Nepal Earthquake

M7.8 - 34km ESE of Lamjung, Nepal

Time

2015-04-25 06:11:26 (UTC)

Nearby Cities

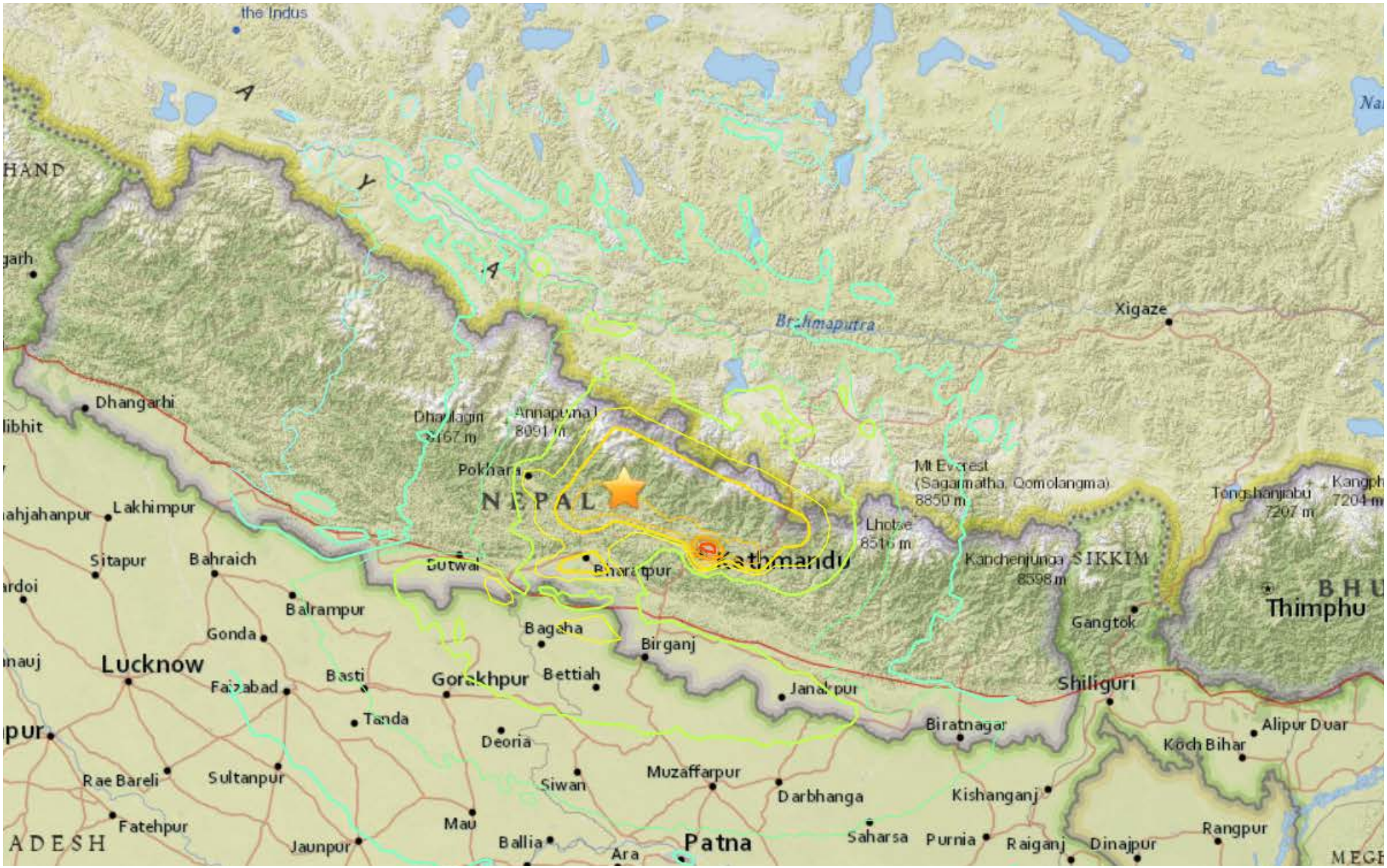
34km ESE of Lamjung, Nepal

58km NNE of Bharatpur, Nepal

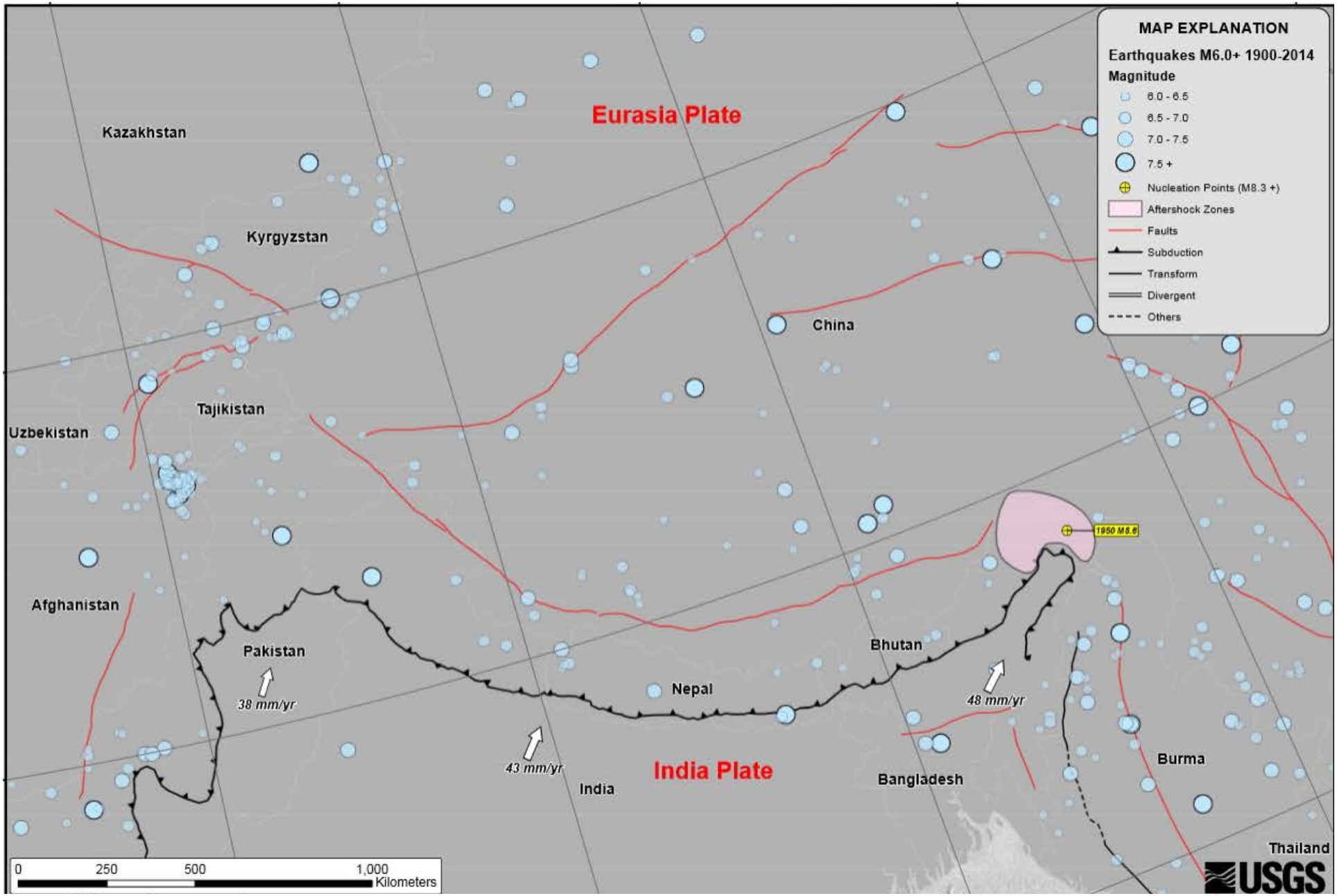
73km E of Pokhara, Nepal

76km NW of Kirtipur, Nepal

77km NW of Kathmandu, Nepal


the Indus
Brahmaputra
Xigaze
Dhangarhi
Dhaulagiri
8167 m
Annapurna I
8091 m
Pokhara
NEPAL
Kathmandu
Mt Everest
(Sagarmatha, Qomolangma)
8850 m
Lhotse
8516 m
Kanchenjunga
8598 m
SIKKIM
Thimphu
Gangtok
Lakhimpur
Sitapur
Bahraich
Balrampur
Gonda
Lucknow
Faizabad
Basti
Gorakhpur
Bettiah
Bagaha
Birganj
Janakpur
Tanda
Deoria
Siwan
Muzaffarpur
Darbhanga
Biratnagar
Shiliguri
Alipur Duar
Koch Bihar
Kishanganj
Rae Bareli
Sultanpur
Fatehpur
Jaunpur
Ballia
Ara
Patna
Saharsa
Purnia
Raiganj
Dinajpur
Rangpur

REGION TECTONICS



Tectonic Summary

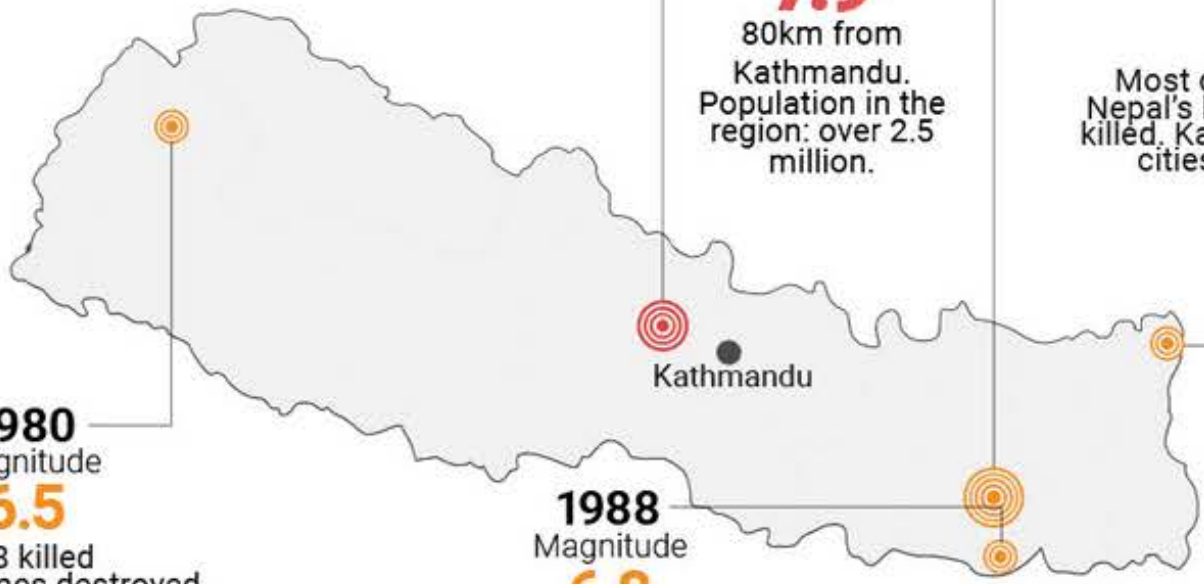
The April 25, 2015 M 7.8 Nepal earthquake occurred as the result of **thrust faulting** on or near the main frontal thrust between **the subducting India plate and the overriding Eurasia plate** to the north. At the location of this earthquake, approximately 80 km to the northeast of the Nepalese capital of Kathmandu, the India plate is converging with Eurasia at a rate of 45 mm/yr towards the north-northeast, driving the uplift of the Himalayan mountain range.

Although a major plate boundary with a history of large-to-great sized earthquakes, **large earthquakes on the Himalayan thrust are rare** in the documented historical era. Just **four events of M6 or larger** have occurred within 250 km of the April 25, 2015 earthquake over the past century. One, a M 6.9 earthquake in August 1988, 240 km to the southeast of the April 25 event, caused close to 1500 fatalities. The largest, an M 8.0 event known as the 1934 Nepal-Bihar earthquake, occurred in a similar location to the 1988 event. It severely damaged Kathmandu, and is thought to have caused around 10,600 fatalities.

