



One of the major disasters that stands out in Charter activations was the December 2004 tsunami that caused immense devastation in coastal regions of India and Southeast Asia. A wide range of crisis-mapping products were supplied via the Charter to support the international humanitarian response (Royal Society Publishing)

→ IN ACTION AROUND THE WORLD

The International Charter 'Space and Major Disasters'

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Operating since November 2000, the International Charter 'Space and Major Disasters' has continued to demonstrate the importance of space in helping relief organisations that deal with major natural and technological hazards around the world.

Initiated by ESA and the French space agency CNES after the Unispace III conference held in Austria in 1999, the Charter officially came into operation after the Canadian Space Agency signed up to the charter on 20 October 2000.

These agencies initially called on data from ERS, Envisat, SPOT and Radarsat, but now a much broader range of

sensors from various national, international and private organisations operating Earth observation missions can be accessed to support disaster management authorities in the event of disasters.

The following agencies subsequently joined the Charter as members: the Indian Space Research Organization (ISRO) and the US National Oceanic and Atmospheric Administration (NOAA) in September 2001, the Argentine Space Agency (CONAE) in 2003, the Japan Aerospace Exploration Agency (JAXA), the US Geological Survey (USGS) and the UK Space Agency/Disaster Monitoring Constellation (DMCii) in 2005, and the China National Space Administration (CNSA) in 2007.

The Charter in operation today

The Charter is an international collaboration to provide space-based services for immediate response to major natural or man-made disasters. Its functions are simple: to task satellites in response to a major disaster and to provide fast access to satellite data to support disaster response. Space agencies play a key role because they are able to ensure that a range of very different satellites is programmed according to a unified plan and their data are disseminated rapidly.

The Charter focuses on major disasters, addressing a portion of the 200–400 catastrophes that occur yearly around the world. It is not designed to address the natural hazard emergencies recorded each year – over 800 according to

reports from the insurance sector – nor is it used for other parts of the risk management cycle, such as rehabilitation, reconstruction, prevention or preparedness.

Within its mandate, the Charter is available globally for a predefined list of appointed users, the ‘authorised users’ who are granted a direct access for triggering the system. Today, there are 10 national and international space agency members of the Charter, representing over 40 countries; each of these countries designates authorised users who primarily are national disaster management authorities such as civil protection, rescue or security bodies.

Each Charter member commits to provide access to Earth observation mission data for disaster response following



→ How it works



CHARTER OPERATIONAL LOOP



Operators are at readiness 24 hours a day at ESRIN to deal with requests for assistance from civil protection authorities. On receiving a request, they check the identity of the caller and verify that the information needed to respond to the emergency is specified correctly.

This information is then passed to an on-call officer who analyses the request and the scope of the disaster with the user to establish how to use the satellites that can provide data to the Charter to their best abilities.

The final step is to prepare an acquisition and processing plan using the available space resources. Data acquisition and delivery take place on an emergency basis, and a project manager, qualified in data ordering, handling and application, assists the user throughout the process.

the procedures of Charter activation – a simple process to supply crisis data in rush mode following a request from an authorised user. The management of the Charter works on a rotation, with a member agency leading the Board and Executive Secretariat on a six-month basis. Following the Indian space agency ISRO, ESA became the lead agency in April 2010.

