



INTERNATIONAL CHARTER SPACE & MAJOR DISASTERS

International Charter ,Space and Major Disasters‘

Satellite-based support for disasters worldwide

Jens Danzeglocke (German Space Agency at DLR)

UN-SPIDER / ZFL Regional Virtual Expert Meeting for Southern Africa:
“Space-based Solutions for Disaster Risk Management and Emergency Response”,
13-15 July 2021



History

Following UNISPACE III in 1999, the International Charter 'Space and Major Disasters' was established by the Space Agencies of Europe (ESA), France (CNES), and Canada (CSA).

Charter became operational in Nov. 2000





Purpose and scope

The Charter supports with space-based data and information emergency response after major disasters, such as

- **Sudden natural events:** floods, storms, landslides, fires, earthquakes, volcanic eruptions etc.
- **Man-made events:** large industrial accidents and oil spills

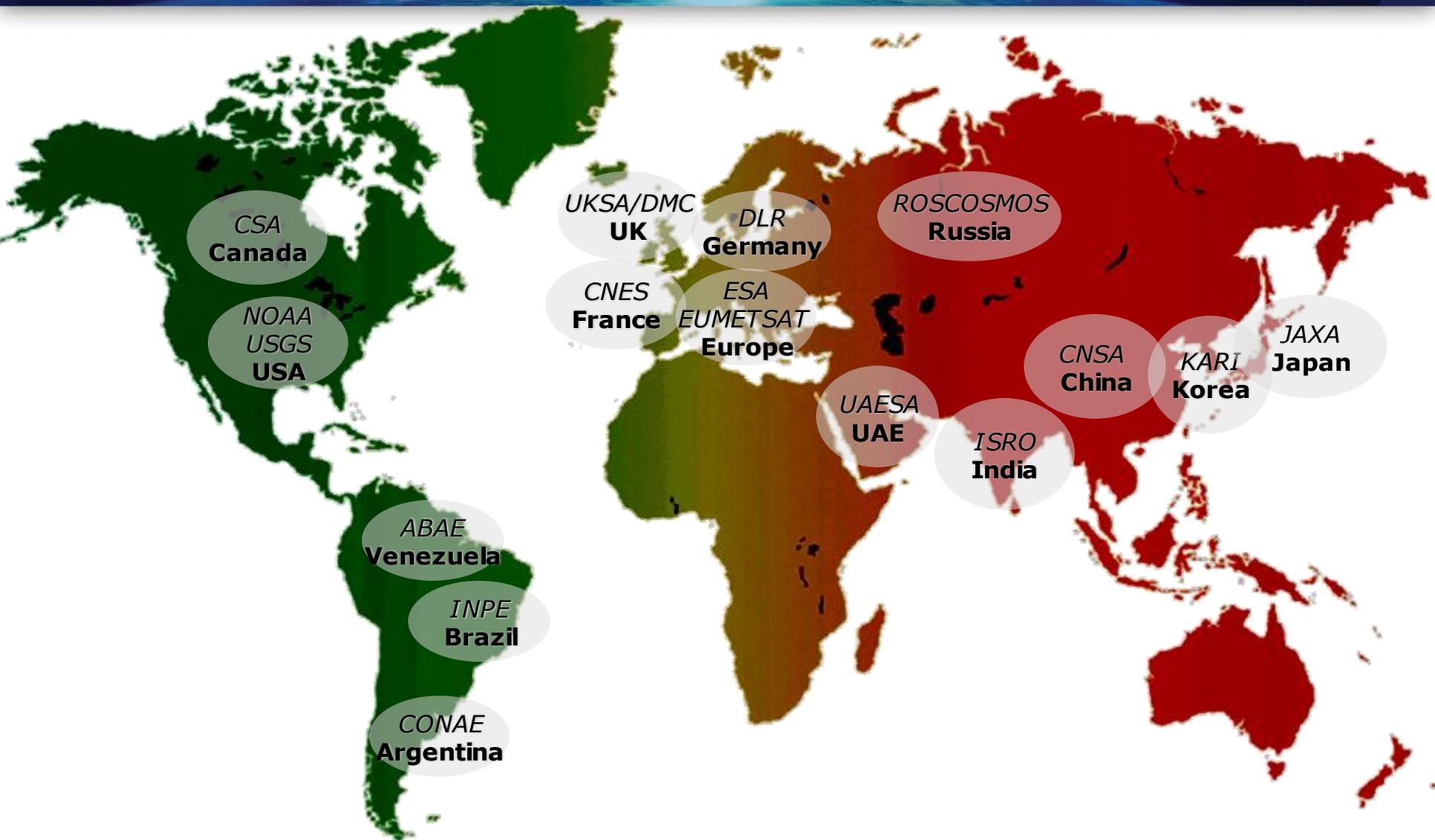
The Charter does not cover emergencies caused by armed conflicts.



The Charter is **available 24/7**. When activated it executes **priority tasking** of numerous Earth-observing satellite missions in a rapid fashion and provides images and/or derived products.

