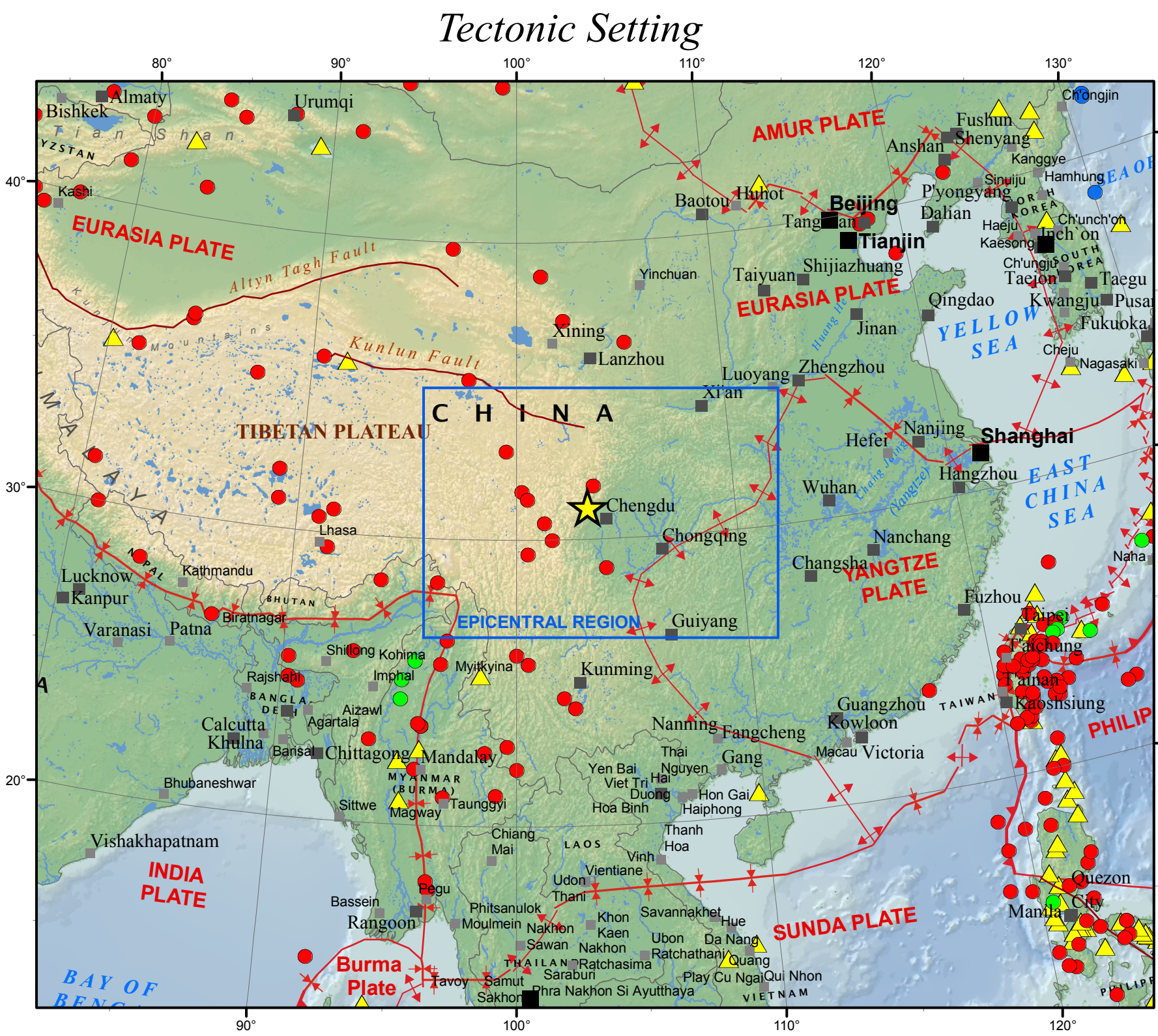


# M7.9 Eastern Sichuan, China Earthquake of 12 May 2008



Eastern Sichuan, China  
12 May 2008 6:28:00 UTC  
30.986° N, 103.364° E  
Depth 19 km  
Mw = 7.9 (USGS)

