

# Emergency Response for Search and Rescue of Nepal earthquake (from the Report of CISAR and UNOCHA)

Qu Guosheng

Expert Group Leader of China Earthquake SAR

Vice President, The International Emergency Management Society (TIEMS)

Deputy General Team Leader of China International Search and Rescue Team

Director, Research Center of Digital Disaster Mitigation and Emergency Management,

IDC, Peking University

Prof. National Earthquake Response Support Service (NERSS), CEA

Email: [qgsh@263.net](mailto:qgsh@263.net), Tel: 86-13801225593



# Outline

1. Quick Estimation of Earthquake Disaster and Determination of Response Level
2. On-site Coordination and Cooperation by OSOCC
3. General Achievements of CISAR in Nepal
4. Brief Introduction of TIEMS

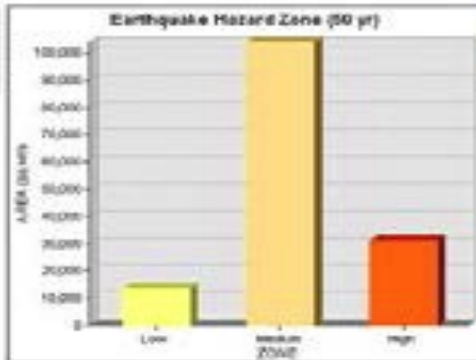


# 1. Quick Estimation of Earthquake Disaster and Determination of Response Level



80°00'E 81°00'E 82°00'E 83°00'E 84°00'E 85°00'E 86°00'E 87°00'E 88°00'E

ZONE	MMI: R.N.PDS
Low	< VI
Medium	VI - VII
High	VII - VIII






2010

**Nepal Hazard Risk Assessment (NHRA)**

**Earthquake Hazard Map  
50 year return period**

**Legend**

-  Country Boundary
-  Geo Development Region
-  District Boundary

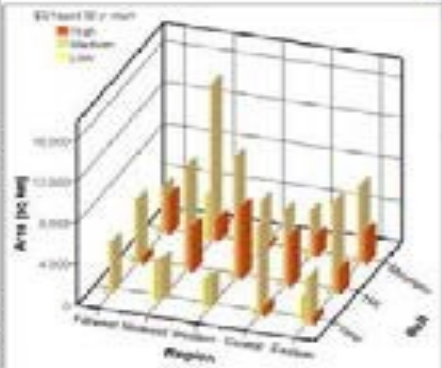
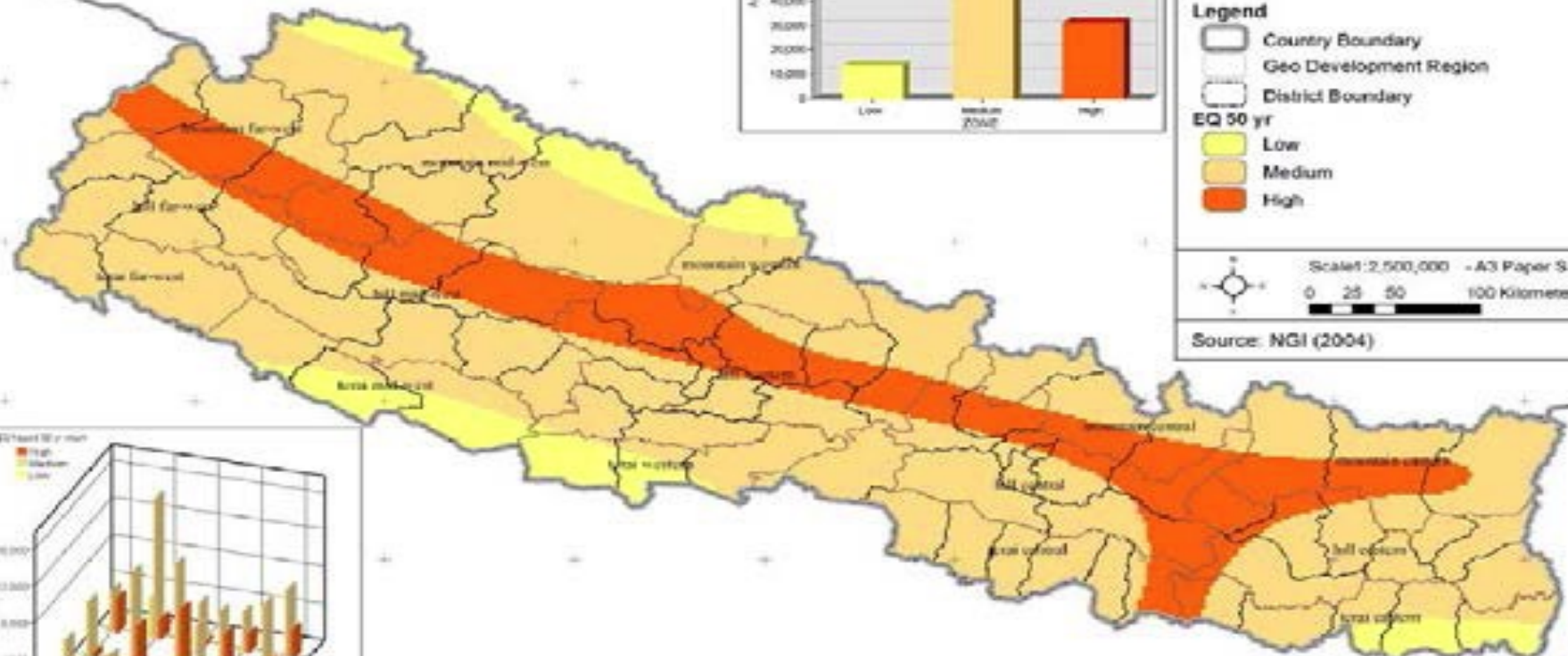
**EQ 50 yr**