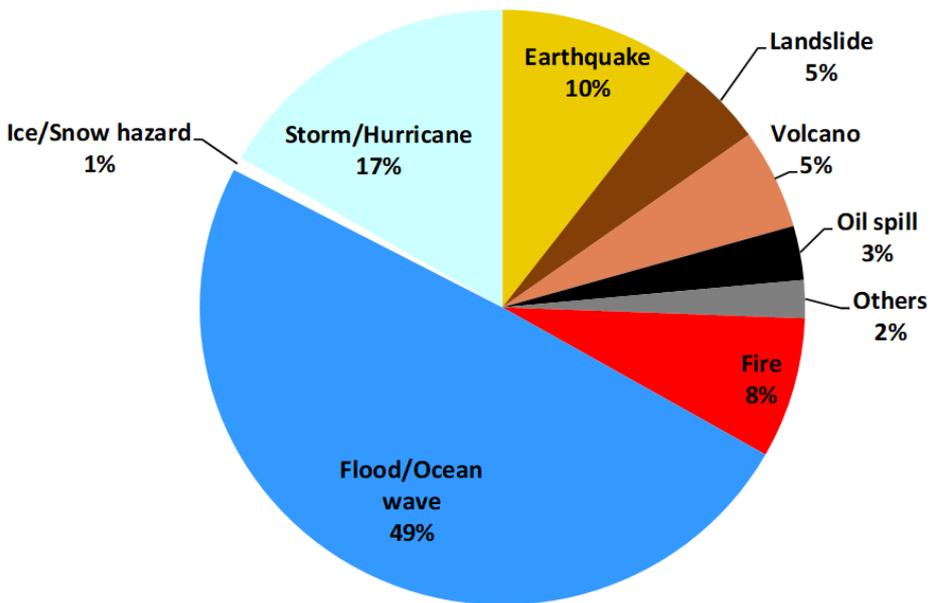


Membership

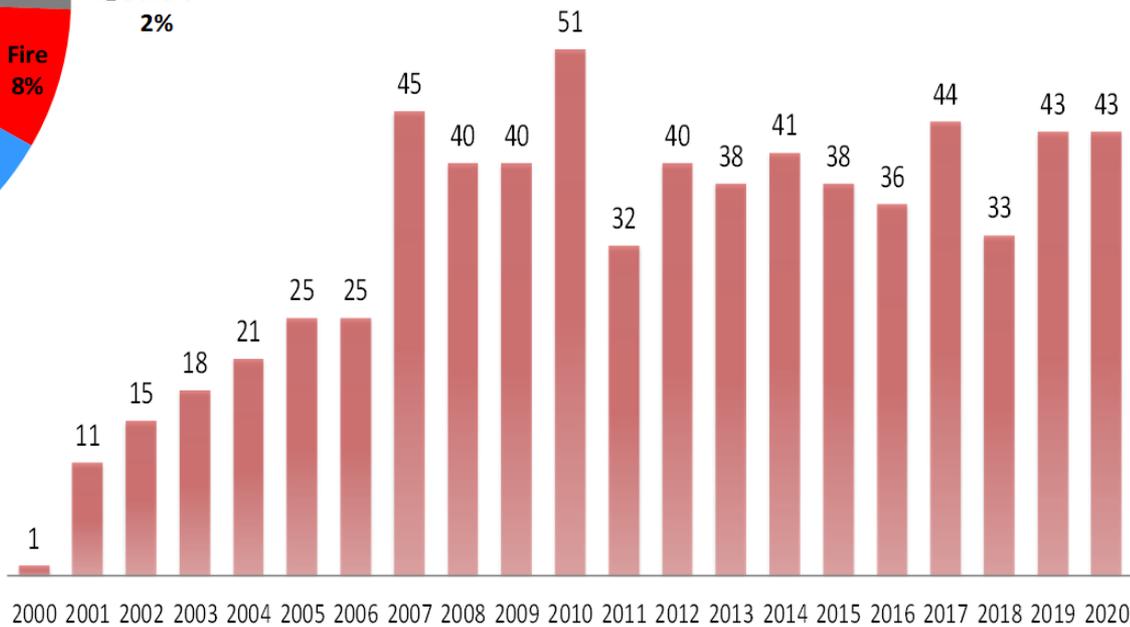




Activation Statistics

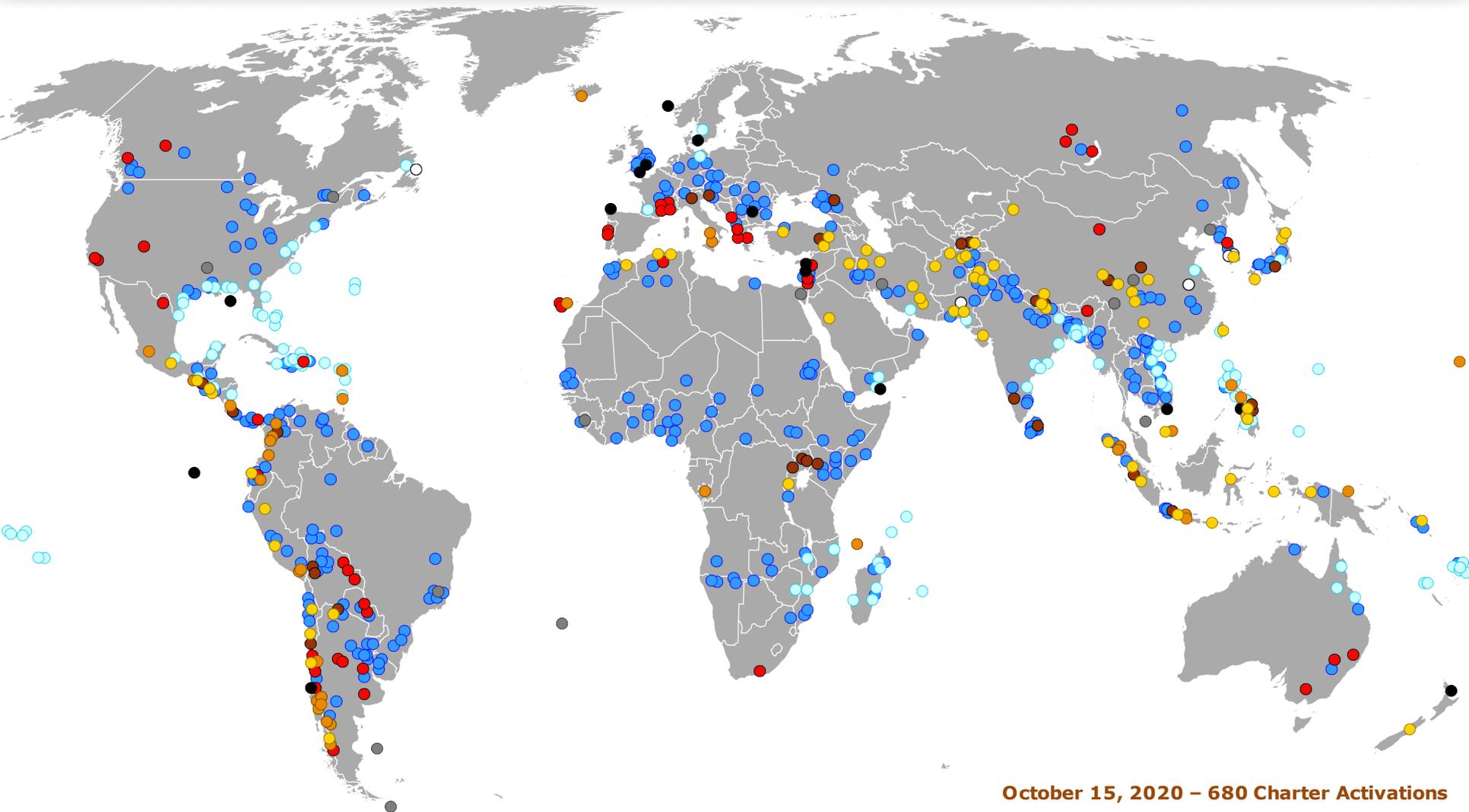


Activation statistics as of 15 Oct. 2020





Distribution of Charter activations: Support to disaster response in more than 120 countries



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



How the web-based of the Charter Operational System (“COS-2”) supports activations

Call Details Dashboard: Activation-628 (Call-722) - Flood (large area) in KENYA

Call status:
PM nominated (Awaiting PM Report submission)

EOD Dossier: EOD-005518R-722.pdf
PM Report: --
URFs: URF-722.pdf
KMLs: primary-722.kml
SRF: --
Published on the Public Site: YES
Charter Geobrowser: see in UGT

Files received

Date submitted:
31 Oct 2019 20:48

Elapsed time:
03:13:20
Days Hours Minutes

Progress:
5m EOD Confirmation
4h EOD Reception
5.5h PM Nomination
1st Image Received

ERF (See full list)

Agency	AnI ID	File Name	Sent Date	Sent By
ONES	Call-722 ID: 1; 2; 3; 4; 5	ONES-722-1-ERF.doc	31 Oct 2019 21:35	EOI_ESA
ONSA	Call-722 ID: 1; 2; 3; 4; 5	ONSA-722-1-ERF.doc	31 Oct 2019 21:35	EOI_ESA
