

Philippines (Bohol) Earthquake – Report #5

21.10.2013 – Situation Report No. 5 – 8.00am GMT



Report Contributors: James Daniell (Earthquake Report & KIT); Armand Vervaeck, Carlos Robles, Jens Skapski (Earthquake Report); Bijan Khazai, Friedemann Wenzel, Bernhard Mühr, Chris Power, Trevor Girard (KIT); Pieter Nierop and Julie Jaramillo (Bohol, Philippines); Joachim Fohringer, Silke Eggert, Thomas Walter (GFZ)

Official Disaster Name	Date	UTC	Local	CATDAT_ID
Bohol EQ	15-Oct-2013	12:12:31	+8	2013-285

Preferred Hazard Information:

EQ_Latitude	EQ_Longitude	Magnitude	Hyp_Depth (km)	Fault Mech.	Source	Spectra
9.866	124.011	7.1-7.2Mw	20	Thrust	USGS	None avail.

Duration: 30 secs

Location Information:

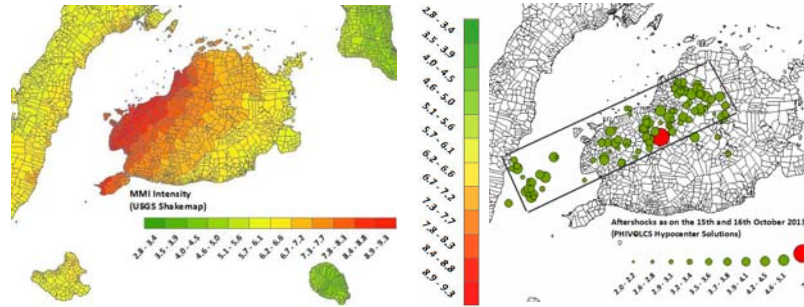
Country	ISO	Province	Most Impact	Building PF	HDI (2012)	Urbanity	Population
Philippines	PH	Bohol	West Coast	Average	0.729	25%	1.3 million
Philippines	PH	Cebu	City	Good	0.761	66%	4 million

Preferred Hazard Information:

MSK-64	MMI	PEIS	Key Hazard Metrics
IX	VIII-IX	VII-VIII	

Hazard Description (Intensities and Ground Motion)

Intensities reached VII on the PEIS scale – very well built structures received slight damage. Older buildings suffered great damage. There was also limited liquefaction. The damage seen corresponds to VIII and perhaps very isolated VIII-IX locations on the MMI scale. Over 900 aftershocks have occurred, with magnitude 5 earthquakes continuing to pepper the region around Clarin, Loon and Tagbilaran on Bohol. The fault sense can start to be seen well from the PHIVOLCS data, with the fault break running at about WSW-ENE. At least 100 of these have been strong enough to be felt.



All absolute values for this earthquake should be treated with caution and are estimates!

Vulnerability and Exposure Metrics (Population, Infrastructure, Economic)

	<p>The island of Bohol has a capital stock around \$5-6 billion USD with approximately 1.3 million inhabitants. It is mountainous in nature and has the chance for many landslide. Cebu is a key tourist area in the Philippines with 2 million arrivals per year as of 2013. Still, the average income and GDP per capita is about the same as that of the whole of the Philippines. Bohol has a lower GDP per capita in comparison. The main industries are dominated by agriculture which could be affected.</p>
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What have been the 2 largest comparable damaging events in the past? None in this region.

Date - Name	Impact Size	Damage %	Social % or Insured %	Economic Loss
1990 Bohol	Mw6-6.8, VII PEIS	7000 homeless	6 deaths, 200 injured	154m PHP (\$7m US)
1996 Bohol	Mw5.6, VI PEIS	Poorly built structures	No deaths	Minor

Preferred Building Damage Information: (Damage states will be filled in later when more info available)

Description: Many government, churches and private (over 45641 so far) The counting of buildings destroyed has not been undertaken with only a few houses included in the current count of **10020 destroyed and 35621 damaged**. Based on families displaced, this value could be up to at least 15000 destroyed. Loon has been particularly hard hit as well as Clarin, Antequera, Carmen, Tagbilaran and others. See the pictures for locations of current counting.



Julie Jaramillo (all rights reserved)

Secondary Effect Information:

Type	Impact	Damage %	Social %	Economic %
Landslides	Many roads blocked, infrastructure damage	Minor	At least 10 deaths	1-5%

See below in the pictures for Barangays affected

Preferred Social Impact Information:

Type	Median	Accepted Range	Description	Source
Deaths	197 incl. 11 missing	May rise	Hypocenter played a major role in fatality estimation: 20 to 400 =various models	Daniell, CATDAT, Earthquake Report.
	**NB: The lowest death toll is currently 186 as 11 are missing. The BQ mall may unfortunately have more victims according to eyewitnesses			
Injuries	583	500+	489 Bohol, 89 Cebu	NDRRMC
Long term Homeless	68100	42000-97000	Using homeless trend model based on Visayas 2012, Luzon 1990 and other Philippines events. Updated 20.10.2013	Daniell, CATDAT
Short term homeless	380906	380906+	380906 currently displaced – see below	NDRRMC
Affected	3003001	3.5m peak	Cebu, West Bohol, Negros	NDRRMC

*predicted

Preferred Current Economic Impact Information: \$million int. event-day dollars

Type	Median	Accepted Range	Description	Source
Total Losses	\$89.4m	\$55m-100m	Total estimate (using rapid loss model combined with damage for range)	CATDAT/James Daniell
Insured Losses	<\$2m	\$1m-5m	Minor insurance takeout but Cebu some	CATDAT
Aid Impact	\$2.2m		Put aside in disaster funds	NDRRMC

Direct Economic Damage (Total) - Summary

- There have been estimates of some components of the infrastructure damage being **867 million PHP** (around 17 million USD).
- The rapid loss estimation of CATDAT/James Daniell, gives a total damage value coming out to between 55-100 million USD (up to 4.5 billion PHP) with a median 89.4 million USD (3.9 billion PHP). This includes infrastructure and direct damage to buildings, industry and contents.
- This is a significant percentage of the gross capital stock of the location, with a MDR approaching 2%.

Weather

- The earthquake occurred in the middle of the typhoon season. Lots of isolated showers and thunderstorms during next 72-96 hours. >100mm expected in the next 5 days in Southern Bohol (usual for the season)
 - They might be heavy in places, may trigger landslides in saturated and unstable slopes.
 - Neither a typhoon nor any other organized tropical rain complex is expected next 144 hours.
 - No widespread and heavy rain.
- Source: Bernhard Mühr, CEDIM, <http://www.wettergefahren-fruehwarnung.de/>

Insured Loss Estimates:

Some public infrastructure damage occurred, and in addition there was minor damage to tourist facilities in various locations. It is still expected that the damage will be insignificant for the insurance industry. In addition no global impacts on supply chains.

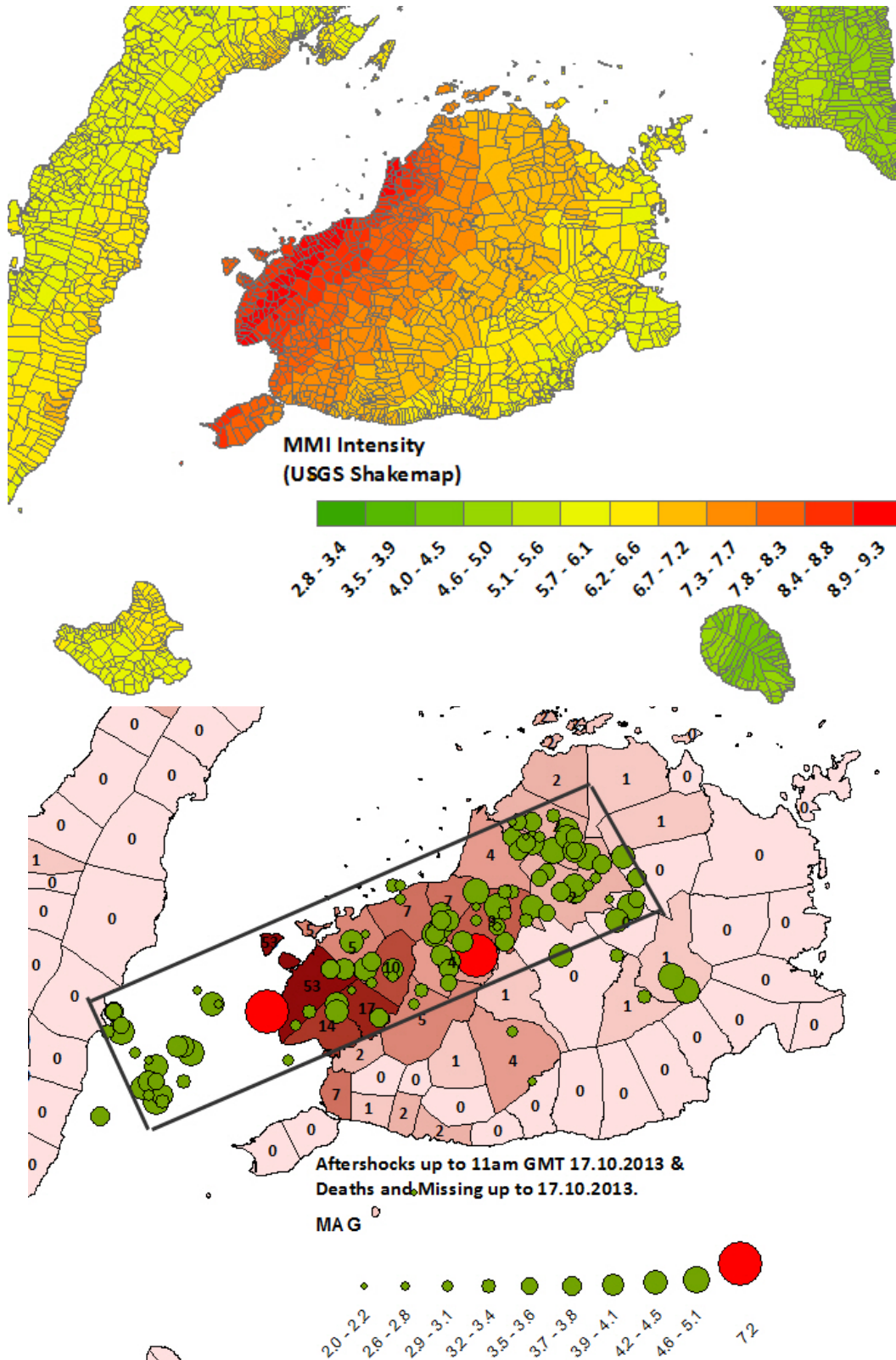
Abridged Summary Description from full CATDAT description sources:

A catastrophic earthquake hit the densely populated area of Cebu, and the less densely populated island of Bohol with catastrophic consequences.

