The International Charter 'Space and Major Disasters'

An international mechanism providing space-based information for disaster response

Jens Danzeglocke (representing DLR in the Charter's Executive Secretariat)

Overview

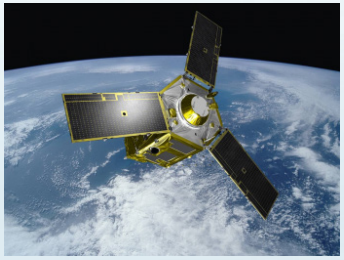
- What is the Charter?
- Mechanisms to activate the Charter & “Universal Access”
- Disaster type examples
  - Floods
  - Earthquakes
  - Tsunamis
  - Tropical Storms
  - Volcanoes
  - Wildfires
- Conclusions

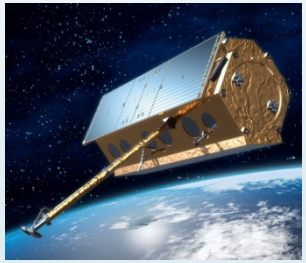
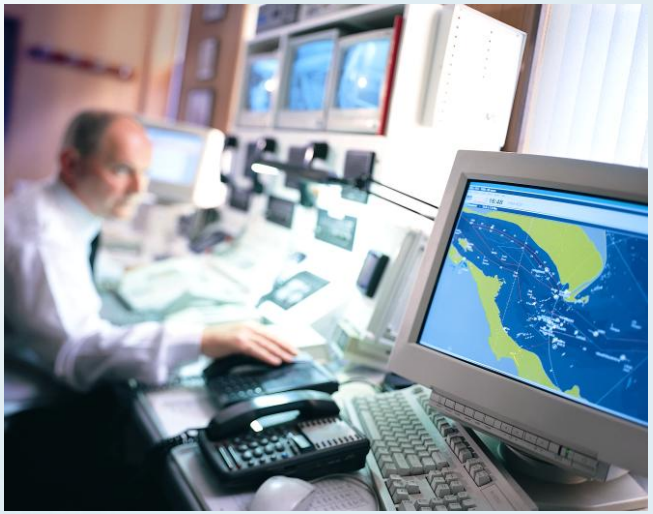
What is the Charter?

An International agreement among participating Agencies to provide space-based data and information in support of response efforts during emergencies caused by major disasters.

What is the Charter?

The Charter brings together efficient space-based technologies to support disaster management.



The Charter's capacities can be activated through a **single access point** which is available 24 hours, seven days a week.

Space agencies contribute

- **Priority satellite tasking**
- Archive Retrievals
- Organisation of map production

Disaster Types Supported

Natural events

- Earthquakes
- Fires
- Floods
- Ice jams
- Landslides
- Tsunamis
- Ocean storms
- Volcanic eruptions

Man-made events

- Oil spills
- Industrial accidents

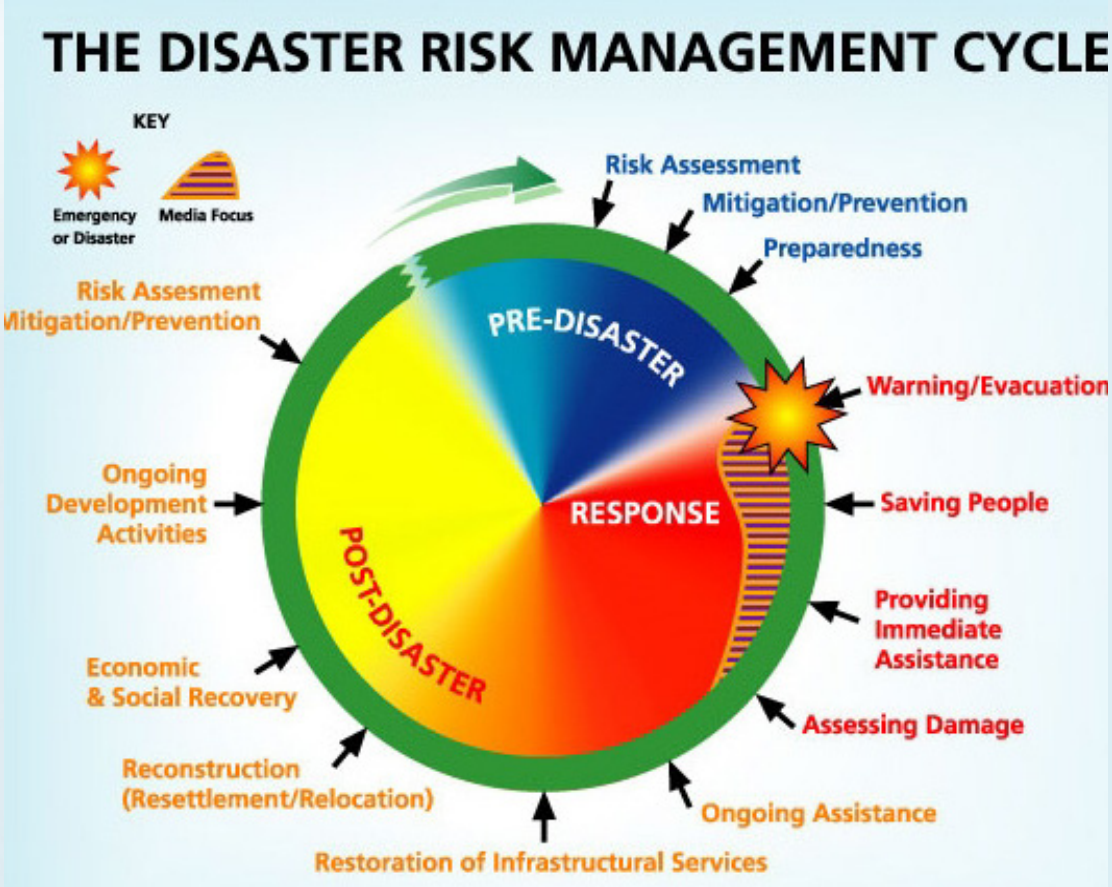
The Charter supports large, often sudden events with high impact in terms of lives, infrastructure, and/or environment.

(slow-onset disasters, such as droughts, are not covered by the Charter)





Limited mandate of the Charter

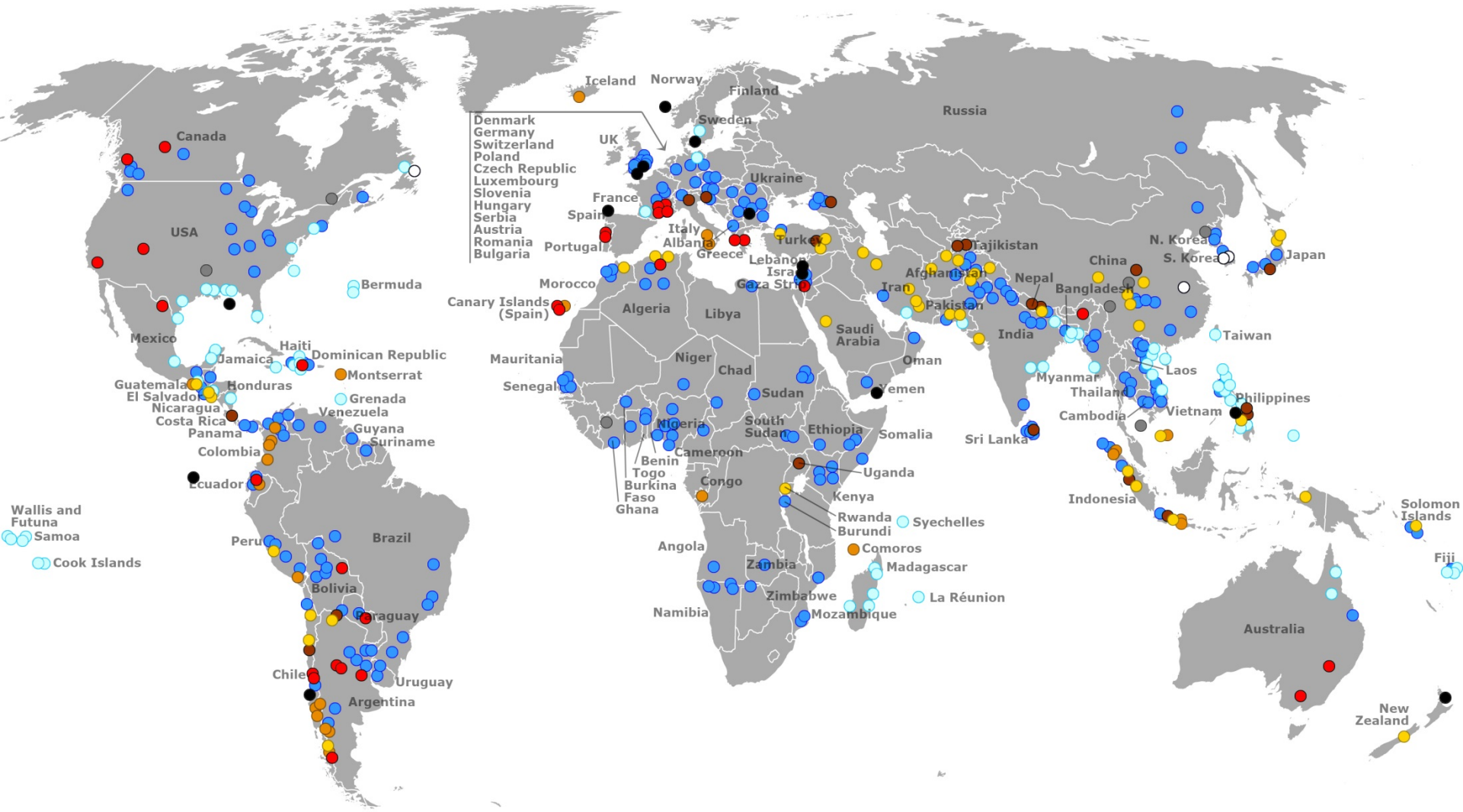


The Charter only supports the **phase of immediate response** to a disaster.

