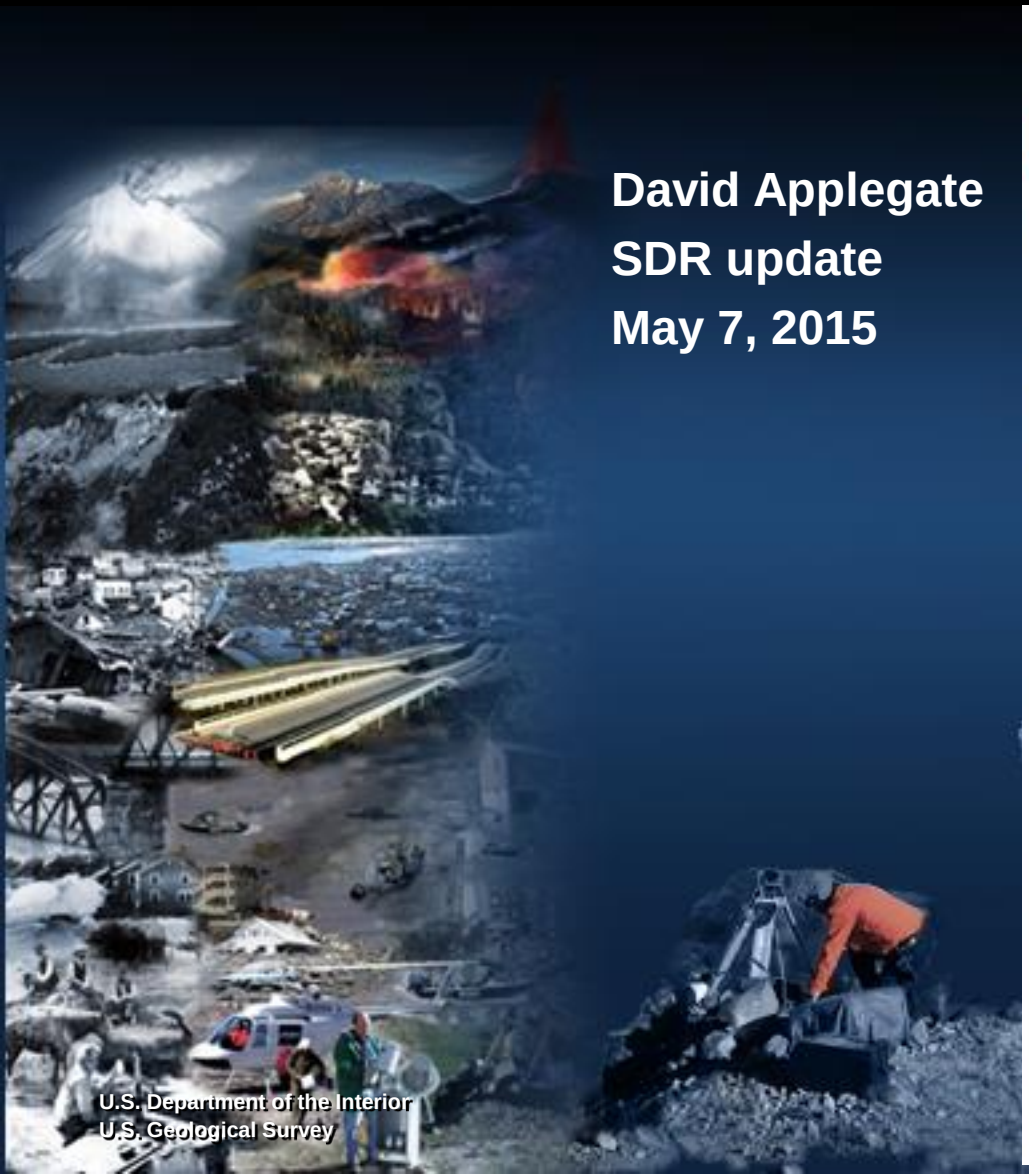
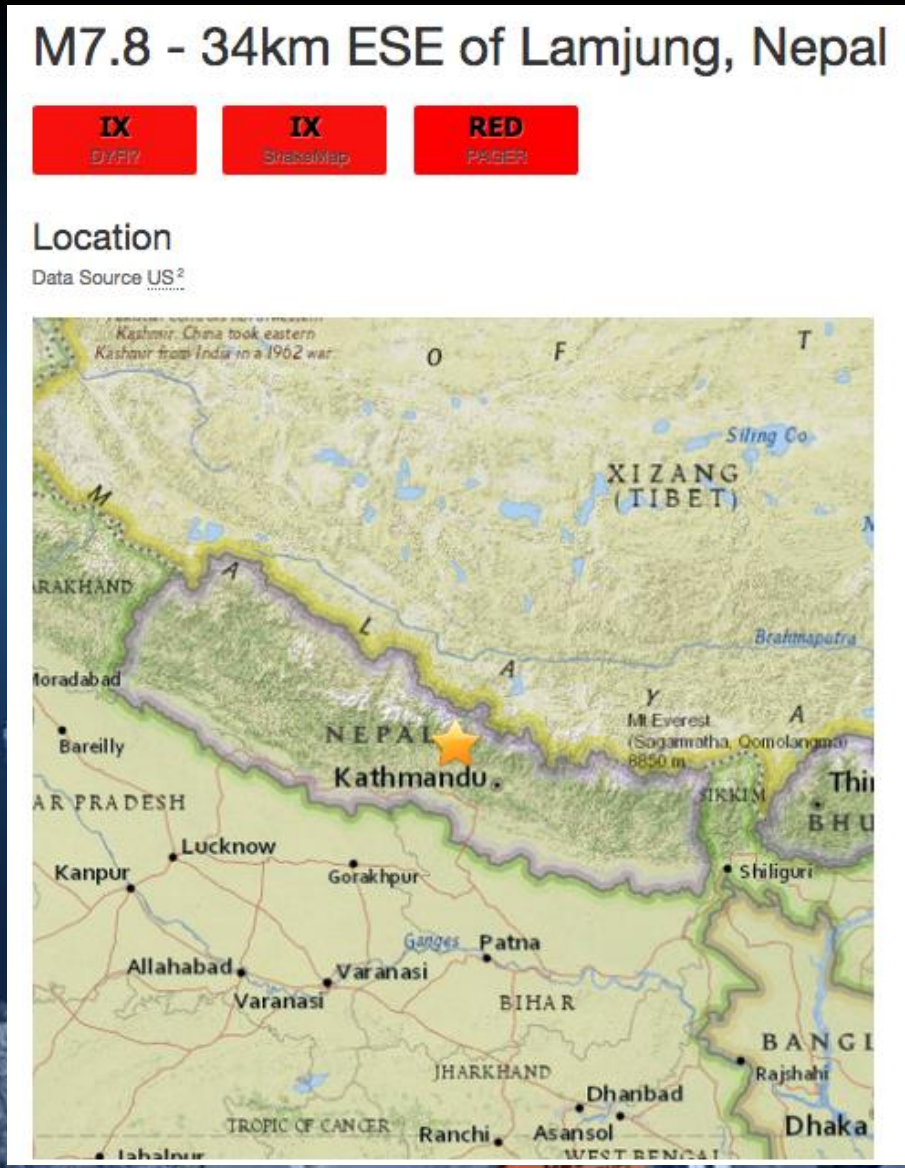
Magnitude-7.8 Gorkha (Nepal) earthquake of April 25, 2015