Timeline: Nepal earthquakes

@ajlabs

Nepal has been struck by the biggest earthquake in over 80 years. The region that has been hit hardest is the very populous Kathmandu valley.



2015
Magnitude
7.9
80km from Kathmandu. Population in the region: over 2.5 million.

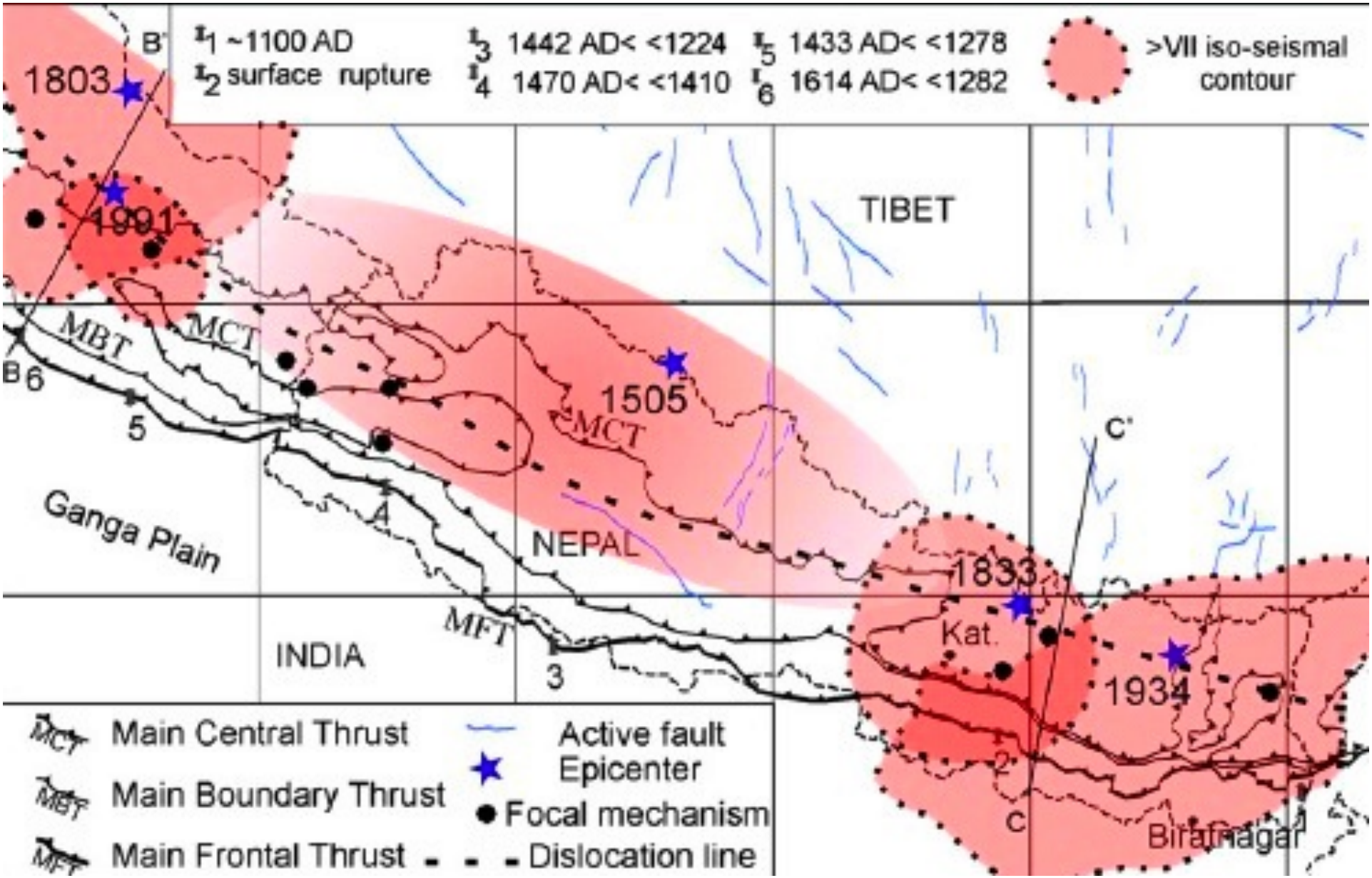
1934
Magnitude
8.0
Most destructive earthquake in Nepal's history. Over 10,000 people killed. Kathmandu and several other cities completely destroyed.

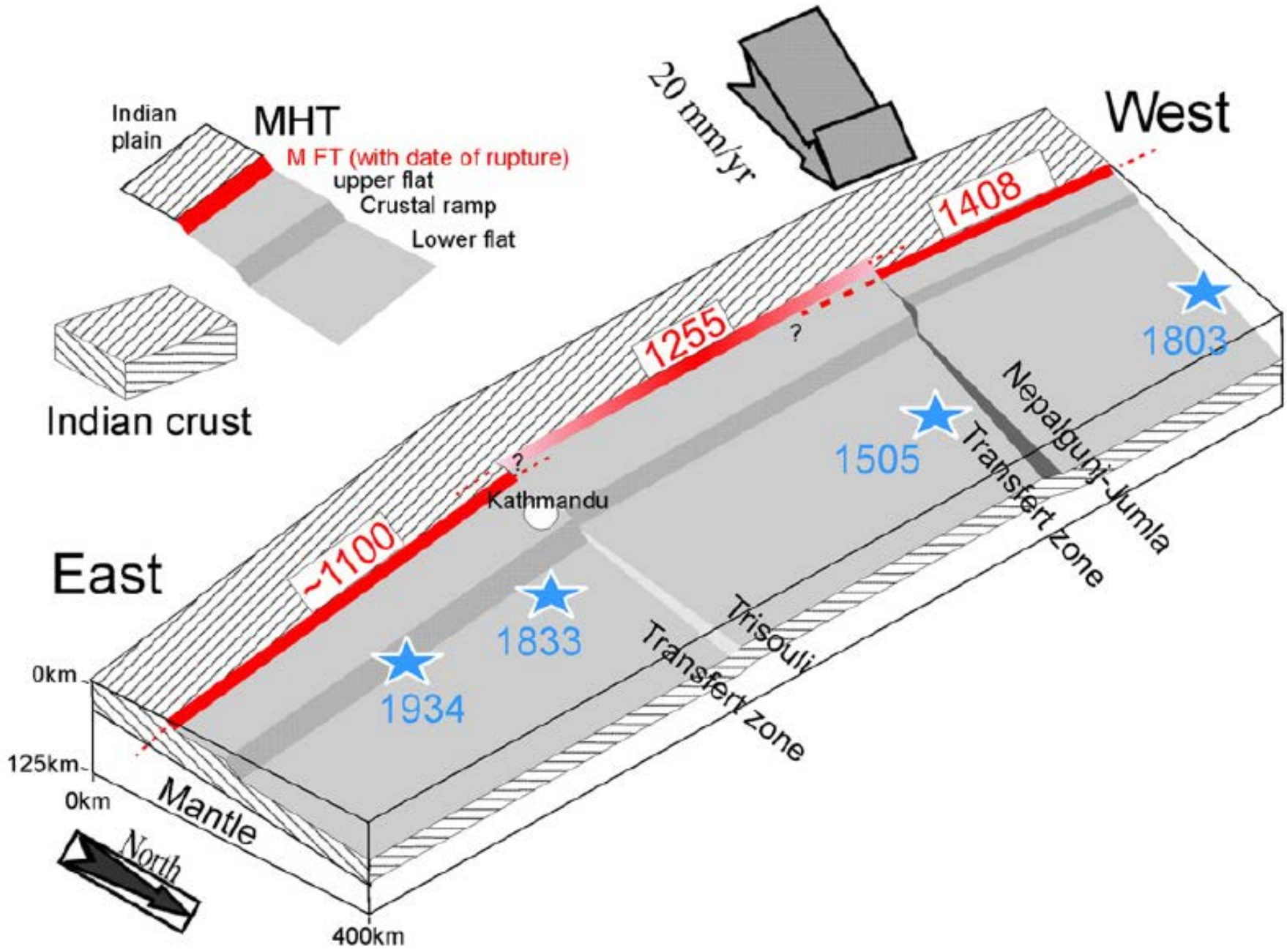
2011
Magnitude
6.9
6 killed, 30 seriously injured.13,000 displaced.

