



INTERNATIONAL CHARTER SPACE & MAJOR DISASTERS

# The International Charter Space & Major Disasters

August 30th 2018 - CEMADEN - INPE/Brazil

Laércio Namikawa - INPE



# Purpose

An International agreement among EO mission owners/operators 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



# The International Charter

A unified system of space data acquisition and delivery in case of natural or human-made disasters - **34 Satellites**

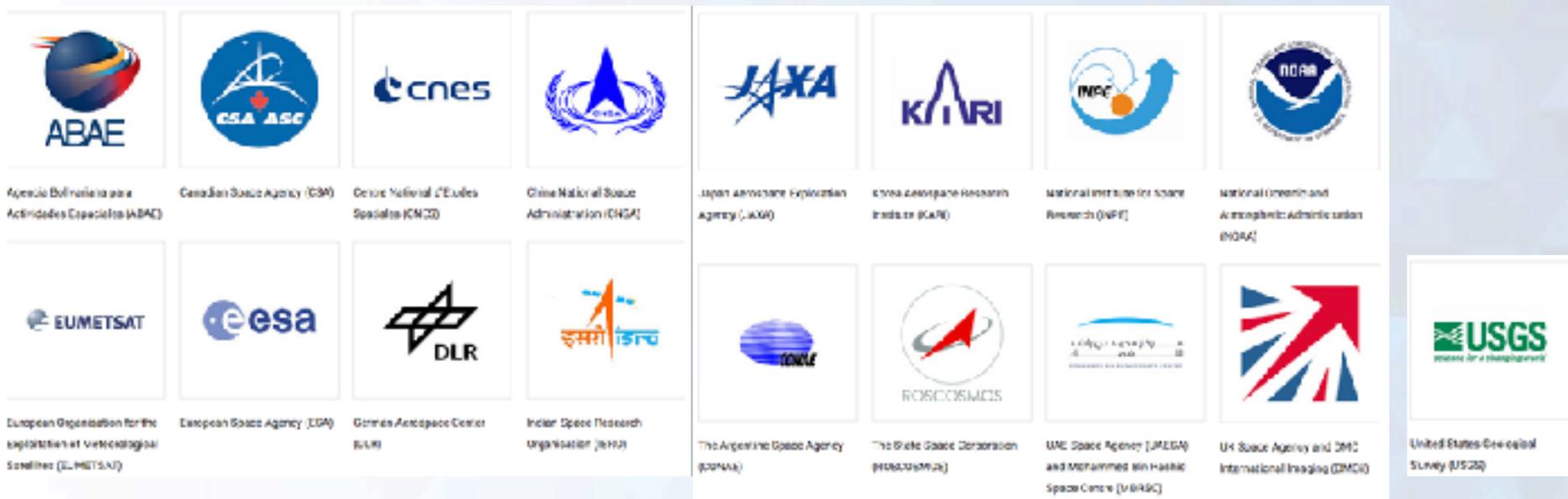
Now composed of 17 members. (New UAESA)

Data delivery to civil protection agencies, emergency & rescue services; Also available to Humanitarian Aid actors of the UN since 2003.

Operational : 24/7 on-duty-operator

Charter activations: +/-40 events/ year

583 disasters covered to date in 125 countries worldwide (as of Aug/30/2018)





# Charter Partners

Organisations that provide disaster monitoring services for specific regions of the world

Data providers for additional satellite data

Value added providers produce maps based on the satellite data for use in interpreting and assessing disaster situations.





# Disasters Types Supported

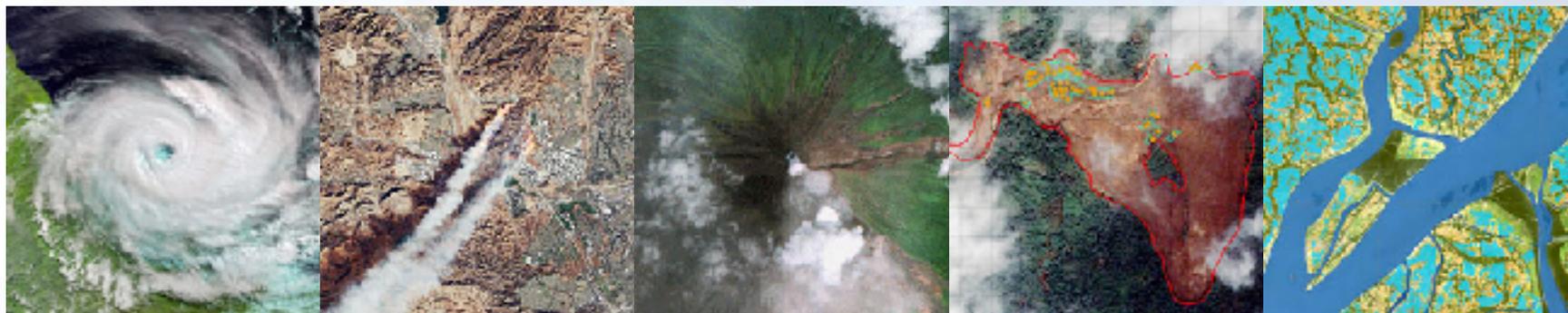
The International Charter executes priority tasking of different EO missions in a rapid fashion; it is designed to address requests concerning major disasters caused by:

## Natural events

Earthquakes  
Fires  
Floods  
Ice jams  
Landslides  
Tsunamis  
Ocean storms  
Volcanic eruptions

## Man-made events

Oil spills  
Industrial accidents





# Disasters Types Supported

Following **UNISPACE III** in Vienna in **July 1999**, ESA (European Space Agency) and CNES (Centre national d'études spatiales) initiated the International Charter in July 1999.

CSA (Canadian Space Agency) signed the Charter on October 20, 2000.

Charter declared operational as of November 1, 2000 after formal rehearsals and qualification tests.



# Charter Members





# Activating the Charter: Authorized Users (AU)

The only bodies authorized to directly request the Charter to be activated are the Authorized Users - AUs (typically civil protection agencies, governmental relief organizations, or other authorities with a mandate related to disaster management).



**Countries with  
Authorized  
Users  
(July 2018).**



# Activating the Charter: Authorized Users (AU)

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).

Civil protection agencies, governmental relief organizations, or other authorities with a mandate related to disaster management.

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 an agreement with UN OOSA (Vienna) and UNITAR/UNOSAT (Geneva) to provide support to UN agencies. UN OOSA and UNITAR/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.



# Charter Functional Units

Authorized Users (AUs)

On-Duty Operator (ODO)

Emergency on-Call Officer (ECO)

Project Manager (PM)