At least 69,185 people killed, 374,171 injured and 18,467 missing and presumed dead in the Chengde-Lixian-Guangyuan area. More than 45.5 million people in 10 provinces and regions were affected. At least 15 million people were evacuated from their homes and more than 5 million were left homeless. An estimated 5.36 million buildings collapsed and more than 21 million buildings were damaged in Sichuan and in parts of Chongqing, Gansu, Hubei, Shaanxi and Yunnan. The total economic loss was estimated at 86 billion US dollars. Beichuan, Dujiangyan, Wulong and Yingxiu were almost completely destroyed. Landslides and rockfalls damaged or destroyed several mountain roads and railways and buried buildings in the Beichuan-Wenchuan area, cutting off access to the region for several days. At least 700 people were buried by a landslide in Qinghai. Landslides also dammed several rivers, creating 34 barrier lakes which threatened about 700,000 people downstream. A train was buried by a landslide near Longnan, Gansu. At least 2,473 dams sustained some damage and more than 53,000 km roads and 47,000 km of tap water pipelines were damaged. About 1.5 km of surface faulting was observed near Qingchuan, surface cracks and fractures occurred on three mountains in the area, and subsidence and street cracks were observed in the city itself. Maximum intensity XI was assigned in the Wenchuan area. Felt in much of central, eastern and southern China, in parts of Bangladesh, Taiwan, Thailand and Vietnam. Seiches were observed at Kotlarpura, Bangladesh.