1980
Magnitude
6.5
178 killed
40,000 homes destroyed.

1988
Magnitude
6.8
722 killed across Nepal and India.
12,000 injured, 460,000 people left homeless.

Map of the historical great earthquakes at central Himalaya

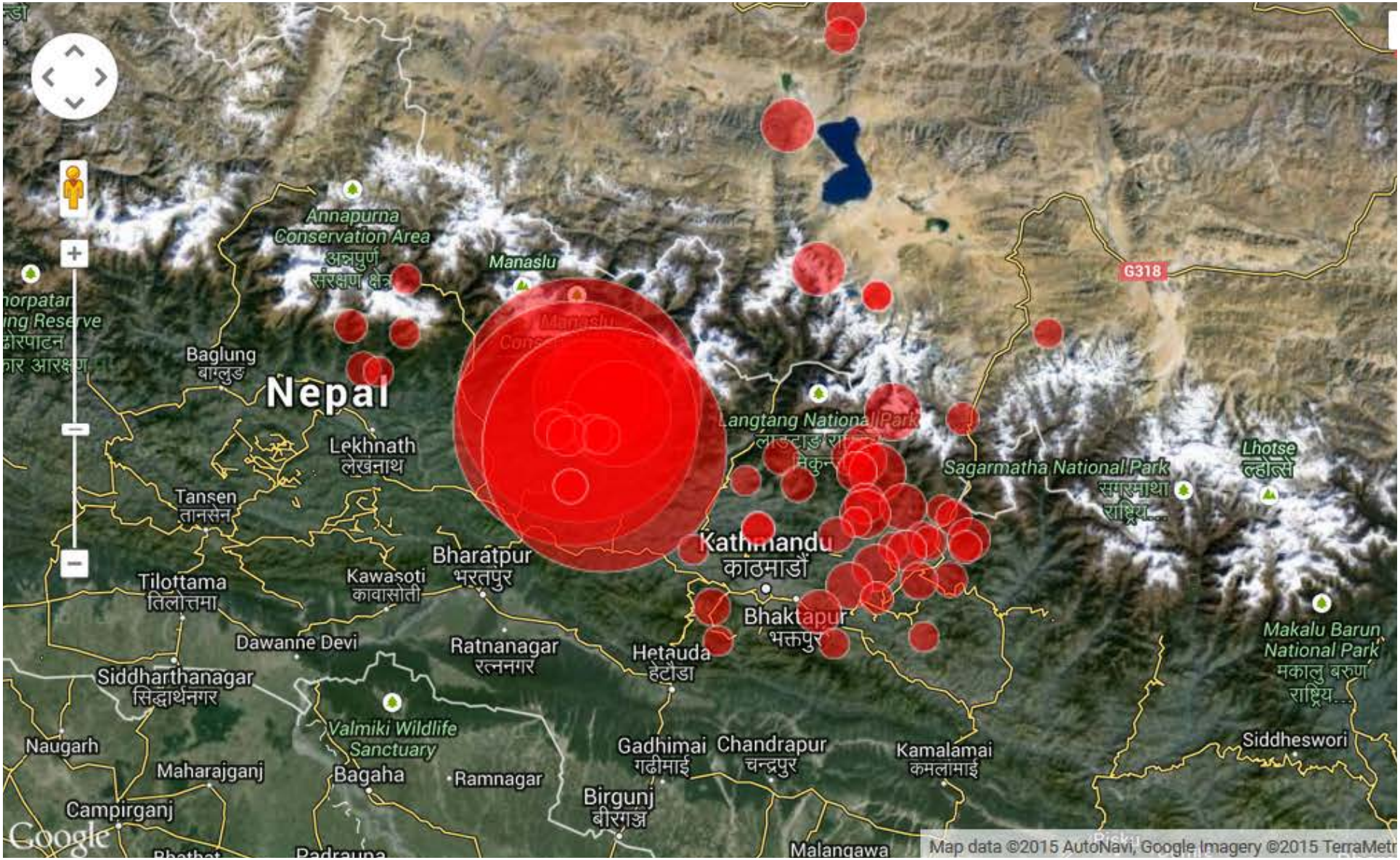


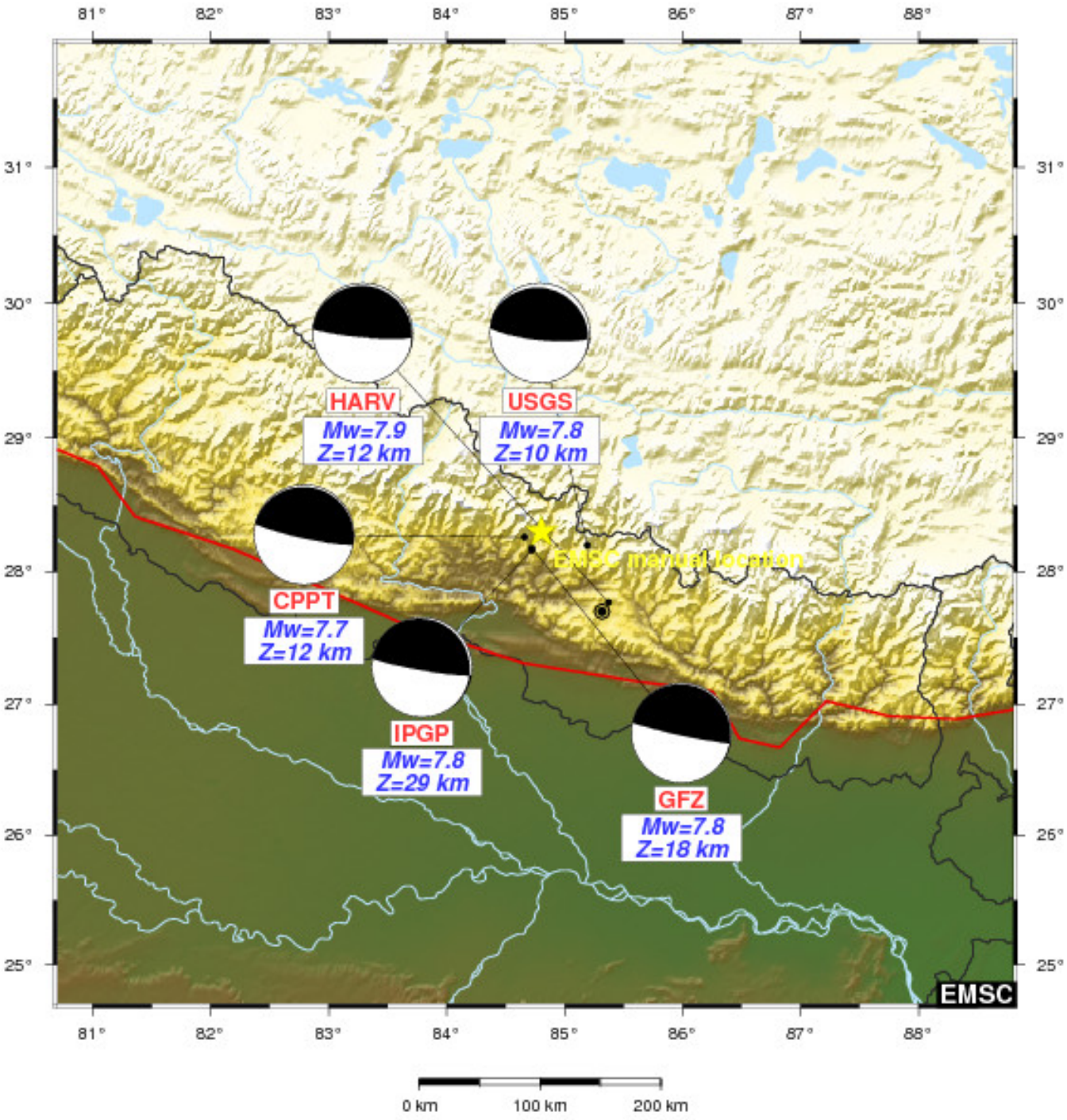

Indian plain
MHT
M FT (with date of rupture)
upper flat
Crustal ramp
Lower flat
Indian crust
20 mm/yr
West
East
1408
1255
?
?
~1100
1803
1505
1833
1934
Kathmandu
Nepalgunj-Jumla Transfert zone
Trisouli Transfert zone
0km
125km
0km
Mantle
North
400km

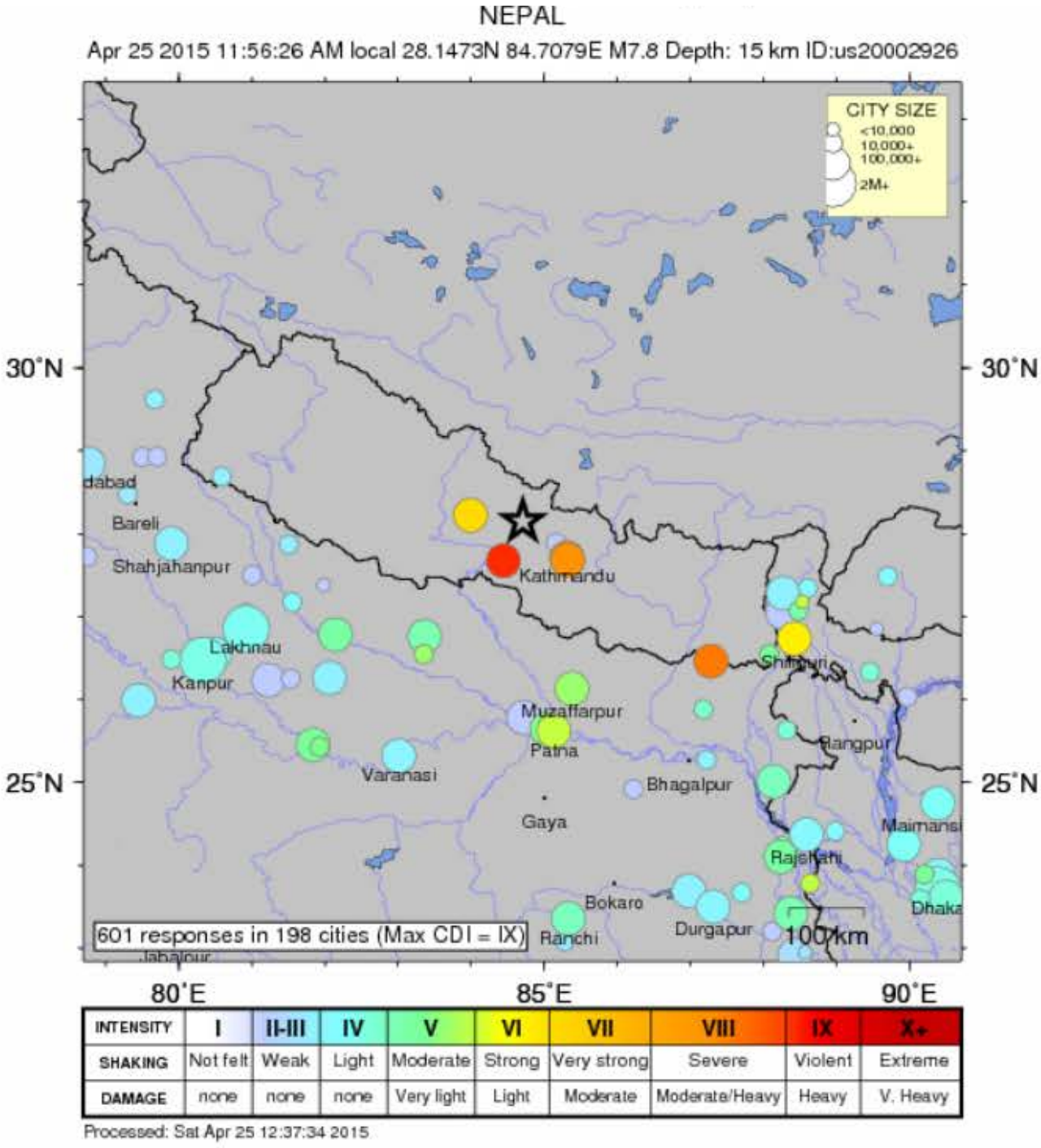
Paleoseisms and historic earthquakes in the Kathmandu area (Intensity MMI greater than VII in Kathmandu).

Date	Source of information	Intensity (MMI)	Magnitude (Mw)	Epicenter or general localization
Cal–11 kyr BC	Seismite	≥XI		?
Cal–1100 AD	Trench	≥X[a]	~8.5	Surface rupture eastern Nepal
1255 AD (6/7)	Historic (only KTM) and Trench	X		Surface rupture western Nepal[i]
1408 AD	Historic (only KTM) and Trench	X	>8.5[b]	Surface rupture in far western Himalaya
1505 AD	Historic (Only regional, not in KTM)	≥VII[c]	8.16[d]	N34.50°, E 69.10°
1681 AD	Historic	IX		
1767 AD	Historic	≥VII		
1810 AD	Historic	IX		Eastern Nepal?[e]
1833 AD (8/26)	Historic	IX–X	7.61[f]	N28.00°, E86.00°[f]
1833 AD (10/04)	Historic	IX	~7?	Central Nepal (South of KTM)?[g]
1833 AD (10/18)	Historic	VIII	~7?	Central Nepal (South-West of KTM)?[g]
1866 AD (5/23)	Historic (regional and KTM)	VIII	7.6?[h]	Central[h] or western[i] Nepal
1934 AD (1/15)	Instrumental and historic	X	8.11[d]	N27.55°, E 87.09°

Strongest earthquakes (since 1900) within a 150 km radius from this earthquake

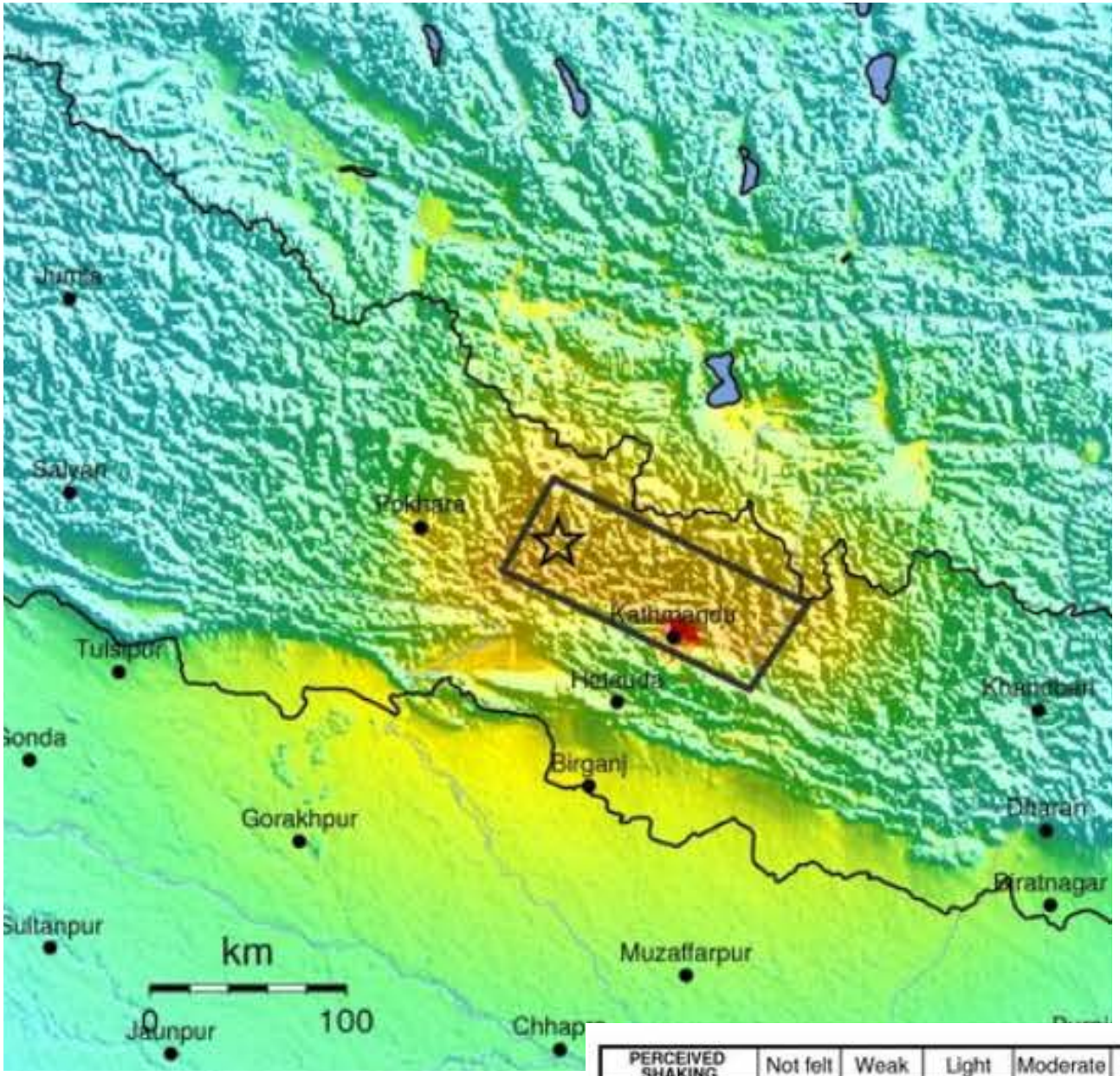



81°
82°
83°
84°
85°
86°
87°
88°
31°
30°
29°
28°
27°
26°
25°
HARV
Mw=7.9
Z=12 km
USGS
Mw=7.8
Z=10 km
EMSC manual location
CPPT
Mw=7.7
Z=12 km
IPGP
Mw=7.8
Z=29 km
GFZ
Mw=7.8
Z=18 km
EMSC
0 km
100 km
200 km



