



A Contribution to Global Monitoring: The operations of the International Charter "Space and Major Disasters"

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What is the Charter?

The Charter is an **International agreement** among Space Agencies **implemented in 2000** to support relief efforts in the event of emergencies caused by major disasters (natural/man-made).

- a **virtual constellation of satellites**, coordinated to ensure immediate access to EO data to support disaster-response (with maps) to organisations dealing with major disasters
- only focusing on the **immediate disaster-response** not the other parts of the 'disaster management cycle' (prevention, reconstruction, etc)

The Charter is a simple mechanism with two key functions:

- to **task relevant satellites** in response to an emergency
(Fast data turn-around – priority acquisition – archive retrieval)
- to supply **EO data at no cost** to users* - no exchange of funds

** Each Member Agency commits resources to support the provisions of the Charter and thus is helping to mitigate the effects of disasters on human life and property*



Background and Membership

- UNISPACE III Conference, Vienna, July 1999
- European and French space agencies (**ESA, CNES**) initiated the International Charter for "Space and Major Disasters"
- Canadian Space Agency (**CSA**) joined Oct. 2000
- Other Space Agencies joined:
 - **2001 National Oceanic and Atmospheric Administration (NOAA)**
 - **2001 Indian Space Research Organization (ISRO)**
 - **2003 Argentinean Space Agency (CONAE)**
 - **2005 Japan Aerospace Exploration Agency (JAXA)**
 - **2005 US Geological Survey (USGS)**
 - **2005 British National Space Centre BNSC/DMCii (including Algeria, Nigeria, Turkey Space Centres)**
 - **2007 China National Space Administration (CNSA)**
- More Space Agencies are expected to join in 2010/2011



The Charter scope: the immediate response time

THE DISASTER RISK MANAGEMENT CYCLE



DISASTER RISK MANAGEMENT CYCLE (DRMC) DIAGRAM

Definitions:

Mitigation/Prevention:

Activities which eliminate or reduce the chance of occurrence or the effects of a disaster.

Preparedness:

Planning on how to respond to disasters should they occur. This includes the provision of legislation, trained personnel and resources.

3 stages of DRMC

PRE-DISASTER

- Risk Assessment
- Mitigation/Prevention
- Preparedness

DISASTER RESPONSE

- Warning/Evacuation
- Saving People
- Providing Immediate Assistance
- Assessing Damage

POST-DISASTER

- Ongoing Assistance
- Restoration of Infrastructural Services
- Reconstruction (Resettlement /Relocation)
- Economic & Social Recovery
- Ongoing Development Activities
- Risk Assessment Mitigation/Prevention

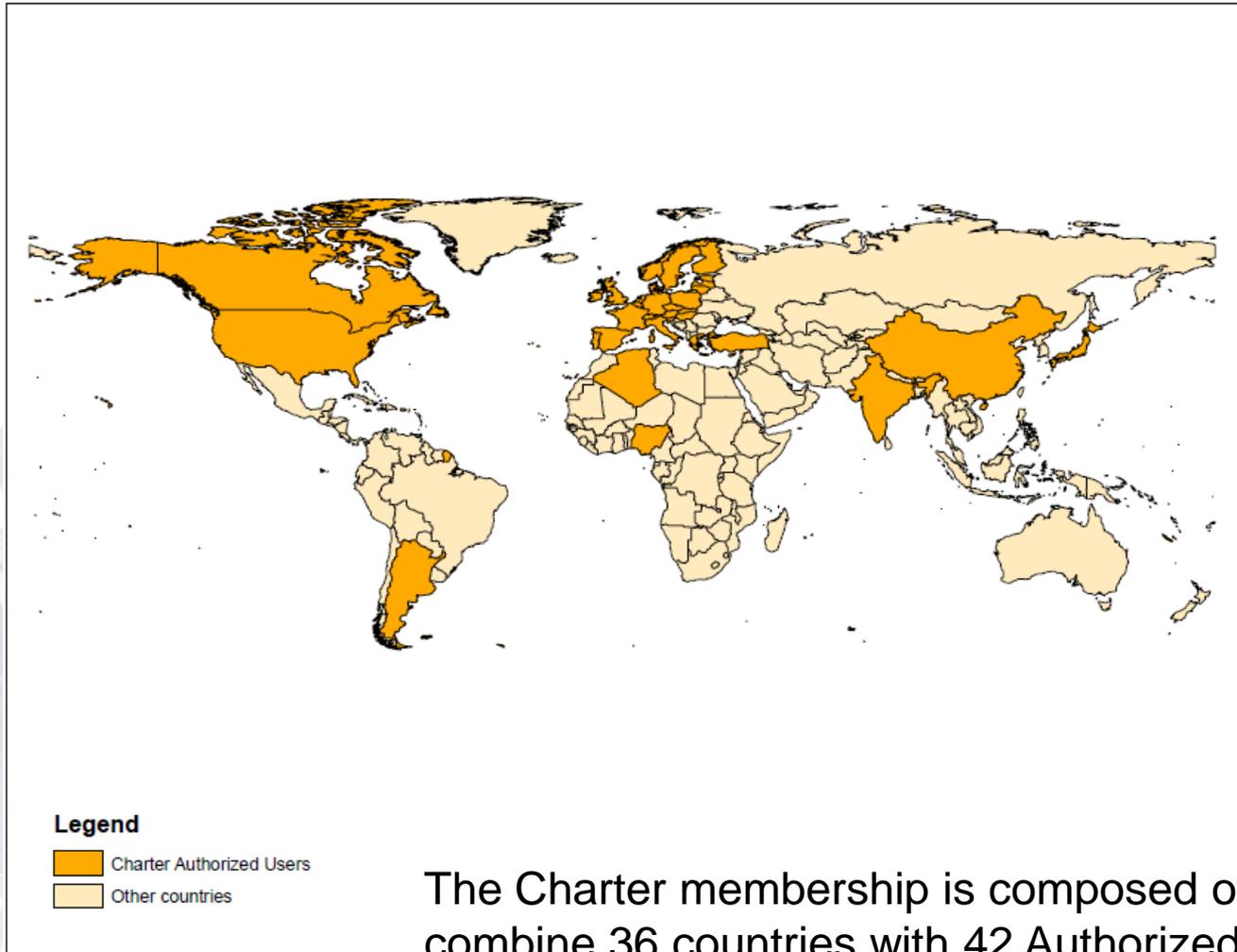


Who can benefit from Charter data?

- Authorities and bodies concerned in a country affected by a disaster (beneficiary bodies)
- They can request space resources via a civil protection, rescue, defence or security body from the country of a Charter member. Those eligible to become members of the Charter include space agencies and national or international space system operators.



