INTERNATIONAL CHARTER NEWSLETTER

23 April 2012 Issue 2

A Busy Year for Charter Member Agencies

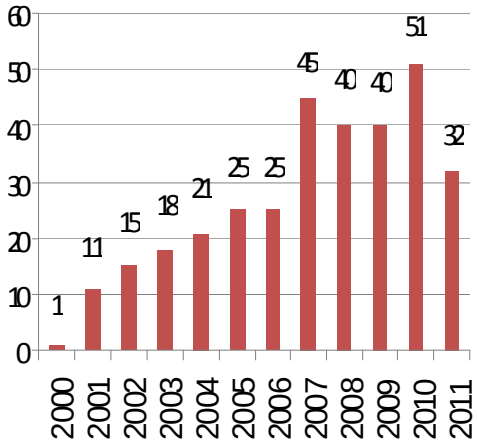
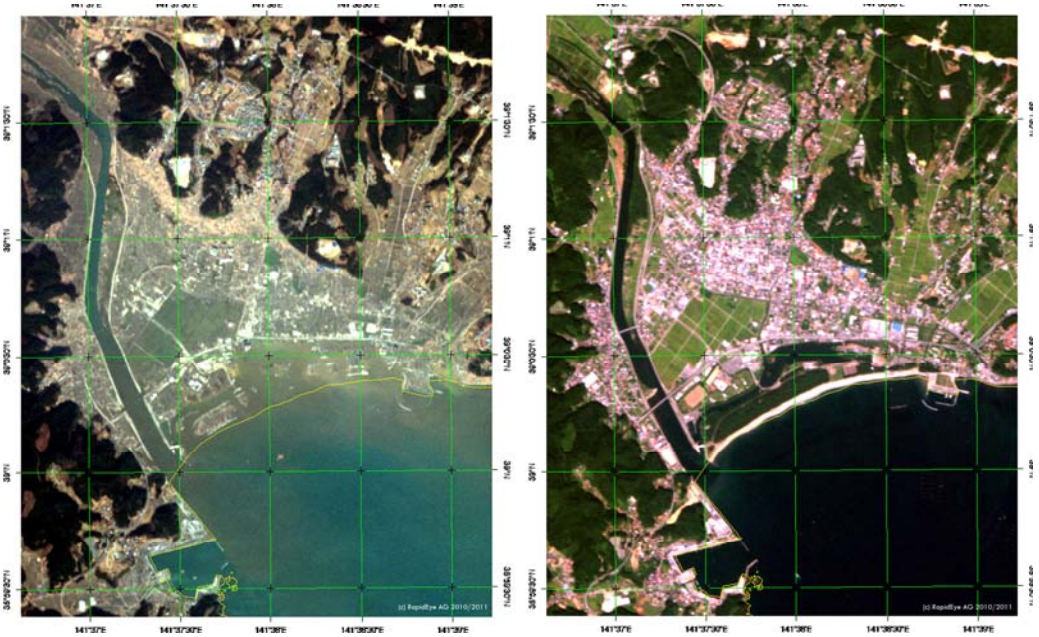


Figure 1. Number of Charter activations per year (2000- 2011)

The Charter is an international collaboration that gives rescue and aid workers rapid access to satellite data in the event of a disaster. In 2011, the International Charter 'Space and Major Disasters' was activated 32 times, considerably less than the 51 activations in 2010. However, there is an overall trend of increasing numbers of activations since the Charter started its operations (Figure 1). The substantial decrease in Charter activations from 2010 to 2011 can be attributed to a smaller number of major disasters worldwide, and to a stronger role taken by regional organisations, especially in Asia and Europe.

Nevertheless, 2011 was a busy year for the Charter member agencies. There were two significant peaks of activity. In the first quarter year the Charter became active in nine cases of major disasters, including the tsunami after the major earthquake off the East coast of Japan. This complex and deadly event had an extraordinarily huge area of effect. The Charter was able to help with thousands of images from optical and radar satellites making possible the rapid production of many overview and damage assessment maps.

Satellite image from Japan earthquake



Credit: RapidEye AG - Map produced by JAXA

These satellite images compare Rikuzentakata in Iwate prefecture before and after tsunami damage from the M9.0 earthquake that struck 130km off the east coast of the Tokohu district of Japan on 11 March 2011.