Charter activations generally last for about **1-4 weeks.**

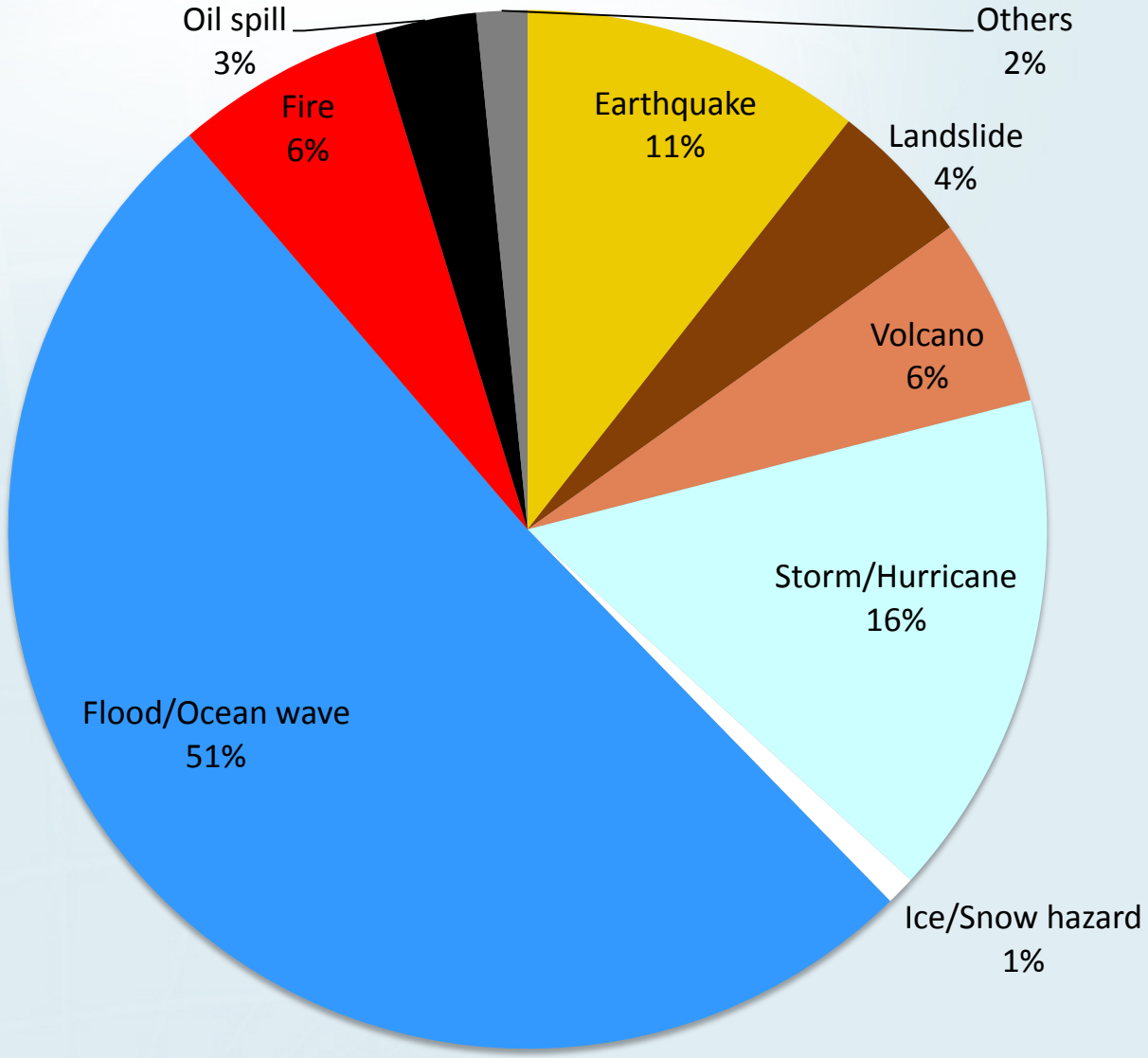
If needed, the Charter can be activated **in advance (1-2 days).**

Activation Distribution



As of January 2, 2015 – 443 Activations

Activations by Disaster Type

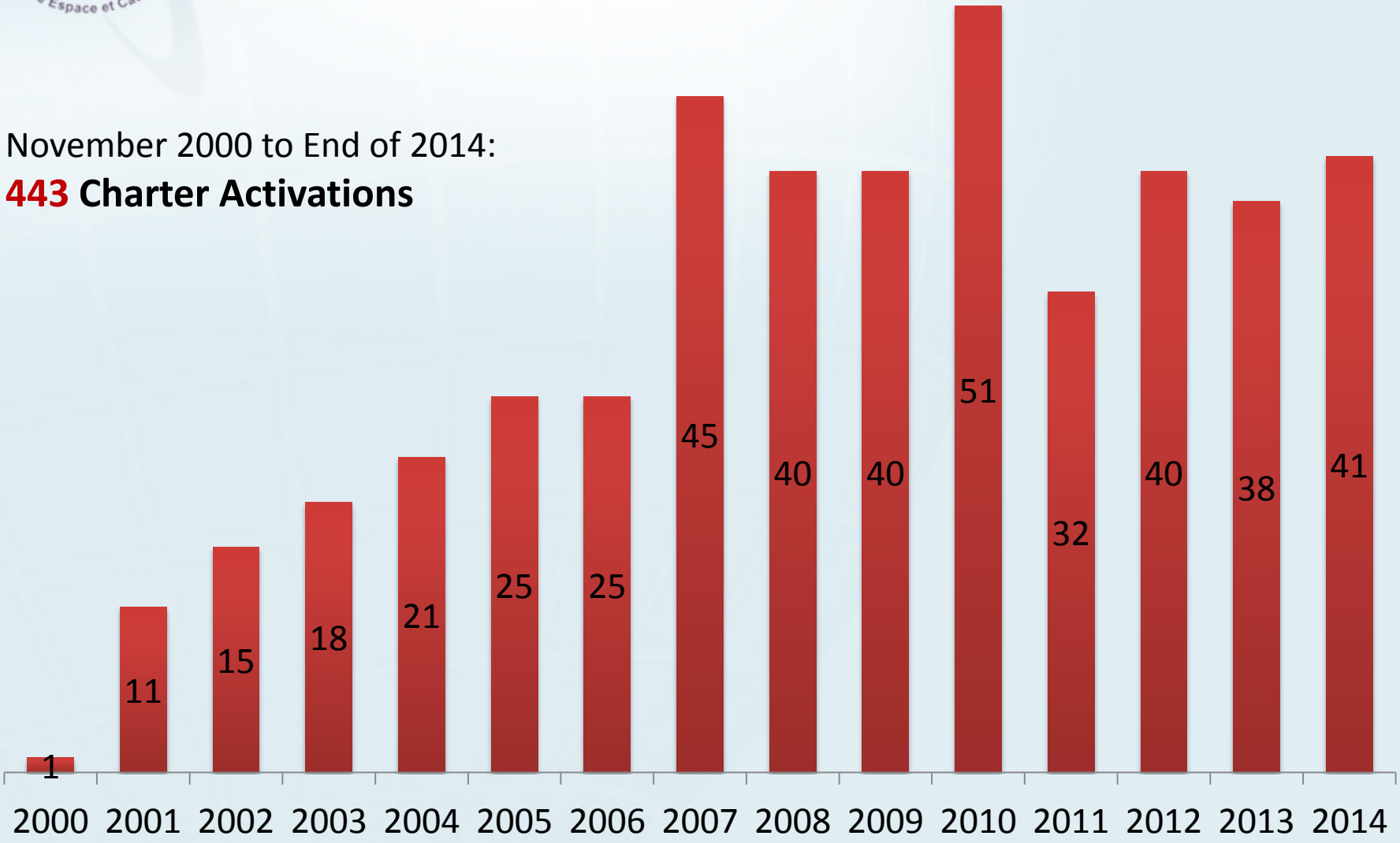


As of January 2, 2015 – 443 Activations

Number of Activations

November 2000 to End of 2014:

443 Charter Activations

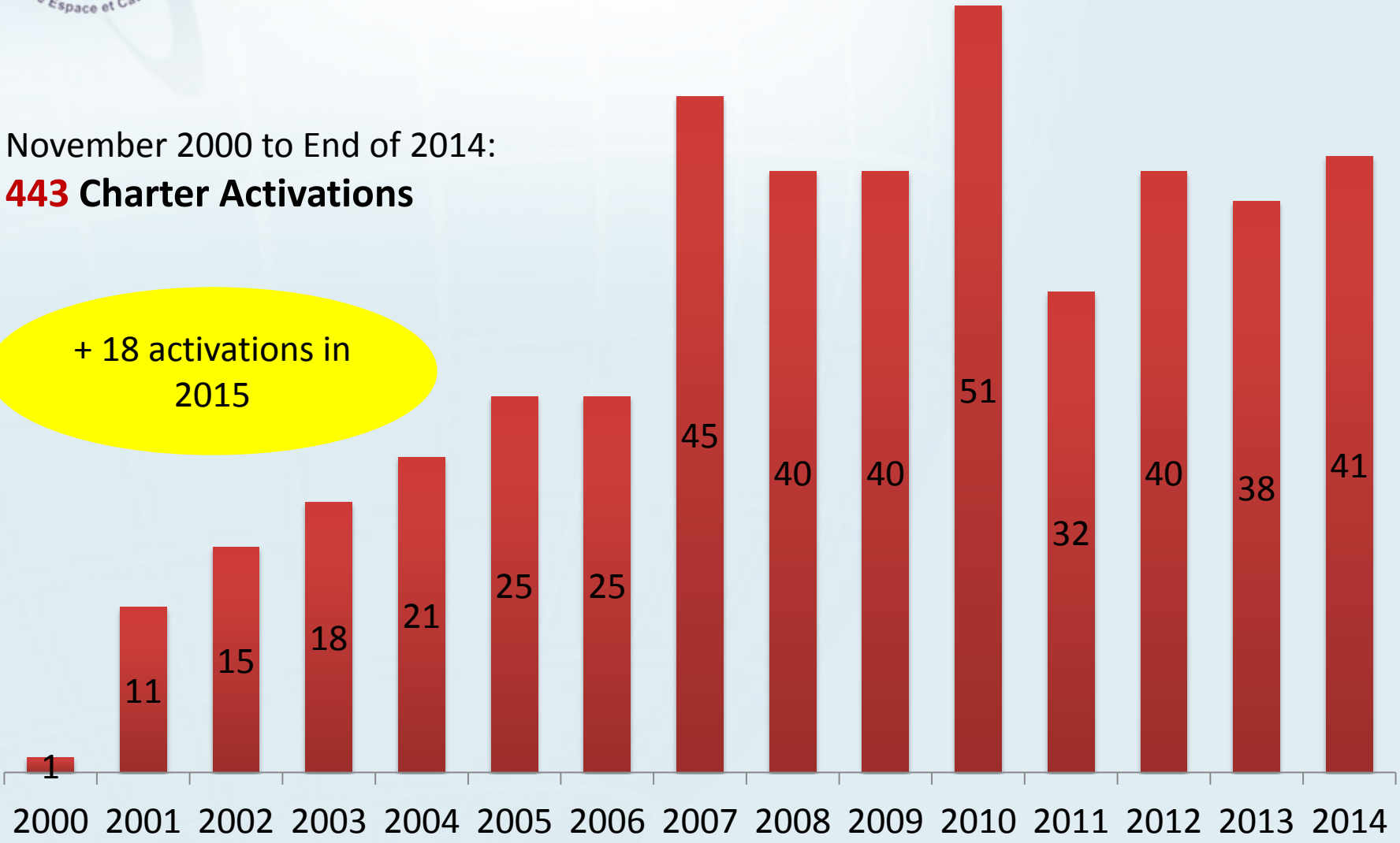


Number of Activations

November 2000 to End of 2014:

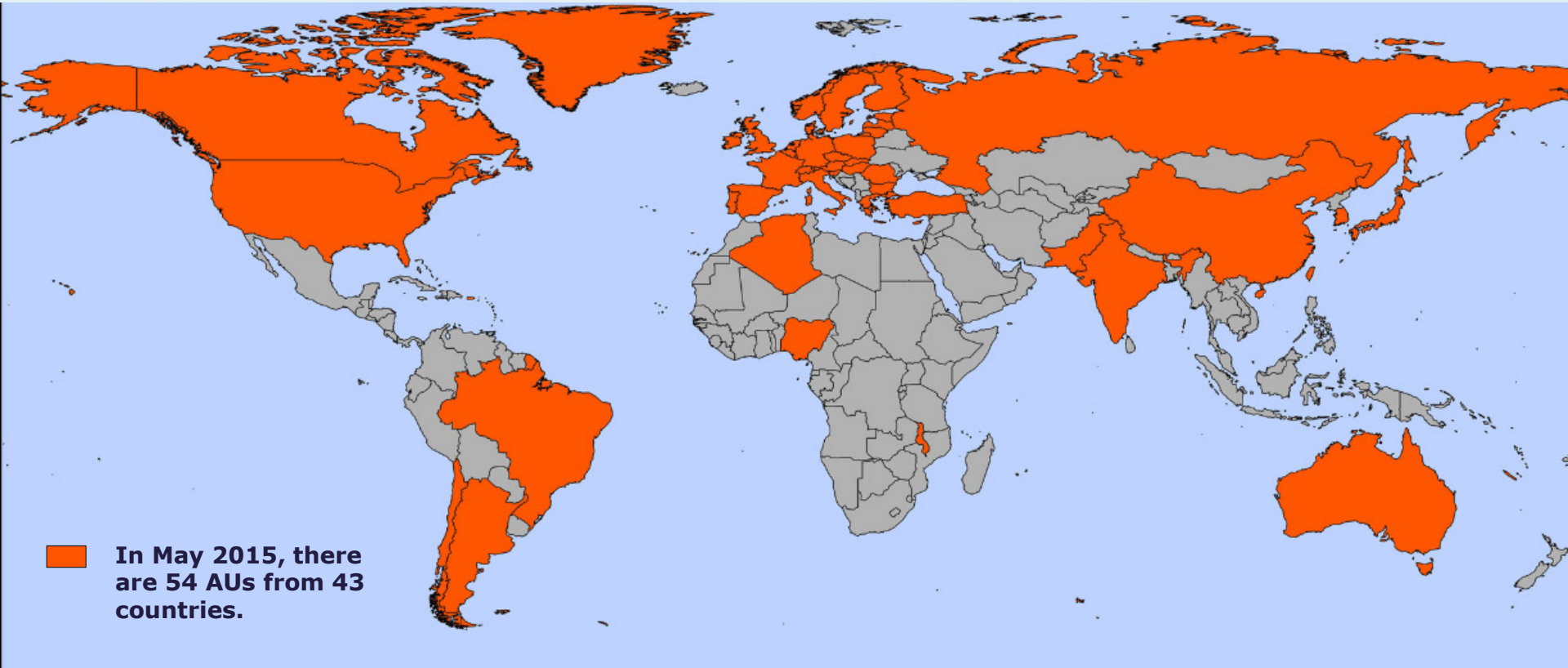
443 Charter Activations

+ 18 activations in 2015



Mechanism to Activate the Charter

- **Direct activation:** The only bodies authorized to directly request the Charter to be activated for a disaster occurring in their country are the **'Authorized Users' (AUs).** They are typically civil protection agencies, or other authorities with a national mandate related to disaster management.



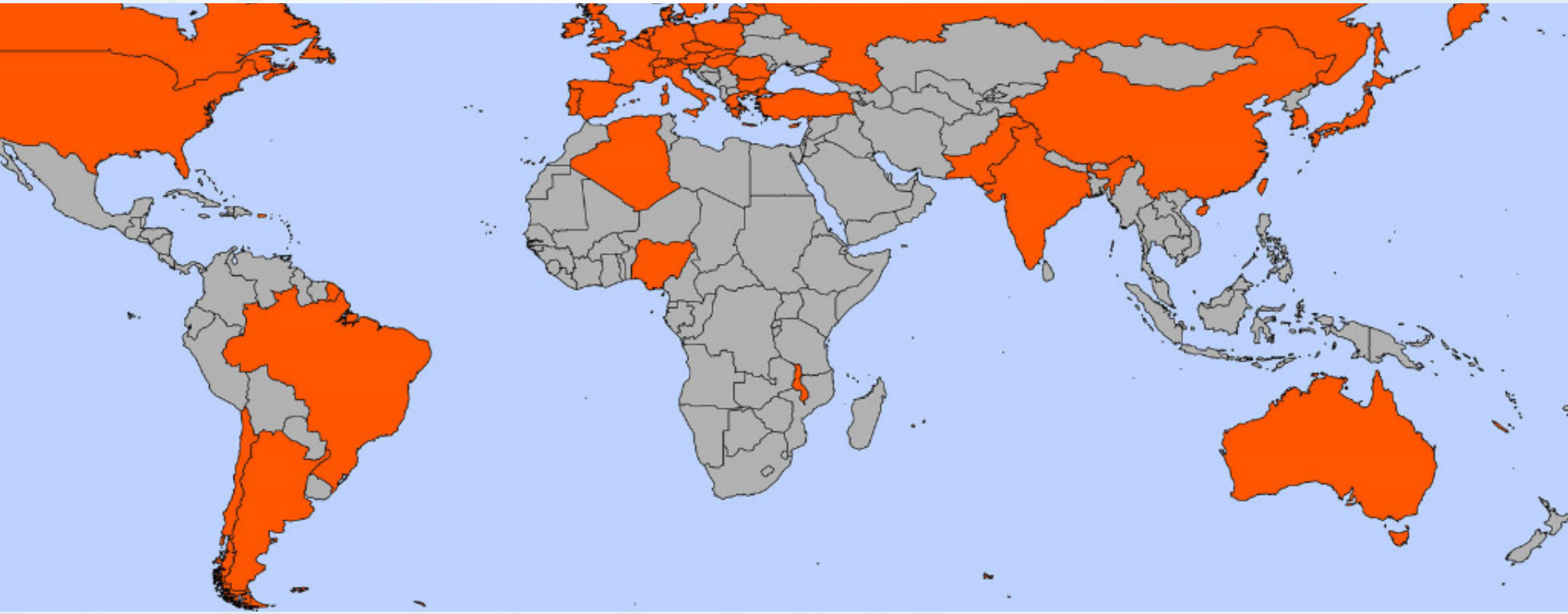
Additional mechanisms to Activate the Charter

- **Activation via an Authorized User on behalf of a user from another country without AU:** Authorized Users can access the Charter to request support for a disaster in another country with which they cooperate for relief purposes.