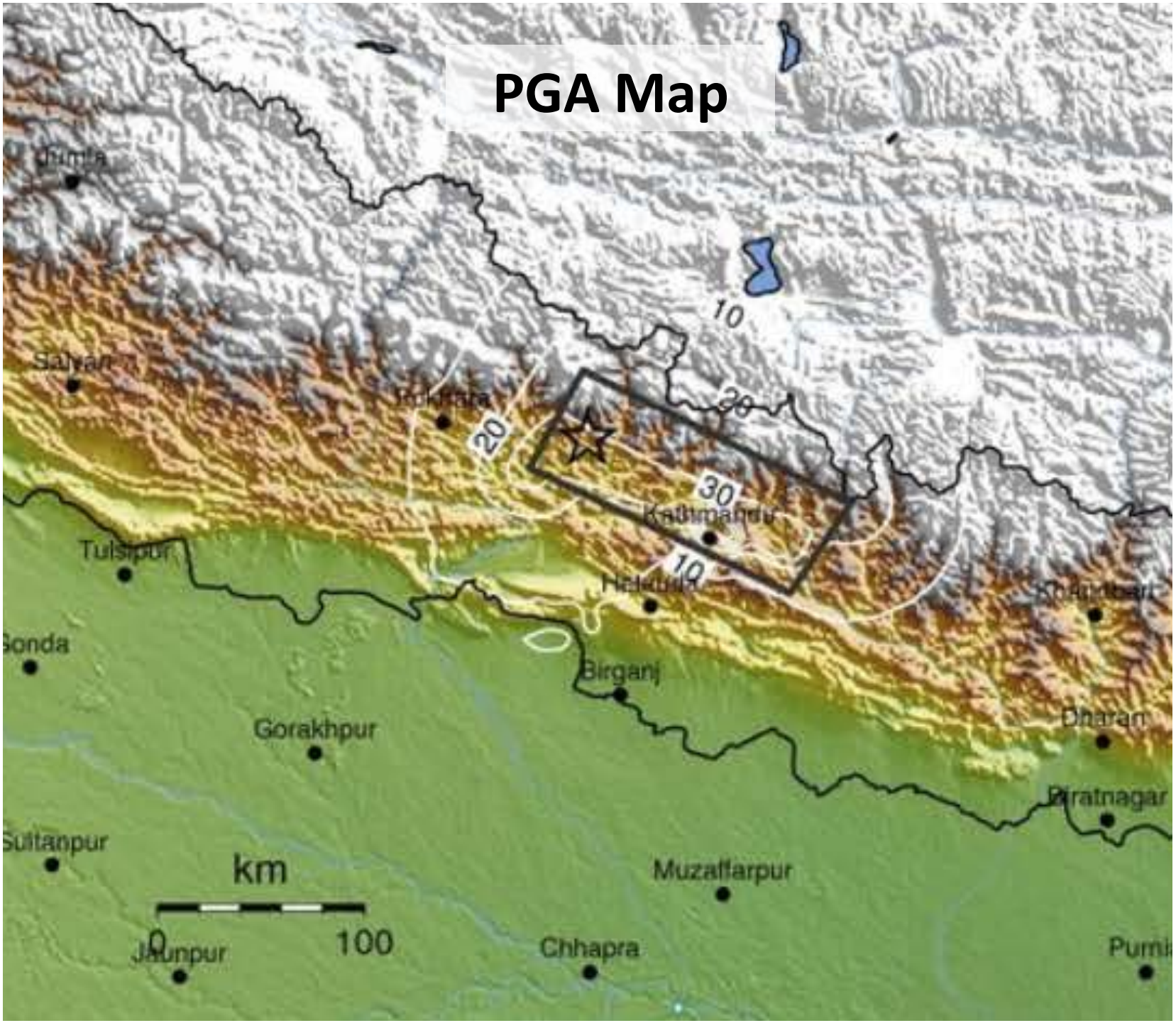
Intensity Map

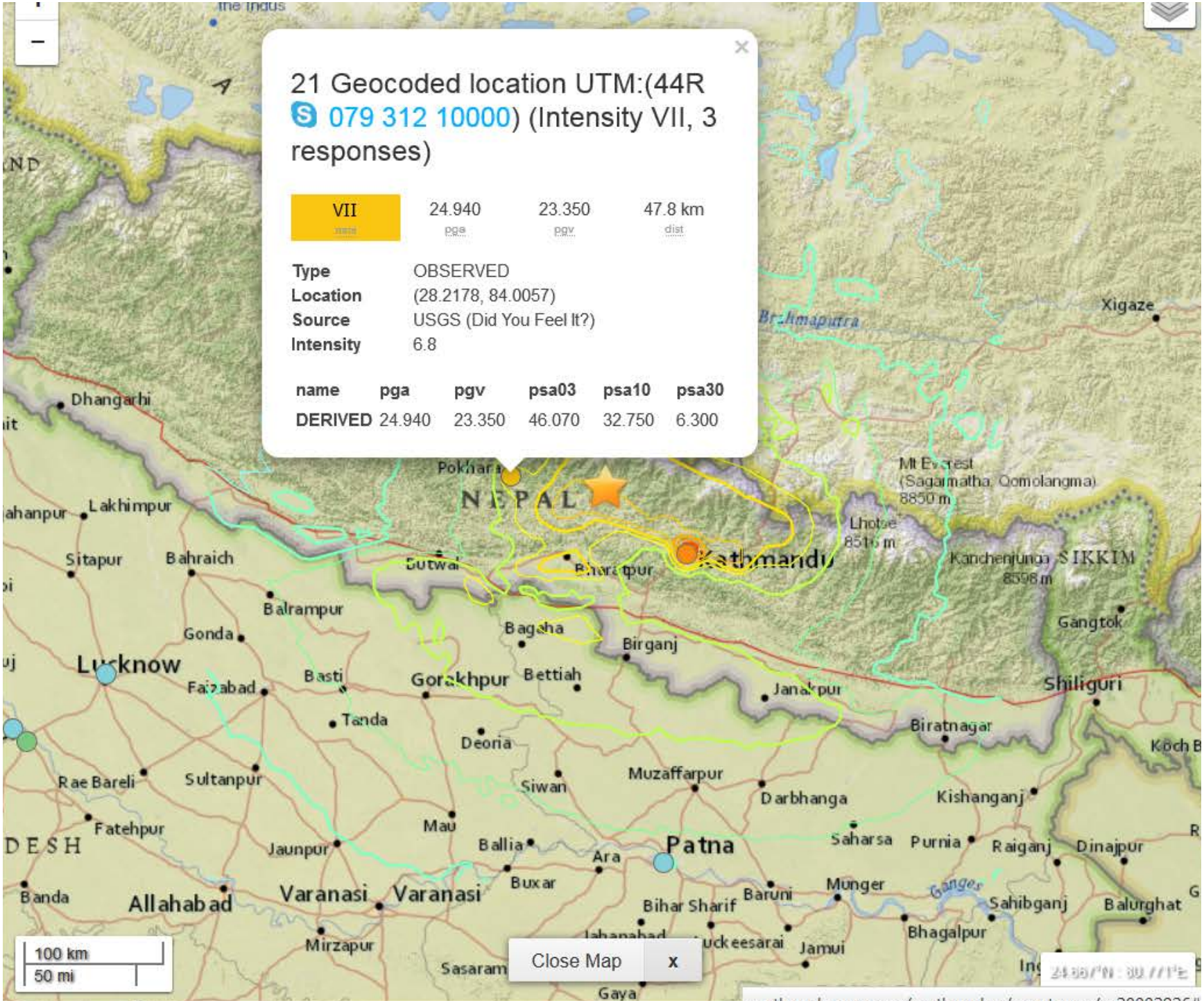
SHAKE Map

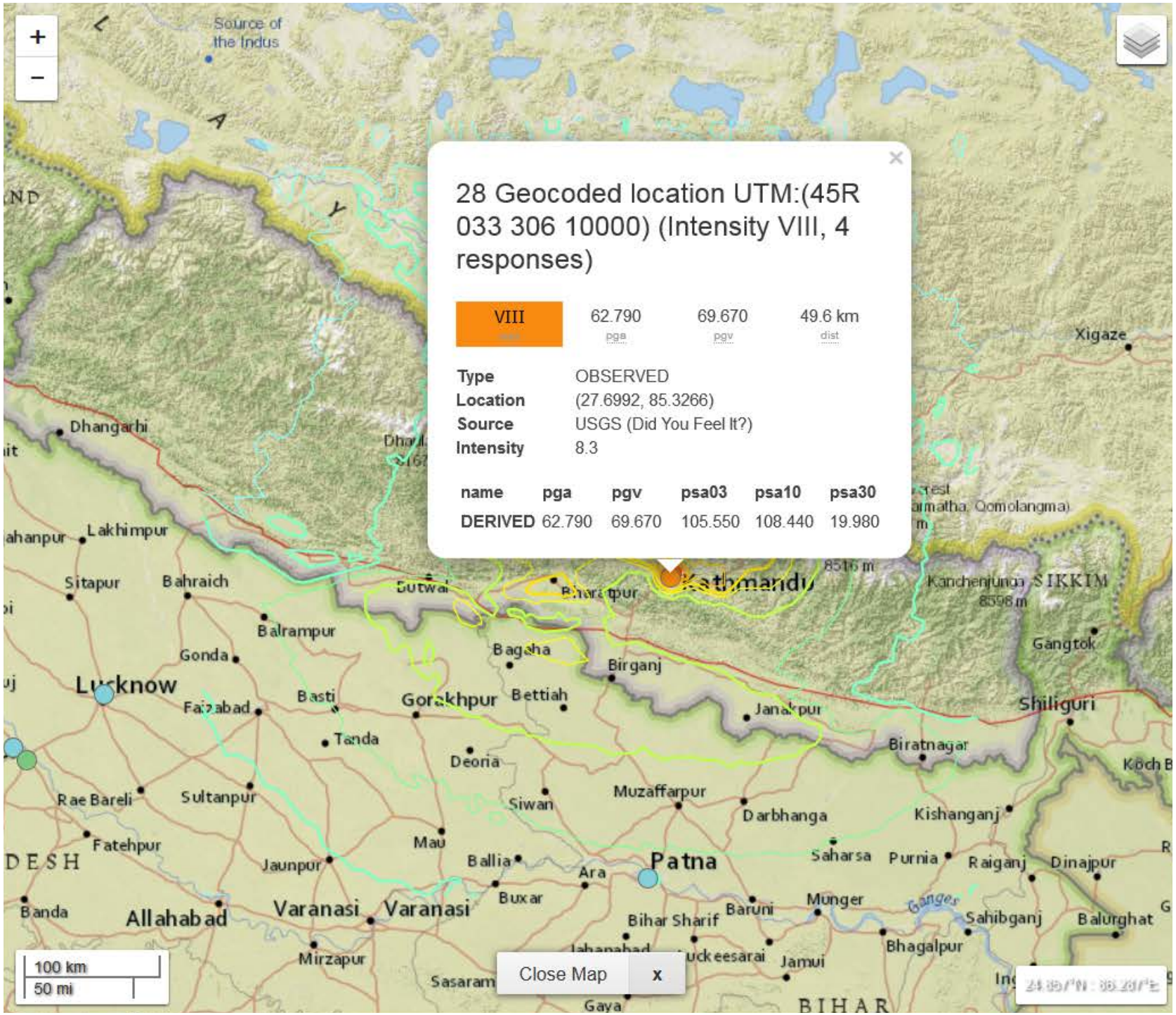


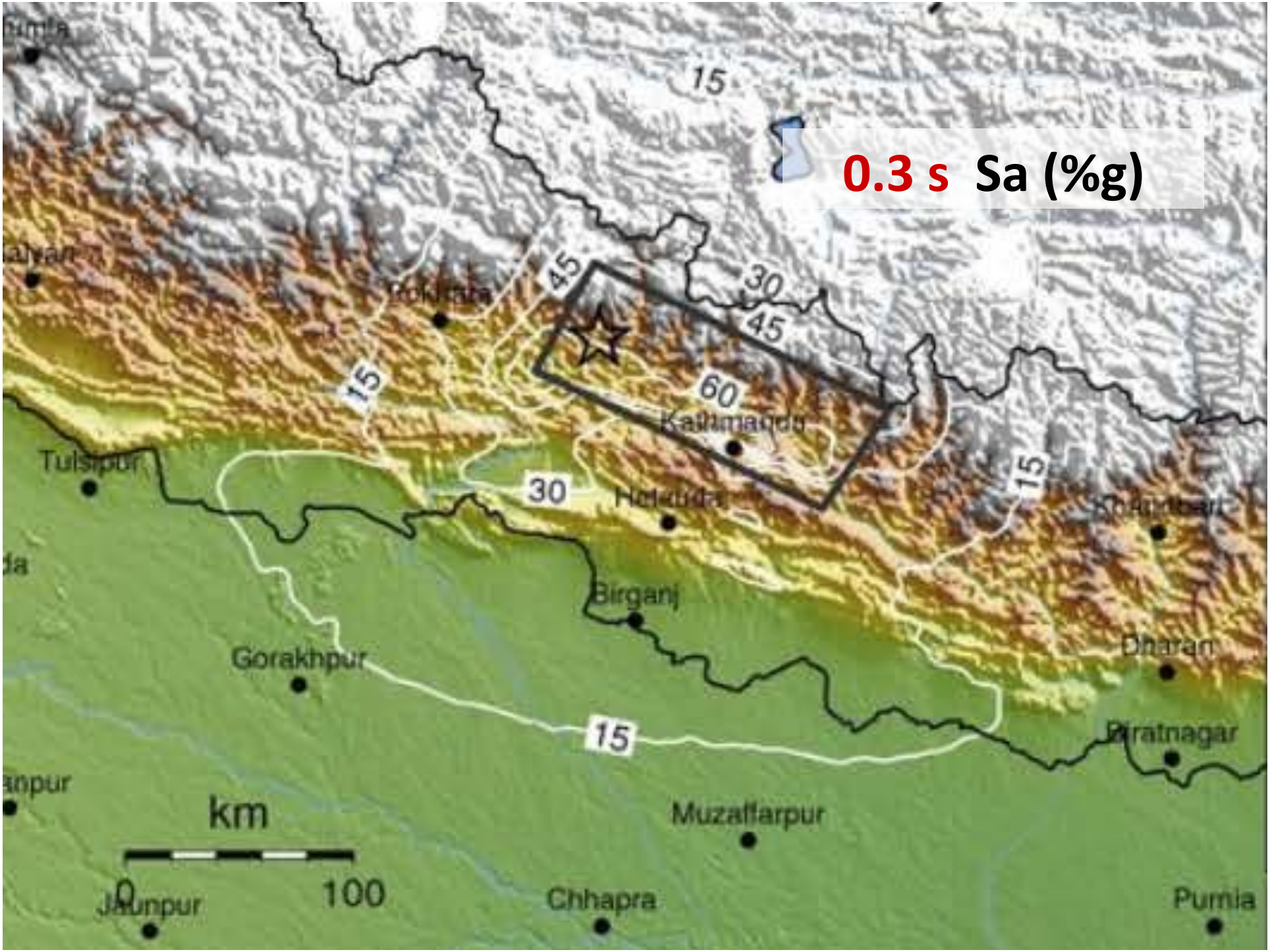
PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Mod./Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<0.05	0.3	2.8	6.2	12	22	40	75	>139