Worldwide Distribution of Authorized Users



The Charter membership is composed of organisations that combine 36 countries with 42 Authorized Users

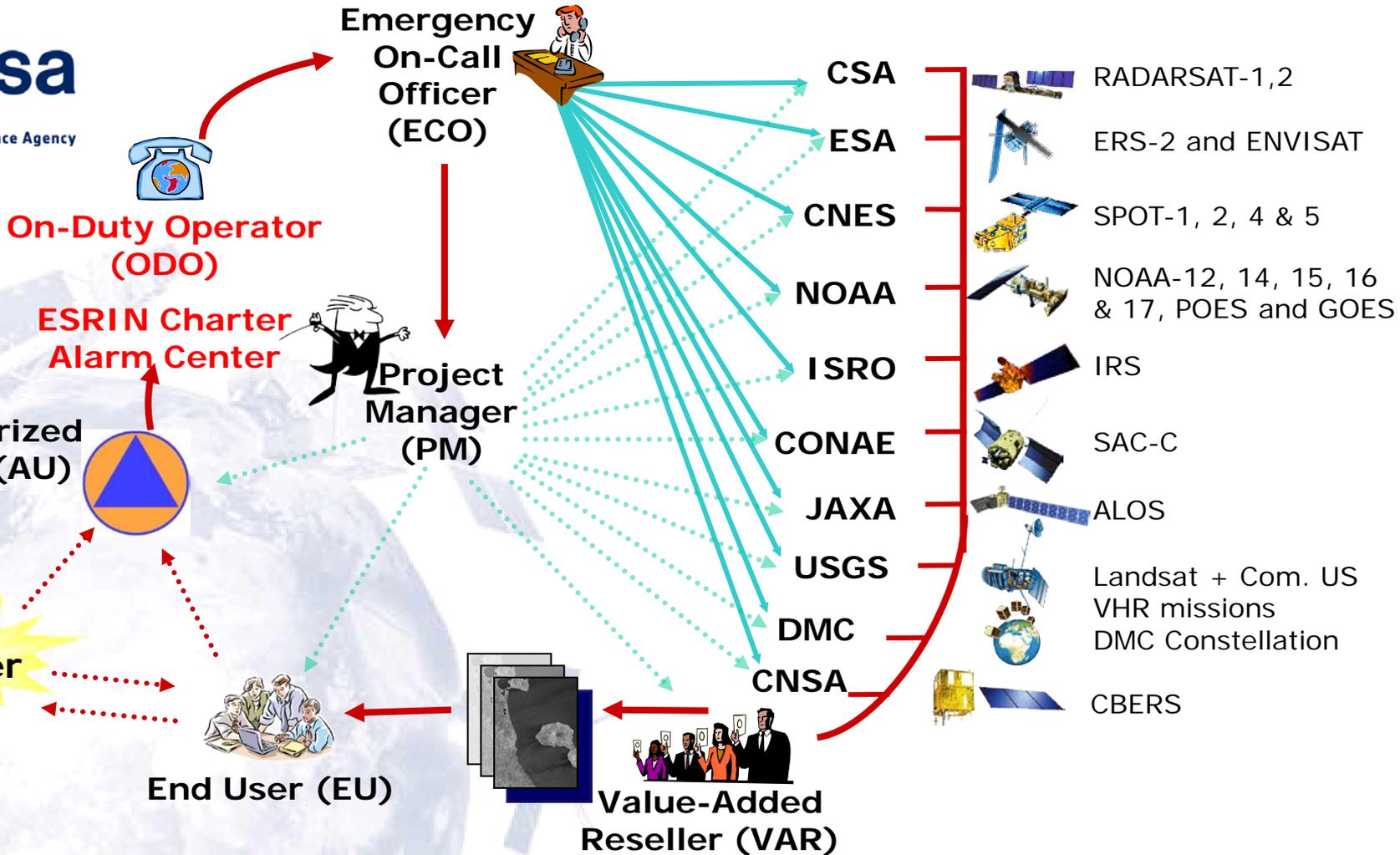


The Operational Loop and the Timeliness of the Response Service



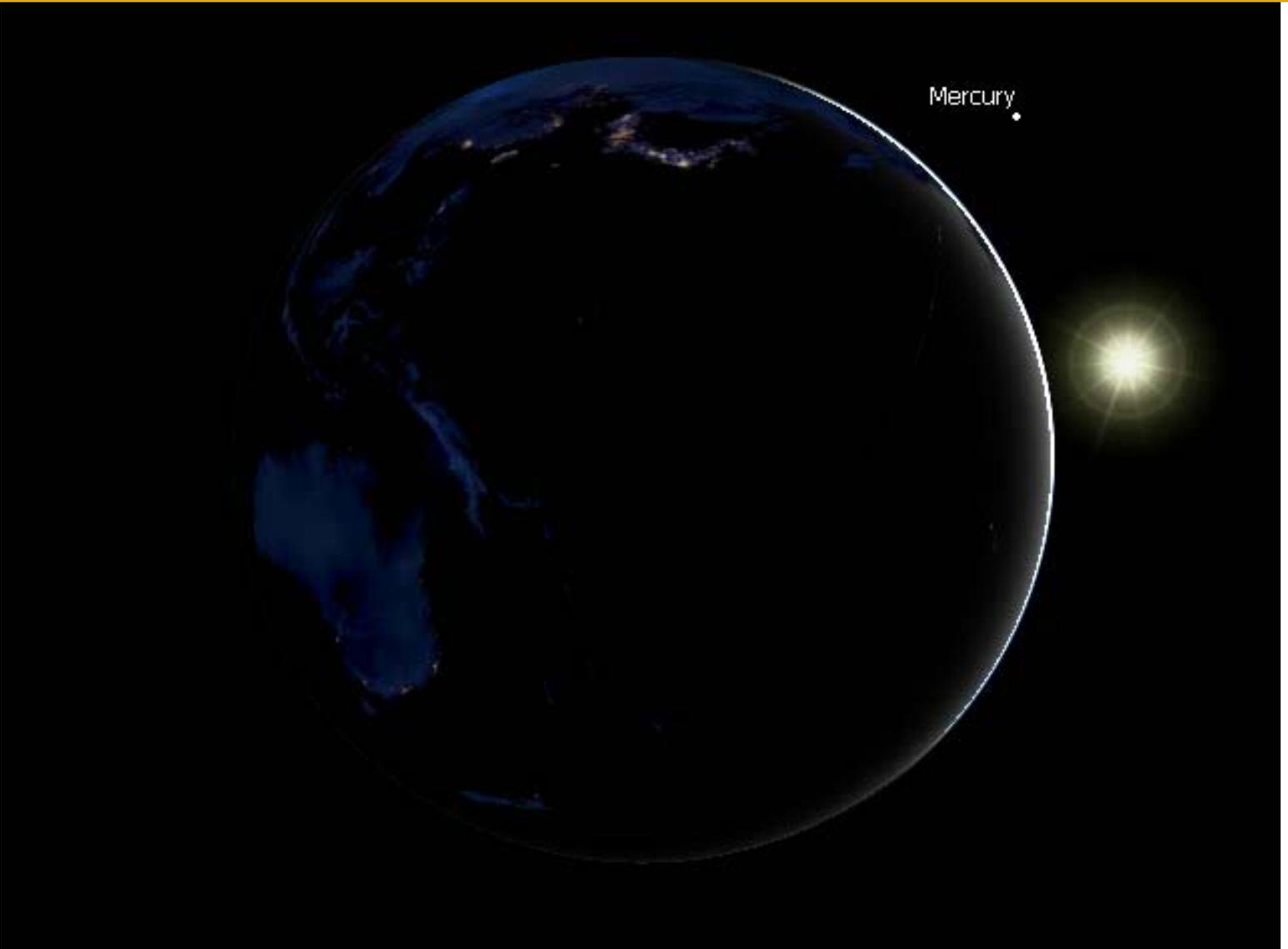


International Charter "Space and Major Disasters": Operational Loop





The Synergy of International Operations: The Charter Space Resources >31 Satellites