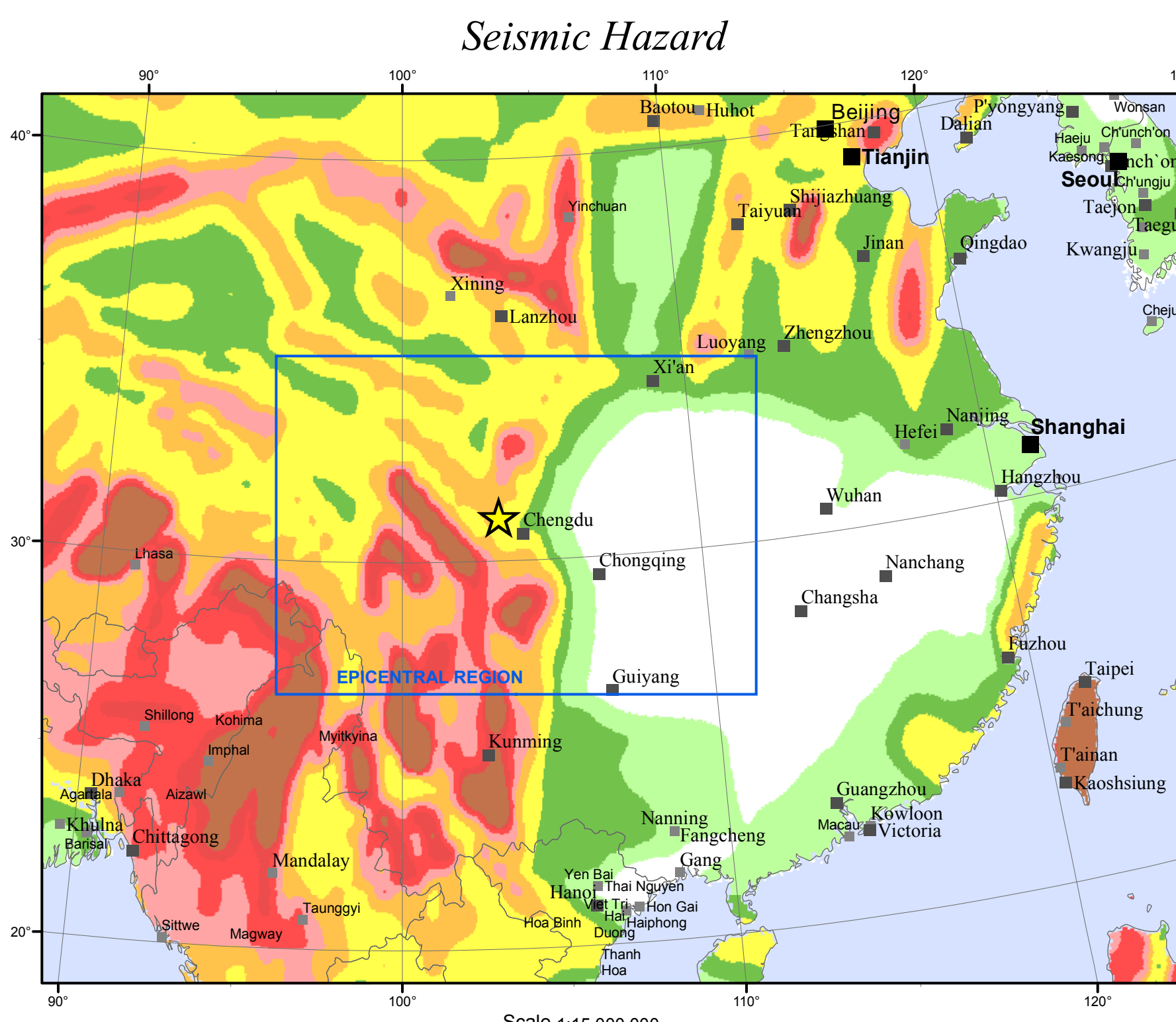


**EXPLANATION**

- ★ Mainshock
- Mag ≥ 7.0
  - 0 - 69 km
  - 70 - 299
  - 300 - 600
- Plate Boundaries
  - Subduction
  - Transform
  - Divergent
  - Convergent
  - ▲ Volcanoes

**RELATIVE PLATE MOTIONS**

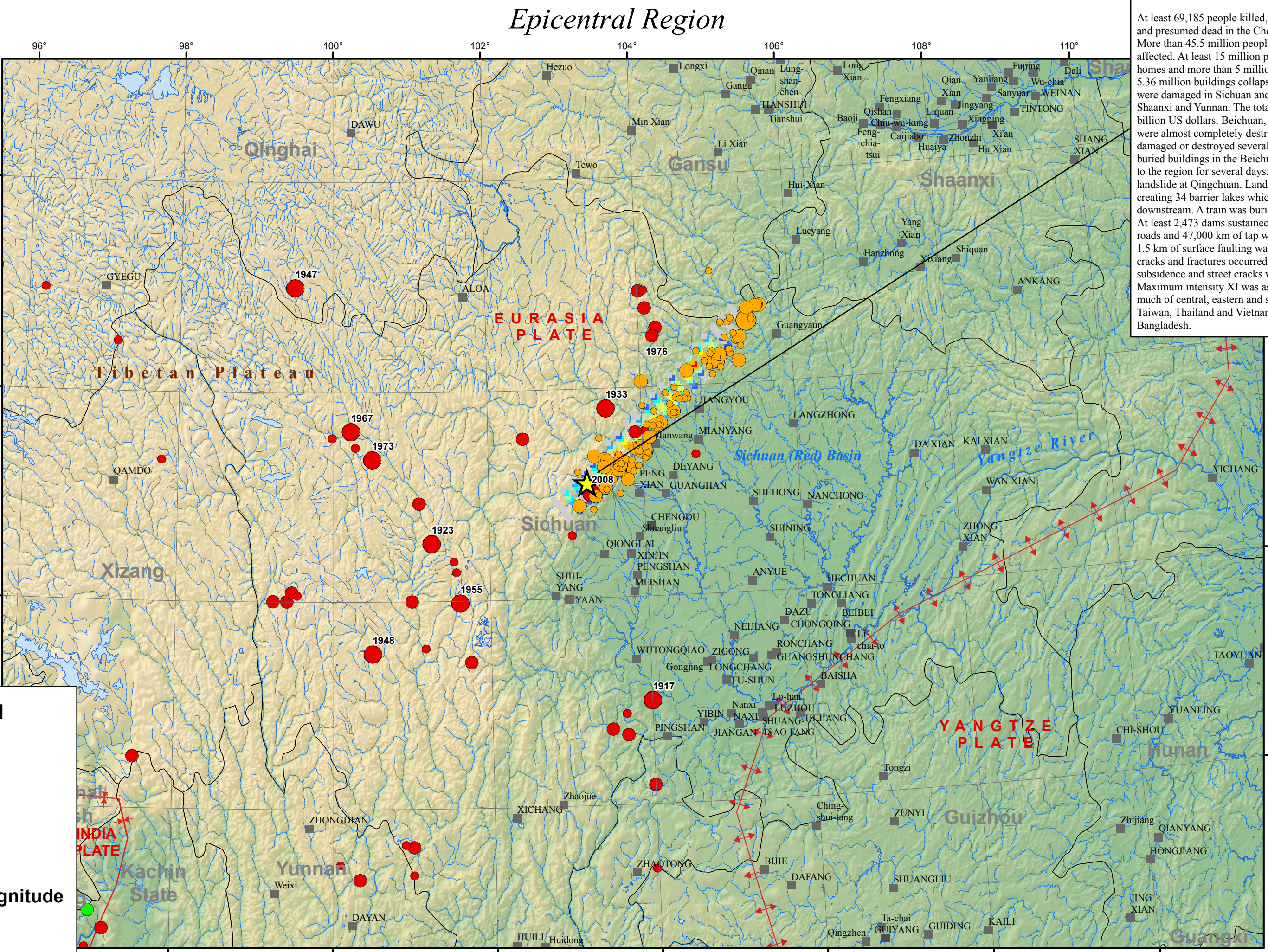
Red vectors indicate relative plate motion. The India Plate is moving northward relative to the Eurasia Plate at about 50 mm/yr.