CSA	Call-722 ID: 1; 2; 3; 4; 5	CSA-722-1-ERF.doc	31 Oct 2019 21:35	EOI_ESA
DLR	Call-722 ID: 1; 2; 3; 4; 5	DLR-722-1-ERF.doc	31 Oct 2019 21:35	EOI_ESA
ESA	Call-722 ID: 1; 2; 3; 4; 5	ESA-722-1-ERF.doc	31 Oct 2019 21:35	EOI_ESA
INPE	Call-722 ID: 1; 2; 3; 4; 5	INPE-722-1-ERF.doc	31 Oct 2019 21:35	EOI_ESA
JAXA	Call-722 ID: 1; 2; 3; 4; 5	JAXA-722-1-ERF.doc	31 Oct 2019 21:35	EOI_ESA
KARI	Call-722 ID: 1; 2; 3; 4; 5	KARI-722-1-ERF.doc	31 Oct 2019 21:43	EOI_ESA
PLANET	Call-722 ID: 1; 2; 3; 4; 5	PLANET-722-1-ERF.doc	31 Oct 2019 21:39	EOI_ESA
ROSCOSMOS	Call-722 ID: 1; 2; 3; 4; 5	ROSCOSMOS-722-1-ERF.doc	31 Oct 2019 21:39	EOI_ESA
USGS	Call-722 ID: 1; 2; 3; 4; 5	USGS-722-1-ERF.doc	31 Oct 2019 21:39	EOI_ESA

AAP (See full list)

Agency	AnI ID	File Name	Upload Date	Type
ROSCOSMOS	Call-722 ID: 1; 2; 3	ROSCOSMOS-722-AAP.csv	01 Nov 2019 05:41	Program
ESA	Call-722 ID: 1; 2; 3	ESA-722-AAP.csv	04 Nov 2019 09:04	Program
ONSA	N/A	ONSA-722-AAP.csv	04 Nov 2019 08:12	Program
DLR	N/A	DLR-722-AAP.csv	01 Nov 2019 09:18	Program
KARI	N/A	KARI-722-AAP.csv	01 Nov 2019 01:15	Program/Archive