- **Activation via the UN for UN users:** The Charter has agreements with UNOOSA (Vienna) and UNITAR/UNOSAT (Geneva) to provide support to UN agencies. UNOOSA and UNOSAT may submit requests on behalf of users from the United Nations.

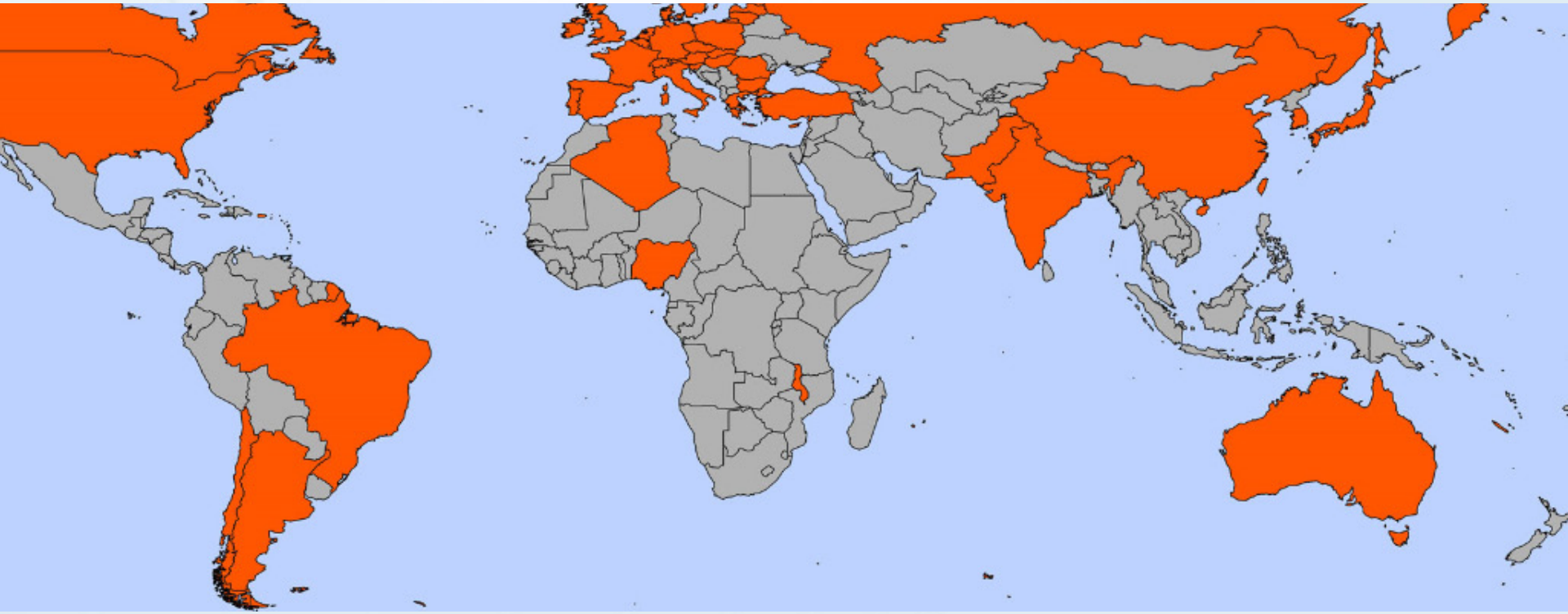
- **Activation for Asia Pacific users via Sentinel Asia:** Sentinel Asia is a regional collaboration for satellite based emergency response in Asia Pacific. Since 2009 the Charter has granted the Asian Disaster Reduction Centre the right to submit activation requests on behalf of national users of Sentinel Asia.

Universal Access



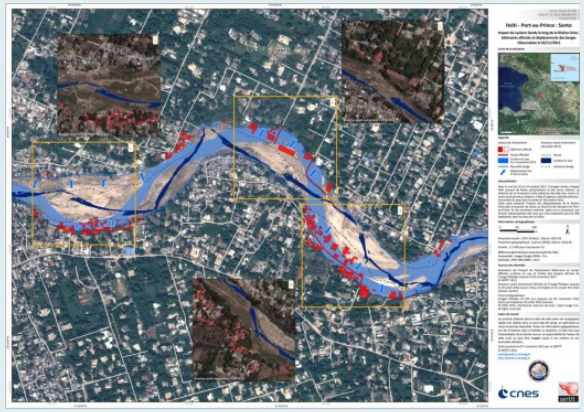
Many countries highly prone to natural disasters do not have a Charter Authorised User yet!

Universal Access



Since September 2012, <u>any</u> national disaster management authority can become an Authorised User, if it meets few basic criteria!

Conditions for becoming an Authorised User



1. be a **national disaster management authority** or its delegated agency in that country

2. have the **capacity to download and use maps**

3. be able to **submit and pursue an activation request in English**

Registration

A **Registration Form*** is available to express interest in becoming a Charter Authorised User.

1. The candidate fills in the questionnaire providing all required information.
2. The questionnaire, *with an official cover letter from the organisation,* must be sent to: ExecutiveSecretariat@disasterscharter.org
3. The request is assessed by the Charter members.
4. A training and an activation exercise is conducted.

*The form and a **Universal Access Information brochure** is available on the Charter website: **https://www.disasterscharter.org/web/guest/activating-the-charter**

The Charter's response to plain flood disasters

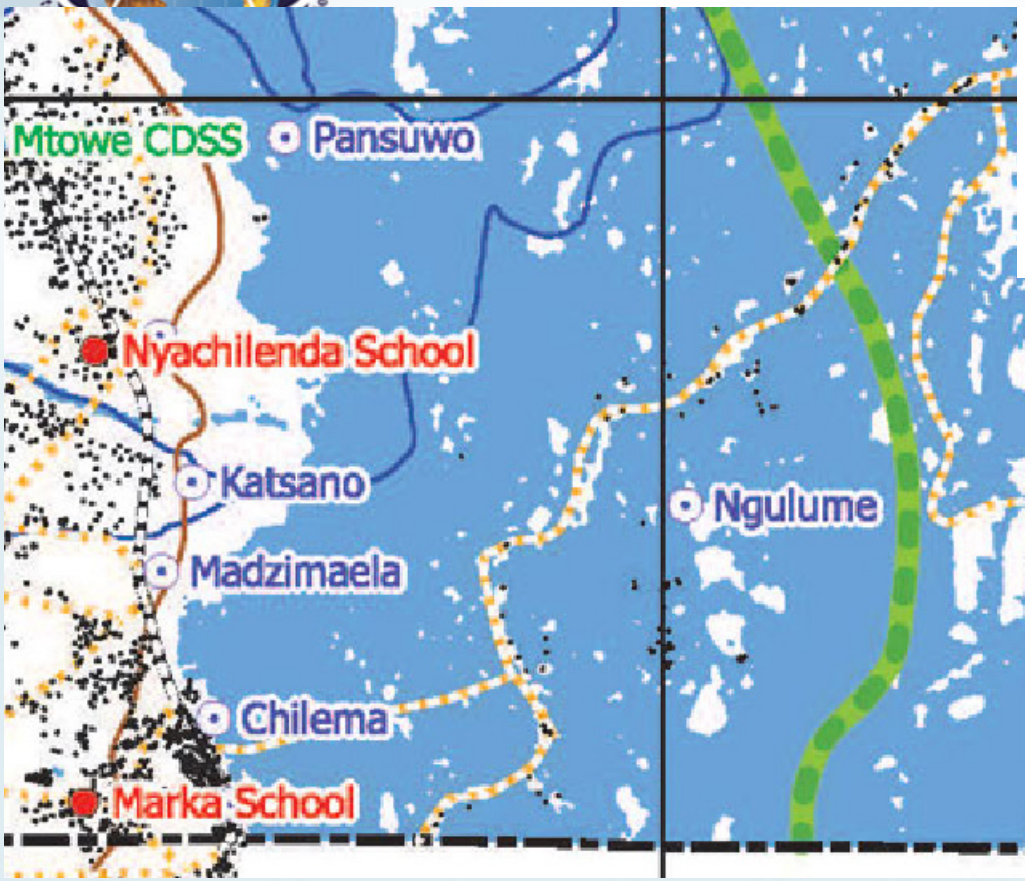
Issues:

