UNITED NATIONS | UNOOSA | **UN-SPIDER**

United Nations Platform for Space-based Information for Disaster Management and Emergency Response

Collaborative Using the International Cooperation Space-based Initiatives for Disaster Management

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UNOOSA/UN-SPIDER Beijing Office

Nov., 23th, 2011

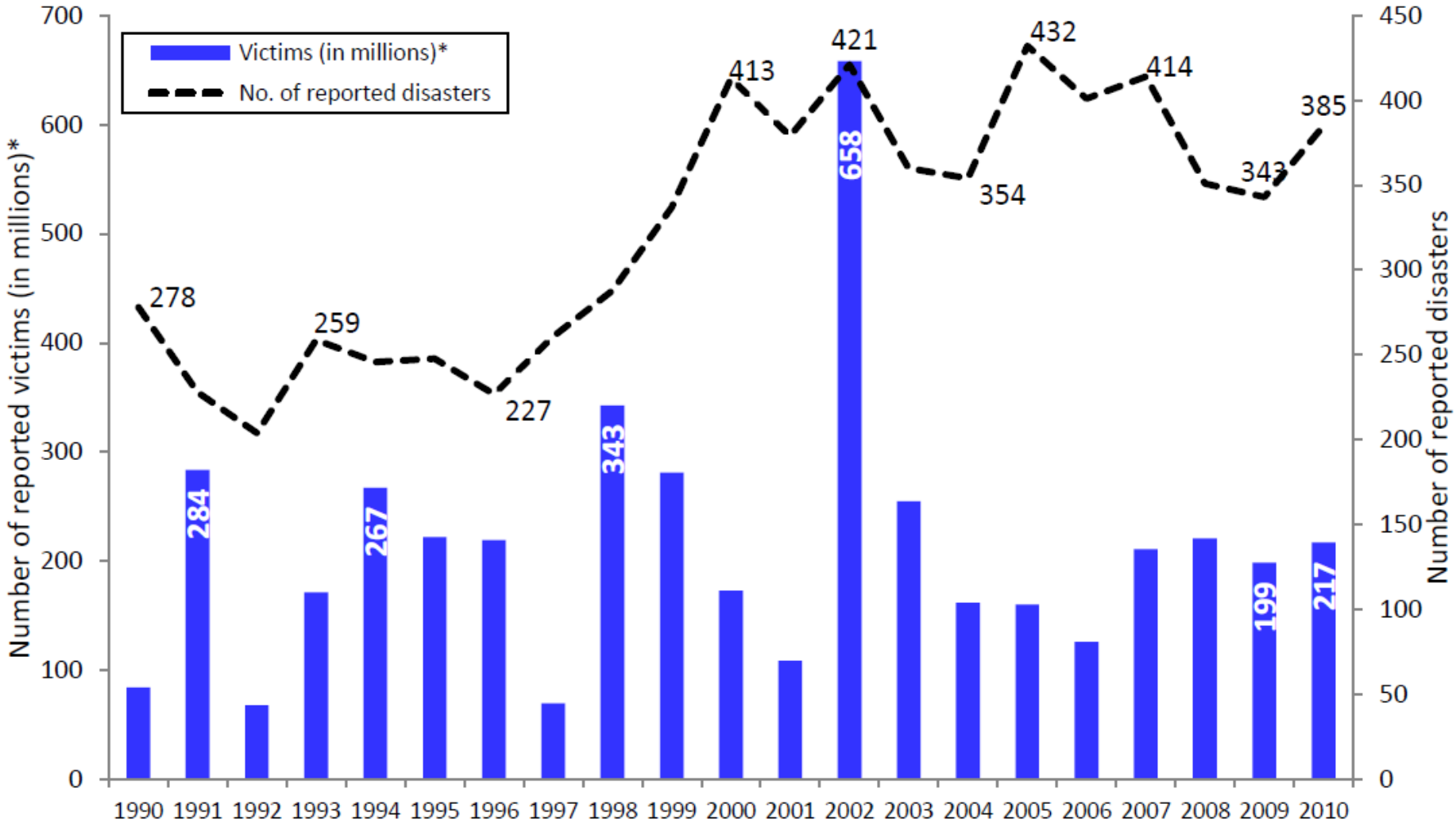
Outlines

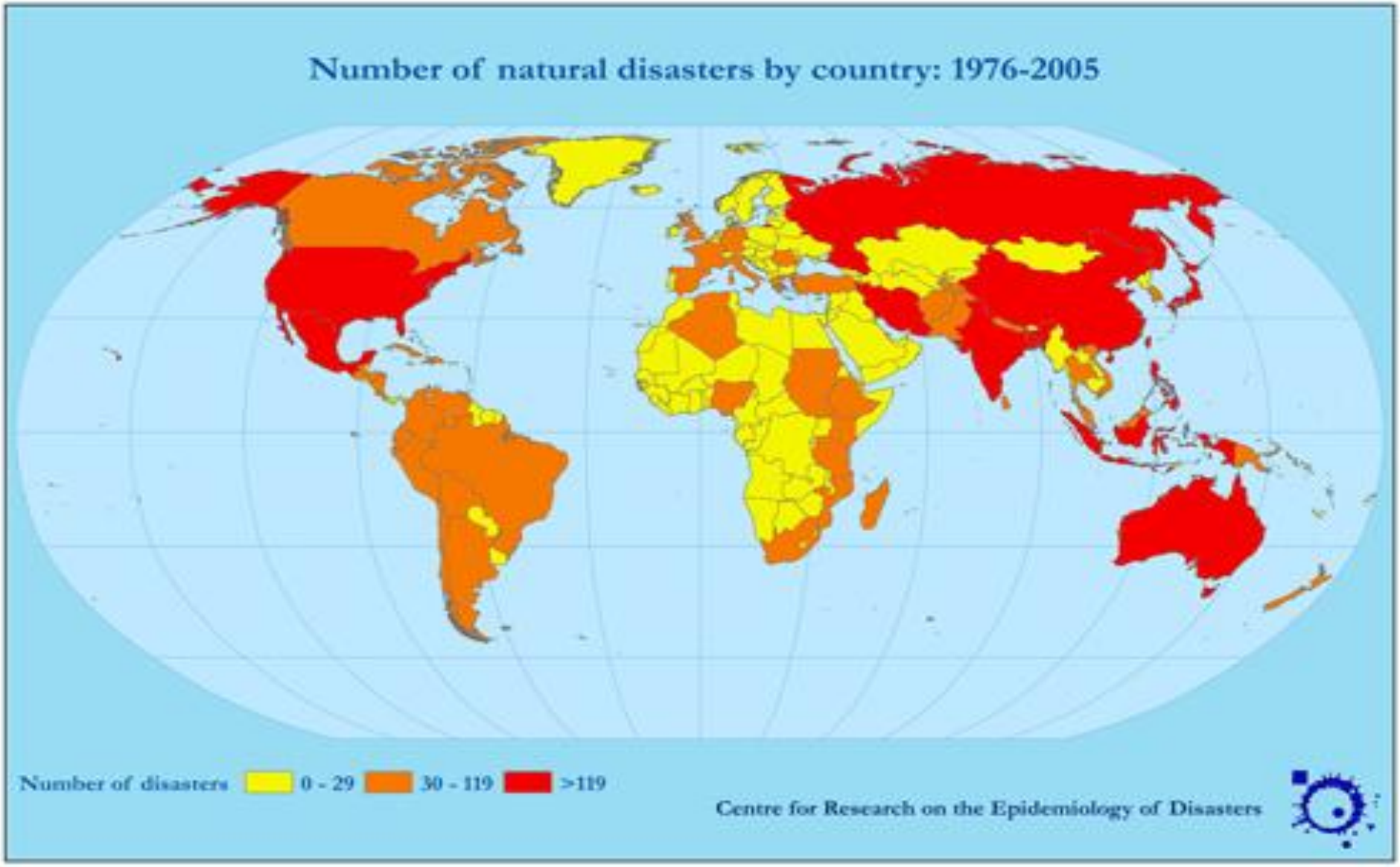
- Natural disaster and disaster management
- Existing international space-based initiatives for disaster management
- Opportunities and gaps for using existing initiatives
- Recommendations for better collaboration.

