

International Charter Space & Major Disasters



Executive Secretariat

13th Annual Report

January-December 2013

*The report was prepared by ESA (Ph Bally, M Viel, S Hopkins, A Eddy)
based on contributions by all Charter members.*

CONTENTS

1	INTRODUCTION	5
1.1	OVERVIEW OF THE INTERNATIONAL CHARTER SPACE AND MAJOR DISASTERS	5
1.2	PURPOSE AND SCOPE OF THIS DOCUMENT	7
1.3	APPLICABLE DOCUMENTS	9
1.4	REFERENCE DOCUMENTS	9
1.5	LIST OF ACRONYMS	10
2	EXTERNAL RELATIONS	12
2.1	NEW MEMBERS ACCESSION	12
2.2	UNIVERSAL ACCESS	12
2.3	COOPERATING BODIES & CHARTER USER INTERMEDIARIES	14
2.3.1	<i>Collaboration with UNOOSA and UNITAR/UNOSAT</i>	<i>14</i>
2.3.2	<i>Cooperation with Sentinel Asia</i>	<i>15</i>
2.3.3	<i>Collaboration with European Union Satellite Centre</i>	<i>16</i>
2.4	COOPERATION WITH OTHER PROGRAMMES AND INITIATIVES	16
2.4.1	<i>Collaboration with GEO</i>	<i>16</i>
2.4.2	<i>Collaboration between European members of the Charter and the Copernicus programme</i>	<i>16</i>
2.5	PROJECT MANAGER TRAINING	17
3	OPERATIONS	19
3.1	CHARTER ACTIVATIONS	19
3.1.1	<i>Monthly activations</i>	<i>21</i>
3.1.2	<i>Geographical distribution</i>	<i>23</i>
3.2	RESOURCE REPORT	27
3.2.1	<i>EO data consumption in 2013</i>	<i>27</i>
3.2.2	<i>Human resource contribution (ECO and PM) in 2013</i>	<i>33</i>
3.3	SARE – SEMI ANNUAL REFRESHER EXERCISES	36
3.4	THE CURRENT AND FUTURE CHARTER TOOLS	36
3.4.1	CHARTER GEOGRAPHIC TOOL	37
3.4.2	SAVOIR	39
3.4.3	HDDS	39
3.4.4	THE NEW CHARTER OPERATIONAL SYSTEM – COS-2	40
4	COMMUNICATION	42
4.1	WEB SITE	42
4.2	CHARTER NEWSLETTERS	43
4.3	CHARTER FLYER	43
4.4	CONFERENCES AND PRESENTATIONS	44
4.5	PRESS RELEASES, ARTICLES	45
5	ASSESSMENT	46
5.1	OVERALL IMPACT	46
5.2	SYSTEM PERFORMANCE ASSESSMENT	50
5.3	ASSESSMENT OF PRODUCTS AND SERVICES	52

5.4	USERS' APPRAISAL	52
5.5	COMMUNICATION ASSESSMENT.....	53
6	CONCLUSIONS.....	54
7	ANNEX.....	56

1 Introduction

1.1 Overview of the International Charter Space and Major Disasters

The Charter is an international collaboration amongst space agencies – the Charter members. Initiated by the European Space Agency (ESA), the French Space Agency (CNES) and the Canadian Space Agency (CSA) in 2000, 12 other space agencies joined between 2000 and 2013, namely (in chronological order):

- US National Oceanic and Atmospheric Administration, NOAA
- Comision Nacional de Actividad Espaciales, Argentina, CONAE
- Indian Space Research Organization, ISRO
- Japan Aerospace Exploration Agency, JAXA
- United States Geological Survey, USGS
- UK Space Agency, UKSA/ Disaster Monitoring Constellation (DMC), DMC
- China National Space Administration, CNSA
- German Aerospace Center, DLR
- Korea Aerospace Research Institute, KARI
- Instituto Nacional de Pesquisas Espaciais, Brazil, INPE
- European Organisation for the Exploitation of Meteorological Satellites, EUMETSAT, Europe
- Russian Federal Space Agency (ROSCOSMOS)

The lead function rotates among all Charter members on a six-month basis. The Lead Agency has the overall responsibility of the implementation of the Charter to oversee and coordinate its operations, administration, communications and external relations. Additionally, at the start of each lead period, the new lead agency hosts the meetings of the Charter Board and Executive Secretariat.

The founding agreement of the Charter is intentionally limited in scope and thus not intended to serve the entire disaster management cycle (mitigation, preparedness, response, and recovery). The Charter provides a mechanism for the rapid tasking of satellites for immediate response rather than for the long-term monitoring of severe environmental hazards such as droughts and non-environment-related humanitarian emergencies (e.g. acts of war, refugee crises etc.). Free satellite-based information is provided to national disaster management authorities and humanitarian organizations to support the immediate response to major natural or man-made disasters.

The Charter has been activated for 402 disasters (as of the end of 2013), in 110 countries, since its inception in 2000. In 2013 alone, the Charter was activated 38 times for disasters in 28 countries. These accomplishments are possible in part because of its narrowly defined scope.

The Charter gives access to a virtual constellation of satellites equipped with radar and optical sensors. In 2013, active satellites included (Table 1-1):

- Radar (high resolution and very high resolution sensors): Risat-1, RADARSAT-2, TerraSAR-X and TanDEM-X.
- Optical (high resolution and very high resolution sensors): SPOT-5, PLEIADES 1A and 1B, Landsat- 7- 8, PROBA 1, SJ-9A, UK-DMC 2, KOMPSAT-2, IRS-P5, Resourcesat-2, Oceansat-2, Cartosat-2, IMS-1, RapidEye.

- Optical (medium and low resolution sensors): POES, GOES, SAC-C.

By August 2013, the Charter's virtual constellation also includes Russian optical satellites of low, medium and high-resolution: Meteor-M, Kanopus-V, and Resurs-P. JAXA will provide data from an HDTV camera, mounted on-board the KIBO module of the International Space Station (ISS) (20 to 200 m spatial resolution, swath width of 17 to 200 Km) at the beginning of 2014. Specific agreements with other entities allow the Charter to access additional products (high and very high resolution) from satellites such as, Formosat, GeoEye, IKONOS, QuickBird, WorldView.

Agency	Satellite (operational)
CNES	PLEIADES 1A and 1B
	SPOT 5
	FORMOSAT-2
CONAE	SAC-C (up to August 2013)
CSA	RADARSAT-1(up to April 2013)
	RADARSAT-2
CNSA	SJ-9A
DLR	TerraSAR-X
	TanDEM-X
	RapidEye
DMCii	UK-DMC2
	Deimos-1
	NigeriaSat-2
	NigeriaSat-X
ESA	PROBA CHRIS
EUMETSAT	Metop Series
	Meteosat Second Generation Series
	Meteosat First Generation Series

Agency	Satellite (operational)
ISRO	IMS-1
	Oceansat-2
	Resourcesat-2
	RISAT-1
	Cartosat-1
	Cartosat-2
KARI	Kompsat-2
NOAA	POES
	GOES
ROSCOSMOS	Kanopus-V
	Meteor-M
	Resurs-P
USGS	Landsat 7 and 8
	QuickBird
	IKONOS
	WorldView-1 and 2
	GeoEye-1

Table 1-1. List of Charter operational satellites [optical (in grey) and radar (in light blue)]

RADARSAT-1 operations were ceased in April 2013 after 17 years of successful activities. SAC-C was decommissioned in August of 2013. Archived data from RADARSAT -1 and other inactive satellites (ALOS, ENVISAT, ERS, CBERS, IRS-1C, SPOT 2, UK-DMC, and NigeriaSat) remain available for use in Charter activations (Table 1-2).

Agency	Satellite (archive only)
CNES	SPOT 1-3
	SPOT 4
CNSA	CBERS-2
CSA	RADARSAT-1
CONAE	SAC-C
DMCii	AlSat-1
ESA	ERS
	ENVISAT MERIS
	ENVISAT ASAR
INPE	CBERS-2
JAXA	ALOS (PRISM, AVNIR-2)
	ALOS Palsar
USGS	Landsat-5

Table 1-2. List of satellites archives available for the Charter
[optical (in grey) and radar (in light blue)]

1.2 Purpose and scope of this document

This document describes the 2013 activities of the International Charter "Space & Major Disasters". During this period, the lead agencies on a six monthly rotational basis have been: the French space agency (CNES) (October 2012 - April 2013), the German space agency (DLR) (April 2013 - October 2013) and the Argentinean space agency (CONAE) (October 2013 - April 2014).



Figure 1-1. 29th Charter Board and Executive Secretariat members in Berlin, Germany, April 2013.

© DLR/Press Office



Figure 1-2. 30th Charter Board and Executive Secretariat members at CONAE's Space Center, in Córdoba, Argentina, November 2013. © CONAE/Press Office

This report is based on the following:

- Working documents, notes and actions of the Charter's Executive Secretariat and Board
- Input from the Charter's Communication Group
- Input from each Charter member concerning EO resources
- Project Managers' reports for each activation, and
- Data, statistics and reports from EM-DAT and other reports on disasters prepared by Insurance companies (e.g. Munich RE and Swiss RE).

This report follows the same structure as the work plan of the Executive Secretariat:

Chapter 1- Introduction.

Chapter 2- External relations; explains the integration of new members, the Universal Access, progress, external relationships and Cooperating Bodies.

Chapter 3- Operations; depicts internal business concerned with operations, resource consumption, and technical updates (in particular the development of COS-2).

Chapter 4 - Communication; reports on all communication activities undertaken throughout the reporting period.

Chapter 5-Assessment; provides an assessment of the overall impact of the Charter as a service in supporting disaster response, of system performance, products and services, user appraisal and communication.

Chapter 6-Conclusions; outlines the significant achievements and conclusions throughout the reporting period.

1.3 *Applicable documents*

[AD1] Text of the Charter "Space and Major Disasters" - <http://www.disasterscharter.org>

[AD2] Charter Implementation Plan, RSCSA-PL0098

[AD3] Project Manager Procedure, RSCSA-PR0419

[AD4] Emergency On-Call Officer Procedure, RSCSA-PR0418

1.4 *Reference documents*

[RD1] D. Guha-Sapir, R. Below, Ph. Hoyois - EM-DAT: International Disaster Database – www.emdat.be – Université Catholique de Louvain – Brussels – Belgium.

1.5 List of acronyms

AOI	Area of Interest
ADRC	Asian Disaster Reduction Center
AIT	Asian Institute of Technology
APRSAF	Asia-Pacific Regional Space Agency Forum
ASEAN	Association of South-East Asian Nations
AU	Authorised User (of the Charter)
BNGRC	Bureau National de Gestion des Risques et des Catastrophes
BBPT	Agency for The Assessment and Application of Technology (Indonesia)
CATHALAC	Centro del Agua del Trópico Húmedo para América Latina y El Caribe
CEOS	Committee on Earth Observation Satellites
Charter	The International Charter Space & Major Disasters
CMA	China Meteorological Administration
CNES	Centre National d'Etudes Spatiales
CNSA	China National Space Administration
COGIC	Centre Opérationnel de Gestion Interministérielle des Crises (France)
CONAE	Comision Nacional de Actividades Espaciales (Argentina)
CONIDA	Comision Nacional de Investigacion y Desarrollo Aerospacial (Peru)
CONRED	Coordinadora Nacional para la Reducción de Desastres (Guatemala)
CRED	Centre for Research on the Epidemiology of Disasters
CRESDA	China Center for Resources Satellite Data and Application
CSA	Canadian Space Agency
CSDP	European Union Common Security and Defence Policy
CVO	Center for Volcanology and Geological Hazard Mitigation
DDSC	Direction de la Défense et de la Sécurité Civiles
DLR	Deutsches Zentrum für Luft und Raumfahrt (German Aerospace Center)
DMA	Disaster Management Authority
DMC	Disaster Management Constellation
DMCii	Disaster Management Constellation International Imaging
ECO	Emergency On-Call Officer (of the Charter)
EM-DAT	Emergency Events Database
EO	Earth Observation
EOR	Emergency Observation Request
ERS	Emergency Response Service
ESA	European Space Agency
ESRIN	ESA Centre for Earth Observation
EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites
EUR-OPA	European Open Partial Agreement
EUSC	European Union Satellite Centre
FASP	European Union Foreign and Security Policy
FTP	File Transfer Protocol
GDACS	Global Disaster Alert and Coordination System
GEO	Group on Earth Observations
GEONETCast	global network of satellite-based data dissemination systems
GEOSS	Global Earth Observation System of Systems, GEO
GIO	GMES Initial Operations
GISTDA	Geo-Informatics and Space Development Agency of Thailand
GMES	Global Monitoring for Environment and Security
HDDS	(USGS) Hazards Data Distribution System
HR	High Resolution
ICD	Interface Control Document
ICIMOD	International Center for Integrated Mountain Development
IFRC	International Federation of Red Cross / Red Crescent societies
INGEOMINAS	Instituto Colombiano de Geología y Minería
INPE	National Institute for Space Research (Brazil)
ISRO	Indian Space Research Organization
ISS	International Space Station
JAXA	Japan Aerospace Exploration Agency
JPTM	Sentinel Asia Joint Project Team Meeting

KARI	Korea Aerospace Research Institute
KML	Keyhole Markup Language
LAPAN	National Institute of Aeronautics and Space (Indonesia)
MO	Manila Observatory (the Philippines)
MCDM	Ministry of Civil Defence and Emergency Management (New Zealand)
MR	Medium Resolution
NASRDA	Nigerian Space Agency
NatCatSERVICE	Natural catastrophe know-how for risk management and research
NDRCC	National Disaster Reduction Center of China
NCDR	National Center for Disaster Reduction
NEMA	National Emergency Management Agency (Nigeria)
NFP	National Focal Point
NOAA	National Oceanic and Atmospheric Administration
NRSC	National Remote Sensing Centre (India)
NSMC	National Satellite Meteorological Center
NSPO	National Space Organization(Taipei)
ODO	On-Duty Operator
ONEMI	Oficina Nacional de Emergencia del Ministeriodel Interior (Chile)
PA	Partner Agency
PAGASA	Philippine Atmospheric, Geophysical and Astronomical Services Administration
PDC	Pacific Disaster Center (USA)
PHIVOLCS	Philippine Institute of Volcanology and Seismology
PM	Project Manager (of the Charter)
RCMRD	Regional Center for Mapping of Resources for Development (Kenya)
RECTAS	Regional Center for Training in Aerospace Survey
RESTEC	Remote Sensing Technology Center (Japan)
ROSCOSMOS	Russian Federal Space Agency
SA	Sentinel Asia
SAFER	Services and Applications for Emergency Response
SARE	Semi Annual Refresher Exercises
SASOT	Sentinel Asia System Operation Training
SEGEMAR	Servicio Geológico Minero Argentino
SERTIT	Service Régional de Traitement d'Image et de Télédétection (France)
SIFEM	Sistema federal de Emergencias (Argentina)
SOPAC	Pacific Islands Applied Geosciences Commission
UA	Universal Access
UKSA	United Kingdom Space Agency
UN COPUOS	United Nations Committee on the Peaceful Uses of Outer Space
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNICEF	United Nations Children's Fund
UNITAR/UNOSAT	United Nations Institute for Training and Research/ United Nations Operational Satellite Applications Programme
UNHCR	United Nations High Commissary for Refugees
UNOCHA	United Nations Office for the Coordination of Humanitarian Affairs
UNOOSA	United Nations Office for Outer Space Affairs
UN-SPIDER	United Nations Platform for Space-based Information for Disaster Management and Emergency Response
URF	User Request Form
USAID/OFDA	United States Agency for International Development's Office of Foreign Disaster Assistance
USGS	United States Geological Survey
VAR	Value Added Reseller
VAP	Value-Added Provider
VHR	Very High Resolution
VHRO	Very High Resolution Optical
WFP	World Food Programme
WWF	World Wide Fund For Nature

2 External relations

2.1 *New members accession*

The operational integration of EUMETSAT was completed in 2013 and ROSCOSMOS was accepted as the 15th Charter member in April 2013; a Charter signature ceremony and a site visit were carried out in August of 2013. The ROSCOSMOS operational integration test was successfully completed in December 2013 and as a result ROSCOSMOS provides data from the Kanopus-V, Meteor-M and Resurs-P satellites.

The integration of the Ukrainian Space Agency (State Space Agency of Ukraine- SSAU) was not pursued due to the loss of their satellite (Sich-2). Ukrainian authorities were informed about the Universal Access (UA) initiative that will allow national disaster risk management organizations to become Authorized Users (AUs) and to directly submit emergency requests.

2.2 *Universal Access*

Charter members, conscious of the need to improve Charter access globally, have adopted the principle of Universal Access (UA). Any national disaster management authority will be able to submit requests to the Charter for emergency response. Proper procedures will have to be followed, but the affected country will not have to be a Charter member. The UA process is designed to further strengthen the Charter's contribution to disaster management worldwide, and is being implemented gradually. UA implementation started in September 2012 with the publication of relevant news, brochures and a registration form on the Charter website. UA was also announced on the GEO, UNITAR/UNOSAT and UNOOSA websites. Charter members have continued to promote UA and the Charter as a whole through their participation in different international events held throughout 2012 and 2013 (e.g. UN COPUOS Scientific and Technical Subcommittee meeting in Vienna, February 2013; ESA Living Planet, September 2013).

In April 2013, the Charter Board made the decision to directly contact a set of national disaster management authorities, which had already been exposed to the Charter because through previous Charter activations or they had been visited within the framework of the formal user consultation in Africa. In addition, the Charter Board and the GEO Secretariat agreed to jointly contact the principals of GEO member countries without direct access to the Charter and make them aware of UA. In total, 63 countries were directly contacted by the Charter and GEO at the end of August 2013. This impact of the outreach will be assessed next year and the Charter's promotion strategy for its UA initiative will be reviewed and updated.

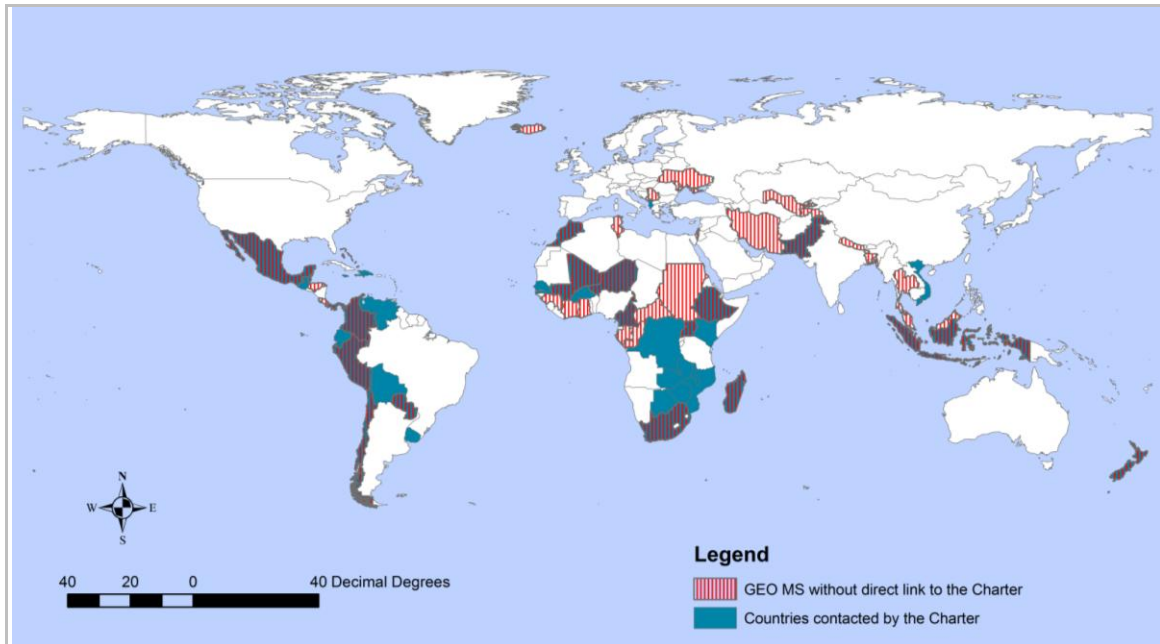


Figure 2-1. Countries contacted by GEO and the Charter in August 2013

Training material for new Authorised Users was finalised by the Charter training subgroup; a AU training brochure was developed with the support of ESA, and a virtual course on the Internet has been implemented by CONAE using the Moodle tool.