-  Low
-  Medium
-  High

Scale: 2,500,000 - A3 Paper Size

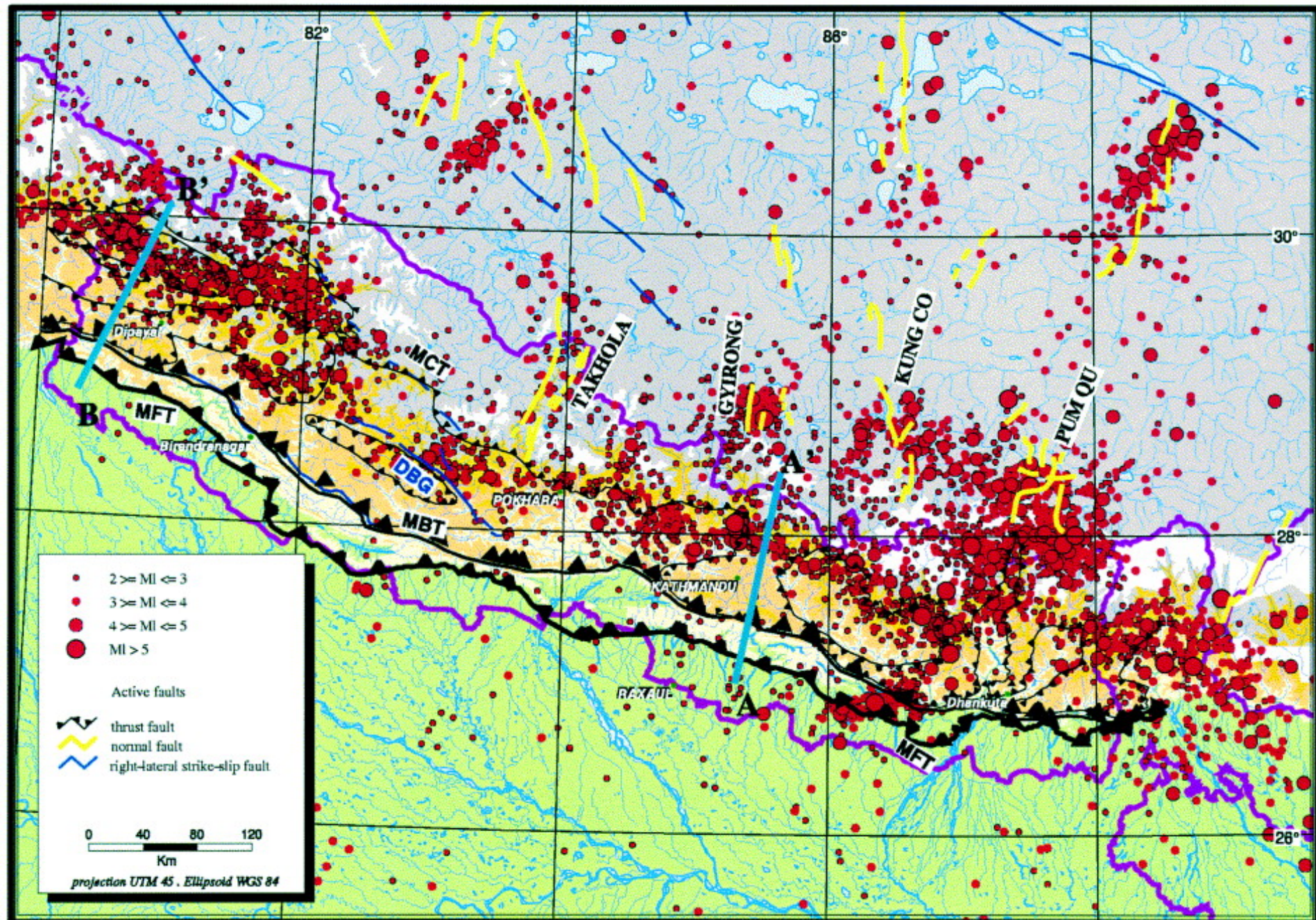


Source: NGI (2004)

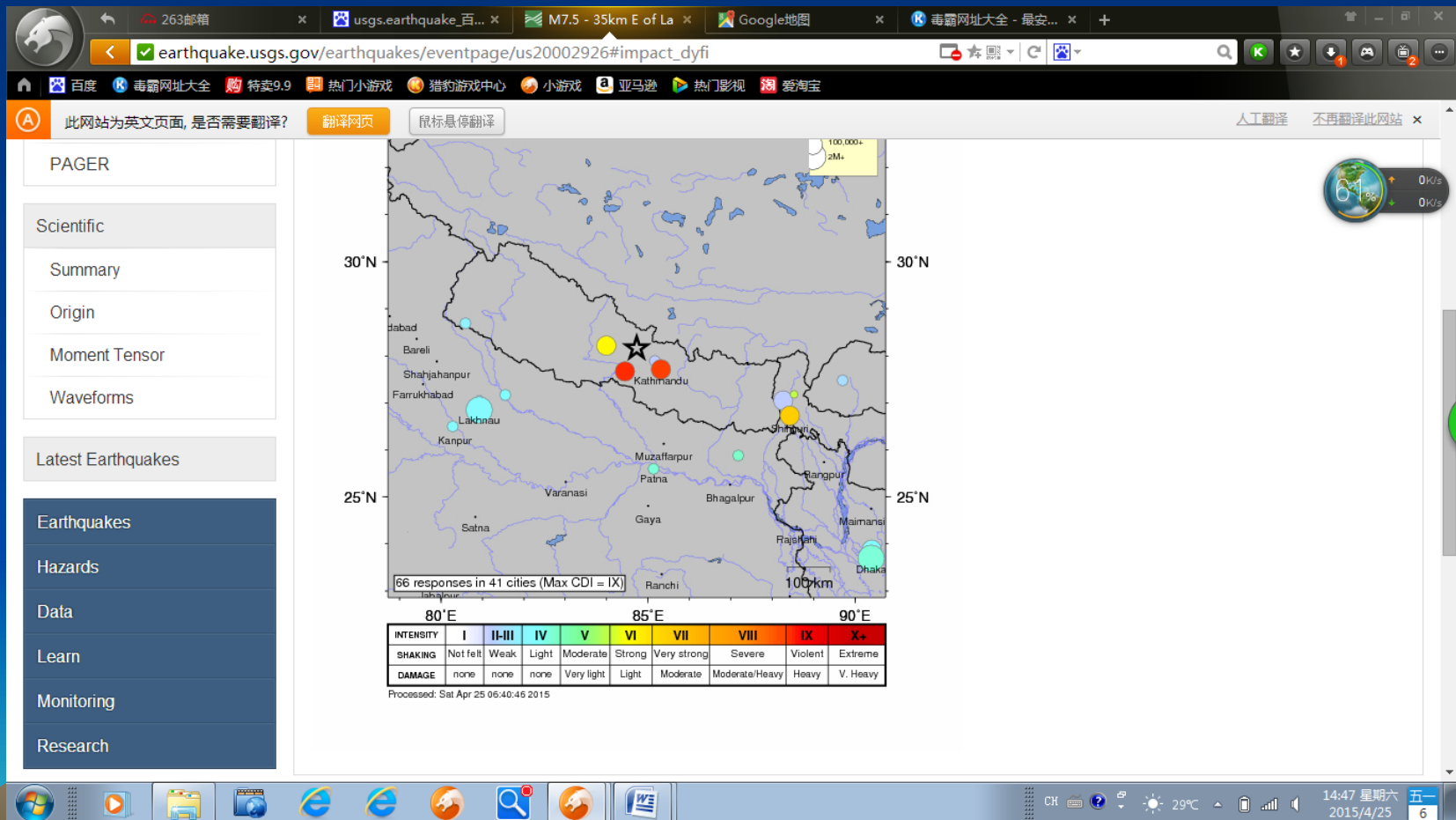


80°00'E 81°00'E 82°00'E 83°00'E 84°00'E 85°00'E 86°00'E 87°00'E 88°00'E





The Ms8.1 earthquake hit Nepal (28.2N, 84.7E) at 14:11hrs (Beijing time) on Apr. 25, 2015.