Disaster and Disaster Management Information Requirement

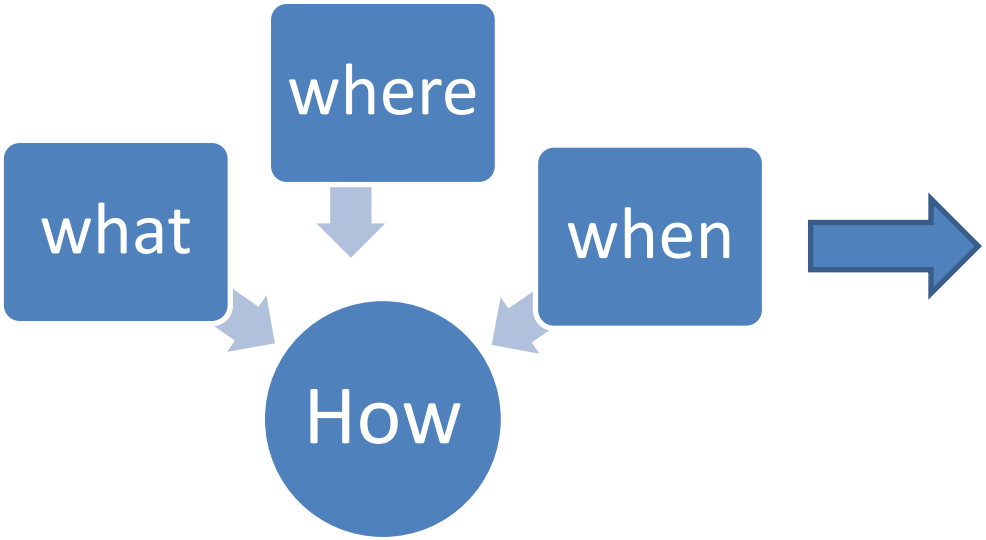
Disaster occurrence and victims from 1990 to 2010

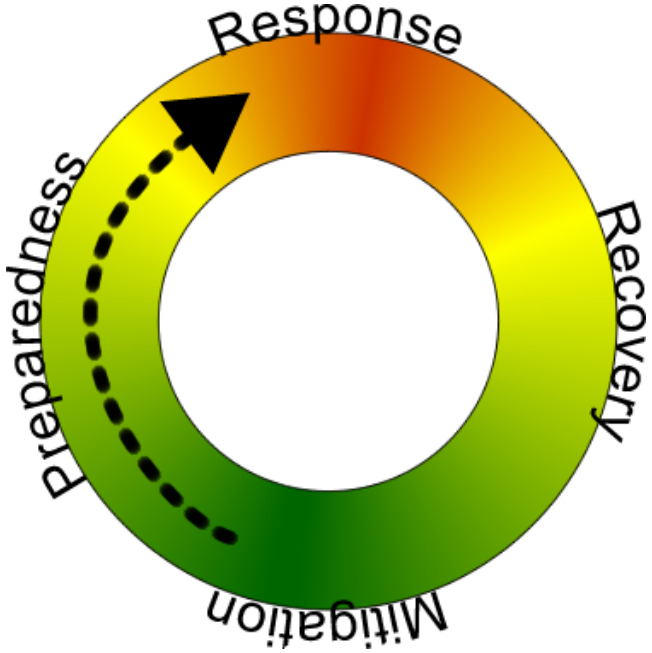
CRED




Number of natural disasters by country: 1976-2005
Number of disasters
0 - 29
30 - 119
>119
Centre for Research on the Epidemiology of Disasters

Space-based Information for Disaster Management





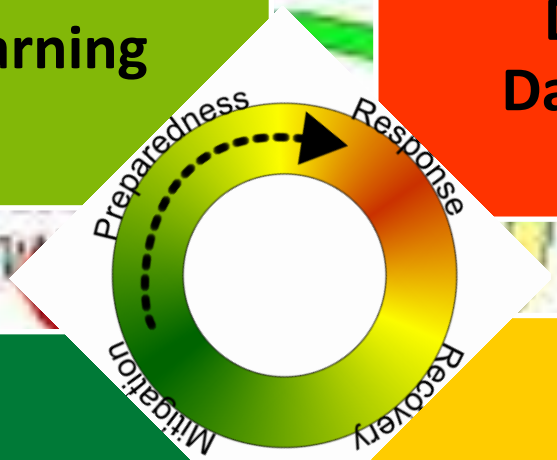
Space-based Information for Disaster Management

Hazard Monitoring

Disaster Early Warning

Dynamic Situation Monitoring

Dynamic Disaster Damage Assessment



Risk Assessment

Vulnerability Assessment

Comprehensive Damage Assessment

Recovery Status Monitoring

Existing international space-based cooperation initiatives for disaster management

Why Space-Based Cooperation for Disaster Management?