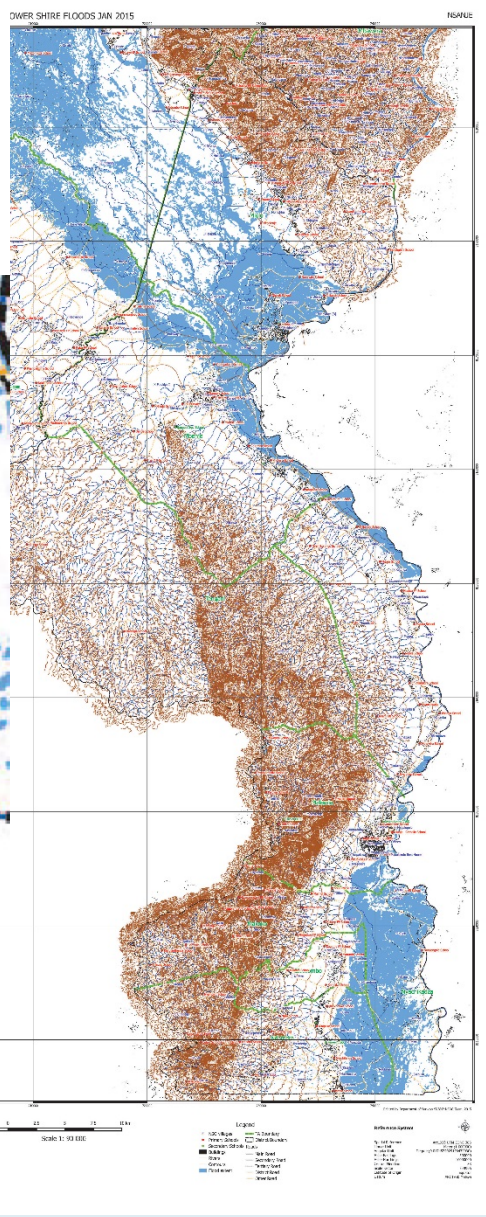
- Flooded areas frequently under cloud cover
- Sometimes huge areas affected

Solution:

- Radar satellite data allows mapping of inundated areas independent from daylight and weather conditions.

Flood disaster example: Malawi 2015





Inundation in the South of Malawi – map prepared by Malawi Department of Surveys, Ministry of Lands, based on Radarsat-2 data.

The Charter's response to earthquake disasters

Issues:

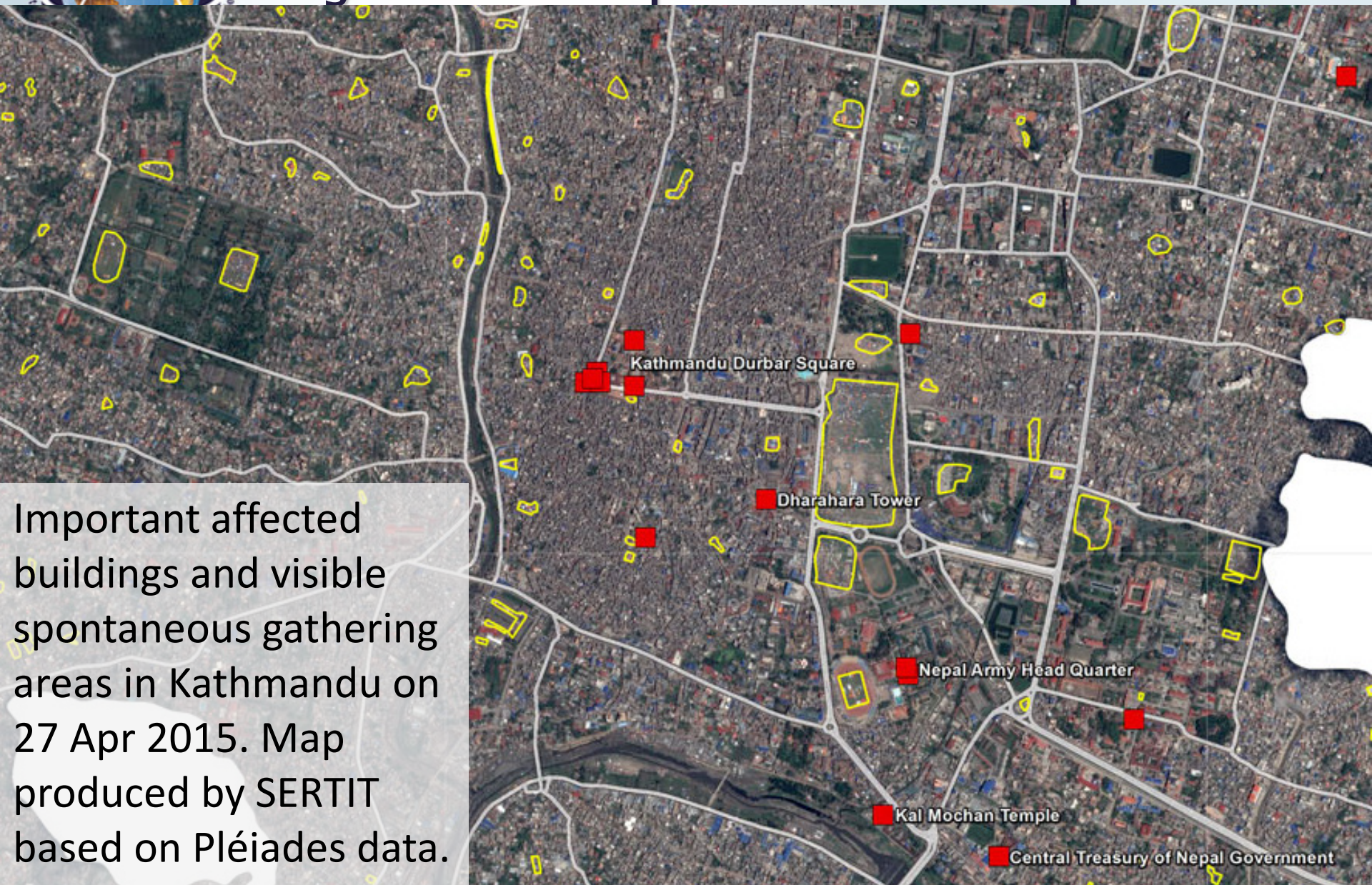
- Different damage types may occur in combination: direct damage, landslides in mountaineous areas, technological disasters…

Solution:

- Damage assessment and detection of gathering places based on very high resolution optical data
- Radar-based change detection possible only if pre-event data is available

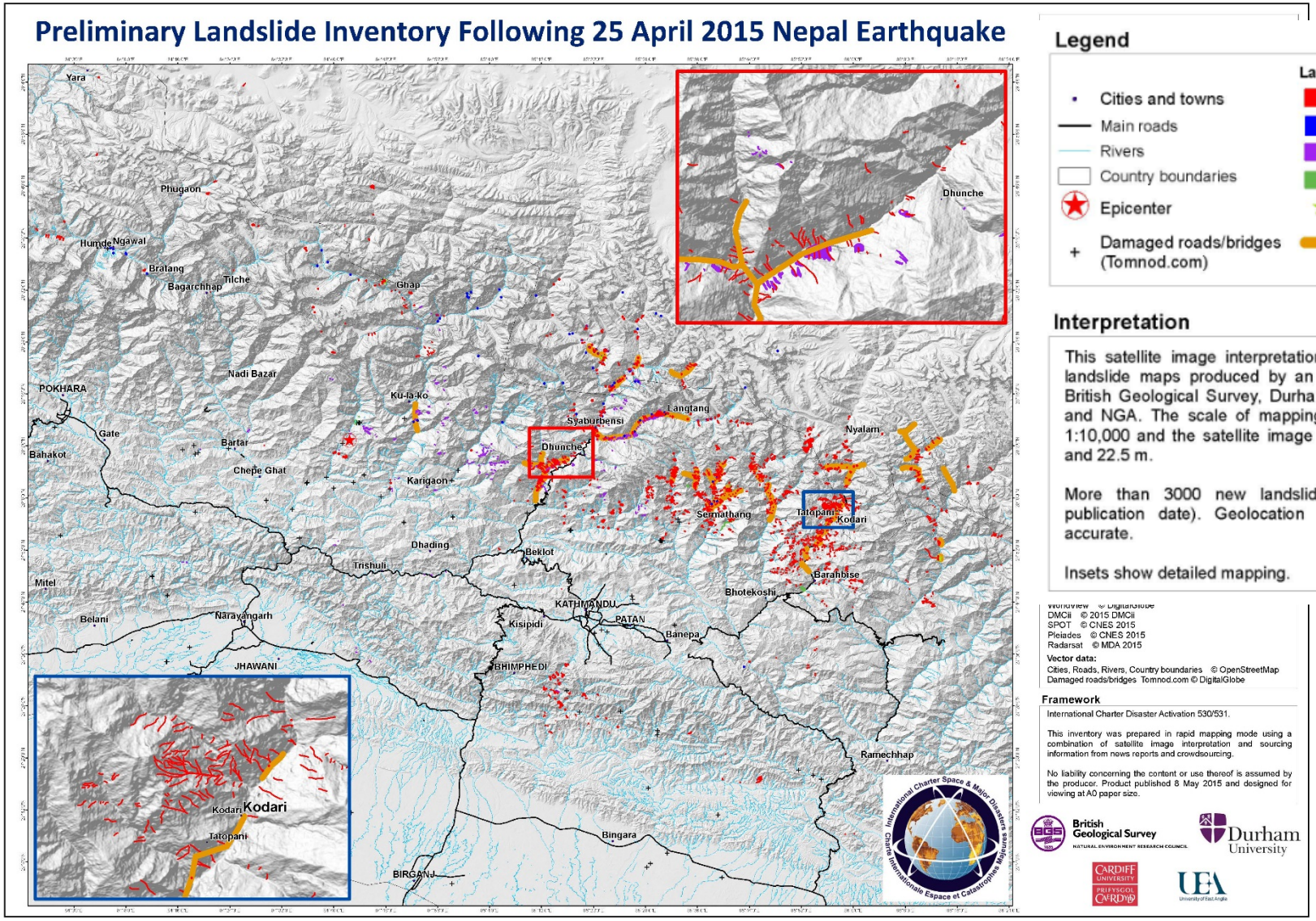
(Interferometric analyses are not supported by the Charter)