Earthquake Shaking **Red Alert**



### M 7.8, NEPAL

Origin Time: Sat 2015-04-25 06:11:28 UTC (11:56:28 local)  
 Location: 28.15°N 84.71°E Depth: 15 km

FOR TSUNAMI INFORMATION, SEE: [tsunami.gov](http://tsunami.gov)

PAGER Version 5

Created: 4 hours, 3 minutes after earthquake

#### Estimated Fatalities

Estimated economic losses are 9-50% GDP of Nepal.

#### Estimated Economic Losses

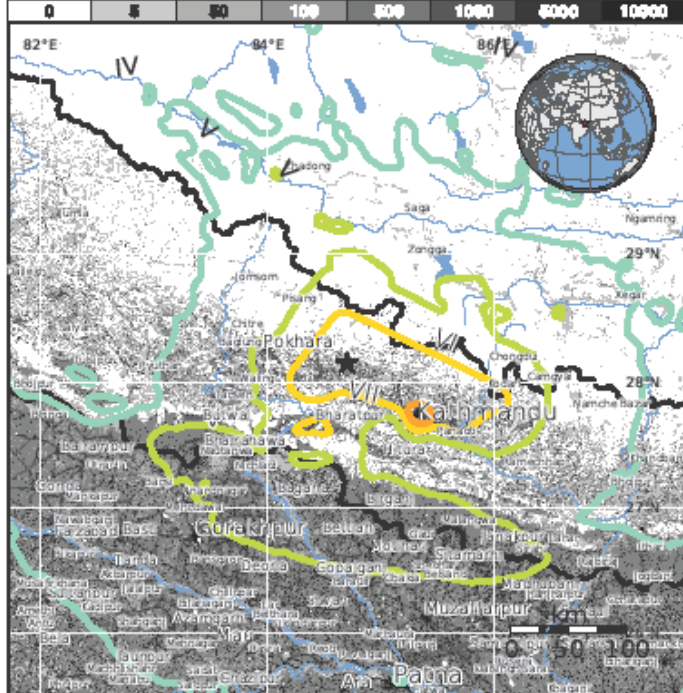
Red alert for shaking-related fatalities and economic losses. High casualties and extensive damage are probable and the disaster is likely widespread. Past red alerts have required a national or international response.

### Estimated Population Exposed to Earthquake Shaking

ESTIMATED POPULATION EXPOSURE (k = x1000)	0	1	2	3	4	5	6	7	8	9
ESTIMATED MODIFIED MERCALLI INTENSITY		I	II-III	IV	V	VI	VII	VIII	IX	X+
PERCEIVED SHAKING		Not felt	Weak	Light	Moderate	Strong	Very Strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	Resistant Structures	none	none	none	V. Light	Light	Moderate	Moderate/Heavy	Heavy	V. Heavy
	Vulnerable Structures	none	none	none	Light	Moderate	Moderate/Heavy	Heavy	V. Heavy	V. Heavy

\*Estimated exposure only includes population within the map area.

### Population Exposure



**Structures:**  
 Overall, the population in this region resides in structures that are highly vulnerable to earthquake shaking, though some resistant structures exist. The predominant vulnerable building types are unreinforced brick masonry and rubble/field stone masonry construction.

**Historical Earthquakes (with MMI levels):**

Date (UTC)	Dist. (km)	Mag.	Max MMI(#)	Shaking Deaths
1980-07-29	364	5.5	VII(18k)	0
1980-07-29	388	6.5	IX(11k)	100
1988-08-20	244	6.8	VIII(12k)	1k

Recent earthquakes in this area have caused secondary hazards such as landslides and liquefaction that might have contributed to losses.

### Selected City Exposure

from GeoNames.org

MMI City	Population
VIII Kathmandu	1,442k
VII Bhaktapur	< 1k
VII Patan	183k
VII Kirtipur	45k
VII Nagarkot	4k
VII Bharatpur	107k
VI Pokhara	200k
V Gorakhpur	674k
V Muzaffarpur	333k
V Patna	1,600k
IV Dhankuta	22k

bold cities appear on map (k = x1000)

PAGER content is automatically generated, and only considers losses due to structural damage. Limitations of input data, shaking estimates, and loss models may add uncertainty.  
<http://earthquake.usgs.gov/pager>



# 2015年4月25日尼泊尔 $M_S$ 8.1地震

根据中国地震台网测定，北京时间2015年4月25日14时11分26.3秒，在尼泊尔发生 $M_S$ 8.1地震，震中位置 $28.2^\circ\text{N}$ ， $84.7^\circ\text{E}$ ，震源深度20km。此次地震发生在印度板块与欧亚板块的陆陆碰撞带上。

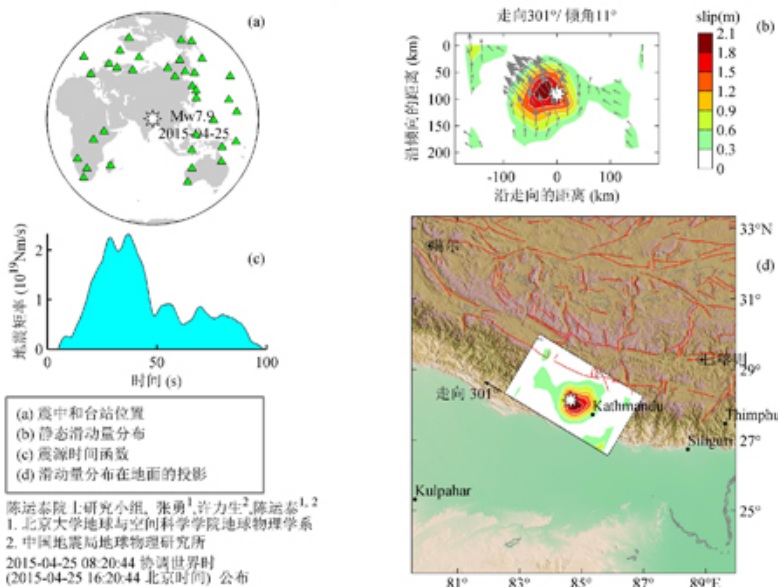
地震发生后，中国地震局地球物理研究所立即启动地震应急处置科技支撑预案。陈运泰院士课题组/北京大学张勇博士等开展了此次地震的震源破裂过程成像工作，结果显示，地震中规模最大、最主要的一次破裂事件向震中东南方向传播，其多普勒效应可能会造成同样位于震中东南的尼泊尔首都加德满都等地区更强烈的震感。根据反演结果，此次地震的破裂出露地表的可能性不大。工程地震学与城市减灾研究室陈鲲鹏博士给出了此次地震的地震动预测图，结果显示，极震区烈度可达X度以上，预计可能的影响范围近20万平方公里。

## 地震破裂过程

(陈运泰院士课题组/北京大学 张勇、许力生、陈运泰提供)