Value Added Product

Call ID	AnI ID	Title	Upload Date	Metadata / Quick Look / Product
722	N/A	Satellite-detected water extents, as of 2 November 2019 over Wajir East Sub County, Wajir County of Kenya	03 Nov 2019 16:57	
722	N/A	Satellite-detected water extents, as of 28 October 2019 over Garsen Sub County, Tana River County of Kenya	02 Nov 2019 08:05	
722	Call-722 ID: 1	Satellite-detected water extents, as of 28 October 2019 over Wajir East Sub County, Wajir	02 Nov 2019	

Call Contacts

Alt/EB: [UNITAR-UNOSAT] ☒

EU: [United Nations Office for the Coordination of Humanitarian Affairs (OCHA), Regional Office for Southern and Eastern Africa (ROSEA)] ☒

DDO: odo odo ☒

EOI: EOI_ESA ☒

+39 06 ☒

PM: [UNITAR] ☒

Nominated: 01 Nov 2019 01:11 by ROSCOSMOS

Affected Areas

Additional Information:
Floods in North Eastern part of Kenya - affecting parts of Mandera, Wajir and Marsabit counties. SAR and VIR SAR will be needed as it is cloudy

- URF-1MP221.pdf
- URF-722.pdf

Uploaded Map Screenshot (Call-722):
• map image

Real-time Meteorological data:
• NOAA: <https://www.star.nesdis.noaa.gov/GOES/index.php>
• BUITEMSAT: <https://sumetview.esmetsat.int/mapviewer/>

Metadata / Product (Go to products dashboard)

Agency	AnI ID	Satellite	Instrument	Acq Time	Upload Date	Metadata / Quick Look / Product / Edit	Show on Map
ROSCOSMOS	Call-722 ID: 2	RESURS_P	KSHMSA_VR	03 Nov 2019 07:39:13	04 Nov 2019 05:19		<input type="checkbox"/>

COS-2 provides a lot of information for the Project Manager and Value Adders in one place, e.g.:

- Contact Information
- Data acquisitions planned by Charter agencies
- Available image data (metadata, quick looks, full data)
- Areas of Interest
- Derived products (maps)



Further Evolution: Charter Processing Environment

The Charter Board approved the implementation of a Charter Processing Environment proposed by ESA. The Processing Environment:

- aims to **support Charter Project Managers and Value-Adding providers with on-line processing services** during the activations.
- currently in **pre-operational phase**

PRIME Processing Environment
[Act-738/Call-857] Flood Large/Earthquake/Tsunami in Indonesia (Activation 738)

Acquisitions Datasets Value Added Products My Results pm1

User Support Filter results

Results

Context Datasets/Optical

Results for series [chartercalibrateddataset, callid8957],disaster_sensor_type_optical

1 Selected

- Resursat-2 L3 STD 22/05/2020 04:53:13
- ALSAT-1B ALITE L1T 14/03/2020 01:26:57
- ALSAT-1B ALITE L1T 14/03/2020 01:26:56
- VRSS-2 PAN L2B 27/01/2020 02:40:41
- VRSS-2 MSS L2B 27/01/2020 02:40:40
- Resursat-2A L3 STD 30/09/2019 14:01:58
- Kompasat-3A AEISS-A L1G 29/09/2019 05:28:38
- UK-DMC-2 SLIM-6-22 L1T 14/10/2018 00:00:00
- VRSS-1 PAN-1 L2B 04/10/2018 02:29:30
- VRSS-1 MSS-1 L2B 04/10/2018 02:29:29
- VRSS-1 MSS-1 L2B 04/10/2018 02:29:26
- VRSS-1 PAN-1 L2B 04/10/2018 02:29:22
- VRSS-1 MSS-1 L2B 04/10/2018 02:29:22
- UK-DMC-2 SLIM-6-22 L1T 04/10/2018 00:00:00
- Gaofen-2 PMS2 L1A 10/02/2018 10:54:21
- Worldview-1 PAN LV1B 02/10/2018 05:36:04
- Kompasat-3 AEISS L1G 02/10/2018 05:34:54
- Worldview-3 MSI LV1B 02/10/2018 02:50:47
- Worldview-3 PAN LV1B 02/10/2018 02:50:47
- Resursat-2 LAFX STD 02/10/2018 02:28:28
- Resursat-2 LAFX STD 02/10/2018 02:28:17
- Worldview-2 MSI LV1B 01/10/2018 03:26:04

Total results: 26

2021-01-28 2021-04-18

Lon: 116.933 Lat: -1.000

30 km

Processing Services

The Geobrowser of the Charter Processing Environment, looking at optical datasets over a Charter activation in Indonesia.



Authorized Users in >70 countries



The Charter works with Authorized Users – these entities are able to directly trigger a Charter activation.



Authorized Users in >70 countries



In addition, there are agreements with entities allowed to use/trigger the Charter in certain cases:

UNOOSA, UNITAR/UNOSAT, ADRC (Sentinel Asia),
EC-ERCC / Copernicus Emergency Management Service



Universal Access

Any national disaster management authority can become a Charter User!

The following conditions apply:

- The entity must be a national disaster management authority or its delegated agency in that country.
- It must have the capacity to download and use maps.
- It must be able to submit and pursue an activation request in English.