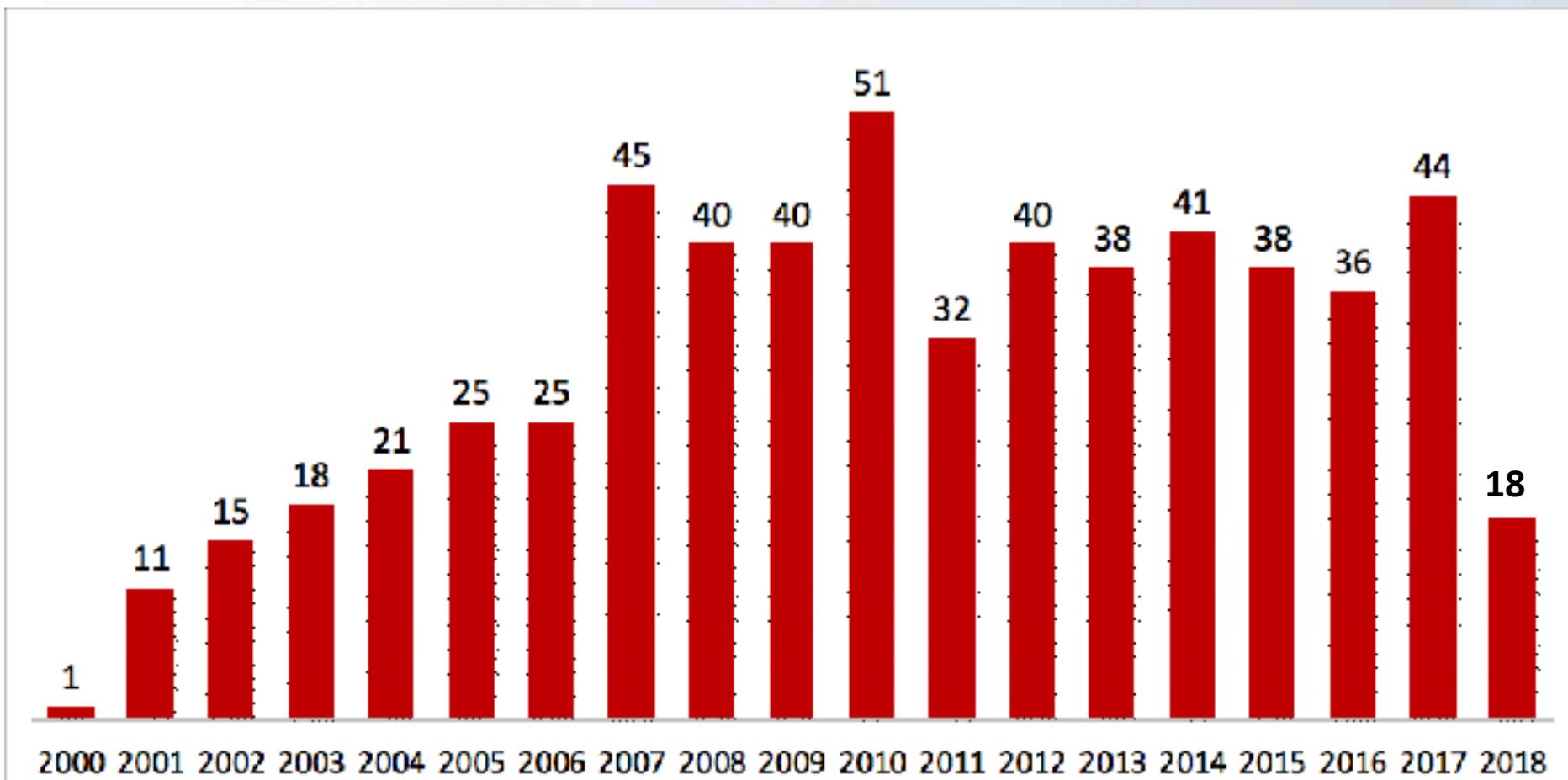
Data processing and distribution facilities

Value-Adding Providers (VAPs)



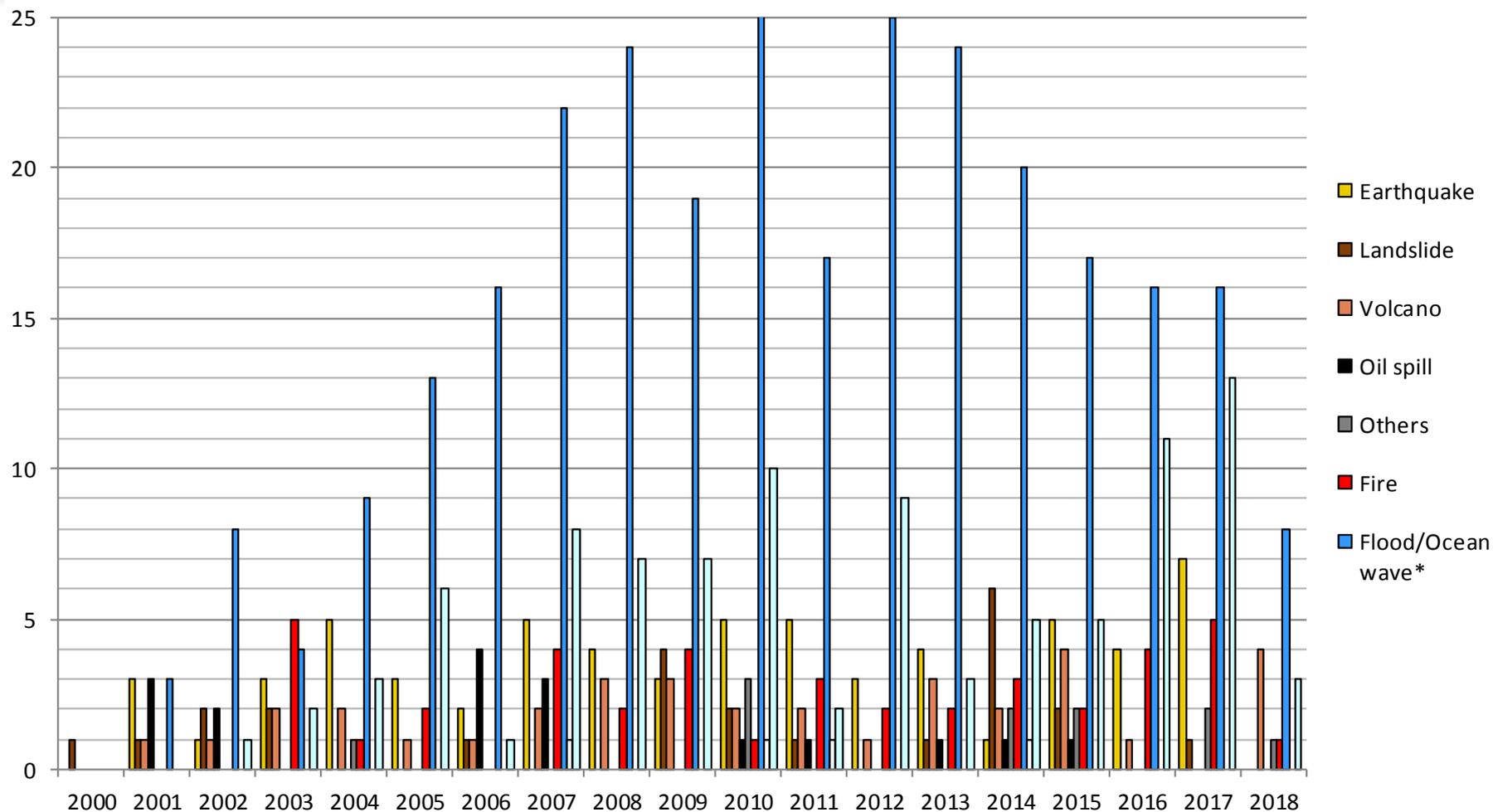


# Number of Activations 579 (Nov/2000-Aug/2018)





# 2000-2017 Distribution of Activations by Hazard Type





# Number of Activations 579 (Nov/2000-Aug/2018)

		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Sub-totals	
Solid Earth	Earthquake		3	1	3	5	3	2	5	4	3	5	5	3	4	1	5	4	7	1	63	
	Landslide	1	1	2	2			1			4	2	1		1	6	2		1		24	123
	Volcano		1	1	2	2	1	1	2	3	3	2	2	1	3	2	4	1		4	35	
Technological	Oil spill		3	2				4	3			1	1		1	1	1				17	28
	Others					1						3				2	2		2	1	11	
Weather / Atmospheric	Fire				5	1	2		4	2	4	1	3	2	2	3	2	4	5	1	41	
	Flood/Ocean wave*		3	8	4	9	13	16	22	24	19	26	17	25	24	20	17	16	16	8	287	428
	Ice/Snow hazard								1			1	1			1					4	
	Storm/Hurricane**			1	2	3	6	1	8	7	7	10	2	9	3	5	5	11	13	3	96	
<b>Total / year</b>		<b>1</b>	<b>11</b>	<b>15</b>	<b>18</b>	<b>21</b>	<b>25</b>	<b>25</b>	<b>45</b>	<b>40</b>	<b>40</b>	<b>51</b>	<b>32</b>	<b>40</b>	<b>38</b>	<b>41</b>	<b>38</b>	<b>36</b>	<b>44</b>	<b>17</b>		

