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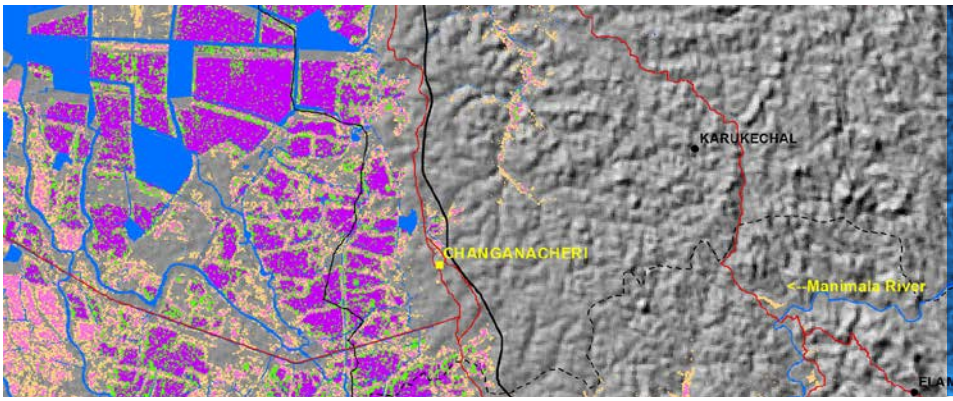
CNES takes the lead

The Centre National d'Etudes Spatiales (CNES) took over as the Charter's lead agency at the 40th Executive Secretariat, Board and Communications Meetings in October 2018.



Severe floods in Kerala, India

The Charter was activated on 16 August 2018 by the Indian Space Research Organisation (ISRO) to support India with devastating floods that struck the state of Kerala.

Spotlight on a Project Manager

Brent Yantis, director of the University of Louisiana at Lafayette Regional Application Center (RAC), explains how they use satellite imagery to aid hurricane disaster recovery.

Bringing together new and efficient space technologies to support disaster management

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CNES takes over chairmanship of the International Charter 'Space and Major Disasters'

The 40th Charter Executive Secretariat, Board and Communications Meetings took place in October 2018 in Toulouse, France. The meetings were hosted by the Centre National d'Etudes Spatiales (CNES), the French Space Agency who took over as the Charter's lead agency on 26 October 2018, succeeding EUMETSAT/DLR.

CNES will hold the chair role for six months, before the Canadian Space Agency (CSA) takes over in April 2019.

During this week of meetings, CNES organized an Authorized Users (AU) and End Users Workshop, which gave Charter members the opportunity to attend presentations from historical Charter partners such as UNOOSA, UNITAR/UNOSAT and from entities such as the National Disaster Reduction Center of China (NDRCC), the Brazilian Disaster Risk Management National Centre (CENAD) and the French Crisis Interdepartmental Management Operational Centre (COGIC), respectively Charter Authorised Users of China, Brazil and France.

Taking the opportunity of the presence of all Charter members, the German Aerospace Center (DLR) presented a new video they produced about the Charter, providing an overview of what the International Charter 'Space and Major Disasters' is, and how it works. The video includes interviews with some of the members of the Executive Secretariat emphasising the operational activities of the Charter, as well as representatives of user organisations that have benefitted from the Charter. It also explains how users - typically disaster management authorities of countries worldwide - can become authorised users and ask for satellite imagery from the Charter in the event of a major disaster.

The video was mostly filmed during the 39th meeting of the Charter and the Project Manager Training session in April 2018 at EUMETSAT in Darmstadt, Germany.