- Gaps always exist between EO observation capacity (quantitative) and disaster management requirement(qualitative).

- Disasters occurs in all the countries not only in the countries with space-based resources.

- Even the country with its own space-based resources could not cope with the catastrophe occurs frequently.

- There's no boarder for earth observation coverage and disaster affected area. We are living in the only one earth


The Global Satellite Observation System
FY-1/3 (China)
METEOR 3M (Russian Federation)
GOES (USA) 75W
GOES (USA) 135W
Terra
NPP
Jason-1/2
Okean series
Aqua
QuikScat
TRMM
MTSAT-1R/2 (Japan) 140E
ALOS
Geostationary orbit
R & D orbit
Polar orbit
35,800 km
COMS-1 (Rep. of Korea) 120E
GPM
GCOM
ENVISAT/ERS-2
METEOR 3M N1
SPOT-5
MSG (EUMETSAT) 0 Longitude
Meteosat (EUMETSAT) 63E
FY-2/4 (China) 105E
INSATs (India) 83E
GOMS / Electro N2 (Russian Federation) 76E
NOAA (USA)
JPSS (USA)
Metop (EUMETSAT)
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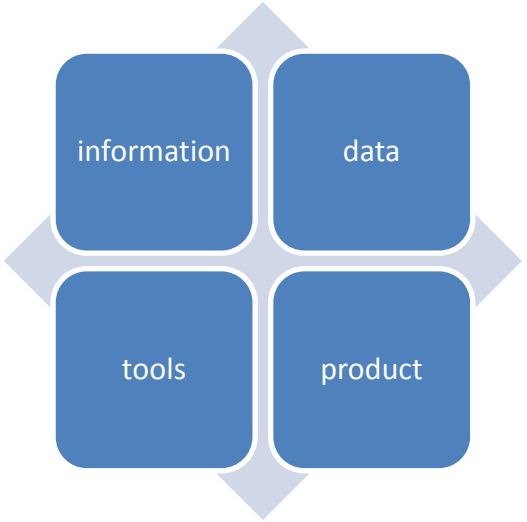
Existing Space-based International Initiatives for Disaster Management

- UNOOSA/UN-SPIDER
  - International Charter Space and Major Disasters
  - SERVIR
  - GMES/SAFER
  - Sentinel Asia
  - GEO
  - Crowdsource
  - Other efforts



UN-SPIDER /Knowledge Portal_ Information

- One of UN-SPIDER's framework to facilitate fast and efficient access to space-based information for countries, international and regional organizations. This includes all types of information provided by earth observation satellites, communication satellites and global navigation satellite systems.

UN-SPIDER SpaceAid: space-based information for earthquake in Japan and tsunami in Pacific Region

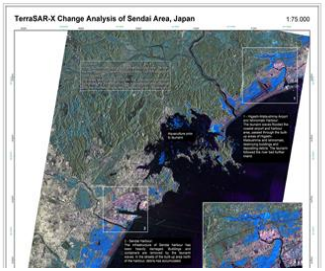
Processed by natalie.epler on Mar 11th 2011 Asia Pacific earthquake Honshu Japan Pacific Tsunami

Status Update: 30 March 2011

Page content:

please click twice on links above to jump to a section

Japan earthquake overview by German Aerospace Center (DLR), Center for Satellite Based Crisis Information (ZKI) (click for resolution image and KML file)

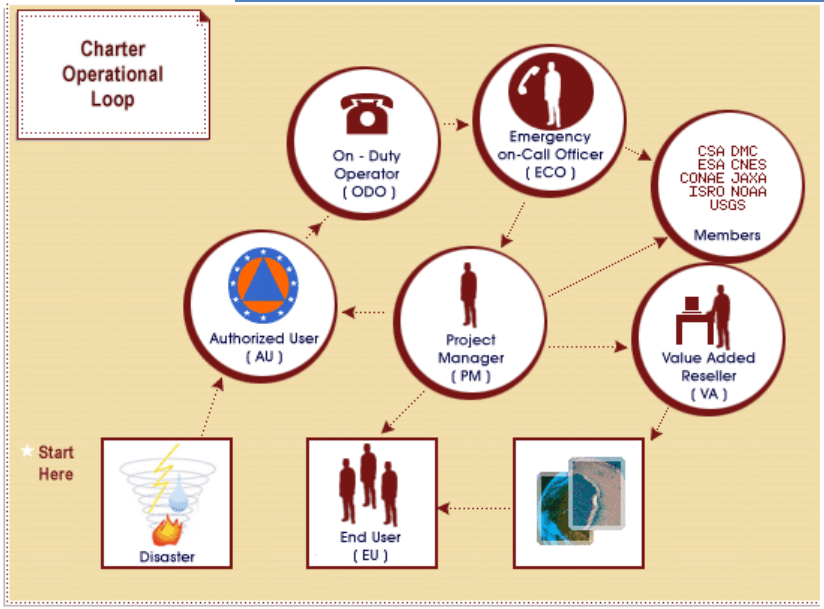


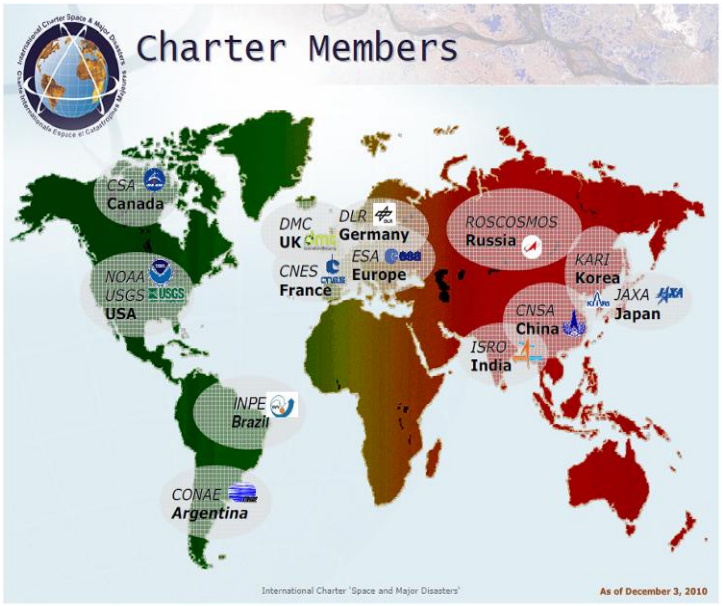
1.2 Institutional links to further mapping products, geodata, geolinks and databases