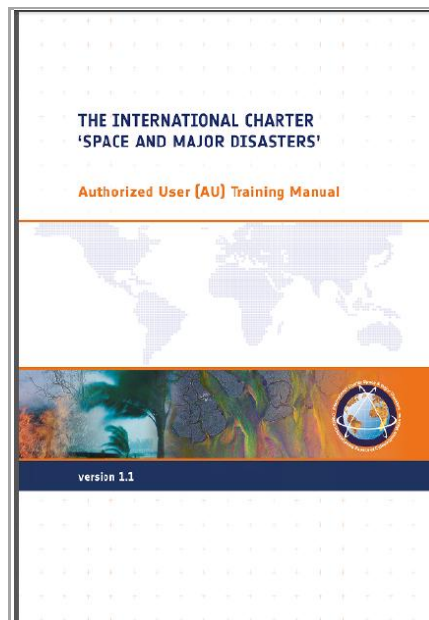


Figure 2-2. Authorized User training manual

The UA registration form and the brochure were also translated in French and Spanish to facilitate communication with French- and Spanish-speaking countries.

Two national disaster management organizations applied for becoming Charter AU at the end of 2012. In 2013, seven additional formal requests were received from national organisations of Africa, Asia, South America and Oceania. An assessment was performed by the Executive

Secretariat (ES) to determine whether each applicant met the conditions for a Charter AU [*The entity must be a national disaster management authority or its delegated agency in that country. The entity must have the capacity to download and utilize maps. The entity must be able to submit and pursue its activation requests in English*]. Some applications were rejected because the candidates did not meet the basic conditions. Six applications from 2012 and 2013 were accepted for AU training by the Charter Board.

The training of the Australian candidate (Geoscience Australia) was successfully completed in September 2013, and this organisation became the first new Authorised User as a result of the UA initiative after the Board acceptance in November 2013. The process to become an AU is finalized by the organisations signature on a document which specifies certain procedures and contacts for Charter activation requests, helping to guide the new AU in accordance with Charter rules in order to avoid loss of time and resources during emergencies.

2.3 Cooperating Bodies & Charter User Intermediaries

2.3.1 Collaboration with UNOOSA and UNITAR/UNOSAT

Active cooperation with the UN is continuing on the basis of existing arrangements with UNOOSA and UNITAR/UNOSAT. Since mid-2013, most of the Charter activations by UN users were channelled through UNITAR/UNOSAT, which supports Charter operations by providing Project Managers (see chapter 3.2.2) and, training and awareness activities; UNOOSA supports awareness and information activities associated with the Charter worldwide, relying on the network of its programme UN-SPIDER. All Charter activations and product references are published in the monthly UN-SPIDER Updates, an electronic publication which is posted on the Knowledge Portal (www.un-spider.org) and distributed to nearly 20,000 subscribers worldwide via e-mail. At the beginning of 2014, UNITAR/UNOSAT will facilitate a new weekly service as part of the *Global Disaster Alert and Coordination System (GDACS)*. An overview of satellite mapping activities including the Charter activations will be accessible through the GDACS portal. Twitter is a social media tool used by both entities to communicate Charter activations and publicize the Charter.

UNITAR/UNOSAT and UNOOSA also continue to promote the UA initiative by giving presentations to numerous audiences at national and international workshops and conferences regarding the objectives and processes involved in becoming a Charter Authorized User. For example, UNOOSA invited CNES as Charter Lead, to present the UA initiative on the occasion of the COPUOS-STSC Plenary in Vienna (February 2013). In a side meeting organised at the same event, CNES and DLR discussed the UA initiative with interested national participants.

UNITAR/UNOSAT supported the ESA sponsored Charter Project Manager (PM) training in June 2013 in Frascati, Italy, by sharing their experience as Charter PM and as of satellite Earth Observation (EO)-based crisis mapping organization. UNOOSA supported the participation of staff from three regional UN-SPIDER support offices (Iran, Romania, and Hungary) in the same training event.

13 of 38 Charter activations for 2013 (34 %) were requested by UN agencies. Of these, 12 activations were through UNITAR/UNOSAT and one through UNOOSA. UNOCHA was the main requestor with 7 calls; the others were initiated by UNDP, UNICEF, WFP and UNESCAP.

Throughout the reporting period, UNITAR/UNOSAT staff members were nominated as PM for 8 activations; these PMs also provided value-adding services. In addition, UNITAR/UNOSAT supported the Charter for 4 other activations by providing value-adding services in the delivery of damage and impact assessment maps.

2.3.2 Cooperation with Sentinel Asia

Since March 2010, the Asian Disaster Reduction Center (ADRC) has had the status of a Charter Cooperating Body and can trigger the Charter in support of requests from national members of Sentinel Asia (SA) and ADRC. In 2013, SA was comprised of 77 organizations from 25 countries and regions including 14 international organizations. There were five new members in 2013: World Wide Fund for Nature (WWF); Pakistan and Prince of Songkla University, Thailand; Myanmar Earthquake Committee (MEC), Myanmar; Institute of Mountain Hazards and Environment (IMHE) - Chinese Academy of Sciences (CAS), China; Myanmar Geospatial and Resources Center (MGRC)/Myanmar Peace Center, Myanmar.

The ADRC provided the Charter with monthly activation status reports and provided two bi-annual reviews presenting Sentinel Asia emergency response and promotional / awareness activities.

In 2013, 16 activations of SA were requested. The escalation mechanism to the Charter was used in response to 5 events. The number of escalations to the Charter has risen slightly: 2 in 2010, 4 in 2011 and 2 in 2012); in 2013 escalation was used for 1/3 of all SA activations.

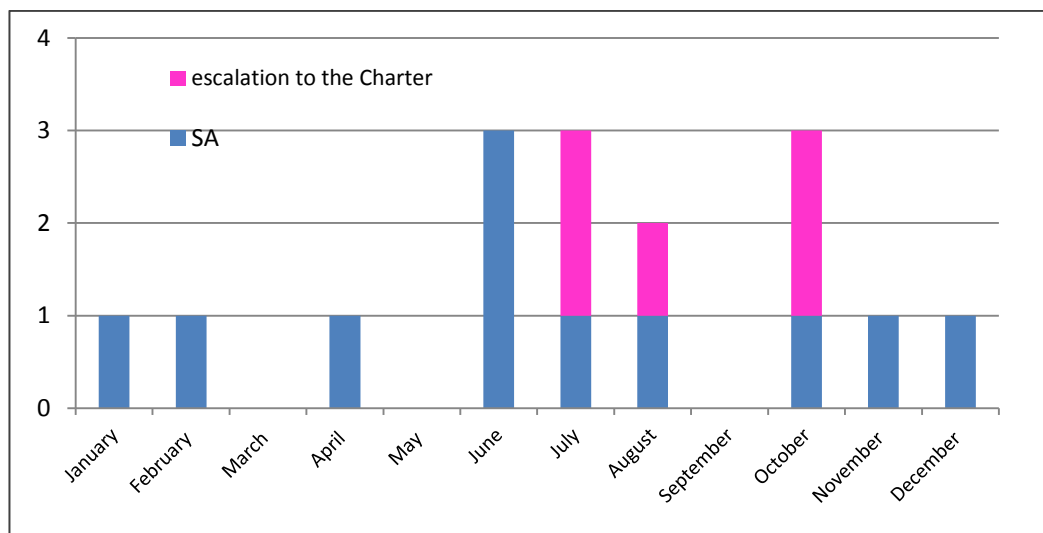


Figure 2-3. Sentinel Asia: 2013 monthly activations
(In pink - the five activations with escalation to the Charter)

SA – with the support of JAXA– continued to promote the Charter, explaining the escalation mechanism to activate the Charter and the UA initiative at several training workshop and conferences including: Sentinel Asia System Operation Training (SASOT) for ASEAN countries in Indonesia in July 2013; APEC Typhoon Symposium in Taipei in October; Sentinel Asia Joint Project Team Meeting (JPTM) in Thailand in November; Asia Pacific Space Agency Forum (APRSAF) in Vietnam in December.

2.3.3 Collaboration with European Union Satellite Centre

Collaboration activities with the European Union Satellite Centre (EUSC or EU SatCen) are continuing, and the agreement has been extended for 2 years. EUSC acts as a Collaborating Body to raise awareness and promote the Charter amongst their users in the EU Member States and within the context of the European External Action Service (EEAS).

EUSC may activate the Charter for natural and man-made disasters and may in addition provide suitable PMs. Staff of EUSC participated in the PM training held at ESA/ESRIN in June 2013.

2.4 Cooperation with other programmes and initiatives

2.4.1 Collaboration with GEO

Collaboration with GEO continues to be active. A special session was organised during the Charter Board Meeting held in Berlin in April 2013 with the GEO Secretariat (Director and the scientific expert for the Disasters Social Benefit Area -SBA) to discuss further collaboration opportunities between GEO and the Charter. The following actions were agreed upon:

- 1) The promotion of the UA initiative to the GEO member states by sending a Charter letter explaining the UA initiative to the GEO principals;
- 2) Increase the participation of Charter members at GEO events (e.g. GEO plenary and Ministerial Summit, January 2014 in Geneva);
- 3) Identify possible PM candidates in developing countries;
- 4) Provide financial support as possible for the participation of potential PMs from developing countries in Charter PM trainings.

In August 2013, the GEO Secretariat sent the Charter letter mentioned above to GEO Principals and additional GEO-related persons of 44 countries. None of the countries have direct access to the Charter and included: Bahrain, Bangladesh, Belize, Central African Republic, Cameroon, Chile, Colombia, Costa Rica, Cote d'Ivoire, Croatia, Ethiopia, Gabon, Ghana, Honduras, Iceland, Indonesia, Iran, Israel, Madagascar, Mali, Malaysia, Mexico, Moldova, Morocco, Nepal, New Zealand, Niger, Panama, Pakistan, Paraguay, Philippines, Peru, Republic of Guinea, Republic of the Congo, Serbia, South Africa, Sudan, Thailand, Tajikistan, The Bahamas, Tunisia, Uganda, Ukraine, and Uzbekistan.

2.4.2 Collaboration between European members of the Charter and the Copernicus programme

A meeting with the Copernicus bureau was held in January 2013 to finalize a collaboration agreement and operational rules, in the framework of the GIO-Emergency Management Service (EMS), with particular emphasis on the rush mode component. The previous arrangement, operated in the framework of GMES Safer project (2009-2012), consisted of providing advanced crisis mapping services to support specific Charter activations relevant to Europe's policy sectors. It was agreed to continue with this collaboration. Additionally it was noted that the European Commission, as Authorized User of the Charter, could activate the Charter in case of a major disaster, and that the JRC may provide a Charter Project Manager (PM) in such a case. Following this, JRC staff participated in the Charter PM Training organised by ESA/ESRIN in June 2013. Information on GIO-EMS activations and Charter activations was regularly exchanged to facilitate coordination.

2.5 Project Manager Training

The PM training is aimed at strengthening the network of Charter PMs by preparing for new participants. Four PM training sessions were carried out in 2013.

- April: Lead by DMCii in Abuja, Nigeria. The participants were from the National Emergency Management Agency (NEMA), the Nigerian Space Agency (NASRDA) and, the Regional Center for Training in Aerospace Surveys (RECTAS) which have already supported the Charter in the framework of activations in Nigeria.
- June: Lead by JAXA in Manila, Philippines. The participants were from three organizations: the National Institute of Aeronautics and Space of Indonesia (LAPAN), the Philippine Institute of Volcanology and Seismology (PHIVOLCS) and, the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA).
- June: Lead by ESA at ESA/ESRIN in Frascati, Italy in association with the French Space Agency (CNES), the German Space Agency (DLR), the United Kingdom Space Agency (UKSA) and their partner DMCii, and EUMETSAT. The organizers were supported from organizations contributing specialists of satellite EO-based crisis mapping such as DLR's ZKI centre (Germany), SERTIT (France), and UNITAR/UNOSAT (Switzerland). Participants of national organizations from Algeria, France, Iran, Germany, Hungary, Italy, UK, Romania, Spain, South Africa, Switzerland, European (EC-JRC and EUSC) and international organizations (UNOOSA, UNITAR/UNOSAT, ICIMOD, and GEO) attended the training.
- November: Lead by JAXA in Bangkok, Thailand. The participants were from the Asian Institute of Technology (AIT).

The Charter training course material is comprised of various presentations on the planning and supply of EO data from the Charter members' order desks during an activation, the relationship with the AUs and end users, an EO capabilities for crisis mapping module and a practical exercise session. Charter tutorials on the history of the Charter and its management structure and, an overview of operational roles and procedure, are also provided.



Figure 2-4. Participants at the Charter PM training in ESA/ESRIN (Frascati, Italy). © ESA



Figure 2-5. Participants at the Charter PM training in Manila. © JAXA

3 Operations

3.1 Charter activations

In 2013, the Charter was activated 38 times, covering disasters in 28 countries (37 natural disasters and one man-made disaster). This is a similar figure to the total activation ‘average’ between 2007 and 2012 (Figure 3-1). By the end of 2013, the Charter had been triggered for 402 disasters in 110 countries since 2000.

Since 2007, the annual number of activations has oscillated between 30 and 50. The Charter has effectively managed about 40 activations per year thanks to its distributed operational capacities and human resources.

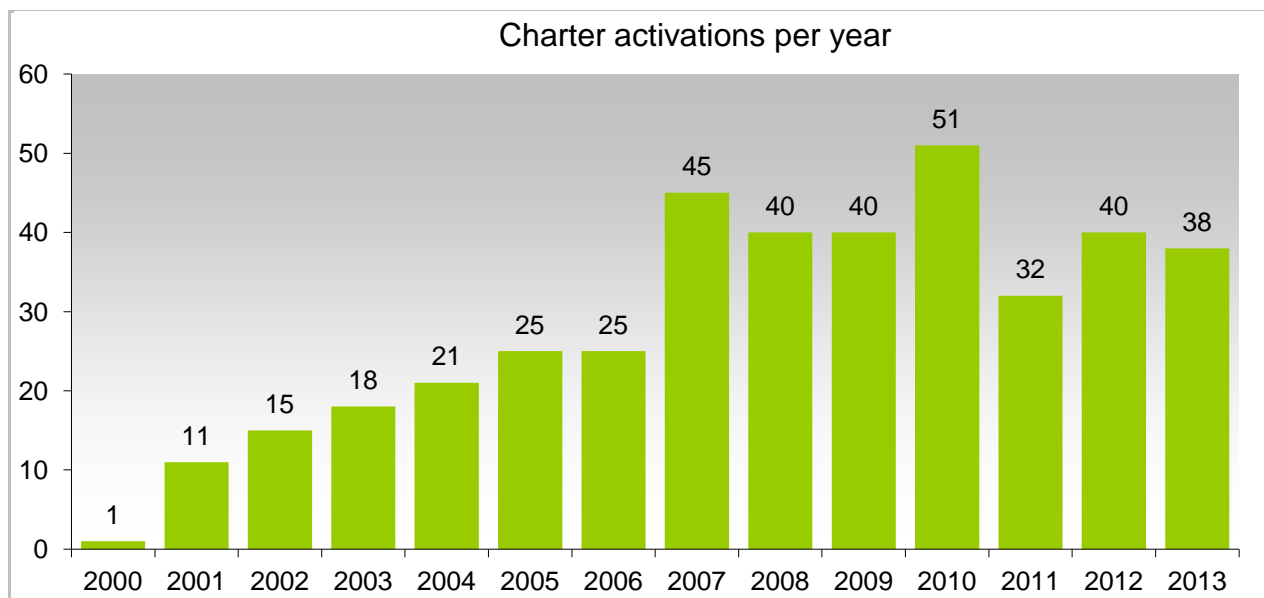


Figure 3-1. Number of Charter activations per year (2000- 2013)

All 2013 activations are listed in Table 3-1. The Call-ID is the unique number assigned by the On-Duty Operator (ODO) to any User Request Form (URF) received. The number of the activation (‘Activation ID’) differs from the Call-ID as some Calls are not processed (rejection mechanism) and others are merged. In total, 42 requests were received in 2013. It is worth noting, however, that:

- Two calls were denied:
 - Call 433, for an earthquake and tsunami hitting the Solomon Islands in February. The request was made by UNITAR/UNOSAT on behalf of UNOCHA. After verification, the Charter did not accept the request since the event was of low magnitude and EO data was not expected to be reliable source for evaluation of damage to traditional habitat.
 - Call 453, for a flash flood in Bamako, Mali in September. The request was by the Algerian Space Agency (ASAL) on behalf of the Algerian AU. After consultation with the AU, the request was denied. The AU did not indicate the Malian end-user to be supported, and the request was sent several days after the event, which significantly decreased the possibility of identifying flash flooding signatures by satellite.

- Two activations (383 and 395) were the result of two calls which were subsequently merged:
 - o Calls 448 and 450 were requested for a flood in the Philippines by ADRC for the same user (Manila Observatory).
 - o Calls 462 and 463 were requested for an ocean storm and flood in Vietnam by ADRC on behalf of two different users (National Remote Sensing Agency of Vietnam and MONRE).

Activation ID	Hazard type	Country name	Activation Date
365	Flood	Israel	2013-01-10
366	Flood	Mozambique	2013-01-21
367	Flood	Indonesia	2013-01-30
368	Ocean storm	Seychelles	2013-02-01
369	Ocean storm	Madagascar	2013-02-23
370	Earthquake	China P Rep	2013-04-20
371	Ocean storm	Bangladesh	2013-05-15
372	Volcano	Chile	2013-05-27
373	Flood	Germany	2013-06-02
374	Flood	India	2013-06-19
375	Flood	Argentina	2013-06-28
376	Train explosion	Canada	2013-07-08
377	Earthquake	China P Rep	2013-07-22
378	Flood	Thailand	2013-07-25
379	Flood	Japan	2013-07-29
380	Flood	Myanmar	2013-08-02
381	Flood	Sudan	2013-08-06
382	Flood	China P Rep	2013-08-16
383	Flood	Philippines	2013-08-19
384	Flood	Russia	2013-08-19
385	Flood	Pakistan	2013-08-22
386	Flood	Senegal	2013-08-25
387	Wildfire	Argentina	2013-09-10
388	Flood	USA	2013-09-13
389	Volcano	Peru	2013-09-19
390	Earthquake	Pakistan	2013-09-24
391	Wind Storm	India	2013-10-12
392	Earthquake	Philippines	2013-10-15
393	Landslide	Japan	2013-10-16
394	Wildfire	Australia	2013-10-17
395	Ocean storm and flood	Vietnam	2013-10-18
396	Flood	Cambodia	2013-10-21
397	Volcano	Indonesia	2013-11-05
398	Ocean storm	Philippines	2013-11-08
399	Ocean storm and flood	Vietnam	2013-11-10
400	Flood	Oman	2013-11-22
401	Flood	UK	2013-12-04
402	Flood and storm	Gaza	2013-12-17

Table 3-1. List of 2013 Activations

3.1.1 Monthly activations

During 2013, the monthly average of calls was 3.5, and the monthly average of activations was 3.2.

Year	Average # of calls per month	Average # of activations per month
2001	1	0.9
2002	1.4	1.3
2003	1.6	1.5
2004	1.9	1.8
2005	2.5	2.1
2006	2.3	2.1
2007	4.1	3.8
2008	3.9	3.3
2009	3.8	3.3
2010	5.3	4.3
2011	3	2.7
2012	3.7	3.3
2013	3.5	3.2

Figure 3-2 shows the monthly distribution of activations throughout 2013. The highest number of activations occurred in August and October, corresponding to 34 % of the total number. The remaining months of 2013 saw a number of activations that varied from 0 to 4.