The video is freely available at:
https://www.youtube.com/watch?v=ZvExM-Z3E2w

Participants of the 40th Charter meeting in Toulouse, France

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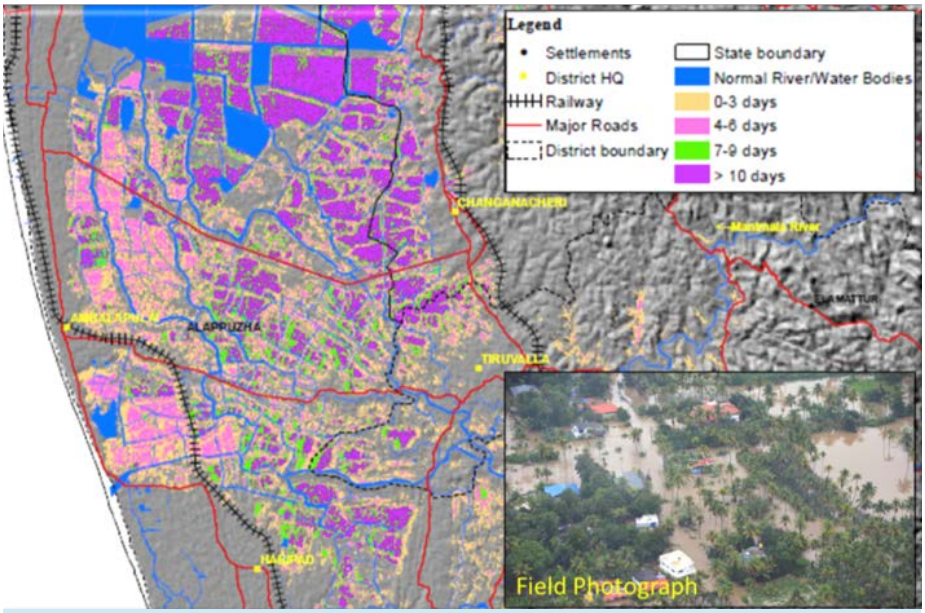
Severe Floods in Kerala, India

India experienced very heavy rainfall in August 2018. In addition, 35 out of the 42 dams in the state had to be opened almost simultaneously. These scenarios resulted in devastating floods in the coastal region. It was one of the most devastating disasters in the history of Kerala.

The Charter was activated (Activation-582) on 16 August by the Indian Space Research Organisation (ISRO), to support the Central Departments (Ministry of Home Affairs, National Disaster Management Authority, etc) and State Departments (Kerala State Disaster Management Authority, etc).

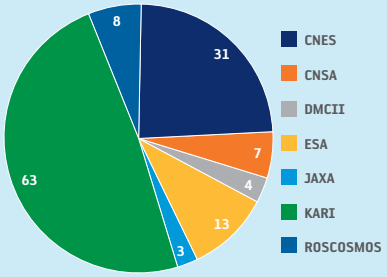
About 130 datasets were received from nine Space Agencies (not including ISRO's contribution) between 17–31 August. The first dataset was received from CNES on 17 August and 63 datasets were received from KARI (mostly SAR data). The minimum time for supply of data was about 1 hour 30 minutes (PLEIADES) and the average time for supply was about two days.

The Sentinel data of the Copernicus programme of the European Union were provided by ESA.

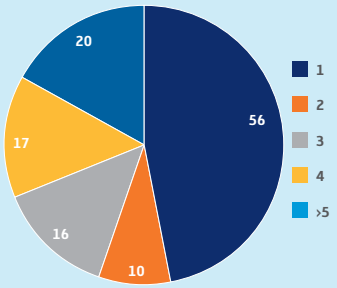


Flood Duration Map for a part of Kerala State (different colours indicate different durations of flood)
Copyright: Charter/ISRO

Several value-added products were generated based on the requirements of the end user, on a near-real time basis, and these products were put to use for organising relief activities. The majority of the SAR datasets were used for mapping the flood inundation areas. Based on multi-date satellite data, the progression and recession areas were also mapped, and this helped to better manage flood relief activities (see picture above). Web map services of these flood inundation layers were also provided through the ISRO-Bhuvan Portal (bhuvan.nrsc.gov.in/disaster), helping users to effectively utilise the value-added products for better management of floods. The State Govt. of Kerala utilised the value-added products effectively and appreciated the timely delivery of information.