Mechanism / Institution / Provider	Link	Remarks
Dartmouth Flood Observatory	http://floodobservatory.colorado.edu/Sendaicoast.ppt	PPT download (maps)
	http://floodobservatory.colorado.edu/hydrography/E130N40.html	Maps
ESRI	http://50.17.221.205/EQJPCOP/index.html	Japan Earthquake & Tsunami Common Operational Picture
	http://www.esri.com/services/disaster-response/japan-earthquake-tsunami-2011-map/index.html	Japan Incident Map
	http://maps.unosat.org/JP/EQ20110311JPN/UNOSAT_RS_20110312_analysis.zip	
Army Geospatial centre	http://www.agc.army.mil/Japan/index.html	Maps (CAC required)
FloodMaps	http://www.floodmaps.net/eftp/files/522286987_Japan_Tsunami_DamageAssessment_13MAR2011.zzz	Google Earth KMZ files and Shapefile Download
Erdas Apollo	http://apollopro.erdas.com/apollo-client/	Disaster Map
GEMDAS	http://gemdas.earth.ncku.edu.tw/Japan/Japan.aspx	Formosat-2 Mapping Application
GEO	http://supersites.earthobservations.org/sendai.php	Collection of maps and links
German Aerospace Center (DLR), Center for Satellite Based Crisis Information (ZKI)	http://www.zki.dlr.de/article/1893	Collection of maps and KMZ files
GFZ Potsdam	http://www.gfz-potsdam.de/portal/gfz/Public+Relations/M40-Bildarchiv/001_+Japan	Images, Maps and Videos
Global Disaster Alert and Coordination System (GDACS)	http://www.gdacs.org/#EQ_104728	Web Mapping and additional maps
Google	http://mw1.google.com/crisisresponse/2011/sendai_earthquake/google/map/sendai_earthquake_2011.html	Web Mapping Application
GDACS (Global Disaster Alert and Coordination System)	http://www.gdacs.org/#EQ_104728	Maps
Harvard Centre for Geographic Analysis	http://cegrp.cga.harvard.edu/japan/	Japan Sendai Earthquake data portal
HEWS	http://www.hewsweb.org/japan89eq/	Earthquake and aftershock seismic activities map
International Nuclear Safety Center	http://www.insc.anl.gov/pwrmaps/map/japan.php	Maps (Password requiered)
Munich RE	http://un-spider.org/story/modeled-tsunami-zones-affected-areas-japan-earthquake	Tsunami modelling
NASA	ftp://sideshow.jpl.nasa.gov/pub/usrs/ARIA	Maps
	http://www.pdc.org/atlas/	Web Mapping application
	http://www.un-spider.org/sites/default/files/PDC-8.9M_HONSHU_JAPAN_EQ_fuk_i_nuclearplant_V3_11MAR11.pdf	Fukushima Daiichi Nuclear Plant

International Charter Space and Major Disasters

- imagery and mapping service





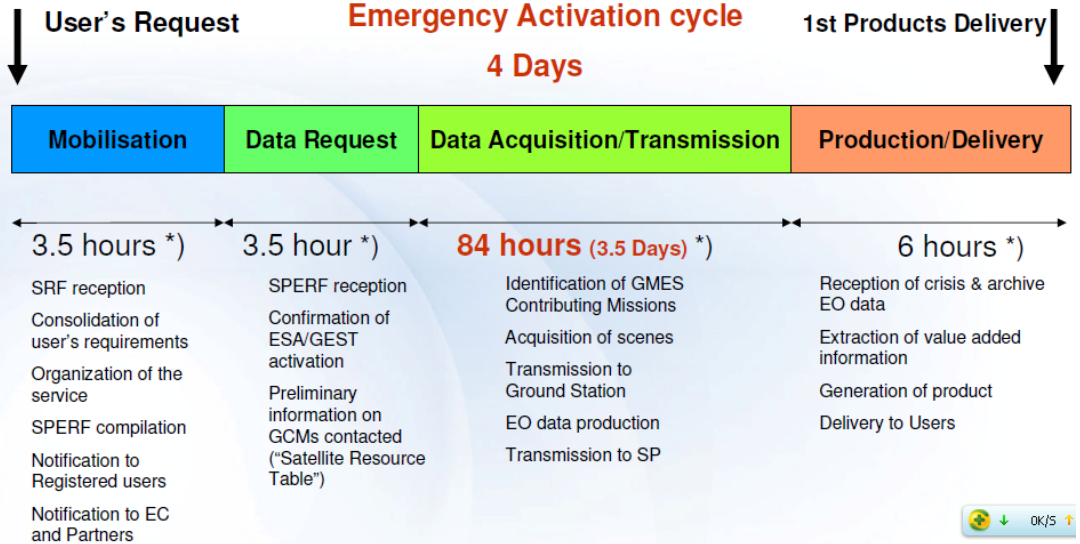
- An International agreement among Space Agencies to support with space-based data and information relief efforts in the event of emergencies caused by major disasters.
- Resources access: AU from member countries, via an AU on behalf of a user from a nonmember country (“Sponsor AU”), activation via the UN (UNOOSA,UNOSAT)for UN users, Sentinel Asia and ADRC.

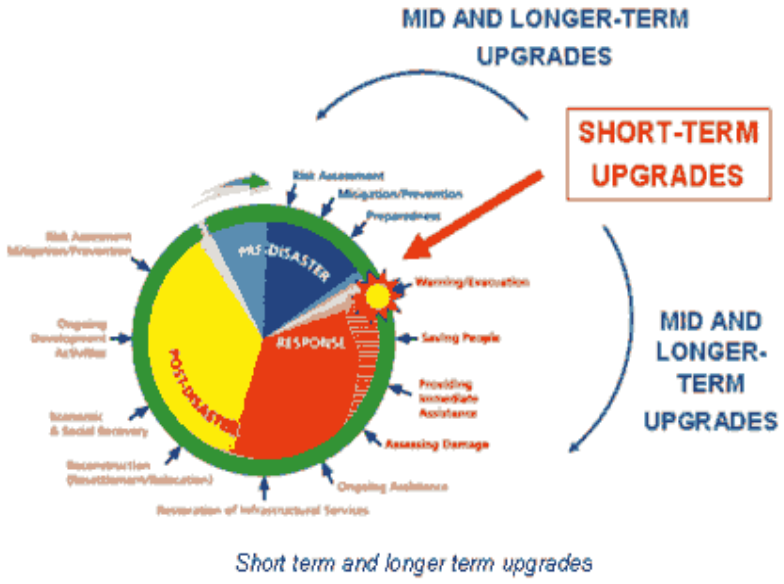
Space Resources
ERS , ENVISAT
SPOT , Formosat
RADARSAT
IRS
POES , GOES
SAC-C
ALOS
Landsat, Quickbird, GeoEye-1
ALSAT-1,NigeriaSat,BILSAT-1 UK-DMC,TopSat
FY, CBERS
TerraSAR-X,TanDEM-X