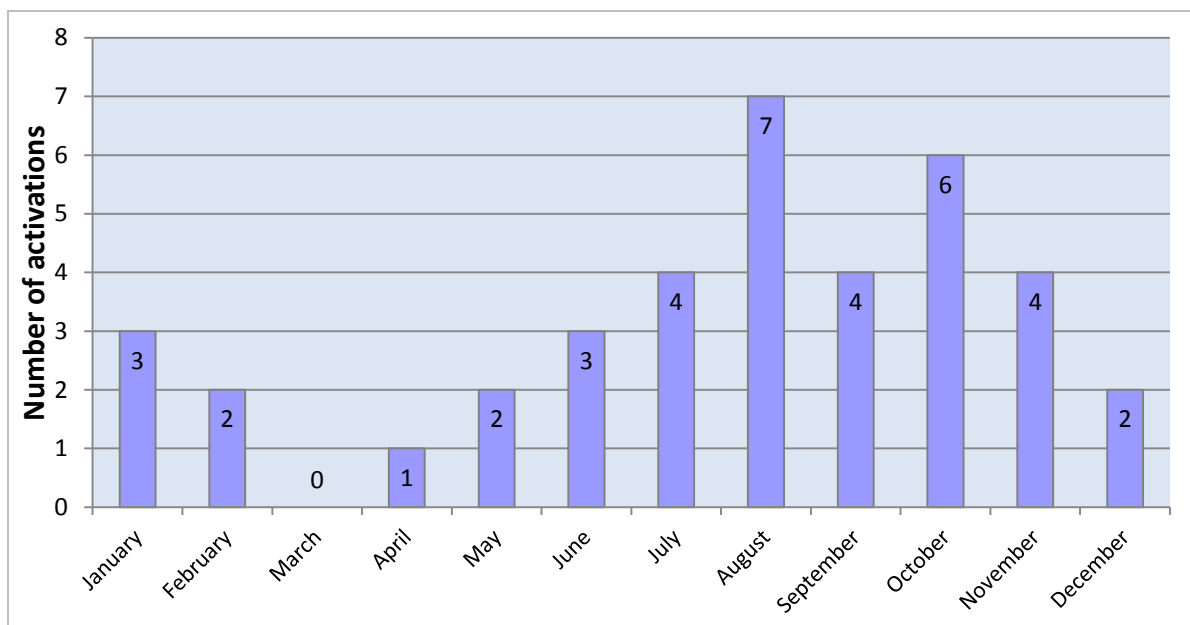


Figure 3-2. Distribution of the Charter activations by months in 2013

Peaks of activations at the end of summer and in autumn have occurred regularly since 2009 (Figures 3-3 and 3-4). Natural disasters occurring throughout that period of the year were found to be mainly attributable to intense rains in Asia, Western Africa, and North America. Ocean storms in Asia are known to mainly occur in autumn explaining the peak of activations towards the end of October and November.

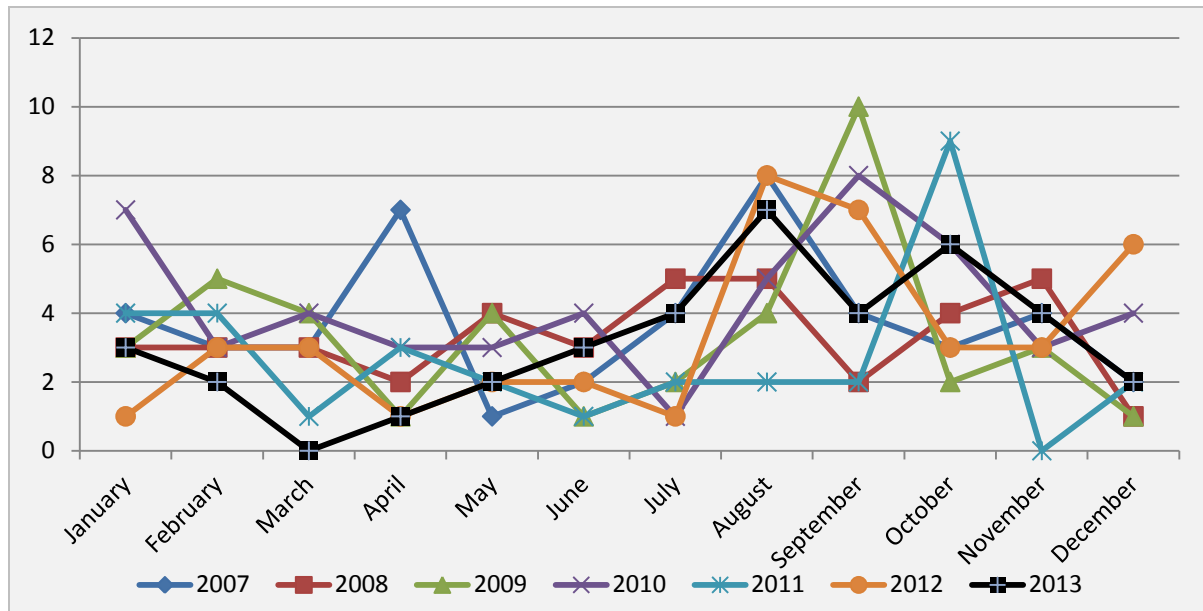


Figure 3-3. Charter activations by months from 2008 to 2013

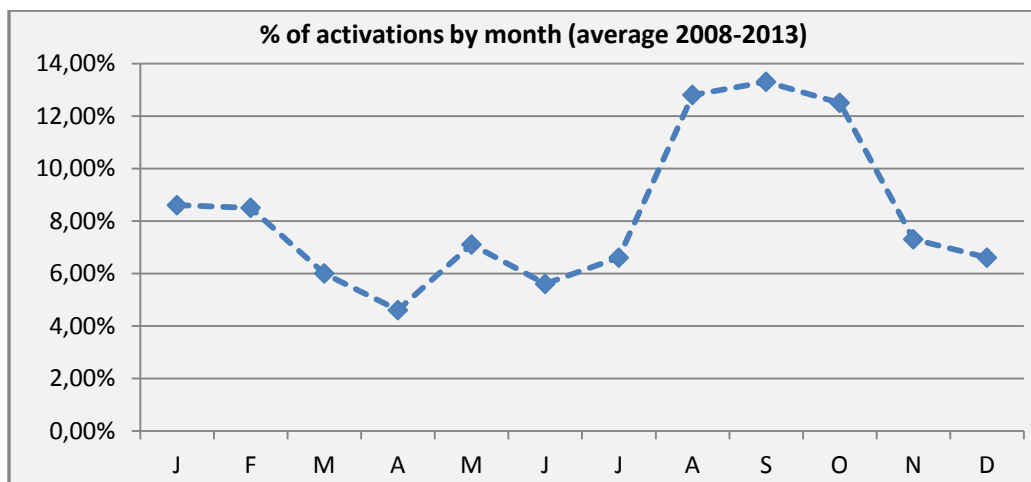


Figure 3-4. Monthly average (in %) of Charter activations (2008 to 2013)

3.1.2 Geographical distribution

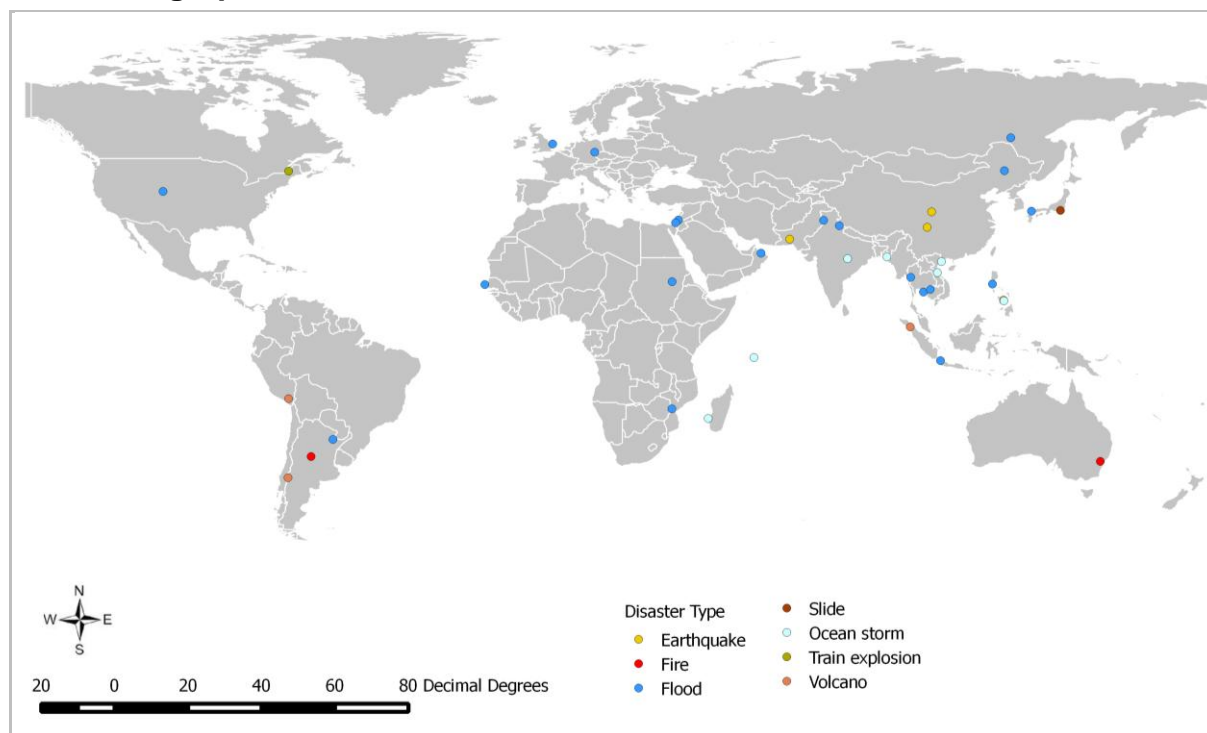


Figure 3-5. Location of the 2013 activations (by hazard type)

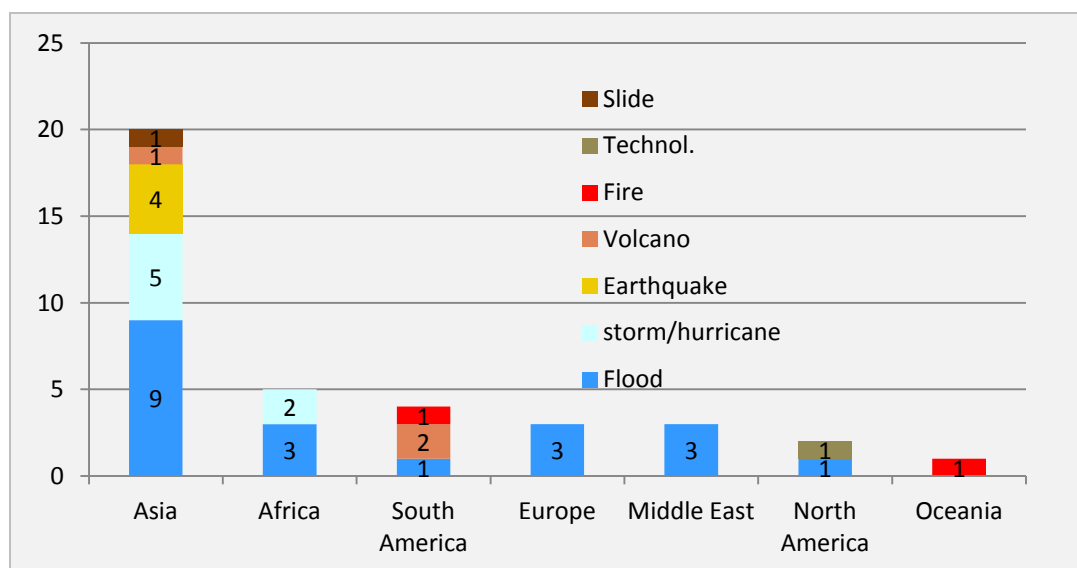


Figure 3-6. Number of activations by continent/subcontinent and hazard type

In 2013, 22 activations occurred in Asia, 5 in Africa, 4 in South America, 3 in Europe, 2 in North America, 1 in Oceania, and 1 in the Middle East (Figure 3-5 & 3-6) with the most frequent hazard types being flooding (53%) and ocean storms (18%) while solid earth-related hazards represented 18% (Figure 3-7). However, it should be noted that it is not always a straightforward process to classify Charter activations by disaster types because there are often multi-hazard events, which combine a multitude of sub-hazard events such as earthquakes causing landslides or tropical storms resulting in floods and landslides.

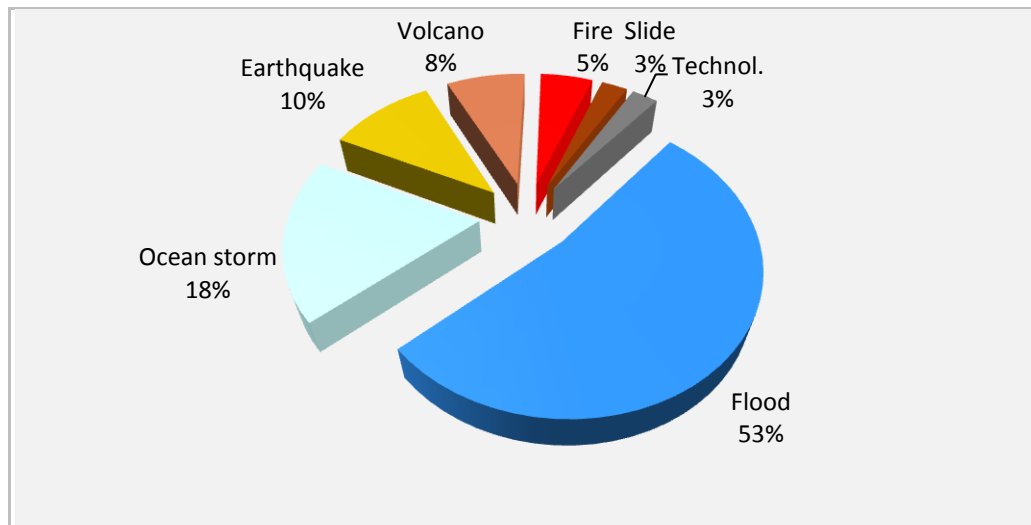


Figure 3-7. 2013 Number of activations by hazard type

As shown in the figure below (Figure 3-8), since 2004, most disasters covered by the Charter are caused by flooding. The other two principal hazards are storm/hurricanes and earthquakes. Activations for ice/snow hazards, technological hazards (e.g. oil spills, other) landslides and volcanic eruptions were infrequent (around 18% in total).

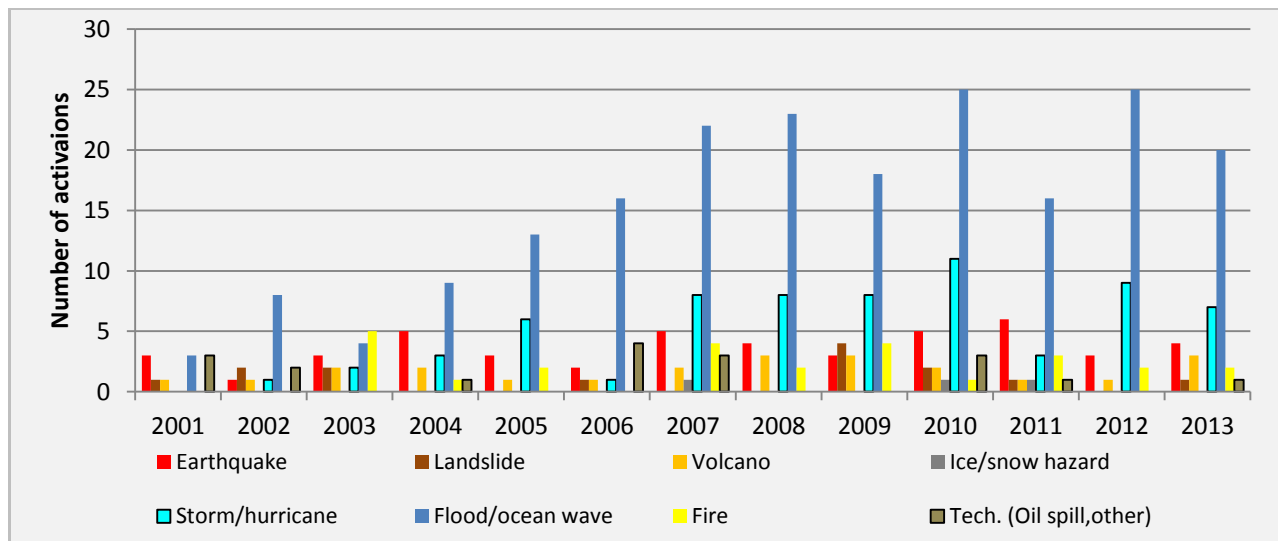


Figure 3-8. 2001-2013 Distribution of activations by hazard type

Figure 3-9 shows the geographic distribution of activations by access mode. Since 2010, there are 4 access modes that have been used:

- Mode 1: direct activation by an Authorized User (AU) for a disaster occurring in their country.
- Mode 2: activation by an Authorized User on behalf of a user from another country.
- Mode 3: activation by UNOOSA or UNITAR/UNOSAT for UN users.
- Mode 4: activation for national users from the Asia Pacific region via Sentinel Asia's partner, the Asian Disaster Reduction Center.

In 2013, Mode 1 was used for disasters in Asia, the Americas, Europe, and Oceania; Mode 2 was used for disasters in Africa, Asia, Middle East, and South America. Mode 3 was used mainly for disasters in Africa, Asia, and Middle East. By definition, Mode 4 was used in Asia (Figure 3-9 & 3-10). In 2013, activations by an AU (mode 1 & 2) were the main access modes (63% in total) while UN activations represented 34% of the total.

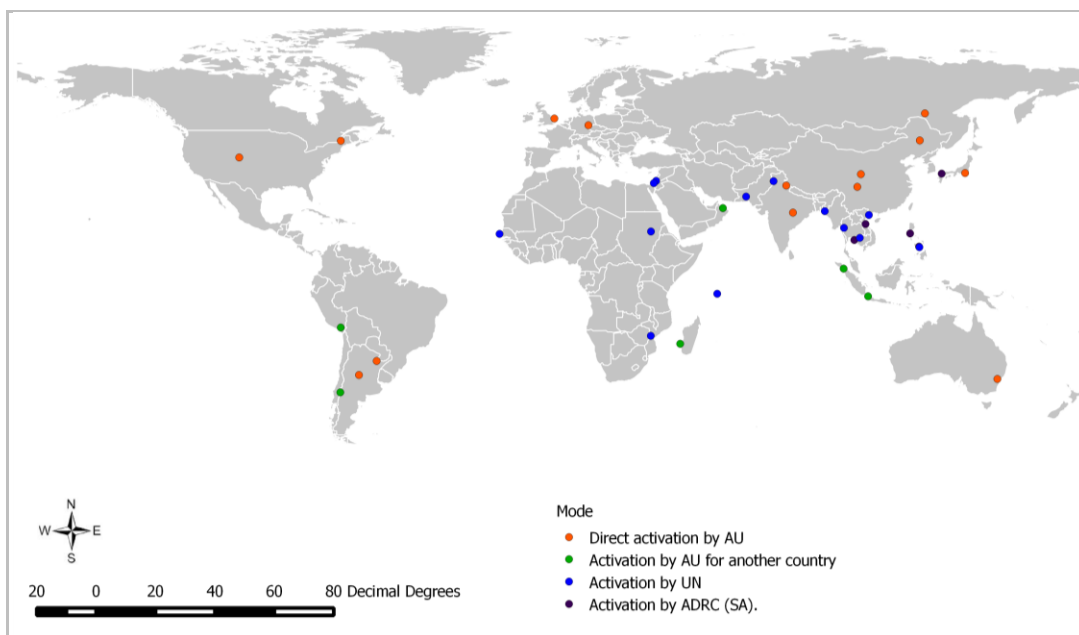


Figure 3-9. Location of the 2013 activations (per mode)

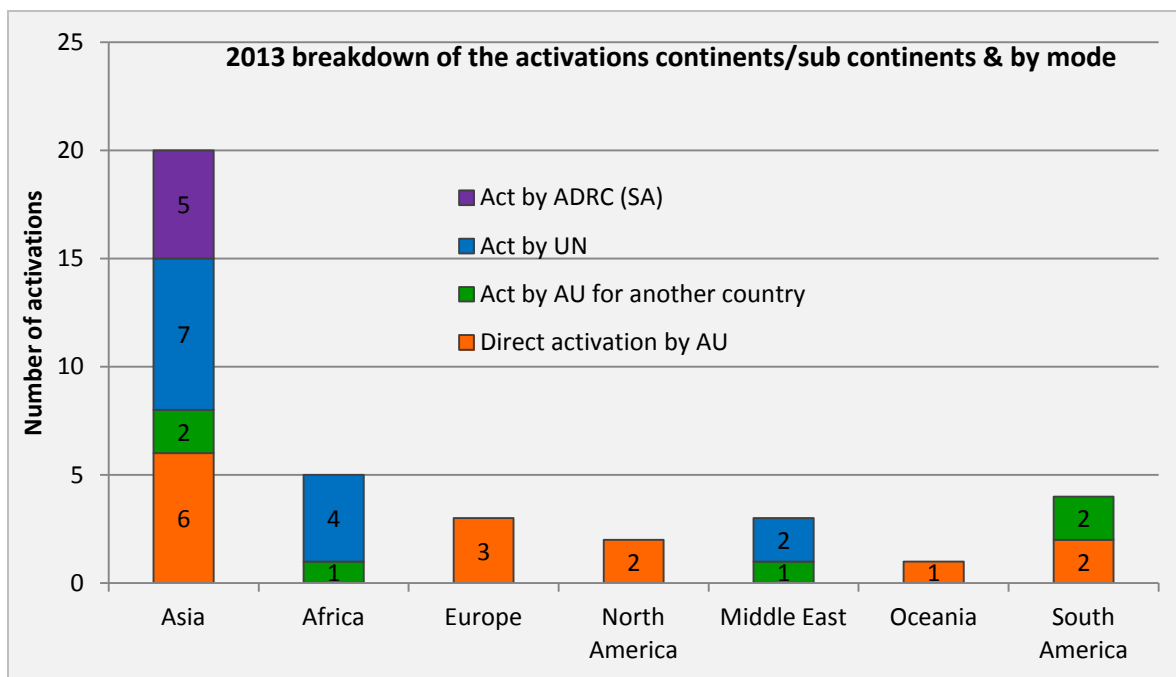


Figure 3-10. 2013 breakdown of Charter activations per continent/sub-continent & per mode

The following diagram (Figure 3-11) compares the relative weight of the different access mechanisms adopted from 2001 to 2013. The Charter continues to address more users and is a service which supports users worldwide, including countries without direct access (through activations by AU for other countries, by UN bodies for UN in-country agencies and through Sentinel Asia). Indeed, since its inception, 80 countries without AUs have benefited from the Charter. For the period 2007-2013, 62% of the activations were not direct requests, but requests on behalf of a user in a country without an AU.