Ten years of Charter operations

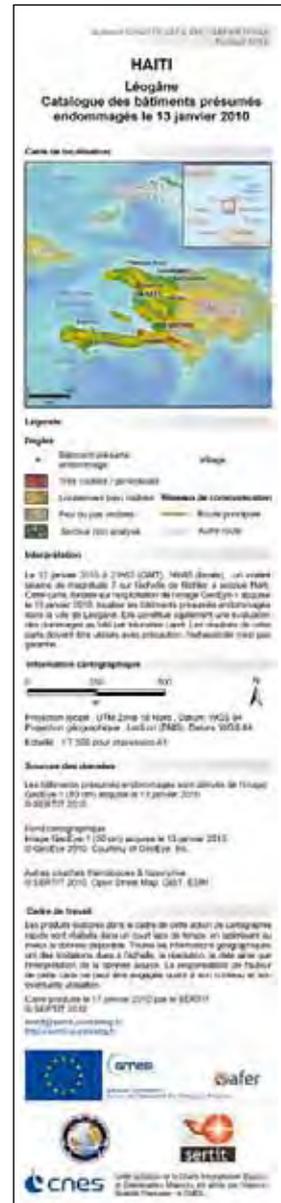
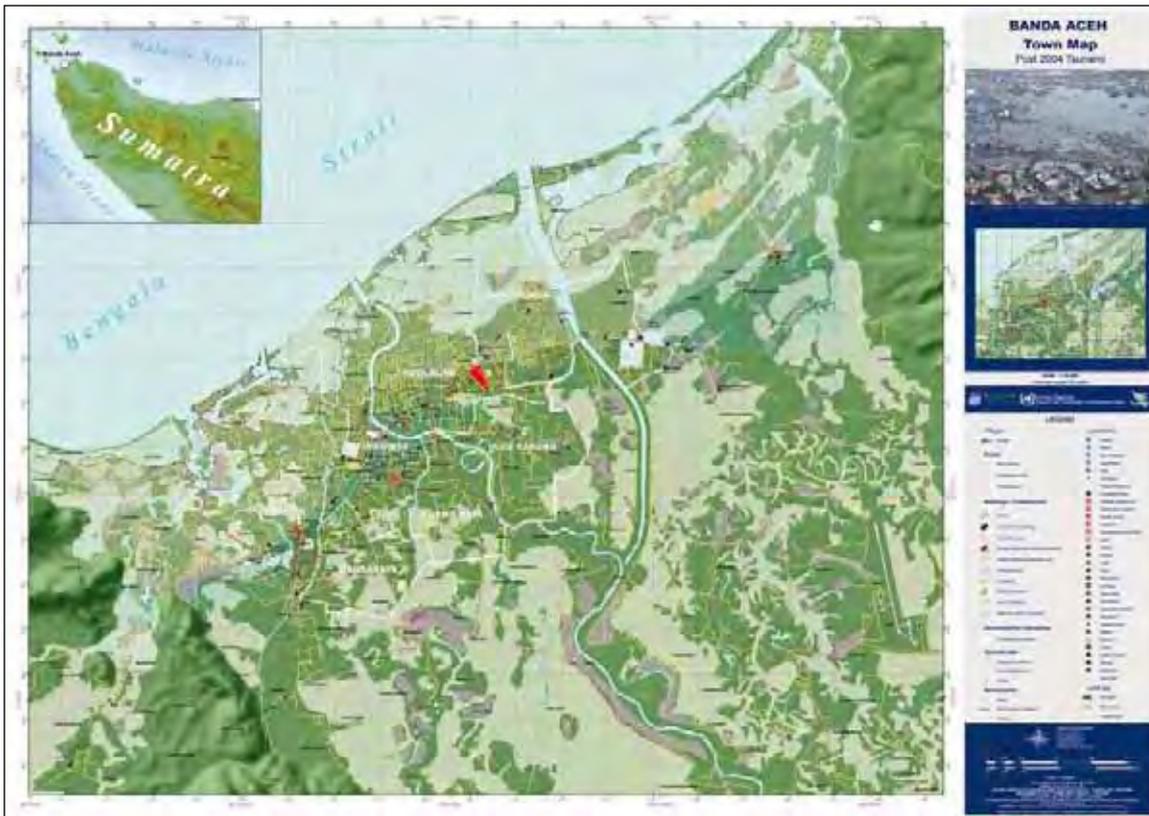
First activated for landslides in Slovenia in November 2000, the Charter has brought space assets into action on many occasions, for disasters such as flooding, hurricanes, tsunamis, earthquakes, forest fires, volcanic eruptions and oil spills.

Looking at the types of hazard for which the Charter has most frequently been requested, hydro-meteorological events appear in the first position: between 2000 and 2010, the system was activated for more than 120 major floods worldwide and 37 hurricanes, making a substantial part of the more than 260 activations in over 90 countries.