Recent Activations

- Floods, Paraguay
- Flood, Fiji
- Floods, landslides in Ecuador
- Flood, Ocean Storm in Madagascar
- Floods, Algeria
- Flood in Peru
- Cyclone Giovanna in Madagascar

Events

- Charter Executive Board Meeting, 26-27 April 2012

Charter Members

- European Space Agency (ESA)
- Centre national d'etudes spatiales (CNES)
- Canadian Space Agency (CSA)
- Indian Space Research Organisation (ISRO)
- National Oceanic and Atmospheric Administration (NOAA)
- Argentina's Comision Nacional de Actividades Espaciales (CONAE)
- Japan Aerospace Exploration Agency (JAXA)
- US Geological Survey (USGS)
- DMC International Imaging (DMC)
- China National Space Administration (CNSA)
- German Aerospace Centre (DLR)
- Korea Aerospace Research Institute (KARI)
- National Institute for Space Research (INPE)

Bringing together new and efficient space technologies to support disaster management

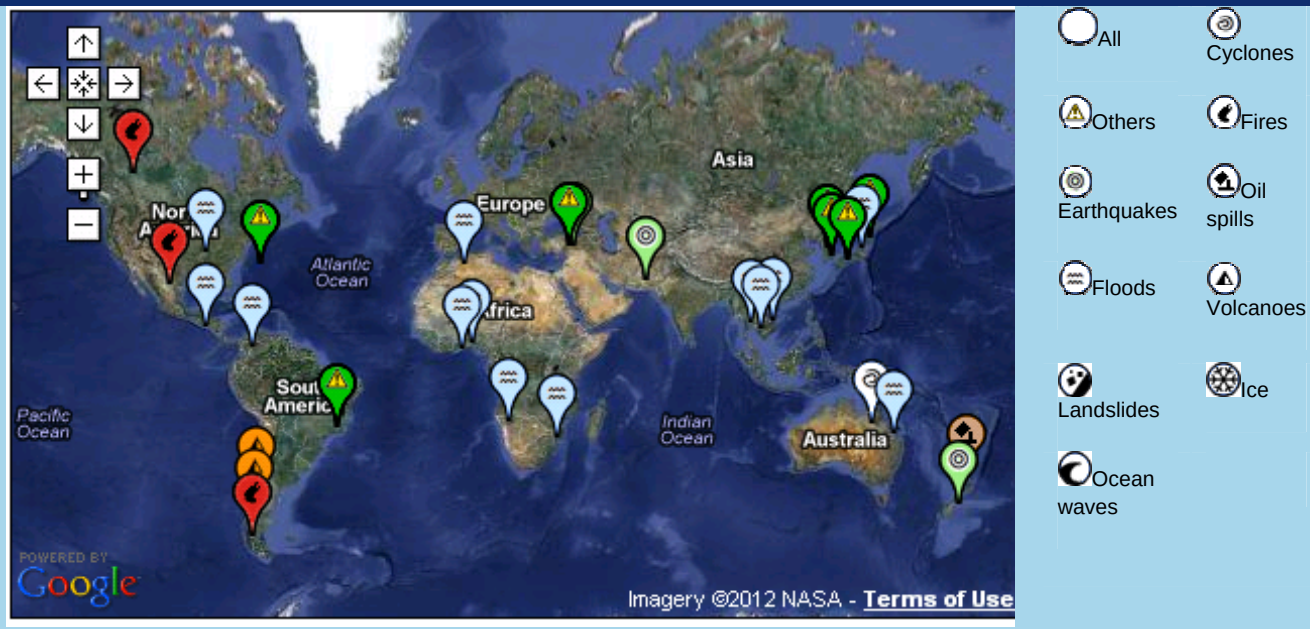
In October 2011, the Charter was again quite busy due to 9 activations coming in less than 4 weeks. Such remarkable peaks occurred a couple of times in the Charter's history, most recently in September 2010 (8 activations in 16 days) and in September 2009 (10 activations).

The members of the International Charter 'Space and Major Disasters' are well prepared to further provide imagery from their earth observation satellites to support rapid emergency response after major disasters. It is also intended to further improve access to the Charter service for users worldwide, such as national civil protection agencies. For further information, details on Charter activations, maps etc. visit the Charter website www.disasterscharter.org.