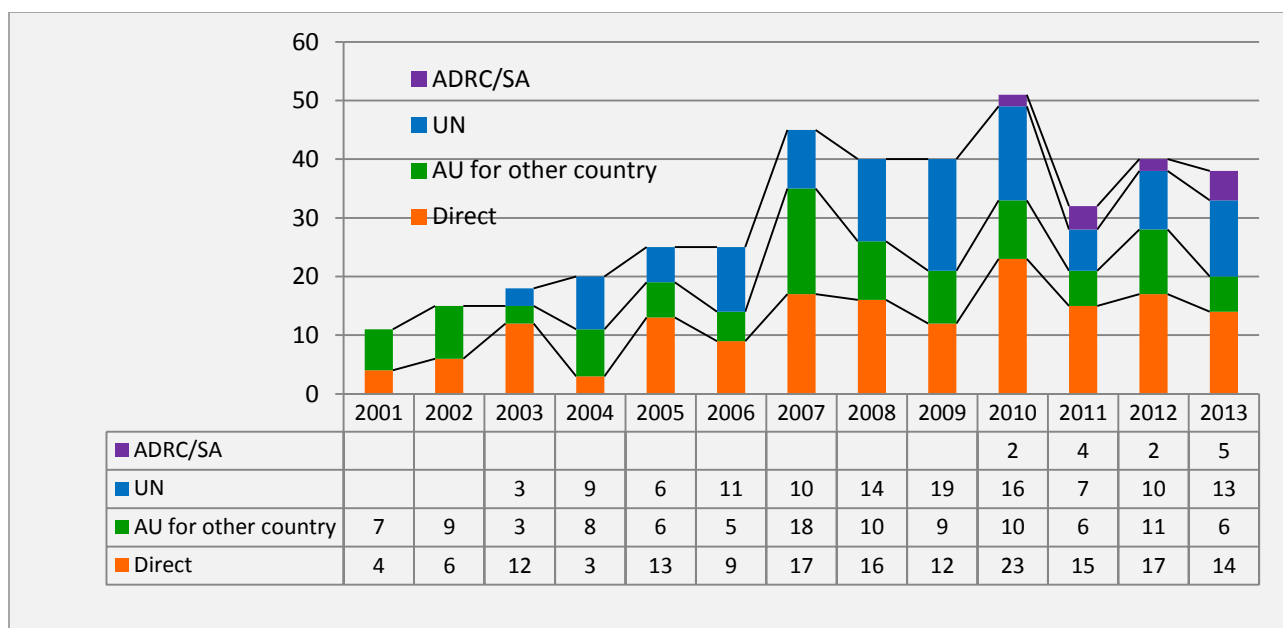


Figure 3-11. 2001-2013 number of Charter activations per mode

3.2 Resource report

3.2.1 EO data consumption in 2013

In 2013, a total of 1549 optical and radar images (Figure 3-13, table 3-2) and (Figure 3-14, table 3-3) of the Charter members satellites and, 4,094 images of commercial US VHR optical satellites (GeoEye, IKONOS, QuickBird, WorldView1 and 2) were supplied (Figure 3-15, table 3-4) for 38 activations in 28 countries.

Figure 3-12 shows the total number of EO data from the Charter virtual constellation and the US VHR optical data provided in 2013 by disaster type.

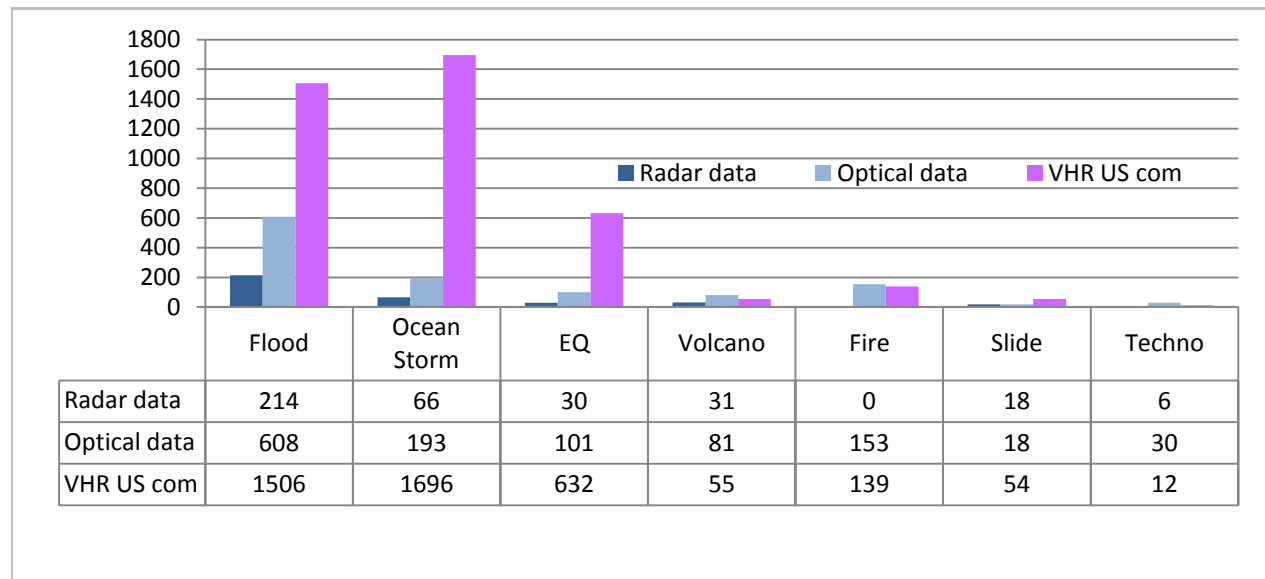


Figure 3-12. 2013 EO data of the Charter virtual constellation and the US VHR optical data provided in 2013 grouped by disaster type.

In 2012, a total of 980 images of the Charter members satellites and 1,826 images of commercial US VHR optical satellites (GeoEye, IKONOS, QuickBird, WorldView 1 and 2) were supplied by the Charter members to support 40 activations in 27 countries.

In 2011, 1105 images and a total of 222 HR optical images from RapidEye and 3,873 VHR optical data US commercial satellites were supplied to support 32 activations in 23 countries.

Differences in the amount of EO data delivered by the agencies year by year, are linked to the annual number of activations, the type of disasters, the sizes of the AOIs, the image tiles, the duration and severity of certain disasters and the change in the virtual Charter constellation (decommissioning of satellites and new satellites entering the constellation).

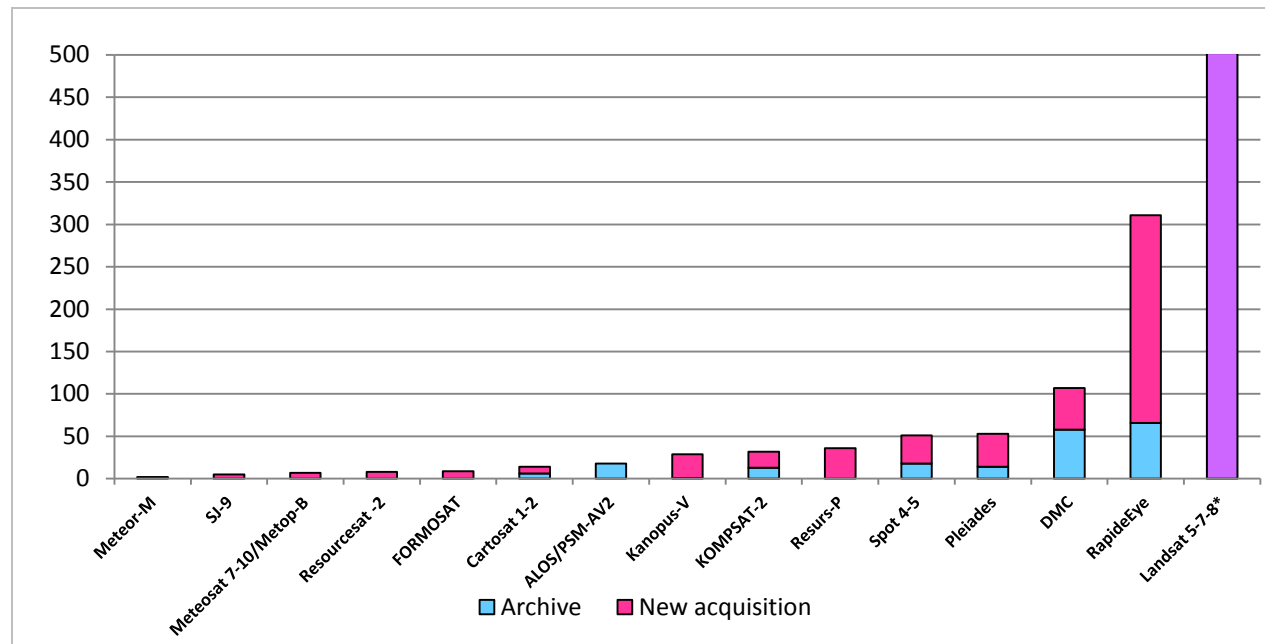


Figure 3-13. 2013 Data Consumption (archive and new acquisition) - Optical sensors.
 (*Landsat 5-7-8 including new acquisition and archive)

Resource	Meteor_M	SJ-9 A	Meteosat 7-10/Metop-b	Resourcesat-2	Formosat	Cartosat 1-2	ALOS/PSM+AV2	Kanopus-V	KOMPSAT-2	Resurs-P	SPOT 4-5	PLEIADES 1A-1B	DMC	RapidEye	Landsat 5, 7, 8
Total number of delivered data	2	5	7	8	9	14	18	29	32	36	51	53	107	311	502
archive	0	0	-	0	-	6	18	1	-	0	18	14	58	66	-
new acquisition	2	5	7	8	9	8	-	28	19	36	33	39	49	245	-
Max. number of images per activation	2	5	1	2	5	8	12	20	13	34	12	7	7	83	73
average number of images per activation	0.07 **	0.13	0.18	0.21	0.24	0.37	0.47	1.07 **	1.18	1.33 **	1.34	1.39	2.81	8.18	13.2

Table 3-2. Statistics by Optical sensors (Charter virtual constellation)

(** average for Russian satellites are calculated on 27 activations (July-December 2013))

Landsat data (5, 7 and 8) represents an important optical resource with a total of 502 images, as was the case in 2012 (288 images), 2011 (511 image) and 2010 (600).

RapidEye data were provided on a case-by-case basis for selected activations, such as the flood in Germany, the fire events in Argentina and Australia. The use of RapidEye data contributed to raising the overall number of images made available through the Charter, as RapidEye image tiles are relatively small (25km x 25km, RapidEye ortho products).

In general it should be noted that resulting from the very different characteristics of different EO systems - such as the spatial resolution and ground coverage of the images, cloud screening procedures, time performance etc. – the total numbers of scenes gave only a general figure of the relative importance and contribution of a system to the overall capacity provided by the Charter.

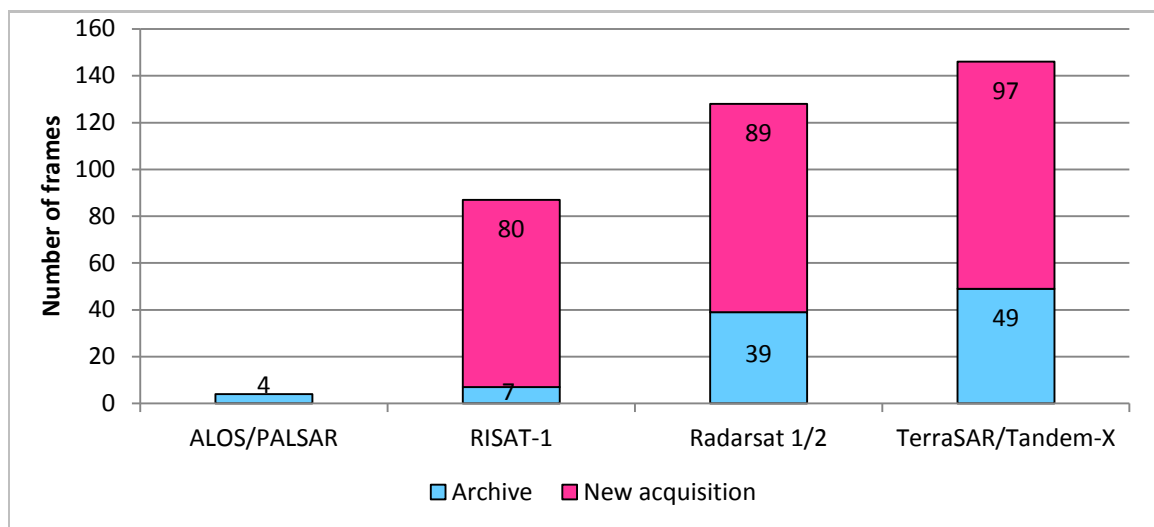


Figure 3-14. 2013 Data Consumption (archive and new acquisition) - Radar sensors

Resource	ALOS\PALSAR	RISAT-1	RADARSAT 1/2	TerraSAR-X/ TanDEM-X
Total number of delivered data	4	87	128	146
archive	4	7	39	49
new acquisition	-	80	89	97
<i>Max. number of images per activation</i>	4	16	6	22
<i>Average number of images per activation</i>	0.1	2.29	3.37	3.84

Table 3-3. Statistics by Radar sensors

Due to decommissioning of ALOS in 2011, ENVISAT in April 2012, and RADARSAT-1 in March 2013, new radar acquisitions provided for activations in 2013 were sourced from the TerraSAR-X, TanDEM-X, RADARSAT-2 and Risat-1 satellites. The total number of RADARSAT scenes delivered was the same as 2012 (126 RADARSAT scenes in 2012) while the contribution of RISAT-1 and TerraSAR-X/TanDEM-X has substantially increased compared to 2012 and 2011.

In total, 4,094 images of commercial US VHR optical satellites (GeoEye, IKONOS, QuickBird, WorldView) were supplied in 2013. US VHR imagery is delivered to the Charter by USGS (Figure 3.15, table 3-4). The number of US VHR data delivered was found to be equivalent to the 2011 number of images (4,095 images).

The majority of the data provided were used to monitor the impact of the cyclone Haiyan that hit the Philippines in November (activation 398) with 941 WorldView 1 and 2 images, 51 QuickBird images and 39 GeoEye images.

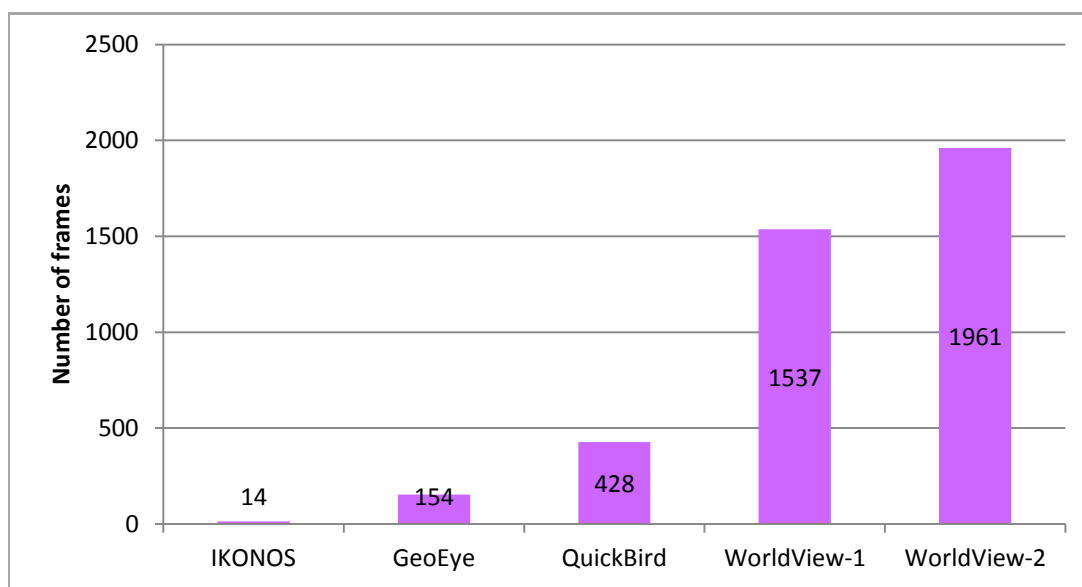


Figure 3-15. 2013 Data Consumption –US Commercial optical satellites

Resources	IKONOS	GEOEYE	QUICKBIRD	WORLDVIEW-1	WORLDVIEW-2
Total number of delivered data	14	154	428	1537	1961
Max images per Activation	8	46	66	419	522
Average images per activation	0.36	4.0	11.3	40.5	52

Table 3-4. Statistics concerning US commercial optical satellites

Overview of Charter data consumption by activation:

Figures 3-16 and 3-17 depict the number of Charter programmed (newly acquired) and archived images by activation and 3-18 shows the number of Landsat and US VHR data by activation.

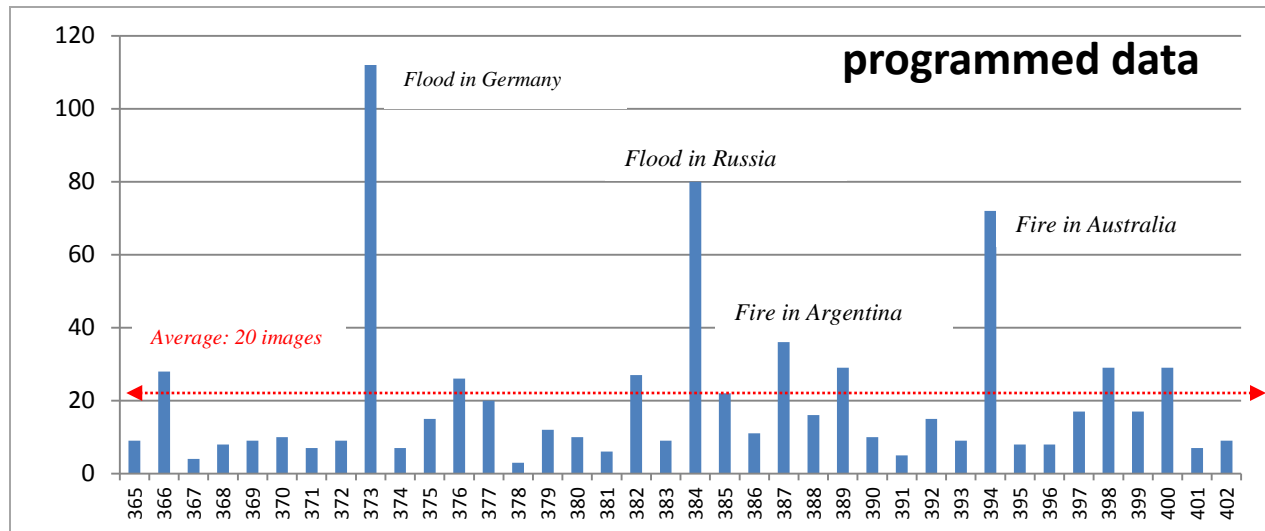


Figure 3-16. Number of programmed images provided by activation (Charter EO sensors without Landsat data)

Due to absence of information regarding Landsat programmed and archived data it was not feasible to compare this outcome of 2013 with the findings of previous years. On average the quantity of images is 18 per activation. There are four activations with a high number (greater than 30) of programmed data (Charter optical & radar sensors), these are: **Act 373**, flood in Germany, 112 images, **Act 384**, flood in Russia, 80 images; **Act 394**, wildfire in Australia, 67 images; **Act 387**, fire in Argentina, 36 images. RapidEye was an important data source for three of these events. In addition, VHR SAR (TerraSAR-X/TanDEM-X), Pleiades images, and other data were used to monitor the extent and impact of the large flood event affecting huge parts of Germany in June 2013. A high number of Russian satellites images were provided to monitor the flood in Russia.