TOTAL

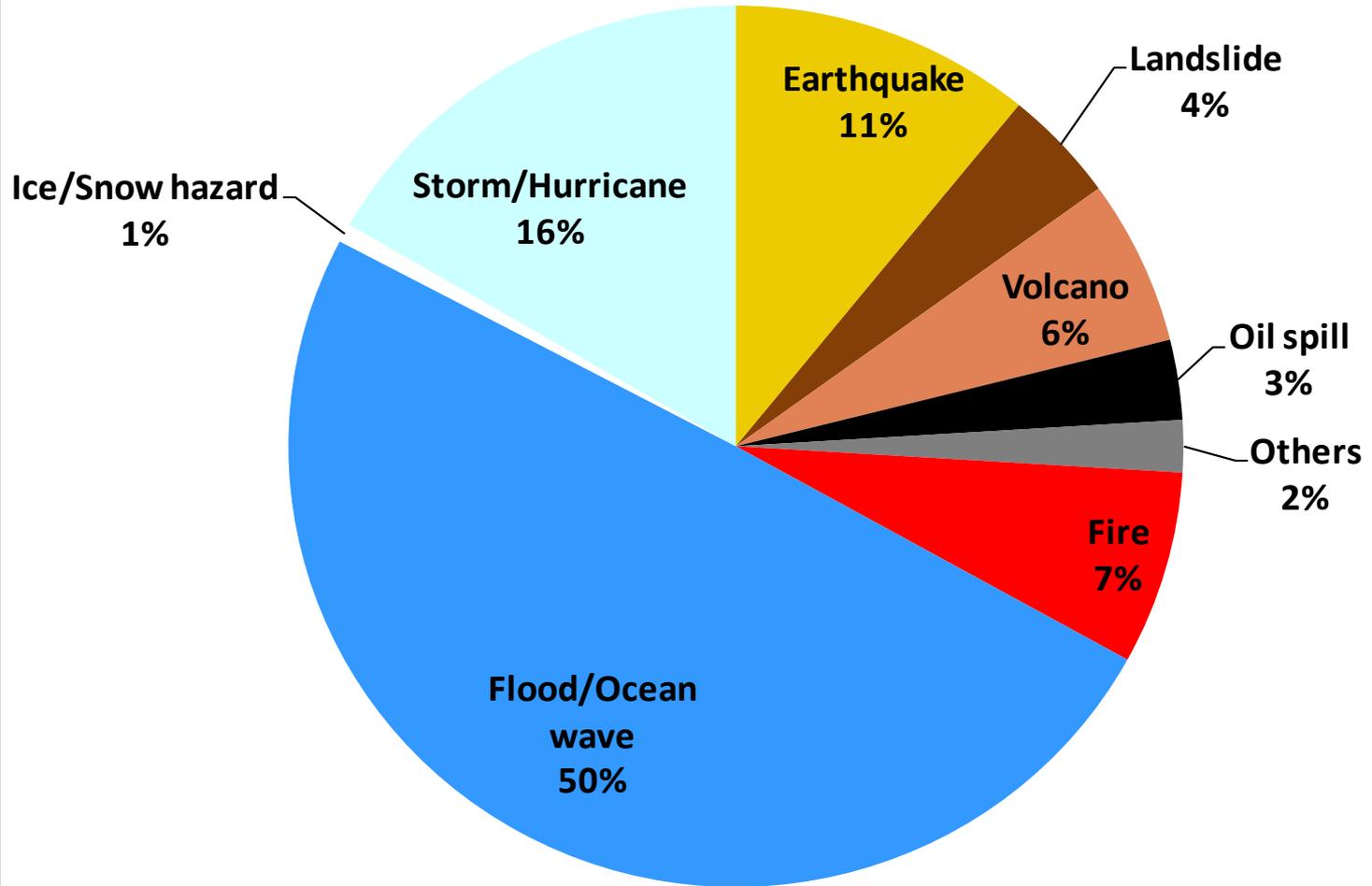
579

6/9/2018 \*Includes solid earth related phenomenon of a tsunami.

\*\*Includes all wind type storms (hurricane, cyclone, typhoon and tornado).

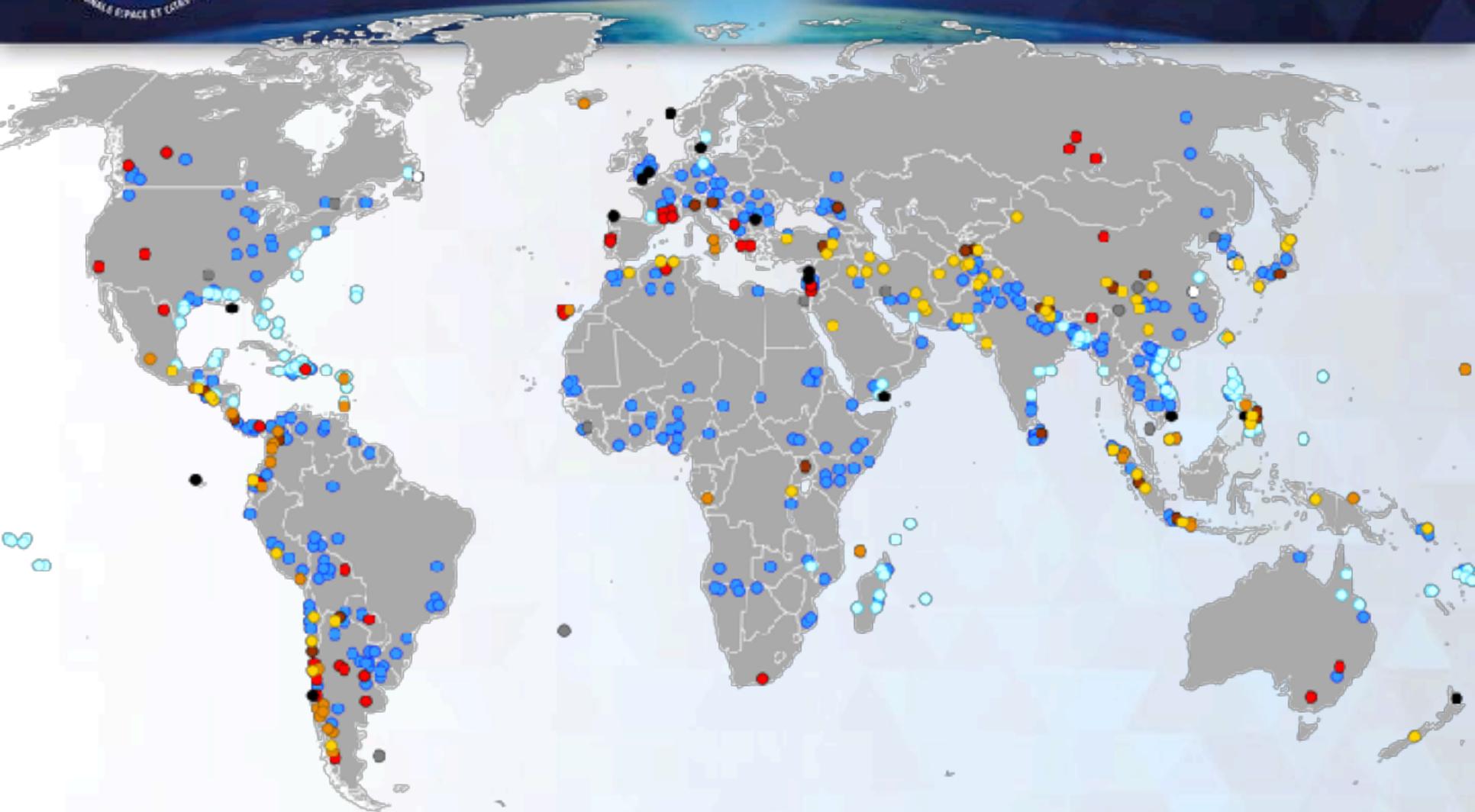


# Activations by Disaster Type





# Activations Breakdown



Legend:    ● Earthquake    ● Landslide    ● Volcano    ● Storm/hurricane    ● Flood/ocean wave    ● Ice/snow hazard    ● Fire    ● Oil spill    ● Other



