Posters 2008 Humboldt County Fair

The 2008 Humboldt County Earthquake – Tsunami Room featured the Big Shaker earthquake simulator and posters about the May 2008 M7.9 China earthquake and lessons for the North Coast

The most important take-away message

Protecting yourself from injury during the earthquake is where it all begins. You can't evacuate if you are incapacitated by the shaking!

As soon as it is safe to move, get your "grab and go" kit and walk to high ground or inland away from the coast. Take the time to put on shoes as debris may make walking hazardous. Use tsunami hazard zone signs to guide you to a safe area.

Tsunamis are TRICKY! Just when you think the waves are done, another damaging surge may arrive. The largest waves may arrive many hours after the first. Stay away from the coast until officials say it is safe to return.

Lessons from the Sichuan, China Earthquake

The May 12, 2008 Magnitude 7.9 China Earthquake

What Happened:

At 2:28 PM local time on Monday, May 12 an earthquake ruptured a 150 mile-long segment of the Longmen Shan fault.

- >87,000 people killed
- >374,000 injured
- >5 million buildings collapsed
- 15 million people displaced
- 45.5 million people affected
- Landslides dammed 34 rivers
- $86 billion (US) economic losses

(source of information: USGS)

Yingxlu

Beichuan

Mianyang

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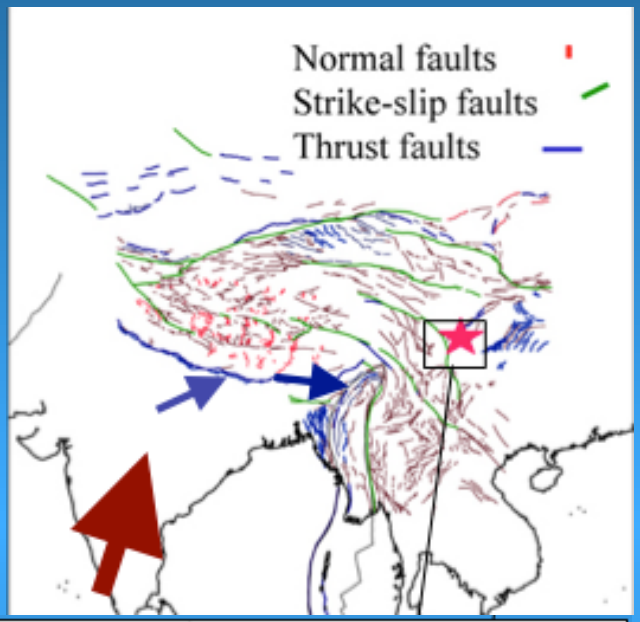
Lessons from the Sichuan, China Earthquake

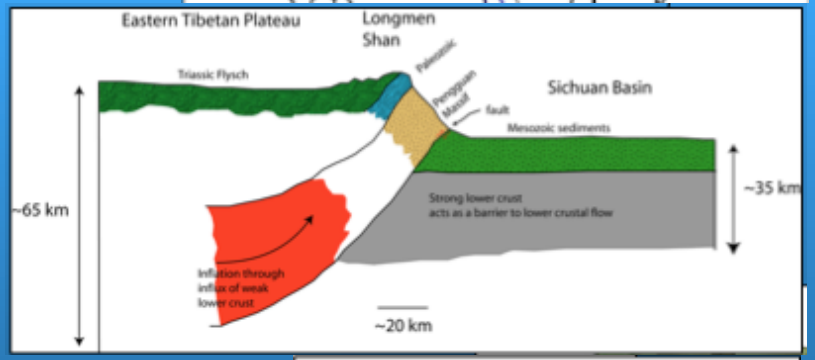
The May 12, 2008 Magnitude 7.9 China Earthquake

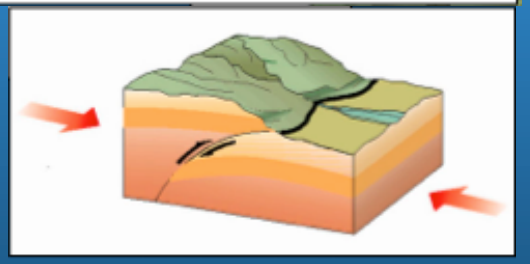
What caused the earthquake:

Many faults crisscross southwestern and central China, caused by the slow collision of the Indian subcontinent into Asia. This collision began about 45 million years ago and India continues to plow into Asia (brown arrow), raising the Himalayan Mountains and producing a great number of fault systems distributed over a very wide area.