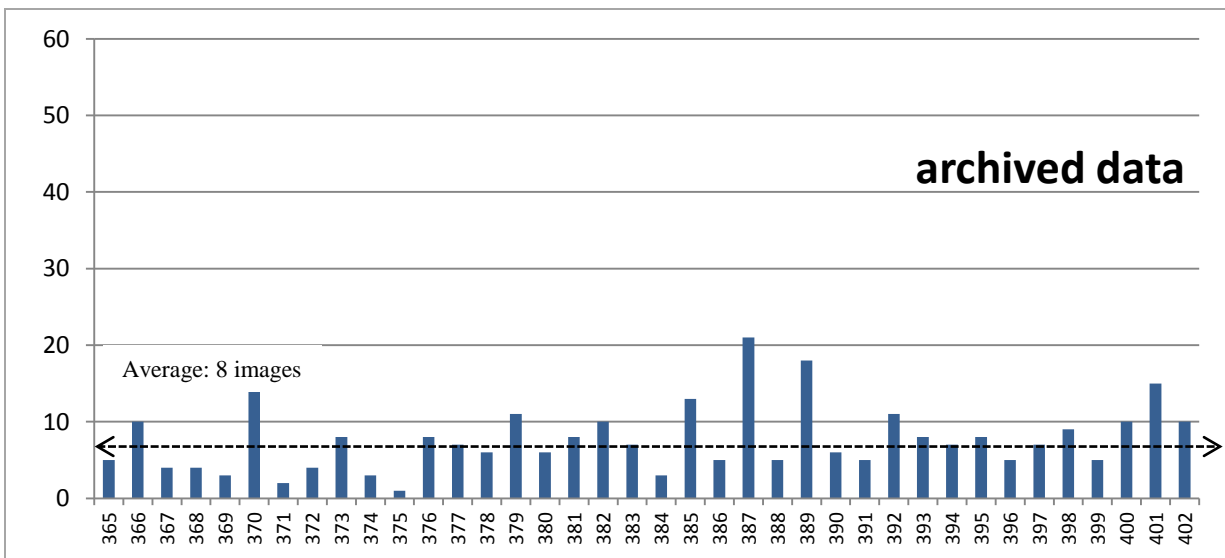


Figure 3-17. Number of archived images provided by activation (Charter EO sensors without Landsat data)
The amount of archived data used on average is less than that of programmed data. There is only one activation with a number of archived data supplied superior to 20 images /frames: Act 387, fire in Argentina.

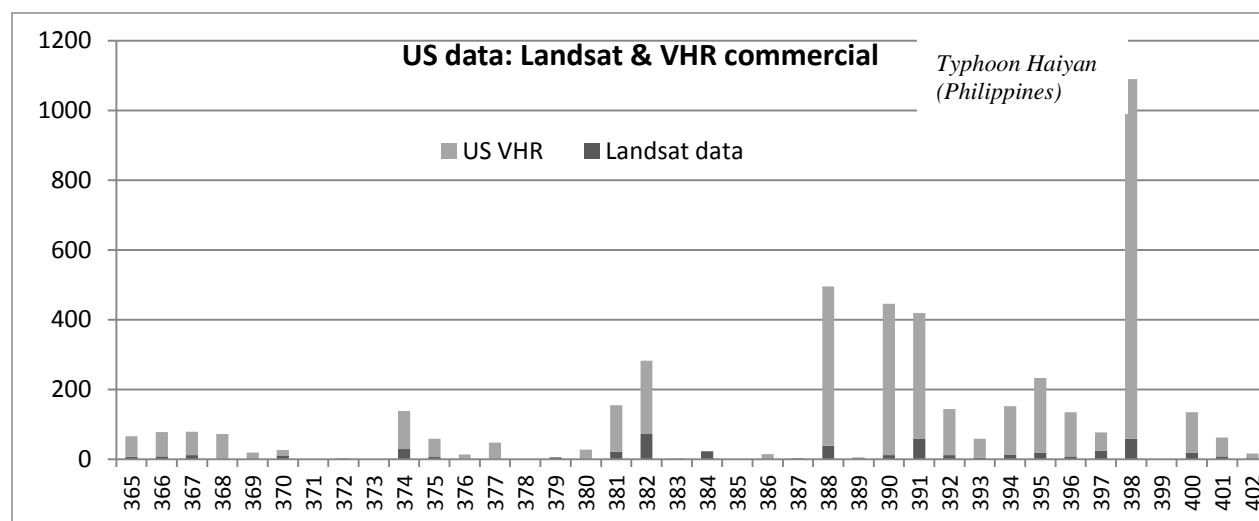


Figure 3-18. Number of images provided by activation (US Landsat and VHR commercial satellites)

The five activations with the highest number of US VHR data (greater than 200) provided are: **Act. 382**, flood in China; **Act. 388**, flood in the US; **Act. 390**, earthquake in Pakistan; **Act. 391**, ocean storm in India; **Act. 395**, ocean storm in Vietnam, and **Act. 398**, Ocean storm (Typhoon Haiyan) in the Philippines. 29 activations of 38 have benefited from US VHR data.

In 2013, the Charter covered 7 of the 10 most severe disasters in terms of fatalities (table 5-1, §5.1), including the devastating Typhoon Haiyan in the Philippines (in November). VHR data (Pleiades, US VHR) were used to analyse the damage caused by the cyclone. UNITAR/UNOSAT offered value-adding services as well as several Charter members (SERTIT (proposed by CNES), DLR/ZKI, and JAXA) to support the PM and several national civil protections involved in the rescue operations.

3.2.2 Human resource contribution (ECO and PM) in 2013

- *ECO resources in 2013*

The Emergency On-Call Officer (ECO) services are provided on a weekly rotational basis by 10 Charter members agencies: CNES, CNSA, CONAE, CSA, DLR, DMCii, ESA, ISRO, JAXA, and KARI. The random nature of calls resulted in an uneven workload distribution for the members, with KARI handling nearly one sixth of the calls. There were 7 calls processed by KARI, 6 calls by CNSA, ESA and JAXA, 3 calls by CONAE, CSA, DLR, DMCii, ISRO, and 2 calls by CNES. Some ECOs had to handle 2-3 calls during their week on duty, particularly in August and October, when the maximum number of calls occurred.

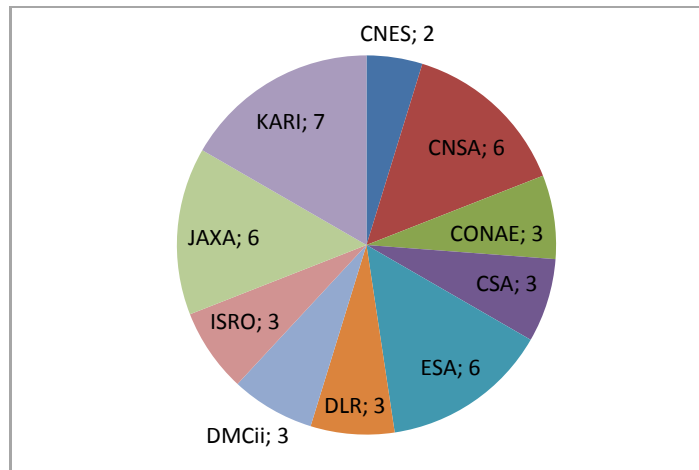


Figure 3-19. Distribution of Charter Parties responsible for the ECO services in 2013

- *Distribution of Charter members responsible for the PM services delivered in 2013*

Project Managers (PMs) nominated by CONAE, JAXA, DLR, and USGS handled 18%, 18%, 16%, and 13% of the Charter activations, respectively. CNES and CNSA nominated PMs supported 8% of the activations, whereas CSA and ISRO nominated PM for 5% each; DMCii, ESA and ROSCOSMOS for 2.5% of activations each (Figure 3-20).

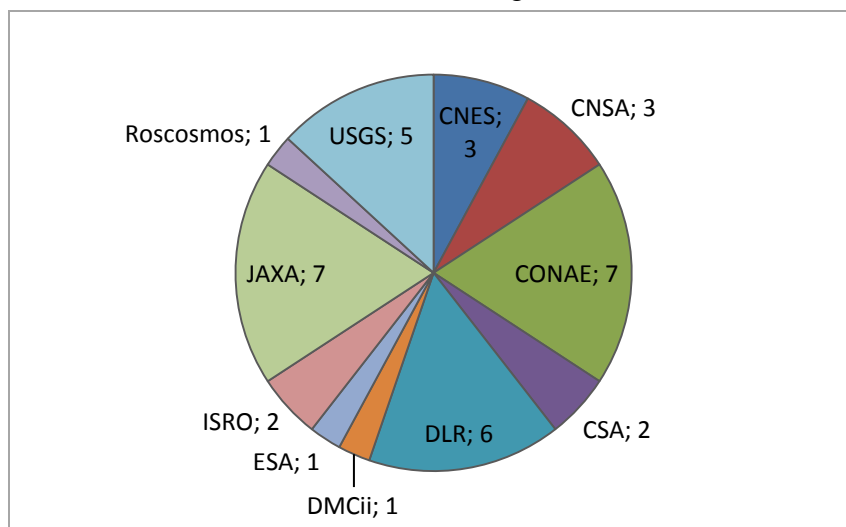


Figure 3-20. Distribution of Charter Parties responsible for the PM services in 2013

- *Distribution of organizations providing PM resources in 2013*

PMs may be sourced from a Charter party or a third party. Figure (3-21) shows the breakdown of the PM organizations. In the case of third party organizations, it is required that a Charter member nominates them and takes the responsibility for the service they provide. During this reporting period, 19 different organizations offered their PM services.

Difference between figures 3-20 & 3-21: Figure 3-20 represents the breakdown of Charter members who nominated PMs in 2013, while Figure 3-21 represents the breakdown of organizations performing the PM work for 2013 activations.

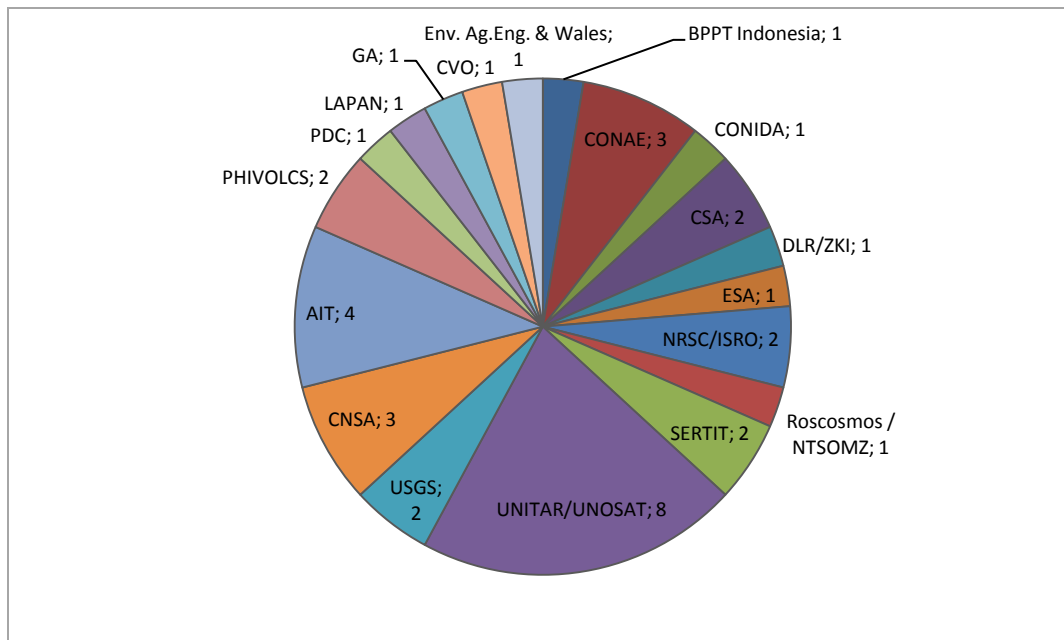


Figure 3-21. Distribution of organizations providing PM resources in 2013

Detailed comments:

- CONAE provided 18% of the total Project Manager services, with three CONAE staff members covering activations in Argentina, and third parties: CONIDA for one activation in Peru, Geoscience Australia for one activation in Australia and, UNITAR/UNOSAT for two activations in Cambodia and Middle East.
- JAXA provided 18% of the total PM services with support from four staff members from the Asian Institute of Technology (AIT), one from LAPAN (Indonesia) and two from PHIVOLCS (Philippines) to cover activations in Asia.
- DLR provided 16% of the total PM services, with nomination of one internal staff member (DLR/ZKI) for an event in Germany and five UNITAR/UNOSAT staff covering activations in Asia and Africa.
- USGS provided 13% of the total PM services with the nomination of two internal staff members and one each from PDC (USA), BPPT and CVO (Indonesia) to cover activations in the USA, the Middle East, and Asia.

- CNES provided 8% of the total PM services with the nomination of one staff member from SERTIT (France) and one from UNITAR/UNOSAT for activations in Africa.
- CNSA provided 8% the total PM services with the nomination of two NDRCC personnel and one from CMA for activations in China.
- ISRO and CSA provided internal PMs to cover activations in their countries and in the Middle East.
- ESA, Roscosmos, DMCii provided each, 2.5%, of the total PM services relying on internal staff (ESA and Roscosmos) or external organizations (Environment Agency of England & Wales) to cover respectively events in the Seychelles, Russia and the UK.

*Note that UNITAR/UNOSAT is an external organization engaged as PM by member agencies, in particular for UN activations. UNOSAT contributed to 16 % of the totality of activations over 2013 (Mozambique, Myanmar, Sudan, Pakistan and Cambodia floods; Bangladesh ocean storm and Pakistan earthquake) and, additionally supported the Charter for 4 other activations by providing value-adding services in the delivery of damage and impact assessment maps (Seychelles, Philippines, Vietnam ocean storms and Oman flood).

- *Distribution of Charter members responsible for the PM services in 2010, 2011, 2012 and 2013.*

The following graph represents the % of PM nominated by each Charter member in 2010 (51 activations), 2011 (32 activations), 2012 (40 activations) and 2013 (38 activations).

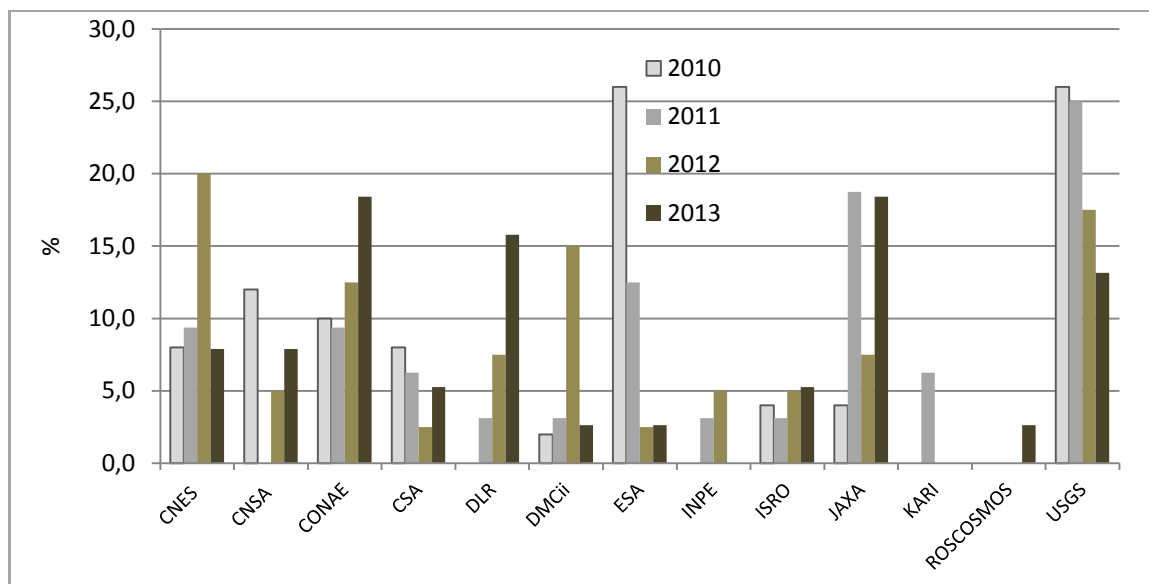


Figure 3-22. Distribution (%) of Charter Parties responsible for the PM services in 2010, 2011, 2012 & 2013

Figure 3-22 shows a large variability per agency per year. This breakdown is explained by:

- The annual number of disasters.
- The number of requests by AUs for disasters occurring in their countries. The PM is nominated by the relevant Charter member.
- The number of requests by AUs for another country without an AU (e.g. 2013 SIFEM requests for Peru and Chile, the French Civil Protection request for Madagascar, USGS

requests for Indonesia and Oman, etc). The PM is nominated by the relevant Charter member.

- The number of requests by UN bodies. In that case, the current Charter Lead Agency has to nominate the PM. In 2013, CNES, DLR and CONAE were the Charter Lead.
- The number of requests by ADRC/SA. In that case, the PM is nominated by JAXA.
- The number of requests by Algeria, Nigeria and Turkey. In that case, the PM is nominated by DMCii.
- The number of PMs managed by each agency and their availability.

During the last four years, USGS is the member who has nominated/provided the highest number of PMs, followed by CONAE, ESA, CNES, JAXA, and DLR.

3.3 SARE – Semi Annual Refresher Exercises

In application of Charter procedures, two Semi Annual Refresher Exercises were performed in 2013:

- SARE-11: Earthquake and tsunami, Kochi prefecture, South-East of Japan (from 24/05/2013 to 12/07/2013). This exercise was led by ESA and JAXA training teams, and the report was prepared by ESA. 35 Emergency on-Call Officers, (ECOs) from 12 agencies participated.
- SARE-12: Floods in Germany (from 28/10/2013 to 23/12/2013). JAXA and DLR were the training team and the report was prepared by DLR. 29 ECOS from 8 agencies participated.

A set of common recommendations were issued to improve the Charter's ECOs operations and data management:

- Preparing SARE using complex scenarios (e.g. earthquake and tsunami) is challenging but useful. There is a need for a tsunami scenario to adequately support the work of the ECOs.
- Regularly updating the ECO procedures and scenarios; in particular to add ROSCOSMOS missions to the procedures and improve the description of the optimum use of ISRO satellites.
- There is a need to modify the Generic ERF to accelerate the process;
- Standardizing the agencies' ERFs in order to make the process easier and faster for ECOs when they are called into action.

All participants recognised that SARE is a useful exercise for improving and upholding the knowledge of ECOs. It was highly recommended that all agencies providing the ECO service participated in these semi-annual exercises in maintaining the ECO staff effectiveness. Some of the issues would be overcome thanks to COS-2, the new Charter operational system that will be ready in 2014.

3.4 The current and future Charter tools

Charter members have developed or are developing tools to improve Charter operational steps and facilitate the work of the different Charter operational staff (ODO, ECOs and PMs).

3.4.1 Charter Geographic Tool

The “Charter Geographic Tool” (CGT) is a geospatial interface, developed by CNES, accessible through the Charter website or directly at the following address: <http://engine.mapshup.info/charternrg/>.

The CGT maps and provides a comprehensive record of all activations and describes the images (metadata) acquired by the Charter members in response to such activations.