# Activations Americas





# Activations Americas





# Some examples of recent activations

<b>AUGUST</b>	05 MONDAY	<a href="#">Earthquake in Indonesia ▶</a>	
<b>JULY</b>	24 TUESDAY	<a href="#">Fire in Greece ▶</a>	
	24 TUESDAY	<a href="#">Flood in Laos ▶</a>	
	07 SATURDAY	<a href="#">Flood in Japan ▶</a>	
<b>JUNE</b>	05 TUESDAY	<a href="#">Fuego Volcano in Guatemala ▶</a>	
	06 MONDAY	<a href="#">Fire in China ▶</a>	
	07 SATURDAY	<a href="#">Cyclone Mekuni in Yemen ▶</a>	
<b>MAY</b>	21 MONDAY	<a href="#">Flood in Sri Lanka ▶</a>	
	29 SUNDAY	<a href="#">Flood in Djibouti ▶</a>	
	07 MONDAY	<a href="#">Earthquake and eruption of Kilauea Volcano in the United States ▶</a>	
	07 MONDAY	<a href="#">Flood in Somalia ▶</a>	
<b>APRIL</b>	04 WEDNESDAY	<a href="#">Flood in Russian Federation ▶</a>	
<b>MARCH</b>	09 THURSDAY	<a href="#">Cyclone Heli in New Caledonia ▶</a>	
<b>FEBRUARY</b>	13 SUNDAY	<a href="#">Airbus crash in Iran ▶</a>	
	12 MONDAY	<a href="#">Cyclone Gita in Tonga ▶</a>	
	09 THURSDAY	<a href="#">Flood in Bolivia ▶</a>	
	09 SATURDAY	<a href="#">Flood in Argentina ▶</a>	
<b>JANUARY</b>	27 MONDAY	<a href="#">Volcano in Papua New Guinea ▶</a>	
	14 THURSDAY	<a href="#">Volcano in Philippines ▶</a>	



# Earthquake in Indonesia

## 06 August 2018



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## Charter activations

06 AUGUST 2018

### Earthquake in Indonesia

[Browse activations on map](#)



Location of Event:	Indonesia
Date of Charter Activation:	2018-08-06
Time of Charter Activation:	14:00
Time zone of Charter Activation:	UTC+00:00
Charter Requestor:	ADRC on behalf of LAPAN, Indonesia
Activation ID:	500
Project Management:	AI1

A magnitude 6.9 earthquake has struck the Indonesian island of Lombok. The neighbouring island of Bali was also affected. At least 91 people are reported to have been killed with many more injured.

The quake struck at a depth of 30 kilometres triggering tsunami warnings and the evacuation of thousands of people. 130 aftershocks have been recorded since the quake hit. This comes only a week after a smaller earthquake shook the island, killing 16 people.

Rescue officials reported most of the damage hit Lombok's main city of Mataram where thousands of buildings were damaged, causing widespread power cuts. Many tourists headed for the airport which was affected, but still operational. Others fled for the beach where boats evacuated people to safety.

### Products



Surface movement analysis of Lombok Island, Indonesia

Source: AI1/25-2

Acquired: Pre-disaster

29/12/2010

Post-disaster: 07/08/2018

Copyright: NLOS-2 © JAXA (2018)

Map produced by AI1



Damage assessment of Salangan, Lombok Island, Indonesia

Source: Pleiades / Sentinel-2

Acquired: Pleiades: 07/06/2010

Sentinel-2: 09/08/2018

Copyright: Pleiades © CNES (2018), Distribution: Airbus DS

Sentinel-2 © Copernicus Sentinel data (2018)

Map produced by SERTIT



Damage assessment of Banjaran and Dangjeng Desa, Kecamatan District, Lombok Island, Indonesia

Source: Pleiades

Acquired: 07/06/2010

Copyright: Pleiades © CNES (2018), Distribution: Airbus DS

Map produced by

UNITAR/UNOSAT



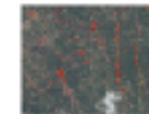
Potentially Damaged Buildings & Gathering Sites over Gil Islands, Lombok -Lila District, Indonesia

Source: Pleiades

Acquired: 07/08/2018 & 06/06/2010

Copyright: Pleiades © CNES (2018), Distribution: Airbus DS

Map produced by UNITAR/UNOSAT



Damage assessment of South West of Salangan, Lombok Island, Indonesia

Source: Pleiades

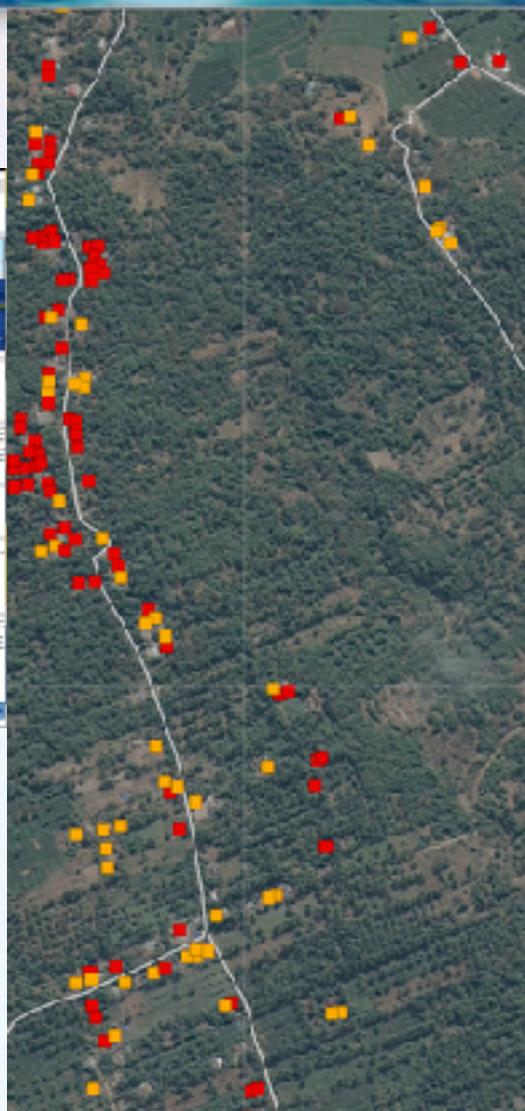
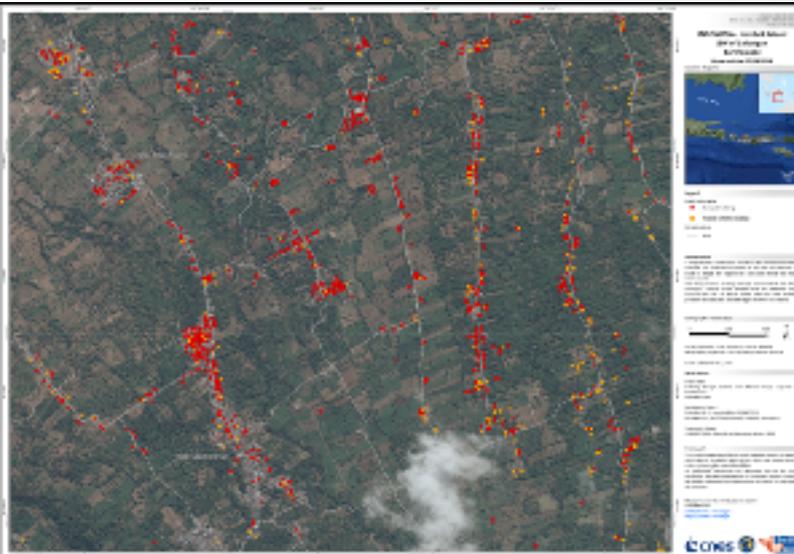
Acquired: 07/08/2018

Copyright: Pleiades © CNES (2018), Distribution: Airbus DS

Map produced by SERTIT



# Earthquake in Indonesia 06 August 2018



## Legend

### Crisis information

- Damaged building
- Probably affected building

### Infrastructure

- Road

### Interpretation

A magnitude 6.5 earthquake has struck the Indonesian island of Lombok. The neighbouring island of Bali was also affected. At least 91 people are reported to have been killed with many more injured.