Service and Applications For Emergency Response

-mapping service

- In the frame of the GMES, SAFER project aims at implementing preoperational versions of the Emergency Response Service.
- 3 years project – kick-off in 2009
- 53 partners from 16 countries: 29 private organisations, 24 public organisations
- The main goal is the upgrade of the core service and the validation of its performance with 2 priorities: rapid mapping during the response phase, extend the use of its products to early warning and to reconstruction

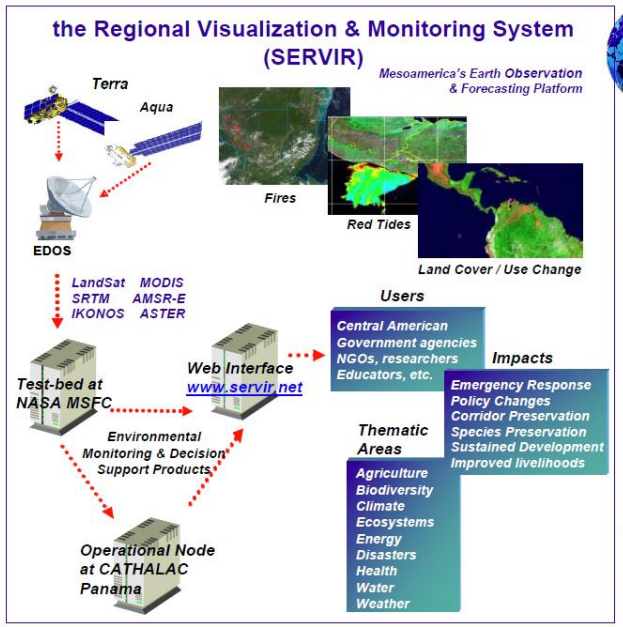




Short term and longer term upgrades

Regional Visualization and Monitoring System
-tools/information

- SERVIR is a Regional Visualization and Monitoring System that integrates earth observations and forecast models together with in situ data and knowledge for timely decision- making to benefit society, which initiated in 2005 by NASA and USAID.
- Three regional offices: SERVIR Africa, SERVIR Latin America, SERVIR Himalaya



SERVIR is a completely open-access system w/ products in range of formats

- provides free and open access to:
  - Satellite and Geospatial
  - Interactive Online Maps
  - Decision Support
  - 3D Interactive Visualizations

•Global Earth Observation System of Systems (GEOSS)

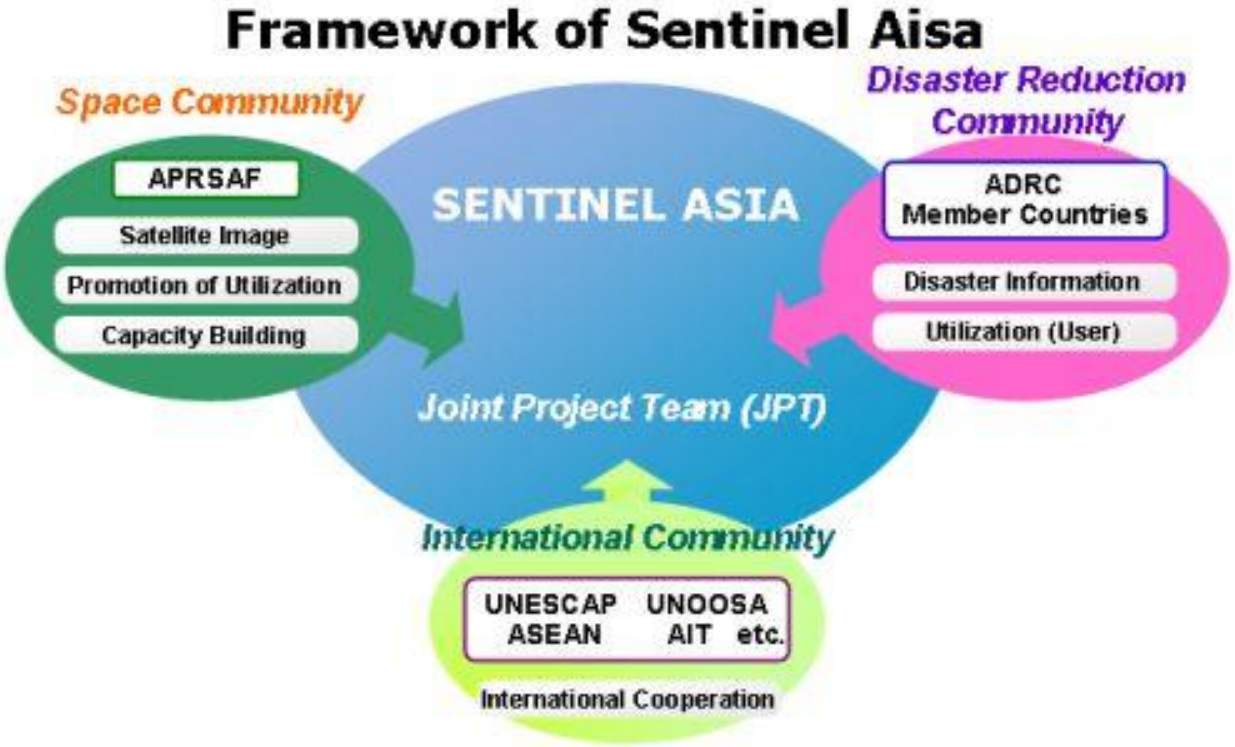
•International Charter on Space and Major Disasters

•Mesoamerican Environmental Information System (SIAM)

Sentinel Asia

- imagery and mapping service

- The Sentinel Asia is a voluntary basis initiative led by the Asia-Pacific Regional Space Agency Forum (APRSAF) to support disaster management activity in the Asia-Pacific region by applying the WEB-GIS technology and space based technology, such as earth observation satellites data.