An official letter of the organisation and a filled **Registration Form** (available at <https://disasterscharter.org>) needs to be sent to ExecutiveSecretariat@disasterscharter.org.

Becoming an Authorized User does not happen from one day to the next, but involves an assessment by the Charter members as well as a training and simulation exercise.



Examples: Malawi

Malawi's Department of Disaster Management Affairs became an Authorized User in 2014.

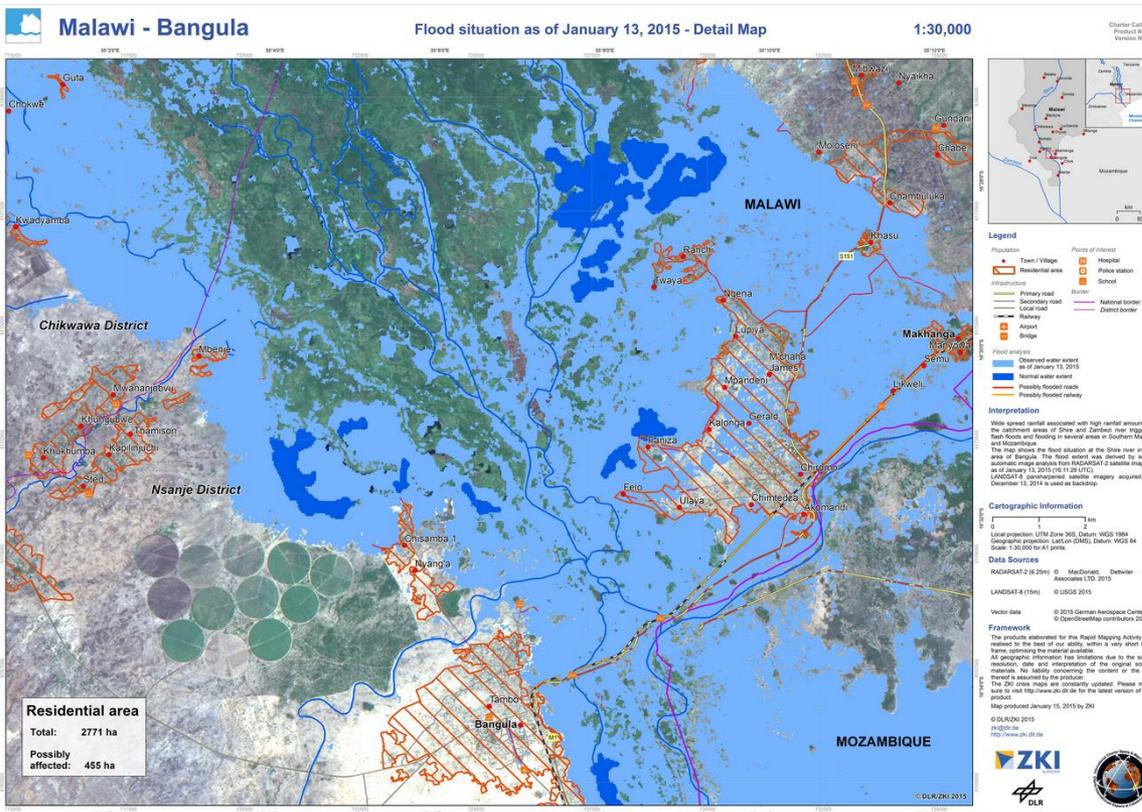
It activated the Charter in 2015 due to major flooding impacting half of the country.



© Shiraz Mohamed/AP



© UNICEF



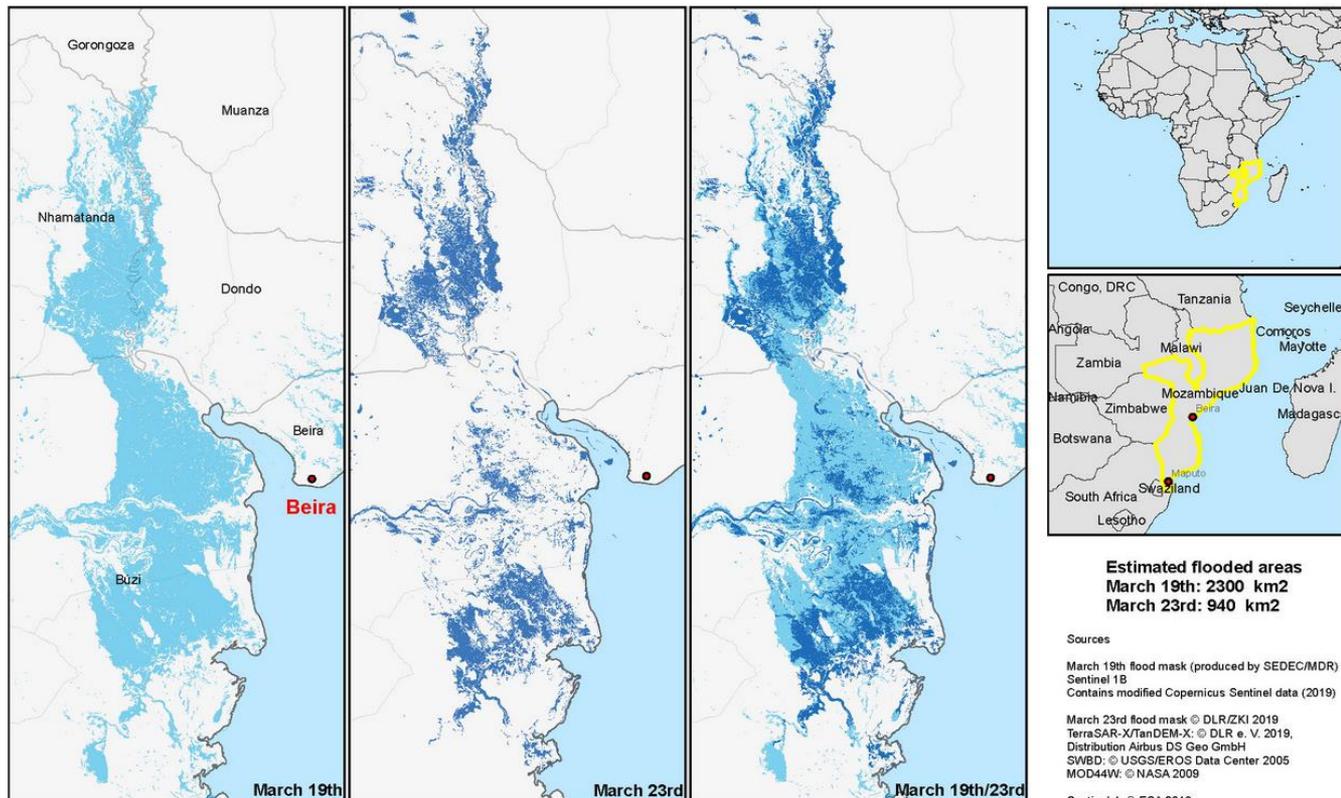
Left: map based on RADARSAT-2 and LANDSAT imagery