The May 12 earthquake was caused by rupture of a thrust fault along the boundary of the Eastern Tibetan Plateau and the Sichuan Basin.







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The May 12, 2008 Magnitude 7.9 China Earthquake

Why were the losses so great?

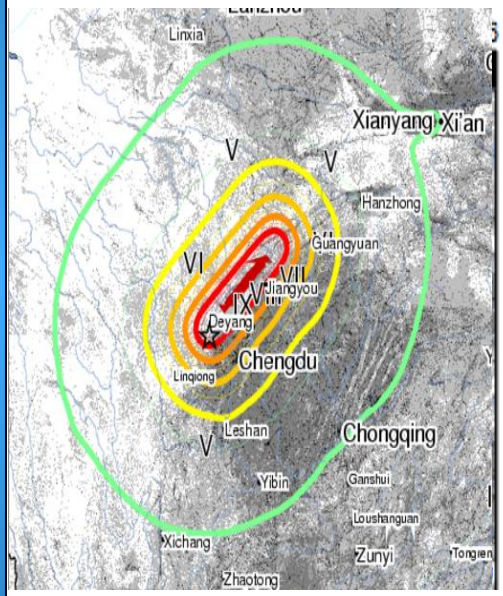
Many buildings were not designed to resist strong ground shaking.

The worst damage occurred in steep, unstable terrain. Roads and infrastructure were destroyed and landslides dammed rivers.

The May 12, 2008 Magnitude 7.9 China Earthquake

Why were the losses so great?

POPULATION DENSITY



Selected City Exposure

MMI	City	Population
VIII	Jiangyou	127k
VIII	Tianpeng	60k
VIII	Mianyang	264k
VII	Deyang	152k
VII	Linqiong	55k
VII	Chengdu	3,950k
VII	Guangyuan	213k
V	Xi'an	3,225k
V	Nanchong	7,150k
V	Chongqing	3,967k
IV	Shiyan	3,460k

bold cities appear on map (k = x1000)

Nearly 5 million people lived in the zone of very strong ground shaking.

TIME OF DAY

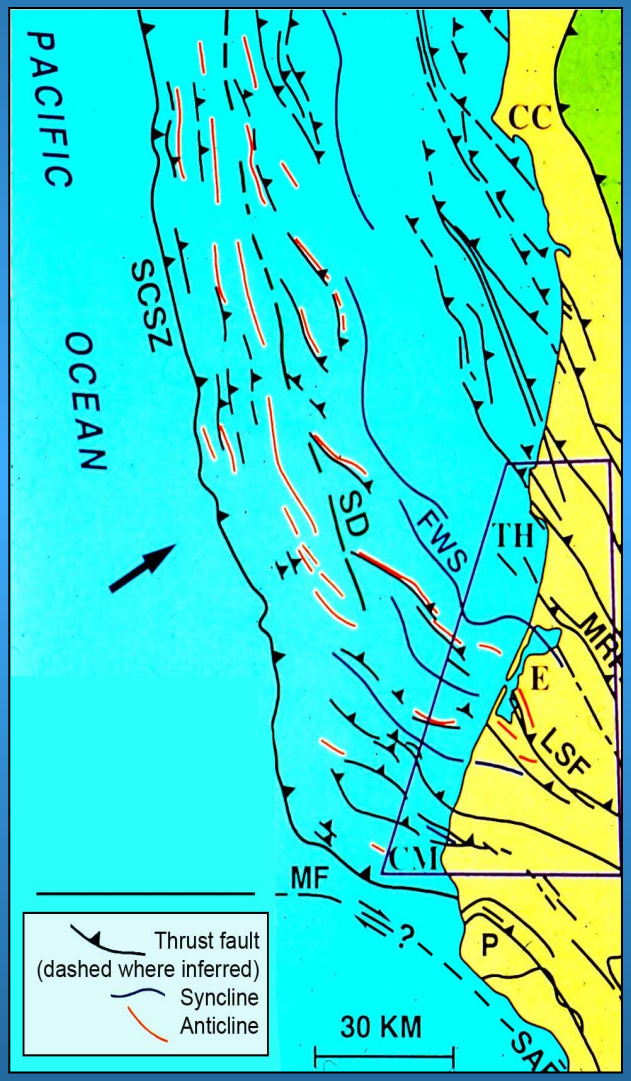
The earthquake occurred in the afternoon on a work day. Schools and office buildings were particularly vulnerable to damage.