There are many major disasters that are milestones in the last 10 years' records of the Charter. On 26 December 2004, the coastal regions of India, Sri Lanka, Thailand, Indonesia, Maldives, Malaysia and Myanmar were all severely affected by an earthquake and a consequent tsunami that caused immense devastation. A wide range of crisis-mapping products was elaborated using data supplied via the Charter to support relief teams and the international humanitarian community engaged with disaster response.



→
A tsunami survivor
in the rubble of
Banda Aceh, Indonesia,
January 2005 (Alertnet/
Reuters/Y. Ahmand)



↑
 Satellite-derived street maps of post-tsunami Banda Aceh, Indonesia, were used by more than 400 relief groups operating in the city (Respond/Keyobs)

→
 Example of a value-adding map supplied by SERTIT (FR) for GMES SAFER project. SAFER provided added-value support following the Charter activation for the earthquake in Haiti on 12 January 2010. The Charter was triggered by the French civil protection authorities, the UN Stabilisation Mission in Haiti, Public Safety of Canada and the US Geological Survey. The map is a 1:7500 scale rapid damage assessment product over Léogâne, Haïti, using a GeoEye-1 image from 13 January as background.

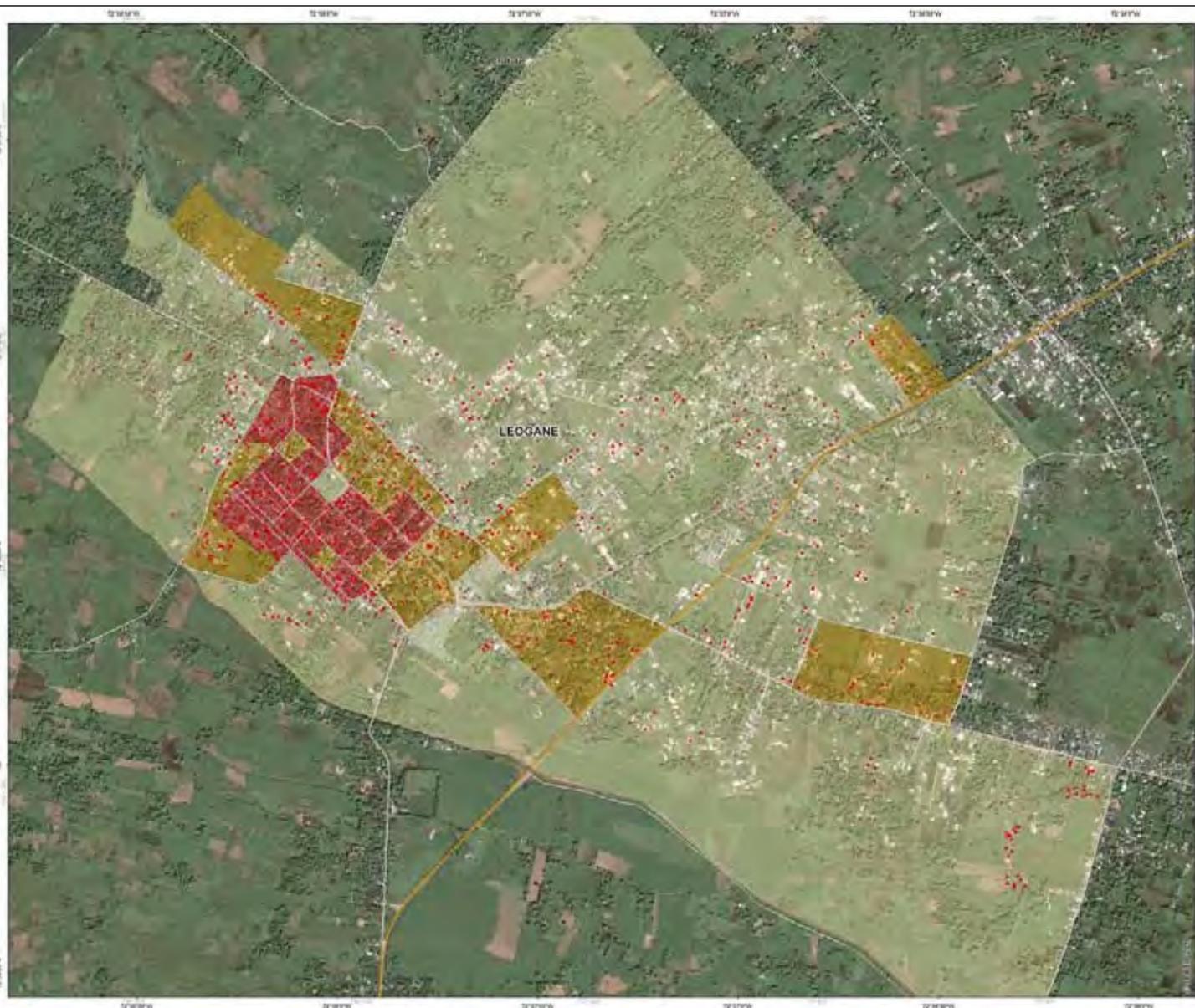
In October 2005, an earthquake of magnitude 7.6 struck on the India/Pakistan border in the Kashmir region. As of 8 November, the Pakistan government official death toll was 79 000. Again, to assist disaster response, the ‘virtual constellation’ of Earth observation missions that the Charter operates was activated to acquire imagery and generate damage assessment maps to users in the field. Beyond this, during a donor conference in Geneva, hardcopy maps produced using Charter data were delivered to UN Secretary General Kofi Annan, UN Humanitarian Coordinator Jan Egeland and the Director of the Office for the Coordination of Humanitarian Affairs in Geneva, Yvette Stevens.