2011 Charter Activations at a Glance.

The map illustrates the distribution and type of activations in 2011. 11 activations, more than one third of all Charter activations in 2011 referred to disasters on the Asian continent. Also, the Americas, Africa, and Australia/New Zealand had a considerable share. There were 7 in South & Central America, 5 in Africa, 4 in Oceania, 3 in North America and 2 in Europe.

Charter Activations map showing distribution and type of hazard in 2011



Credit: International Charter

As in previous years, about half of Charter activations were related to flood events (Figure 2). However, it should be noted that it is not always a clear-cut classification of activations by disaster types, as there are often combinations of events, such as earthquakes causing tsunamis, and tropical storms resulting in floods and landslides. In 2011, weather related hazards represented 62% of total calls while solid Earth-related hazards represented 25% with earthquakes being the most numerous at 16%.

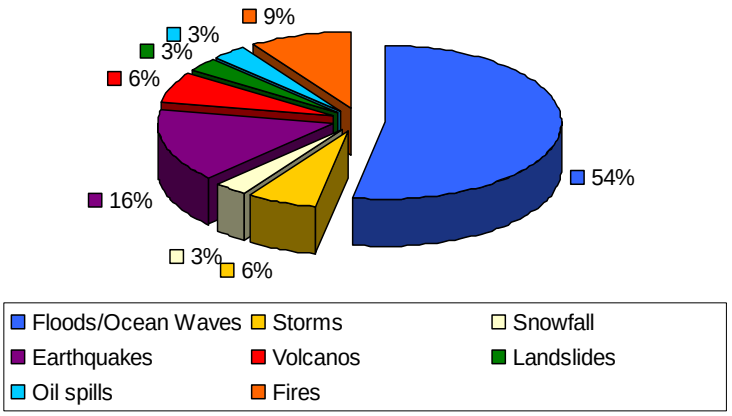


Figure 2: 2011 Charter activations by hazard type.

Envisat: 10 years for our planet, for all of us

In March 2012, the largest Earth observation satellite ever built, Envisat, marked its tenth year in orbit. A decade of data from this innovative spacecraft has proven invaluable not only to furthering our understanding of the planet, but to the global community in times of need.

Its largest single instrument is the Advanced Synthetic Aperture Radar (ASAR). It features enhanced capability in terms of coverage, as it can acquire images through clouds and darkness.

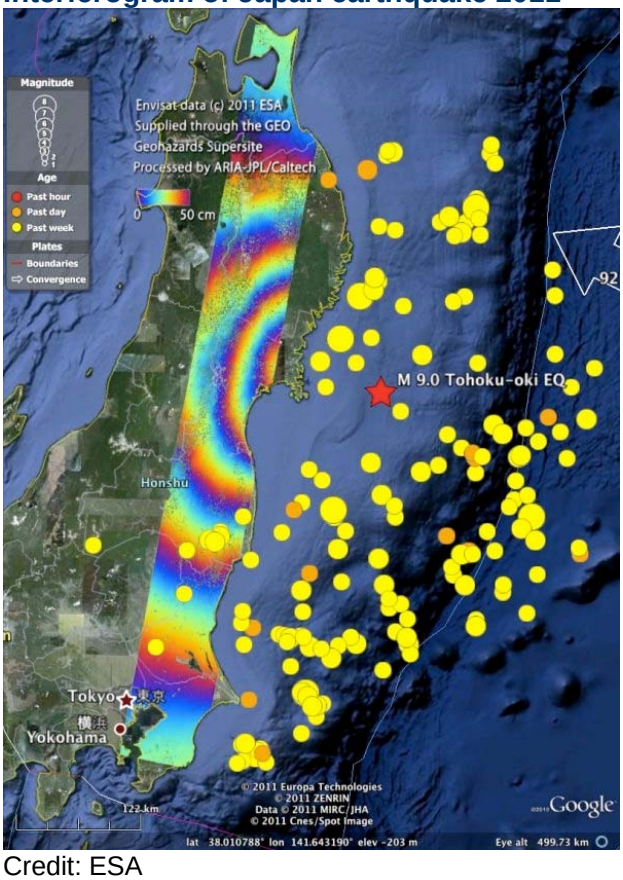
Precise measurements – down to a scale of a few millimetres – can be detected across wide areas. This has proven to be a very useful tool in the area of disaster management, and ESA, Envisats operator, has been providing data to aid relief efforts since the first year of the satellites launch under the International Charter.