Space Agency-wise Data Contribution (> 2 datasets)



Data Acquisition vs Supply

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Seasonality of the Charter activations

Everyone living in an area prone to natural disasters – whether they be hurricanes, tornadoes, fires, or floods – knows that there is a certain seasonality to those events. But is this seasonality also visible in the number of Charter activations?

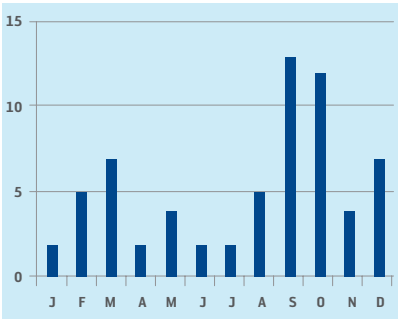
Disaster seasonality describes the notion that events of a certain type are more likely to happen during a given season. This applies to non-geological disasters and, in particular, meteorological events, which tend to be seasonal.

To identify a possible seasonality in the activations of the Charter, we focused on hydro-meteo disasters excluding geological disasters such as earthquakes, landslides and volcanic eruptions, and man-made disasters such as oil spills, dam collapses or epidemics. From a total of 400 activations in the period of 2008-2017, 293 were due to non-geological disasters (cyclones/storms, fires, floods).

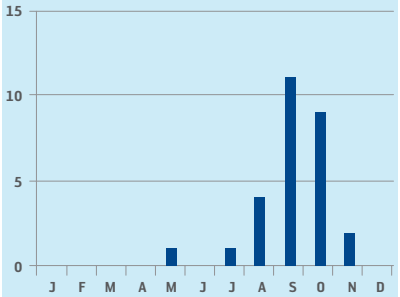
Then we looked at the number of activations for each month of the disaster types separately. At first glance there is an overall seasonality for non-geological events in the months August-October. Floods and fires have a peak in August, and cyclones are most frequent in September/October.

The global incidence of Charter activations due to cyclones shows a clear peak, but to see a distinct season, it is necessary to look closer at one particular region, e.g. the Northern Atlantic/Caribbean Sea. The graph below exhibits the regional hurricane season, which runs from 1 June to 30 November.

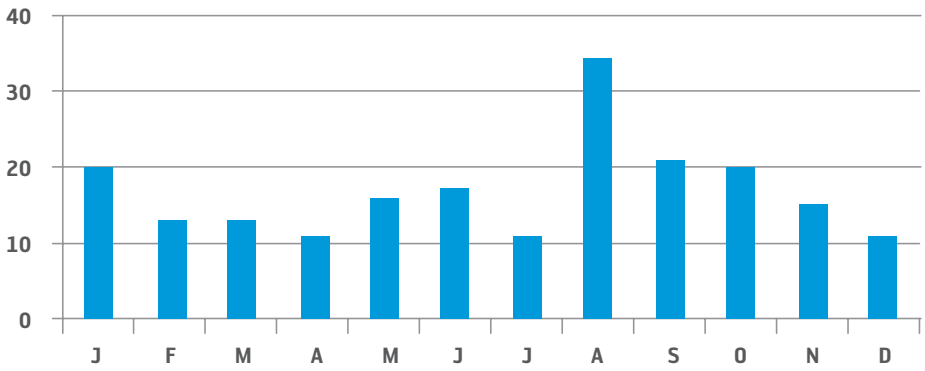
Also, flooding occurs year-round, but there is a geographically driven seasonality – especially during the Asian monsoon season.



Number of activations due to cyclones for each month from 2008-2017



Number of activations due to cyclones for each month from 2008-2017 (Northern Atlantic/Caribbean Sea)



Number of activations due to floods for each month from 2008-2017

The number of activations for fires has two peaks, in April and in August respectively. This shows that the consideration of spatial location is important because summer - when most of the fires arise - does not occur during the same time period in the northern and southern hemispheres.

Awareness of the seasonal dynamics of hazards which led to Charter activations helps us to be better prepared for future events likely to occur.

