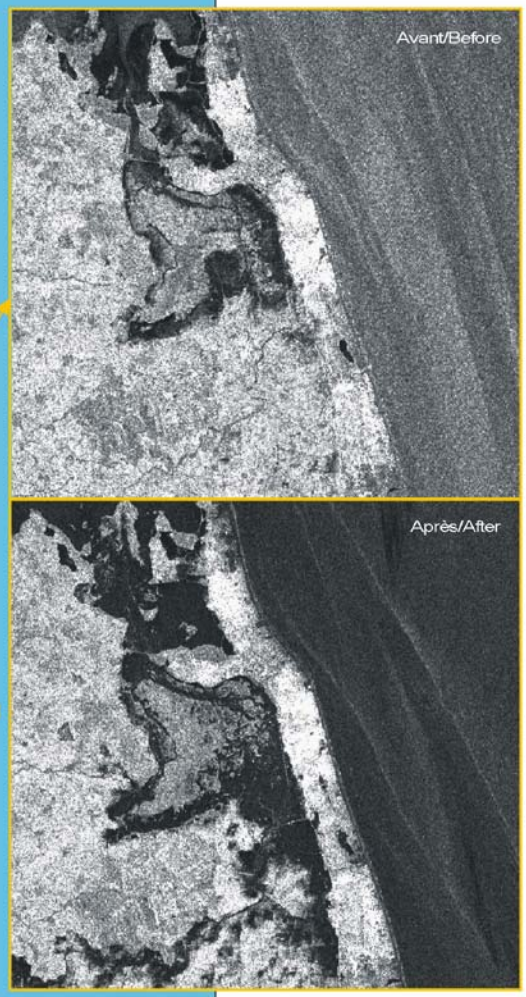


RADARSAT-1
December 31, 2004

Tsunami, Sri Lanka

Effects of Tsunami on the East Coast of Sri Lanka





RADARSAT-1
December 27, 2002

RADARSAT-1
January 5, 2005

Legend/Légende

- Eau/Water
- Zone urbaine/Urban
- Chemins/Roads
- Ligne de côte de 2002/ 2002 Coastline

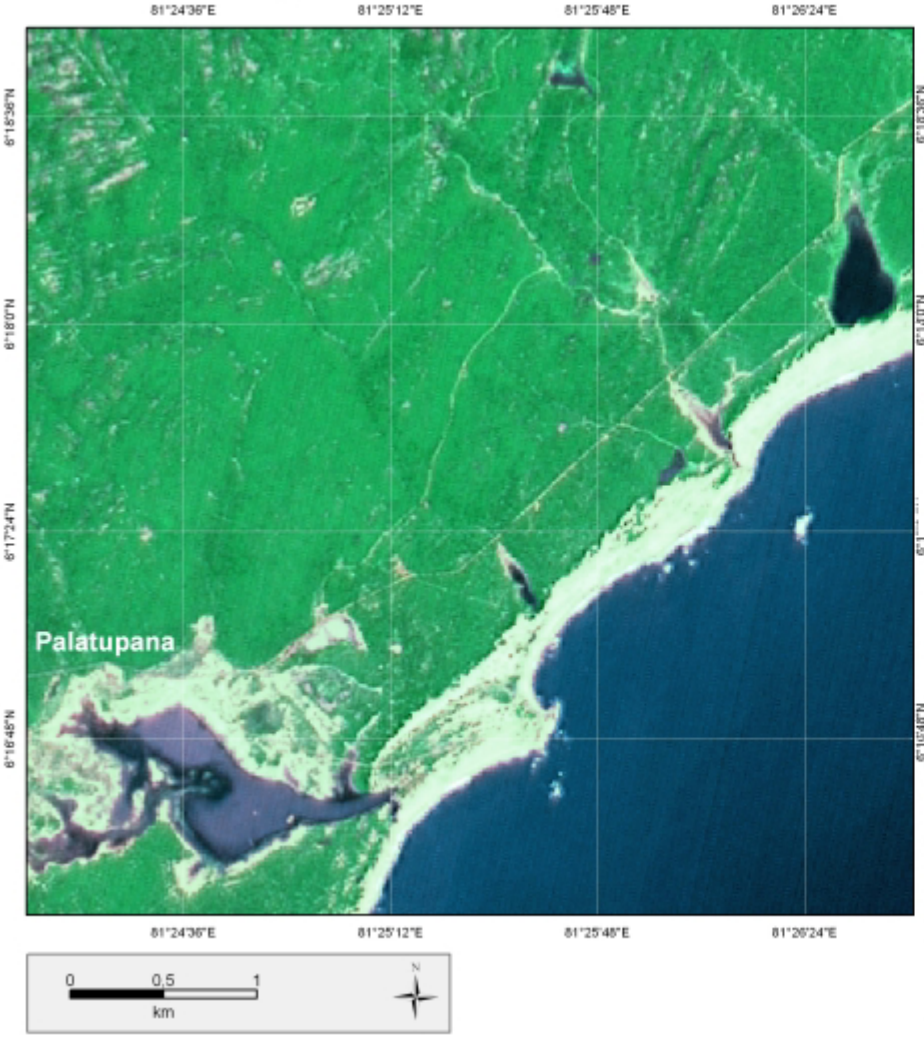
15 km

Produced by Dendron Resource Surveys Inc.