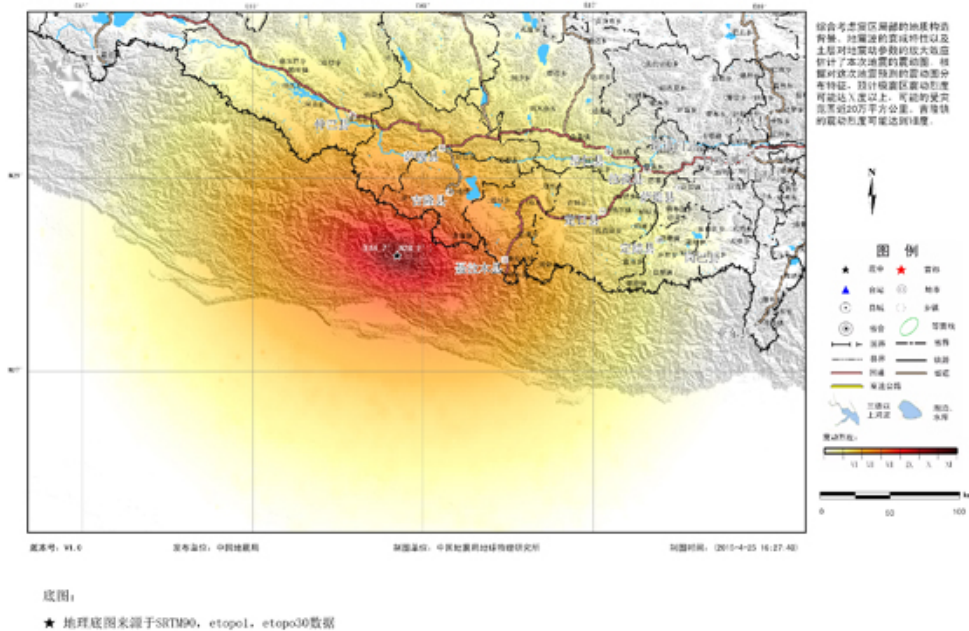
2015-04-25 06:11 协调世界时 (2015-04-25 14:11 北京时间)  
震中位置:  $28.131^\circ\text{N}$ ,  $84.649^\circ\text{E}$ , 震源深度: 15千米, 矩震级 $M_w$ 7.9

走向 $301^\circ$  倾角 $11^\circ$



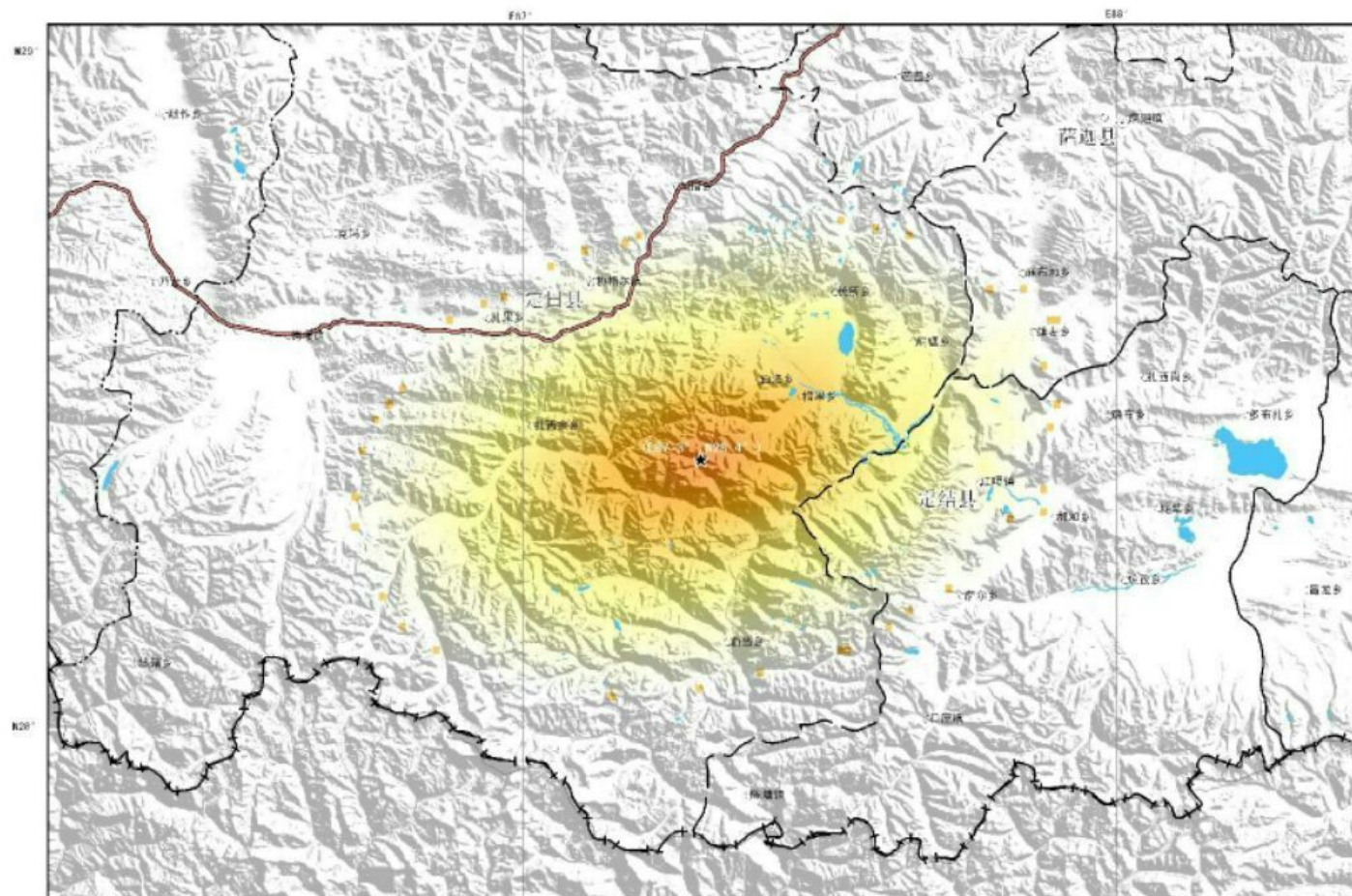
## 地震动预测图 (ShakeMap)

(工程地震学与城市减灾研究室 陈鲲鹏提供)





## 2015年4月25日西藏自治区定日县5.9级地震地震动强度预测图

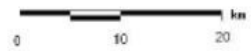


综合考虑震区局部的地质构造背景、地震波的衰减特性以及土层对地震动参数的放大效应估计了本次地震的震动图。根据对这次地震预测的震动图分布特征，预计极震区震动烈度可能达VII度以上，可能的受灾范围近2000平方公里。曲洛乡、扎西宗乡、曲洛乡等的震动烈度可能达到VII度。



### 图例

- ★ 震中
- ★ 首都
- ▲ 县级
- 地级
- 县级
- 乡级
- ◎ 省会
- 等震线
- 国界
- 省界
- 县界
- 铁路
- 国道
- 省道
- 高速公路
- 三级以上河流
- 湖泊、水库



版本号: V1.0

发布单位: 中国地震局

制图单位: 中国地震局地球物理研究所

制图时间: (2015-4-25 17:55:00)