Similarly, the Charter was activated in response to other major earthquakes, such as the magnitude 7.8 event in eastern Sichuan, China, on 12 May 2008, the magnitude 7

event destroying the capital city of Haiti, Port-au-Prince, on 12 January 2010 and the magnitude 8.3 event hitting Chile on 27 February 2010.

Sometimes the ‘immediate emergency response’ phase is longer than the standard four-week crisis window time of the Charter and the service is supplied over an extended period; this is the case with the Charter activation to monitor the oil slick following the collapse of the *Deepwater Horizon* drilling rig on 20 April in the Gulf of Mexico. NOAA and the US Coast Guard indicated that Earth observation imagery might be useful at least for a few months after the oil slick started to expand in the sea.

Earth observation data are key because they provide objective and synoptic information. However, even with



a multi-sensor system using different satellites, the main issue is timeliness because most users request fresh information on a daily or even hourly basis. The capacity of the Earth observation missions that the Charter provides today is still not at the level most disaster management centres would expect.

However, this is improving every year and currently, for a given target anywhere around the globe, the average time to task one of the satellites and perform the first acquisition is less than two days. The average time to produce an Earth observation data product after data downlink is between a fraction of an hour and half a day.

The average time to analyse data products and produce the first crisis/damage assessment product is better than

half a day. This latter component is generally performed by external value-adding organisations collaborating with the Charter and working on a 24-hour basis.

Just looking at ESA mission data, more than 1350 products have been provided since 2000; they are primarily based on ERS Synthetic Aperture Radar (SAR) and Envisat Advanced SAR. All-weather SAR imagery is often requested and is the main data source for floods and hurricanes. Out of the national Earth observation missions from European members of the Charter, SPOT and DMC are used very often and for a broad range of hazard types. Evidently, to meet timeliness requirements from the users, many sensors are activated as the activation starts: Earth observation missions from all 10 Charter member agencies are used.



↑ A high-resolution image of central Port-au-Prince, Haiti, showing extensive damage and debris-covered streets, taken by the US GeoEye-1 satellite in January, as part of the worldwide satellite observation campaign activated by the International Charter 'Space and Major Disasters' (GeoEye)