Tsunami, Sri Lanka

Effects on the South East Coast

SPOT 2, February 8, 2002



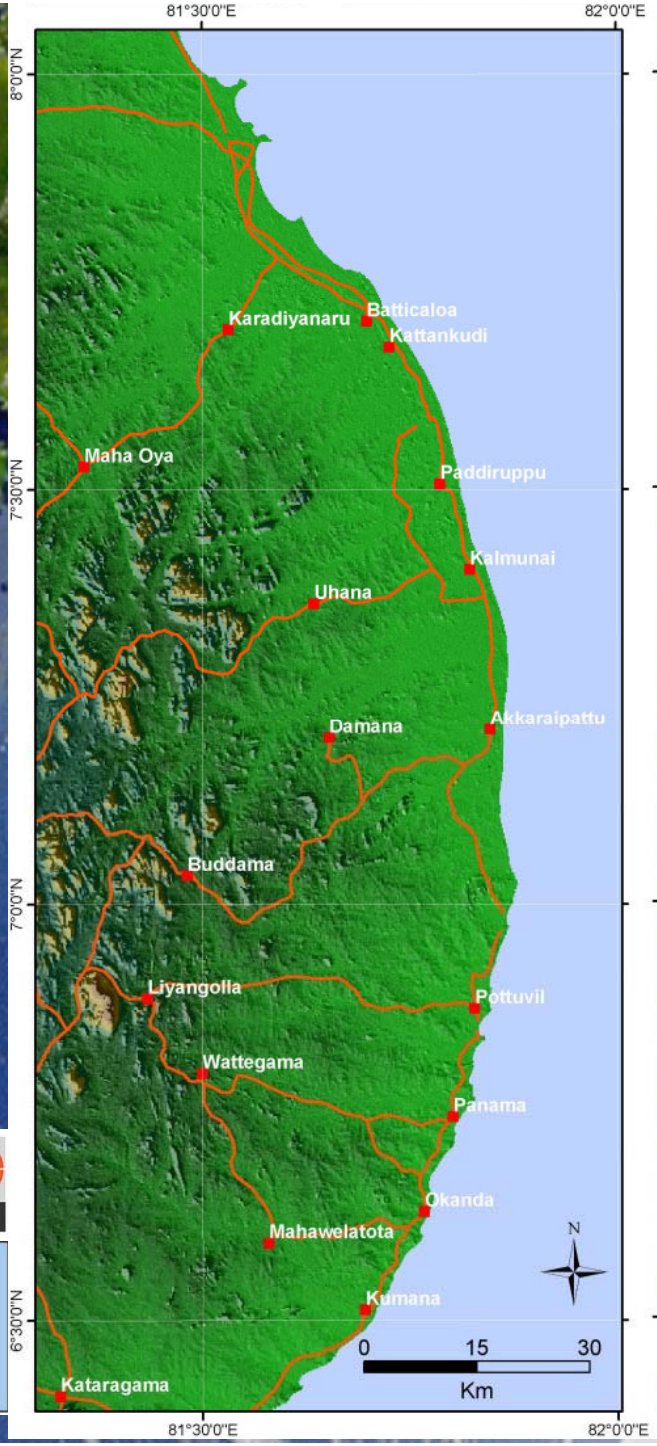
Spot 4, January 13, 2005

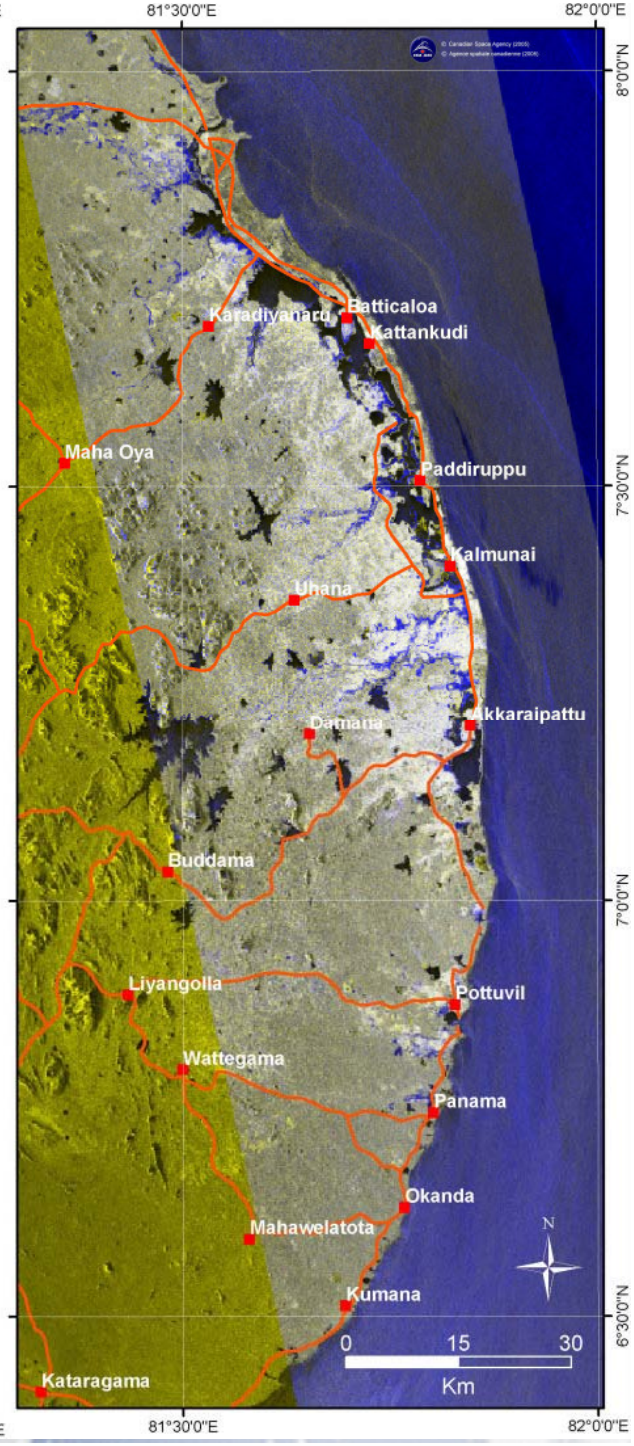
Tsunami
Sri Lanka

Effects of Tsunami on the East Coast

Reference image:
RADARSAT-1
December 27, 2002

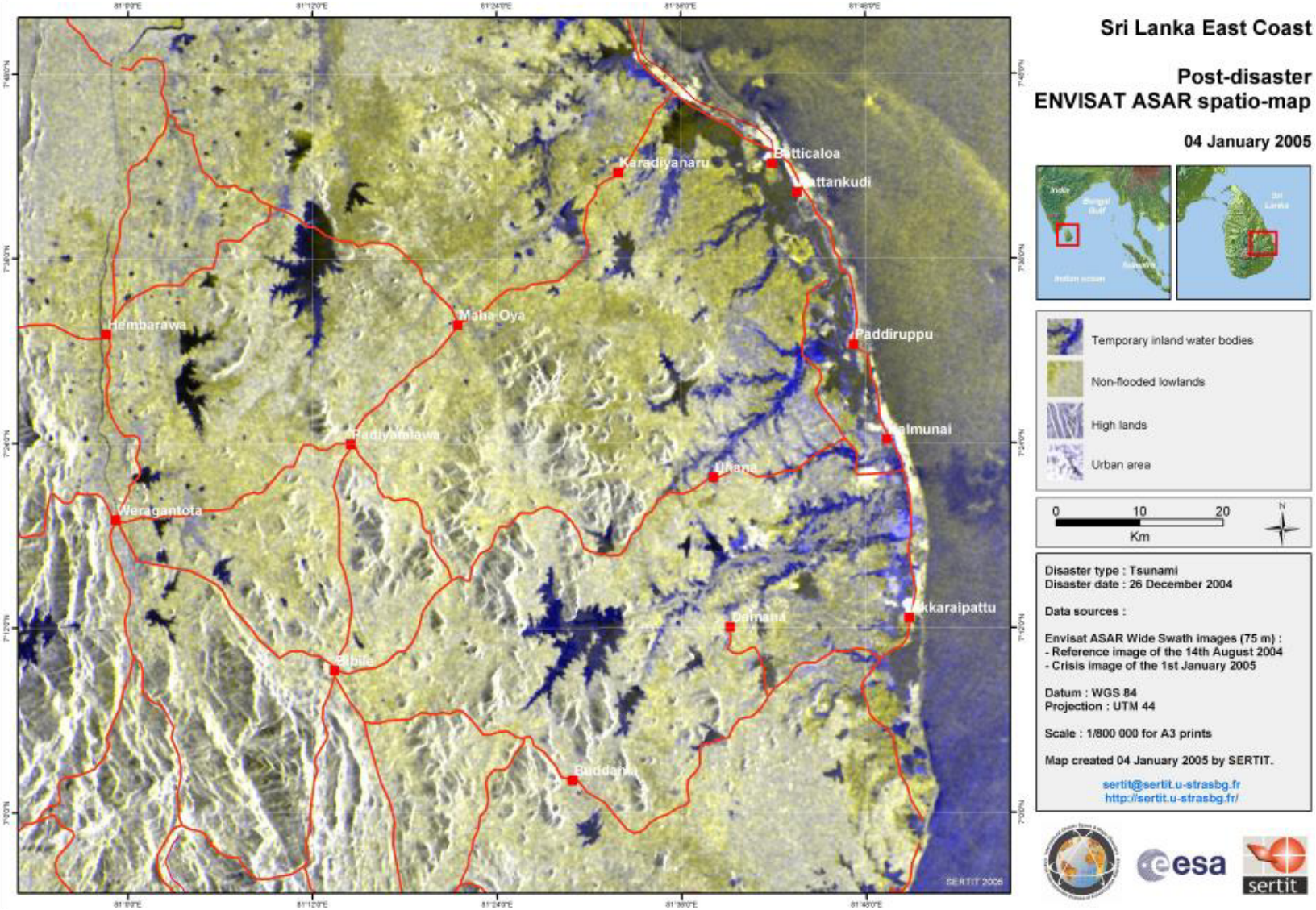
Post-disaster crisis image: RADARSAT-1
January 2, 2005