The CGT consists of three main components:

- An image metadata catalogue,
- An FTP site which manages the harvesting of the metadata files uploaded by the Charter agencies,
- A web interface which allows the searching and browsing of the metadata catalogue by activation, date and hazard typology.

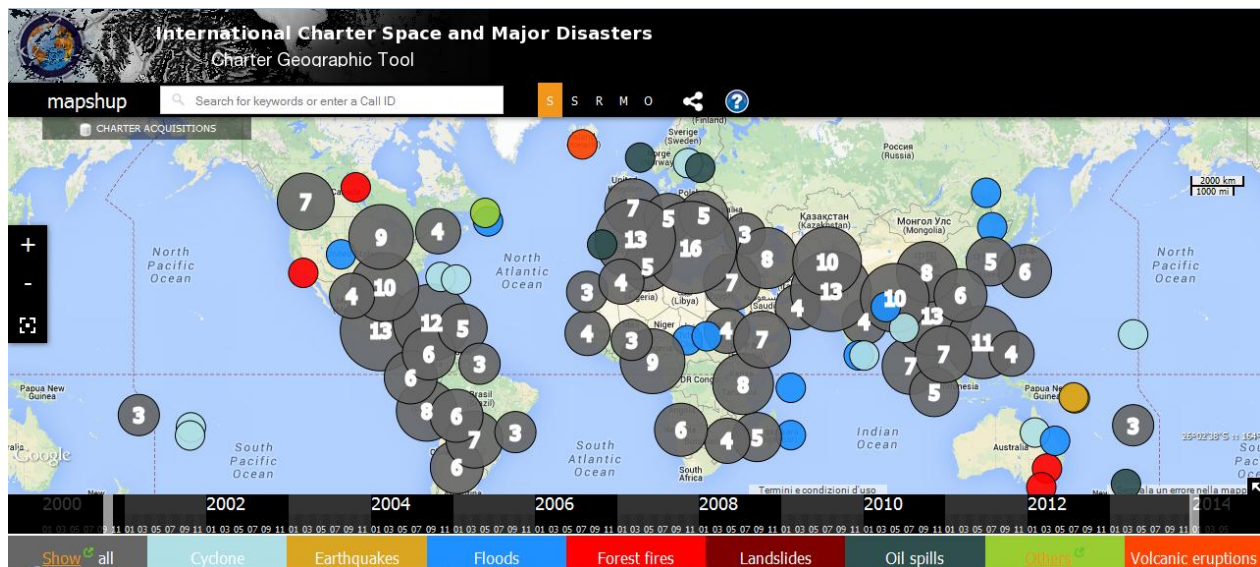


Figure 3-23. CGT home page showing all Charter activations locations and hazards (2000-2013)

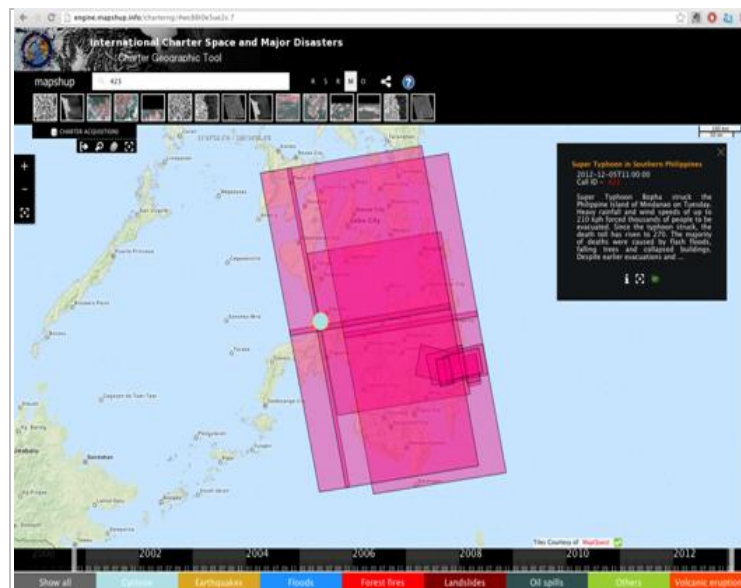


Figure 3-24. Selection of one call, depicting all image footprints and relevant quick looks

By the end of 2013, the CGT contained about 4800 Charter metadata files and quicklooks from Charter satellite sensors.

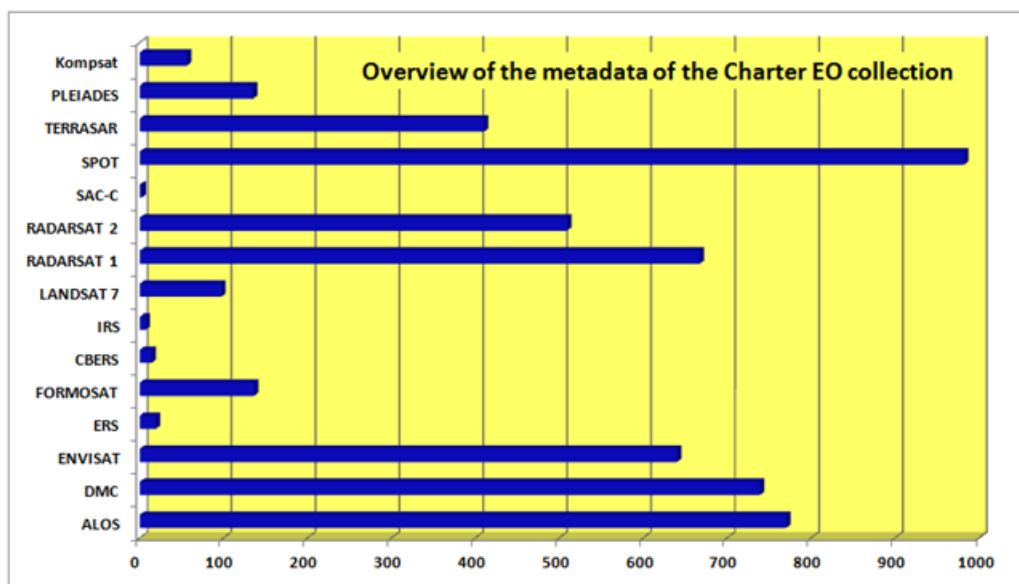


Figure 3-25. Number of metadata by Charter sensors registered in CGT (2013)

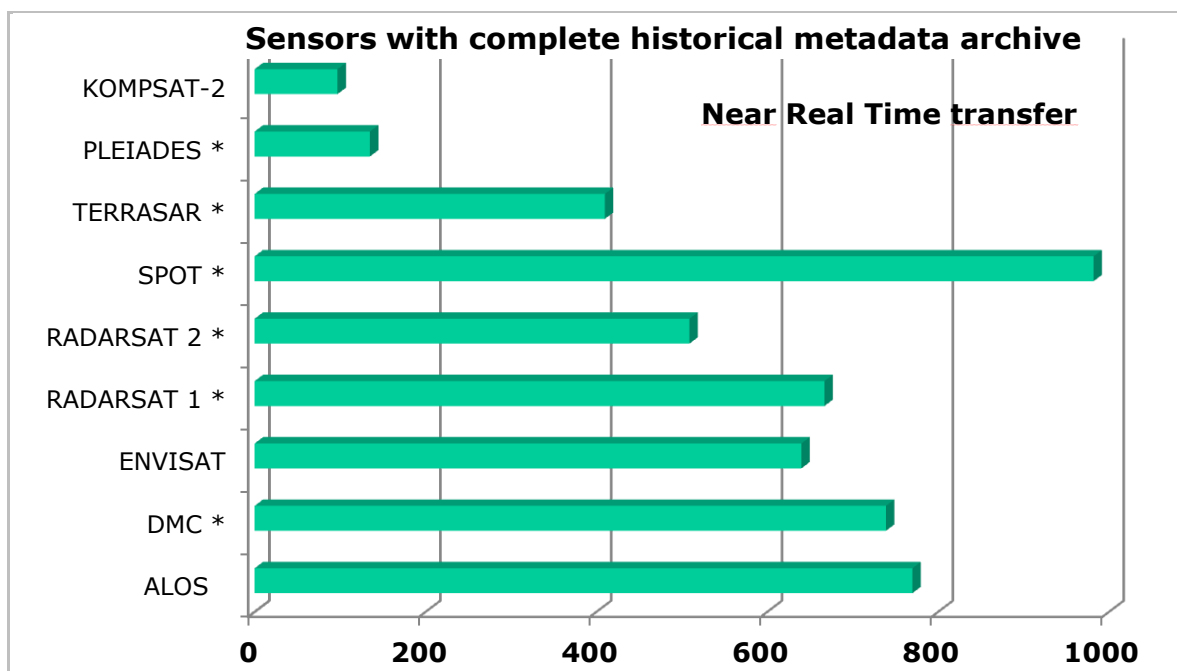


Figure 3-26. Sensors with a complete metadata archive as registered in CGT (2000-2013)

For Pleiades, SPOT, TerraSar, RADARSAT and, DMC constellation images, the relevant agencies have developed procedures to ingest the metadata in near-real-time, (NRT), once the data has been acquired during a Charter activation.

In 2014, the CGT will be integrated in COS-2 (see §3.4.4). The CGT coupled with COS-2 will provide a geographical and a list presentation of images available for download. These images may be hosted on COS-2 or may be available on agency specific distribution systems. For some

of these images, according to licensing arrangements, it may be possible to provide full-resolution visualisation enabling the user to better select relevant images before download. As a final step, users will then be able to download images directly either from COS-2 or from agency-specific download services.

3.4.2 SaVoir

SaVoir is a multi-satellite planner that was developed to support the operations of the Charter. It is maintained by ESA and is available free of charge for Charter ECOs and PMs. It is a standalone application for analyzing potential remote sensing opportunities of EO satellites. By combining the satellite orbit, sensor field-of-view geometry, user-defined AOIs, and system capabilities and constraints, it determines the exact times and footprints of possible acquisitions to support the ECO in preparing the sensors Acquisition & archive plan (AAP) during the early stages of a Charter activation. SaVoir allows the ECO to derive acquisition plans over any AOI with any Charter satellite and sensor combination, identified by the specific Charter scenario (e.g. flood, earthquake, etc). SaVoir may also support the PM in complementing orders originating from the ECO. In summary, SaVoir can help to optimize the ordering of images, thus improving the Charter performance by helping to select the right image at the right time. SaVoir will be integrated in COS-2 next year.

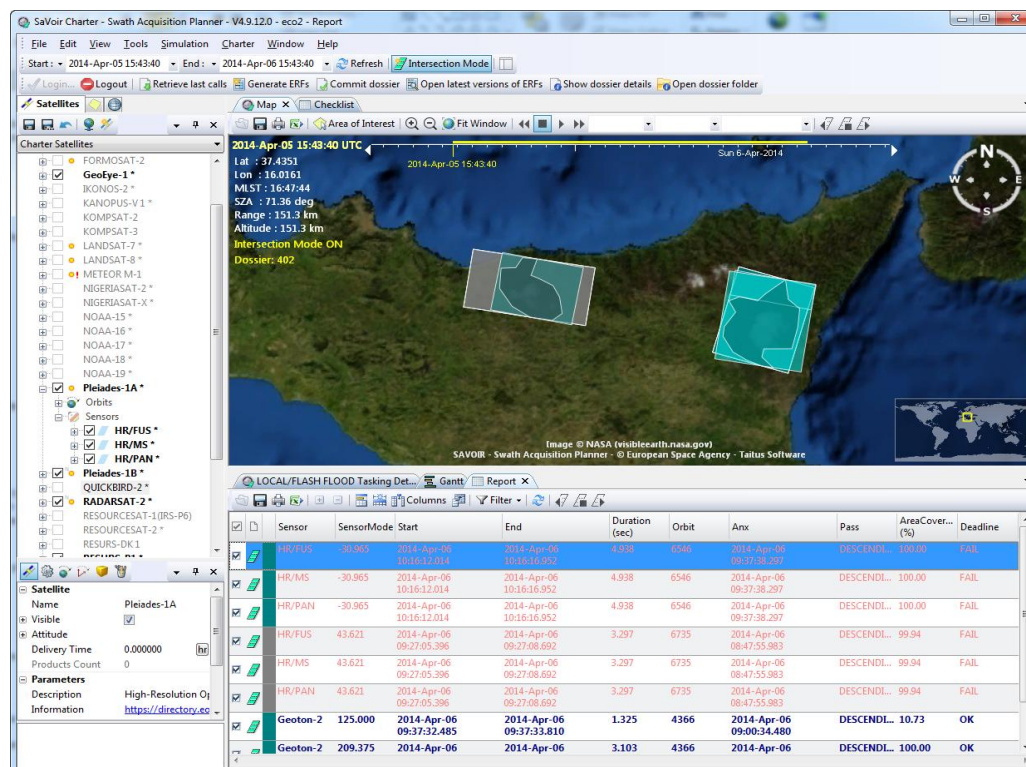


Figure 3-27. Preparation of an Acquisition Plan using SaVoir tool

3.4.3 HDDS

The U.S. Geological Survey (USGS) Hazards Data Distribution System (HDDS) (<http://HDDSExplorer.usgs.gov>) is a unique collection of imagery and documents designed to assist in the response to natural and man-made disasters. Like a traditional web-based interface with an imagery archive (such as USGS' Earth Explorer), HDDS provides a geographic search capability based on latitude and longitude boundaries amongst other criteria. HDDS contains

imagery acquired in the aftermath of a disaster, as well as imagery of the same region before the event.

HDDS is currently used by the PM for selecting and downloading US EO data including Landsat, GeoEye, IKONOS, QuickBird, and WorldView and imagery provided by DMCii during a Charter activation.

The graphical interface gives PMs the capability to enter query criteria over an AOI. It includes the capability of selecting both ingested and ad-hoc data, the provision of a RSS feed, the ability to refine the search results, the option to create a standing request for automatic notifications, the capacity to create a custom web mapping service, a bulk download tool, and a registration service. It also allows for the viewing of browse images and footprints to determine product usability before downloading.

3.4.4 The new Charter Operational System – COS-2

In 2012, the Board accepted a proposal made by ESA to develop a new Charter Operational System, (COS-2) to help increase the operational performance of the Charter.

The need for improvement from the current Charter operational system was due to:

- the obsolescence of the Charter ftp site which is not in line with modern security requirements;
- the lack of an integrated system and links between its components;
- a requirement to manually enter the same information many times;
- a poor security level, in particular no personal identification for ECO and PM.

The new Charter Operational System “COS-2” is currently under development and a beta version was tested by Charter members during 2013. Final version of COS-2 will be available in 2014. The main aim of COS-2 will be to increase activation performance (timeliness, best usage of resources) and to provide a single point of entry for operations. In particular, the system will integrate the CGT and SaVoir. It will also improve Charter reporting (e.g. produce the ECO dossier; prepare a draft PM dossier; generate Charter statistics). In the future, a link with HDDS will be also established.

COS-2 will be embedded in the newly revamped Charter website.

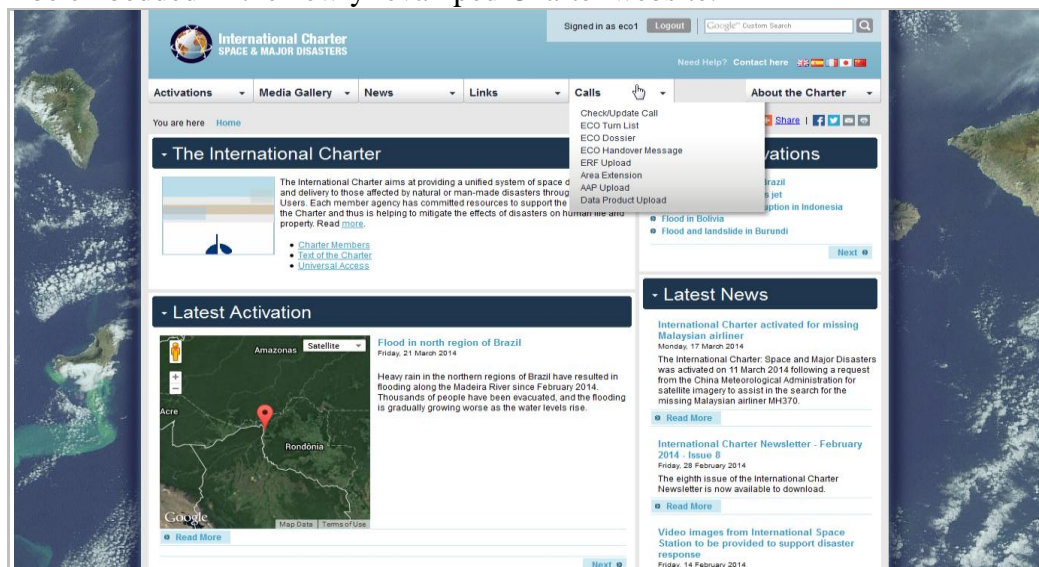


Figure 3-28. Charter web home page with access to COS-2 platform (Calls)

COS-2 is structured to carry out AU, ODO, ECO, PM and ES workflows, encompassing all communications/notifications exchanges (e.g. e-mails generation). All tasks to be accomplished by every functional unit of the Charter will be performed through the COS-2 platform, such as completion of the User Request Form (URF) on-line by an Authorized User (AU) as well as the inputting of AOI coordinates through a geographical interface or by uploading a KML file. However, the traditional way of sending a URF by fax will be maintained in case the AU doesn't have access to the online system.



Figure 3-29. COS-2 workflow: preparation of on-line URF by a Charter AU/cooperating Body

4 Communication

4.1 Web site

The Charter website is currently available in five languages (English, Chinese, French, Japanese and Spanish).

Summary					
Reported period	Year 2013				
First visit	01 Jan 2013 - 00:00				
Last visit	31 Dec 2013 - 23:59				
	Unique visitors	Number of visits	Pages	Hits	Bandwidth
Viewed traffic *	<= 116914 Exact value not available in 'Year' view	275482 (2.35 visits/visitor)	2140558 (7.77 Pages/Visit)	5046241 (18.31 Hits/Visit)	873.38 GB (3324.36 KB/Visit)
Not viewed traffic *			1946773	2392099	197.50 GB

* Not viewed traffic includes traffic generated by robots, worms, or replies with special HTTP status codes.

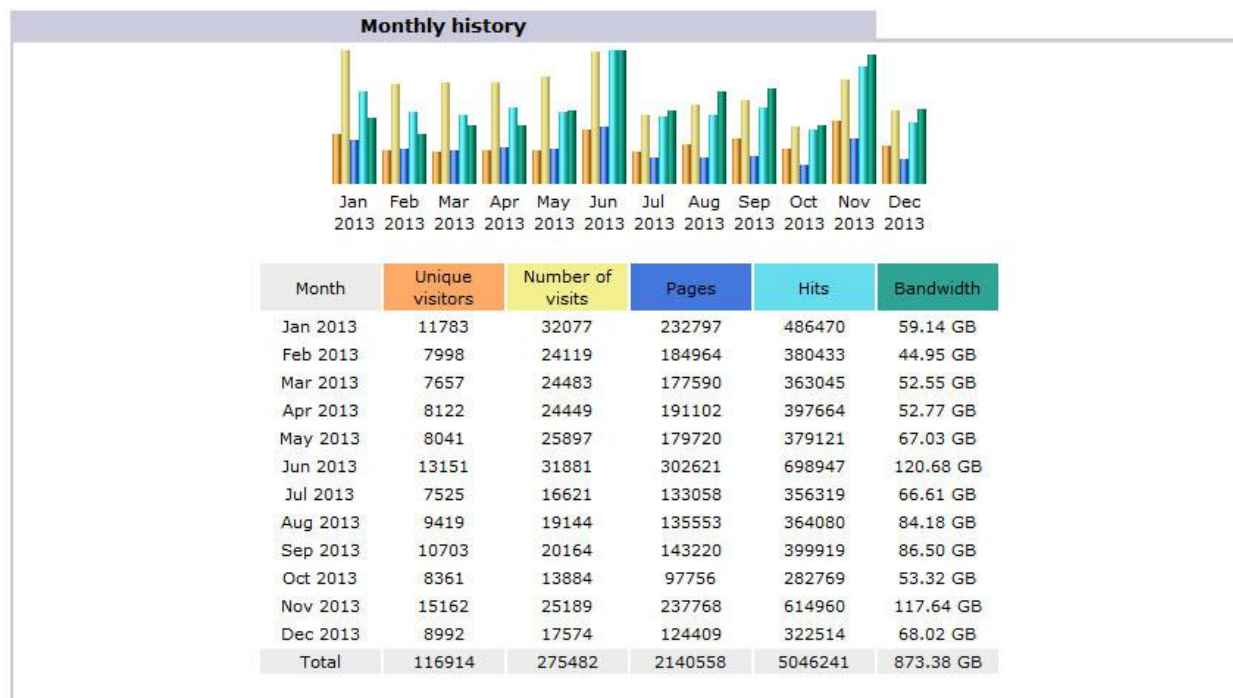


Table 4-1. Charter web monthly usage January – December 2013

The 6 columns respectively represent: month, number of different visitors, and number of visits, number of pages and hits, and bandwidth.