CATDAT Economic Index Rank:	8: Very Damaging	CATDAT Social Index Rank:	8: Destructive
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This report was produced in conjunction with the CATDAT database, earthquake-report.com, NDRRMC and USGS data. As shown below is full size documentation of the diagrams shown in the summary above. The data is current as of 21st October 8:00am European Standard Time. For the current data, go to www.earthquake-report.com or contact James Daniell (j.e.daniell@gmail.com).

Maps of the affected region signalling some of the destruction and photos of affected infrastructure.



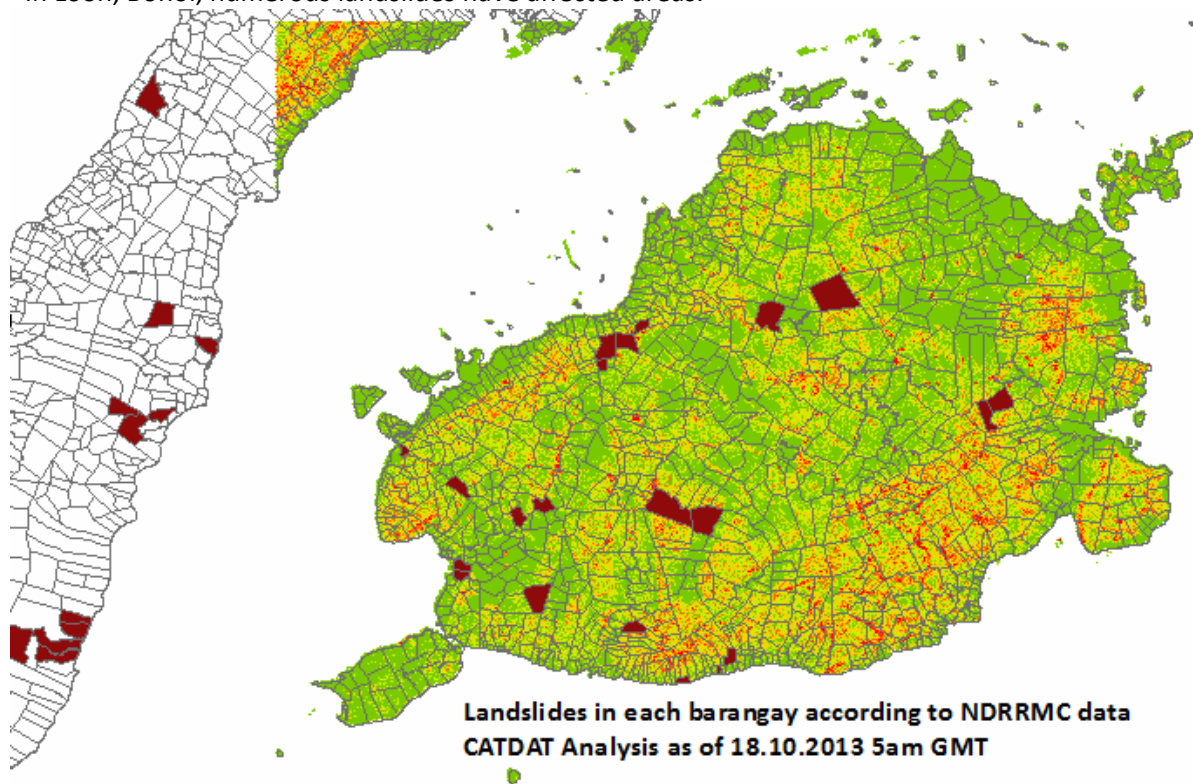
2193 aftershocks have occurred so far, with the main ones shown here. Two aftershocks have caused minor additional damage (Earthquake Report). 46 main felt aftershocks have occurred. However, there is still potential for larger aftershocks up to M=6 which could cause additional damage. The intensity map will be reevaluated with the incoming damage and fault solution as there are 2 potential locations of the epicenter as shown in red on the diagram above.

Earthquake-induced Landslides

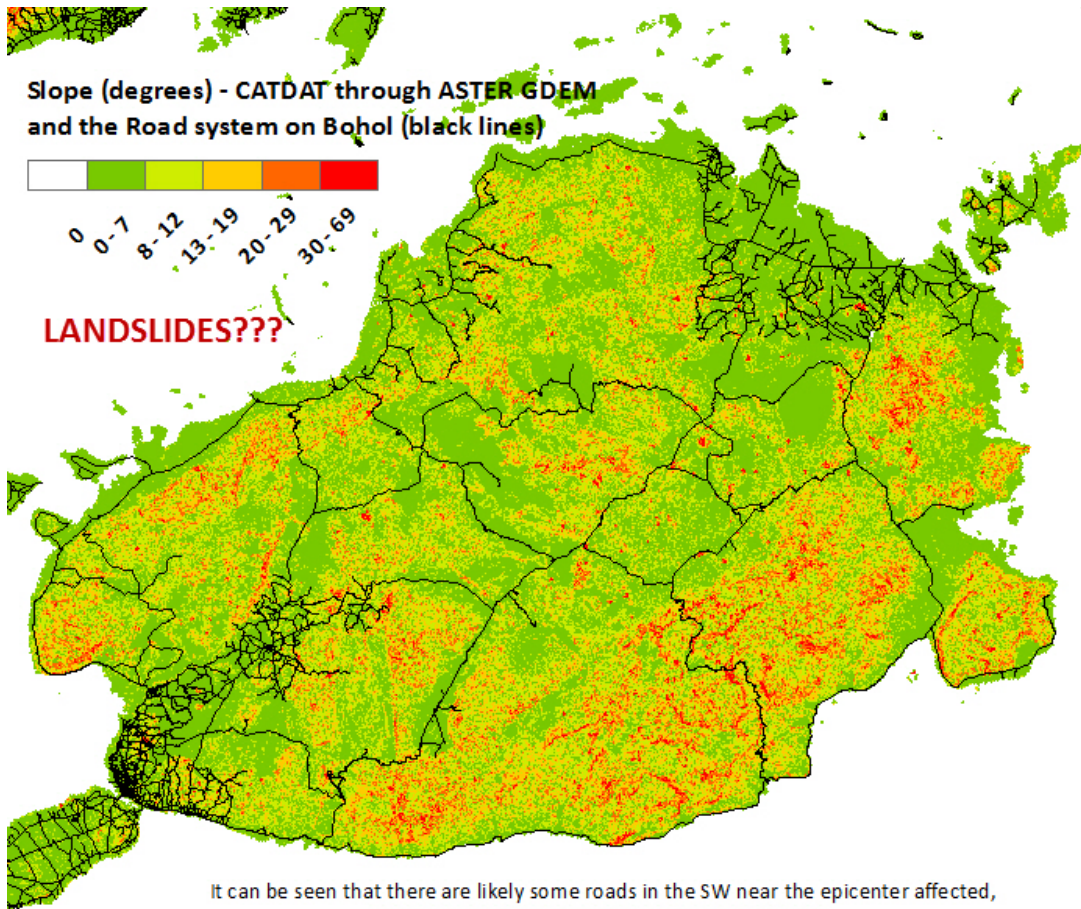
The magnitude 7.2 earthquake on 15 October 2013 main shock, triggered shallow landslides that can be observed on the steep natural slopes of the famous Chocolate Hills in Bohol. The shallow disaggregated landslides are typically not associated with particular geologic units and/or type of slopes. They are usually as deep as the root zone of the vegetative cover, anywhere from several decimeters to a meter deep, and consist of dry, highly disaggregated and fractured material that cascaded down-slope to flatter areas at or near the base of slopes.

Shallow disaggregated landslides account for most the failure types after earthquakes. However, some of the landslides shown on the Chocolate Hills (when looked at more closely are more deep-seated rock and earth slumps that involve relatively large volumes of material (see Figure at the end of the report from Julie Jaramillo). Earthquake triggered landslides contributed to the following noted disruptions as shown and more than 32 barangays have reported landslides :

- The highway in Cortes particularly in Lilo-and was rendered impassable due to a landslide. A part of Cortes' highway was also damaged.
- In Balilihan, the Bohol Mayor, Dominisio Chatto has confirmed that 5 people died from a landslide due to the earthquake.
- In Loon, Bohol, numerous landslides have affected areas.