Tsunami, Sri Lanka

Effects on the East Coast

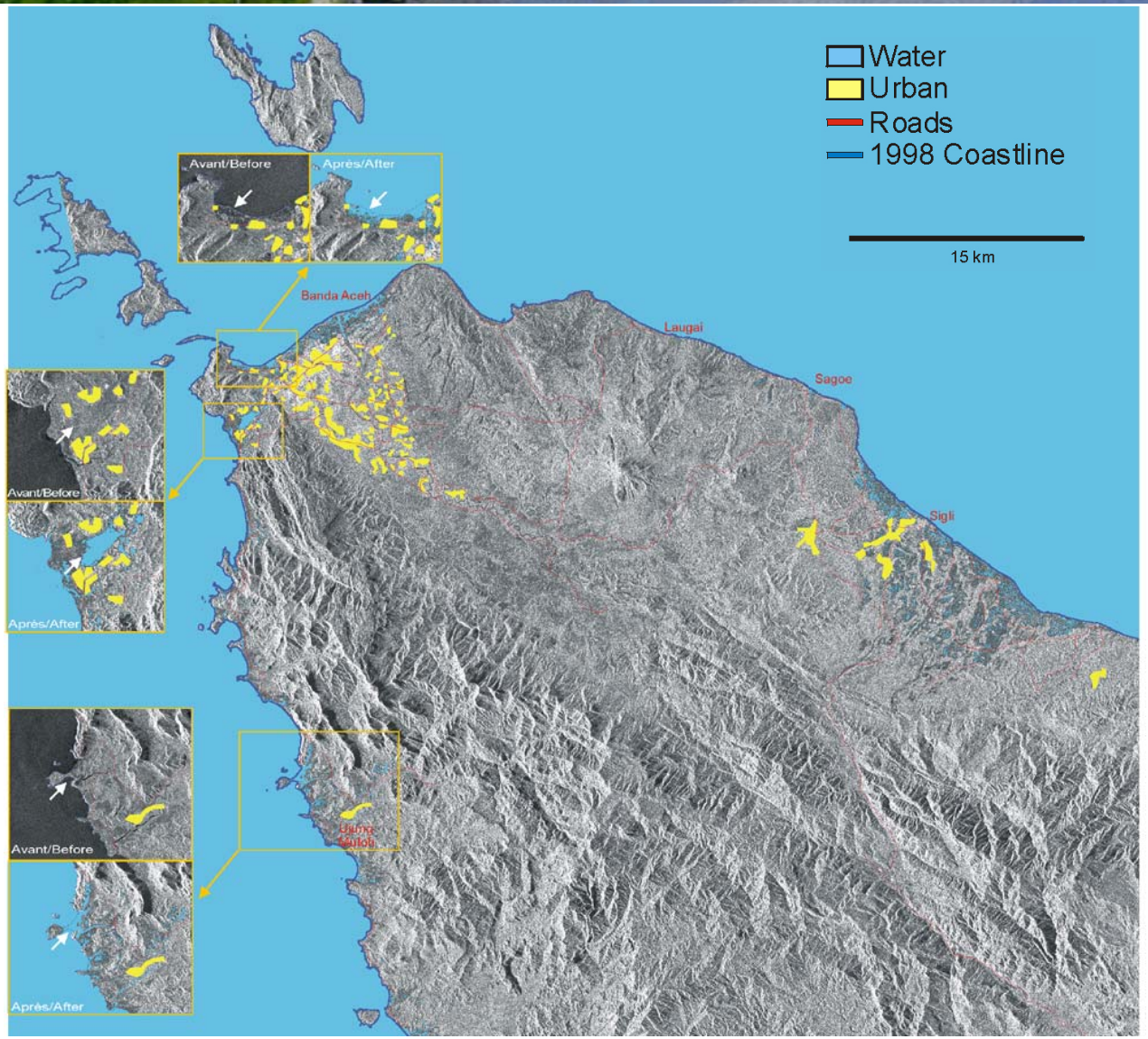


Tsunami, Indonesia

Effects of the Tsunami in Northern Sumatra, Indonesia

Before image:
RADARSAT-1
April 9, 1998

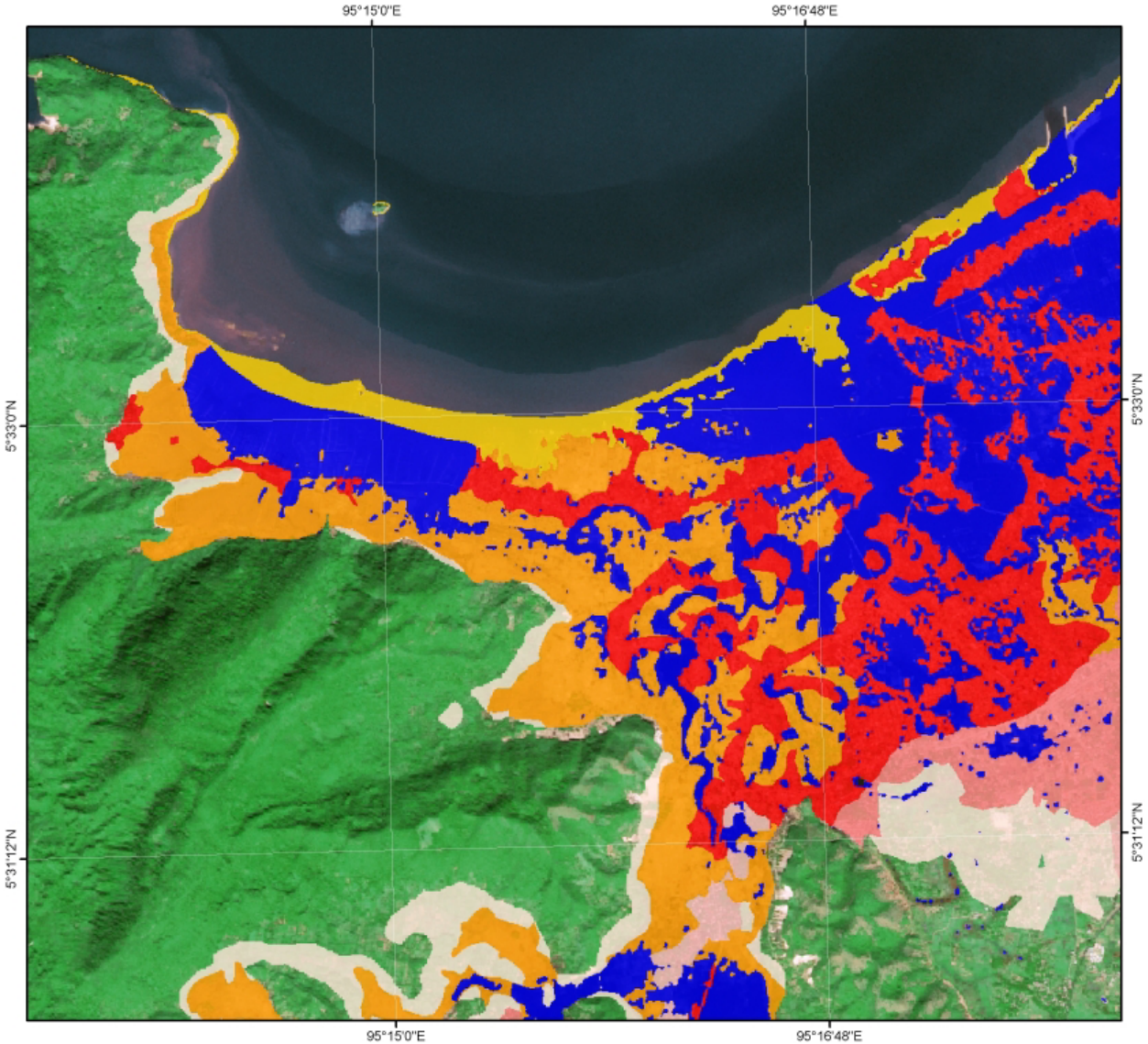
After image:
RADARSAT-1
December 31, 2004



Produced by Dendron Resource Surveys Inc.

Tsunami, Indonesia

Banda Aceh, West area



Indonesia - Sumatra
Banda Aceh - West area

Damage map
30 December 2004

Damage within urban area
- Devastated urban area
- Highly affected urban area
- Affected urban area
- Not/Slightly affected

Damage within rural/natural area
- Completely destroyed shoreline
- Devastated rural area
- Water

0 0,5 1
Km

N

Disaster type : Tsunami
Disaster date : 26 December 2004

Data source : SPOT 5 colour (2,5 m)
Acquisition date : 30 December 2004
© CNES 2004 : distribution SPOT Image

Datum : WGS 84
Projection : UTM 46

Scale : 1/30 000 for A3 prints

Map created 05 January 2005 by SERTIT.
© SERTIT 2005
sertit@sertit.u-strasbg.fr
http://sertit.u-strasbg.fr/

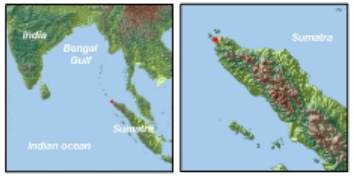
Tsunami, Indonesia

Banda Aceh, West area

Indonesia - Sumatra
Banda Aceh - West area

Post-disaster map

30 December 2004



Forest	City
Agriculture/ grassland	Ocean
Clouds	Affected area

0 0,5 1
Km

N

Disaster type : Tsunami
Disaster date : 26 December 2004

Data source : SPOT 5 colour (2,5 m)
Acquisition date : 30 December 2004

Datum : WGS 84
Projection : UTM 46

Scale : 1/30 000 for A3 prints

Map created 04 January 2005 by SERTIT.