From 1st January to 31st December 2013, the total number of visits to the charter webpages was close to 300,000 (ca. 100,000 different visitors). Monthly activity is between 7,000 and 15,000 unique visitors. The 2013 number of total visits is comparable to the years 2012, 2010 and 2009.

Charter visibility is also ensured through other social media outlets, such as Twitter, which had around 880 followers by the end of 2013, a three times increase over last year.

4.2 Charter Newsletters

Charter newsletters were issued in March, July and October 2013. The newsletter represents an additional means of communication for regularly informing users and stakeholders on recent Charter activations, news, events and related activities.

(<http://www.disasterscharter.org/web/charter/newsletter>).

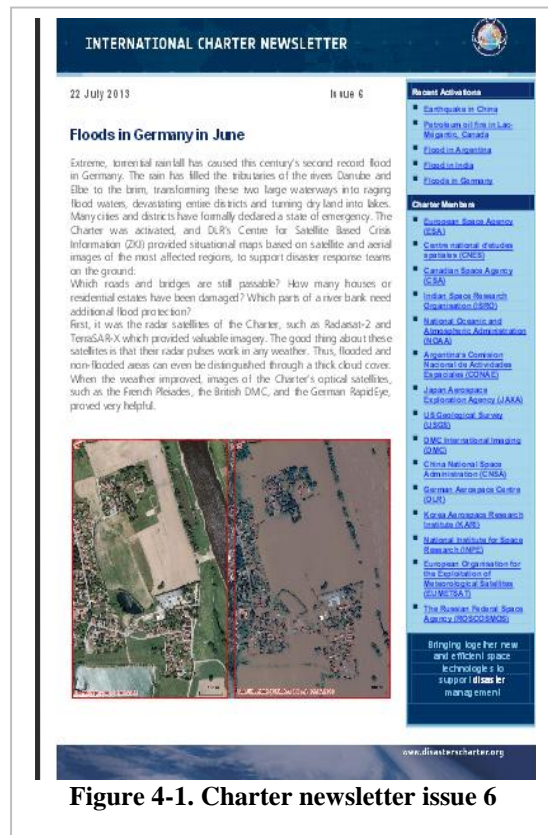


Figure 4-1. Charter newsletter issue 6

The March issue focused on the presentation of the Charter and the UA initiative at the UN COPUOS plenary (*Scientific and Technical Subcommittee (STSC) of the Committee on Peaceful Uses of Outer Space*); presentations of the RADARSAT constellation, the Charter activations statistics in 2012, and the CGT. It concluded with a summary of the Charter's activations for flooding in the UK during November and December 2012.

The July issue summarized the activation pertaining to the large flood event in Germany. This issue also reported on the end of RADARSAT-1 in March; the meeting of the European Charter Emergency On-Call officers (ECOs) in Berlin and on the Launching of the Landsat Data Continuity Mission (LDCM) (Landsat 8) in February 2013.

The October issue reported on the integration of the Russian Space Agency (ROSCOSMOS) as the 15th Charter member; the Charter activations for flood disasters that occurred in summer 2013 in the North of India, Argentina, Thailand, Japan, Myanmar, Sudan, Senegal, Pakistan, and in China. This issue also presented the Sentinel-1 mission which was readying for launch early 2014 and, the PM training sessions organized by the various Charter members in Abuja/Nigeria, Manila/Philippines, and Frascati/Italy.

The dissemination of the newsletter is through the Charter website or by e-mail. Each agency deals with its own distribution list. In addition, direct subscription is possible through the Charter web at <http://www.disasterscharter.org/web/charter/newsletter>.

4.3 Charter flyer

A charter flyer was designed by ESA in association with the Charter's Communications Group, and produced in June. This brochure briefly presents the Charter mission, objectives, and mechanisms. It introduces the UA initiative launched in 2012, aimed at improving the Charter access worldwide.



Figure 4-2. Charter flyer

4.4 Conferences and presentations

The following table provides details of the 2013 events or conferences where the Charter was represented. On such occasions, presentations were given covering the Charter's role in the acquisition and production of satellite imagery for disaster response together with the UA initiative launched in 2012.

Event	Venue	Date	Speakers
UN COPUOS STSC	Vienna, Austria	19 February	CNES, DLR
The Big Bang UK Young Scientists and Engineers Fair	Birmingham, UK	14-17 March	UKSA
Le Salon du Bourget	Paris, France	17-23 June	CNES
IEEE International Geoscience and Remote Sensing Symposium	Melbourne, Australia	21-26 July	ESA, CNES
Deutscher Luft- und Raumfahrtkongress	Stuttgart, Germany	10 September	DLR
ESA Living Planet Symposium	Edinburgh, UK	11 September	ESA
“Social Space” event at the German Aerospace Day	German Aerospace Center, DLR, Cologne, Germany	22 September	DLR
Ca/GIS/ASPRS 2013	Specialty Conference, San Antonio, USA	27-31 October	USGS
Sentinel Asia Joint Project Team Meeting (JPTM)	Asian Institute of Technology (AIT), Thailand	27-29 November	JAXA
Asia Pacific Space Agency Forum (APRSAP)-	Hanoi, Vietnam	3-6 December	JAXA

Table 4-2. List of conferences/workshops with Charter presence

UNOOSA and UNITAR/UNOSAT also contributed towards increasing Charter awareness through newsletters and presentations to a wider public audience, ranging from Ministers and Heads of Agencies to operational entities within the UN system and beyond.

4.5 Press releases, articles

Table 4-3 summarises the main press releases, web and paper articles issued by the member agencies or others during this reporting period.

Date	Issuing agency	Title
2 March	CNES	"Les satellites au secours des sinistrés d'Haruna". Le Journal De L'île De La Réunion - France
28 March	CNES;ESA	Press Conference: "Parlons d'espace"
31 March	CNES	Depêche AFP
1 April	CNES	Space News
April	DLR	DLR Magazine 136/137, p. 10-15; "Satellite images for emergencies"; http://www.dlr.de/dlr/en/Portaldata/1/Resources/documents/dlr_magazin_137_neu/Magazine_136-137_GB_web.pdf
16 April	DLR	"Disaster relief – DLR to chair the International Charter 'Space and Major Disasters'"; http://www.dlr.de/dlr/en/desktopdefault.aspx/tabid-10081/151_read-6780/year-all/151_page-1/#/gallery/1538
22 April	CNES	Aviation week
16 May	CNES	Valeurs Actuelles : "Catastrophes : le salut vient de l'espace"
24 June	DLR	"DLR delivers satellite images for Indian flood assistance"; http://www.dlr.de/dlr/en/desktopdefault.aspx/tabid-10081/151_read-7429/year-all/151_page-2/#/gallery/11369
16 July	ESA	N° 25–2013: International Space Station Agencies make statement on benefits of space station during disasters on earth.
23 July	ESA/DLR	ESA "Earth from Space" video program, special edition on the international Charter Space and Major Disasters. https://www.youtube.com/watch?v=NtoTf4VS1ok
July	DLR	DLR Countdown No. 22, p. 16-19; "Flood Disaster - DLR aids local Emergency Teams". http://www.dlr.de/dlr/en/Portaldata/28/Resources/dokumente/Publikationen/Countdown/Countdown22_lowres.pdf
22 September	DLR	The international charter on space and major disasters, Jens Danzeglocke from DLR explains @disasterchart #socialspace"; http://audioboo.fm/boos/1614855-the-international-charter-on-space-and-major-disasters-jens-danzeglocke-from-dlr-explains-disasterchart-socialspace
December	DLR	DLR Countdown No. 24, p. 24-27; "Charter – Germany passes the Baton to Argentina"; http://www.dlr.de/dlr/en/Portaldata/28/Resources/dokumente/Countdown_24_lores.pdf
	USGS	Costa Rica in the third millennium: challenges and proposals to reduce the vulnerability caused by disaster."Satellite Information for Disaster Management: International Charter for Space and Major Disasters and USGS Experiences." Chapter 15, Pages 367-380.

Table 4-3. Press releases and publications

5 Assessment

This section provides a synopsis of the lessons learned and recommendations to consider for improving Charter operations.

Statistics on the 2013 activations were compared with EM-DAT data to evaluate the overall impact of the Charter as a service in supporting disaster response (*D. Guha-Sapir, R. Below, Ph. Hoyois - EM-DAT: International Disaster Database – www.emdat.be – Université Catholique de Louvain – Brussels – Belgium* **Errore. L'origine riferimento non è stata trovata.**).

Other reports and statistics published by Swiss RE (*Swiss Re sigma N° 1/2014 “Natural catastrophes and man-made disasters in 2013: large losses from floods and hail; Haiyan hits the Philippines”*) and by MunichRE as NatCatService were also consulted (*Natural catastrophes 2013, Analyses, assessments, positions, 2014 issue, Munich Re Topics Geo*).

The reports issued by the Project Managers of the Charter activations remain one of the main sources of information for assessing the performance and quality of service provided by the Charter during 2013.

5.1 Overall impact

The Centre for Research on the Epidemiology of Disasters (CRED) reported 334 natural disasters in 2013 (including droughts, extreme temperature, earthquakes and tsunamis, floods, landslides, storms, volcanic eruptions and, wildfires). The disasters claimed 22,616 lives, affected over 96 million others and caused economic damages of USD 118 billion (*CredCrunch, issue 34, March 2014*). Mortality was linked mostly to weather-related events (floods for 43% and storms for 41%).

Asia experienced 88% of all disaster-related mortality with the two deadliest events: Typhoon Haiyan devastating the Philippines (7,986 killed) and causing damages equal to 5% of national GDP, and a single flood event in India which claimed around 6,000 lives. Haiyan was the strongest typhoon to ever hit the Philippines, and one of the strongest to have ever been recorded, worldwide. Central Europe was also affected during the latter half of spring by severe floods; damage was particularly severe in Germany and the Czech Republic, while Hungary and Poland also suffered. The total economic loss for Central Europe was estimated to be USD 16 – 17 billion (*CredCrunch, issue 34, March 2014 & Swiss Re sigma No 1/2014*).

The 2013 North Atlantic hurricane season was very quiet, with only two storms reaching the hurricane status. This was the fewest number of hurricanes since 1982 and well below the yearly average of 6.3 for the period 1950-2012 (*Swiss Re sigma No 1/2014*). Unlike the US, Mexico had an active storm season and was hit by eight storms, the most damaging was Hurricane Manuel provoking 169 fatalities, with insured losses of USD 0.9 billion and total economic losses of over USD 4 billion, it was one of the costliest tropical cyclones in Mexico's history (*Swiss Re sigma No 1/2014*).

A train, carrying crude oil, exploded in the center of Lac Megantic (Quebec, Canada) in July and claimed 47 lives. This was the worst train disaster in Canada since 1864. The accident set off debate in Canada and the US, and demands for a review of current safety practices and regulations.

The Charter responded to around 11% of the total number of natural disasters registered by EM-DAT in 2013 (13 % in 2010 and 2012; 10% in 2011). For comparison, generally accepted figures

concerning the occurrence of natural hazards (not only major disasters) are around 800-1000 per year. The Munich Re NatCatSERVICE registered 890 loss events worldwide with overall losses of US\$ 135bn and insured losses of US\$ 35bn. 2013 like 2012, was described as a relatively moderate year. The number of events in 2013 was lower than in 2012 (920) but still exceeded the ten-year (790) and 30-year (630) average (*Natural catastrophes 2013, Analyses, assessments, positions, 2014 issue, Munich Re Topics Geo*).

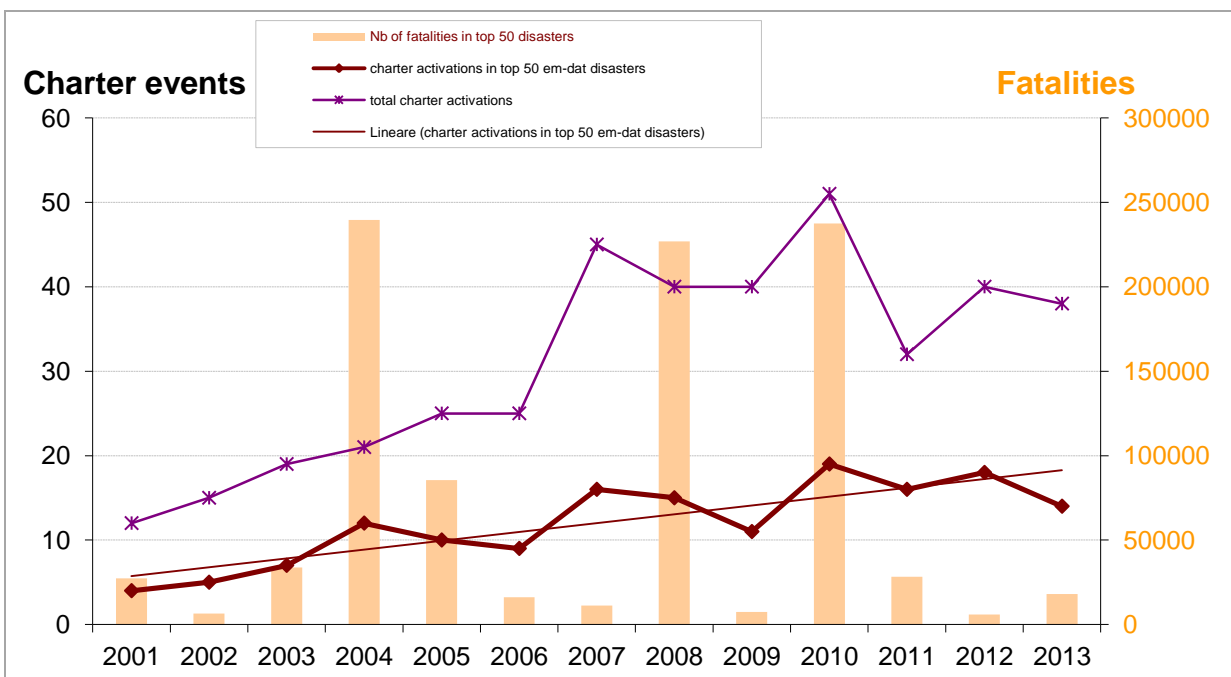


Figure 5-1. Number of Charter events over 2001-2013

Represented in red are the number of Charter events per year that are included within the 50 most severe disasters recorded in EM-DAT each year. The total number of fatalities counted for the 50 main disasters was much lower than 2004, 2008 and 2010 but superior to 2012 numbers. 77% of 2013 fatalities in top 50 disasters were caused by the Typhoon Haiyan in the Philippines, November 2013, and the floods in India in June 2013.

Figure 5-1 shows that 2013, with some 38 activations, is consistent with recent years, the fluctuation of Charter events ranging from 30 to 50 a year since 2007. Such oscillations can be explained in part by the variability in the number of total natural disasters occurring during the relevant year and by the existence of other regional EO-based emergency response services (e.g. Copernicus EMS, Sentinel Asia) triggered by national entities in Europe or in Asia Pacific.

In 2013, the Charter covered 7 of the 10 most severe disasters by fatalities (Table 5-1); this confirms the fact that the Charter remains focused on major disasters. Indeed, among the last four years (2009-2013), the Charter was triggered for 14 of the 15 most severe natural disasters by fatalities, as reported by EM-DAT (Table 5-2).

Top 10 Disasters – Number Killed – 2013				
<i>The text in italic indicates that the Charter was activated</i>				
Date	Country	Type	# Killed	#Affected people
<i>8/11/2013</i>	<i>Philippines</i>	<i>Tropical cyclone (Haiyan)</i>	<i>7,354</i>	<i>16,106,807</i>
<i>12-27/06/2013</i>	<i>India</i>	<i>Flood</i>	<i>6,054</i>	<i>504,473</i>
<i>24/09/2013</i>	<i>Pakistan</i>	<i>Earthquake</i>	<i>399</i>	<i>185,749</i>
<i>7-21/08/2013</i>	<i>Pakistan</i>	<i>Flood</i>	<i>234</i>	<i>1,497,725</i>
07/07/2013	China Rep P	Flood	233	3,500,000
<i>15/10/2013</i>	<i>Philippines</i>	<i>Earthquake</i>	<i>230</i>	<i>3,222,224</i>
<i>15/09-14/10</i>	<i>Cambodia</i>	<i>Flood</i>	<i>200</i>	<i>1,500,000</i>
<i>20/04/2013</i>	<i>China</i>	<i>Earthquake</i>	<i>198</i>	<i>2,198,785</i>
09/07/2013	India	Flood	174	500,000
13/09/2013	Mexico	Tropical cyclone (Manuel)	169	105,000

Table 5-1. Ten most severe natural disasters by number of fatalities in 2013 (events covered by Charter activations are indicated in bold and italics). (Source: EM-DAT, filtered according to the type of disasters covered by the Charter)

Top 15 Disasters – Number Killed – 2009-2013				
<i>The text in italic indicates that the Charter was activated</i>				
Date	Country/District	Type	# Killed	#Affected people
<i>12/01/2010</i>	<i>Haiti</i>	<i>Earthquake</i>	<i>222,570</i>	<i>3,700,000</i>
<i>11/03/2011</i>	<i>Japan</i>	<i>Earthquake and tsunami</i>	<i>19,848</i>	<i>368,820</i>
<i>8/11/2013</i>	<i>Philippines</i>	<i>Tropical cyclone</i>	<i>7,354</i>	<i>16,106,807</i>
<i>12-27/06/2013</i>	<i>India</i>	<i>Flood</i>	<i>6,054</i>	<i>504,473</i>
<i>14/04/2010</i>	<i>China P Rep</i>	<i>Earthquake</i>	<i>2,968</i>	<i>112,000</i>
<i>28/07/2010</i>	<i>Pakistan</i>	<i>Flash flood</i>	<i>1,985</i>	<i>2,0359,496</i>
<i>4-5/12/2012</i>	<i>Philippines</i>	<i>Tropical cyclone</i>	<i>1,900</i>	<i>6,246,664</i>
<i>07/08/2010</i>	<i>China P Rep</i>	<i>Landslide</i>	<i>1,765</i>	<i>4,7200</i>
<i>29/05/2010</i>	<i>China P Rep</i>	<i>General flood</i>	<i>1,691</i>	<i>134,000,000</i>
<i>15/12/2011</i>	<i>Philippines</i>	<i>Tropical cyclone</i>	<i>1,439</i>	<i>1,150,300</i>
<i>30/09/2009</i>	<i>Indonesia</i>	<i>Earthquake</i>	<i>1177</i>	<i>679,402</i>
07-09 /2009	India	flood	992	1,886,000
<i>11/01/2011</i>	<i>Brazil</i>	<i>General flood</i>	<i>900</i>	<i>45,000</i>
<i>05/08/2011</i>	<i>Thailand</i>	<i>General flood</i>	<i>813</i>	<i>9,500,000</i>
<i>7/08/2009</i>	<i>Taiwan</i>	<i>Storm</i>	<i>630</i>	<i>2,307,523</i>

Table 5-2. Fifteen most severe disasters by number of fatalities (2009-2013) (events covered by Charter activations are indicated in bold and italics). (Source: EM-DAT filtered according to the type of disasters covered by the Charter)

In addition, according to the Charter rules, the Charter was activated in 2013 for events with high economic impact, or major environmental impact or threat to human life, for example:

- The flooding in Germany in June 2013, which presented large-scale destruction, threatened human lives and caused significant economic damage and loss.
- The volcanic activities (Ubinas Volcano in Peru; Mount Sinabung on the island of Sumatra Indonesia and, Copahue volcano in Chile) provoked red alerts and evacuation of villages (effect of ash on human health).
- The flooding in the USA (Colorado) which caused severe damage to infrastructure (bridges, highways) and property.
- The train explosion in the centre of Lac Megantic (Quebec, Canada) in July, which claimed 47 lives, levelled the entire downtown core of Lac Megantic and is the worst train disaster in Canada since 1864.