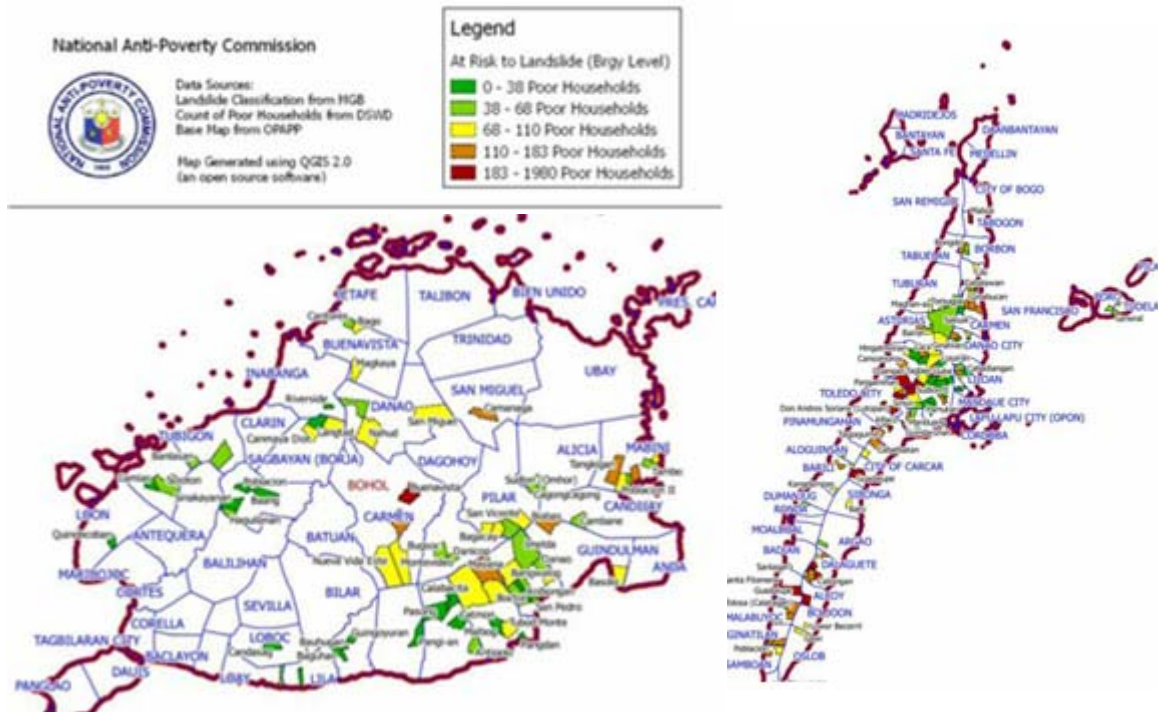


Left: Chocolate Hills Landslides (courtesy: @docjolt); Right: Julie Jaramillo on site at Choc Hills.



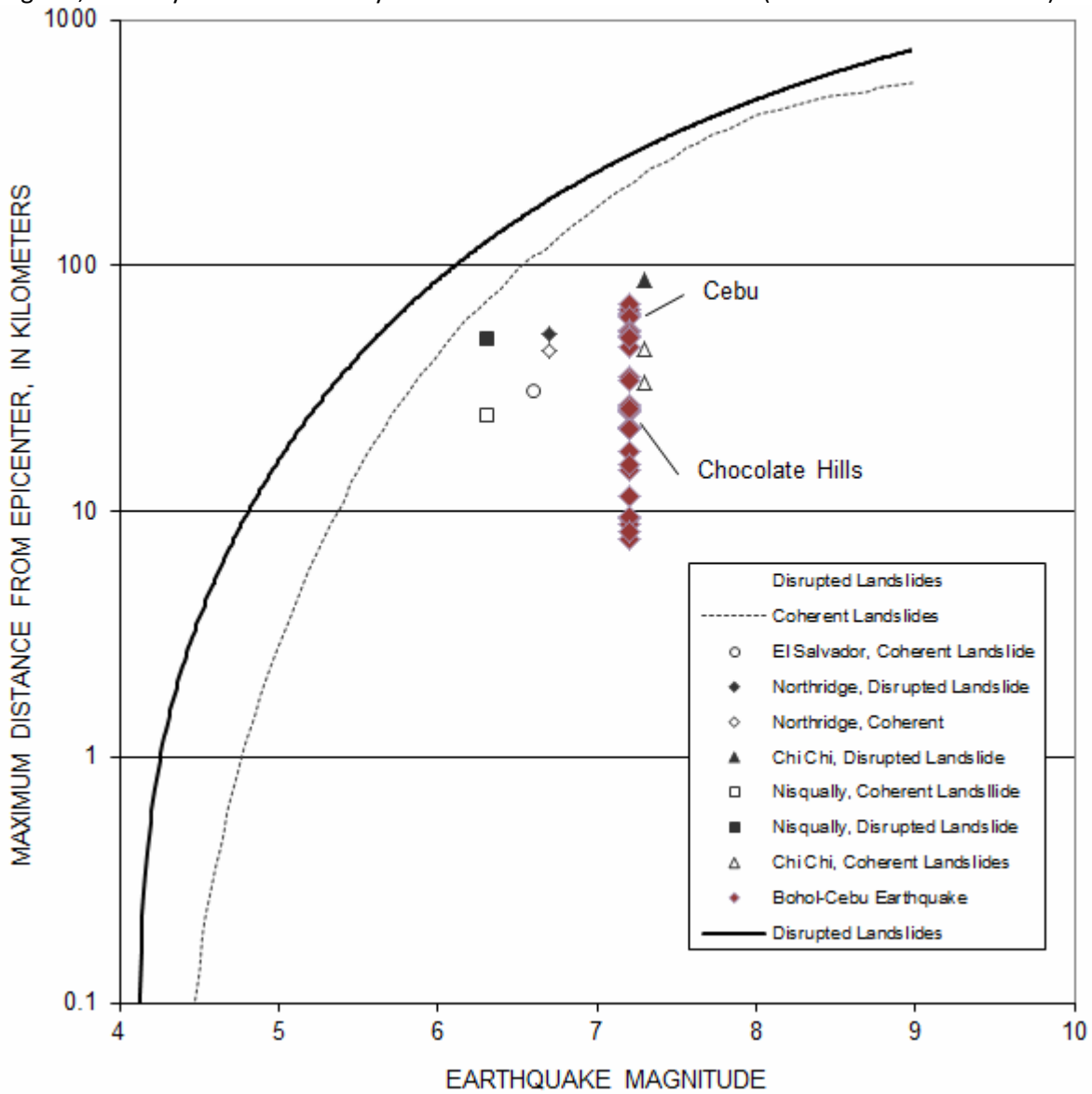
It can be seen that there are likely some roads in the SW near the epicenter affected, and some of the central roads through the center. Additional towns to the NW of the island may have problems given the extreme shaking.

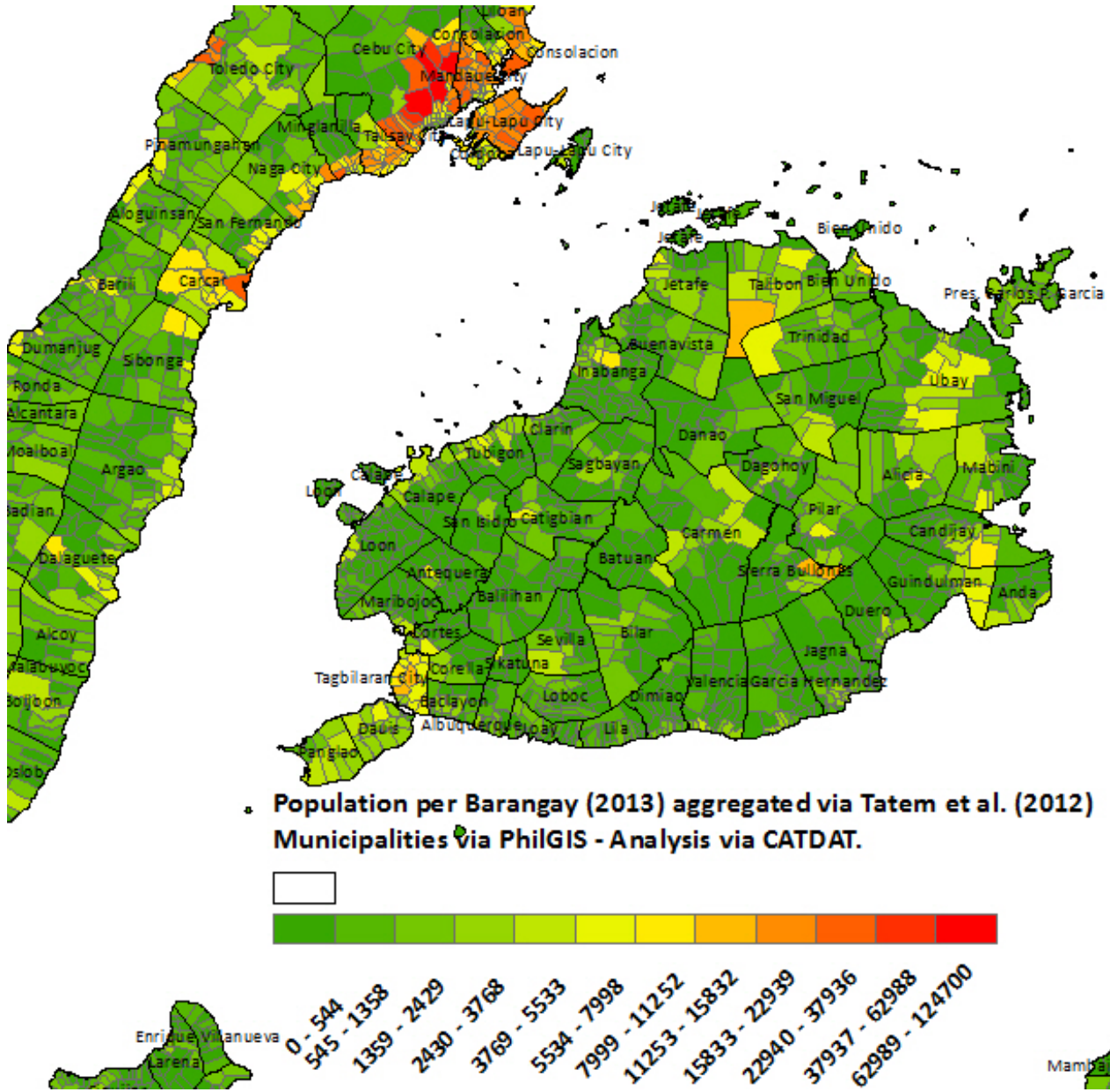
To aid in the rescue and relief as well as resettlement operations, the National Anti-Poverty Commission (NAPC) on Wednesday released the maps of Cebu, Negros Oriental, and Siquijor indicating location of poor households in barangays that are exposed to high risks of landslides.