Seismic hazard is expressed as peak ground acceleration (PGA) on firm rock, in meters/sec<sup>2</sup>, expected to be exceeded in a 50-yr period with a probability of 10 percent.

Peak Ground Acceleration in m/sec<sup>2</sup>

2 4 8 1.6 2.4 3.2 4.0 4.8



**EXPLANATION**

- ★ Mainshock
- Aftershocks
  - 4 - 4.9
  - 5 - 5.9
  - 6 - 6.9
- Earthquake Magnitude
  - 4.00 - 5.99
  - 6.00 - 6.99
  - 7.00 - 7.99
  - 8.00 - 8.99
  - 9.00 - 9.99
- Earthquake Depth
  - 0 - 69
  - 70 - 299
  - 300 - 700

**TECTONIC SUMMARY**

The Sichuan earthquake of May 12, 2008, occurred as the result of motion on a northeast striking reverse fault or thrust fault on the northwestern margin of the Sichuan Basin. The earthquake's epicenter and focal-mechanism are consistent with it having occurred as the result of movement on the Longmenshan fault or a tectonically related fault. The earthquake reflects tectonic stresses resulting from the convergence of crustal material slowly moving from the high Tibetan Plateau, to the west, against strong crust underlying the Sichuan Basin and southeastern China.

On a continental scale, the seismicity of central and eastern Asia is a result of northward convergence of the India plate against the Eurasia plate with a velocity of about 50 mm/yr. The convergence of the two plates is broadly accommodated by the uplift of the Asian highlands and by the motion of crustal material to the east away from the uplifted Tibetan Plateau.

The northwestern margin of the Sichuan Basin has previously experienced destructive earthquakes. The magnitude 7.3 earthquake of August 25, 1933, killed more than 6,800 people. Another 2,500 later perished as the result of failure of a natural dam created by a landslide caused by the earthquake.

**Significant Earthquakes Mag >= 7.0**

Year	Mon	Day	Time	Lat	Long	Dep	Mag
1917	07	30	2354	29.000	104.000	0	7.3
1923	03	24	1240	30.553	101.258	25	7.2
1933	08	25	0750	31.810	103.541	25	7.3
1947	03	17	0819	33.000	99.500	0	7.5
1948	05	25	0711	29.500	100.500	0	7.2
1950	08	15	1409	28.500	96.500	0	8.6
1955	04	14	0129	29.981	101.613	10	7.5
1967	08	30	0422	31.631	100.232	8.1	7.0
1973	02	06	1037	31.361	100.504	6.6	7.4
2008	05	12	0628	30.986	103.364	19	7.9