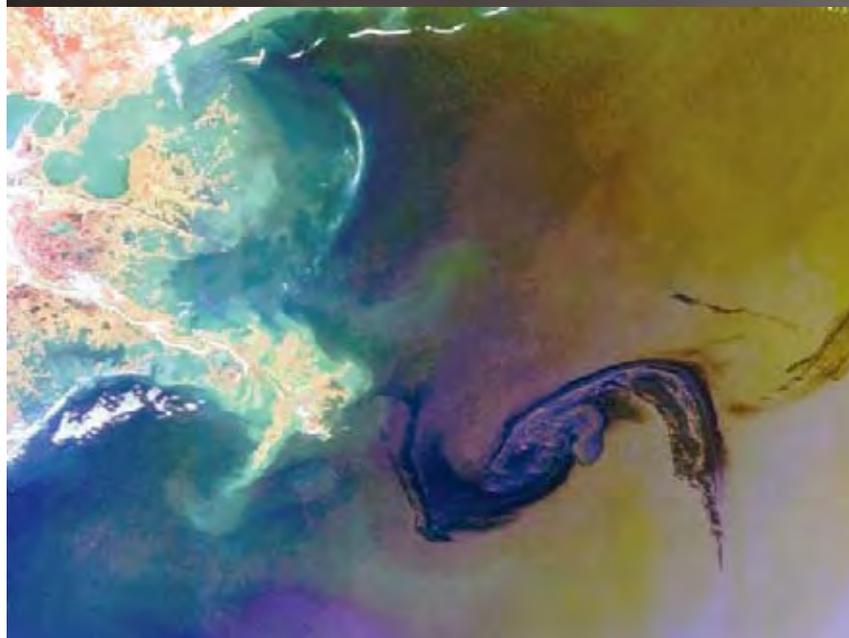
The expansion of the Charter

New space agencies regularly contact the Charter to take part, such as the Russian Federal Space Agency Roscosmos, the Brazilian National Institute for Space Research (INPE), the Korea Aerospace Research Institute (KARI) and the Taiwanese National Space Organization (NSPO), who has provided access to data from their Formosat Earth observation satellite for several years.

As far as users are concerned, the number of organisations asking to be able to access the system is increasing every day. There are several mechanisms to access and activate the Charter. The first is directly from one of the authorised users (AUs). The second is from a country without an AU via a 'sponsor AU', that is an AU who requests the Charter to assist a disaster management user from another country.

The Charter has defined arrangements with the UN Office of Outer Space Affairs (OOSA), in Vienna, and the Operational Satellite Applications Programme of the UN Institute for Training and Research (UNITAR/UNOSAT), in Geneva, to provide support to UN agencies. UN OOSA and UNITAR/UNOSAT may submit requests on behalf of users from the UN to assist the international humanitarian community.

With these mechanisms, over the last few years, the Charter has been able to provide data for more than one activation per week on average. However, this is not enough and it is intended to increase Charter access with a primary focus on users from regions exposed to major disasters without direct access to the system. With this in mind the Charter Board adopted the principle of 'universal access' in 2008, with the aim of improving Charter access worldwide.



Example of imagery supplied by ESA in response to an activation of the Charter, Call 308 on 22 April 2010, for the oil slick following the explosion of the Deepwater Horizon oil platform in the Gulf of Mexico. These images represent how repeat Envisat observations are supplied to NOAA and the Charter requester, the US Coast Guard. Above, an Envisat ASAR image from 26 April, left, a MERIS Full Resolution image from 29 April, prepared by Alessandro Burini, Rheagroup SA, with ESA. Since the first day of this incident, continuous Envisat observations were provided in near-real time (two hours after downlink) with observations from other Earth observation missions associated with the Charter

In this spirit, and following a formal request from the intergovernmental Group on Earth Observations (GEO) Secretariat in 2007, several initiatives were implemented in 2009 and 2010 to make request submission possible for more users from GEO member states. A collaboration with GEO was put in place by ESA with priority on the 44 out of 81 member states of GEO that do not have direct access to the Charter.

Improving access for the Asia–Pacific region

In April 2009, the Charter decided to establish an interface between the Charter and Sentinel Asia, a regional Earth observation capacity for emergency response. By allowing improved Charter access to the national users from member states of Sentinel Asia, significant progress was achieved concerning the Asia–Pacific region.

In October 2009, the Asian Disaster Reduction Centre (ADRC) was granted the status of Charter Cooperating Body with the prerogative to trigger the Charter on the basis of the activation mechanism of Sentinel Asia. This agreement concerns 31 countries of the region – 28 of which did not have direct access to the Charter before and 15 of which are GEO member states. Just looking at the GEO requests, after one year of collaboration, from those 44 countries worldwide without direct Charter access, now 12 GEO member states from Asia–Pacific can trigger the system.