Example: Kathmandu after the major earthquake on 25 Apr 2015

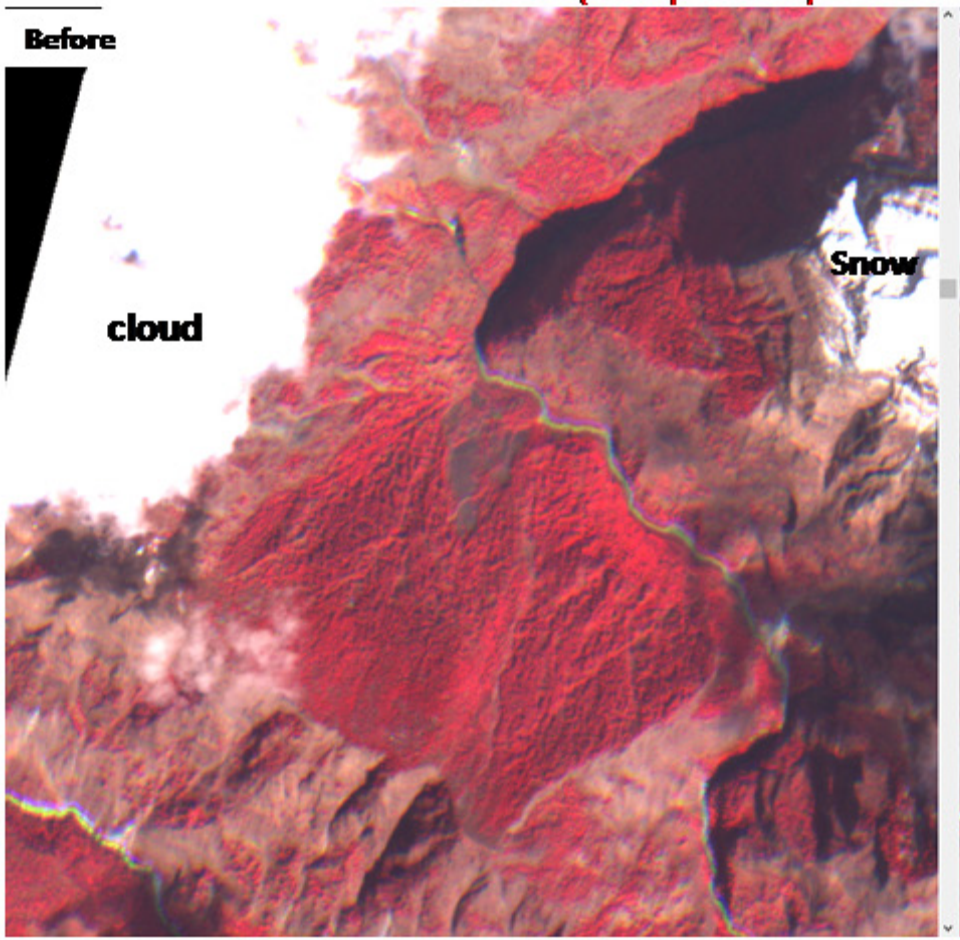


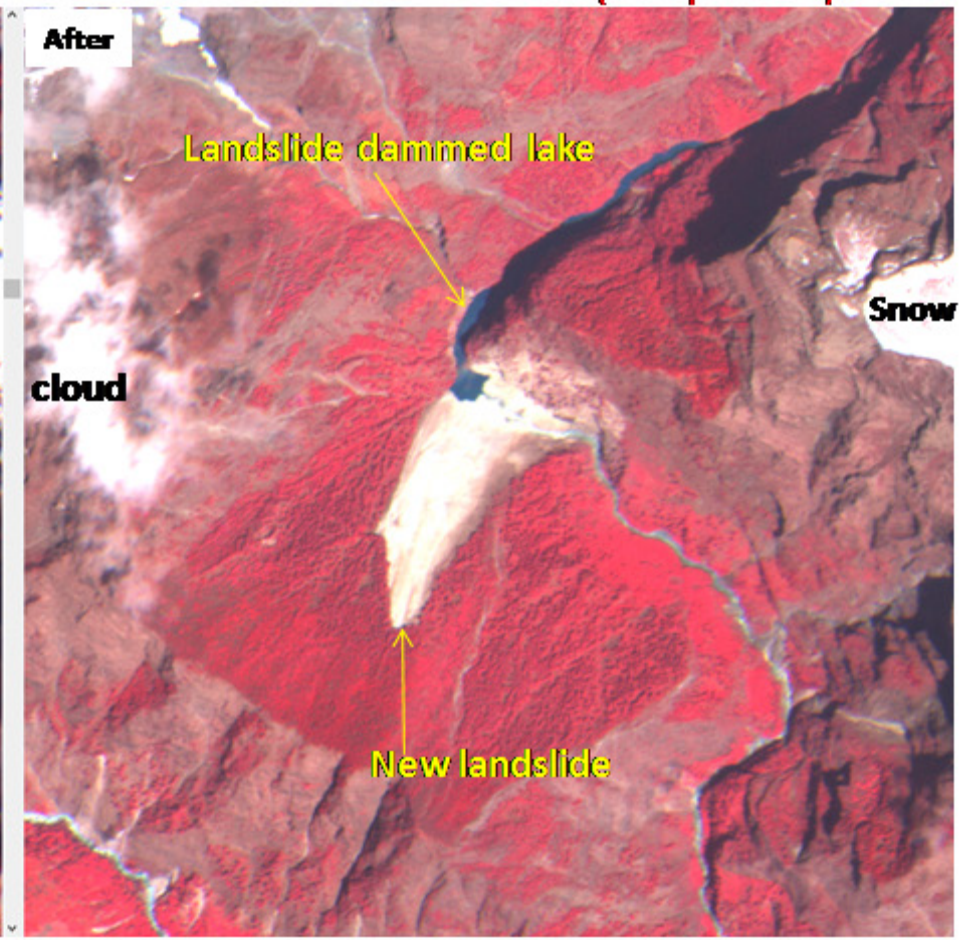
Important affected buildings and visible spontaneous gathering areas in Kathmandu on 27 Apr 2015. Map produced by SERTIT based on Pléiades data.

Example: Nepal earthquake landslide inventory



Example: Landslide caused by the Nepal earthquake on 25 Apr 2015





Observation: A new major landslide has blocked the valley resulting in development of a lake. Several other small new landslide are also seen.

Location of the landslide: 84° 47′ 30″ E & 28° 33′ 8″ N

The Charter's response to tsunamis disasters

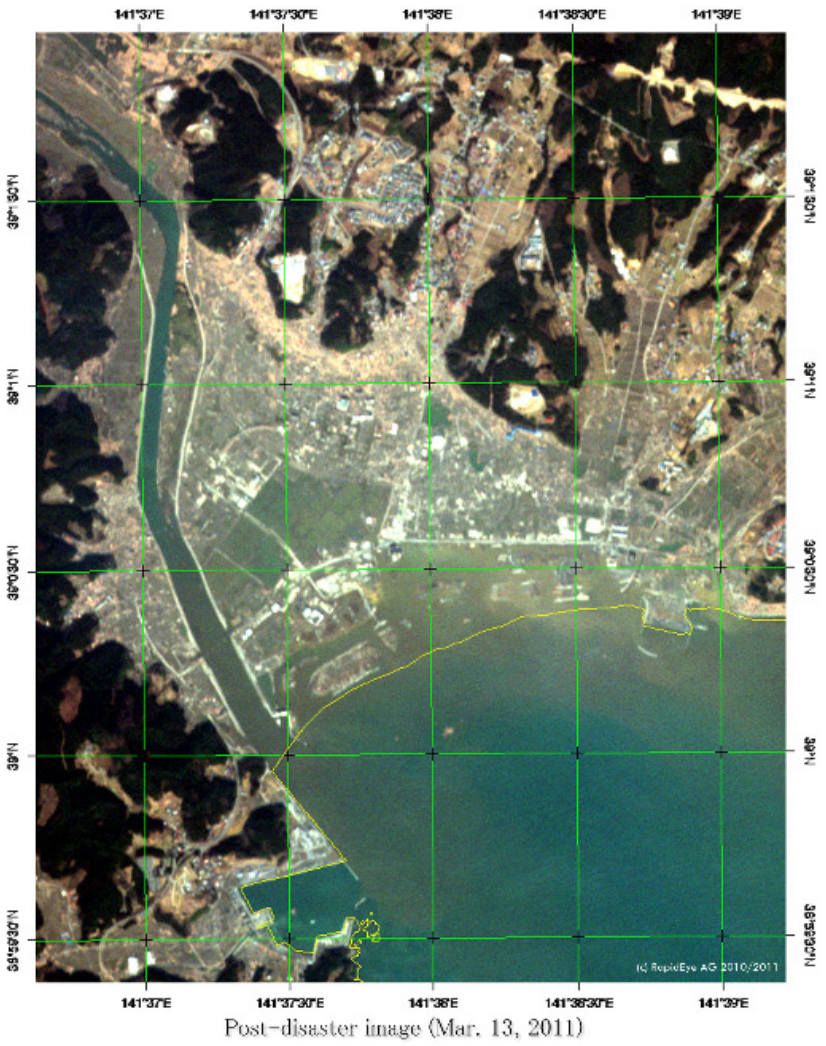
Issues:

- Large area affected (in cases of major tsunamis)
- High risk of technological disasters caused by Tsunami

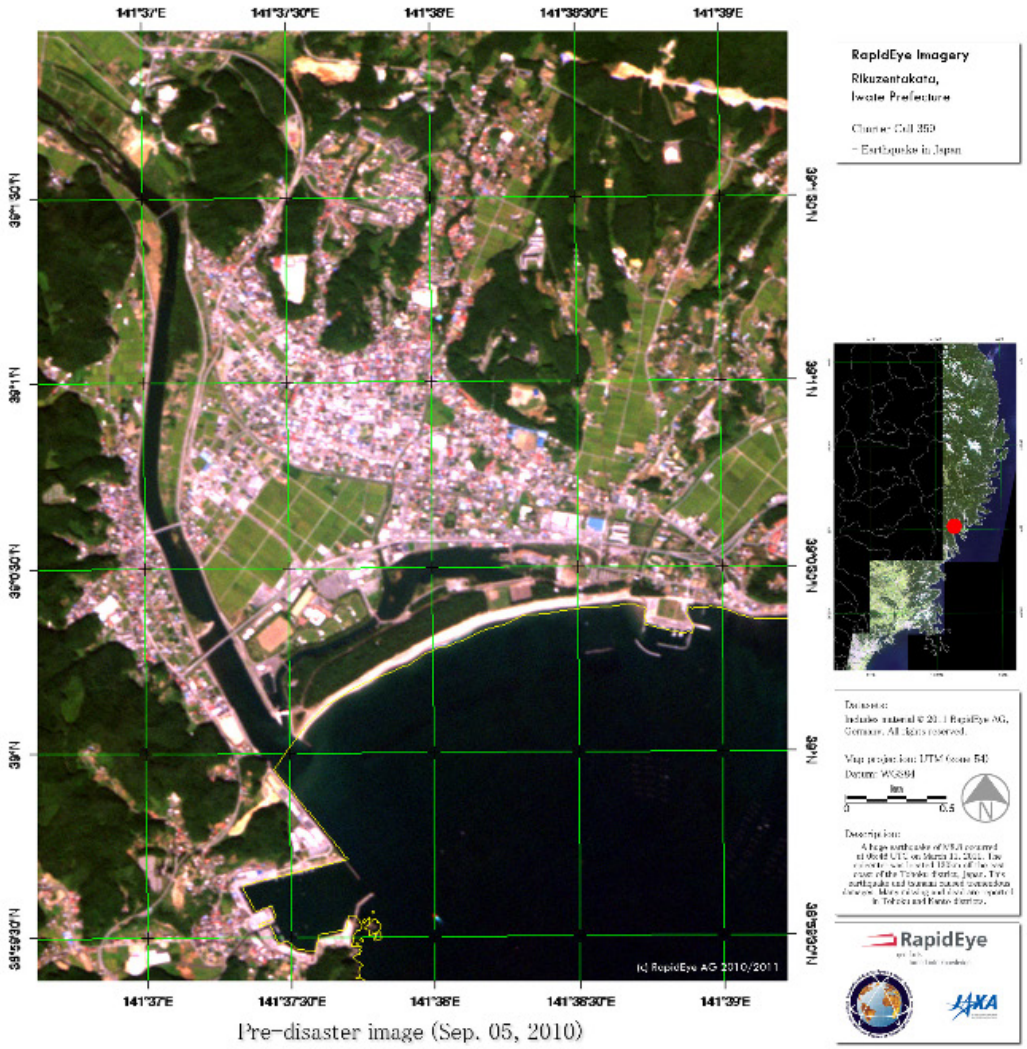
Solution:

- Acquisition of many data and all different image types
- Combination of flooded area detection and damage assessment

Tsunami in Japan, March 2011



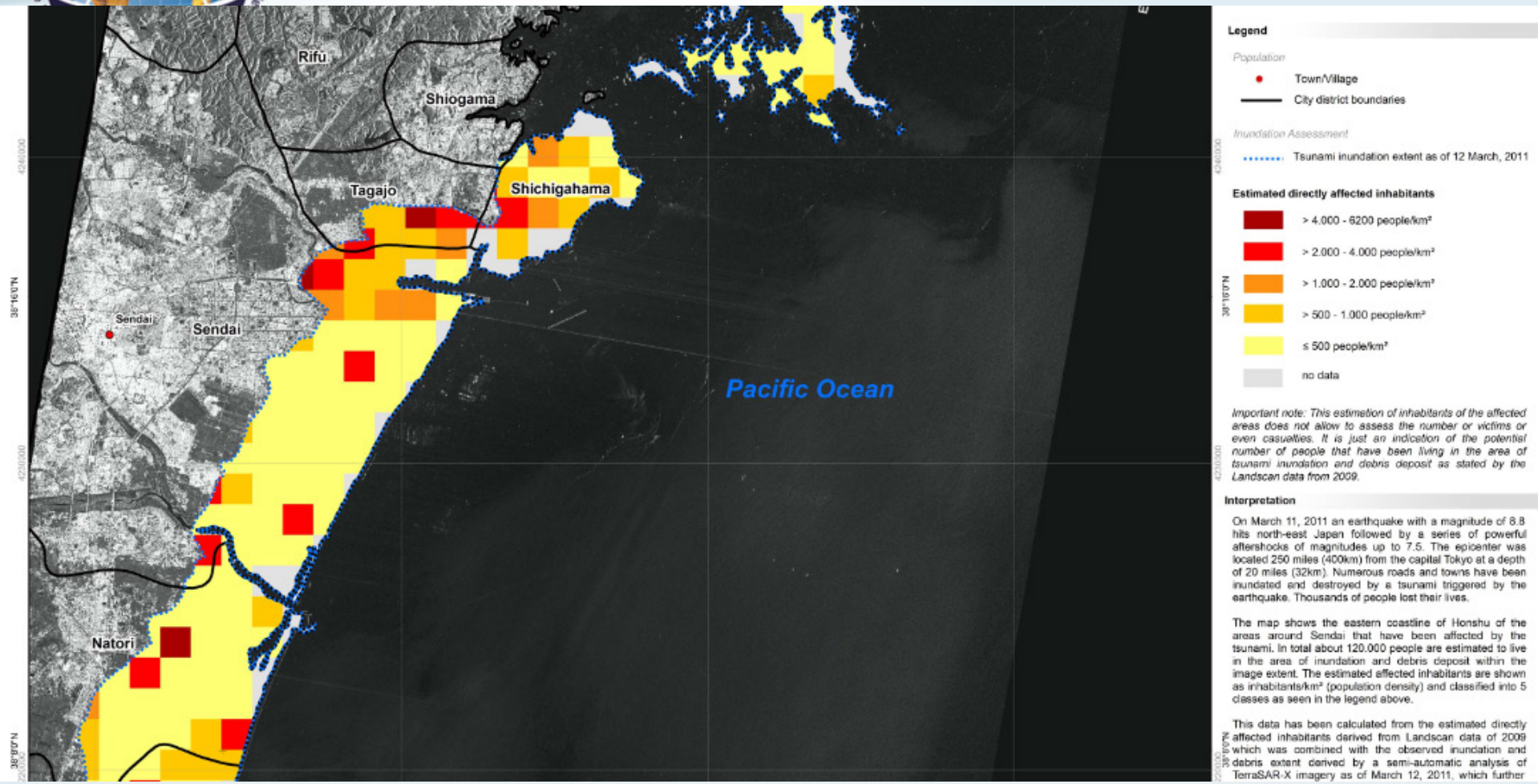
Post-disaster image (Mar. 13, 2011)



Pre-disaster image (Sep. 05, 2010)

Pre- and post-disaster image from the RapidEye satellite constellation.

Tsunami in Japan, March 2011



Estimated directly affected population
(product made by DLR/ZKI, based on flood extent derived from TerraSAR-X data and Landscan 2009™ population data)

The Charter's response to tropical storm disasters

Issues:

- Different damage types may occur in combination: direct storm damage, flooding, landslides…
- Areas of most severe damages not always known immediately after landfall
- High probability of cloud cover
- Very high resolution images needed for detection of direct storm damages

Solution:

- Redundant tasking of all VHR satellites (hoping for breaks in the clouds…)
- Radar and lower resolution optical for floods, landslides etc.

Example: Damage analysis after Typhoon Haiyan, Philippines, November 2013

Daanbantayan, affected individual housing, detected via Pléiades data

Philippines - Daanbantayan Maya area

Potentially affected building structures Observed the 14/11/2013

Location Diagrams

Legend

Interpretation

Typhoon Haiyan hit Daanbantayan, Cebu Island, the 8th of November, associating heavy rainfalls and very strong winds. A Pléiades-1B image was acquired the 14th of November 2013 over Maya. Analysis highlights many destroyed dwellings particularly in areas close to trees, and much debris on the ground, especially along the sea front. Many trees have been flattened by the strong winds and some roads could be blocked. However, considering the lack of reference data, the cloud coverage, the reduced visibility in cloud shadows, and the extreme change in tree cover, this interpretation of highly damaged building structures cannot be exhaustive and hence is more indicative.