This map presents building damage assessment to the SW of Saingan, Lombok island, derived from the Pleiades image acquired the 7th of August 2018. There are 268 buildings probably affected and 1033 damaged detected in the area.

### Cartographic information



Local projection: UTM Zone 53 S, Datum: WGS 84

Geographic projection: Lat/Lon (DMS), Datum: WGS 84

Scale: 1:5 000 for A1 prints

### Data Sources

Crisis layers

Building damage derived from Pleiades image acquired the 07/08/2018  
© SERTT 2018

Background layers

Pleiades-1R 1A acquired the 07/08/2018  
© CNES 2018, distribution Airbus Defense and Space



# Earthquake in Indonesia 06 August 2018



## INDONESIA

Gili Islands / Gili Indah Desa / Lombok Utara District / Pemenang Regency

Imagery analysis: 7 & 8 August 2018 | Published 8 August 2018 | Version 1.0



EQ201808050N



### Potentially Damaged Buildings & Gathering Sites over Gili Islands, Lombok Utara District, Indonesia

This map illustrates satellite-detected potentially damaged buildings and gathering sites over Gili Islands as of 8 August 2018, after the 6.9 earthquake that struck Lombok Island on 5 August 2018. The analysis was conducted using a post-event Pleiades satellite image acquired on 8 August 2018. UNTAR-UNOSAT analysis identified minor damage over Gili Islands, 15 potentially damaged buildings, mostly observed in Gili Air and 8 potentially gatherings sites in Gili Trawangan island. Kindly note that Google Earth was used as Pre-event imagery, it might have decreased the confidence level of the analysis. This is a preliminary analysis and has not yet been validated in the field. Please send ground feedback to UNTAR-UNOSAT.

#### Legend

- Potential damage building
- Potential gathering site
- Ferry terminal
- Coastline
- District boundary



Analysis conducted with ArcGIS v10.4.1  
Coordinate System: GCS 1984 UTM Zone 48S  
Projection: Transverse Mercator  
Datum: WGS 1984  
Units: Meter



Imagery Date: Pleiades  
Imagery Date: 7 & 8 August 2018  
Resolution: 30 cm  
Copyright: CNES 2018, Distribution Airbus Defense and Space  
Sensor: Airbus Defense and Space

Road Data: OpenStreetMap  
Administrative boundaries: SP  
Other Data: USGS, UNCC, UNCC, NSG, NSG  
Analysis: UNTAR-UNOSAT  
Production: UNTAR-UNOSAT



The depiction and use of boundaries, geographic names and related data shown here are not warranted to be error-free nor do they imply official endorsement or acceptance by the United Nations. UNOSAT is a program of the United Nations Institute for Training and Research (UNITAR) providing satellite imagery and related geographic information, research and analysis to UN member states & development agencies & their implementing partners. The work by UNTAR-UNOSAT is licensed under a CC BY-NC 3.0.



# Fuego Volcano in Guatemala

## 05 June 2018



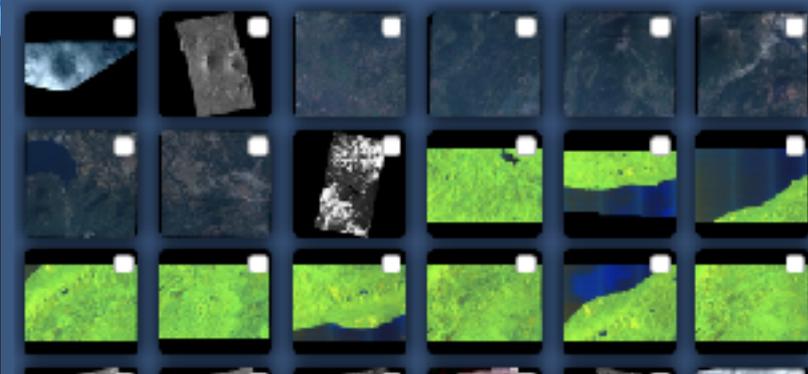
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## Charter activations

Activation 576 Acquisitions 136 Products 56

Resolution  High  Low  Medium  Very high  Very low  
Sensor  Optical  Radar

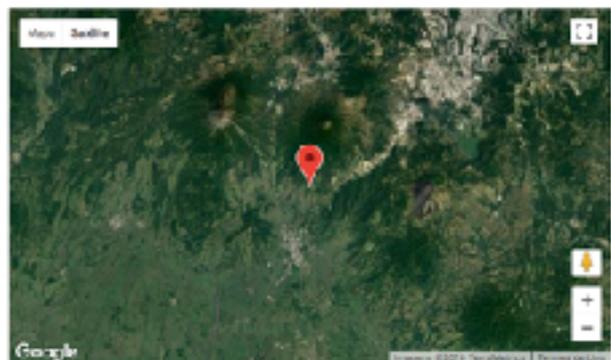
Show / hide all acquisitions images on the map



### 05 June 2018

## Fuego Volcano in Guatemala

[Browse activations on map](#)



Type of Event:	Volcano
Location of Event:	Guatemala
Date of Charter Activation:	2018-06-06
Time of Charter Activation:	09:12
Time zone of Charter Activation:	UTC+02:00
Charter Requestor:	CONRED
Activation ID:	576
Project Management:	DLR

Guatemala's Fuego volcano has erupted, covering villages in volcanic ash and debris during its most powerful eruption in over 100 years. Local reports confirm at least 68 people have been killed with many more still missing.

A state of emergency was declared as 3,000 people living near the volcano were evacuated to temporary shelters. The town of El Redo was worst affected, with rescuers still trying to reach the other nearby towns of Alotenango and San Miguel Las Lotes.

The eruption closed Guatemala's main international airport as columns of ash and smoke rose 10km into the air. The falling ash and rock has also covered the villages and coffee farms which sit on the slopes of the volcano.

Searchers and firefighters assisting emergency workers are still searching for missing people in the dense covering of ash, mud and rock with at least 10 people being pulled from the lava flows by helicopter.

Metadata: `atroposd01-DLR-DEGA_WISG_A_DV_wf0a_010_R_2018-06-06T09:12:07Z_0020022`

Activation: 576

Start Date: Wednesday, May 23, 2018, 08:02 AM End Date: Wednesday, May 23, 2018, 12:01 AM