**DATA SOURCES**

**EARTHQUAKES AND SEISMIC HAZARD**  
USGS, National Earthquake Information Center  
NOAA, National Geophysical Data Center  
IASPEI, Centennial Catalog (1900 - 1999) and extensions (Engdahl and Villaseñor, 2002)  
HDF (unpublished earthquake catalog) (Engdahl, 2003)  
Global Seismic Hazard Assessment Program

**PLATE TECTONICS AND FAULT MODEL**  
PB2002 (Bird, 2003)  
Finite Fault Model, Chen Ji, UC Santa Barbara (2007)

**BASE MAP**  
NIMA and ESRI, Digital Chart of the World  
USGS, EROS Data Center  
NOAA GEBCO and GLOBE Elevation Models

**REFERENCES**

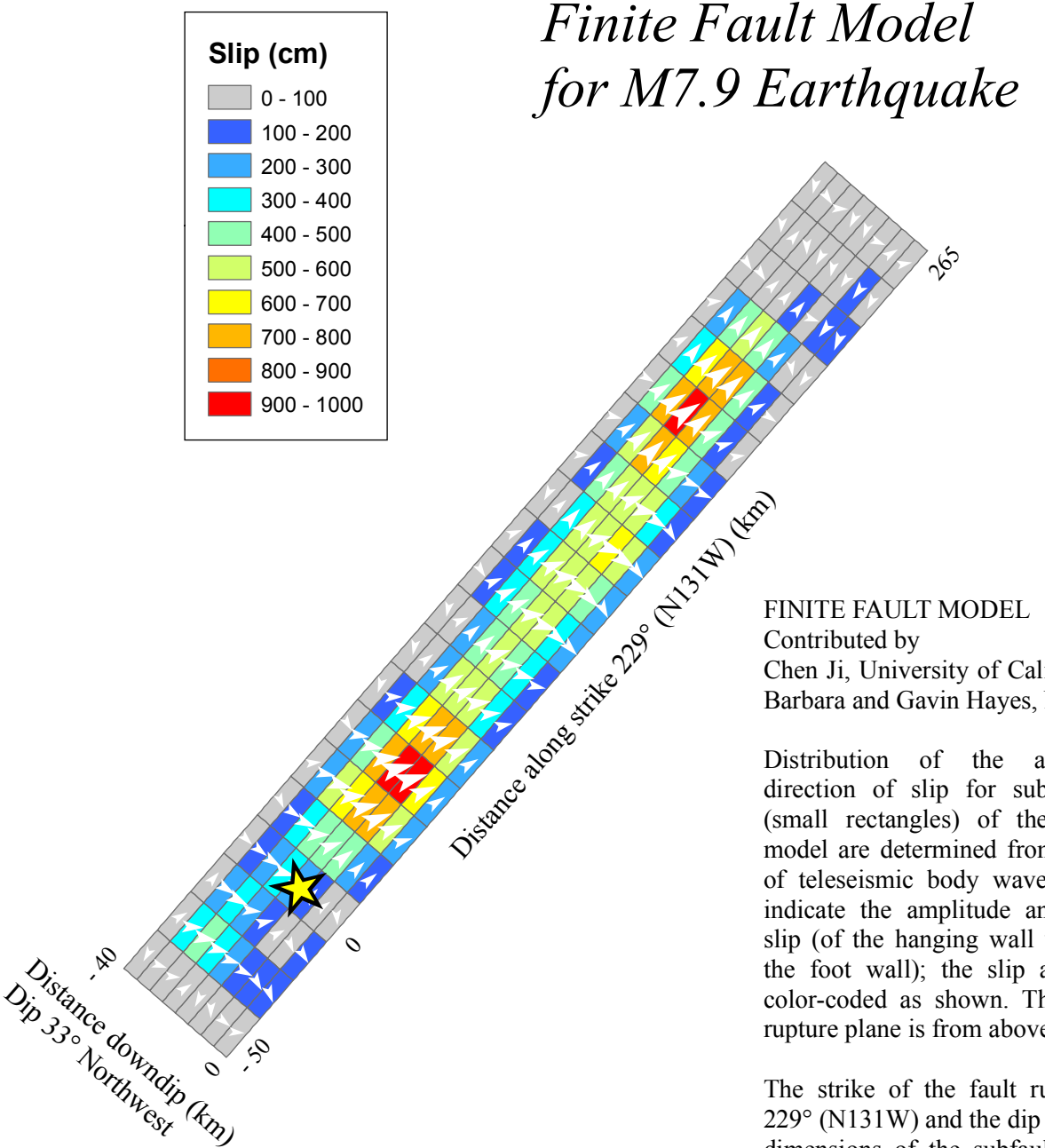
Bird, P., 2003. An updated digital model of plate boundaries; Geochim. Geophys. Geosyst., v. 4, no. 3, pp. 1027-80.