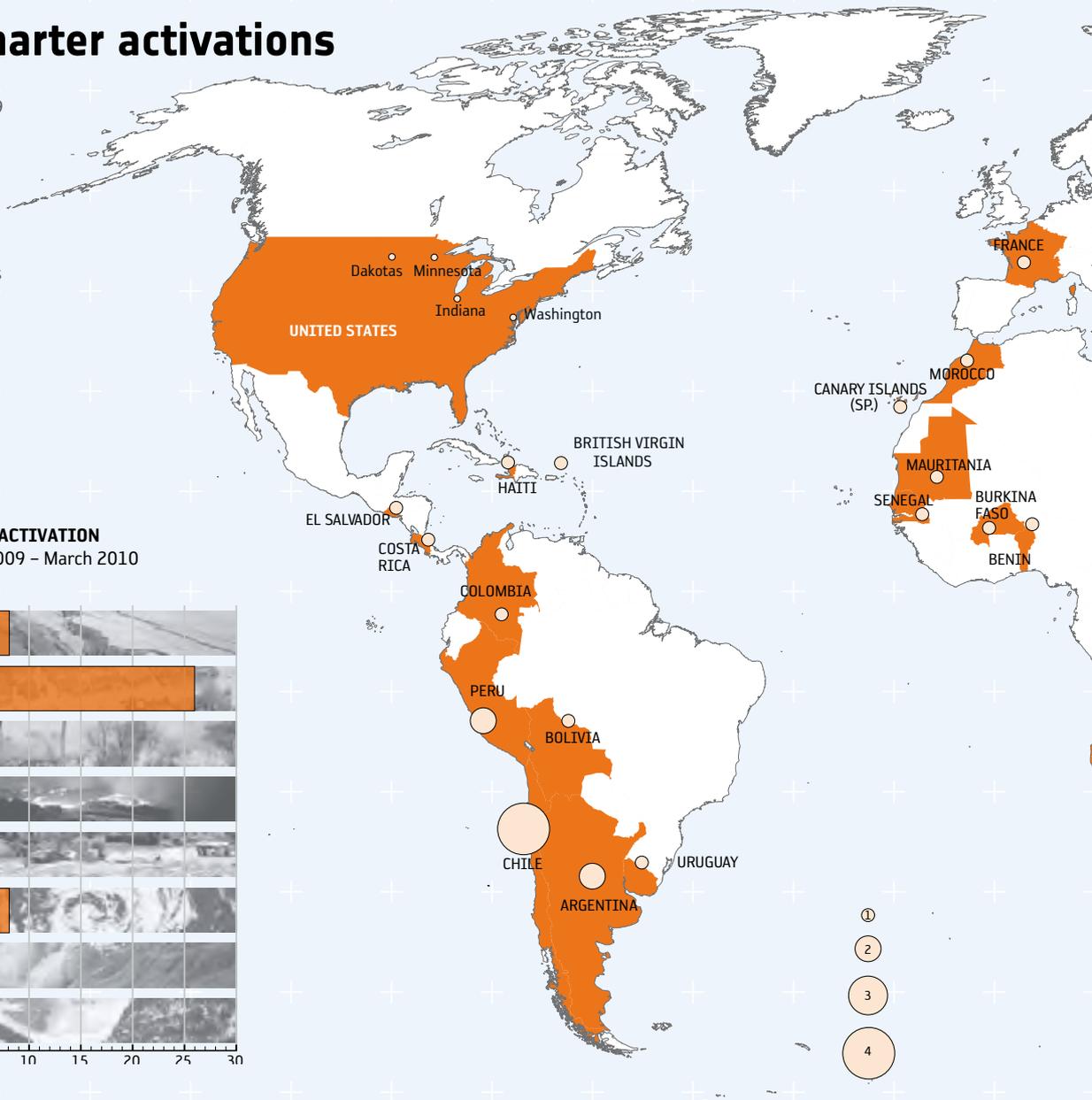
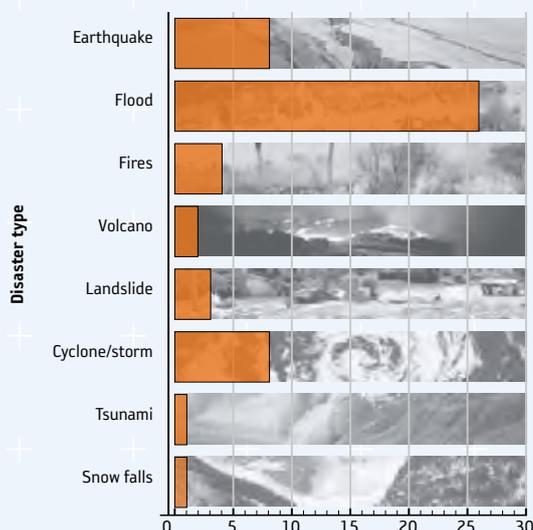
Improving access for the Africa region