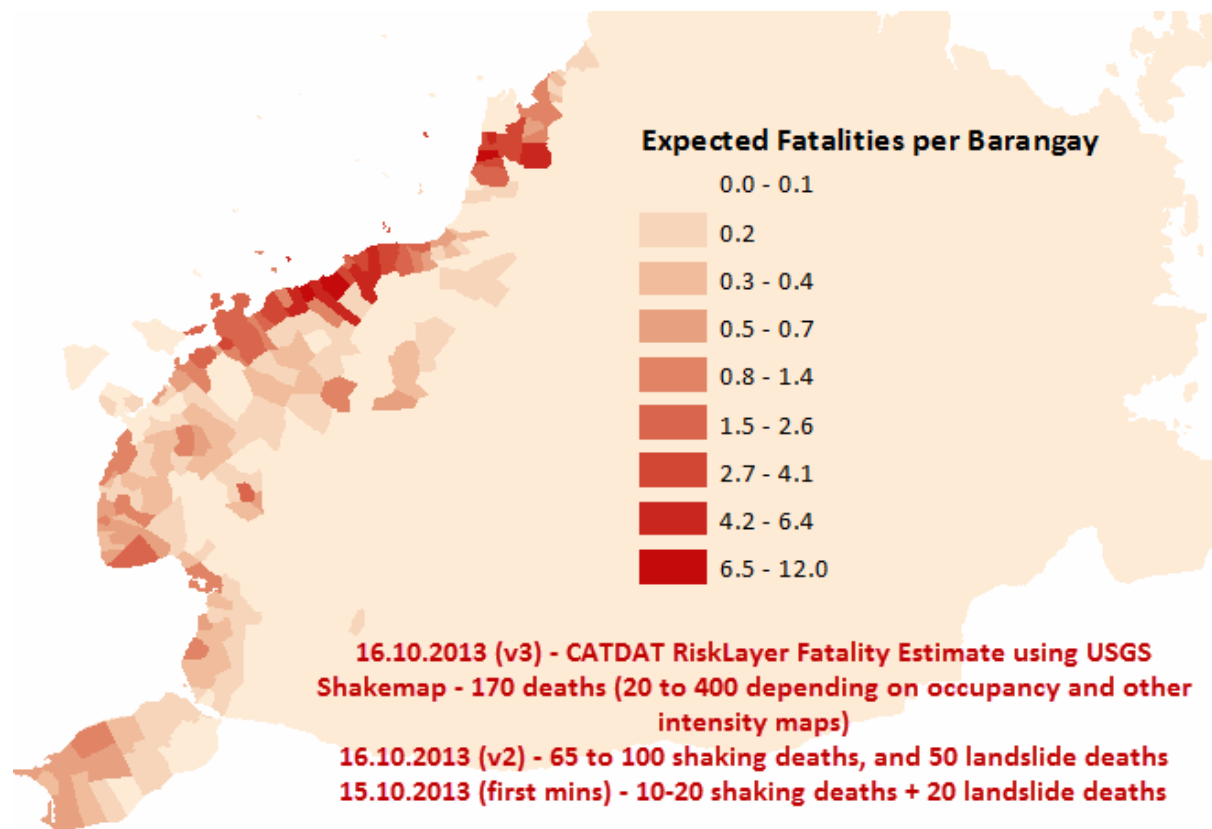
The landslide distances are within the bounds seen in historical earthquakes as tested by Bijan Khazai for ChiChi, Northridge, Seattle (Nisqually) and El Salvador earthquakes, and James Daniell for Cebu-Bohol (after Keefer, 1999; Khazai, 2004).

Keefer (1984a) presents magnitude-distance relationships using two distance definitions (epicentral and fault projection) for three different landslide categories: coherent, disrupted slides and falls, and lateral spreads and flows. The figure above shows the earthquake magnitude and the maximum distance from the epicenter limit curves obtained by Keefer (1984a) for both coherent and disrupted slides. Superimposed on these curves is a suite of more recent events that plots well within this envelope, indicating that for the most part the types of landslides that occurred were quite typical of what can be expected in major earthquakes. The range of landslides is shown in this diagram, but only the furthest away counts as the maximum distance (in this case around 65km).





This region holds 10.75 % of the Total Elderly Population, as a percent of the Population of the Region VII the elderly make up 4.75 % of the total population which is higher than the national average (3.77 %).



NDRRMC Update on Infrastructure damaged (www.ndrrmc.gov.ph) – Situation Report 13

21 October 2013, 6:00 AM

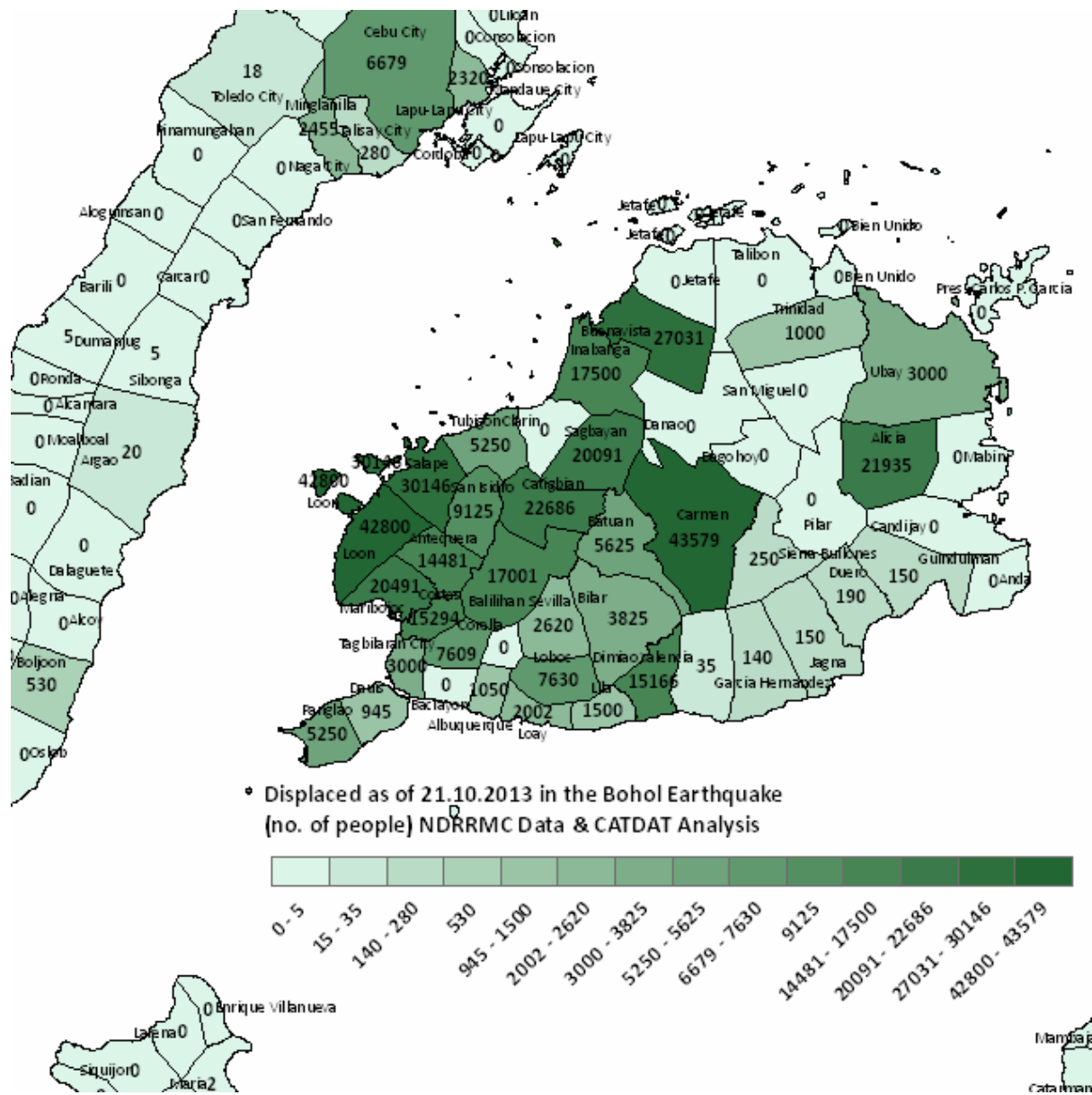
REGION	Province/Municipality	DAMAGED ROADS AND BRIDGES		
		NATURE OF DAMAGE	STATUS	
VII	BOHOL			
	BRIDGES			32
	<i>Desemparados Bridge</i>	Collapsed	Not passable	
	<i>Bayog Bridge</i>	Settlement of abutment	Passable	
	<i>Can away Bridge</i>	Settlement of abutment	Passable	
	<i>Moawa Bridge</i>	Settlement of abutment	Passable	
	<i>Abatan Bridge Maribojoc</i>	Bridge collapsed	Not passable	
	<i>Agape Bridge</i>	Settlement of bridge approach	Passable	
	<i>Bacong Bridge</i>	Damaged	Passable	
	<i>Balbalan Bridge</i>	Settlement of bridge approach	Passable	
	<i>Banban Bridge</i>	Settlement of bridge approach	Passable	
	<i>Bongkokan Bridge</i>	Settlement of bridge approach	Passable	
	<i>Clarín Bridge, Clarín</i>	Settlement of bridge approach	Passable	
	<i>Camayaan Bridge</i>	Damaged bridged approach	Passable	
	<i>Daef Bridge</i>	Settlement of bridge approach	Passable	
	<i>Dimiao Bridge</i>	Settlement of bridge approach	Passable	
	<i>Hinawanan Bridge</i>	Settlement of bridge approach	Passable	
	<i>Loay Bridge</i>	Damaged	Passable	
	<i>Moalong Bridge</i>	Bridged collapsed	Not passable	
	<i>Palo Bridge</i>	Settlement of bridge approach	Passable	
	<i>Panangatan Bridge</i>	Settlement of bridge approach	Passable	
	<i>Punan Bridge</i>	Settlement of bridge approach	Passable	
	<i>Sen. Clarín Bridge, Loay</i>	Settlement of bridge approach	Passable	
	<i>Hunan Bridge</i>	Settlement of bridge approach	Passable	
	<i>Tagbawane Bridge</i>	Bridge collapsed	Not passable	
	<i>Tagimtim Bridge</i>	Settlement of bridge approach	Passable	
	<i>Tultugan Bridge</i>	Collapsed bridge approach	Passable	
	<i>Anislag Bridge</i>	Damaged bridge approach	Passable	
	<i>Liboron Bridge</i>	Intermittent shattered pavements	Passable	
	<i>Maubid Bridge</i>	Depression on bridge approach and cracking, loosened slope protection material	Passable	
	<i>Mactán Bridge - Expansion Joint</i>	Damaged	Passable	
	<i>Salog Bridge</i>	Damaged bridge approach	Passable	
	<i>Suarez Bridge</i>	Damaged bridge approach	Passable	
<i>Sombria Bridge</i>	Damaged bridge approach	Not passable		
ROADS			13	
<i>Jagna-Sierra Bullones Road</i>	Road settlement	Passable		
<i>National Highway at Laya Section</i>	Damaged, remedial works on going	Passable		
<i>Cortes-Balilihan-Macaas Road</i>	Massive landslide	Passable		
<i>Tagbilaran-East Road</i>	Settlement	Passable		
<i>Tagbilaran-North Road</i>	Road slip and settlement of pavement	Not passable		
<i>Loay Interior Road</i>	Damaged	Not Passable		
<i>Maribojoc-Antequera, Catagbacan Road</i>	Lanslide	Passable		
<i>Antequera-San Isidro, Libertad Road</i>	Lanslide	Passable		
<i>Danao-Getafe Road, TNR</i>	Cracked roadway	Passable		
<i>Carmen-Sagbayan-Bacani Road</i>	Cracked roadway	Passable		
<i>Sagbayan-Danao Road</i>	Cracked roadway	Passable		
<i>Balilihan-Hanopol-Batuan Road</i>	Landslide and crack of gravel road	Passable		