Engdahl, E.R. and Villaseñor, A., 2002. Global Seismicity: 1900 - 1999, chap. 41 of Lee, W.H.K., and others, eds., International Earthquake and Engineering Seismology, Part A: New York, N.Y., Elsevier Academic Press, 932 p.

Engdahl, E.R., Van der Hilst, R.D., and Buland, R.P., 1998. Global teleseismic earthquake relocation with improved travel times and procedures for depth determination; Bull. Seism. Soc. Amer., v. 88, p. 722-743.

**DISCLAIMER**

Base map data, such as place names and political boundaries, are the best available but may not be current or may contain inaccuracies and therefore should not be regarded as having official significance.



**FINITE FAULT MODEL**

Contributed by  
Chen Ji, University of California at Santa Barbara and Gavin Hayes, NEIC

Distribution of the amplitude and direction of slip for subfault elements (small rectangles) of the fault rupture model are determined from the inversion of teleseismic body waveforms. Arrows indicate the amplitude and direction of slip (of the hanging wall with respect to the foot wall); the slip amount is also color-coded as shown. The view of the rupture plane is from above.

The strike of the fault rupture plane is 229° (N131W) and the dip is 13° NW. The dimensions of the subfault elements are 15 km in the strike direction and 5 km in the dip direction. The seismic moment release based on this plane is .115E+29 dyne cm.

**USGS** **USAID**

**M 7.9, EASTERN SICHUAN, CHINA**  
Origin Time: Mon 2008-05-12 06:28:01 UTC  
Location: 31.02° N 103.37° E Depth: 19 km

**Estimated Population Exposed to Earthquake Shaking**

ESTIMATED POPULATION EXPOSURE (x1000)	I	II-III	IV	V	VI	VII	VIII	IX	X+
ESTIMATED POPULATION EXPOSURE (x1000)	1	1	1	1	1	1	1	1	1
PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	None	None	None	Light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
POTENTIAL DAMAGE	None	None	None	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy	Very Heavy

Population Exposure (population per 1 sq. km from LandScan 2005)

Selected City Exposure

City	Population	Intensity
Wangmo	133K	VIII
Taiyuan	123K	VII
Dayan	112K	VII
Liangzong	25K	VII
Chengde	3,950K	VI
Maoershan	254K	VI
Guangyuan	213K	VI
Nanchong	2,155K	V
Chongqing	3,267K	V
Lanzhou	3,305K	V
Shiyi	3,450K	IV

Overall, structures in this region are vulnerable to earthquake shaking. Though some resistant structures exist, A magnitude 6.4 earthquake struck the Sichuan, China region on August 23, 1976 (UTC), with estimated population exposures of 1,500 at intensity IX or greater and 5,700 at intensity VIII, resulting in 41 deaths. Additionally, a magnitude 7.3 struck this region in 1933 killing 6,800 people. Recent earthquakes in this area have also triggered landslide hazards that have contributed to losses. Users should consider the preliminary nature of this information and check for updates as additional data becomes available.

This information was automatically generated and has not been reviewed by a seismologist.  
<http://earthquake.usgs.gov/pager> Event ID: us2008ryan

**Did You Feel It?**  
USGS Community Internet Intensity Map (52 miles WNW of Chengde, China)