Steps in time with Mapping Events: the operational loop

Catastrophe



Satellite Resources



Crisis Management



Authorized User (AU)



The Charter

Event
→
Charter
Triggering



Satellite Tasking

Image
Capture

Down-linking



Pre-processing

Data Transfer



Value-Added Reseller (VAR)

Map
Production

Information
Broadcasting

Mobilisation 1

Acquisition 2

Raw Data 3

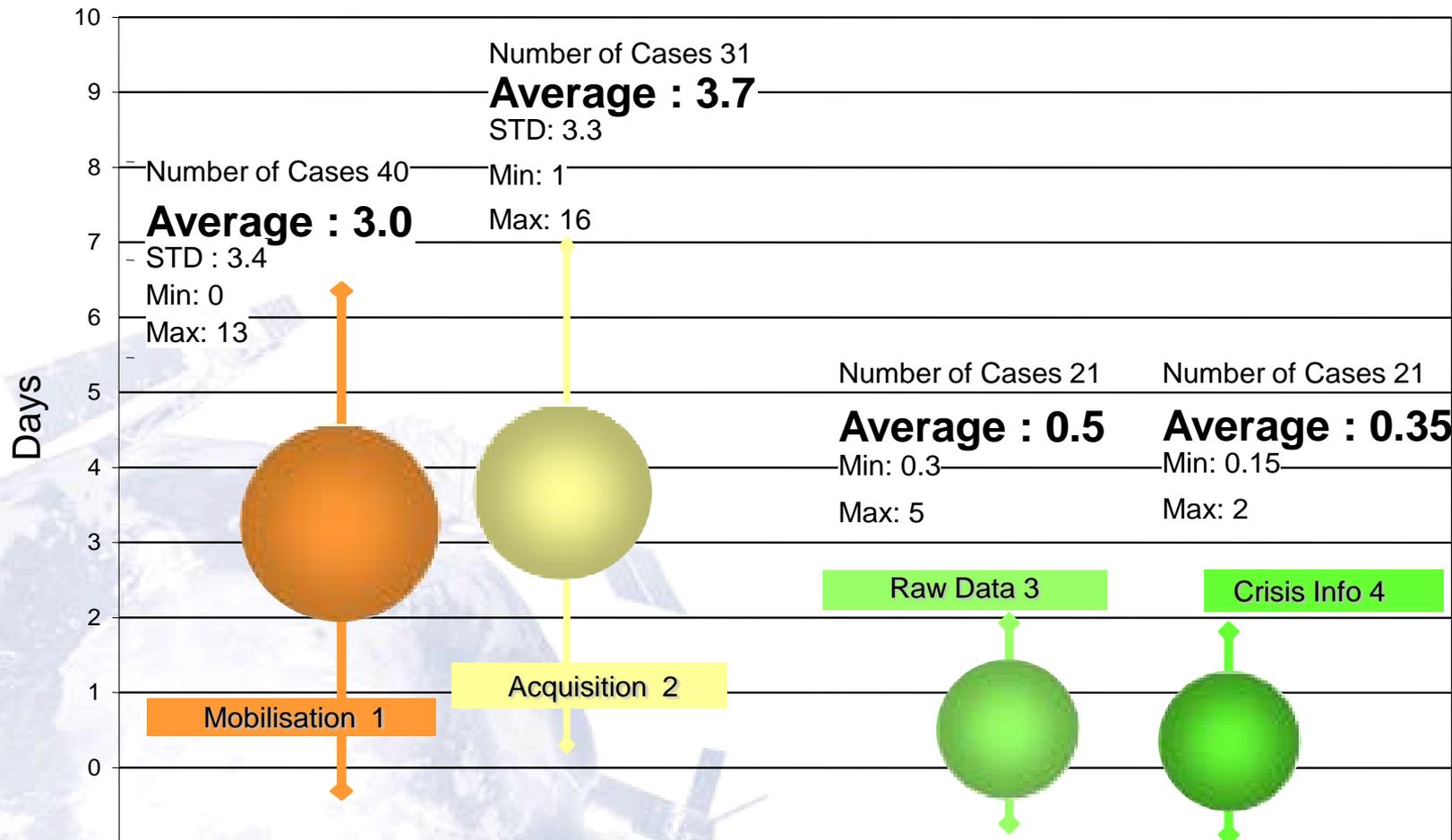
Crisis Info 4

Main focus is **TIMELINESS**



Chronogram Statistics: Results

Average Rapid Mapping Times Compilation from www.disasterscharter.org and Sertit's experience