Envisat in space

Credit: ESA

Two or more radar images over the same area can be combined to detect changes in surface height occurring between acquisitions – a remote sensing technique called Interferometric Synthetic Aperture Radar, or InSAR. In 2004, an earthquake and subsequent tsunami hit Southeast Asia. Under the Charter, radar data from Envisat was used to observe changes in land of stricken coastal regions.

Interferogram of Japan earthquake 2011



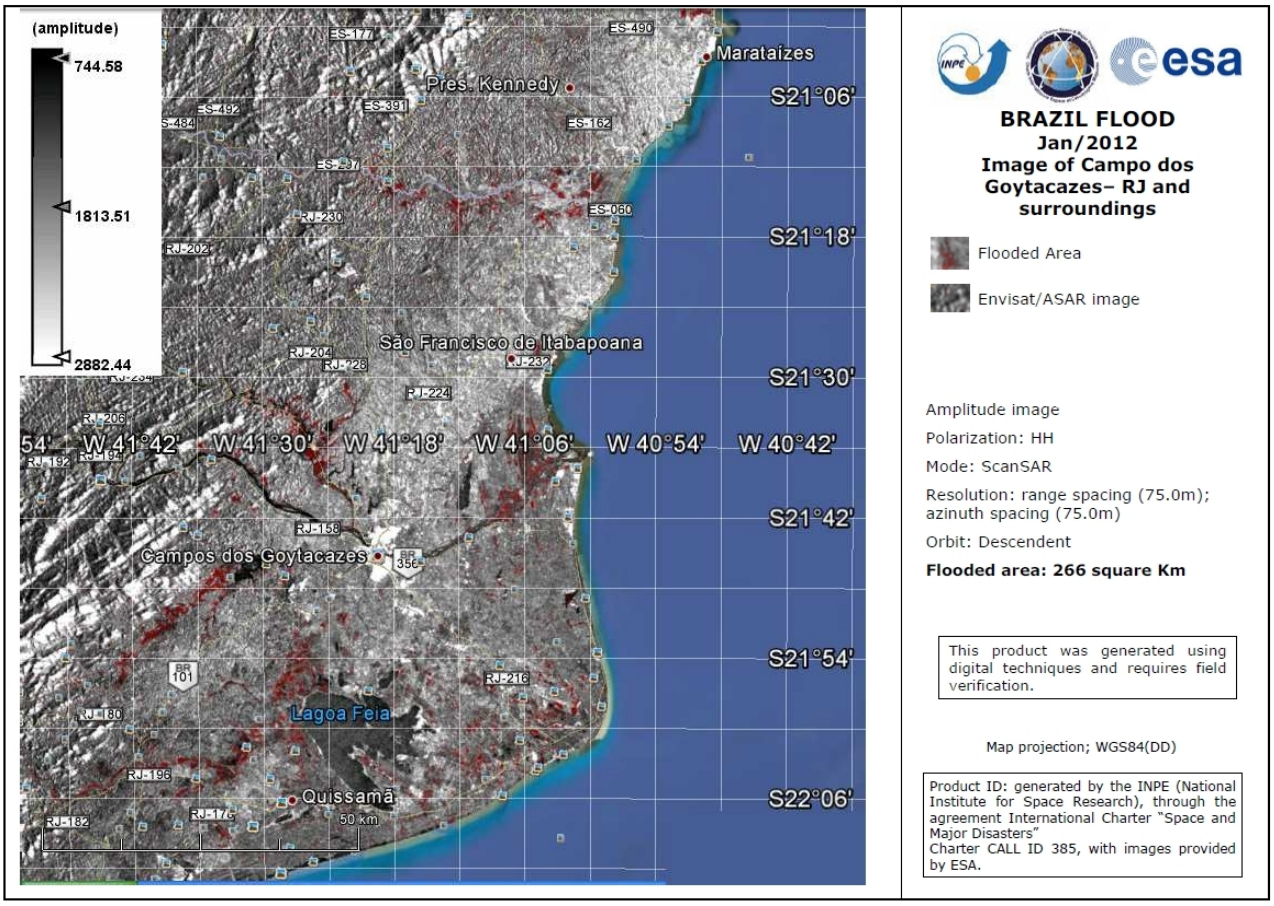
Credit: ESA

Over the past decade, Envisat data has been used in response to numerous disasters such as landslides, volcanic eruptions, floods and fires. Data from Envisat has been used in some of the most high profile disasters of the past few years. From monitoring the Deepwater Horizon oil spill in the Gulf of Mexico in 2010 to mapping surface deformations caused by the magnitude 9.0 earthquake in Japan in 2011. Most recently, Envisat's radar imagery was used to map flooded areas in and around Campos dos Goytacezes, Brazil.

The technique of interferometry was developed based on the radar instruments which first became available from the European Remote Sensing missions, ERS-1 and -2. Today, the ERS missions are no longer operational, but