Lessons from the Sichuan, China Earthquake

A Magnitude 7.9 Earthquake - Could it happen here?

YES!

No earthquakes this large have occurred on California's North Coast in the 150 years of written records. But the oral history of many local tribes and the indicators of great earthquakes left in the geologic record show that a number of our faults have caused earthquakes of similar size in the past. One of our faults, the Cascadia subduction zone, could produce even larger earthquakes.



North coast faults. SCSZ marks the edge of the Cascadia subduction zone.

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Lessons from the Sichuan, China Earthquake

More than 80,000 earthquake deaths – Could it happen here?

NO !

The high casualty numbers in the China earthquake were the tragic result of three factors:

- Very strong shaking
- Extremely high population density
- Buildings that weren't designed to resist strong ground shaking

In California, building codes require all structures to be built to resist earthquake shaking and codes are strictly enforced by inspectors. Most homes and apartment buildings on the North Coast are wood frame construction. Wooden buildings are particularly resilient to strong shaking.

These brick buildings in Shifang collapsed.

These wooden buildings in Shifang withstood the earthquake

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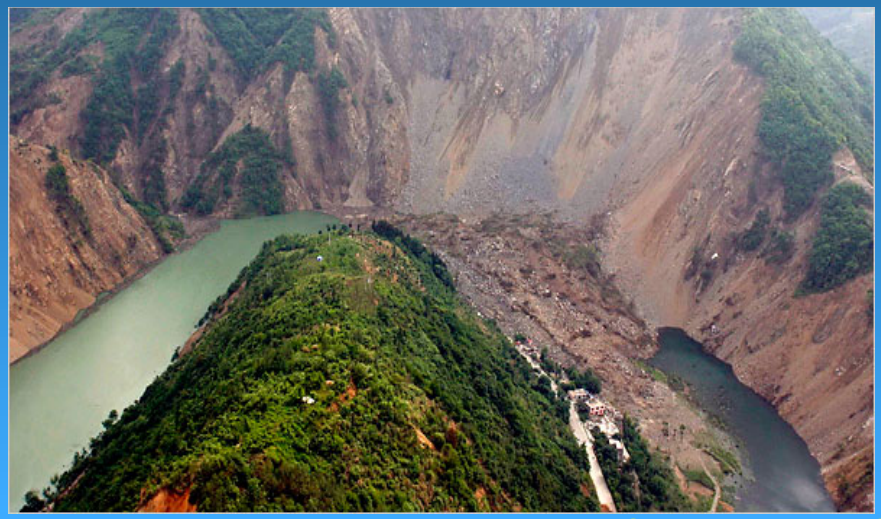
Lessons from the Sichuan, China Earthquake

Landslide-dammed rivers - Could it happen here?

YES!

The China earthquake triggered thousands of landslides in the steep terrain of the Tibetan Plateau. At least 34 landslide dammed lakes were formed when slides blocked rivers. The largest of these created a 211.6 million cubic meter lake (about 70 times larger than Trinity Lake) when a slide blocked the Tangjiashan river.

The North Coast has steep slopes that are also vulnerable to landslides, and landslide-triggered dams have occurred in the past. We don't have the population exposure of China, but people living near rivers should be aware of this hazard.



Tangjiashan Lake, upstream of Beichuan City

Rattlesnake slide temporarily dammed the South Fork of the Smith River

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Lessons from the Sichuan, China Earthquake

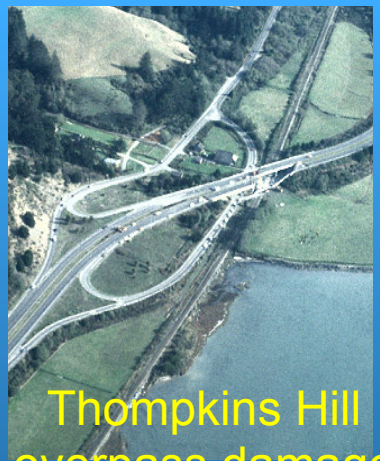
Disrupted roads and bridges - Could it happen here?