Resolution: 100

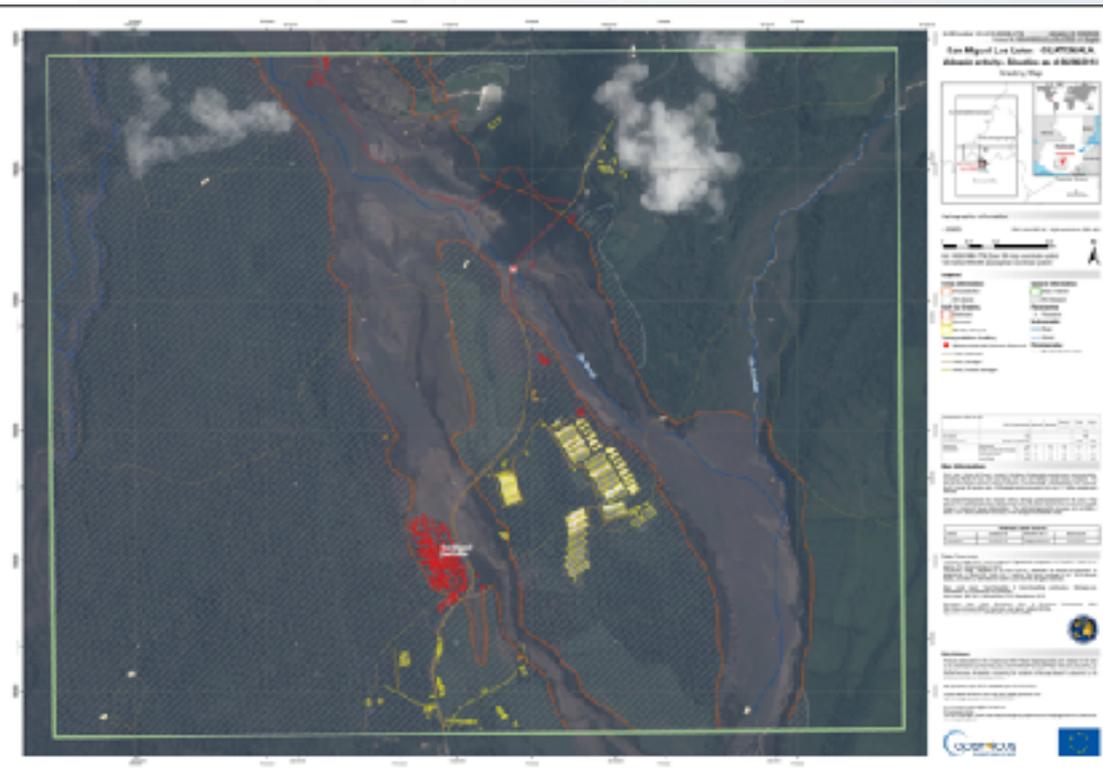
Size: 1433x1048

Sensor: 000 Type: 00



# Fuego Volcano in Guatemala

## 05 June 2018





**GUATEMALA**  
 Volcano de Fuego  
 Inagrupados: 4 Jun 2018 | Publicado: 7 Jun 2018 | Versión: 1.0





**Volcano de Fuego: Estimation of Damaged Buildings in San Miguel de Los Lotes and surrounding area, Guatemala**

This map contains an estimation of the number of buildings potentially affected by gravitational debris flows triggered by the eruption of Fuego using a Sentinel-2 satellite image collected on 4 June 2018. UNCSIT-UNEP/WHO estimates 471 buildings at risk from debris flow generated by ~700 000 m<sup>3</sup> of ash and sand that the vicinity of the Miguel Aguilar observed the onset of the eruption. The map is included in the extent of the gravitational flow. This is a preliminary map and has not yet been validated in the field. Please refer to the report for further information.

**Legend**

- Blue square: Buildings at risk of gravitational flow
- Red square: Potential damaged buildings
- Red circle: Potential flow of a debris flow (gravitational flow)



**Map Data**  
 Satellite: Sentinel-2  
 Date: 04 Jun 2018  
 Resolution: 10m









# Flood in Bolivia

## 08 February 2018

08 FEBRUARY 2018

### Flood in Bolivia

[Browse activations on map](#)

Type of Event:	Flood
Location of Event:	Bolivia
Date of Charter Activation:	2018-02-08
Time of Charter Activation:	22:12
Time zone of Charter Activation:	UTC+01:00
Charter Requester:	UC0jS1NAG2b-4P/1D6C1
Activation ID:	565
Project Management:	ABAE

### Products

<p><b>Flood in Tupiza in Potosí Department</b>          Source: Phébus          Acquired: 09/02/2018          Copyright: Phébus © CNRS (2018) - Distribution: Airbus Defence and Space, all rights reserved. Map produced by ABAE</p>	<p><b>Flooding on the Karalí River, La Paz Department</b>          Source: TerraSAR-X          Acquired: 12/02/2018          Copyright: TerraSAR-X © DLR e. V. 2018, Distribution: Airbus DS Geo GmbH. Map produced by ABAE</p>
<p><b>Damage to the wall of Yullo de Zongo, La Paz Department</b>          Source: Phébus          Acquired: 03/02/2018          Copyright: Phébus © CNRS (2018) - Distribution: Airbus Defence and Space, all rights reserved. Map produced by ABAE</p>	<p><b>Satellite detected waters in Santa Ana del Yacuma</b>          Source: RADARSAT-2          Acquired: 12/02/2018          Copyright: RADARSAT-2 Data and Products © Meteor Technologies Ltd. (2018) - All Rights Reserved. RADARSAT is an official trademark of the Canadian Space Agency. Map produced by ABAE</p>
<p><b>Satellite detected waters over El Beni department</b>          Source: RADARSAT-2          Acquired: 12/02/2018          Copyright: RADARSAT-2 Data and Products © Meteor Technologies Ltd. (2018) - All Rights Reserved. RADARSAT is an official trademark of the Canadian Space Agency. Map produced by ABAE</p>	<p><b>Satellite detected waters over Cochabamba department</b>          Source: Sentinel-1/ MCR1547-2          Acquired: Sentinel-1: 02/02/2018 and 12/02/2018          Copyright: Sentinel-1 © Copernicus Sentinel data (2018) RADARSAT-2 Data and Products © Meteor Technologies Ltd. (2018) - All Rights Reserved. RADARSAT is an official trademark of the Canadian Space Agency. Map produced by UNISPA, NSGA</p>

Recent rainfall in southern Bolivia has caused severe flooding with local authorities declaring a state of emergency. Seven of the nine departments in the country have been effected, and authorities have reported that 60,000 people have been forced from their homes.

The floods follow days of heavy rain and particularly affect the southern part of the nation along the border with Paraguay and Argentina; which is also experiencing floods.