It can be seen now that most bridges on Bohol are passable and have been stabilised now and checked for settlement of the bridge approaches. Public transport is running in various locations.

An update of the major bridges that are out are shown here:-



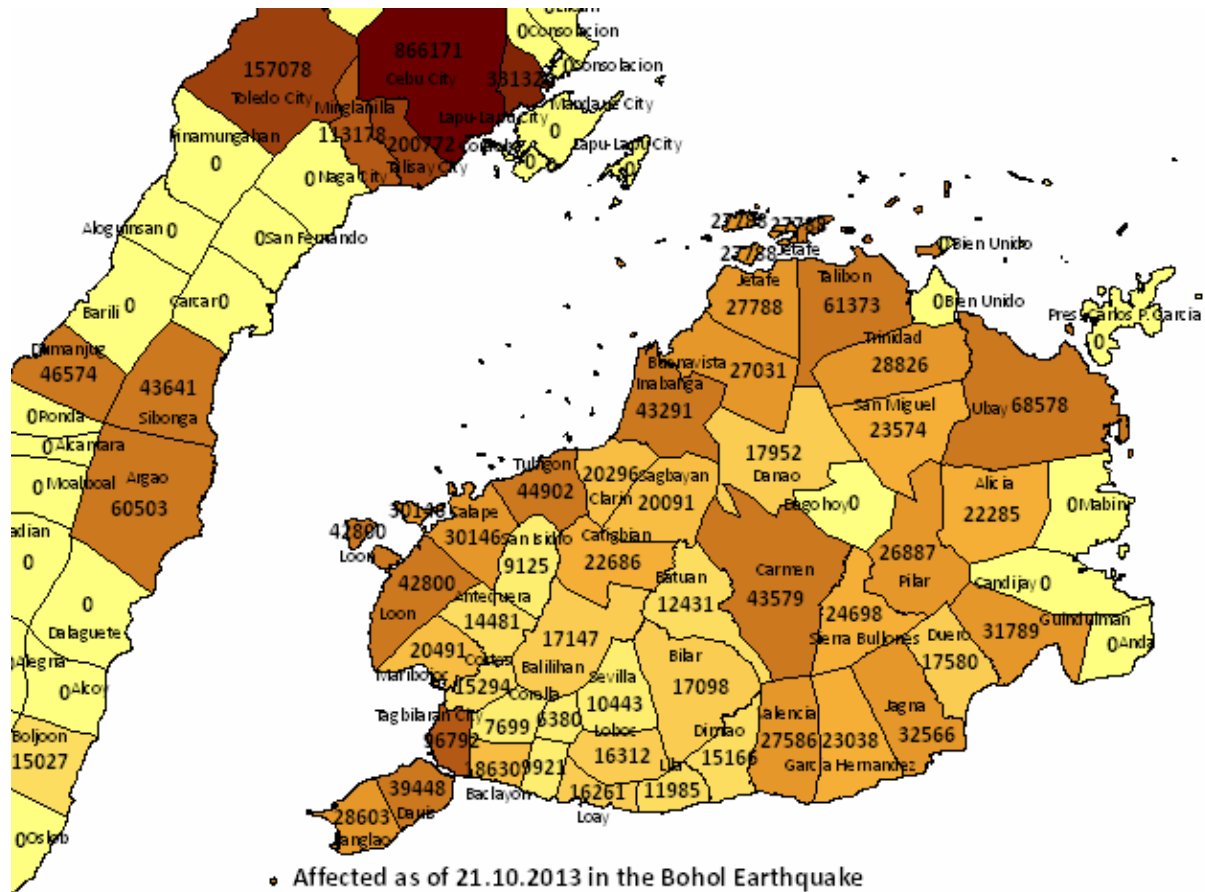
For a current update, users should go to the transportation department for an in-depth analysis. (<http://www.dpwh.gov.ph/>) where the last update on the website was the following:



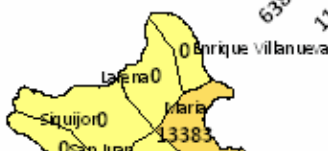
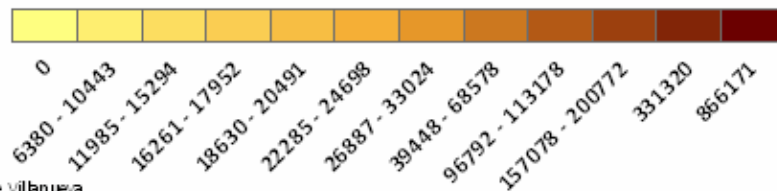
Emergency Situation according to NDRRMC site report 13 (21. Oct 2013 – 06:00) for displaced families and persons who are in or outside evacuation centers.

Province	No. of evacuation centers	Displaced families/persons	Families/persons inside centers	Families/persons outside centers
Cebu	25	2388/12327	1009/5439	1379/6886
Bohol	71	78278/368577	21104/104273	57174/264304
Total	96	80667/380906	22113/109712	58554/271194

The numbers are still being counted and we must wait for more information.



• Affected as of 21.10.2013 in the Bohol Earthquake (no. of people) NDRRMC Data & CATDAT Analysis



The total number of affected has reduced slightly to 3.03 million people.

Weather Impacts

It is not yet clear which requirement for shelters will emerge from this situation. There are no obvious natural aggravating factors to seek shelter. The weather conditions are fair (day temperatures of about 30 centigrade, night temperatures of 24 degrees; little rain announced); the aftershock activity is (currently) moderate. As most affected areas are rural people likely have social mechanisms to avoid shelters. The total number of shelter seeking persons should be below 100000.

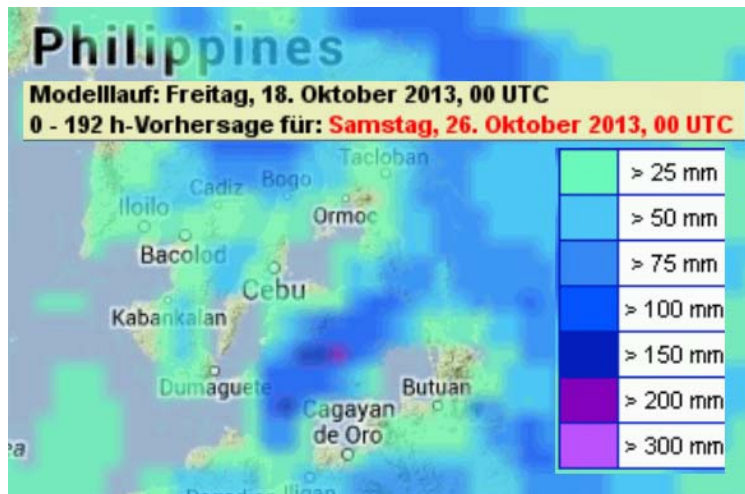
The attached GFS rain forecast for the next 120 hours is shown below.

No organized tropical systems will affect the Cebu/Bohol area within next 5-7 days. Most rain expected over the Mindanao-Sea and the southern half of Bohol, especially in mountainous areas.