sertit@sertit.u-strasbg.fr
http://sertit.u-strasbg.fr/

Tsunami, Indonesia

Banda Aceh, City center

Indonesia - Sumatra
Banda Aceh
City center
Post-disaster map

30 December 2004

Forest
City
Agriculture/ grassland
Ocean
Clouds
Affected area

0 0,5 1
Km
N

Disaster type : Tsunami
Disaster date : 26 December 2004

Data source : SPOT 5 colour (2,5 m)
Acquisition date : 30 December 2004

Datum : WGS 84
Projection : UTM 46

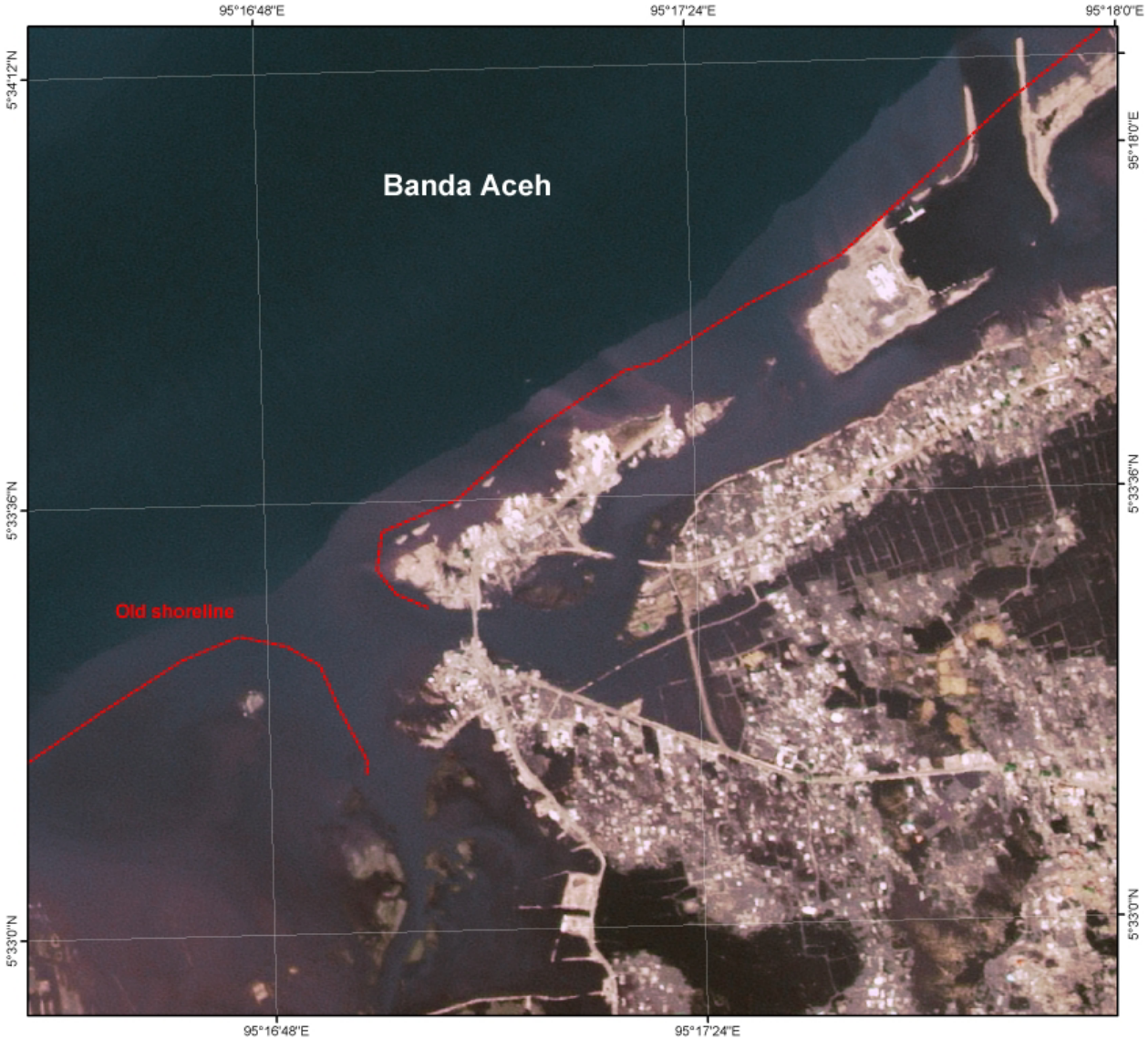
Scale : 1/30 000 for A3 prints

Map created 04 January 2005 by SERTIT.

sertit@sertit.u-strasbg.fr
http://sertit.u-strasbg.fr/

Tsunami, Indonesia

Banda Aceh, West coast area



Indonesia - Sumatra
Banda Aceh
West coast area
Post-disaster map

30 December 2004

Ocean

Affected area

0 250 500
Meters

N

Disaster type : Tsunami
Disaster date : 26 December 2004

Data source : SPOT 5 colour (2,5 m)
Acquisition date : 30 December 2004

Datum : WGS 84
Projection : UTM 46

Scale : 1/10 000 for A3 prints

Map created 04 January 2005 by SERTIT.

sertit@sertit.u-strasbg.fr
http://sertit.u-strasbg.fr/

Tsunami, Sri Lanka

Banda Aceh

Quickbird, December 28, 2004

Quickbird, June 23, 2004

Volcanic Eruption, Comoros

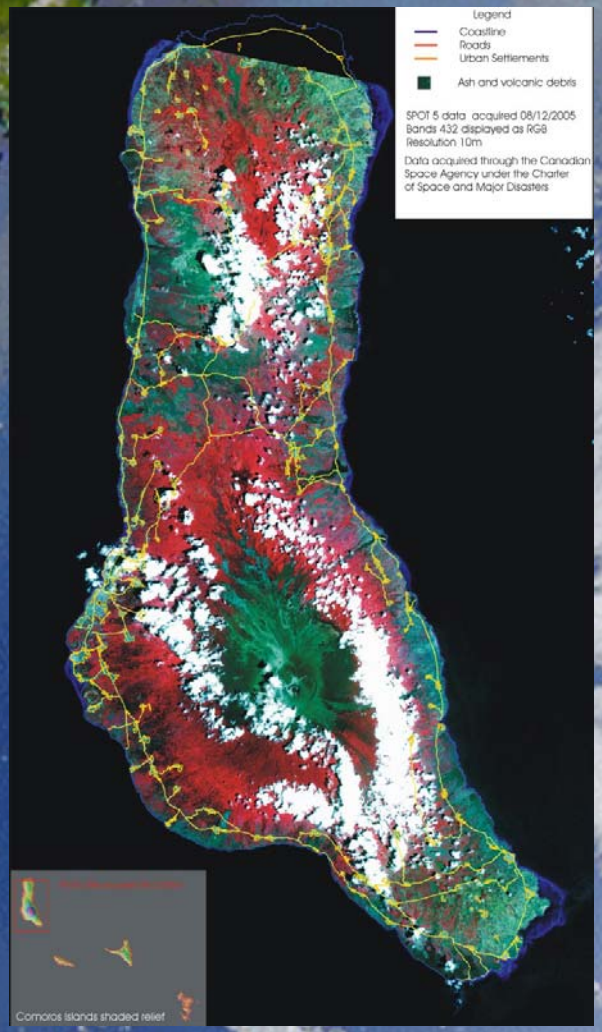
Activation information

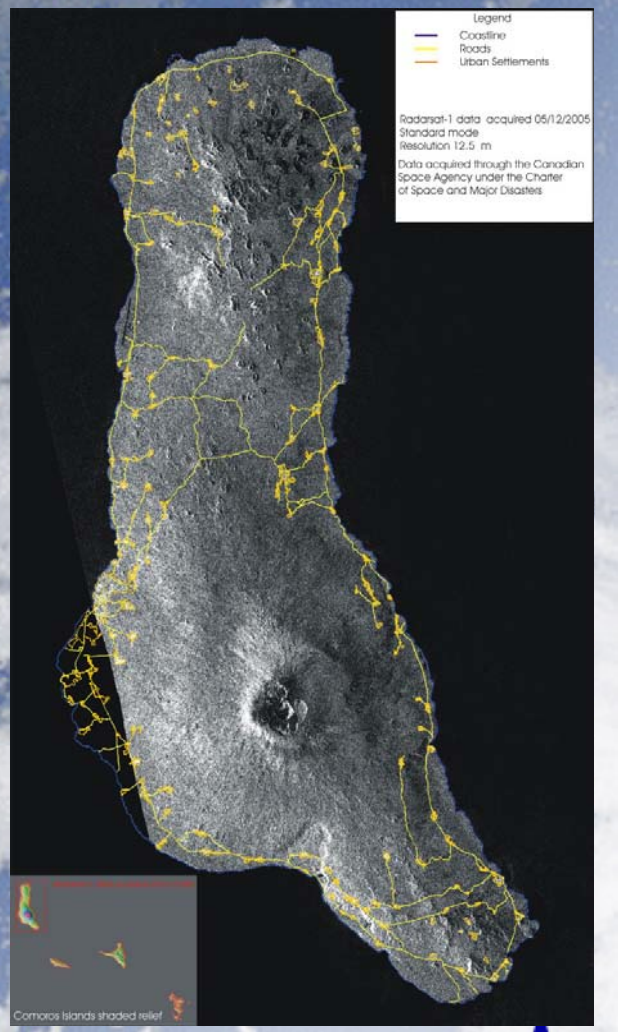
Activation 91

- Authorized User: **UNOOSA**
- Date of activation: **December 1, 2005**
- Emergency On-Call Officer of that week: **ESA**
- Project Manager: **CSA**
- Value-Added Reseller: **Dendron Resource Surveys**
- End User: **UNDP, UNOCHA, French Red Cross**