Examples: Mozambique

Cyclone Idai brought torrential rain and flooding to Mozambique in March 2019. The Charter received activation requests from CENAD and UNOSAT

Flood regression in Sofala province of Mozambique - Cyclone IDAI - March 19th/23rd - 2019



Sources
 March 19th flood mask (produced by SEDEC/MDR)
 Sentinel 1B
 Contains modified Copernicus Sentinel data (2019)
 March 23rd flood mask © DLR/ZKI 2019
 TerraSAR-X/TanDEM-X; © DLR e. V. 2019,
 Distribution Airbus DS Geo GmbH
 SWBD: © USGS/EROS Data Center 2005
 MOD44W: © NASA 2009
 Sentinel-1: © ESA 2019
 SWBD: © USGS/EROS Data Center 2005
 MOD44W: © NASA 2009
 Product ID: generated by SEDEC/MDR
 (Brazilian Department of Civil Protection and
 Defense / Ministry of Regional Development)

Map produced by SEDEC/MDR based on Sentinel-1 and TerraSAR-X imagery



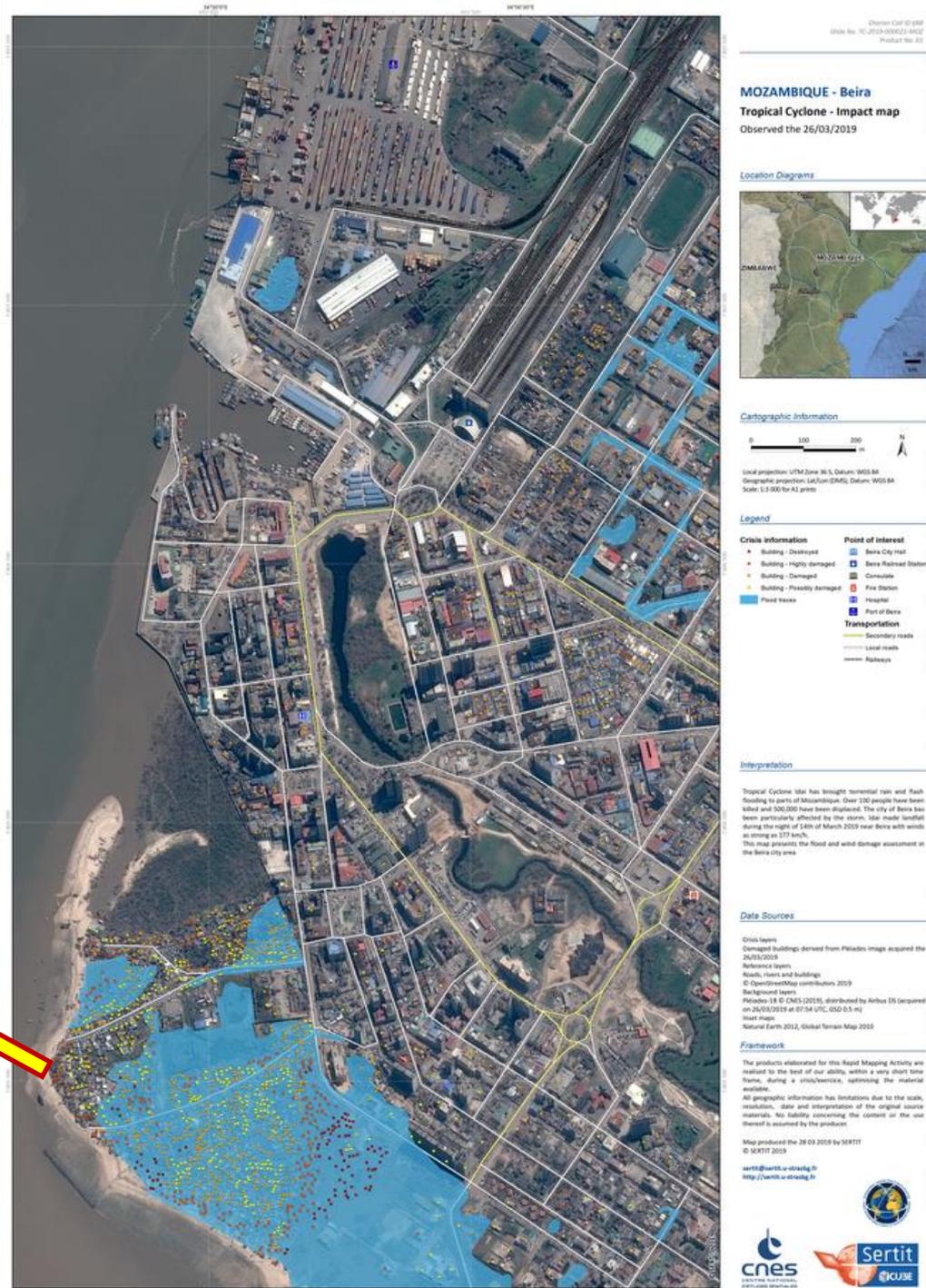


Examples: Mozambique

Several Value-adders contributed to the provision of maps for this Charter activation.



Map produced by SERTIT based on Pleiades very-high resolution imagery





Examples: South Africa

Floods and mudslides in Durban and the surrounding KwaZulu-Natal province of South Africa have killed over 60 people and displaced more than 1000 in April 2019. Charter was activated by UNOOSA on behalf of the National Disaster Management Centre of South Africa.