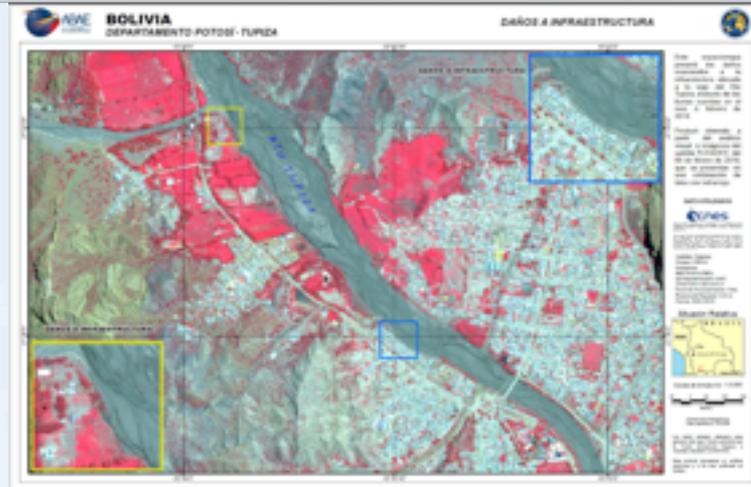
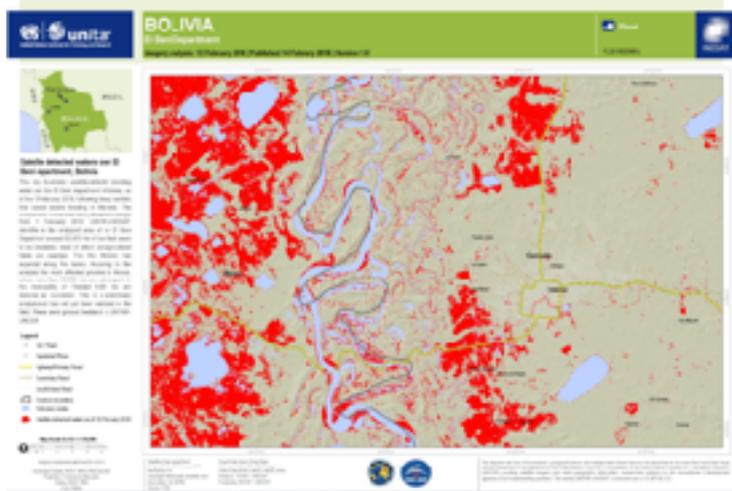
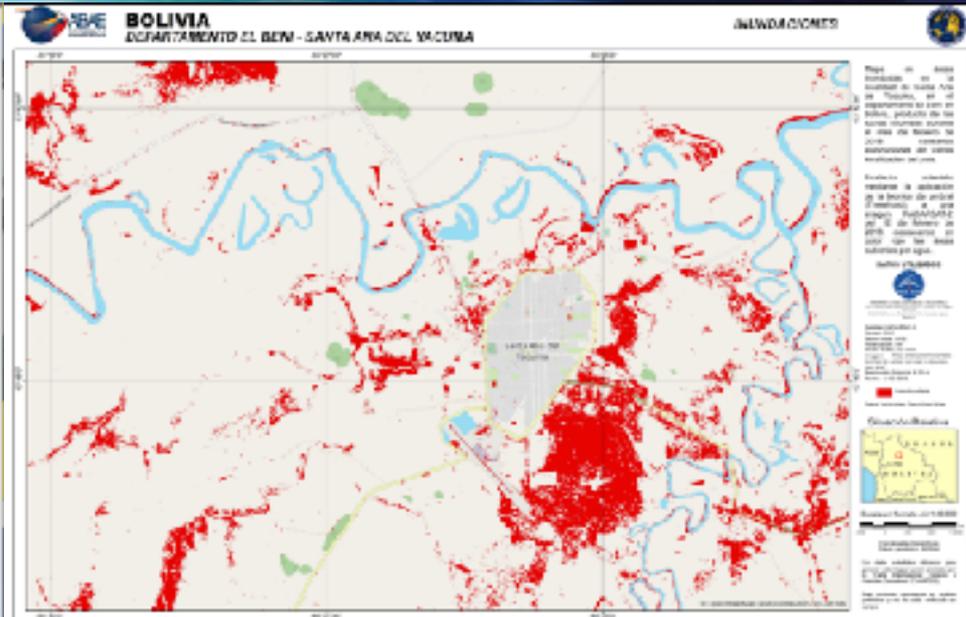
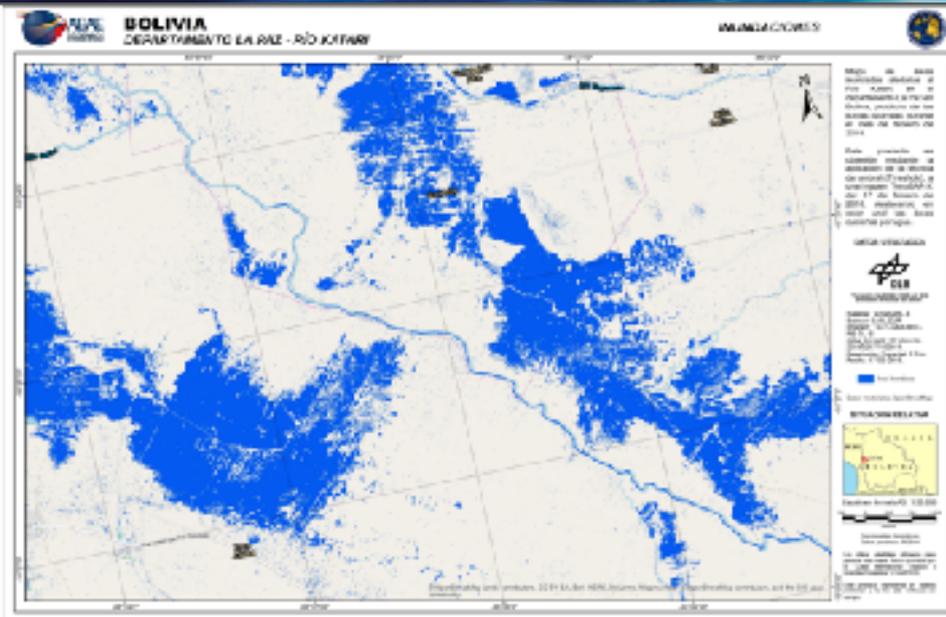
The rain caused the Tupiza river to overflow, flooding the city which shares the same name and affecting an estimated 1000 people. Reports indicate flood waters reached as high as 7 metres in some places.

Due to the flood conditions, some roads in the affected regions have been inundated, making them impossible for relief efforts.



# Flood in Bolivia

## 08 February 2018





# Flood in Argentina

## 03 February 2018



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# Charter activations

03 FEBRUARY 2018

## Flood in Argentina

[Browse activations on map](#)



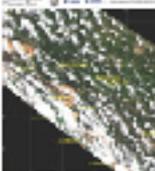
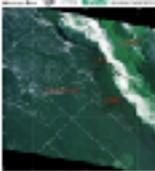
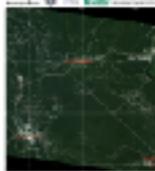
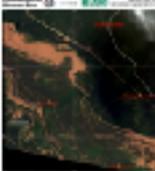
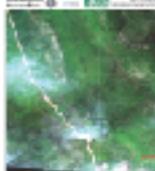
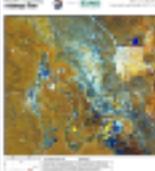
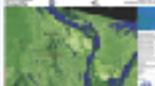
Type of Event:	Floods
Location of Event:	Argentina
Date of Charter Activation:	2018-02-03
Time of Charter Activation:	04:51
Time zone of Charter Activation:	UTC+05:00
Charter Requestor:	Sec. Nacional de Protección Civil Argentina - Ministerio de Seguridad - SIFEM - ARGENTINA
Activation ID:	564
Project Management:	CONAE

Heavy rains across Argentina and Bolivia have caused widespread damage with authorities activating emergency operations to evacuate residents and provide aid.

Over 10 thousand residents were evacuated from villages along the Pilcomayo River, northwest Argentina. The floodwaters washed away homes and cars as heavy rains persisted for days.

In the town of Salta residents were airlifted to safety after the Pilcomayo river rose over 6 metres. Officials said the water is expected to rise further over the coming days.