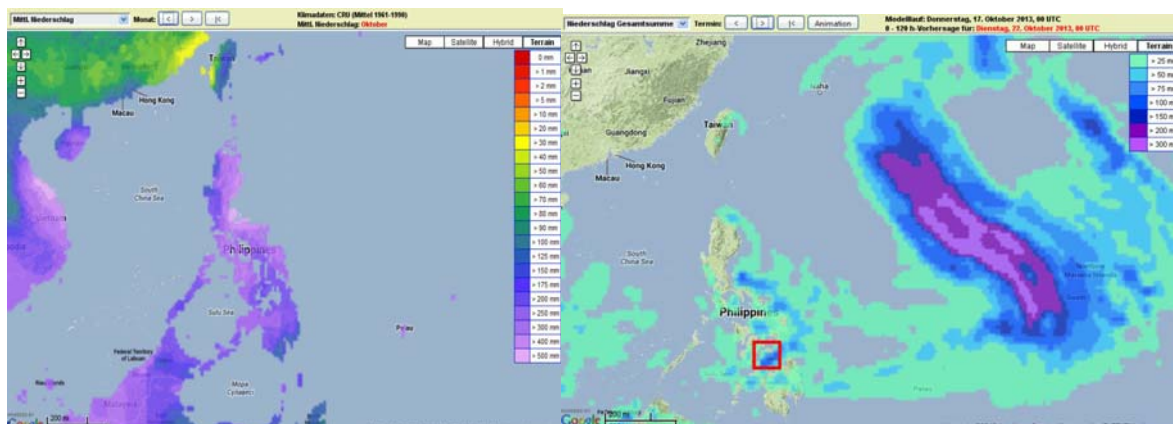
All other areas have to take into account some thunderstorms, only isolated, however may be heavy for a short while.

October is still monsoon (and typhoon) season. A tropical cyclone must taken into account within next weeks. 3 and 6 hourly rain forecast (updated every 6 hours) can be found here: http://www.wettergefahren-fruehwarnung.de/GM/precip_01.html

The vast rain area to the east is related to the track of "Francisco" another typhoon heading for Japan, but not affecting Philippines.

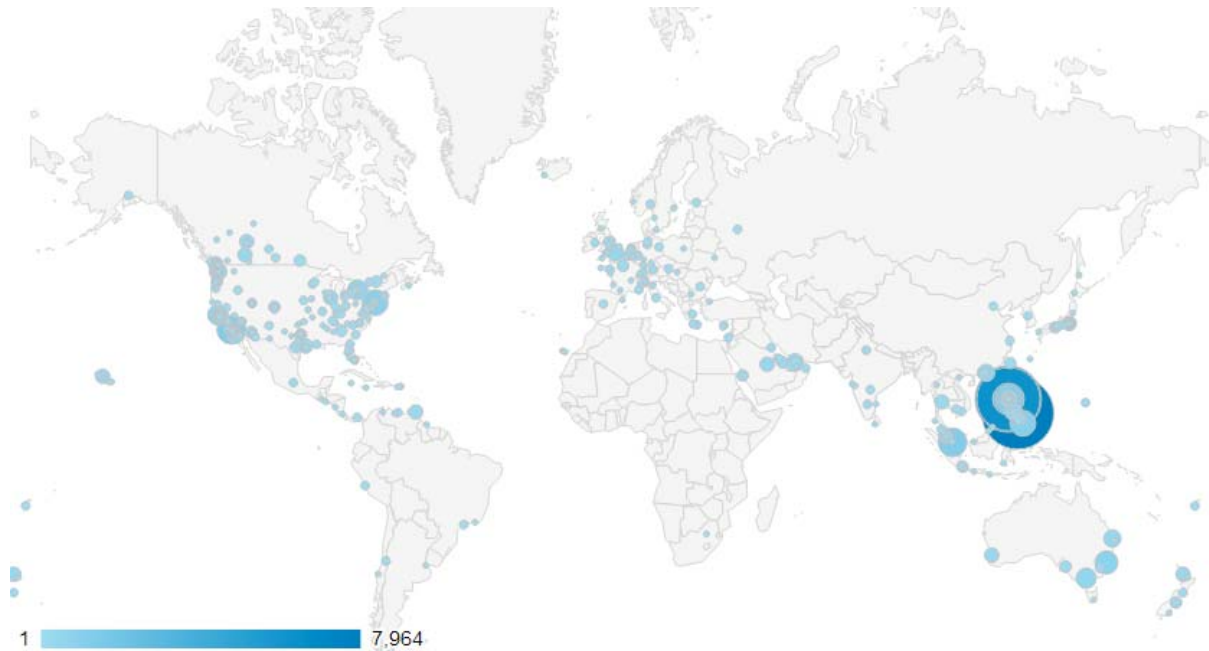


It can be seen that around 100-200mm of rain may fall in the next 5 days in Bohol, increasing the chances of major landslides, if large aftershocks occur. 200mm-300mm is the average for October on Bohol using data from 1961-1990.



Social Analysis

Over 40% of people logging into the Earthquake Report website in the first 10 mins were from Cebu City, 12% of people logging into the website in the first 6 hours were from Cebu City, and around 30% from Philippines. The following diagram shows visitors in the first 6 hours from each city. The darker circle in Cebu City, and the other blue circle is Manila. Individual peaks were seen with each major aftershock and the initial alert after 1 minute was from IP address increases.

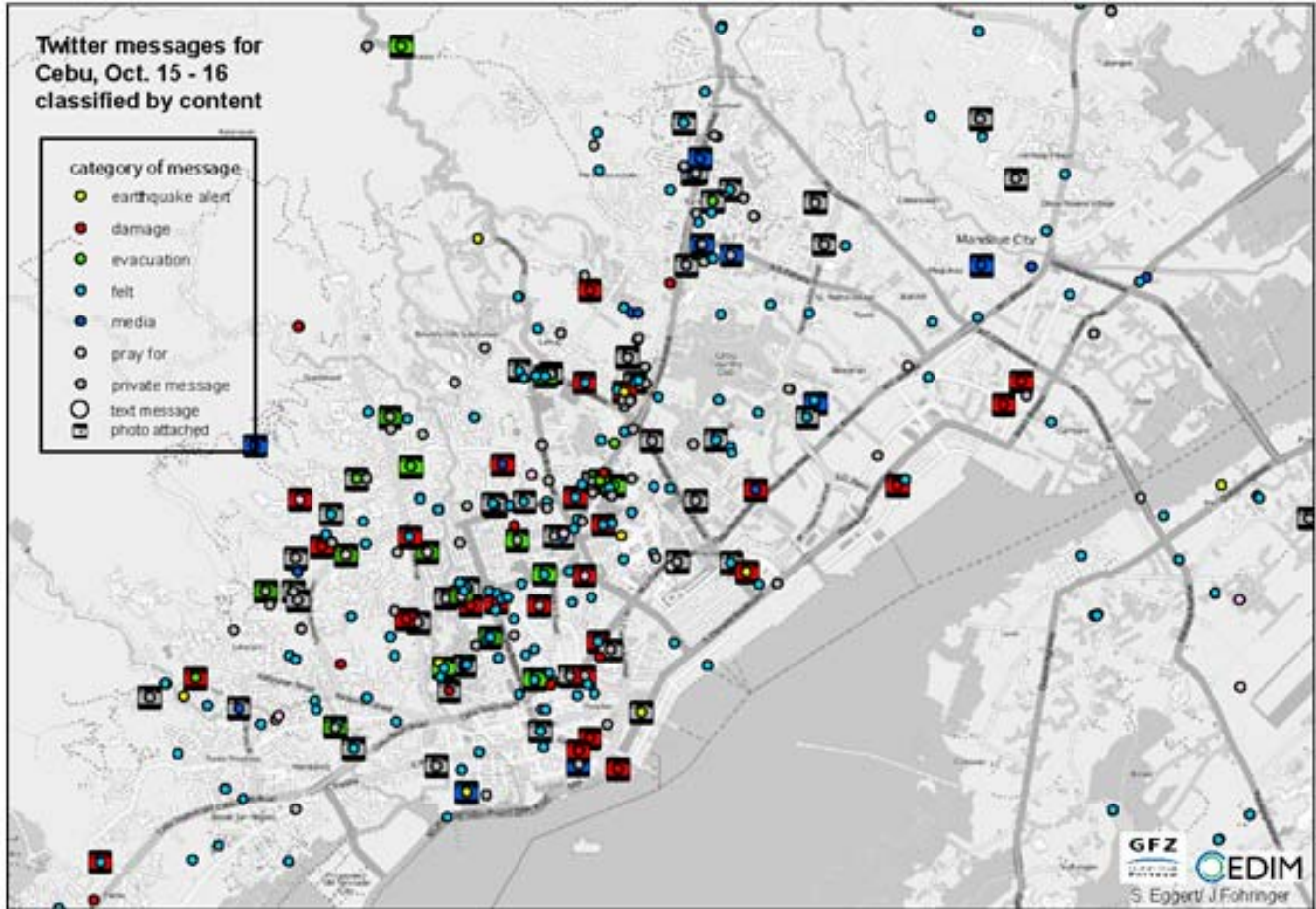
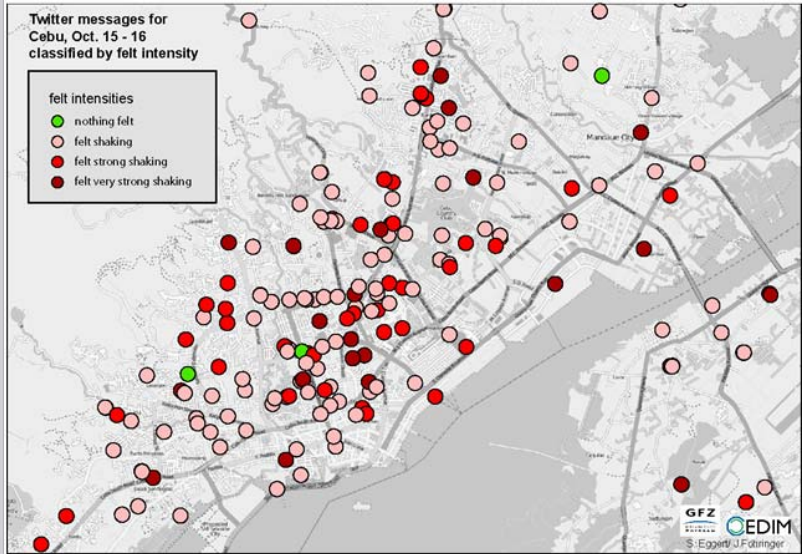
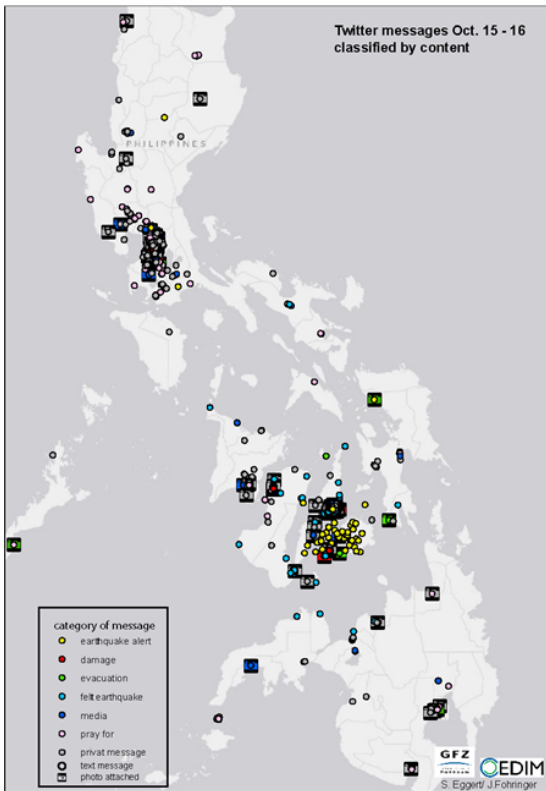