at the time of their launches in 1991 and 1995, they were the most sophisticated Earth observation spacecraft ever developed by Europe. Their archived data continue to prove useful for scientists. Envisat has provided continuity of data after ERS-2, paving the way for radar technology and driving interferometry to perfection.

Unfortunately, shortly after reaching this milestone, contact with the satellite has unexpectedly stopped. It has been confirmed that Envisat is still in a stable orbit but work has been underway since 08 April 2012 to re-establish contact and understand the situation.

Envisat image of flooding in Campos do Goytacazes and surroundings in Brazil January 2012.



Credit: ESA/INPE

Landsat: 40 Years of Hazard Monitoring

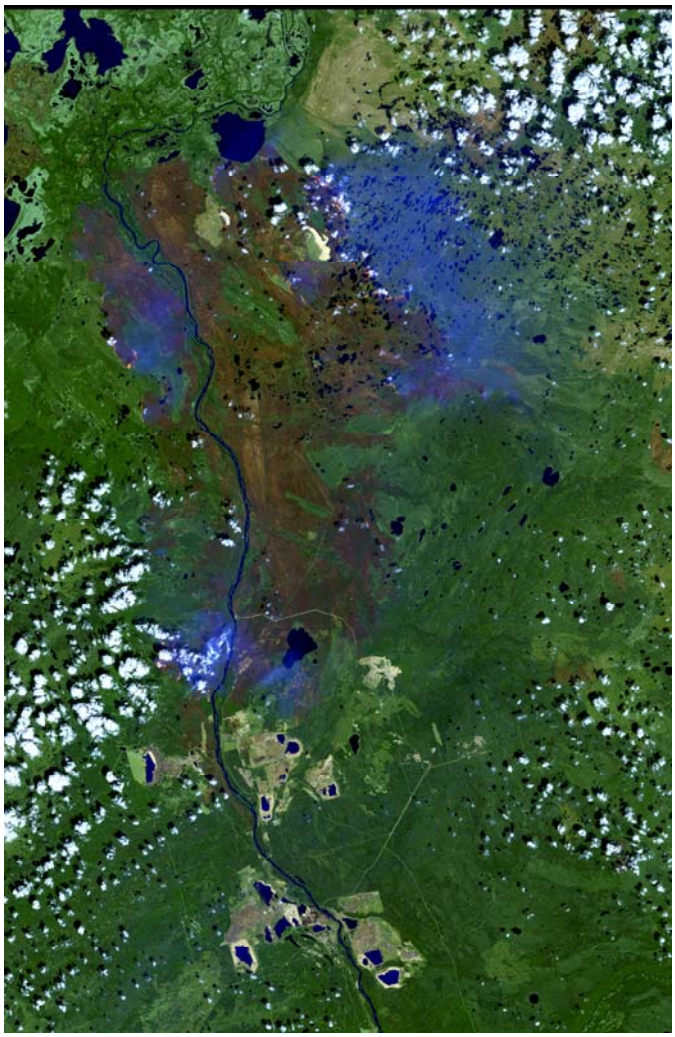
The Landsat satellite Program will celebrate its 40th anniversary on 23 July this year. Landsat 1 set a standard for collecting moderate resolution observations of the planet's land mass and was an important contributor to 'new' ways to see and monitor natural and anthropogenic features and changes. The US Geological Survey manages the Landsat series of satellite missions. As a Charter participant this includes the monitoring of natural hazards.