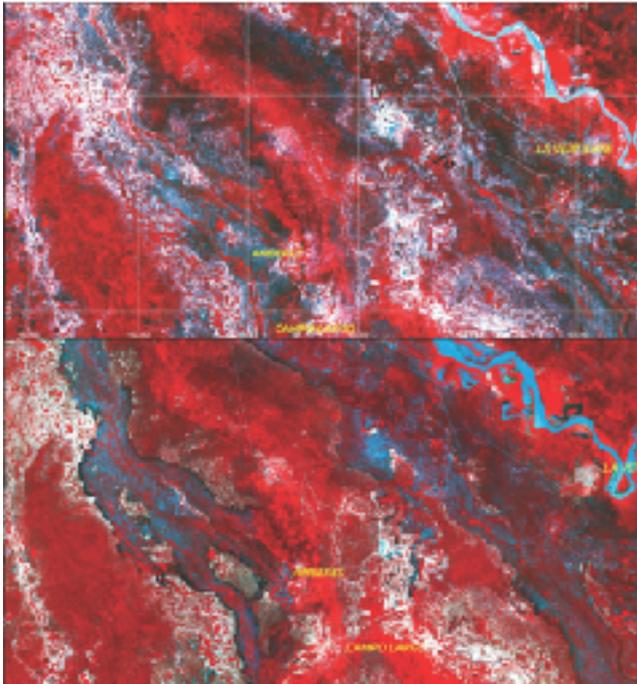
### Products

	<p>Flooding on the Pilcomayo River</p> <p>Source: SPOT-6 Acquired: 18/02/2018</p> <p>Copyright: SPOT-6 © CNES 2018 - Distribution: Airbus DS, all rights reserved Map produced by CONAE</p>		<p>Flooding on the Pilcomayo River</p> <p>Source: SPOT-7 Acquired: 18/02/2018</p> <p>Copyright: SPOT-7 © CNES 2018 - Distribution: Airbus DS, all rights reserved Map produced by CONAE</p>
	<p>Flooding on the Pilcomayo River at Obispo La Represa</p> <p>Source: WorldView-3 Acquired: 12/02/2018</p> <p>Copyright: WorldView-3 © DigitalGlobe Inc. Map produced by CONAE</p>		<p>Flooding on the Pilcomayo River at La Vista Perdida</p> <p>Source: WorldView-3 Acquired: 12/02/2018</p> <p>Copyright: WorldView-3 © DigitalGlobe Inc. Map produced by CONAE</p>
	<p>Flooding on the Pilcomayo River at El Chuaco</p> <p>Source: WorldView-3 Acquired: 12/02/2018</p> <p>Copyright: WorldView-3 © DigitalGlobe Inc. Map produced by CONAE</p>		<p>Flood on the Pilcomayo River at San Juan</p> <p>Source: WorldView-3 Acquired: 12/02/2018</p> <p>Copyright: WorldView-3 © DigitalGlobe Inc. Map produced by CONAE</p>
	<p>Flooding on the Pilcomayo River at Santa Victoria</p> <p>Source: WorldView-3 Acquired: 08/02/2018</p> <p>Copyright: WorldView-3 © DigitalGlobe Inc. Map produced by CONAE</p>		<p>Floods at Santa Victoria, Argentina</p> <p>Source: WorldView-3 Acquired: 03/02/2018</p> <p>Copyright: WorldView-3 © DigitalGlobe Inc. Map produced by CONAE</p>
	<p>Flooding on the Pilcomayo River at Santa Maria</p> <p>Source: TerraSAR-X Acquired: 06/02/2018</p>		<p>Flooding on the Pilcomayo River at Amancay</p> <p>Source: SPOT-6 Acquired: Pre-classic 03/01/2018</p>



# Flood in Argentina 03 February 2018

Flood in Argentina  
Pilcomayo River February 03th, 2018  
International Charter Call ID: 6487



**Description of the data:**  
This data was generated using the Sentinel-1 SAR data from the Copernicus Sentinel-1 mission. The data was processed using the Sentinel-1 Toolbox and the Sentinel-1 Flood Detection Algorithm. The data was generated on February 03th, 2018.

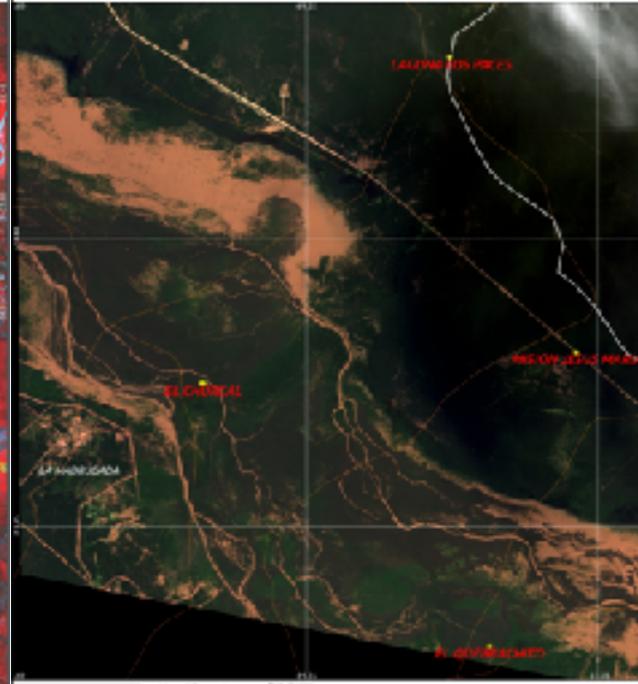
**Legend:**  
Flooded Area  
Non-Flooded Area

**Map Coordinates:**  
Latitude: 26° 30' S  
Longitude: 64° 30' W

**Scale:**  
1:100,000

**Source:**  
Copernicus Sentinel-1

Flood in Argentina  
Pilcomayo River February 03th, 2018  
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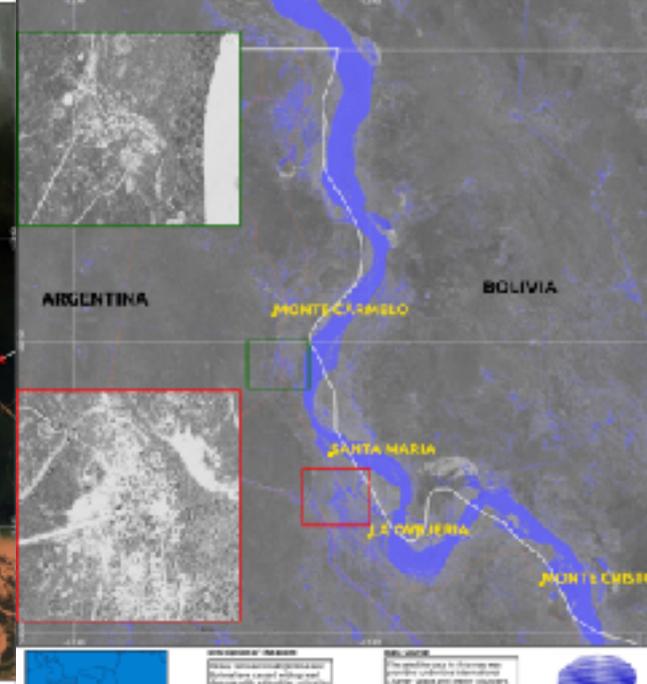
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# Universal Access

Launched in September 2012

Any **national disaster management authority** can apply to become a Charter Authorized User



# Authorized Users

Must be a national disaster management authority or its delegated agency in that country



Must have the capacity to download and use maps



Must be able to submit and pursue an activation request in English





# Registration

A registration form\* (in English, French and Spanish) is available for national authorities to express interest in becoming a Charter Authorized User:

The candidate fills in the questionnaire providing all required information.

The questionnaire, with an official cover letter from the organisation, must be sent to:

**[ExecutiveSecretariat@disasterscharter.org](mailto:ExecutiveSecretariat@disasterscharter.org)**

The request is assessed by the Charter members.

\*The form may be downloaded together with the Information brochure from the Charter website:

**[www.disasterscharter.org/web/guest/activating-the-charter](http://www.disasterscharter.org/web/guest/activating-the-charter)**

or **[www.disasterscharter.org/web/guest/home](http://www.disasterscharter.org/web/guest/home)**





# Conclusion

Space technologies can deliver key information that brings benefit to the definition, planning, implementation, monitoring & assessment of disaster relief operations.

The Charter is focused on the immediate response phase and services of national disaster management centres and the International Humanitarian community (e.g. UN).

It is growing: 583 disasters covered since 2000 in 125 countries worldwide.

Building on a decade of success in making satellite data available to users for disaster response, the Charter is now opening its doors even wider with Universal Access.

Universal Access benefits national users in countries beyond those of the Charter members, who were previously unable to make direct requests to the Charter during emergency situations.

Currently, there are 20 AUs nominated thanks to the UA process in the following countries: Australia, Belarus, **Bolivia, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala**, Iraq, Madagascar, Malawi, Myanmar, New Caledonia, Pakistan, **Paraguay, Peru**, Sri Lanka and **Uruguay** and the list is growing.



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# International Charter Space and Major Disasters

**[www.disasterscharter.org](http://www.disasterscharter.org)**

**Thank You!**

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

[ExecutiveSecretariat@disasterscharter.org](mailto:ExecutiveSecretariat@disasterscharter.org)

General requests for information should be addressed to

[webmaster@disasterscharter.org](mailto:webmaster@disasterscharter.org)





# Disasters Course

The course will present digital image processing techniques for identifying damages and producing maps in support of disaster response, as well as, the use of **Sentinel data and ESA tools for Disaster mapping**.

TerraView and SPRING, INPE free and open source tools, and ESA toolboxes **GEP (Geohazards Exploitation Platform)** and **SNAP (Sentinel Application Platform)** will be used during hands-on activities.

By the end of the course, the participants will be able to:

- Select and obtain appropriate images for disaster applications

- Perform some skills of image processing: registration and geometric correction, image mosaic, enhancement and export