The social sensing project of CEDIM at GFZ and KIT (Joachim Fohringer and Silke Eggert) has also been active with characterising photos from Twitter responses. Here is the link to these photos and the location of the twitter response. Thomas Walter of GFZ has also examined volcanic activity and this remains normal.

We analyze twitter messages related to the Oct. 15 Philippines earthquake to see where and what kind of information people affected by the event send. In total, ca. 2000 twitter messages sent within two days after the main shock were used for further analysis.

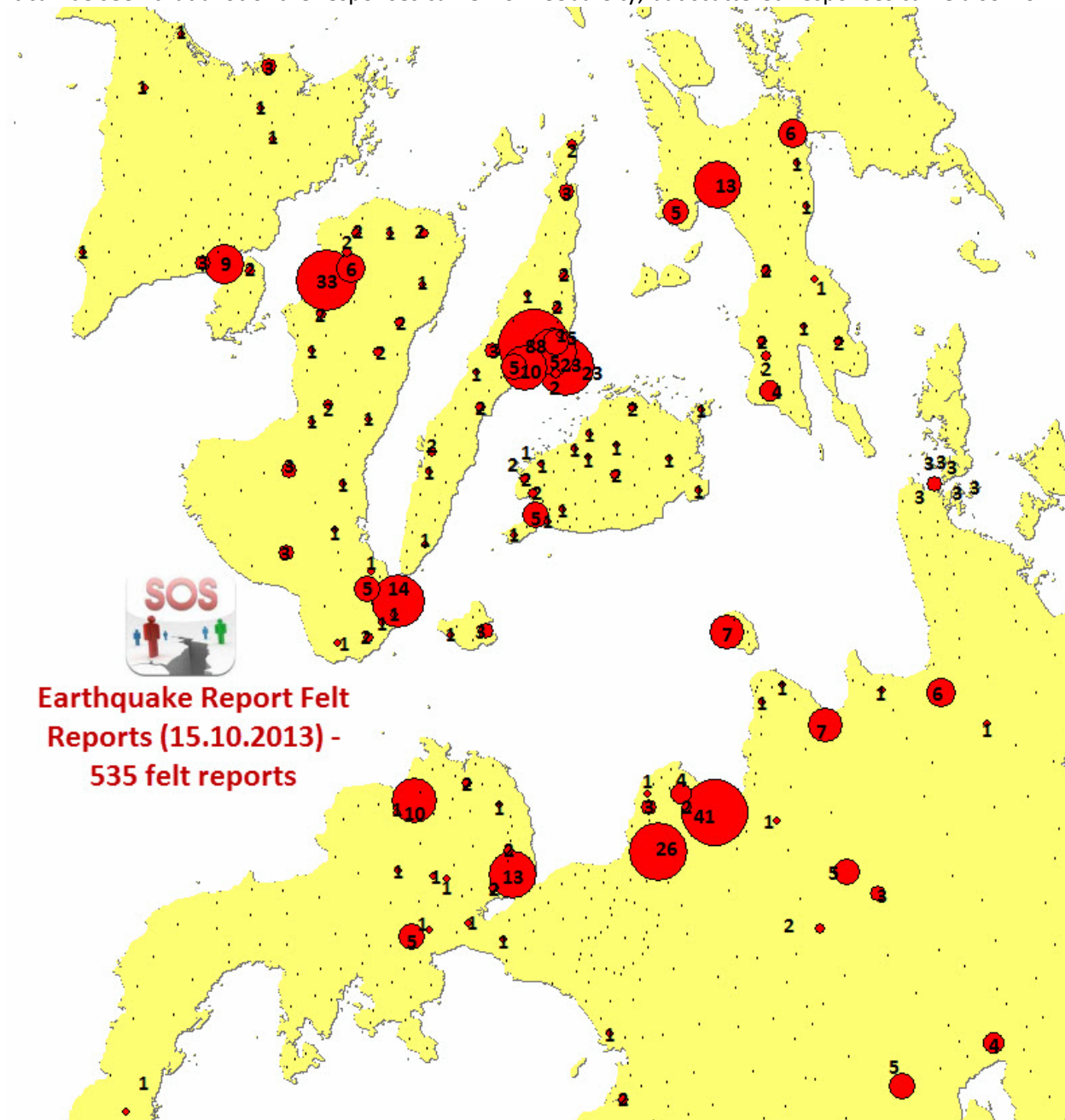
To see the spatial distribution of the messages, we created a heat map. Apart of the world wide reaction on the earthquake, the main concentration of tweets is located on Philippines Island. The hotspot Manila, the country's capital, reflects the national reaction on the event. More interesting is the hotspot Cebu, the closest and therefore most affected city to the epicenter. Therefore, further analyses are focused on that area. In a second step, we divided the messages into pure text messages and messages with a photo attached. Pictures taken or distributed by the author can be taken as a hint to proof the content and to gain a visual impression of the in-situ situation. Figure 1 and 2 show the distribution of tweets (circle = text, camera = text + photo) national wide and as a zoom into the city of Cebu. While messages calling for spiritual support or containing personal information are distributed all over the country, messages related to damage, evacuation and felt shaking are located in the epicentral area.

Finally, we extracted all messaged related to felt shaking and categorized them roughly by three categories: felt nothing, shaking, strong shaking, and very strong shaking. In this first analysis, the categories are not based on any standard values; they are just done roughly by scanning the message content. Again, the highest intensities are felt within the epicentral area and are concentrated in the city of Cebu.



Over 530 felt reports were collected on Earthquake-Report.com, with additional intensity estimates from many people which are currently being geocoded.

It can be seen that a lot of the responses came from Cebu City, but scattered responses came also from Bohol.



Evaluation of the Information provided as of 18 Oct 2013 for:
 Bohol Earthquake, Philippines: 8:12 am local time, 15 Oct 2013
 Produced by: Trevor Girard