In close collaboration with the GEO Secretariat and with support from the network of local GEO principals, ESA has organised a first ‘formal user consultation’ in Africa,

→ Recent Charter activations

Between January 2009 and March 2010, the Charter was activated 55 times, for 45 countries. Twenty-four activations responded to UN humanitarian organisations requests and 29 responded to national civil protection authority requests. Flooding is the most common type of major hazard.

CHARTER ACTIVATION
January 2009 – March 2010



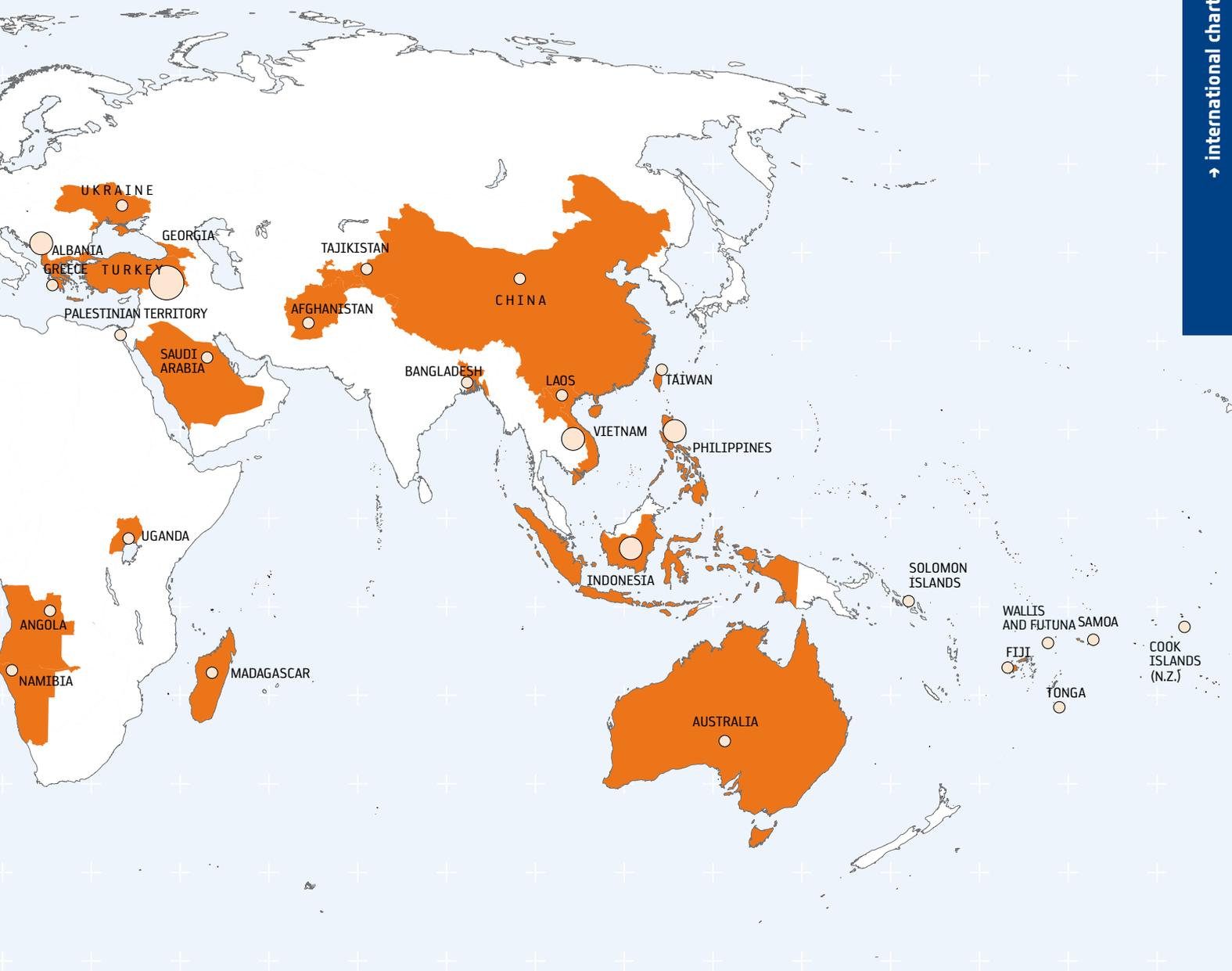
focusing on national users with the aim to gather and analyse their viewpoints concerning how EO can be accessed and used for disaster response. This two-year programme is accompanied with dedicated actions to raise awareness, explain and promote the Charter and provide training support.