PEAK VEL.(cm/s)	*<0.02*	*0.1*	*1.4*	*4.7*	*9.6*	*20*	*41*	*86*	*>178*
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

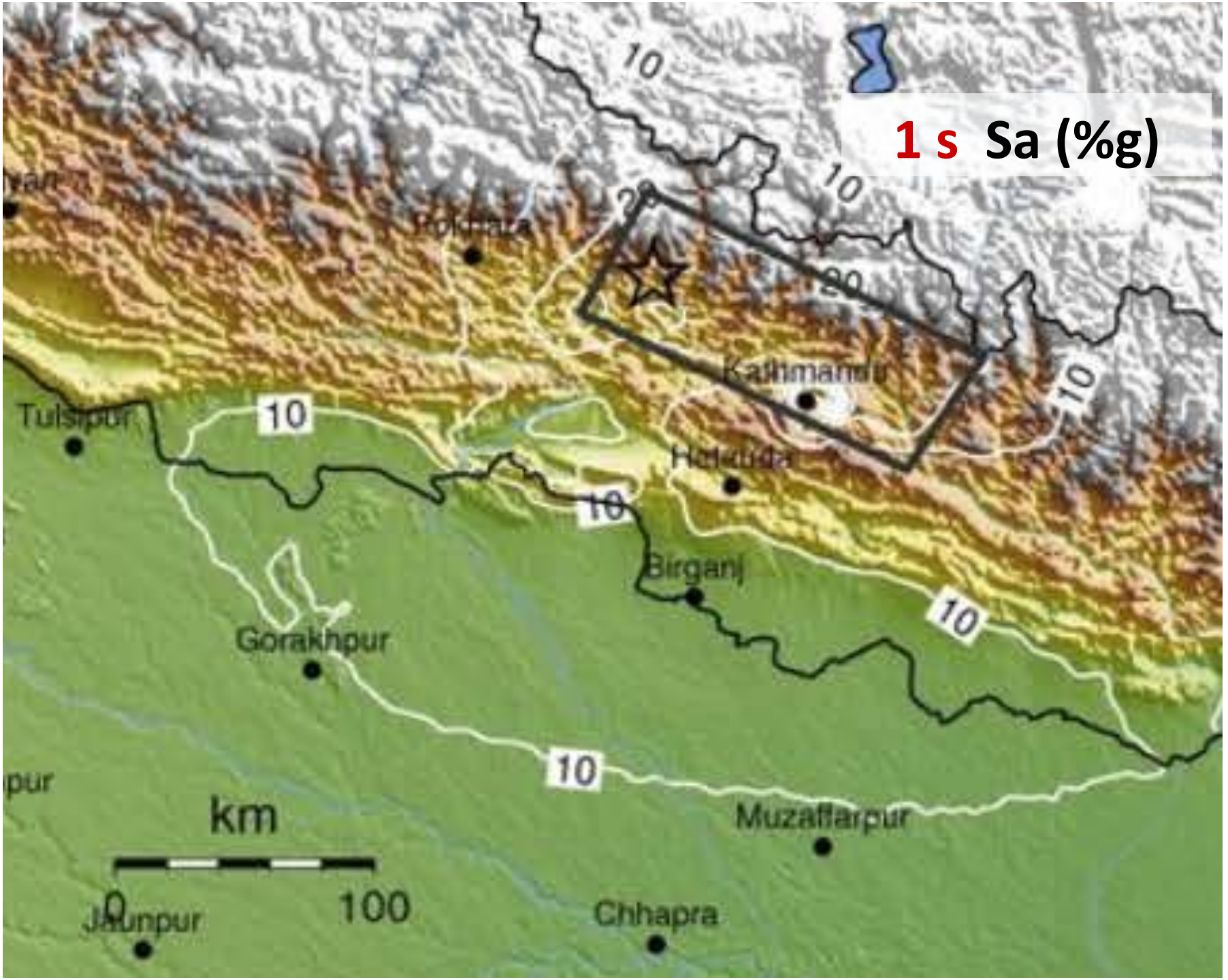
Scale based upon Worden et al. (2012)

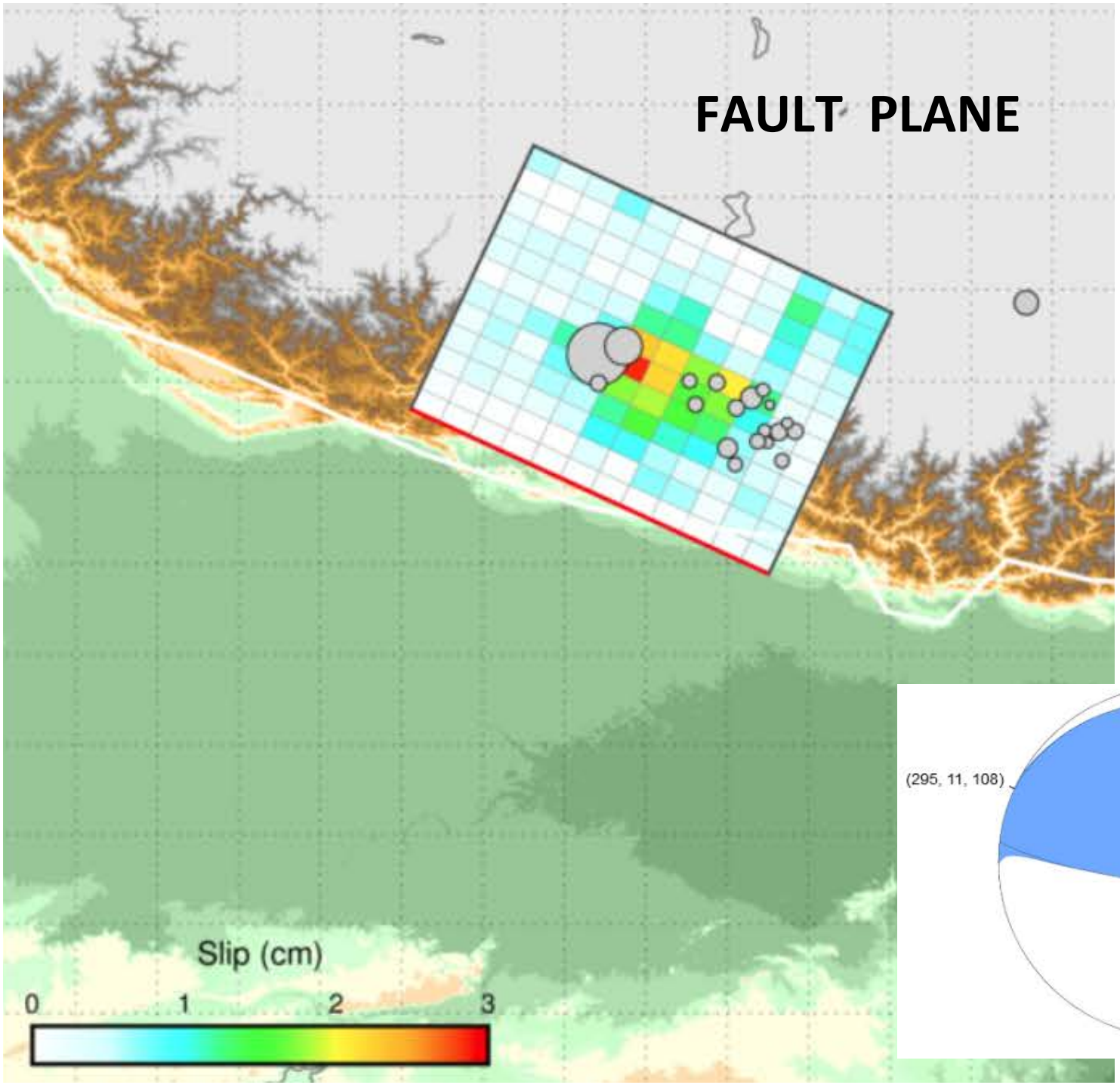

PGA Map
10
20
20
30
10
Tulsipur
Gonda
Gorakhpur
Sultanpur
Jaunpur
Birganj
Muzaffarpur
Chhapra
Dharan
km
0
100