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Spotlight on a Project Manager

Brent Yantis, director of the University of Louisiana at Lafayette Regional Application Center (RAC), explains how they use satellite imagery to aid hurricane disaster recovery.

The University of Louisiana at Lafayette (UL Lafayette) Regional Application Center (RAC), a NASA research program, joined the Charter in 2008. Over the past 11 years they have been involved in a number of activations, including being the Project Manager (PM) for two of the 2018 major hurricanes — Florence and Michael — at the request of the Authorised User, the U.S. Geological Survey (USGS).

At the RAC, geospatial scientists work to gather and share satellite and remote sensing imagery. The RAC shares data with the public, the military, governmental agencies, and other research centres. Our research and data are vital pieces in emergency response, coastal restoration, the transportation industry, and precision agriculture.

The RAC has contributed directly to disaster assistance, assisted in decision-making surrounding pre and post disasters, and conducted outreach and education focusing on disasters and disaster response, each year since 2001. We also host annual workshops to better prepare geospatial responders for natural and manmade disasters working with USGS and America View.

Hurricane Katrina

In 2005, the RAC facility worked as a hub for geospatial data and communication coordination during, and in the aftermath, of Hurricane Katrina. Datasets were acquired from agencies across the US, and overseas, to assist in recovery efforts.

Imagery of the affected area in and around New Orleans, Louisiana, was collected — much of which was supplied on large hard drives delivered to the facility by vehicle, due to no connectivity or limited communication capabilities. These datasets were then printed and provided as maps to the Louisiana National Guard and displayed at the Joint Operations Center. When the National Guard went in to do search and rescue, I deployed with them, hauling maps and other remotely sensed products with me. We actually had to launch off the interstate to get into some areas.

Brent Yantis, RAC

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Remote Sensing Emergency Response Imagery Training

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This imagery of the area prior to the flooding was vital to on-the-ground responders, due to many out-of-state guardsmen and Red Cross workers who had never been to the New Orleans area before. These image sets provided a foundation to identify landmarks, roads and infrastructure that were, at the time, nine feet underwater. As water subsided from the area, imagery was again used to identify those areas to deploy large high water rescue and emergency response vehicles.

Much of this geospatial data collection and imagery development was repeated a month later with the arrival of Hurricane Rita, as it made landfall on the western coast of Louisiana.

Katrina flood

Future developments

At the RAC, our future research will focus heavily on response and recovery affiliated with emergency response. It is well known that Louisiana is no stranger to natural and man-made disasters, as exemplified by Hurricane Katrina and the Deep Water Horizon tragedy. Satellite imagery enables natural disaster assessment and restoration to begin quickly, followed by aerial imagery, including optical sensors.

Our new project, Strategic UAS Technologies for Optimizing Response and Monitoring, known as STORM™, will work to significantly improve emergency response time for natural and man-made disasters. We have multiple partnerships and alliances in place, including the Louisiana National Guard, the State Business Emergency Operations Center, the backup Emergency Operations Center for Louisiana, Regional Planning Commissions, along with many federal response agencies and local community response groups, working on developing applications using data types and technologies that can enable data sharing among emergency responders.

The need for this type of program was vividly illustrated in the multiple record floods of 2016 and 2017 in Louisiana and Texas. The lead response group for the Disaster Charter data acquisition during Hurricane Harvey, and the flooding that ensued, was the Center for Space Research (CSR) at The University of Texas at Austin. During the events of 2017, the RAC supported Texas and in the floods of 2016, CSR supported Louisiana.

In the future, the plan is to extend the UL Lafayette partnerships in emergency response to a gulf-wide network, so that response groups, at different geographical locations, (Louisiana, Texas, etc.) can share field-collected imagery and data, as well as use new analytical tools via a common data model and interoperable technologies.

As director of the RAC, I was trained by the Charter in 2008 (Denver, CO), 2015 (Sioux Falls, SD) and 2018 (Darmstadt, Germany) on managing remote sensing data acquisition and delivery during disaster events, and I am currently working to bring Charter representatives to Louisiana for training new project managers along the Gulf Coast.