Priority has been put on 17 African countries, the most affected by natural disasters: Angola, Cote d'Ivoire, Democratic Republic of Congo, Egypt, Ethiopia, Kenya, Madagascar, Mali, Morocco, Mozambique, Namibia, Niger, Senegal, South Africa, Tanzania, Uganda and Zambia. Consultation with national authorities of Ethiopia, Mali, Mozambique, Niger, South Africa and Uganda took place between September 2009 and May 2010.

So far feedback from national users is showing a strong interest in the contribution that the Charter can bring by providing rapid, objective and free information to monitor

an emergency and its impact. For the majority, the national disaster centres consulted were generally not aware of the Charter. The Charter and GEO are working together to evaluate the current access mechanisms, methods to improve it and the potential role that national, regional and international organisations could play to use the data and information that the Charter provides.

Beyond the fundamental subject of triggering the system, the way the Charter service is provided and exploited generally requires collaboration and local organisations can play a key role because they are close to the theatre of operations. Once an activation is triggered, the Charter designates a Project Manager – not necessarily from a country of a Charter member – who plans for the appropriate Earth observation acquisitions and manages their dissemination and exploitation. This aspect is also under investigation for the many countries not yet closely linked to the Charter.



Global Monitoring for Environment and Security (GMES)

GMES is a joint initiative of the EC and ESA aimed at achieving an autonomous and operational Earth observation capacity. It has a major component concerning Emergency Response. In this context, a collaboration has been initiated between European members of the Charter (UK Space Agency, CNES and ESA) and the GMES SAFER project.

This involves the interpretation and added value of Earth observation data provided through the Charter when activated by authorised users. Accessing support from SAFER for Charter activations is particularly relevant for Charter users concerning requests on emergencies in Europe and emergencies outside the European sphere that are priorities in the policy sectors of Europe.

The collaboration with GMES SAFER was activated for

several Charter activations in 2009 (for example, tropical cyclone Aila in Bangladesh in May, fires in Greece in August, tropical storms in Philippines in September) and recently in 2010 (the major earthquake in Haiti in January and the volcanic eruption in Iceland in April). With its capacity, SAFER also brings access to other extremely useful data sources, such as the very high resolution SARs on the German TerraSAR-X and Italian COSMO-SkyMed satellites.

Celebrating ten years of the Charter

To celebrate the 10 anniversary of the Charter, with the support of the other agencies, ESA has developed a new brochure and prepared a short movie illustrating the Charter and its achievements. This material is available on a revised Charter website (www.disasterscharter.org), in five languages: French, Spanish, English, Japanese and Chinese. To watch the Charter movie, click on the 'News' link. ■