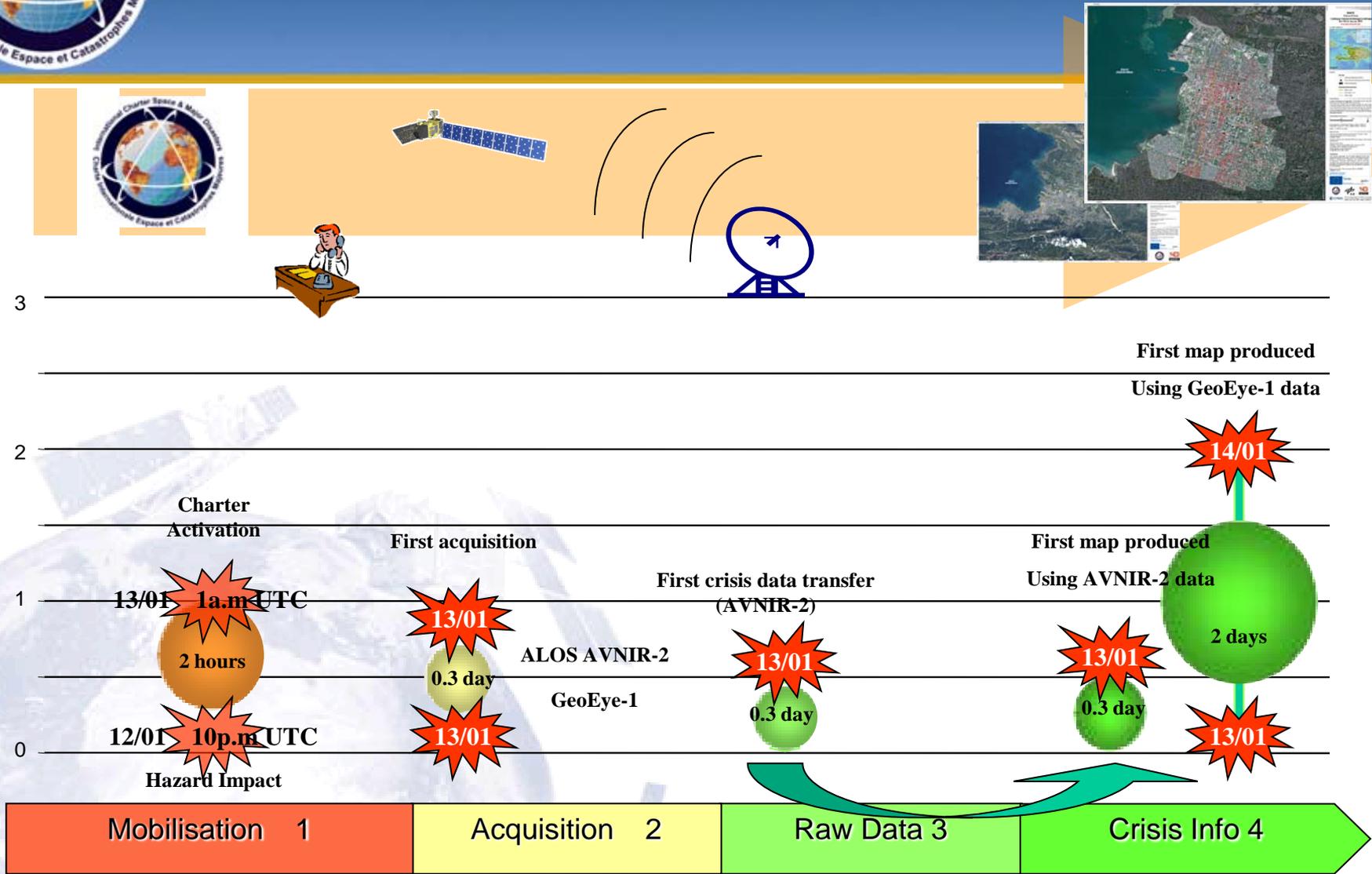


Method looks at first output for each element (not average). Typical events versus large events: impact on Acquisition time and on VA production time.



EXAMPLE: the Chronogram of event: Calls 287, 288, 289, 290 EQ in HAITI

Days





Some Examples of Value Added Images from Charter Partners





Climate Change Monitoring and Charter?

Address <http://www.disasterscharter.org/web/charter/map>



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Activation	Date	Description
Ocean Storm in Madagascar	19 March 2010	Tropical Storm Hubert hit the southeast coast of Madagascar island on Wednesday 10th March 2010. Officials say at least 36 people have died and more than 38,000 were made homeless. Many rice plantations, roads and homes have been affected or destroyed by flooding.
Hurricane over Wallis and Futuna	18 March 2010	Cyclone Tomas, category 4 cyclone, battered northern islands, damaging homes and crops. About 5,000 people have been evacuated.
Cyclone on Pacific	12 February	Pacific Islands have been hit by a Tropical Storm. Cyclone Pat (Category 2 on



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

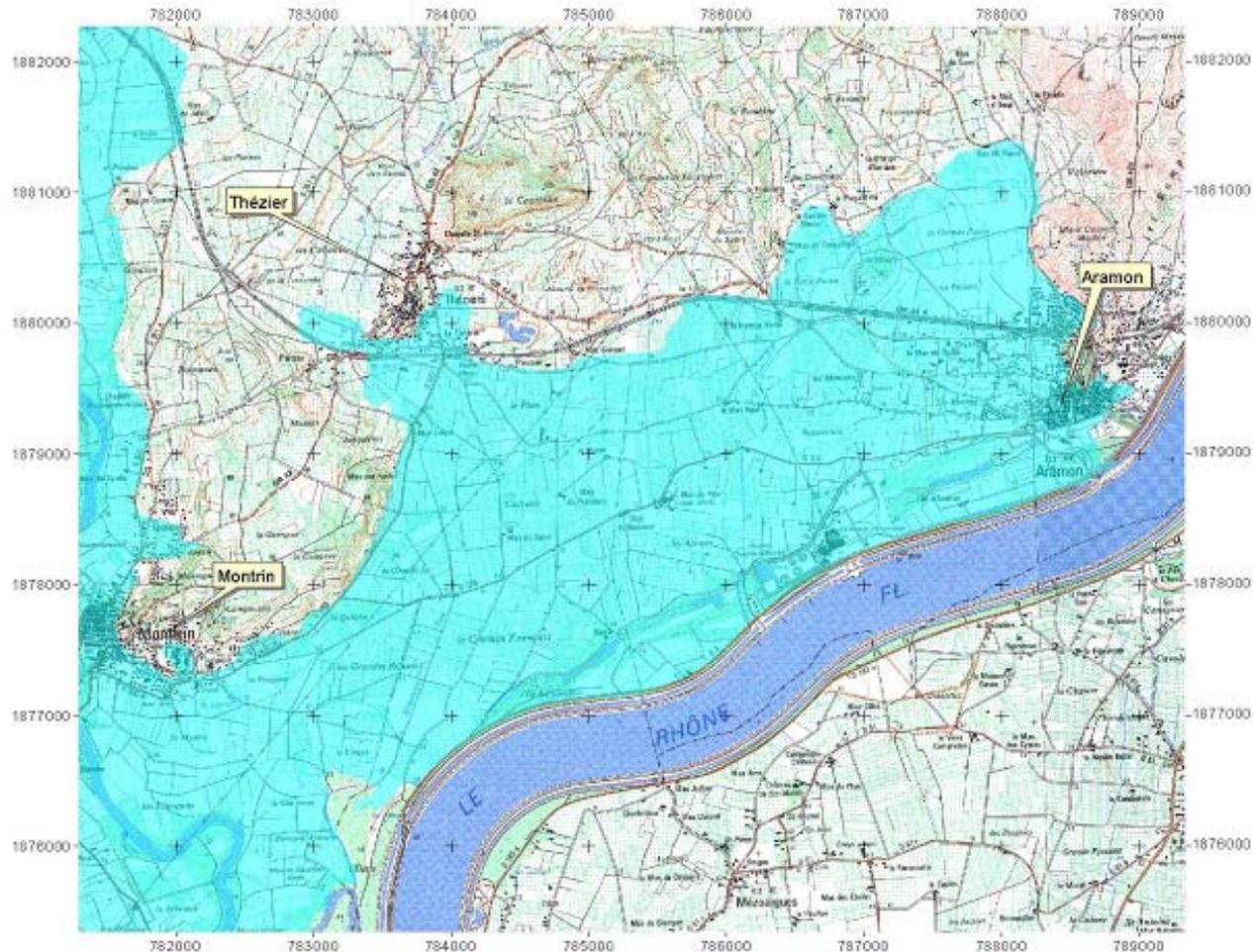
Produced using stamp of flooded area (in dark green) extracted from SPOT-4 data superimposed on accurate SPOT-5 image (2.5 m resolution)