Group on Earth Observation
- information and data

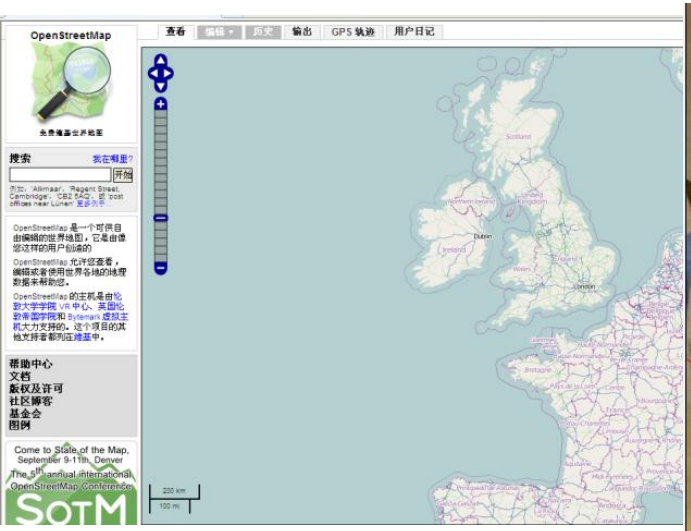
- GEO was established in February 2005 after the World Summit on sustainable Development, the Group of Eight leading industrialized countries (G8) and three ministerial Earth Observation Summits.

- Till now, more than 100 governments and leading international organizations have founded GEO to coordinate the construction of a Global Earth Observation System of Systems (GEOSS) by the year 2015.

Crowdsource Mapping Community

– information, tools, mapping

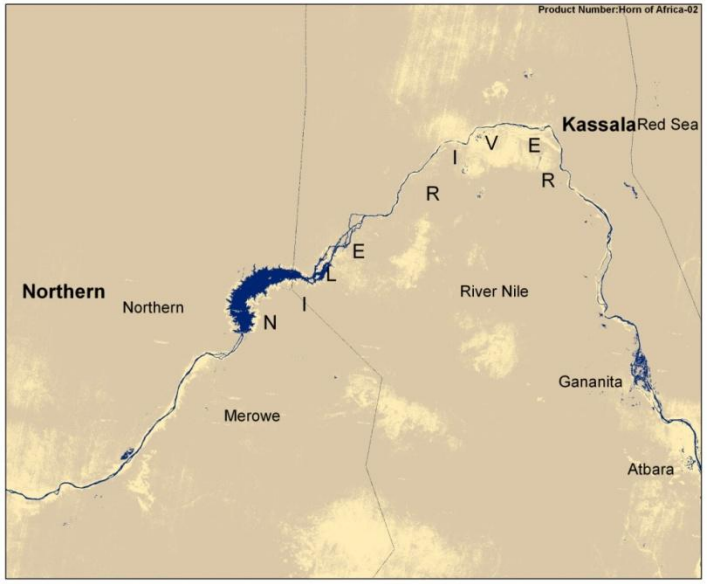
- Advancements in technologies have made it possible for virtual communities such as OpenStreetMap, Ushahidi, Sahana, CrisisMappers, Virtual Disaster Viewer, Google MapMaker and INSTEDD to provide increasing support to disaster preparedness and emergency response efforts.

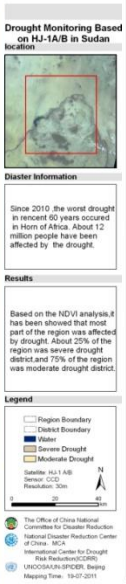


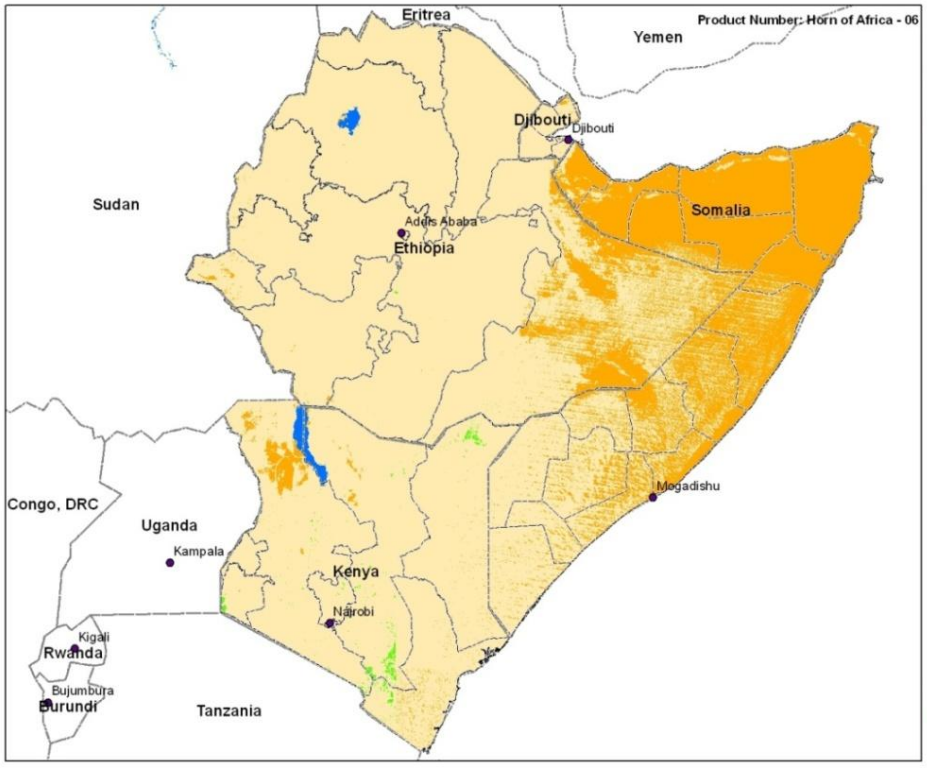
Second UN-SPIDER International Expert Meeting:
Crowdsource Mapping for Preparedness and Emergency Response

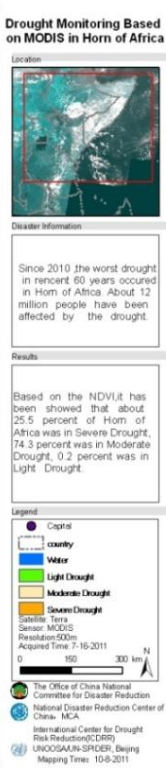
Other Efforts for Space-based Information