Cartographic Information

Data Sources

Framework

Map produced the 16th of November 2013 by SERTIT

The Charter's response to volcanic disasters

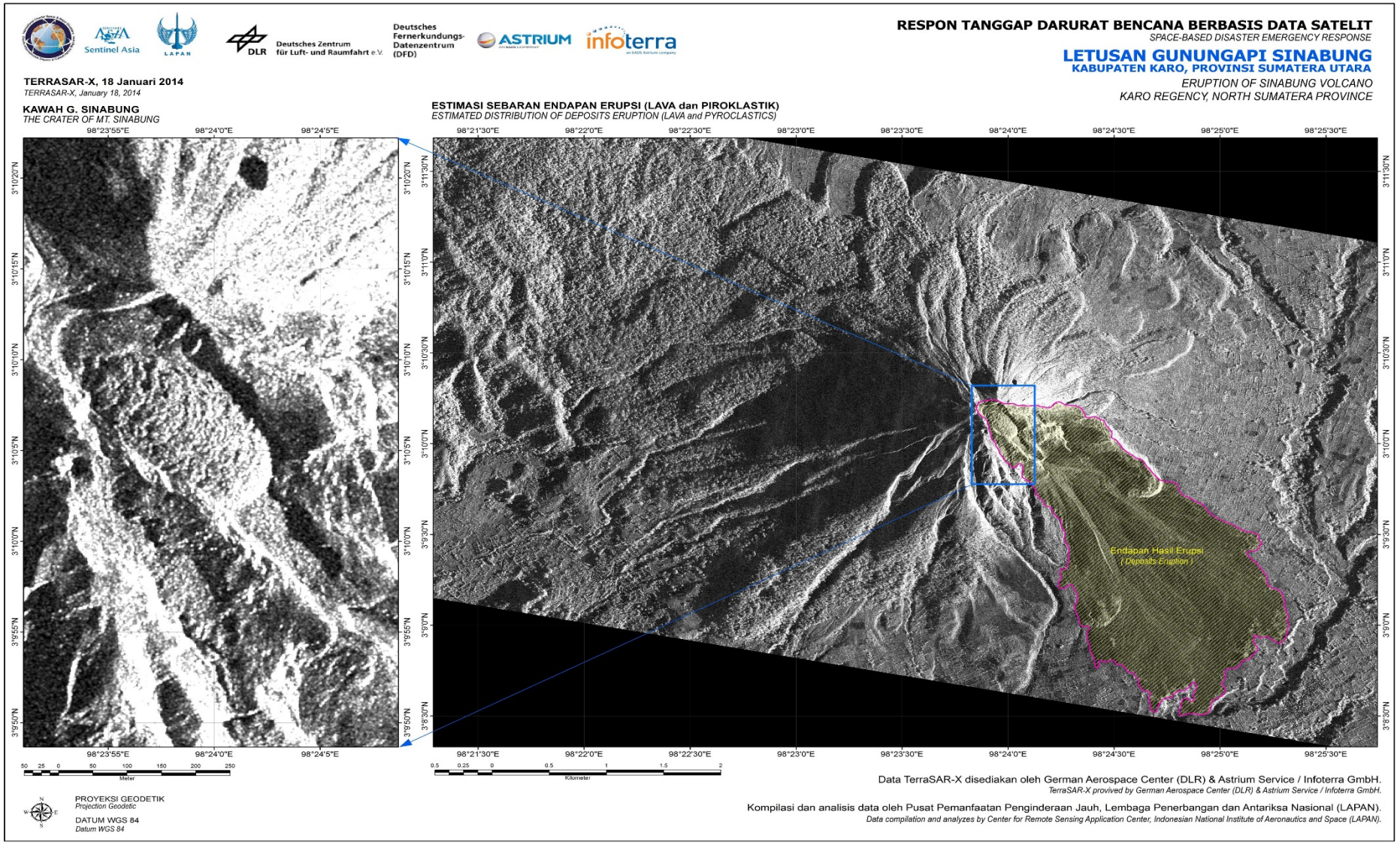
Issues:

- Surrounding area often inaccessible
- Possible combination of local devastation and wide-spread ash clouds

Solution:

- Optical observation as well as radar-based change detection

Example: Sinabung volcano eruption in 2014



The Charter's response to wildfire disasters

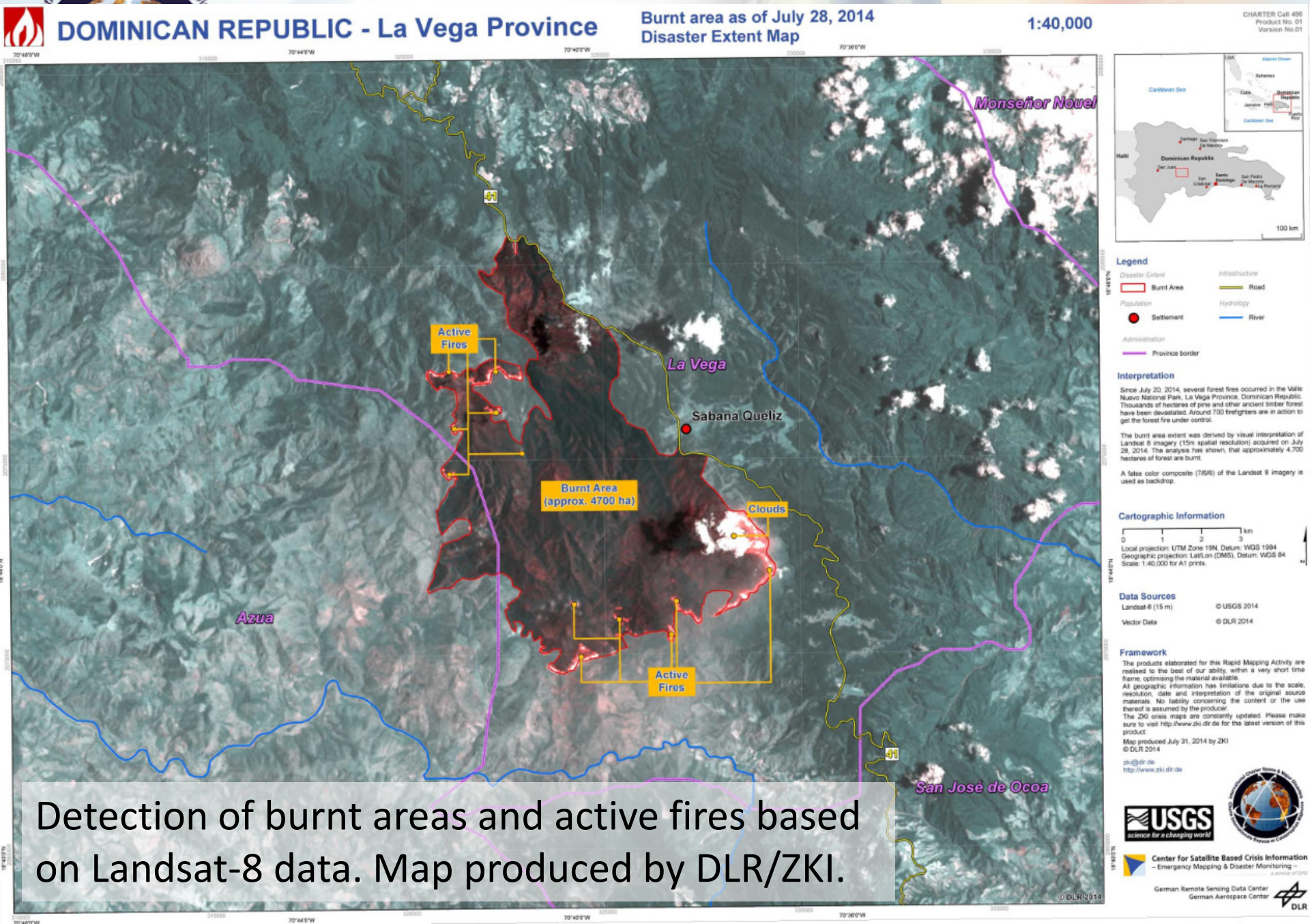
Issues:

- Very quick progression of fire fronts
- Clouds or smoke may hide fire spots

Solution:

- Optical or thermal-infrared observations
- Extra-fast preparation of maps

Wild Fire in the Dom. Rep., Aug 2014



Detection of burnt areas and active fires based on Landsat-8 data. Map produced by DLR/ZKI.

Conclusions

- The Charter is an international mechanism providing space-based information, with a focus on the phase of immediate disaster response.
- The Charter provides earth-observation based information at no cost to the user.
- National Disaster Management authorities can become Charter Authorized Users to be able to directly activate the Charter.
- The Charter is indirectly related to disaster resiliency: countries prone to natural disasters can become better prepared by benefiting from the Charter's Universal Access initiative.

The Charter online

Website

www.disasterscharter.org

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Newsletter

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International Charter
Space and Major Disasters

Thank you for your attention!

Emergency enquiries from users requiring direct access to Charter resources should be addressed to:

ExecutiveSecretariat@disasterscharter.org

General requests for information should be addressed to

webmaster@disasterscharter.org