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



0.5 0 0.5 1km

Projection Lambert II étendu

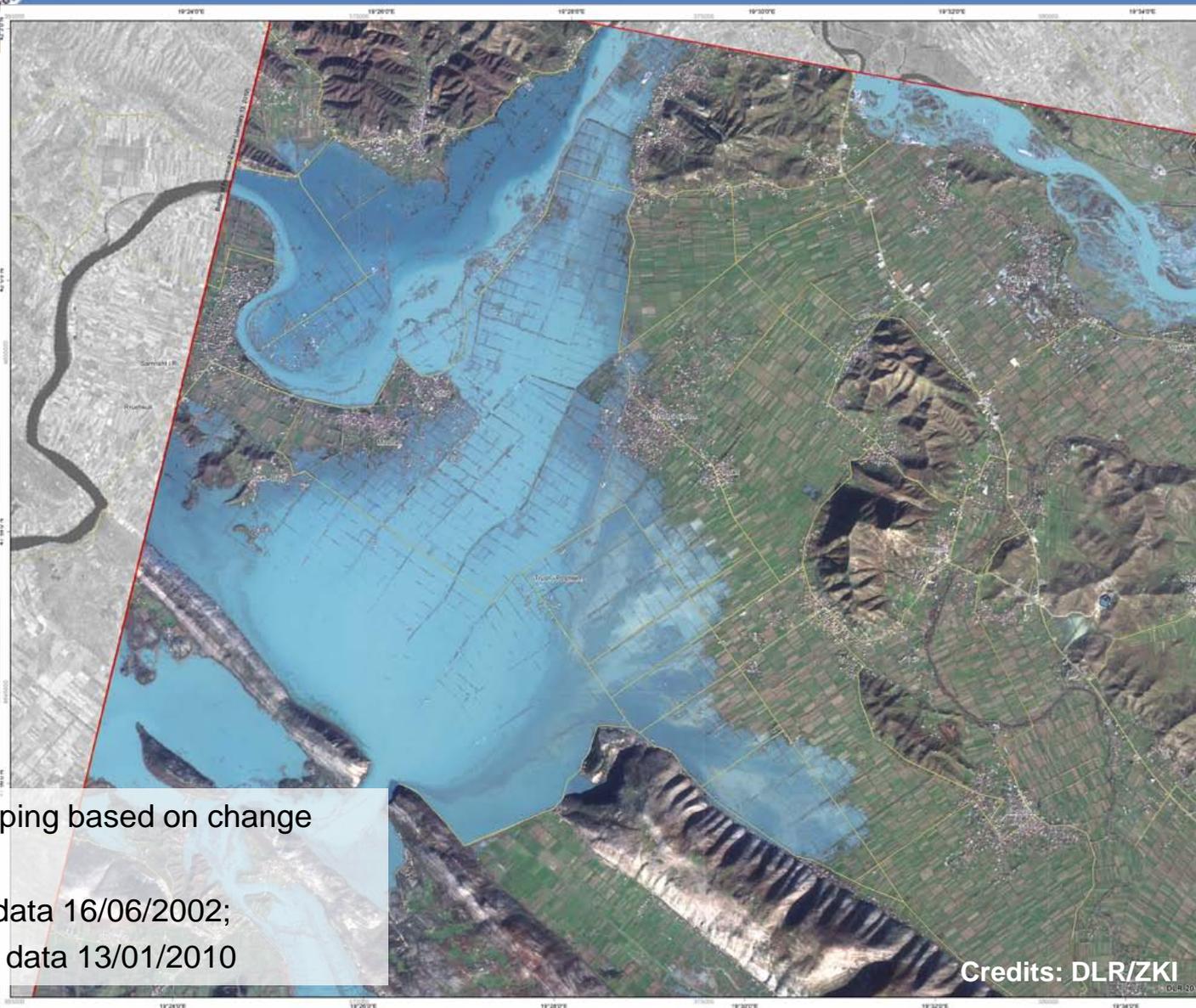
Source Imagerie SPOT

© CNES 2002
Distribution SPOT Image
Réalisation Sertit 2002



E0 capability and Charter products

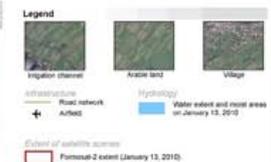
Flood mapping – Albania Charter activated on 07/01/2010



Charter Cell ID 28
Grid No. FL 3009 0230n ALI
Product 0307

ALBANIA - South of Shkoder - Sheet 1

Flood extent based on Formosat
Situation as of January 13, 2010
Scale 1:25,000



Interpretation

Heavy rainfall and unusually warm weather have caused flooding in the northwestern regions of Albania since January 4, 2010. The map shows the post-event water extents and most areas around Shkoder as detected on January 13, 2010. The analysis was based on a Formosat-2 scene. As a backdrop, a FORMOSAT-2 and a LANDSAT-7 image acquired on June 18, 2002 were used. Streets have been digitized on the basis of the FORMOSAT-2 image and do not represent the complete road network.

Cartographic information

0 500 1 000 1 500 2 000 2 500 meters

Local projection: UTM Zone 34 North, Datum: WGS 84
Geographic projection: Lat/Lon (GMS), Datum: WGS 84

Data Sources

FORMOSAT-2 © CNES 2010
LANDSAT-7 © USGS 2002
Vector data © OpenStreetMap 2010, Wikimedia 2010

Framework

The products elaborated for this Rapid Mapping Activity are realized 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 of the use thereof is assumed by the producer.

The ZGO crisis maps are constantly updated. Please make sure to visit <http://www.zki.dlr.de> for the latest version of this product.
Map produced on January 14, 2010 by ZKI
© DLR 2010



Center for Satellite Based Crisis Information
- Emergency Mapping & Disaster Monitoring -
a service of DLR

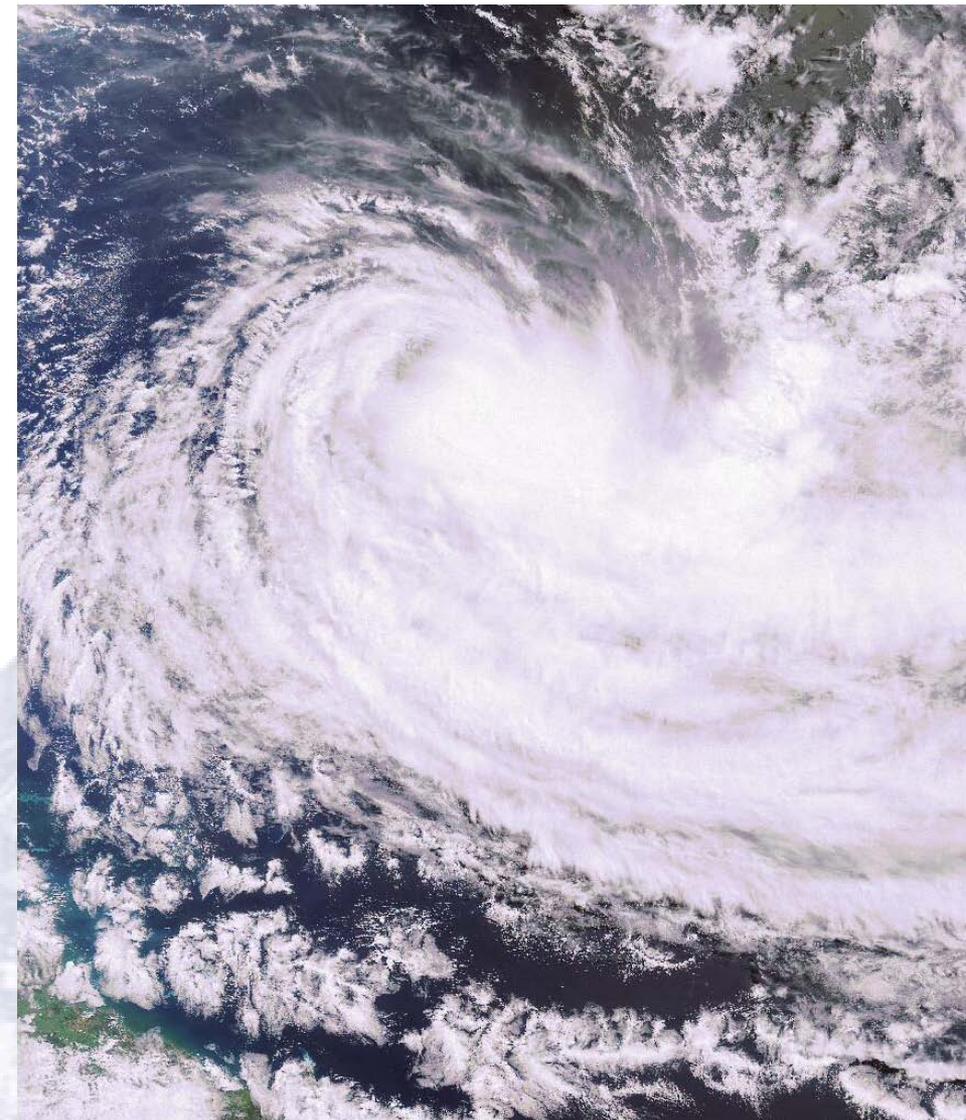
Flood mapping based on change detection:
pre-event data 16/06/2002;
post-event data 13/01/2010