- National agency
- Private sector
- NGO,etc

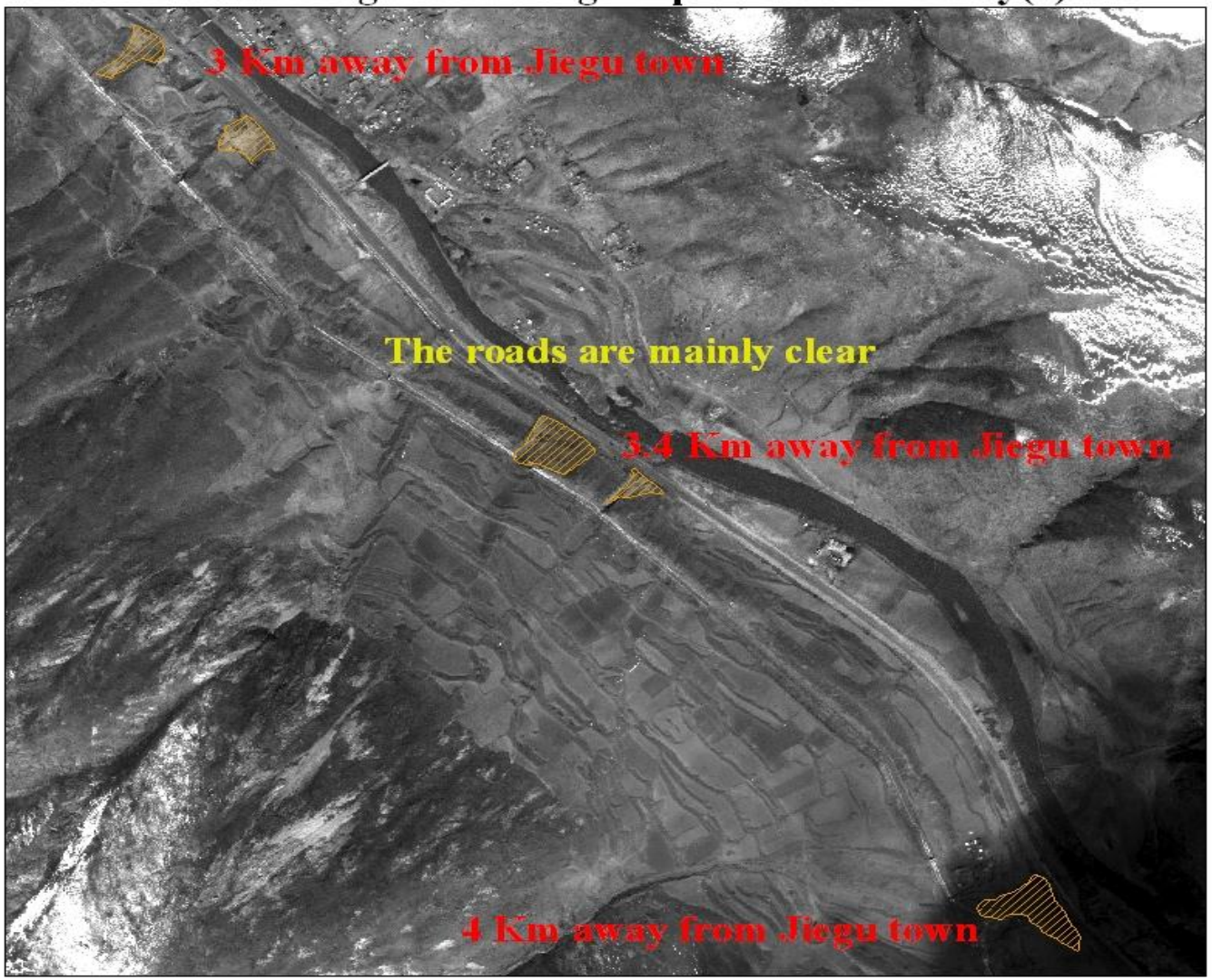




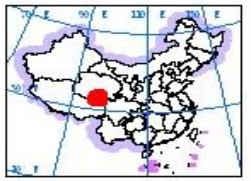




青海省玉树县遥感监测图(4)
Remote Sensing Monitoring Map in Yushu County(4)



Charter 306号订单—产品编号 04
Charter Call 306 - Product No. 04



Legend

Landslide

灾害类型：地震　　时间：2010年4月
Disaster Type: EarthQuake　　Date: Apr. 2010

灾害影像 Disaster Image:
WORLDVIEW, 分辨率0.5m, 获取时间2010年4月22日
WORLDVIEW 0.5m acquired 22 Apr.
Provided by USGS, © Digital Globe

灾害分析Disaster Analysis:
WORLDVIEW, 分辨率0.5m, 获取时间2010年4月22
WORLDVIEW 0.5m acquired 22 Apr.
Provided by USGS, © Digital Globe

制图 Map Production:
WORLDVIEW, 分辨率0.5m, 获取时间2010年4月22
WORLDVIEW 0.5m acquired 22 Apr.
Provided by USGS, © Digital Globe

投影 Projection: UTM
椭球体 Spheroid: WGS84
地球模型 Datum: WGS84

N

0　137.5

国家减灾委员会办公室
Office Of National Committee for Disaster Reductio

国家减灾中心
民政部卫星减灾应用中心
National Disaster Reduction Center of China
http://www.jianzai.gov.cn

联系方式 Contact Information:
remotesensing@ndrcc.gov.cn
电话 Hotline:(86-10) 8354 5980

USGS　DIGITALGLOBE

SAFER Action No. 33
Glide No. EQ-2010-000073-CHN
Product n°04

CHINA - Yushu Prefecture Earthquake on April 14, 2010

Detailed Damage Assessment Map - Gyegu

Scale 1:7,500

Location Diagrams

Legend

Population
- Government building

Point of interest
- Monastery
- Gathering areas
- Hospital

Infrastructure
- Primary road
- Local road
- Bridge

Damage Assessment
- Vast damage visible
- Moderate damage visible

Important to note: Areas not marked with "damage visible" may still show considerable impact/damage from the earthquake. Due to the resolution of the imagery and viewing geometry of the satellite, the damage assessment is of very coarse character and might considerably differ from actual damages on the ground.

Interpretation

On April 14, 2010, an earthquake with a magnitude of 6.9 hit the Yushu prefecture in the Qinghai province of China, followed by several aftershocks. Many hundred people were reported dead, injured or missing. Buildings collapsed or were severly damaged. Road network and communication lines were interrupted.
The map shows a post-disaster damage assessment of Gyegu and its suburbs. The damage assessment was derived by a joint analysis of a GeoEye-1 and a QuickBird-2 image, both acquired on April 15th, 2010. The QuickBird-2 image serves as backdrop.