# Surface Rupture cutting the highway











sz.bendibao.com



央视新闻

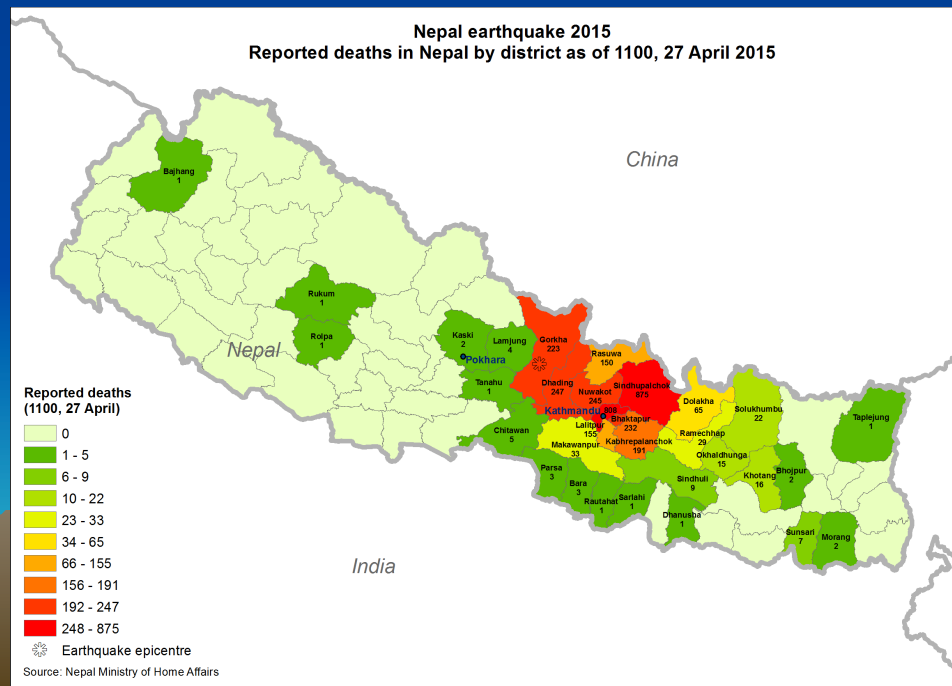


European Pressphoto Agency





The Ms8.1 earthquake hit Nepal (28.2N, 84.7E) at 14:11hrs (Beijing time) on Apr. 25, 2015. As of 1500hrs, May 6, the earthquake killed 7759 victims, injured 16434, and 2,800,000 are homeless. The disaster areas cover 39 districts of Nepal, with affected population of 8,000,000. With the efforts of local government of affected country, and international supports and aids, the rescue has obtained much progress after quake. As the relief items, like tents, foods and drinking water are still much needed, the affected country is facing big challenge in relief and reconstruction.



# International responding procedures for strong earthquake and severe disaster of Chinese Government

## Task of National Earthquake Response Support Service (NERSS)

1--0.5h

2--2-3h

3--6-10h

4--CISAR operation period

Since 2007

Quick estimate and report on global strong earthquake

Headquarter Office of CEA

EM Office of State Council

Leaders of State Council and Central Military Commission

Ministry of Foreign Affairs

Government of the country affected by the disaster

Magnitude over 6.0 in continents, 6.5 in ocean area

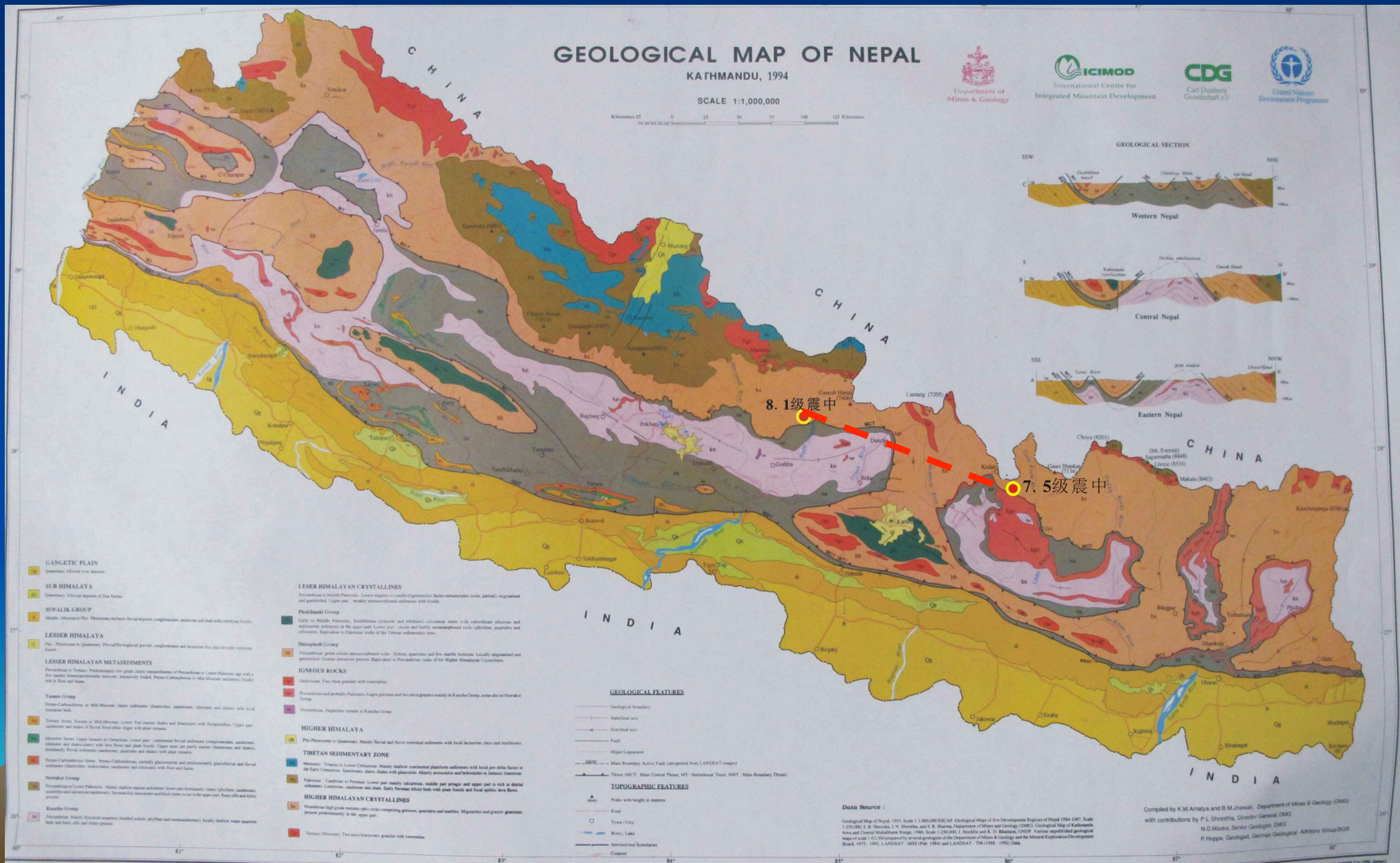
No response for no disaster in strong earthquake  
Condole and financial support for small disaster by strong earthquake