21 Geocoded location UTM:(44R 079 312 10000) (Intensity VII, 3 responses)
VII
mmi
24.940
pga
23.350
pgv
47.8 km
dist
Type OBSERVED
Location (28.2178, 84.0057)
Source USGS (Did You Feel It?)
Intensity 6.8
name pga pgv psa03 psa10 psa30
DERIVED 24.940 23.350 46.070 32.750 6.300
NEPAL
Kathmandu
Pokhara
Lucknow
Patna
Varanasi
Allahabad
Gorakhpur
Siliguri
Gangtok
Xigaze
Mt Everest (Sagarmatha; Qomolangma) 8850 m
Lhotse 8516 m
Kanchenjunga 8598 m
SIKKIM
Brahmaputra
Ganges
Close Map
x
100 km
50 mi

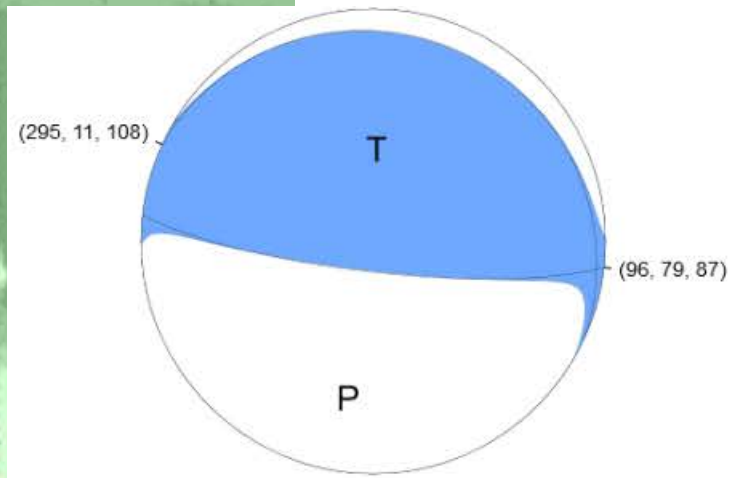

28 Geocoded location UTM:(45R 033 306 10000) (Intensity VIII, 4 responses)
VIII
62.790
pga
69.670
pgv
49.6 km
dist
Type OBSERVED
Location (27.6992, 85.3266)
Source USGS (Did You Feel It?)
Intensity 8.3
name pga pgv psa03 psa10 psa30
DERIVED 62.790 69.670 105.550 108.440 19.980
Close Map
x
100 km
50 mi
Source of the Indus
Kathmandu
Lucknow
Patna
Varanasi
Allahabad
Gorakhpur
Xigaze
Shiliguri
Gangtok
SIKKIM
BIHAR
Ganges

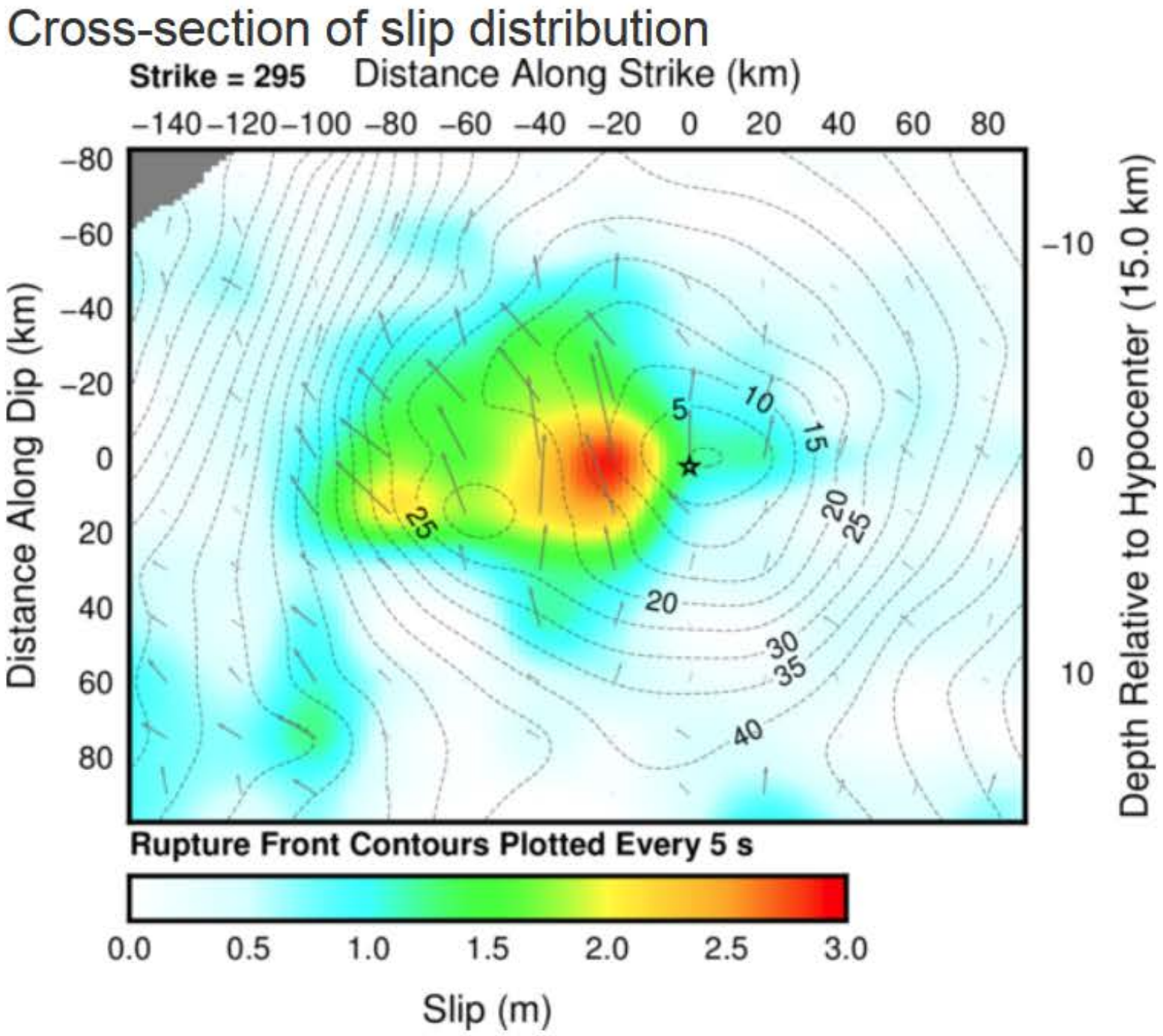

0.3 s Sa (%g)
15
45
30
45
60
15
30
15
15
Kathmandu
Tulsipur
Birganj
Gorakhpur
Dharan
Biratnagar
Muzaffarpur
Chhapra
Purnia
km
0
100

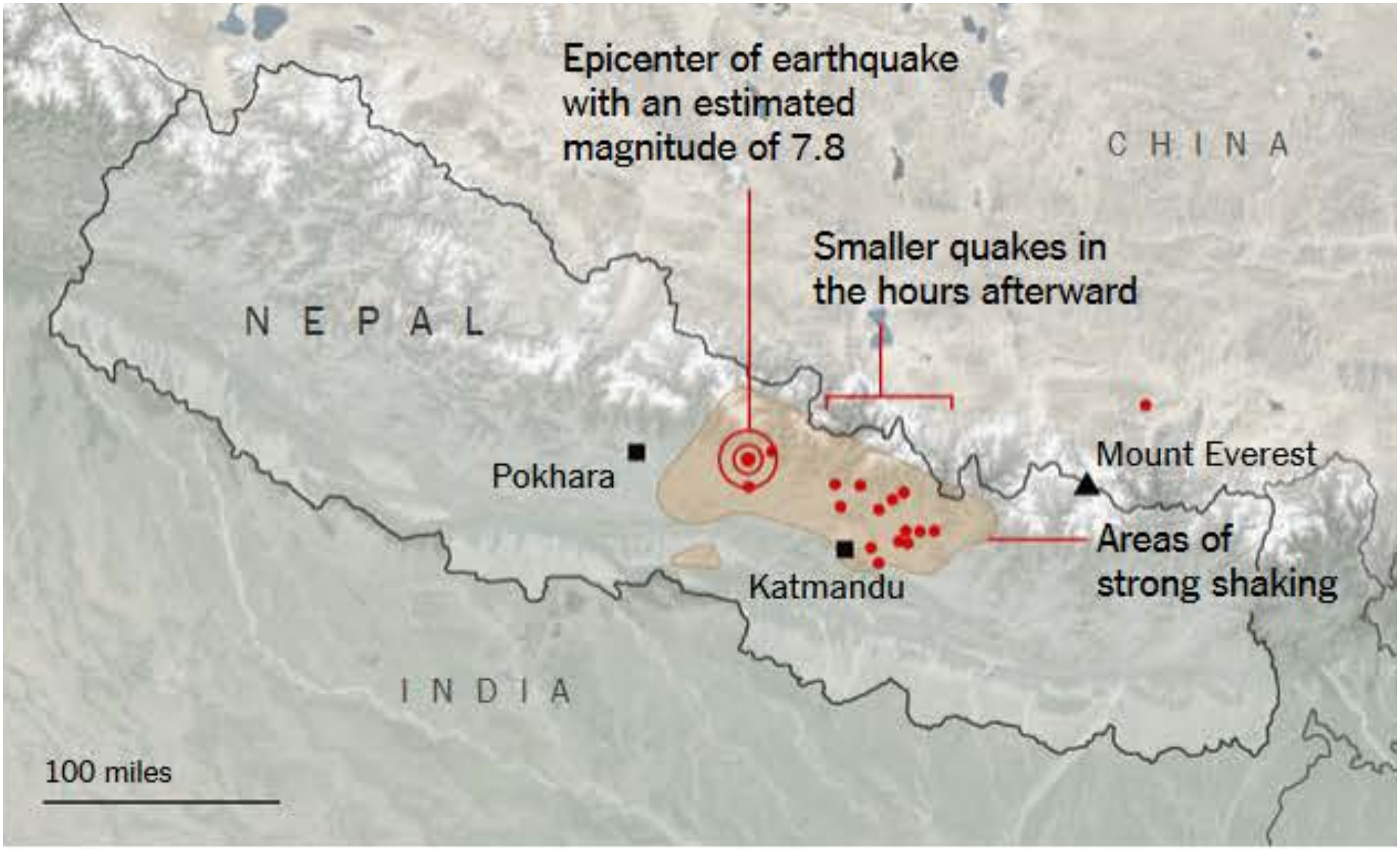

1 s Sa (%g)
10
10
10
10
10
10
10
Kathmandu
Tulsipur
Birganj
Gorakhpur
Muzaffarpur
Chhapra
Jaunpur
km
0
100