Credits: DLR/ZKI



E0 capability and Charter products

Cyclone Tomas - observed on 18/03/2010



On Monday the 15th of March 2010, the Wallis and Futuna archipelago in Southern Pacific Ocean was hit by the category 4 Tomas hurricane. Winds reached an average speed of 175km/h. Damages observed are significant especially on Futuna Island. They concern both roads infrastructure and public or private buildings.

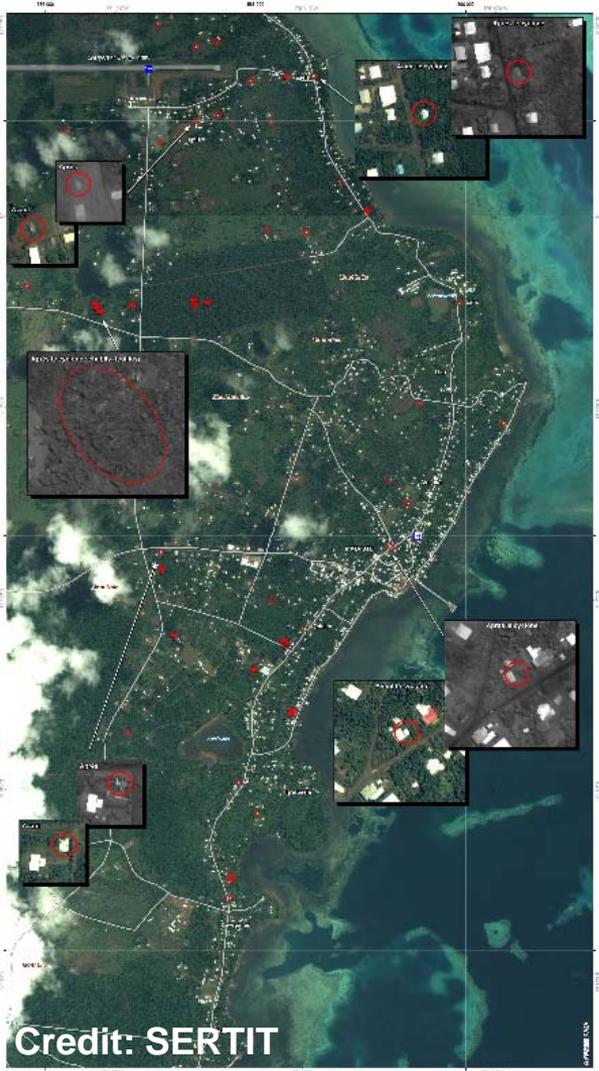
MERIS data 18/03/2010

Resolution 260 m



E0 capability and Charter products

Cyclone Tomas - Charter triggered on 18/03/2010



Location: Wallis and Futuna, Wallis island - sector east

Theme: Damage observed on buildings and vegetation after Tomas hurricane (15th of March 2010) derived from Worldview-1 image (0.5m) acquired the 28th of March 2010

Scale: 1 : 12 500

Background: QuickBird image (0,65m) acquired the 7th of March 2010

Credit: SERTIT





Where are the Charter Disasters?

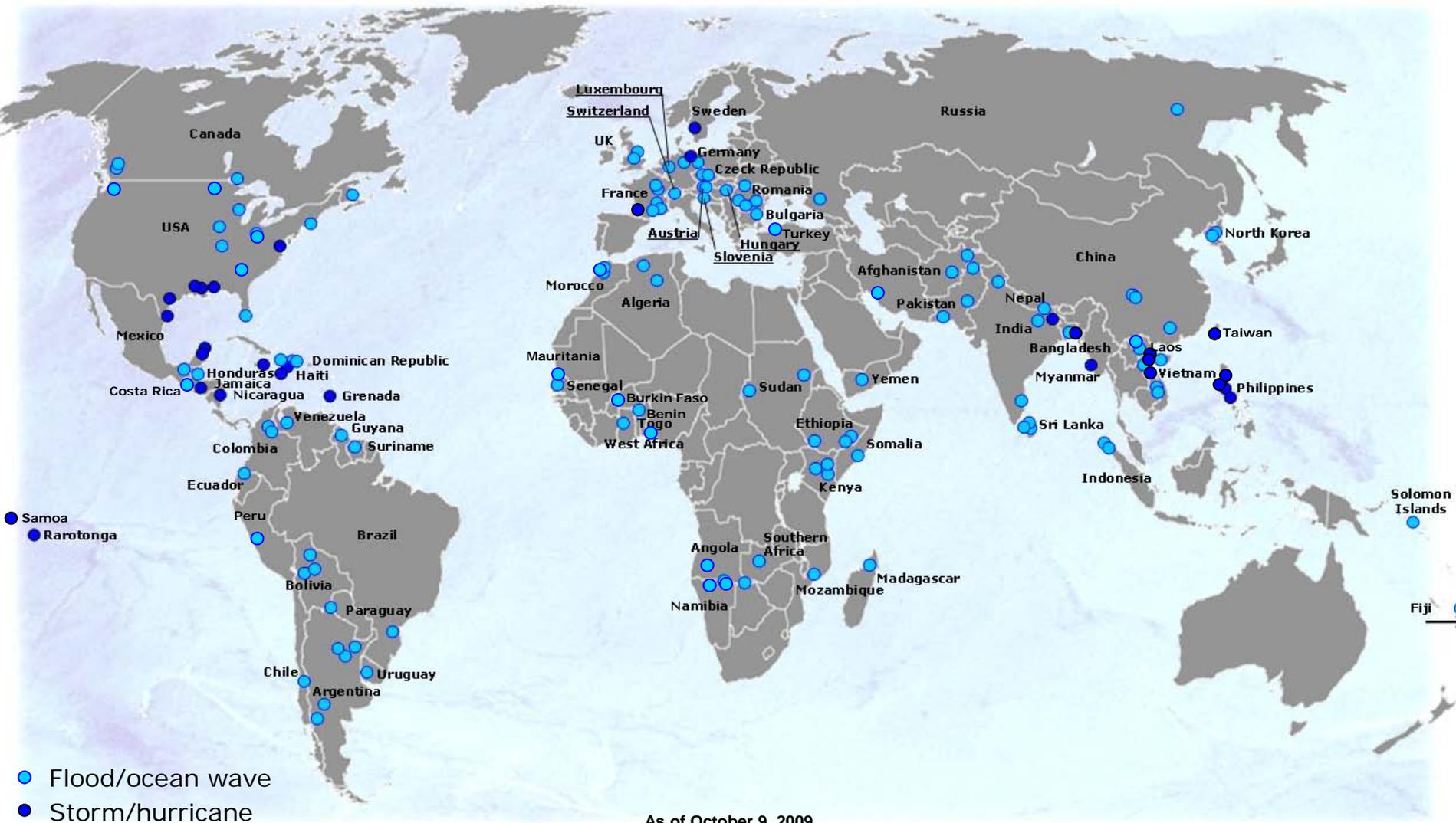
Who activates the Charter?