- Data Used: **IRS-1D**: 2 archive, 2 new
  IRS-1C: 1 new
  IRS-P6: 4 archive, 12 new
  IRS-P4: 1 new
  ENVISAT: 2 new
  RADARSAT-1: 4 archive, 4 new
  SPOT-5: 3 new

Volcanic Eruption, Comoros





Left to right: SPOT-4, July 13, 2004; SPOT-5, December 8, 2005; RADARSAT-1, December 5, 2005

Hurricane Katrina, USA

Activation information

Activation 83[1],85[2] & 86[3]

- Authorized User: **USGS[1], USGS[2], DDSC/COGIC[3]**
- Date of activation: **August 26[1], August 31[2], September 2[3], 2005**
- Emergency On-Call Officer of that week: **CSA[1], ISRO[2&3]**
- Project Manager: **USGS[1&2], CNES[3]**
- Value-Added Reseller: **SERTIT[3]**

- End User: **State of Florida-Division of Emergency Management[1]**
  Federal Emergency Management Agency[2]
  DDSC/COGIC[3]
- Data Used: **DMC**: 2 new
  Enivsat: 5 archive, 7 new
  ERA: 2 new
  IRA: 5 new
  Landsat: 22 archive, 53 new
  Nigeriasat: 1 new
  RADARSAT-1: 7 archive, 8 new
  SPOT: 16 archive, 51 new