strike= 295° d
10°

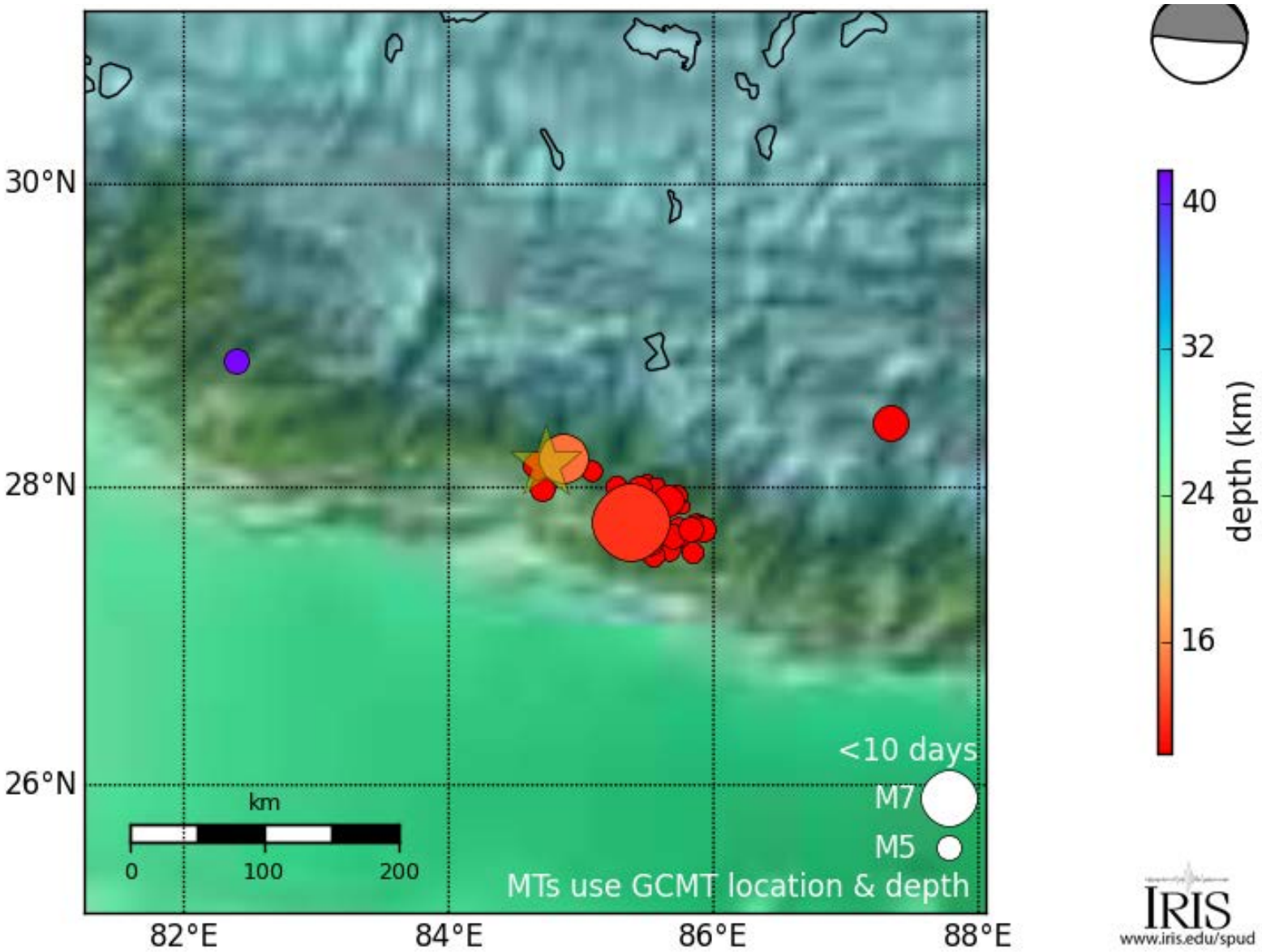


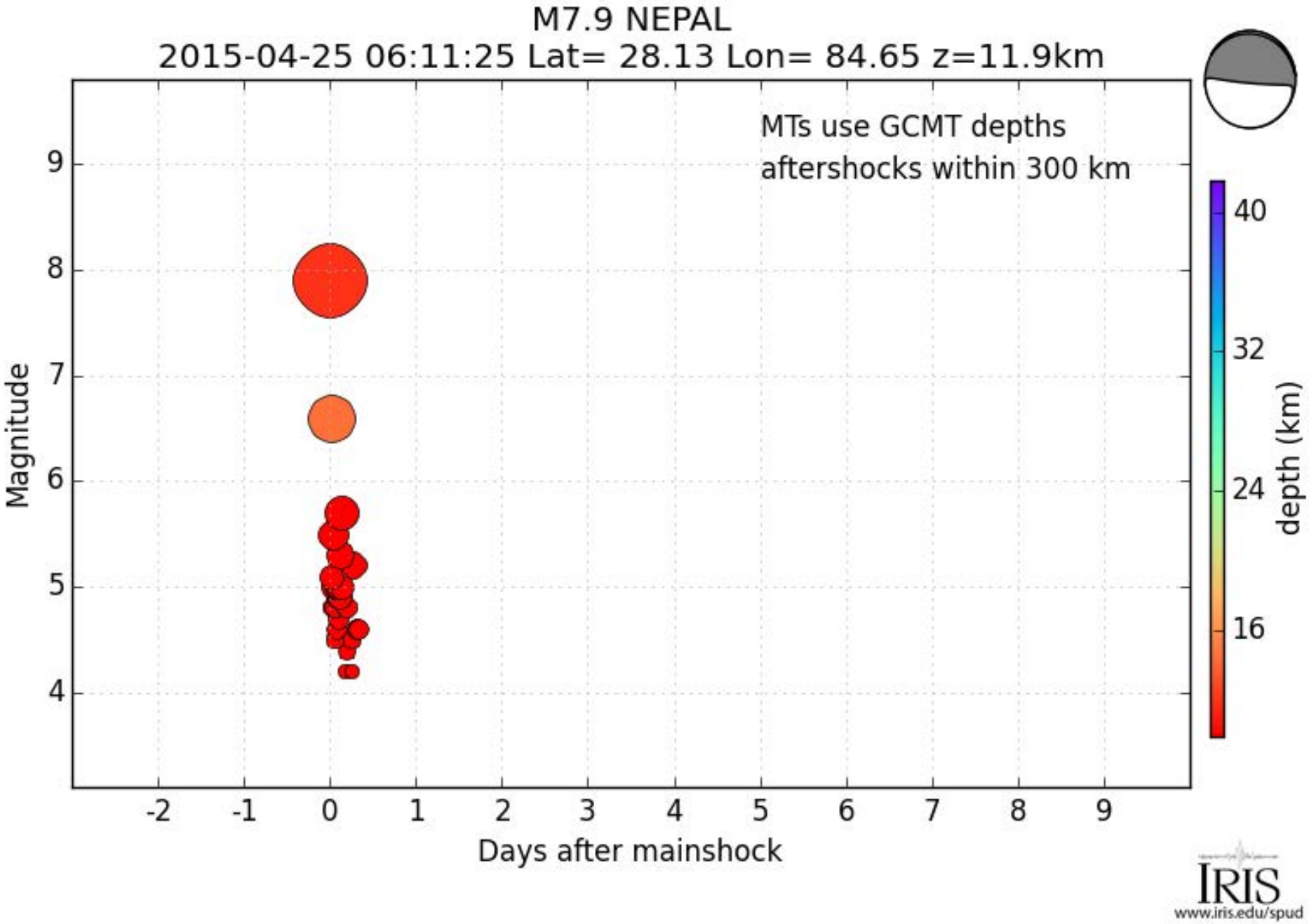

Cross-section of slip distribution
Strike = 295
Distance Along Strike (km)
−140 −120 −100 −80 −60 −40 −20 0 20 40 60 80
Distance Along Dip (km)
−80 −60 −40 −20 0 20 40 60 80
Depth Relative to Hypocenter (15.0 km)
−10 0 10
5
10
15
20
25
20
25
20
30
35
40
Rupture Front Contours Plotted Every 5 s
0.0 0.5 1.0 1.5 2.0 2.5 3.0
Slip (m)



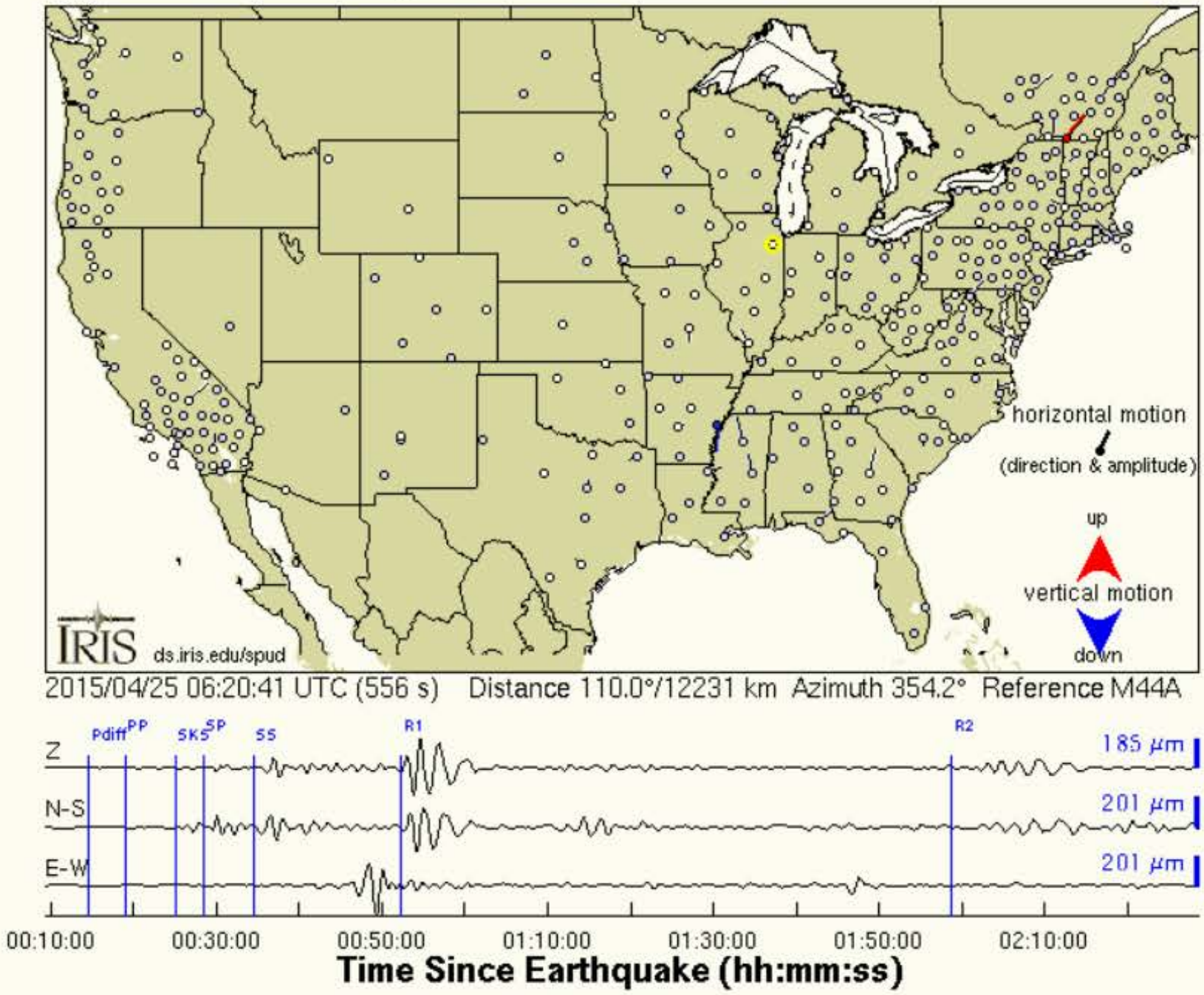
By The New York Times; satellite image by NASA/U.S.G.S. Landsat via Google Earth