David Applegate
SDR update
May 7, 2015





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USG HUMANITARIAN ASSISTANCE FOR THE NEPAL EARTHQUAKE

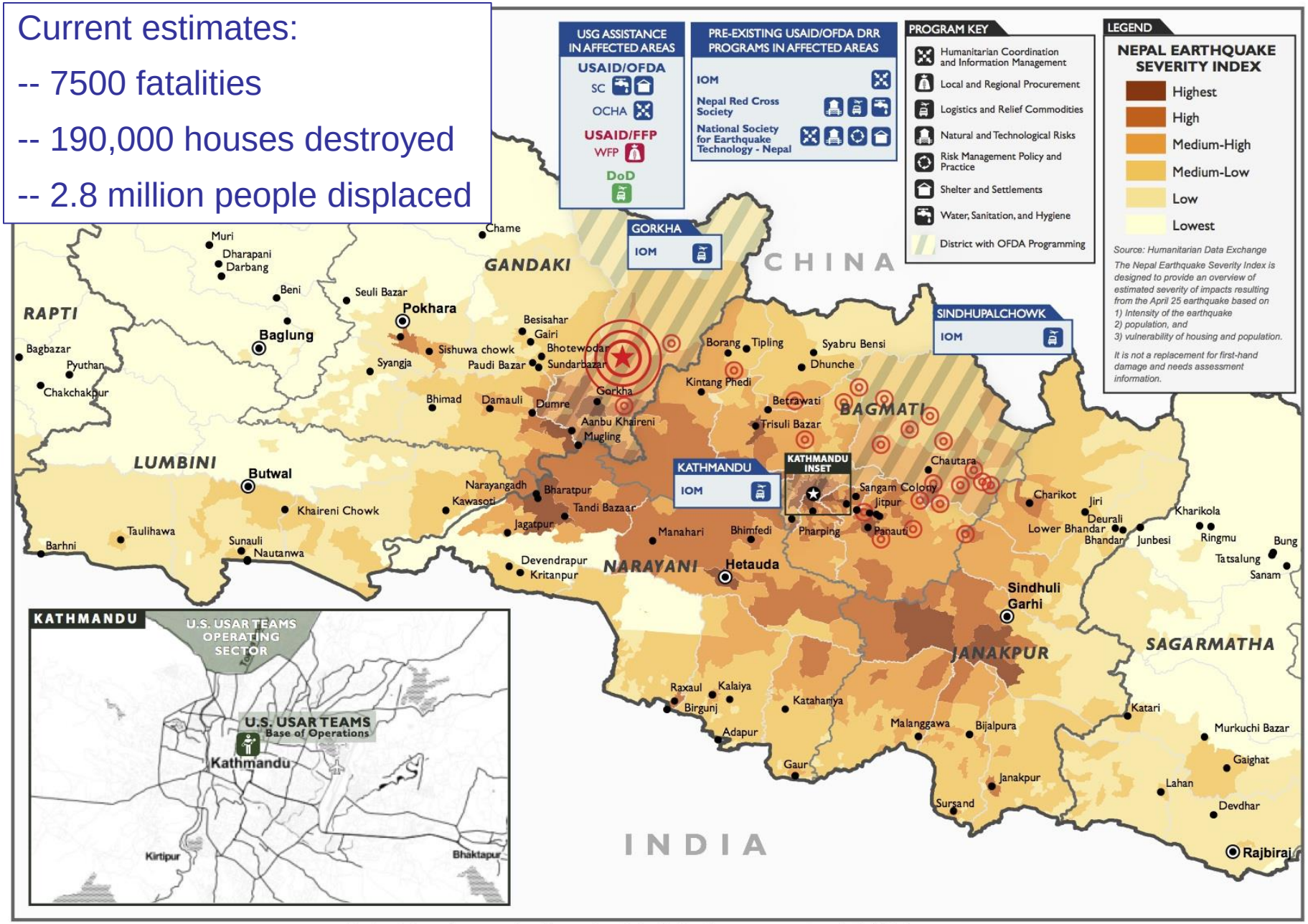
Last Updated 05/04/15

Current estimates:

-- 7500 fatalities

-- 190,000 houses destroyed

-- 2.8 million people displaced



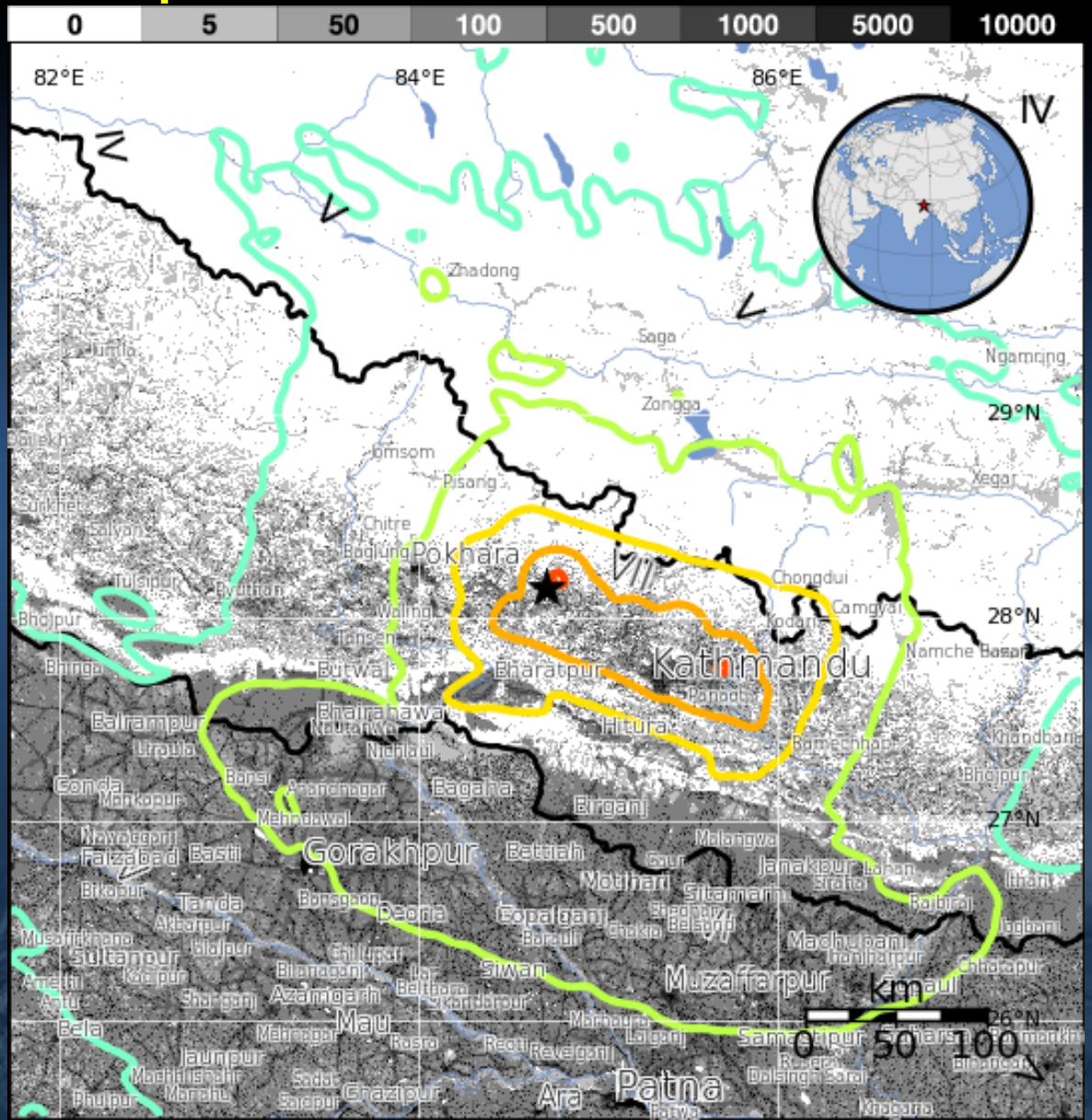
USGS roles and responsibilities in response to the Ghorka (Nepal) earthquake

- The 24/7 USGS National Earthquake Information Center (NEIC) provided a suite of rapid situational awareness products to government and the global public (e.g. ShakeMap, PAGER , Did You Feel It, and ShakeCast).
- Held S&T coordination calls including USAID, FEMA, NASA, NSF, NIST, NGA, OSTP, NSC staff, and a range of university and NGO partners.
- Issued aftershock forecasts to provide a sense of how many, how big, and how long the aftershocks will continue.
- Landslide experts work with partners to prioritize imagery acquisitions and carry out interpretative analysis.
- Coordinated satellite tasking requests through International Charter on Space and Major Disasters. Resulting imagery posted on USGS Hazards Data Distribution System.
- The USGS/USAID Earthquake Disaster Assistance Team (EDAT) is a mechanism to provide technical assistance.
- Served as a primary source of information for media outlets.

USGS

PAGER: Prompt Assessment of Global Earthquakes for Response

- Correlates ShakeMap with population density database to estimate scale of potential disaster.
- New versions released when new information changes the forecasted impacts.
- Alert levels for estimated fatalities and economic losses.



USGS

PAGER: Prompt Assessment of Global Earthquakes for Response

USGS science for a changing world

Earthquake Shaking — Red Alert

GSN · ANSS · USAID FROM THE AMERICAN PEOPLE

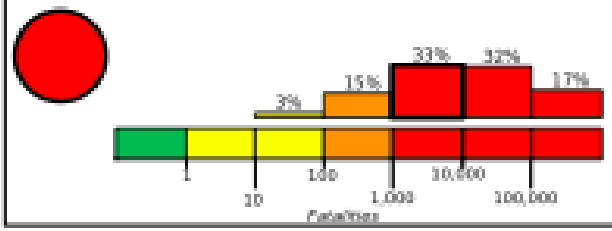
M 7.8, NEPAL

Origin Time: Sat 2015-04-25 06:11:26 UTC (11:56:26 local)

Location: 28.15°N 84.71°E Depth: 15 km

PAGER
Version 7
Created: 1 week, 2 days after earthquake

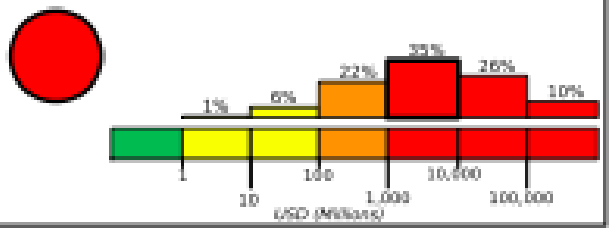
Estimated Fatalities



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 economic losses are 10-70% GDP of Nepal.