Hurricane Katrina, USA

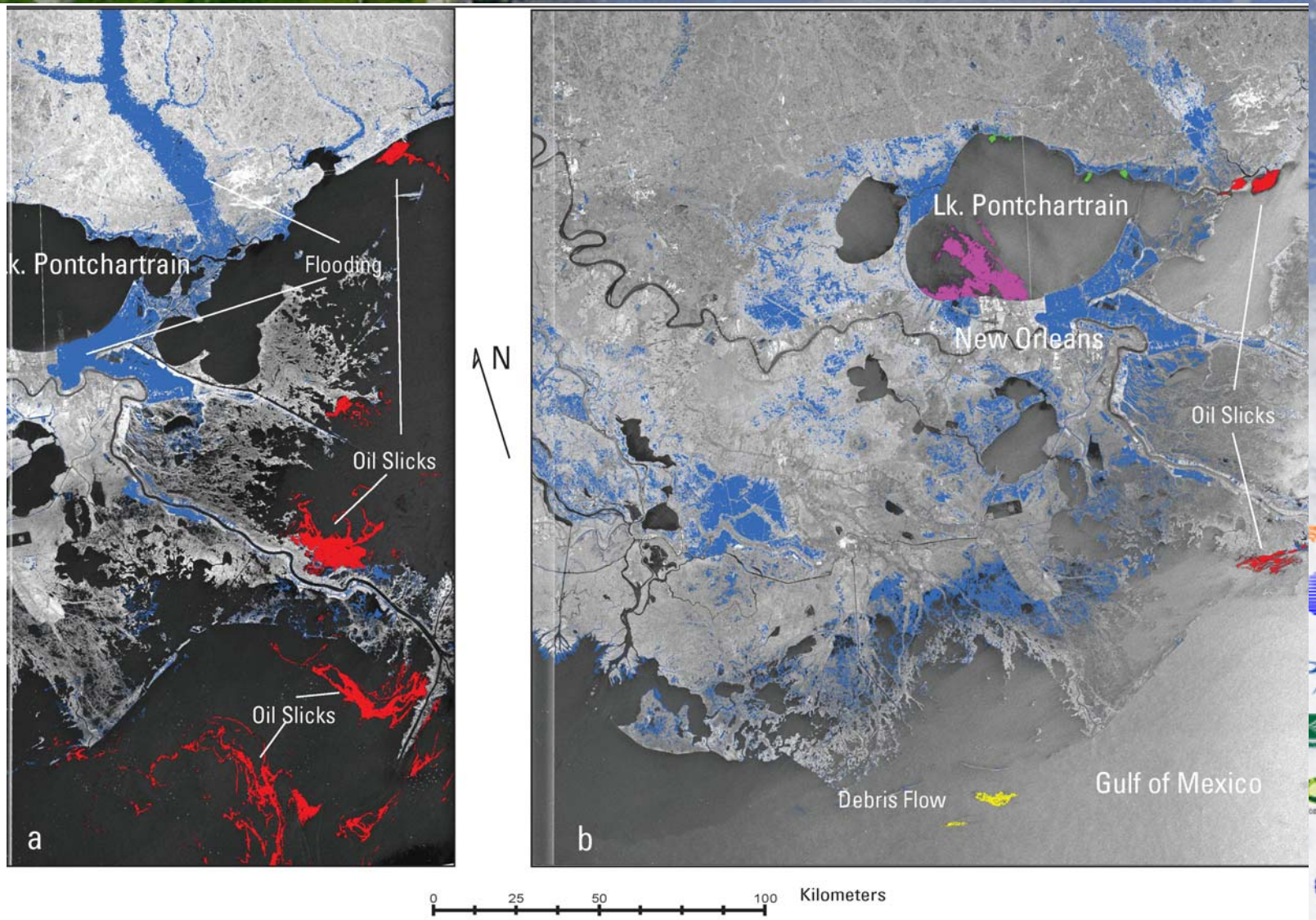
Damage assessment with RADARSAT-1

Reference Image
RADARSAT-1
June 14, 2001

Crisis Image
RADARSAT-1
September 09, 2005

Hurricane Katrina, USA

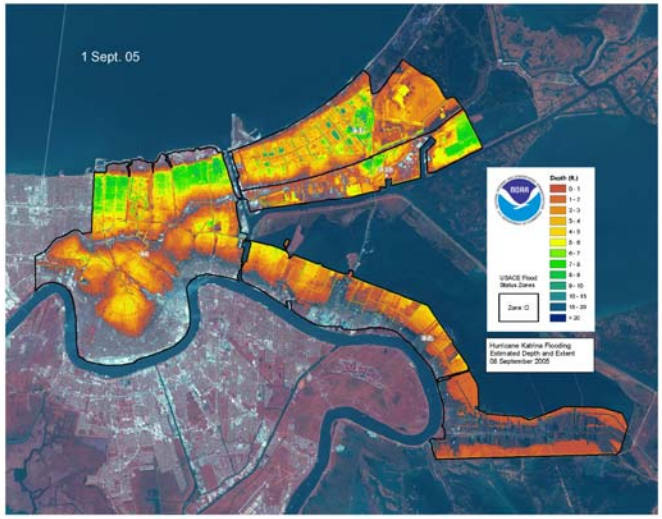
Damage assessment with RADARSAT-1

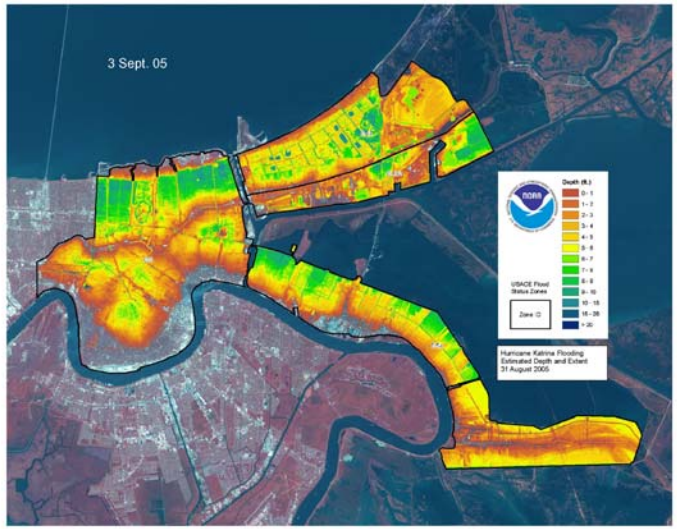


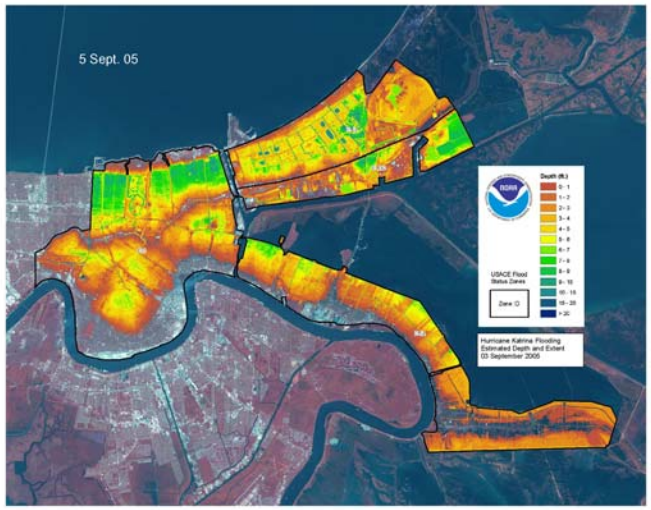
Hurricane Katrina, USA

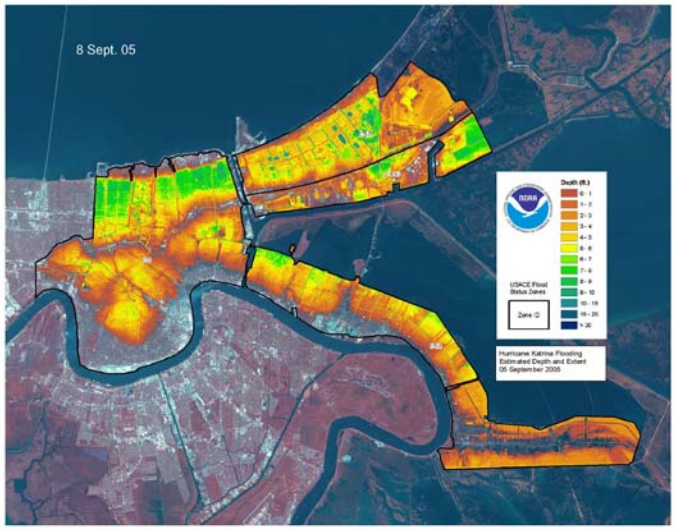
Water depths with RADARSAT-1

New Orleans Flood Depths









Hurricane Nargis

Activation information

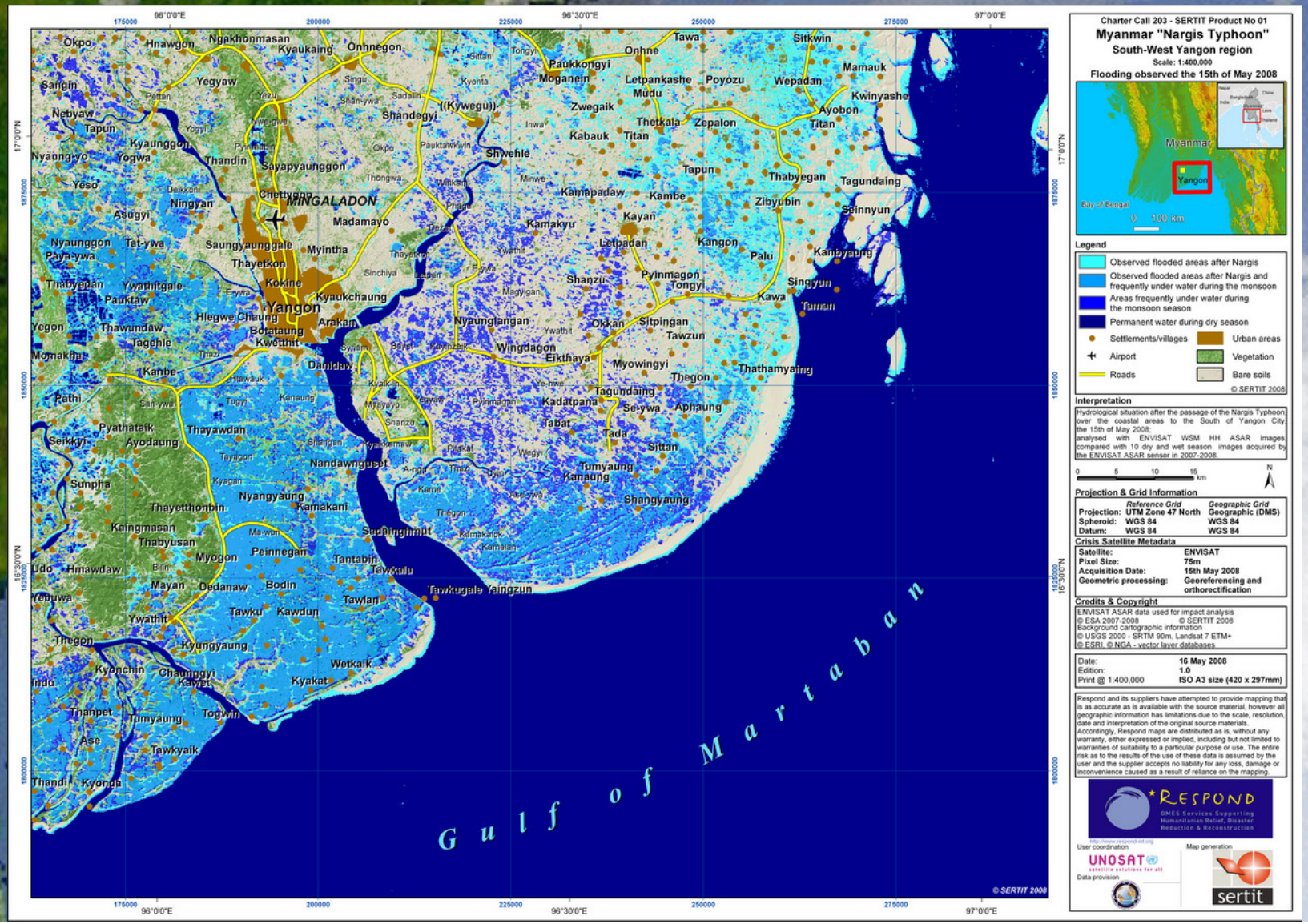
Activation 174

- Authorized User: **OCHA**
- Date of activation: **May 3, 2008**