I have worked in remote sensing and geospatial acquisition for emergency response for over 25 years, and it is my goal to acquire imagery and get reliable data to the agency managers/geospatial first responders responsible for implementing state response and restoration projects as quickly as possible.

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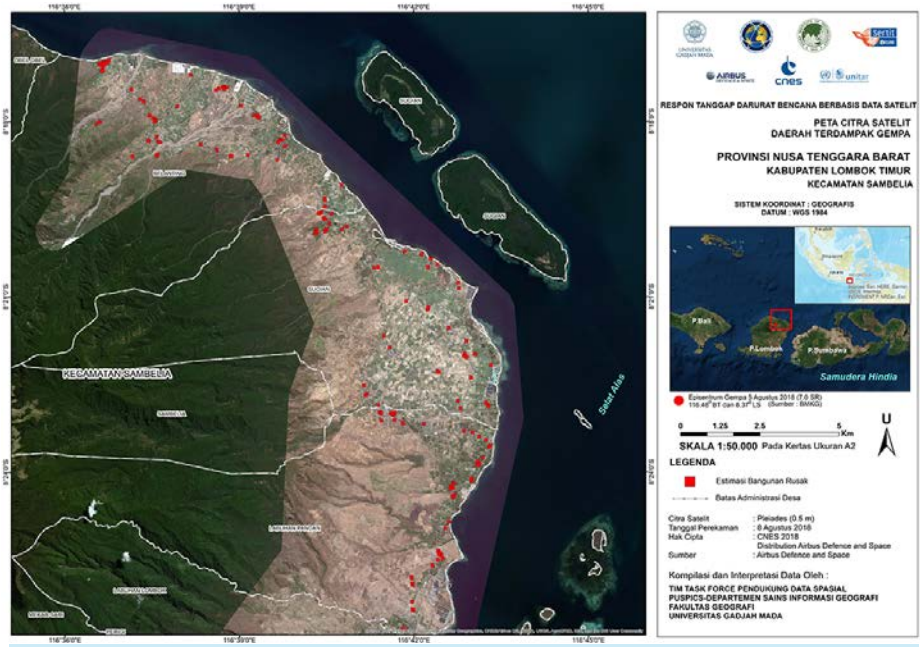
Five examples of activations

Since 2007, the Charter has been activated 40 times per year on average

1. Earthquakes and tsunamis in Indonesia (August and September 2018)

The Indonesian National Institute of Aeronautics and Space (LAPAN) requested aid from the Charter on two occasions following earthquakes that affected the country in August and September 2018. The earthquakes - and the tsunamis that followed - struck the islands of Lombok and Sulawesi. The Charter members provided many images and radar data from their satellites which were used to assess the damage. PM service was provided by JAXA, with Value Adding support from UNITAR and the Institute Teknologi Bandung

The Charter and EMS Copernicus closely collaborated for both activations.



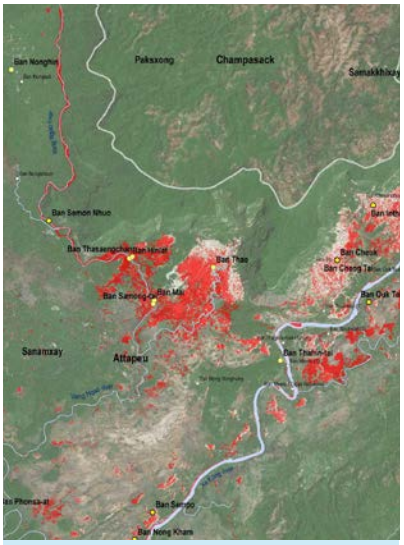
Damaged Building Estimation in Lombok
Pleiades © CNES (2018), Distribution: Airbus DS Map produced by Gadjah Mada University

2. Flood in Laos

Monsoon rain caused a hydroelectric dam to collapse in Laos on 23 July. Flood waters inundated six villages in Attapeu province and left more than 6,000 homeless and hundreds unaccounted for. The Charter was activated by UNITAR/UNOSAT and UNOOSA respectively, on behalf of the World Food Programme (WFP) and the Ministry of Science and Technology and Department of Disaster Management and Climate Change of Laos with contribution from LIST (LU) and Cima Research Foundation (IT).