Which Disasters?



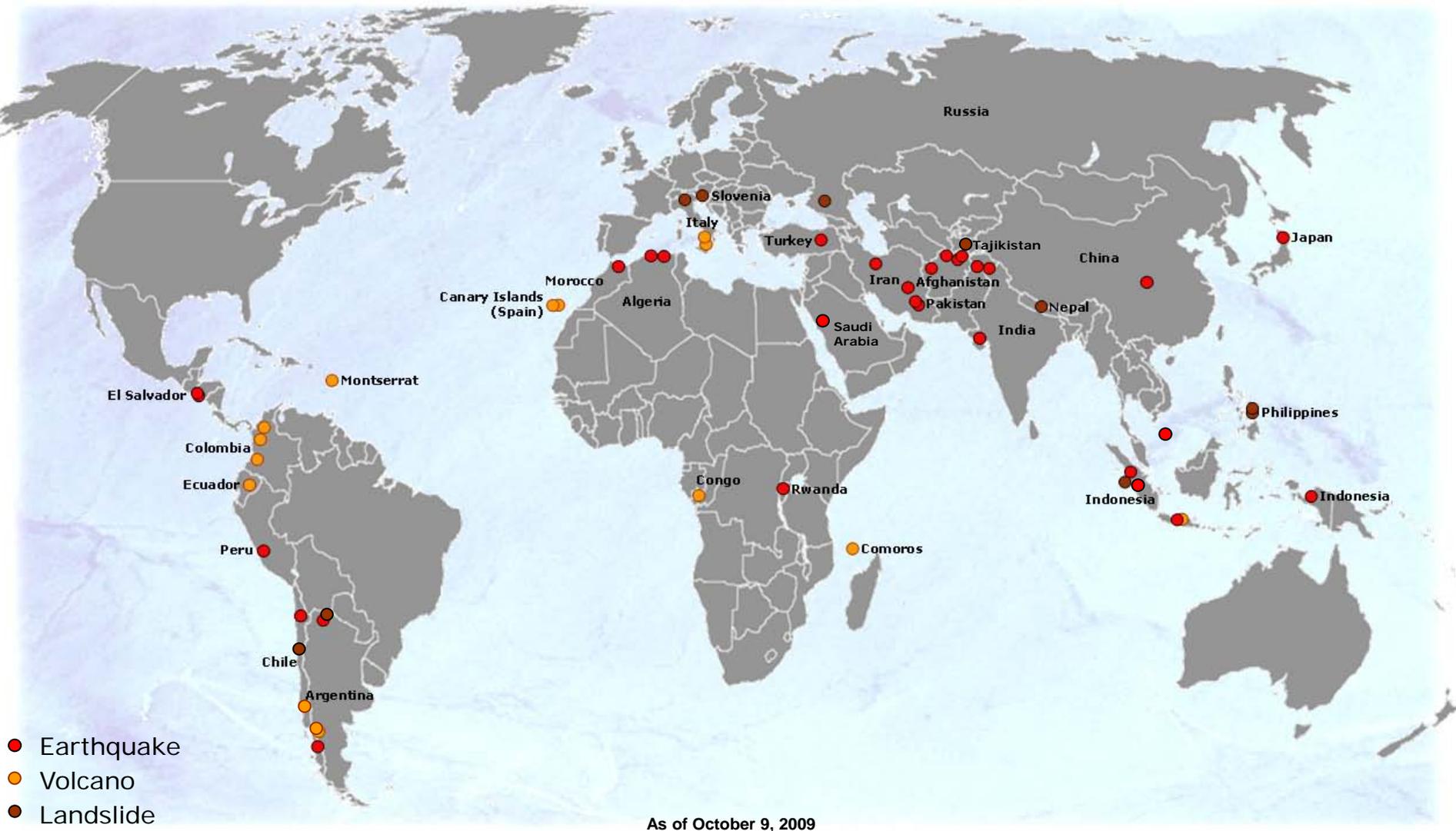
Activation Distribution

Floods and storms



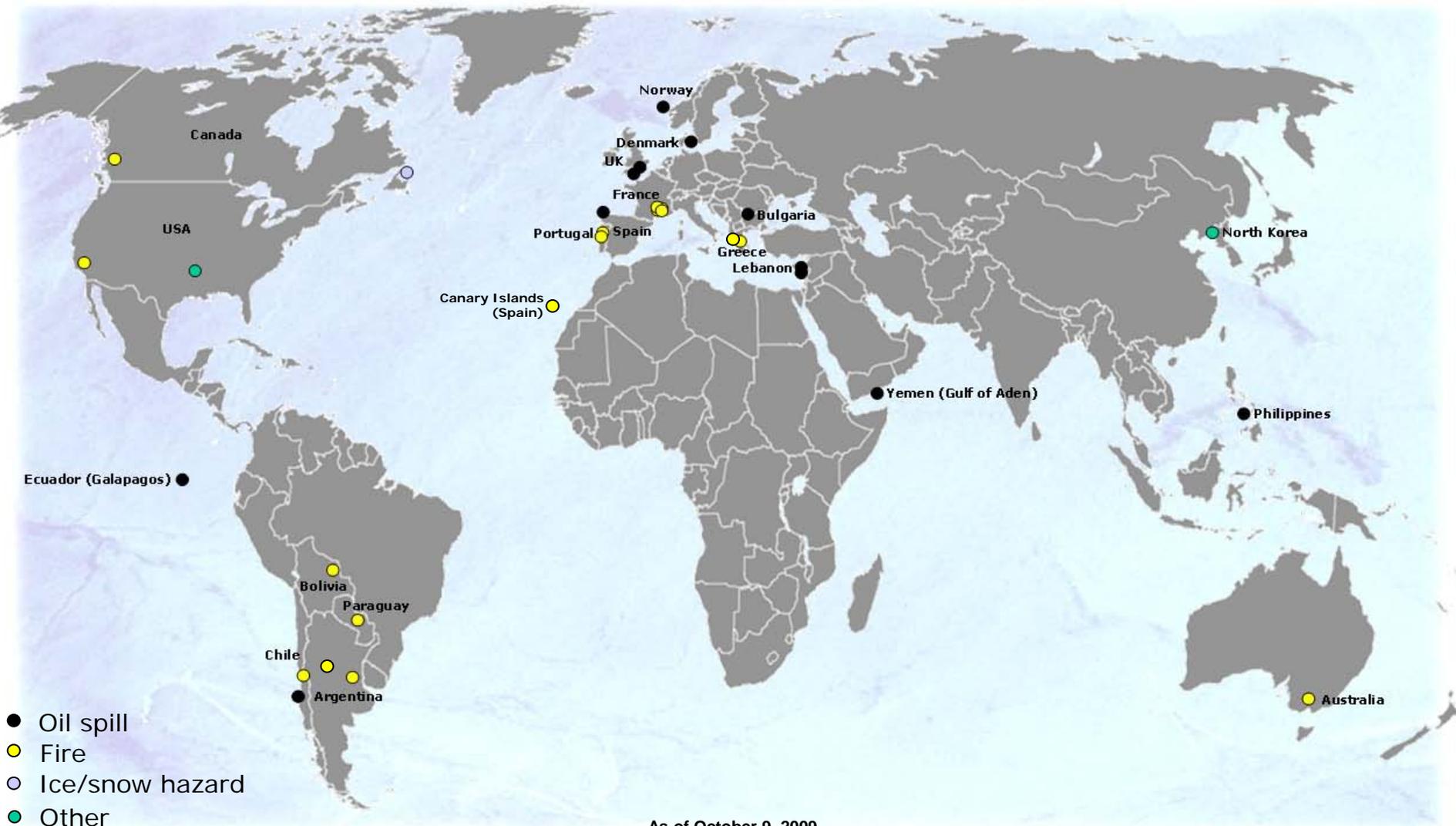
Activation Distribution

Earthquakes, volcanic eruptions and landslides



Activation Distribution

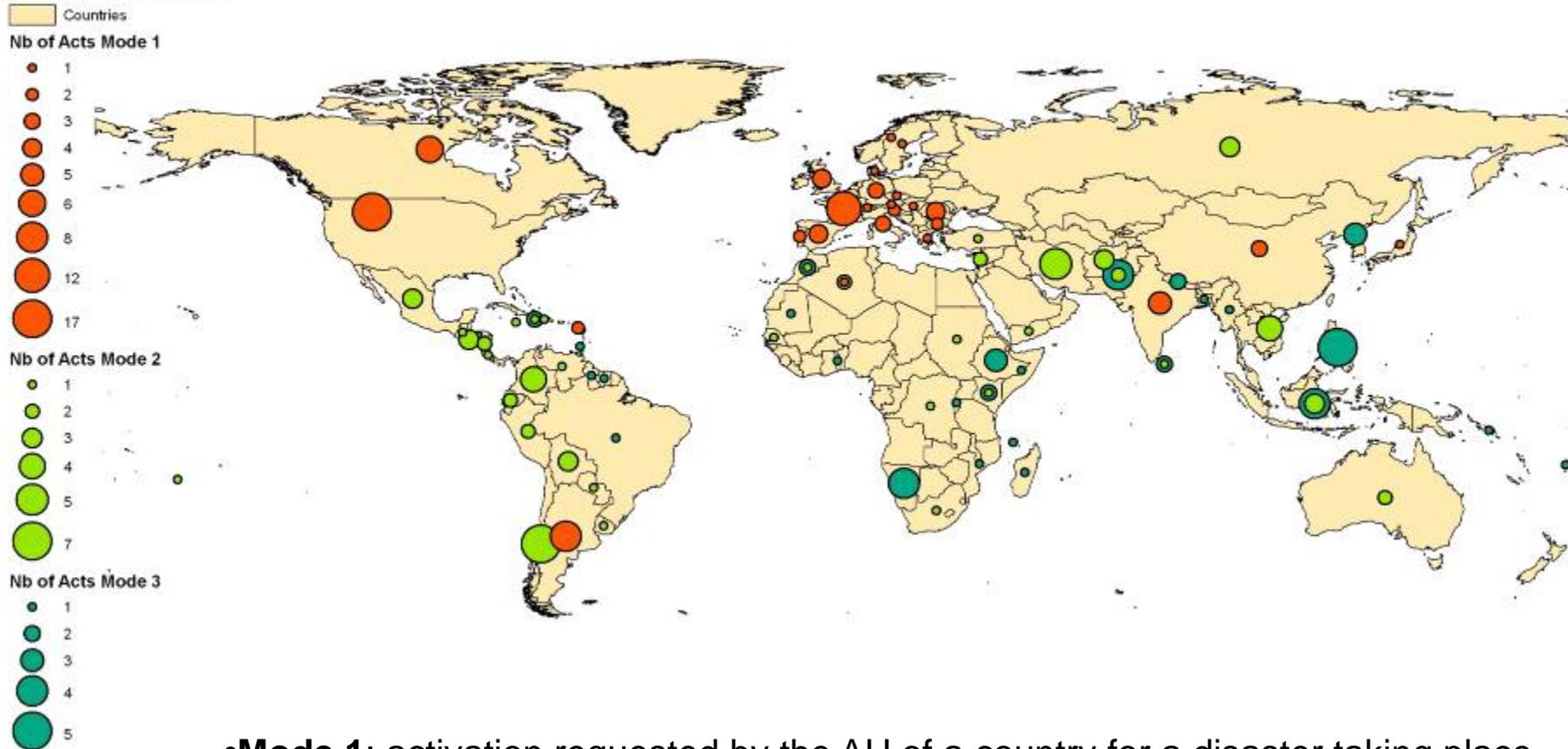
Oil spills, forest fires and other hazards



As of October 9, 2009

Worldwide distribution of activation modes (2000 – 2009)

All charter activations per mode



- **Mode 1:** activation requested by the AU of a country for a disaster taking place in the same country (in country activation)
- **Mode 2:** activation requested by the AU of a country for a disaster taking place in another country
- **Mode 3:** activation requested via the UN



Type & Number of Activations (status Sep 2009)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	Sept.2009	Sub-totals	
<i>Earthquake</i>	0	3	1	3	6	3	2	4	4	2	28	51
<i>Slides</i>	1	0	2	1	0	0	1	1	0	2	8	
<i>Volcano</i>	0	1	1	2	1	2	1	2	3	2	15	
<i>Wind Storm</i>	0	0	1	2	3	5	2	10	8	2	33	165
<i>Flood</i>	0	4	8	5	6	13	15	19	23	16	109	
<i>Ice Jam</i>	0	0	0	0	0	0	0	1	0	0	1	
<i>Wave/Surge</i>	0	0	0	0	3	0	0	1	0	0	4	
<i>Wild Fires</i>	0	0	0	5	1	2	0	4	2	4	18	
<i>Industrial Accident</i>	0	3	2	0	1	0	4	3	0	0	13	13
Total/year	1	11	15	18	21	25	25	45	40	28	229	

« There are two types of disasters: **flooding and others** »

Flood (plain flooding) is the most frequent Charter event



The Charter Web

<http://www.disasterscharter.org>

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The International Charter

The International Charter aims at providing a unified system of space data acquisition and delivery to those affected by natural or man-made disasters through Authorized Users. Each member agency has committed resources to support the provisions of the Charter and thus is helping to mitigate the effects of disasters on human life and property.

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Latest Charter Activation



Earthquake in China

Wednesday, April 14, 2010

A major earthquake of magnitude 7.1, struck the Yushu County on 13 April 2010. The earthquake caused damages to most of the nearby buildings, to the airport and to some of the hydropower stations.

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Recent Activations

- [Earthquake in China](#)
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- [Hurricane over Wallis and Futuna](#)
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- [Landslide in Uganda](#)
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