Rescue operation for huge disaster by strong earthquake

Quick Response, quick decision-making, rescue starting up, and on-site operation

60-70 times response/year  
1-2 years/rescue in large disaster

# Estimating the Surface Rupture zone of the Earthquake by Tectonic Structure and Attenuation Model along Himalayan Mountains



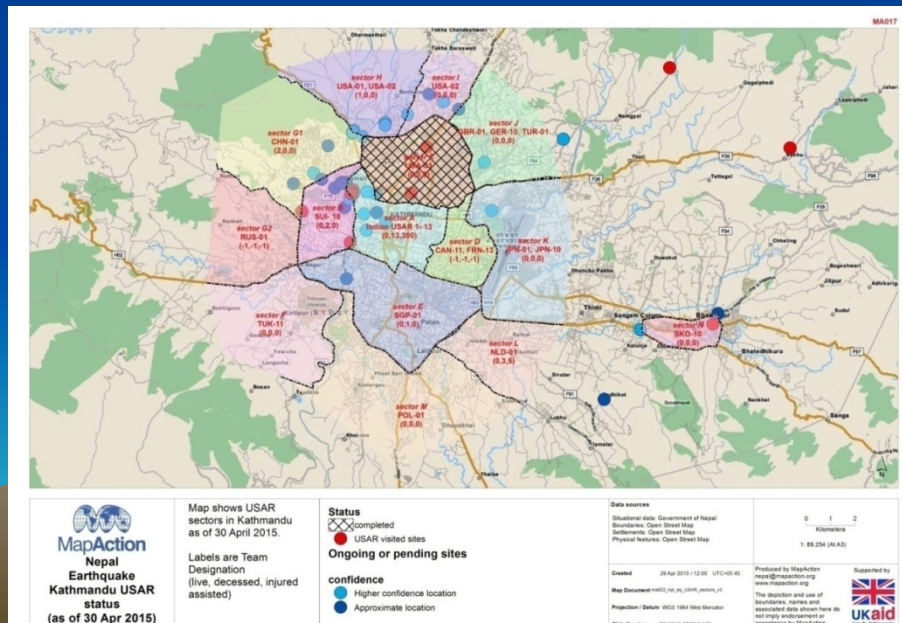
# Phases Classification of SAR Operation of Nepal Earthquake

- I. Emergency Response
- II. Emergency Victims Rescue
- III. Search of Victim and Dead Body  
Clearing
- IV. Regional Search and Assessments of  
Disaster
- V. Disaster Relief and Rehabilitation
- VI. Recovery and Reconstruction

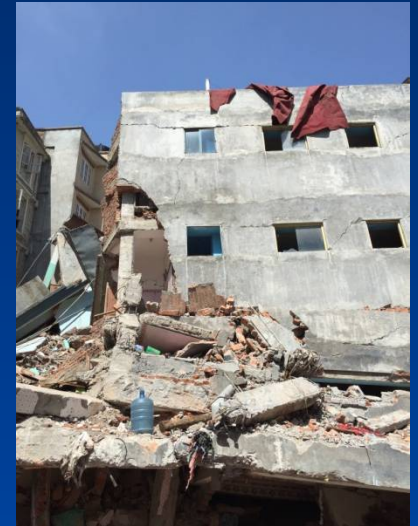
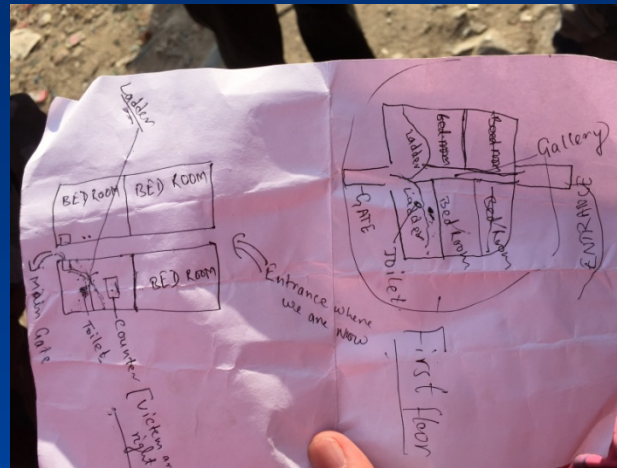


# Distribution of Heavy Disaster Areas in Kathmandu Valley

Kathmandu Valley is the heavy disaster area affected by the earthquake, and there are two characteristics about the disaster distributions. First, the old buildings are mainly brick structure and collapsed heavily, including a large number of ancient buildings collapsed in KTM city, and some brick-adobe structure and stone structure buildings collapsed dispersedly in the northern villages. Second, in the northeast area of KTM city, like Balaju, there are some high-rise buildings (5-7 floors) collapsed along the both sides of the river, with the pancake collapsed of 1-4 floors and upper floors integrally intact, which caused many people trapped in the debris. Above all, these collapsed buildings resulted in large casualties and economic losses in KTM Valley.