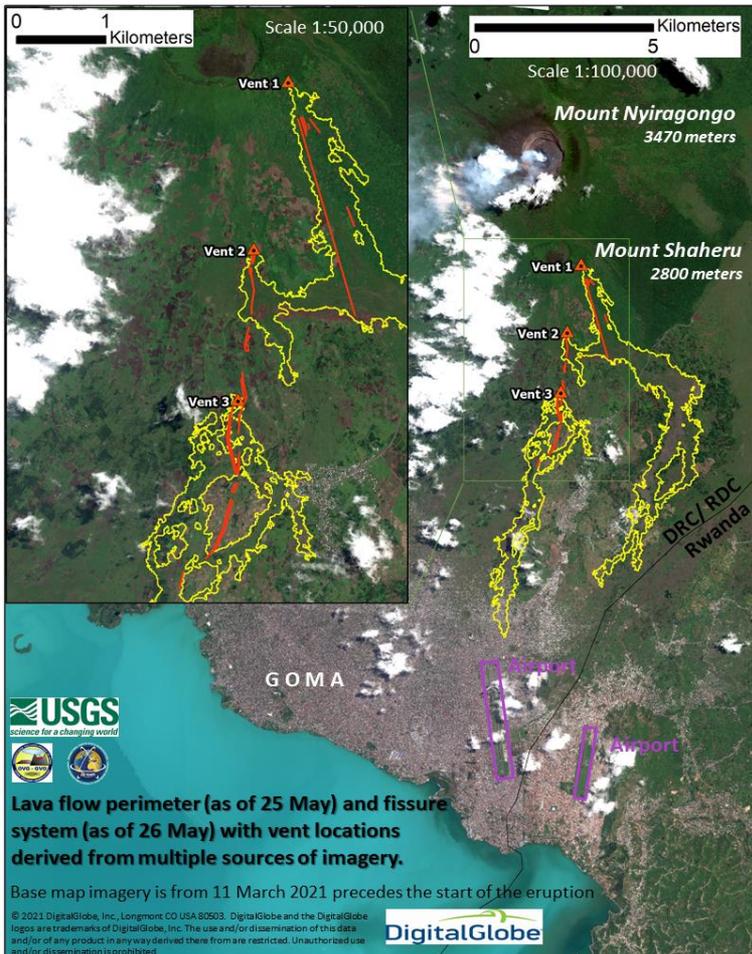
Umlazi Mega City, Durban	
<p>The heavy rainfall in Durban on April 2019 resulted in flooding which resulted in infrastructure damage, displacement and death of over 60 people. The SAR satellite image was used to map status of the flooding as it was happening on April 23rd.</p>	
Legend	
Flooded Area	
Damage Area	
Pleiades image	
<small> Projection: UTM 36S Datum: WGS 1984 Image Acquisition Date: 23/04/2019 Paper size: A4 SANSA, Farm No 502JQ, Hartbeesthoek, District Krugersdorp P.O. Box 484, Silverton, 0127 T: +27 12 842 7800 F: +27 12 842 7809 Email: earthobservation@sansa.org.za http://www.sansa.org.za </small>	
<small> Data Sources: Optical Images supplied by DigitalGlobe, AIRBUS Defence and Space, SAR data supplied by MDA, International Disaster Charter, SANSA, NDMC, and Enven information obtained from NGI Cadastre. </small>	
<small> Disclaimer: Products created in this SANSA Disaster Mapping Rapid response are realised to the best of our abilities within a very short time frame, optimizing available data and information. All geographic information has limitations due to scale, resolution, date and interpretation of the original sources. No liability concerning the contents or the use thereof is assumed by the producer. </small>	