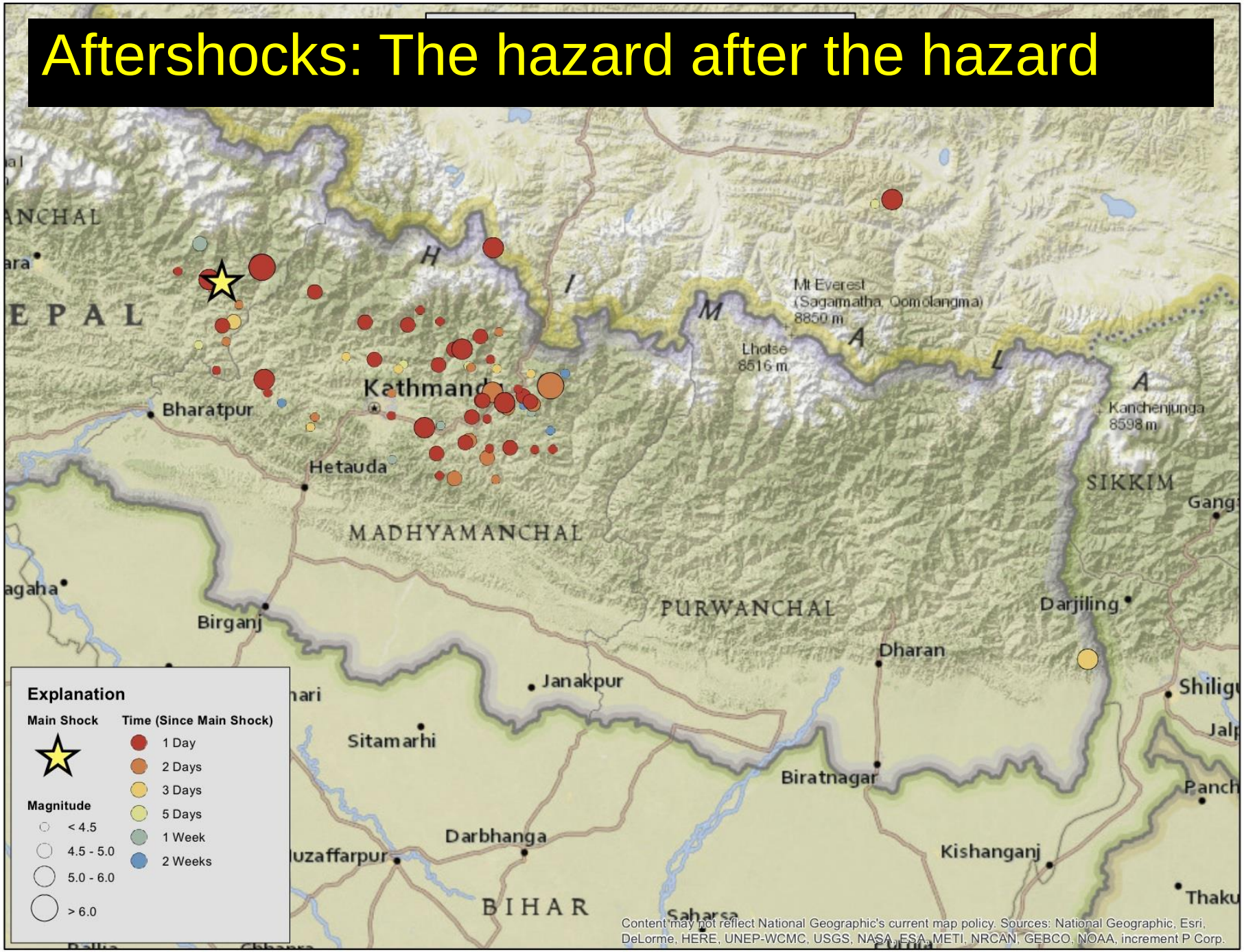
Estimated Economic Losses



Estimated Population Exposed to Earthquake Shaking

ESTIMATED POPULATION EXPOSURE (k = x1000)		- -*	- -*	7,053k*	82,752k*	55,057k	2,355k	4,483k	86k	0
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