YES!

More than 30,000 miles of roads and nearly 5000 bridges were damaged in the China earthquake. Rescue teams were unable to reach the most heavily damaged areas for many days after the earthquake.

Damaged bridge near Beichuan City

Many North Coast communities are connected by one or two roads and a few bridges, and are very vulnerable to becoming isolated in a large earthquake. People must rely upon themselves for food and water and emergency medical care in the first crucial hours and days after an earthquake emergency.



Thompkins Hill overpass damage from the 1980 Trinidad earthquake

Road near Beichuan City

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Lessons from the Sichuan, China Earthquake

Rumors - Could it happen here?

YES!

Whenever a major earthquake occurs, there is some confusion and misinformation. Rumors that were widely circulated in China included:

- Government collusion in suppressing earthquake predictions that had been made before the earthquake
- The epicenter will "move" to other areas and cause similar destruction.

While rumors have frequently followed California earthquakes, the China earthquake showed the strength of bloggers, cell phones and other media in rapidly spreading rumors and alarming an already traumatized public.

A page from the Sichuan Government Website. It claims to have restored order and peace after successfully dispelling the rumor of an incoming earthquake.

A plague of toads was interpreted by some as a predictor of another earthquake.

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Lessons from the Sichuan, China Earthquake

Misinformation - Could it happen here? **YES !**

"My friend just emailed me an important tip on what to do during an earthquake…"

After every major earthquake one particularly persistent piece of misinformation always makes the internet rounds. The message will state that you should not DROP, COVER, AND HOLD ON, but instead, crouch next to a large object in the hope that it will create a *triangle of life*. In California, the most likely cause of injury in an earthquake is from falling debris and broken glass. Crouching next to an object will provide no protection from bricks, ceiling tiles and light fixtures which may come crashing down.

The triangle of life will expose you and your loved ones to injuries from falling objects

Drop, cover and hold on is still the best advice.

Drop, Cover and Hold On
is endorsed by many agencies including:

- American Red Cross
- Governor's Office of Emergency Services
- Earthquake Engineering Research Institute
- Structural Engineers Association of California
- Federal Emergency Management Agency
- National Disaster Education Association
- Oregon Office of Homeland Security
- Redwood Coast Tsunami Work Group

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Lessons from the Sichuan, China Earthquake

School collapses - Could it happen here?

Very unlikely!

One of the biggest tragedies of the China earthquake was damage to schools. Over 900 schools were badly damaged, and because the earthquake occurred during school hours, many of the victims were school children. Schools collapsed even when other nearby buildings withstood the shaking. Poor code enforcement and shoddy construction may have both contributed to the damage.

In 1933, California passed landmark legislation 30 days after an earthquake damaged many schools in Long Beach. The Field Act has been revised many times and requires that all existing and new public K-12 school and community college buildings meet strict structural requirements.

A High School in Beichuan City collapsed because of poor structural reinforcement.

This damage at a Middle School in Coalinga is typical of what happens to California schools during earthquakes. The building withstood the ground shaking and all of the damage was non-structural — ceiling tiles and light fixtures fell. Getting under the desks and table protected everyone from injury.

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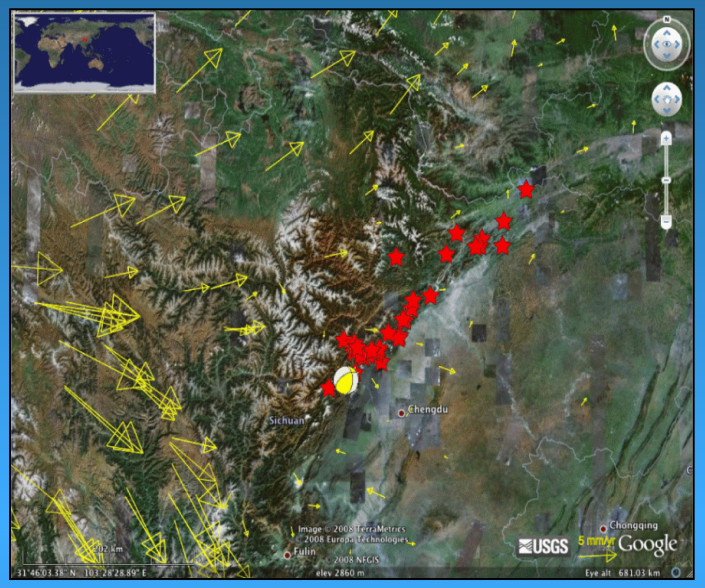
Lessons from the Sichuan, China Earthquake

Aftershocks - Could it happen here?