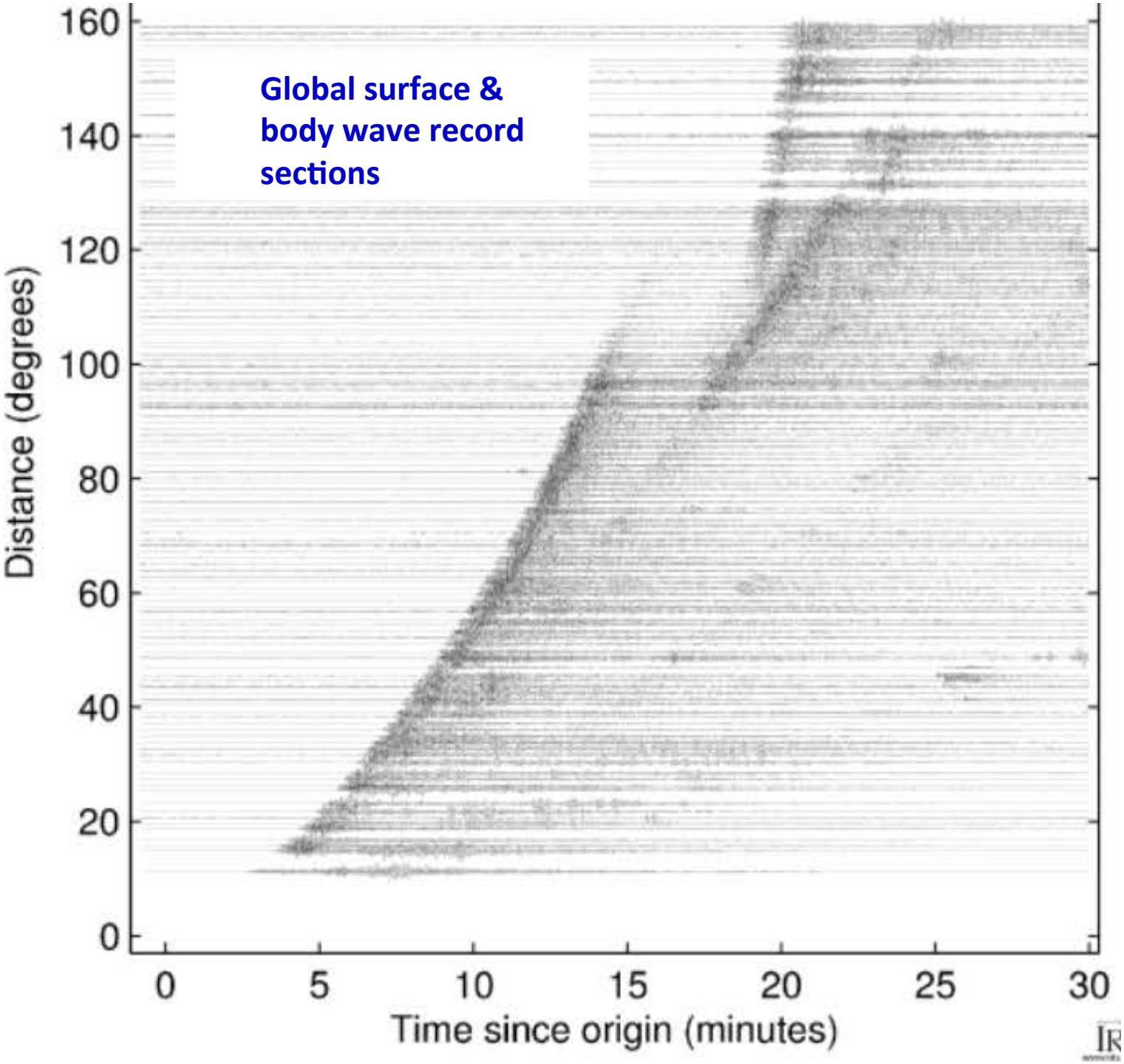
Aftershocks of M 7.9 NEPAL

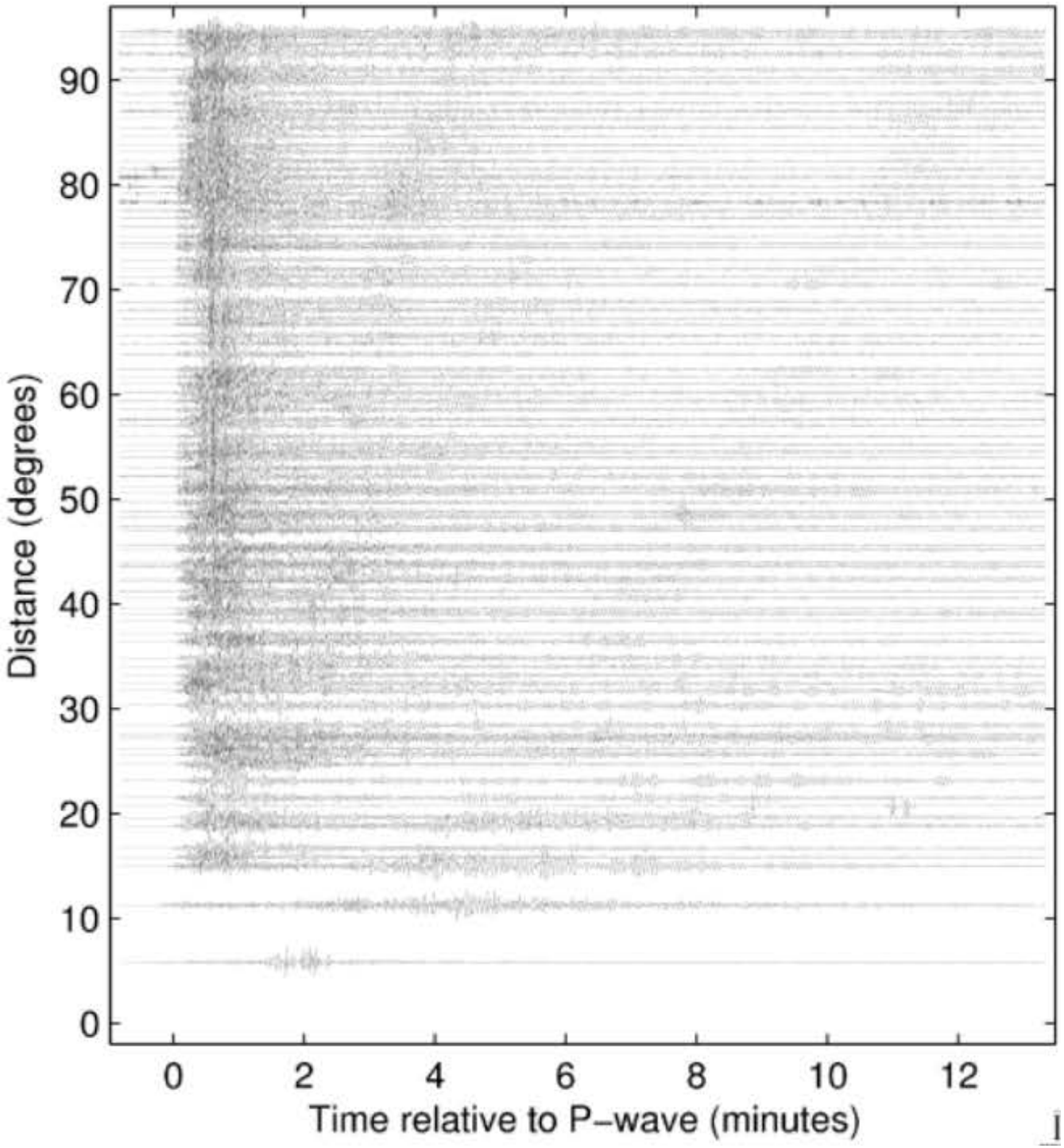



M7.9 NEPAL
2015-04-25 06:11:25 Lat= 28.13 Lon= 84.65 z=11.9km
MTs use GCMT depths
aftershocks within 300 km
Magnitude
9
8
7
6
5
4
-2
-1
0
1
2
3
4
5
6
7
8
9
Days after mainshock
40
32
24
16
depth (km)
IRIS
www.iris.edu/spud

April 25, 2015, NEPAL, M=7.9




Global surface &
body wave record
sections
Distance (degrees)
0
20
40
60
80
100
120
140
160
0
5
10
15
20
25
30
Time since origin (minutes)



Phase aligned record sections

- **The UNESCO World Heritage Site of Kathmandu Durbar Square reportedly collapsed Historic buildings in Kathmandu lay in rubble on the ground**
- **The nine-story Dharahara Tower, one of Kathmandu's landmarks built by Nepal's royal rulers as a watchtower in the 1800s and a UNESCO-recognized historical monument was totally collapsed.**
- **The quake struck at 11:41 local time**
- **Earthquake triggers avalanches at Mt. Everest**
- **Massive damage in Gorkha, Lamjung and Bhaktapur**

Death toll	
Nepal	1,457
India	34
Tibet	12
Bangladesh	2
Total	**1,505**

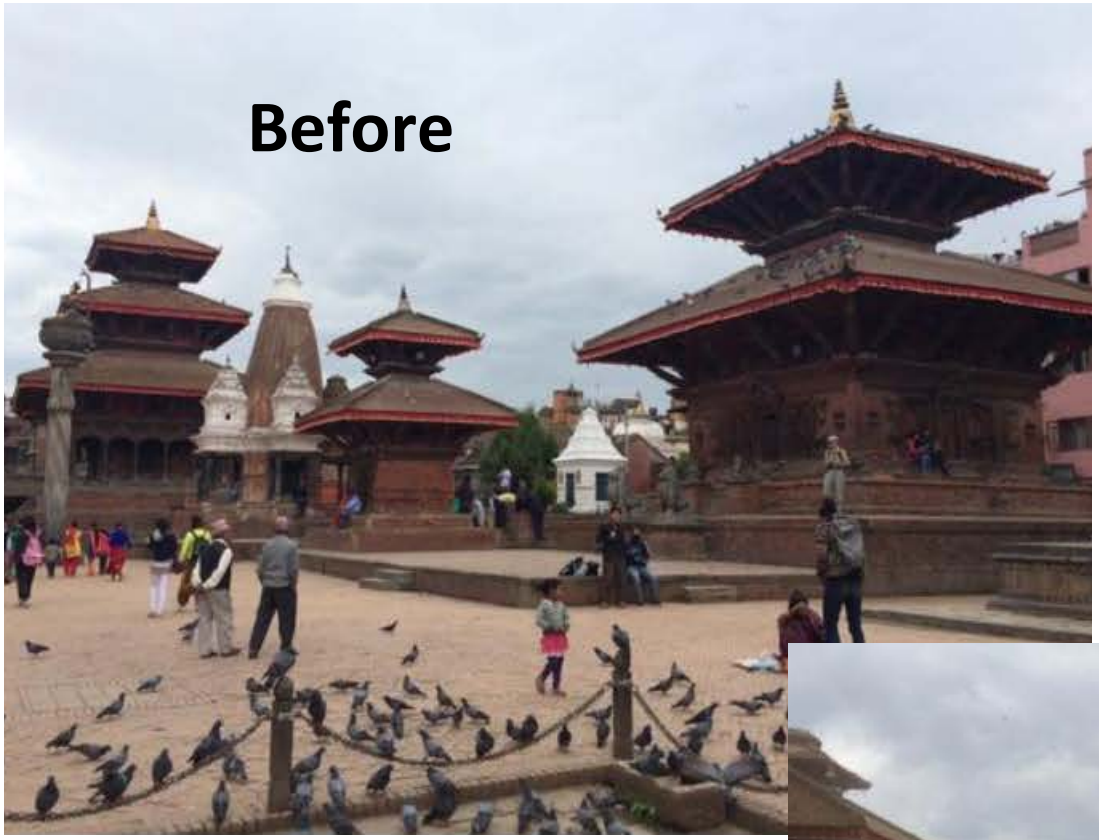
The Dharahara tower

People search for survivors in the debris of Dharahara tower.

The Manakamana Temple

Kathmandu Durbar Square

Kathmandu's Darbar Square


Before


After


world heritage site Basantapur
Dist to epicenter: 83.6 Km
EMSC

Collapsed buildings at Lalitpur, on the outskirts of Kathmandu.


गेष्ट हाउस

The Park Horizon apartments in Kathmandu

Kathmandu's Durbar Square


NIC ASIA
ASIA
NIC ASIA

People search for survivors stuck under the rubble of a destroyed building in Kathmandu

Photograph: Narendra Shrestha/EPA


THE SHIP RESTAURANT


REUTERS


reblop.com
reblop.com


Observation: Kathmandu, Nepal
Dist to epicenter: 83.6 Km
EMSC

Observation: Kathmandu
Dist to epicenter: 83.6 Km


This image was tweeted by @ashbel_nialler

Avalanche on Everest south side