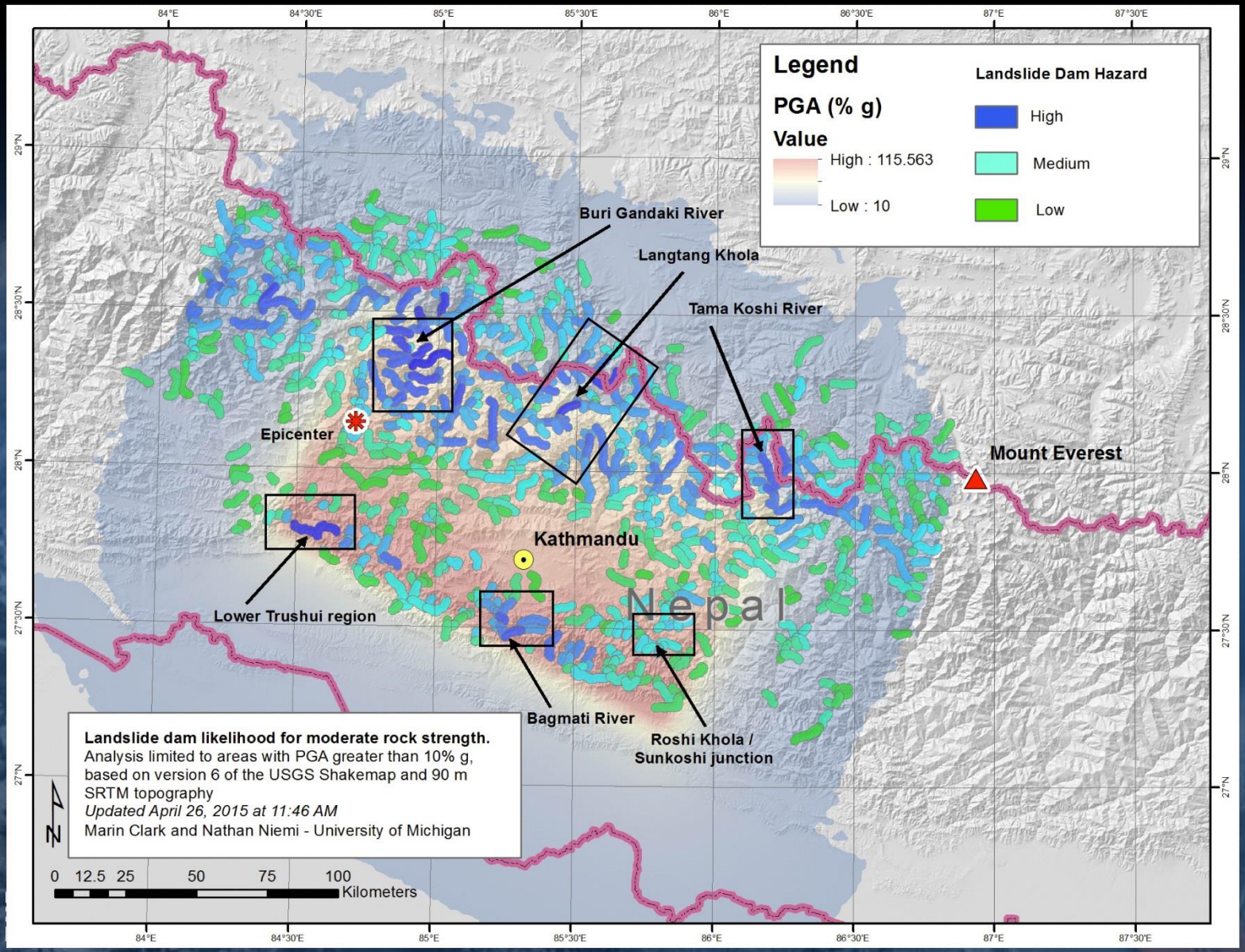
Aftershocks: The hazard after the hazard