- Emergency On-Call Officer of that week: **CNSA**
- Project Manager: **UNOSAT**
- Value-Added Reseller: **UNOSAT**
- End User: **UN OCHA**

- Data Used:
  - **ASAR**: 7 archive, 7 new
  - **MERIS**: 1 archive, 1 new
  - **DMC**: 2 archive, 5 new
  - **Landsat**: 11 archive, 1 new
  - **Alos**: 2 archive, 2 new
  - **Radarsat**: 3 archive, 2 new
  - **CNSA**: 3 archive
  - **SPOT**: 1 Archive, 6 new
  - **Formosat**: 2 Archive, 2 new

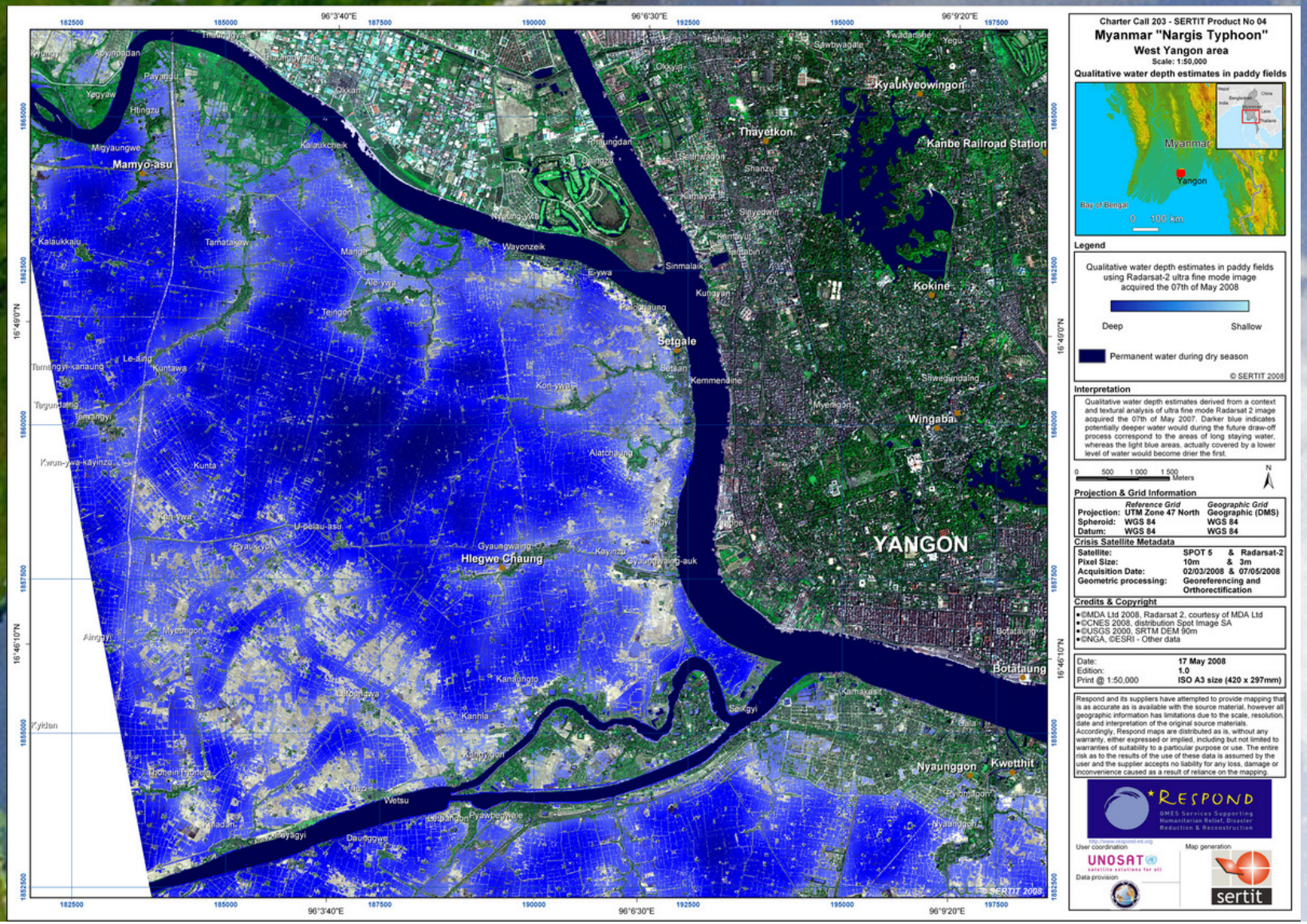
Hurricane Nargis

Myanmar - damage assessment with ENVISAT



Hurricane Nargis

Myanmar - damage assessment with SPOT-5 & RADARSAT-2



Conclusions

- The PM selection has so far been restricted generally to Charter member-agency nominations, or from the UN OOSA-affiliated bodies.
- As the Charter operations evolve, PM from the disaster affected country with in-depth knowledge of the region and close interaction with the end-user may be encouraged.
- A country furnishing PM services gets associated with the Charter as the PM obtains direct access to the Charter operations.
- Regional networks of PMs functioning under the lead of the PMs of the member states may therefore be foreseen.
- Information sessions, workshops, training opportunities may be organized to maintain the regional networks.

Non-disclosure

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