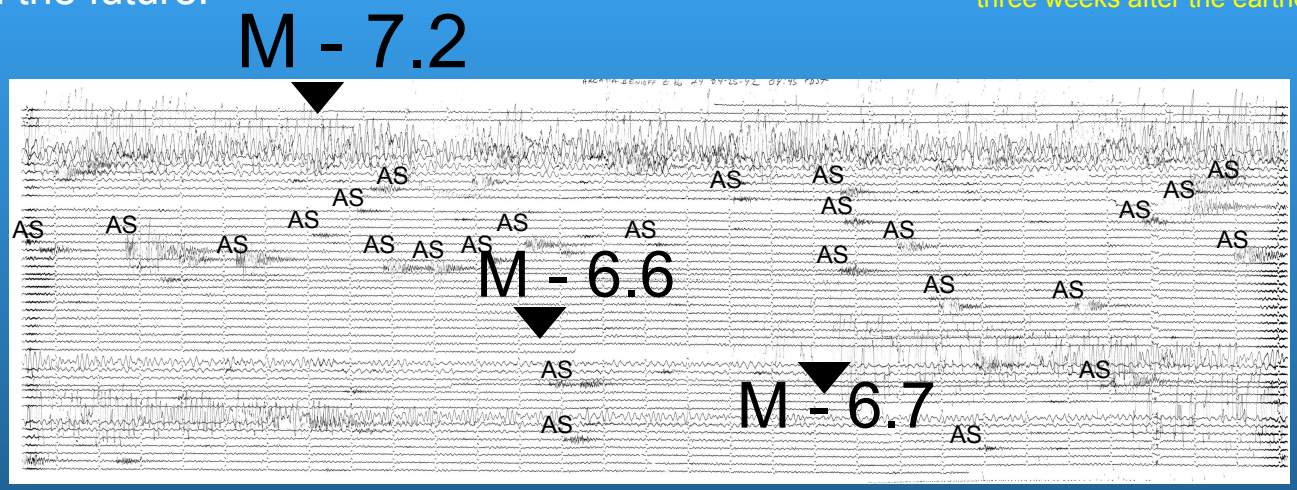
YES.

As of July 2008, over 50 aftershocks of magnitude 5 or larger had been recorded, many caused additional damage to structures already weakened by the main earthquake. The aftershocks extend along the 150-mile long rupture zone and are likely to continue for years.

Large North Coast earthquakes have been followed by aftershocks in the past and will be in the future.



Mainshock (yellow and white ball) of the May 12, M 7.9 Sichuan earthquake. Aftershocks recorded during the first three weeks after the earthquake are shown by the red stars.



This is the seismogram recorded at Humboldt State University after the April 25, 1992 Magnitude 7.2 Cape Mendocino earthquake. Many aftershocks occurred including a magnitude 6.6 and 6.7. Strong aftershocks continued for 9 months. The aftershock period for a larger earthquake will likely last even longer.

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Mitigating the North Coast Earthquake and Tsunami Risk

Signs

Tsunami signs are popping up all over the North Coast! These signs will help you to determine if you are in an area that may be exposed to tsunami risks. In some communities signs are also posted to show tsunami evacuation routes and evacuation sites. If you feel an earthquake that shakes the ground so strongly that you cannot stand for 30 seconds or longer AND you are in a tsunami hazard zone move out of the zone as soon as it is safe to do so. If you are outside of a tsunami hazard zone, you are safe where you are. Do not evacuate.

Tsunami evacuation route and evacuation site signs in Samoa.

Official approved California Highway Tsunami Signs

Caltrans installs first sign on Highway 101 in Arcata.

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