Map produced by SANSA based on Pleiades imagery



Examples: DR Congo

Eruptions of Mount Nyiragongo in May 2021. Maps produced by USGS and UNITAR/UNOSAT

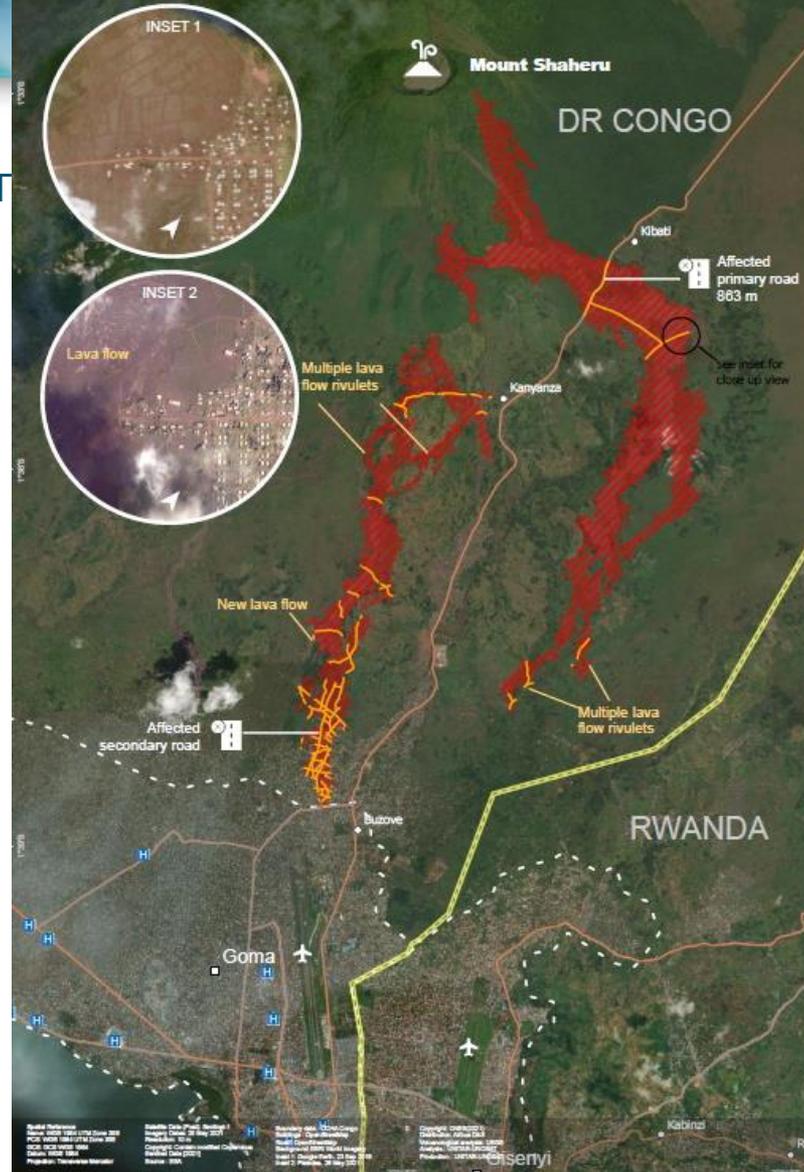


THE DEMOCRATIC REPUBLIC OF THE CONGO GOMA CITY, NYIRAGONGO DISTRICT, NORD-KIVU PROVINCE

IMAGERY ANALYSIS: 25 MAY 2021 PUBLISHED 26 MAY 2021 V1.

POTENTIALLY AFFECTED STRUCTURES 1,722

POTENTIALLY AFFECTED ROADS 18 km



VOLCANO
VO20210523GOD



Lava flow extent and affected structures and buildings caused by the 22 May 2021 Nyiragongo volcanic eruption in Goma, Nord-Kivu Province, D.R. of the Congo

This map illustrates potentially affected structures and buildings in Nyiragongo district, Nord-Kivu province, DR Congo as detected by satellite image acquired after the 22 May 2021 Nyiragongo volcanic eruption. UNITAR-UNOSAT analysis used a Sentinel-1 image acquired on 25 May 2021, at 16:21 UTC, to extract the lava flow extent. Within the map extent, about 1,722 structures and the road about 18 km are potentially affected by the lava flow.

This is a preliminary analysis and has not yet been validated in the field. Please send ground feedback to UNITAR-UNOSAT.



Map Scale for A3: 1:50,000



Conclusions / Societal benefit achieved by the Charter

- The International Charter Space and Major Disasters is a rush-mode mechanism **supporting emergency response by providing quick access to satellite data** and/or derived products – with the intention to help save lives, property, infrastructure, and the environment in cases of major disasters worldwide.
- The Charter has covered **>700 emergencies** caused by disasters **in >120 countries**.
- **Universal Access** encourages disaster management authorities from all countries to become Authorised Users after training.
- The Charter encourages **in-country capacities** to act as “Project Managers” and “Value Adders” (producers of satellite-based maps)
- In fruitful **collaboration with UNOOSA/UN-SPIDER, UNITAR/UNOSAT, Sentinel Asia, and the Copernicus Emergency Management Service**, the Charter intends to help filling the gap between space-faring and space-emerging nations.



Find the Charter at

<https://disasterscharter.org>

<https://twitter.com/disastersChart>

How the Charter works and how users can benefit (5min Video):

<https://www.youtube.com/watch?v=ZvExM-Z3E2w>