USGS aftershock forecast

Forecast Time Window	Magnitude (M) range of aftershocks considered	Range of Expected Number of Aftershocks (95% confidence)	Probability of one or more aftershocks
1 Week starting on May 01, 2015 to the end of May 07, 2015	M ≥ 5.0	0 - 4	78%
	M ≥ 6.0	0 - 1	14%
	M ≥ 7.0	0 - 0	1%
	M ≥ 7.8	0 - 0	0.2%
1 Month starting on May 01, 2015 to the end of May 31, 2015	M ≥ 5.0	0 - 7	83%
	M ≥ 6.0	0 - 2	16%
	M ≥ 7.0	0 - 1	2%
	M ≥ 7.8	0 - 0	0.3%
1 Year starting at May 01, 2015 to the end of April 30, 2016	M ≥ 5.0	2 - 11	93%
	M ≥ 6.0	0 - 2	24%
	M ≥ 7.0	0 - 1	3%
	M ≥ 7.8	0 - 0	0.4%

Rapid assessment of landslide dam hazard



Marin Clark and Nathan Niemi, Univ. of Michigan

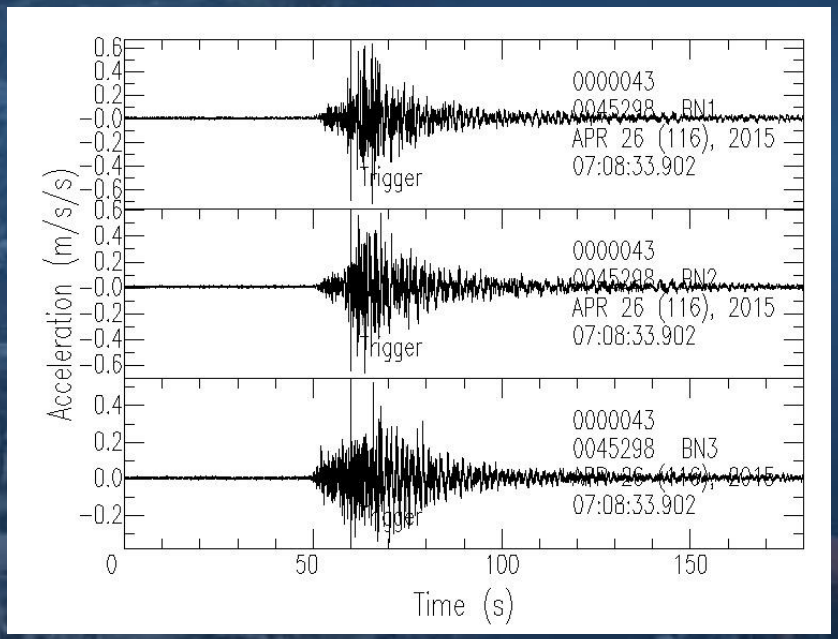
Questions for post-earthquake investigations

- Existence of surface rupture?
- Geometry of fault surface that slipped?
- Landslide-dammed rivers causing flood hazard?
- Distribution and nature of landslides?
- Likelihood of large aftershocks?
- How does this fault fit into the regional tectonics?
- How did structures perform?
- How well did retrofits work?
- Why did Kathmandu escape a worst-case disaster?

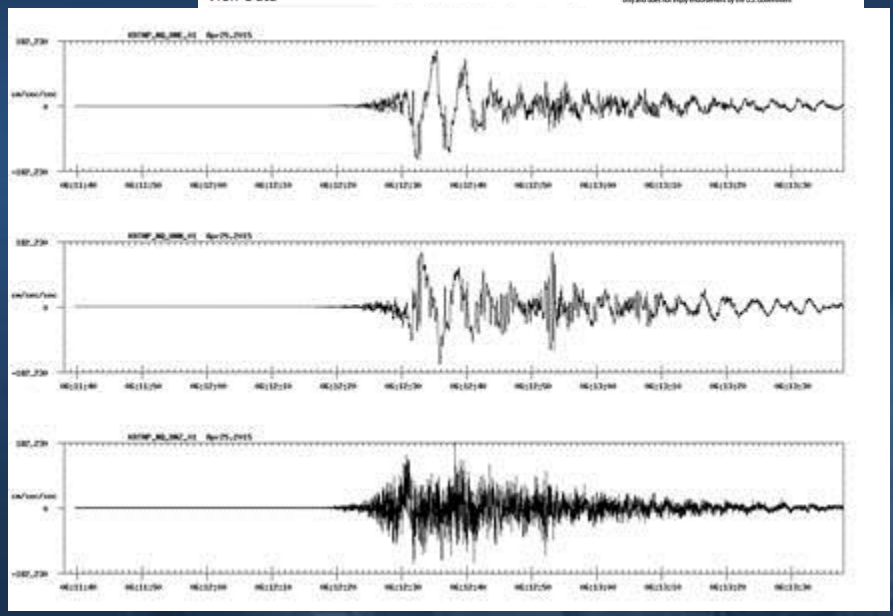
USGS

Priceless data from cheap seismic sensors

QuakeCatcher Network
(Stanford Univ.)