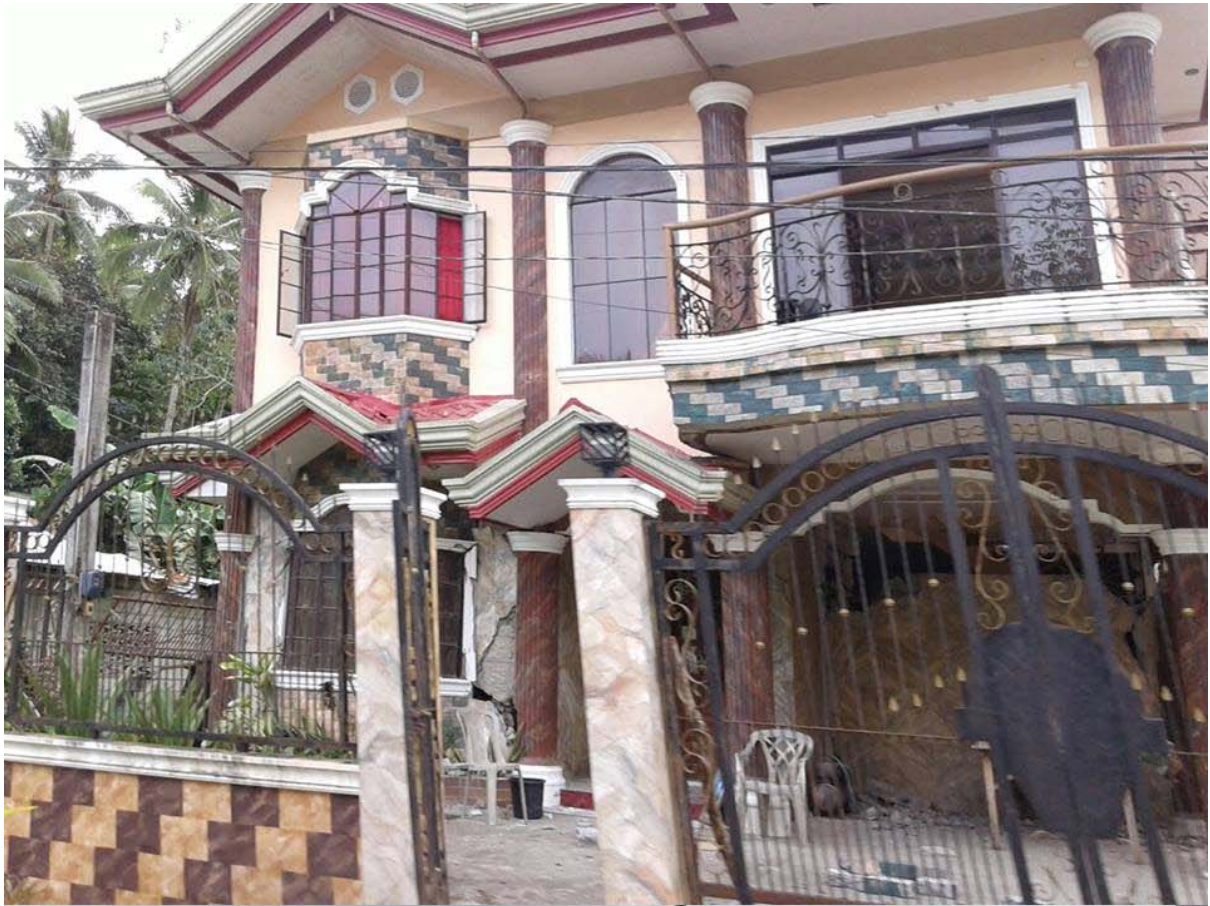
Information predicting a disaster event, describing an event which has occurred, or describing the current situation:	
When is the public made aware of the characteristics of the event (intensity, direction of travel, water levels) that could have been predicted? and: *What was the quality of this information? (*asked for every question which follows in this table)	Information detailed and provided within a reasonable time-frame, and updates were frequent Basedon: Details were provided within 20 minutes and updates were very frequent. Within hours of the earthquake the potential for aftershocks was identified. Within the same day it was confirmed that there was no immediate threat of a tsunami.
How soon after the disaster event was the public made aware of the details?	
How often was the public provided with updates on the situation?	
Description of affected area(s) or people:	
How soon after the disaster event was information provided detailing the areas or specific people affected?	information detailed and provided within a reasonable time-frame Basedon: cities suspected to be worst affected were identified within hours including populations. Number of affected and areas updated more than daily.
Human life safety and potential threats to human life safety in the near future (including particularly vulnerable populations)	
How soon after event is the public made aware of the casualties/missing?	information detailed and provided within a reasonable time-frame Basedon: casualties begin to be reported within 20 minutes, with updates to numbers every hour or two for the first day. By 2 days after, total dead risen to 156, 22 missing, and 374 injured, and identification of all casualties provided including name, age, address and cause of death where known (only for 5).
When is the public made aware of dangers to human life safety (potential tsunami/flooding, building failure, landslides, water/air contamination) that ought to have been predicted?	no information provided basedon: although discussion of predicted aftershocks and landslides, there is no description of how these events are a threat to human life safety.
When did the DM system begin activities aimed at combating threats to human life safety (evacuations, SAR)?	information provided within a reasonable time-frame; however, coverage is questionable as 1 day after Loon is reported to have no SAR personnel even though it is identified as being one of hardest hit Basedon: Same day descriptions of SAR activity, Disaster response team deployed including location and update on number rescued (3). After 1 day report states that in Loon the only people involved in the search and rescue efforts were residents and local police.
When did the DM system begin activities aimed at dealing with fatalities?	no information provided Basedon: no info regardings handling of fatalities and to the contrary one case of a fatality not being able to receive last rites because the church was destroyed, which suggests there may be an issue with dealing with some of the
Basic human needs (water, food, shelter, clean air, sanitation)	
Disruption: How soon is the DM system aware of disruptions to basic human needs?	information detailed and provided within a reasonable time-frame Basedon: After 1 hour report of many callapsed homes. On same day description of areas without water, number of families displaced provided, and number served in evacuation centers and updates follow daily.
Solution: How soon are activities being undertaken to meet the basic needs of those affected?	information detailed and provided within a reasonable time-frame Basedon: Same day DSWD is delivering relief material to Bohol, the PRC made available NFIs for at least 15,000, and government pre-positioned PhP98.66 million worth of standby funds, family food packs, and NFIs. After 1 day 13 evacuation centers are holding 12,500 people.
Transportation networks (road, air, rail, river/sea)	
Disruption: How soon is the public made aware of disruptions to transportation networks?	information detailed and provided within a reasonable time-frame Basedon: Within hours reports of road damage and sea travel is suspended. Same day updates detail on road, bridge, airport, and sea port disruptions.
Solution: How soon are activities being undertaken to meet the transportation needs of those affected?	information detailed and provided within a reasonable time-frame Basedon: Most sea ports and airports resumed operation on same day. After 1 day helicopters were being used for transport and clearing of roads being conducted.
Capacity of medical/ health services	
Disruption: How soon is the public made aware of disruptions to the capacity of medical/ health services?	information detailed and provided within a reasonable time-frame Basedon: Same day description of collapsed hospital including location and cause, and list of damages to hospitals including location and status. After 1 day report confirms child births are being done in the open and patients are being treated outdoors, and states that medical supplies and hygiene kits are badly need. After 2 days 3 hospitals are deemed unsafe for occupancy.
Solution: How soon are activities being undertaken to meet the medical needs of those affected?	information detailed and provided within a reasonable time-frame Basedon: Same day delivery of relief material and emergency response teams mobilized with ambulances, and list of corrective actions taken at hospitals (patients and personnel evacuated/ patients transported to other hospital/ rescue operation in progress for those trapped).
Communication Networks	

Disruption: How soon is the public made aware of disruptions to communication networks?	information provided within a reasonable time-frame; however very limited detail on communication issues, particularly in areas which appear to have no communication <u>Based on:</u> First few hours there are no reports from certain areas suggesting communication issues; however, exact issues are not provided in government reports. Same day report states that phone networks went down after earthquake, but locations not provided.
Solution: How soon are activities being undertaken to meet the communication needs of those affected?	information provided within a reasonable time-frame; however, very limited detail on government activities to meet communication needs of those areas in particular that were said to be cutoff <u>Based on:</u> No discussion of communication issues being worked on until 3 days after (18 Oct) in Taglibaran.
Other systems (electricity, agriculture, education, financial, business)	
Disruption: How soon is the public made aware of disruptions to other important networks?	information detailed and provided within a reasonable time-frame <u>Based on:</u> In the first few hours reports stating one school partially collapsed, school classes are suspended, electricity down, 400 year old churches damaged, economic damage expected to be huge, damage to Chocolate Hills tourist area. Other updates follow daily.
Solution: How soon are activities being undertaken to meet the other important needs of those affected?	information detailed and provided within a reasonable time-frame <u>Based on:</u> After 1 day 67% of power restored to Bohol as of 2pm with other areas said to be restored within 2-3 days, evaluations being carried out of structures and emergency price and supply monitoring of market goods put
Assessment of needs of people or response	
When have the various areas affected been assessed?	information detailed and provided within a reasonable time-frame <u>Based on:</u> numerous updates from NDRRMC detailing assessment activities including who is carrying out assessments, for what purpose and where.
Establishment of prioritised needs of those affected or needs to improve the response:	
When has the DM system established the critical needs of those affected or of the response?	information provided within a reasonable time-frame; however, almost no detail from government regarding its priorities for the response <u>Based on:</u> Reports from other organisations stating their priorities, but none from the government, although it could be assumed to be assessment and SAR from their activities.
Activation/coordination of emergency services, i.e., EOC, medical teams, SAR, police, army	
How quickly has the DM system activated emergency services?	information detailed and provided within a reasonable time-frame <u>Based on:</u> numerous updates from NDRRMC starting 7 hrs after earthquake detailing response activities including who is carrying out what and where and regularly updated.
How often have updates regarding emergency service activities been provided?	
Acquisition of funding and/or dispersal	
How soon after the event is funding begin to be acquired?	information detailed and provided within a reasonable time-frame, and so far system appears to be able to fund the disaster response phase
How soon after the event is funding dispersed?	<u>Based on:</u> Same day 89.7 million PHP earmarked for the people affected, and the DSWD has a standby fund of 8.7 million pesos, releases 10 million PHP for purchase of relief goods and operational expenses.
Establishment and identification of resources available to those affected	
When is the public made aware of the various resources which have been established?	information detailed and provided within a reasonable time-frame, and resources appear to have real ability to help <u>Based on:</u> First day NDRRMC report issued which in itself is resource (identifies damaged roads, bridges, buildings, affected areas etc.), contact info provided for PRC, link provided to webpage which provides guidelines for what to do before during and after an earthquake. After 1.5 days map provided identifying areas at risk to landslides with Roadways overlaid. Exact launch time unknown, but Google Crisis and Needs map identifies location of
Establishment of a system to distribute disaster related information and updates	
When does the DM system establish a system to distribute disaster related information and updates?	information detailed and provided within a reasonable time-frame, and system appears to be capable of reaching a very large audience <u>Based on:</u> Immediately NDRRMC issue advisory to OCD V and VI through fax, sms, and website for further dissemination. Within 4 hours first press briefing held with more to come. After 7 hrs first NDRRMC Sit Rep issued which provides complete info with updates highlighted.

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A Chocolate Hill landslide - Deep-seated rock slump