In that 40 year period there have been 5 subsequent satellites continuing the remarkable series. Two, Landsats 5 and 7 continue to function, though with significant problems. Landsat 5 acquisitions have been halted while engineers try to resolve data relay problems and Landsat 7 has had a problem with the scan line corrector since 2003. Both satellites are well past their design lives. In the 40 years, over 7 million scenes have been acquired by US ground stations and by the network of global wide partners.

Landsat data has offered the global science community pioneering space based information…

- **A single Landsat scene covers over 13,000 square miles.**
- **Nearly complete global coverage. The orbit is such that only the near polar caps are not observed.**
- **Repetitive coverage.**
- **Uniformity over time. Landsat passes any given point at mid-morning local time, providing consistent perspectives.**
- **Rapid, easy access to the data, without restriction.**

Landsat-7 satellite image of 2011 wildfires in Alberta Canada



Credit: US Geological Survey

Recently, a United Nations group established to preserve humanity's documentary history has selected a portion of the US Geological Survey Landsat archive of Earth imagery to be added to the Memory of the World International Register.

"During a span of almost 40 years, the Landsat series of Earth observation satellites has become a unique reference worldwide for advancing our scientific knowledge and our understanding of terrestrial systems," said Anne Castle, Assistant Secretary for Water and Science, US Department of the Interior. "The inclusion of the Landsat data archive in the Memory of the World Register is recognition of the incredible value of this long term data collection, not only for its contribution to scientific research but also for its rich international cultural value."

While the forty years of data acquisitions are significant, the US is focusing on data continuity. In early 2013 the Landsat Data Continuity Mission (in effect, Landsat 8) will be launched and discussions and plans for future systems are underway with the goal of providing scientists, educators and policy managers with earth observations well into the future.

Charter – Member Profile

- **Japan Aerospace Exploration Agency (JAXA)**

JAXA became a member of the International Charter on 16 February 2005 in Brussels at the Earth Observation Summit III.

Over its operational life, from 2006 to 2011, Advanced Land Observing Satellite (ALOS) was Japan's major observation data supplier to the International Charter. Its three sensors made it ideal for the 24 hour nature of disaster monitoring alongside its usual earth observation functions. Archive data from ALOS is still used by the Charter.

The mission will be continued with ALOS-2 which will have greater resolution capabilities than the PALSAR instrument on board its predecessor. This and ALOS-2's increased observable capability means that the data it will supply will be more detailed and more extensive, enhancing the disaster relief data available through the Charter.

JAXA has been an active member, providing data across the world. Over the last year Japan has experienced its own disasters initially with the huge 9.0 earthquake and tsunami in March 2011 followed by floods and typhoon damage. Data from JAXA and the other charter members helped to understand, alleviate and monitor these disasters.

PLEIADES launch: tailor-made for imaging crises

The first Pleiades satellite was launched 17 December 2011 from the European spaceport in French Guiana.

Having been designed to meet both defence and civilian needs, Pleiades is the first truly dual-purpose optical observation system to serve primarily institutional but also commercial users.

Pleiades- key figures

- **5 years mission duration**
- **450 images/day/satellite acquisition capability**
- **Sub-metric resolution**
- **20km field of view**
- **694km orbit altitude**

The Centre National d'Etudes Spatiales (CNES) of France is overseeing the full system. It is responsible for developing space systems for the Ministry of Higher Education and Research and the Ministry of Defence. The system development costs were funded almost entirely by CNES. Pleiades will consist of two satellites, a ground control segment and a ground mission segment. The second satellite is currently scheduled for launch during the first quarter of 2013.

By offering a greater range of images, the Pleiades mission will complement Spot 5, which will remain operational until at least late 2014. The SPOT family of satellites has long supplied high resolution images for the Charter.

Pleiades main characteristics are: its agility, enabling it to reach any point of the globe on a daily basis, its image quality and its location accuracy. The combination of agility and acquisition capacity will allow coverage of linear or more complex features, for example, coastlines or rivers. These characteristics make the system very useful for optimising programming in a range of crisis situations.

Pléiades image of Venice, Italy.

Credit: CNES