Optical and radar images were provided by the Charter members, but because of bad weather conditions, only radar satellites (such as Sentinel-1, Kompsat-5, ALOS-2, TerraSAR-X and RADARSAT-2) were used to identify the water extent and the potentially affected villages.

Indonesia Tsunami



Laos flood Satellite detected water extent as of 27 July 2018
TerraSAR-X © DLR e. V. 2018, Distribution: Airbus DS Geo GmbH. Map produced by UNITAR/UNOSAT

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3. Flood in Kerala State, India

Learn more about this activation in our featured article.

Laos flood

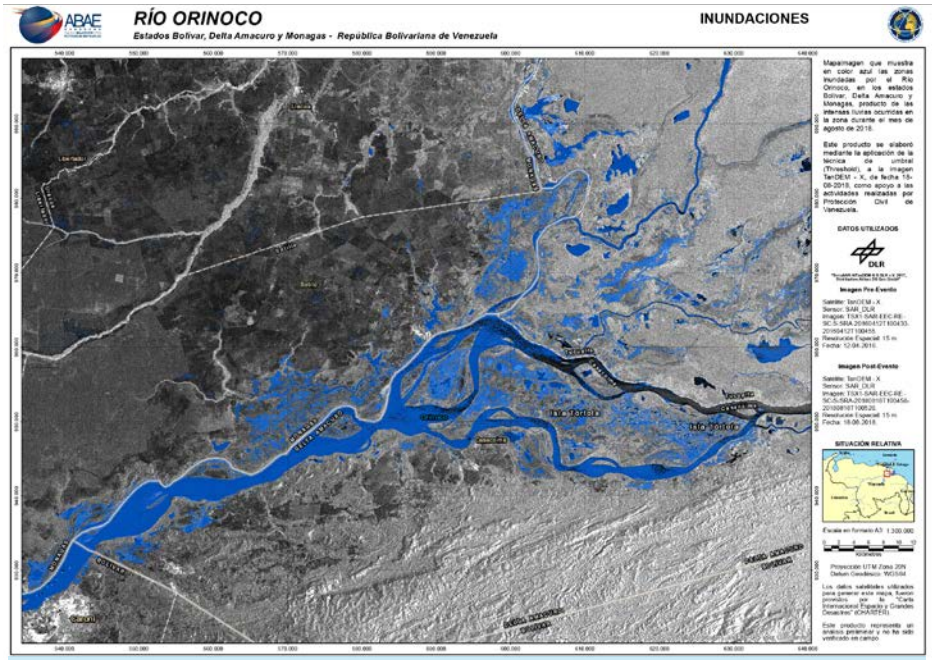
4. Flood in Japan

The Cabinet Office Government of Japan activated the Charter on 7 July, two days after record-breaking torrential rainfall struck the western and central parts on Japan. The rainfall caused floods and landslides. Damage and extension maps were generated by several organisations. Among more than 150 satellites images provided by the Charter, a large number (19) of damage and extension maps were generated by several organisations, using VHR optical as well as HR radar data. PM service was performed by JAXA with Value Adding support from RESTEC, National Research Institute for Earth Science and Disaster Resilience (NIED) and Hiroshima Institute of Technology.

Landslide in Kure, Hiroshima Prefecture, Japan. © *TanDEM-X © DLR e. V. 2017*

5. Flood in Venezuela

Persistent heavy rains caused severe flooding in Venezuela in August. The Venezuelan Civil Protection requested aid from the Charter in order to assess the extent of flooding PM service was performed by ABAE. 21 maps generated from 11 optical and radar images were provided. Those maps showed the extent of the floods in various areas.



Flooding on the Orinoco River in Bolivar State of Venezuela
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