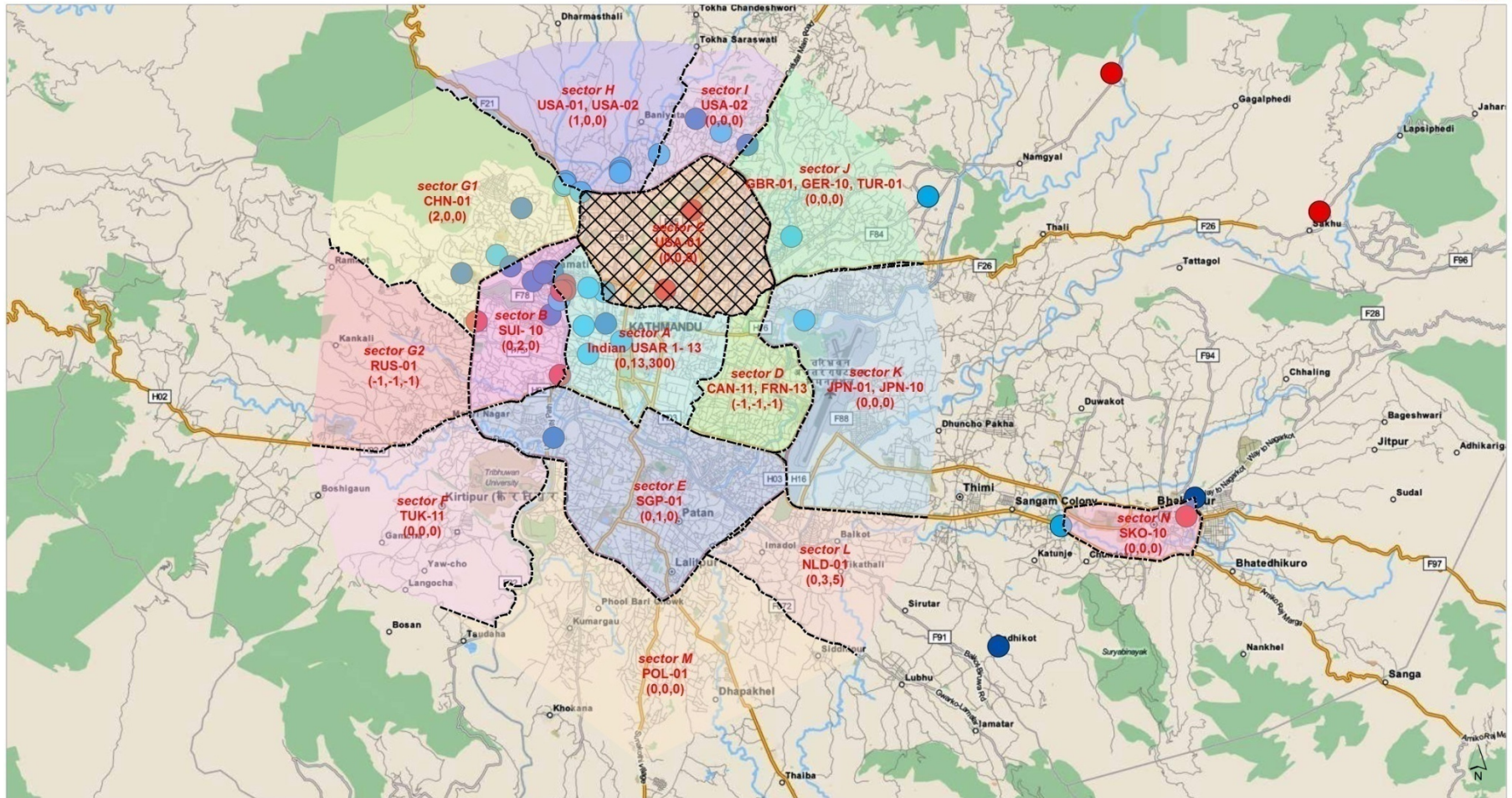


# On-site operation of CISAR for second victim



# Kathmandu SAR Sectors

MA017





  
**MapAction**  
 Nepal  
 Earthquake  
 Kathmandu USAR  
 status  
 (as of 30 Apr 2015)

Map shows USAR sectors in Kathmandu as of 30 April 2015.



Labels are Team Designation (live, deceased, injured, assisted)

### Status

-  completed
-  USAR visited sites


### Ongoing or pending sites

### confidence

-  Higher confidence location
-  Approximate location

### Data sources

Situational data: Government of Nepal  
 Boundaries: Open Street Map  
 Settlements: Open Street Map  
 Physical features: Open Street Map

  
 0 1 2  
 Kilometers  
 1: 89,254 (At A3)

Created 29 Apr 2015 / 12:00 UTC+05:45  
 Map Document m0022\_npl\_eq\_USAR\_sectors\_v3  
 Projection / Datum WGS 1984 Web Mercator  
 Glide Number EQ-2015-000048-NPL

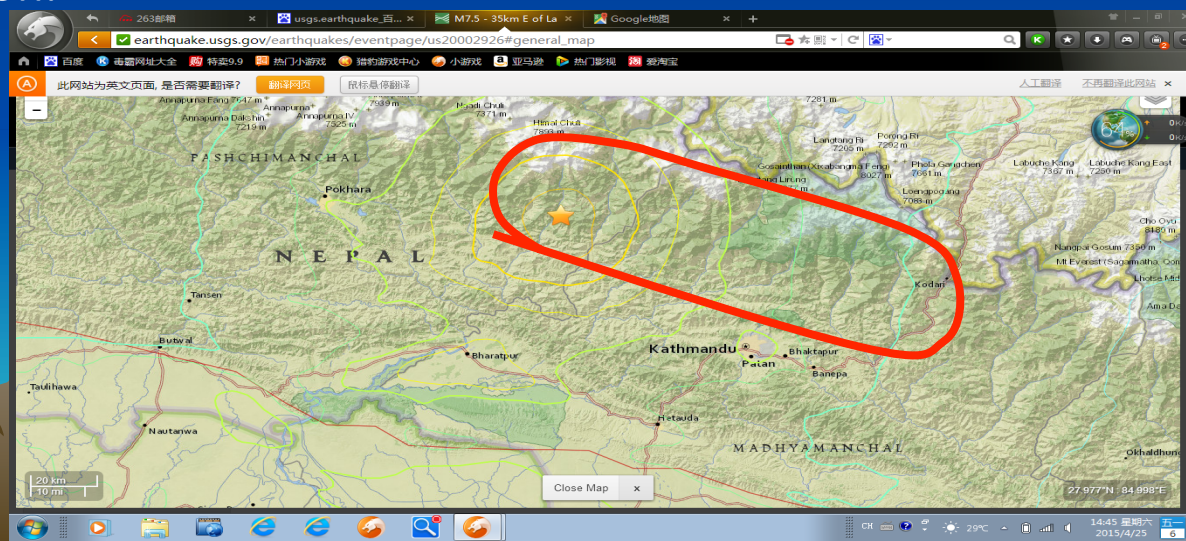
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 The depiction and use of boundaries, names and associated data shown here do not imply endorsement or acceptance by MapAction.

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# Distribution of Severely Affected Areas in the Northern Mountain Region

The severely affected areas (seismic intensity IX degree and above) locate in the northern mountain region of Nepal, with about 300 kilometers in EW direction, from the microscopic epicenter of Ms8.1 Earthquake eastward of the northern mountain region of Nepal. The region mainly distributes in the areas from the villages and towns of Arughat-Chrangephedi-Bidur(Trishuli) -Chisapani-Newargaon etc. which locate about 30 kilometers north to the cities of Gorkha-Dhading Besi-Kathmandu, and northward to the Chinese border.

In these areas, a large number of buildings collapsed, a lot of landslide and avalanche occurred, part of the villages and tourist camps disappeared, also with some bridges collapsed, road transportation, communications and power broke off, which caused heavy casualties and some people missing. Meanwhile, the search, rescue and medical operations are facing great difficulty because of the huge differences of terrain elevation.





# On-site Operation of CISAR Search and Coordination in Dhading Besi with Russia, Malaysia, and Mountain and Land SAR of Shenzhen, China