The Charter covered 14 of the 50 most severe natural disasters in terms of fatalities (list in Annex 1) recorded by EM-DAT in 2013 (37% of 2013 Charter activations), excluding droughts and extreme temperature events. Activation of the Charter was also requested for the event in Mali in August which is registered in the 50 most severe natural disasters in terms of fatalities. This activation was denied due to the fact that the request came in quite late, procedural errors, and the nature of the event (flash flood). These 15 requests were made by Charter Authorised Users (AUs) for disasters in their countries (China (3), India (1)), by AUs on behalf of other countries (Mali, Madagascar, and Indonesia) and, by Charter Cooperating Bodies (UN bodies and ADRC) (Cambodia, Japan, Mozambique, Pakistan (2), Philippines (2), and Sudan). The number of Charter events that are triggered by disasters in the annual top 50, fluctuates slightly year-by-year but there is a positive trend (Figure 5-1).

The Charter service was not requested for 35 of the 50 most severe disasters events (by fatalities):

- 14 occurred in countries with an AU (Brazil, China, India, and Argentina). It is assumed that these AUs were able to judge appropriately between triggering the Charter and coping with the disaster without requesting a Charter activation.
- 21 happened in countries without direct access mechanisms to the Charter. All fall well within the hazard types of the Charter.
 - o 14 occurred in Asia (Afghanistan, Bangladesh, Korean Democratic Republic, Iran, Indonesia, Nepal, Pakistan, Philippines, Sri Lanka, Yemen, and Vietnam). Sentinel Asia was activated for the event in Nepal, without escalation to the Charter.
 - o 4 occurred in Africa (Kenya, Somalia, South Sudan, and Zimbabwe) and 3 in Latin America (Bolivia, Mexico and Peru).

It is expected that the implementation of the Universal Access (UA) initiative will improve Charter access globally, with the potential of increasing the number of annual requests of activations. However, 80 countries without AUs have already benefited from the Charter thanks to the different arrangements set up to improve Charter access. For instance, throughout 2007-2013, 62% of activations were requests on behalf of a user in a country without an AU, suggesting that UA wouldn't dramatically increase the volume of requests, hence the burden on EO mission owners/operators. Within one year of the UA initiative launch, six organizations dealing with disaster management made a request to become AU for their countries; five of them represent countries which have already benefited from the Charter through the other mechanisms to activate the Charter.

5.2 System performance assessment

The triggering time (where the On-Duty Operator, ODO, receives the User Request Form, URF, and the Emergency on-Call Officer, ECO, contacts the Project Manager (PM)) is on average less than one day. This time span includes the process of finding a qualified PM and his nomination by the Charter Executive Secretariat.

The histogram in Figure 5-2 shows the acquisition time of the first satellite images received after Charter activations of the years 2011, 2012 and 2013. This parameter estimates the rapidity of Charter tasking and relevant image acquisition, calculated as [Date of first crisis image acquisition - Date of Charter activation]. It is important to note that the PM/Value Adder may not use the first crisis scene to generate the first information product, e.g. if the first scene is too cloudy or too coarse to monitor the impact, etc.

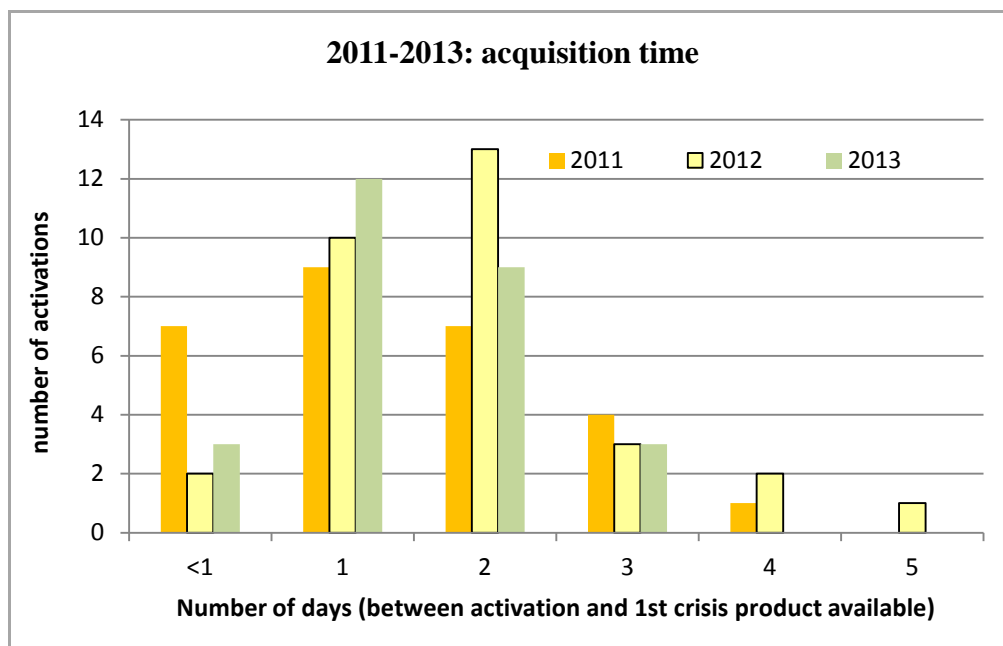


Figure 5-2. Time interval between Charter activation date and date of first data acquisition (2011-2013)
Statistics generated using PM reports information

On average, the acquisition time is better than two days. Some images are available on the same day as the activation, as is often the case when images are already acquired through Charter members' "background missions", such as CSA's Disaster Watch initiative, even before the Charter is activated. The 2013 acquisition time was slightly better than 2011 and 2012 since the 1st crisis product was available within 1 day for 15 activations out of 38 (and within 2 days for 35 activations out of 38).

It is difficult to compare such figures to user requirements *in general* and EO systems will always be slower than needed for certain users; a constraint being the timeliness in accessing new observations (and cloud-free observations in the case of optical systems) in the aftermath of a hazard impact; more satellites will be needed to reduce this constraint. More radar satellites, in particular, would reduce the effect of cloudy weather conditions in disaster zones on the Charter's performance. Many users indicated that providing crisis mapping (i.e. based on fresh acquisitions) on a daily basis and starting on Day 1 is an appropriate target.

In some cases, additional delay is caused by a change of the Areas of Interest or imprecise information given by the requestor of a Charter activation, because this implies a re-tasking of the satellites.

It should also be noted that activation of the Charter by an AU or a Cooperating Body after a disaster event can fluctuate between < 1 to 3 days, but could be longer as shown in Figure 5-3.

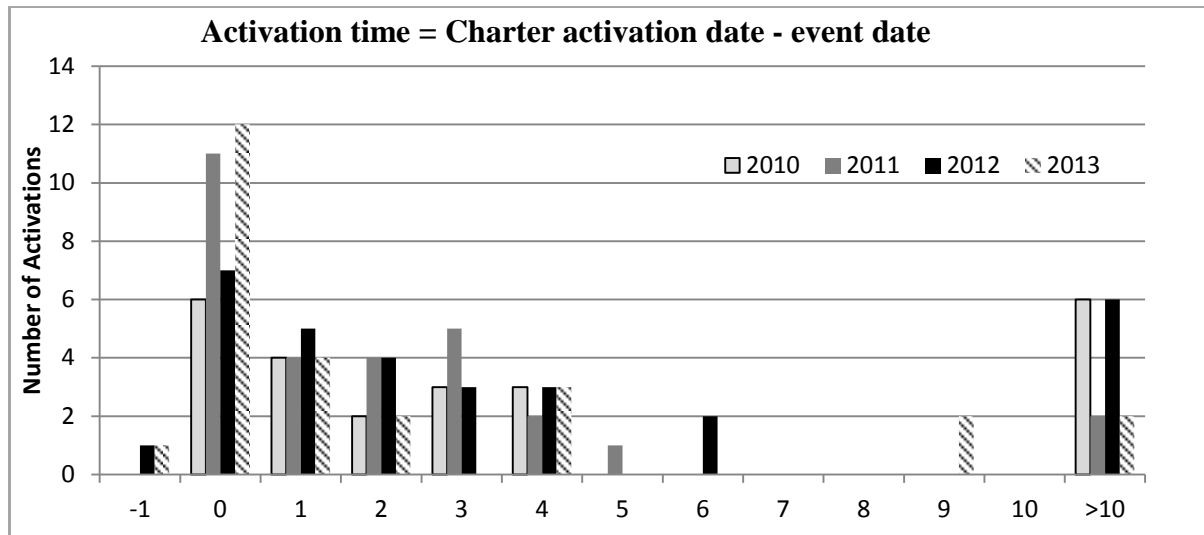


Figure 5-3. Time to activate the Charter by an AU or a Charter Cooperating Body (2010-2013 period)
Statistics generated using PM reports information

During the period 2010-2013, the activation of the Charter by an Authorised User (AU) or Cooperating Body after a disaster event occurred on average in 3.5 days: within one day for around 40 % of the cases, but longer in others. In 2013, in 34% of cases the Charter was activated the same day of the event, which increased the ability of the Charter to deliver useful products in time.

Activation time is mainly linked to the event type and the AU or end user decision process concerning the need for geo-information. In some cases, the delay in activating the Charter has an impact on the usefulness of the Charter products, in particular, after flash flood events or hurricanes.

In 2013, ESA has analysed the operational performance of the Charter service from the activation to the delivery of the products to the AU/end user to identify the causes of delays and to find solutions for improving performance. The implementation of the new operational system COS-2, in service in 2014, will help to improve the speed of some operations and exchanges amongst the different operational staff involved during an activation (ODO - ECO - Charter members' order desks - PM). A plan to systematically monitor the operational performance throughout the Charter workflow management system via COS-2 is in discussion.

A permanent revision of the different EO scenario procedures for flooding, earthquake, volcanic eruption, etc. taking into account every modification in the Charter satellite constellation, as well as ECOs and PMs recommendations, is also required to offer the best background procedures. This makes the work of the ECOs and PMs during Charter activations more efficient and easier.

Finally, the human factor shall be emphasised, because it is of major importance for the Charter's performance: The ODO and the respective ECO of the week are available 24 hours every day.

Also the Charter's Executive Secretariat and the member agencies' order desks use their best effort to react quickly when the Charter is activated, or when during an activation additional relevant information becomes available. The members of the Charter make considerable effort to ensure that all relevant staff is well-trained and that Charter operations are running smoothly in whatever circumstances.

5.3 Assessment of products and services

Although the Charter's mandate is limited to supplying satellite data quickly and at no cost, Charter members invest a significant amount of effort and resources in providing crisis mapping and damage assessment for most of the Charter activations. Value-adding services were carried out using in-house or external resources. UNITAR/UNOSAT provided value-adding services for 12 of the 38 activations in 2013.

Four trainings events for new PMs were organised in Nigeria, the Philippines, Italy and in Thailand which demonstrates the constant commitment of Charter members to regularly enhancing the PM network and improving Charter services worldwide. Such regular growth and commitment will avoid overburdening PMs (e.g. the same PM which manages two consecutive activations) and will enhance the ability to assign a PM from the geographical region of the disaster. PM training activities are essential in supporting the implementation of the UA initiative and further training events have been planned for 2014.

5.4 Users' appraisal

The Charter's end users are, in general, satisfied by Charter products and services. However, a few users have remarked that the EO crisis products were too coarse to observe and estimate damages (e.g. wind storms in small islands with traditional habitat). Such cases could be limited by a better filtering of requests to avoid Charter activation for events that are not major or for events which cannot be efficiently assessed by Charter EO data.

Examples of recurrent users' recommendations reported by the PMs are:

- The need for technical training to improve end user awareness (use and exploitation of Charter products).
- To involve specialist partners in the further processing and interpretation of data (VA partners, local actors, scientific community, etc.).
- To receive information products as vector data files to be directly exploited in Geographical Information Systems (GIS). During some activations, the PMs/VA organizations already provided GIS layers to the end users.

It should be noted that there is an increase in end users able to perform EO and GIS processing.

Efforts to increase awareness of stakeholders have been initiated via the participation of Charter members at international conferences and meetings as well as conferences organized by Sentinel Asia in the Asia-Pacific region. UNOOSA, UNITAR/UNOSAT, and GEO also support the Charter in presenting the Charter and the Universal Access initiative at a number of trainings and international events.

5.5 Communication assessment

Several channels were used to ensure more comprehensive communication to Charter stakeholders and the general public:

- The publication and distribution of 3 newsletters.
- The publication of articles and press releases.
- The Charter Twitter account. All Charter activations and news are emphasized via tweets by the Webmaster. 880 followers were counted by end of 2013 (many more will actually be reached due to re-tweets of Charter messages, e.g. through Charter agency twitter accounts).
- The preparation of a new Charter flyer, a light version of the Charter brochure.
- Participation in international/regional events all over the world to promote the Charter and the Universal Access (UA) initiative.
- An agreement with GEO to promote the UA initiative by sending a letter explaining the UA process to the GEO principals of countries without direct access to the Charter.
- The distribution of letters to a set of national disaster management authorities without direct access to the Charter, to explain the Charter and UA process and encourage them in participating in this new opportunity.

The commitment of the Charter representatives in promoting the International Charter is high. The Charter movie and brochure in English and French are distributed and used regularly at conferences and workshops both nationally and internationally.

6 Conclusions

The official entry of the Russian Federal Space Agency (ROSCOSMOS) as the 15th Charter member is a notable milestone for 2013.

In 2013, the following agencies took the lead function which rotates among Charter members on a six-month basis: the French Space Agency, CNES, until the middle of April, the German Aerospace Center, DLR, from April to mid-October, and the Argentinean Space Agency (CONAE), from October into the year 2014. With the beginning of the leadership periods, the members of the Charter Board and the Executive Secretariat came together to their bi-annual meetings in Berlin, Germany, in April 2013, and in Cordoba, Argentina, in November 2013.

Throughout the reporting period, there were 38 activations in 28 countries, a similar figure to the total activation 'average' between 2007 and 2012. In total, the Charter has been triggered for 402 disasters in 110 countries since 2000. Summer and Autumn (in particular August and October) were the periods where the largest number of activations were observed due to intense rains in Asia, Western Africa, and North America, and ocean storms in Asia.

Seven activations were among the 10 most severe disasters in 2013. In particular, the Charter was requested to monitor the impact of the two deadliest events to have occurred: Typhoon Haiyan that devastated the Philippines (7,986 killed) in November and caused economic damages equal to 5% of the national GDP, and the single flood event in India which claimed around 6,000 lives. The Charter was also activated to monitor the impact of the large flood event which affected Germany in June. This event caused substantial economic loss in Germany and in other countries in Central Europe (Czech Republic, Hungary and Poland). The Charter has demonstrated its capability to respond to major disasters by utilising its resources appropriately and collaborating with other programmes to enhance its value-adding capacity.

The Universal Access (UA) initiative, launched in September 2012, is progressing gradually and gaining recognition. A number of applications for Authorized User (AU) status were received by the end of 2013, and six were accepted for Authorized User (AU) training. The Australian candidate was trained successfully and became the first new Charter AU resulting from the UA initiative.

Extensive e-mail campaigns were carried out in summer 2013, partly with the precious support of the GEO Secretariat. The scope of these campaigns was to directly contact 1) national emergency management organizations that had been in touch with the Charter in the past, and 2) GEO principals of GEO member countries without direct access to the Charter. In total, 63 countries were contacted either directly by the Charter or with the help of GEO. The impact of these campaigns will be assessed next year.

Charter members have promoted Universal Access and the Charter as a whole, through participation in different international events held throughout 2013 (e.g. UN COPUOS conference in Vienna, February 2013; ESA Living Planet, September 2013). Sentinel Asia, UNITAR/UNOSAT and UNOOSA, mainly through its programme UN-SPIDER, have supported the Charter in promoting the UA initiative, explaining to the audience at numerous national or international workshops and conferences the relevant process to become a Charter Authorised User. Collaboration with the Charter's Cooperating Bodies (UNOOSA, UNITAR/UNOSAT, and ADRC) and GEO remains one of the major avenues for improving the awareness of the Charter worldwide.

The new Charter Operational System (COS-2) is under-development and a beta version was tested by Charter members during 2013. The full release of COS-2 is foreseen mid-2014. The main aim of COS-2 is to increase activation performance (timeliness, best usage of resources) and to provide a single point of entry for operations. In particular the COS-2 system will integrate the Charter Geographic Tool (CGT) and SaVoir. It will also improve Charter reporting, generate Charter statistics, and establish a link with HDDS.

Four Project Manager training sessions were organised in Africa (Nigeria), Europe (ESA/ESRIN, Italy), and Asia (the Philippines and Thailand) to strengthen the network of Charter PMs in preparing new participants.

Three Charter newsletters were issued in 2013. Twitter was also used as an additional tool to widely publicize Charter activations and other relevant news, as well as to raise public awareness of the comprehensive information available on the Charter's website (www.disasterscharter.org). The Charter Twitter account has 880 followers as of the end of 2013, three times more than last year.

7 Annex

List of 50 most severe natural disasters (by number of fatalities) recorded by EM-DAT (2013) (*D. Guha-Sapir, R. Below, Ph. Hoyois - EM-DAT: International Disaster Database – www.emdat.be – Université Catholique de Louvain – Brussels – Belgium*).

Note: EM-DAT events were filtered according to the type of natural disasters covered by the Charter.

Country	Type of event	Date	No Killed	Total affected	Charter event
Philippines	Tropical cyclone	08/11/2013	7354	16106870	X
India	Flood	12/06-27/06	6054	504473	X
Pakistan	Earthquake (ground shaking)	24/09/2013	399	185749	X
Pakistan	Flood	21/08/2013	234	1497725	X
China P rep	Flood	07/07/2013	233	3500000	
Philippines	Earthquake (ground shaking)	15/10/2013	230	3222224	X
Cambodia	Flood	24/09-14/10	200	1500000	X
China	Earthquake (ground shaking)	20/04/2013	198	2198785	X
India	Flood	09/07/2013	174	500000	
Mexico	Tropical cyclone (Hurricane Manuel)	13/09/2013	169	105000	
Somalia	Cyclone (3A)	08/11/2013	162	142380	
Zimbabwe	Flood	01/01/2013	125	9700	
Mozambique	Flood	Jan 2013	119	240000	X
Nepal	Flood	July 2013	119	4320	
China	Flood	12/08-5/09	118	1075000	X
South Sudan	Flood	Aug 2013	98	425000	
Kenya	Flood	10/03/2013	96	100020	
China P Rep	Earthquake (ground shaking)	22/07/2013	95	123887	X
China P Rep	Tropical cyclone	15/08/2013	88	8000000	
China P Rep	Landslide	29/03/2013	83	0	
India	Flood	23/06/2013	80	2000000	
Sudan	Flood	01/08/2013	76	401013	X
Nepal	Flood	25/05/2013	76	12503	
Bolivia	Flood	01/10/2013	74	338995	
China P Rep	Tropical cyclone	30/09/2013	74	0	
India	Flood	27/07/2013	73	40000	
India	Flood	21/10/2013	72	375000	
Peru	Flood	01/01-20/02	67	180766	
Brazil	Flood	17/12/2013	64	43300	

Thailand	Flood	30/09/2013	61	3500000	
Sri Lanka	Flood	08/06/2013	58	17214	
China P Rep	Flood	12/05/2013	55	300000	
China P Rep	Flood	29/06/2013	55	625000	
Sri Lanka	Flood	8/01-16-01	52	56747	
Argentina	Flood	1/04-7/04	52	350000	
Afghanistan	Flood	1/08-7/08	52	2597	
Korea Dem Rep	Flood	12/07-23/07	51	848690	
Indonesia	Earthquake (ground shaking)	02/07/2013	48	55935	
Vietnam	Flood	14/11/2013	47	2130001	
India	Cyclone (Phailin)	12/10/2013	47	13230000	X
China P Rep	Landslide	11/01/2013	46	2	
China P Rep	Flood	18/8 -21/8	43	255000	
Madagascar	Tropical cyclone (Haruna)	22/02/2013	42	40281	X
Pakistan	Earthquake (ground shaking)	16/04/2013	41	15175	
Yemen	Flood	16/08-17/08/2013	40	49092	
Japan	Cyclone (Typhoon Wipha)	14/10/2013	39	19289	X
Iran Islam Rep	Earthquake (ground shaking)	09/04/2013	37	4350	
Mali	Flash flood	29/08/2013	37	34700	(call rejected)
China P Rep	Flood	21/07-25/07	36	718500	
Indonesia	Flood	17/01-31/01	34	248846	