Cartographic Information

0 250 500 750 Meters N

Local projection: UTM Zone 47N, Datum: WGS 84
Geographic projection: Lat/Lon (DMS), Datum: WGS 84

Scale: 1:7,500 for A1 prints

Data Sources

QuickBird-2	© DigitalGlobe 2010
GeoEye-1	© GeoEye 2010
Vector Data	© DLR 2010
Earthquake Information	© GDACS 2010

Framework

The products elaborated for this Rapid Mapping Activity are realised to the best of our ability, within a very short time frame, during a crisis, optimising the material available.
All geographic information has limitations due to the scale, resolution, date and interpretation of the original source materials. No liability concerning the content or the use thereof is assumed by the producer.
The ZKI crisis maps are constantly updated. Please make sure to visit http://www.zki.dlr.de for the latest version of this product.

Map produced April 16, 2010 by ZKI
Updated April 22, 2010 by ZKI
© DLR 2010
zki@dlr.de
http://www.zki.dlr.de

gmes
European Commission Service and Applications For Emergency Response
safer

Center for Satellite Based Crisis Information
– Emergency Mapping & Disaster Monitoring –
a service of DFD

DLR

Reference map, assessment map, thematic map

Opportunities for Collaboration

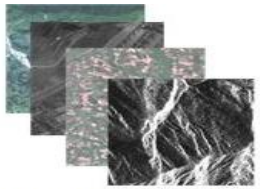
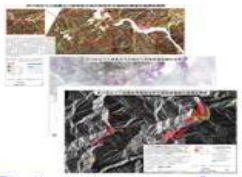


Image Acquisition



Data processing & map making

Product Dissemination & Service

Space-based Resource access

- Development of EO technology
- More open access resources(geo-base/space based)

Space based Information analysis

- Advanced technical tools, models,..
- Personnel resources

Information Service

- Communication development
- Disaster management requirement

Challenges for Collaboration

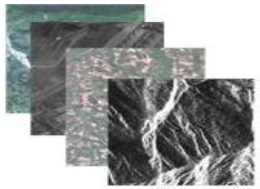
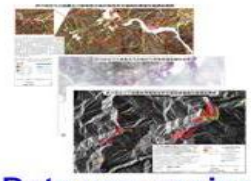


Image Acquisition



Data processing & map making

Product Dissemination & Service

Space-based Resource access

- Data sharing policy
- Synergy among different satellites and initiatives
- Lack of data for non-emergency stage

Space based Information analysis

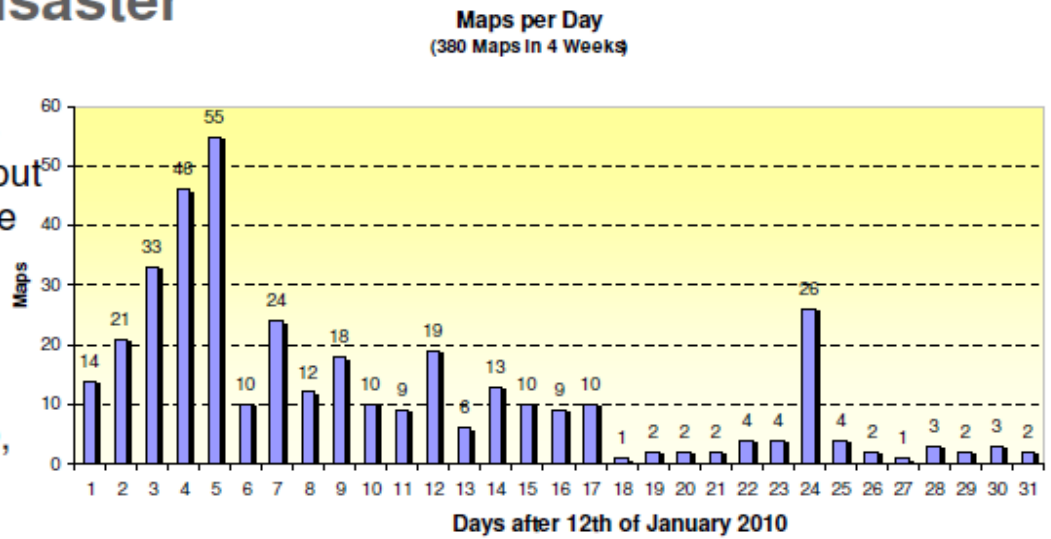
- Standard (data processing and mapping)
- Coordination among different platform

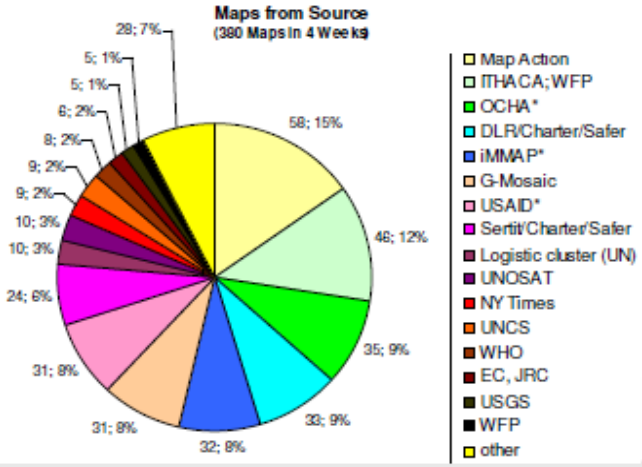
Information Service

- Specific end user requirement
- Information interpretation capacity

„Haiti Mapping Disaster“

- **Within four Weeks 380 maps** were posted on UNOCHA/Reliefweb, about half of which were based on satellite data
- **34 different producers/sources** - CartONG, DLR, EC/JRC,ITHACA MapAction, Sertit, UNOSAT,USAID, WHO, WFP,…
- **Different type of maps**: reference maps, damage assessment, situation maps, overview maps and further specialised maps
- **Different scales**, from 1:5.000-1:500.000
- Partially **contradicting information**





Further steps for collaboration among the initiatives

- Better understanding and closer linkage among space community, mapping community and disaster management community
- Satellite imagery acquisition synergy to fulfill the requirement and to avoid duplication and redundancy
- Facilitating data sharing policy and standard for imagery and geo-dataset sharing among different initiatives.
- Facilitating the guidline for space-based information analysis for easy collaboration among mapping service agencies and understanding by the disaster management community.
- Improving the awareness raising for disaster manager and capacity building for information support .

"The only tools and information you will use and trust in a crisis are the ones you have been using already"

- David Stevens


谢谢
Thanks