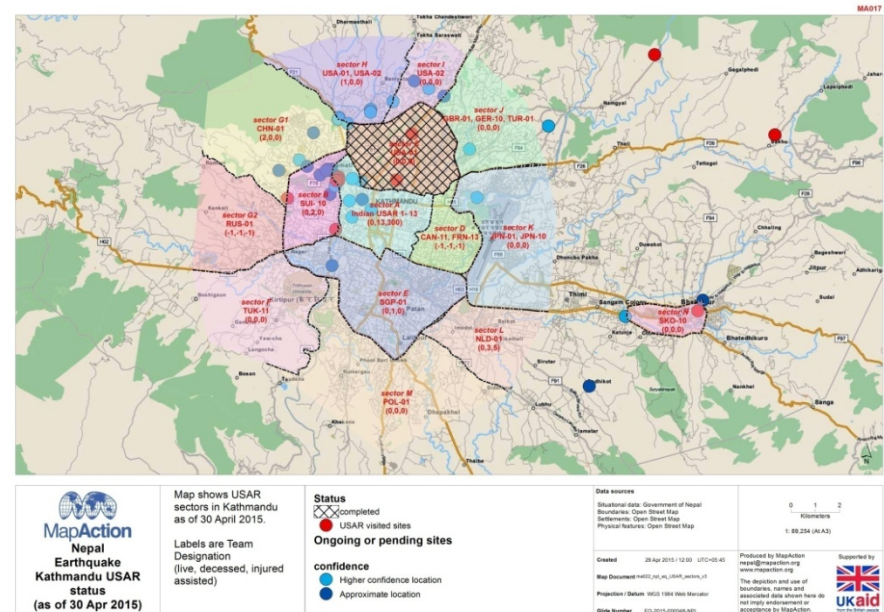




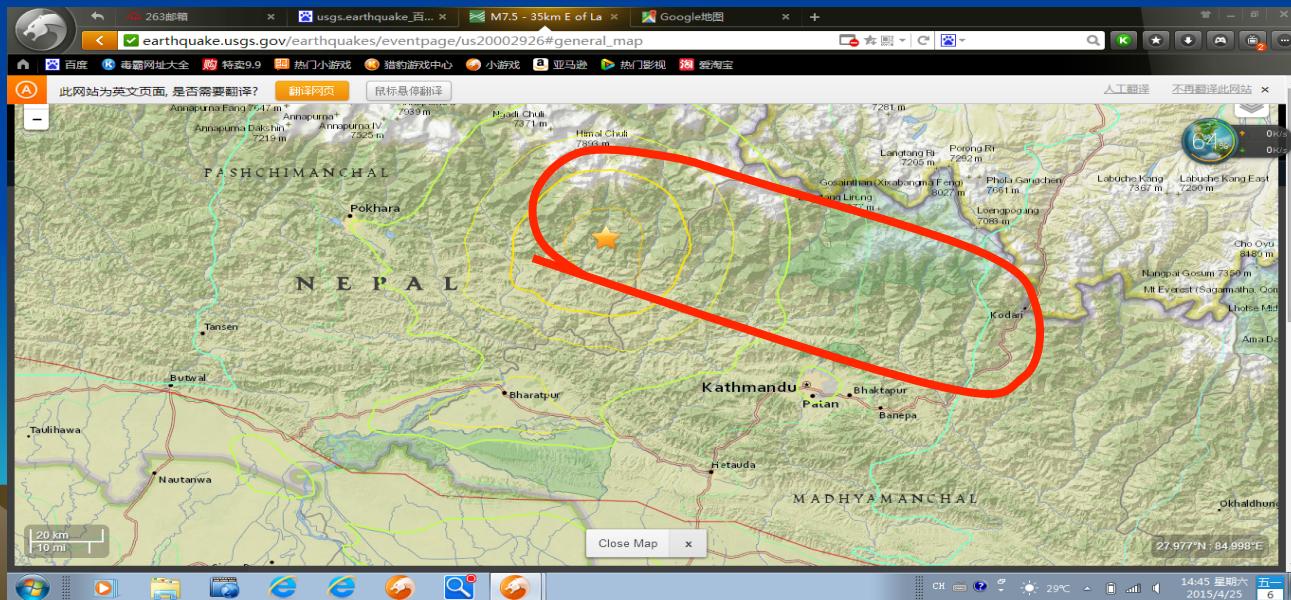
# Overview of CISAR Operation

CISAR is the first heavy team, which was classified by INSARAG and recognized by UN, to arrive at Nepal. Under the guidance and support from the Embassy of People's Republic of China in Nepal and Nepal military, CISAR deployed the advanced team to Balaju, one of the most affected areas in Kathmandu valley, for search and rescue soon after the arrival. 2 live victims were successfully rescued, and handed over to the local medical authority after proper emergency treatment of medical group of CISAR.

## Kathmandu SAR Sectors



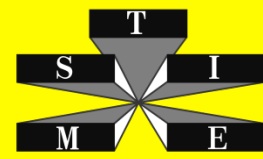
As a classified heavy team, CISAR was tasked by UN OCHA as sector coordinator for coordinating the search and rescue, and body recovery operation of Russian team, Spain and France team in NW of Kathmandu city. On May 1, CISAR was asked to operate outside the Kathmandu City, playing as the Dhading District Coordinator with the responsibilities to coordinate the operations of international USAR teams, i.e. Russian team, Malaysia team, Singapore team, Philippine team and China Shenzhen Mountain team. Together with these teams, CISAR successfully implemented the search and rescue, and assessment missions in Dhading Besi and its north area.



## 4. Brief Introduction of TIEMS



# TIEMS



## The International Emergency Management Society

- **TIEMS was founded in 1993 in Washington, USA, and is today registered as an international, independent, non political, not for profit NGO in Belgium**
- **TIEMS is an International Network of Users, Planners, Researchers, Industry, Managers, Response Personnel, Practitioners, Social scientists, and other Interested Parties within Emergency and Disaster Management**
- **TIEMS stimulates to the exchange of information on the use of innovative methods and technologies within emergency and disaster management to improve society's ability to avoid, mitigate, respond to, and recover from natural and technological disasters**

# TIEMS Chapters



## In Operation

**1. Romania Chapter**

**2. BeNeLux Chapter**

*Belgium/Netherlands/  
Luxemburg*

**3. China Chapter**

**4. South Korea Chapter**

**5. India Chapter**

**6. MENA Chapter**

*Middle East and North Africa*

**7. Finland Chapter**

**8. Iraq Chapter**

**9. Japan Chapter**

**10. Italy Chapter**

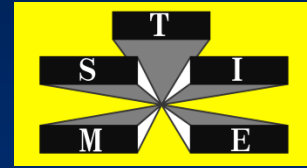
**11. USA Chapter**

**12. West Africa Countries**

## In Planning

- **Thailand**
- **South East Europe**
- **Pakistan**
- **Philippines**
- **France**

# TIEMS Annual Conferences



- Fort Lauderdale, USA, 1994
- Sofia Antipolis, France, 1995
- Montreal, Canada, 1996
- Copenhagen, Denmark, 1997
- Washington, USA, 1998
- Delft, Netherlands, 1999
- Orlando, USA, 2000
- Oslo, Norway, 2001
- Waterloo, Canada, 2002

- Sofia Antipolis, France, 2003
- Melbourne, Australia, 2004
- Thorshavn, Faroe Islands, 2005
- Seoul, Korea, 2006
- Trogir, Croatia, 2007
- Prague, Czech Republic, 2008
- Istanbul, Turkey, 2009
- Beijing, China, 2010
- Bucharest, Romania, 2011
- Irag, 2012
- France, 2013
- Niigata, Japan, 2014
- Rome, Itly, 2015



# TIEMS Board of Directors



**K. Harald Drager, TIEMS President (Norway)**  
**Guosheng Qu, Vice President (China)**

**TIEMS are focus on the S&D of theory and application of emergency management, response, technique and equipments, commanding and coordination, cases analysis, training and certification.**

**TIEMS website:**  
**[www.tiems.info](http://www.tiems.info)**

# China National Training Base for Urban Search and Rescue (CNSART)

Thanks a lot !



**Thinking Globally, Acting  
Locally !**