NetQuakes
(USGS)



USGS

Any questions?

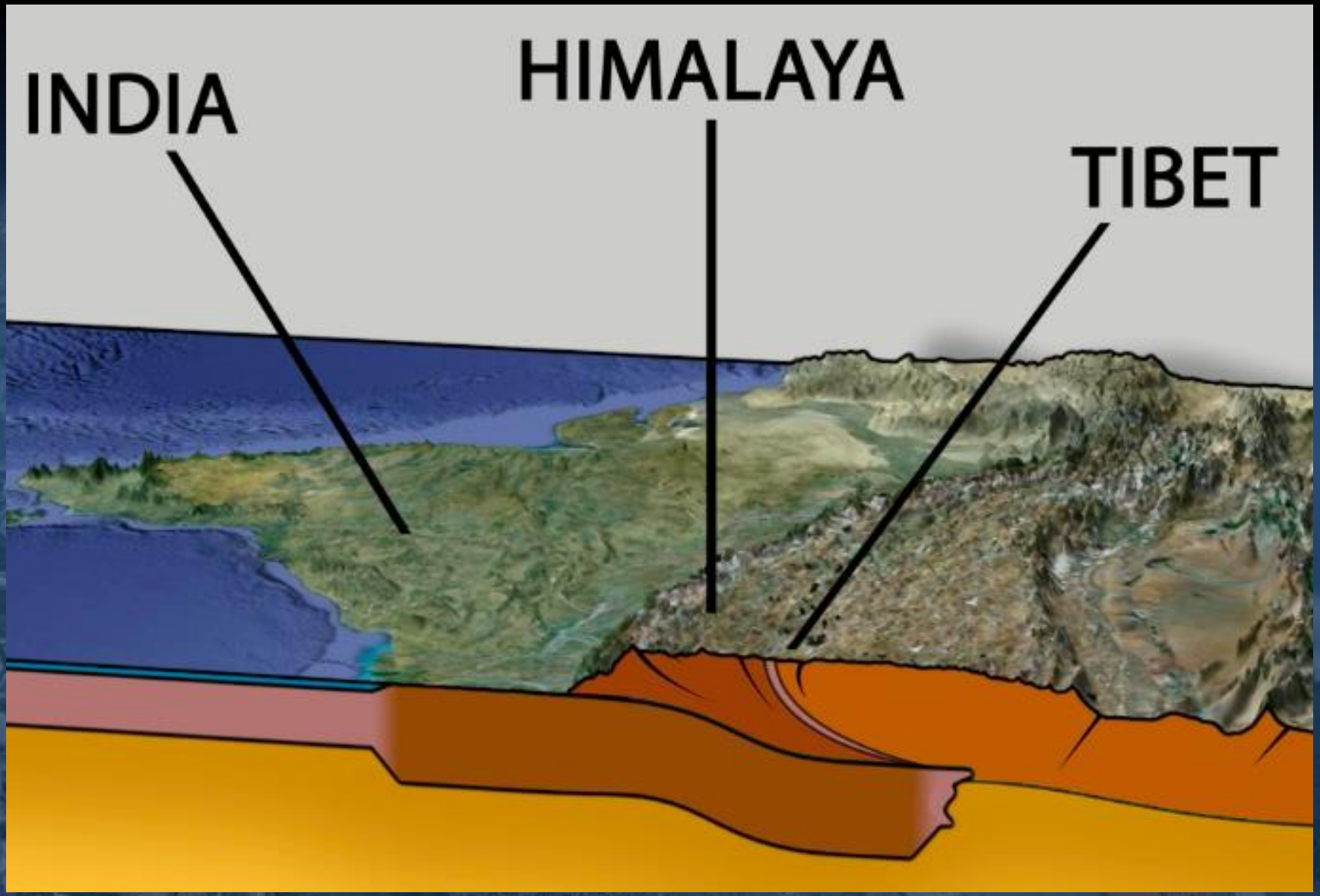
Get more information at

earthquake.usgs.gov

applegate@usgs.gov
703-648-6600

USGS

Continent-continent collision



Stress loading of un-slipped fault ramp

Earthquake did not extend to shallow extent of fault.

Stress has thus been raised on un-slipped, shallow fault area to the south.

Fault areas to east and west may also have had stress raised.