

Posters 2009 Humboldt & Del Norte County Fairs



The 2009 Humboldt County Earthquake – Tsunami Room ran from August 13 – August 21 and featured the L'Aquila, Italy earthquake and the TsunamiReady program

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.

The April 6, 2009 Magnitude 6.3 L'Aquila, Italy Earthquake

What Happened:

At 3:32 AM local time on Monday April 6, an earthquake ruptured a fault in the Apennine Mountains of central Italy.

- 297 people killed
- 1,179 injured
- 15,000 buildings damaged or destroyed
- 29,000 people displaced
- Damage to many medieval structures
- \$15.9 billion (US) economic losses

(source of information: USGS. GEER, EERI, MCEER)

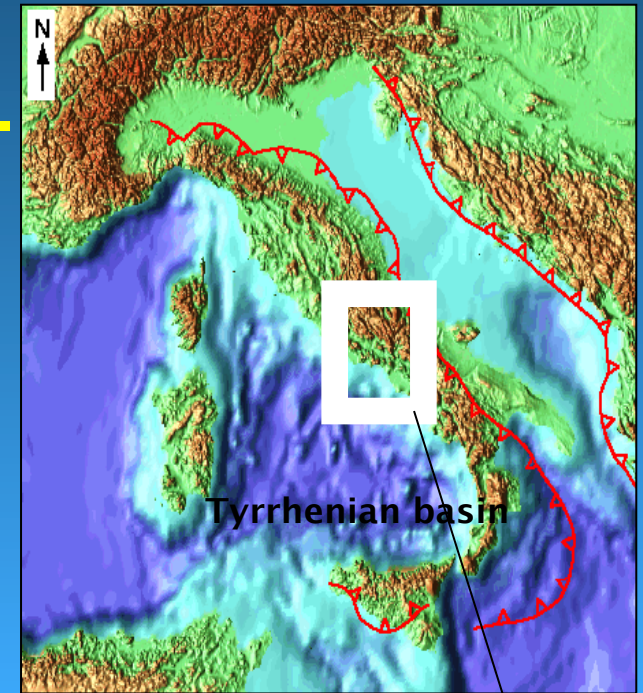


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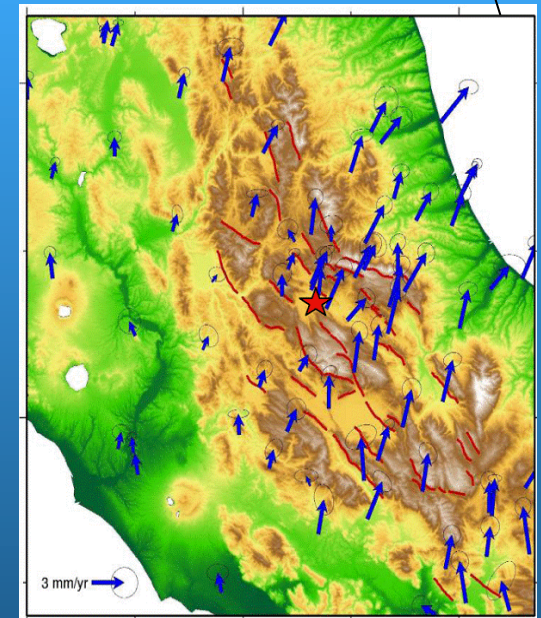
What caused the earthquake:

The Mediterranean is slowly closing due to the collision of the African plate into the Eurasian plate. This collision has created a complex pattern of faults and “microplates” in the Mediterranean region. A subduction zone along the east coast of the Iberian peninsula created the Apennine Mountains, the spiny ridge that runs down the center of the country. To the west, the Tyrrhenian basin is opening up. The April 9 earthquake was the result of extension because the Tyrrhenian basin is opening up more rapidly than the rate of compression.

Central Italy is cut by a number of extensional faults (red lines) created because the rate of north - northeastern movement to the east (blue arrows) is greater than the rate of movement to the west. Star shows the April 6 epicenter.

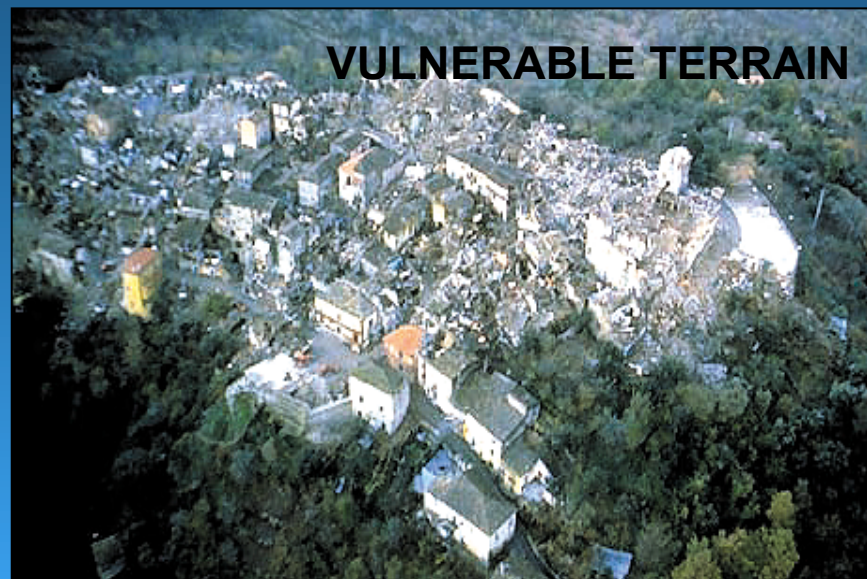


Italy is located on the Iberian peninsula, sandwiched between a subduction zone (red lines) and the Tyrrhenian basin.



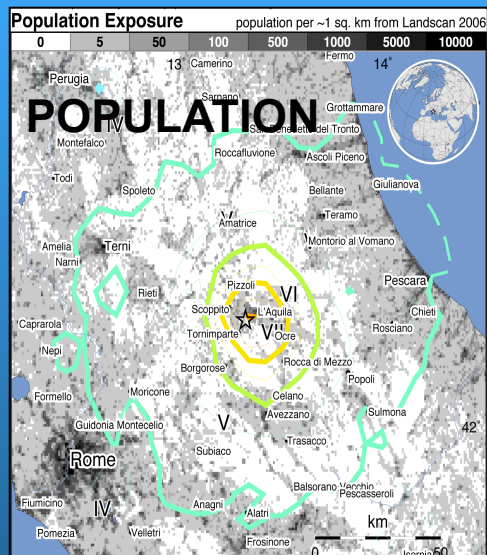
Lessons from the L'Aquila, Italy Earthquake

Why were the losses so large in a 6.3 earthquake?



Ground motion is often amplified in Italy's famous hill towns because the seismic waves converge at the top of the hill. This is the town of Irpina damaged in a M 6.9 earthquake in 1980 that was located 150 miles southwest of L'Aquila.

Many buildings were not designed to resist strong ground shaking



Selected City Exposure

MMI City	Population
VIII L'Aquila	68k
VII Tornimparte	2k
VII Ocre	1k
VII Scoppito	2k
VII Pizzoli	3k
VII Poggio Pienze	1k
V Terni	105k
V Pescara	116k
IV Rome	2,563k
IV Guidonia	75k
IV Perugia	149k

Nearly 77,000 people lived in the zone of very strong ground shaking

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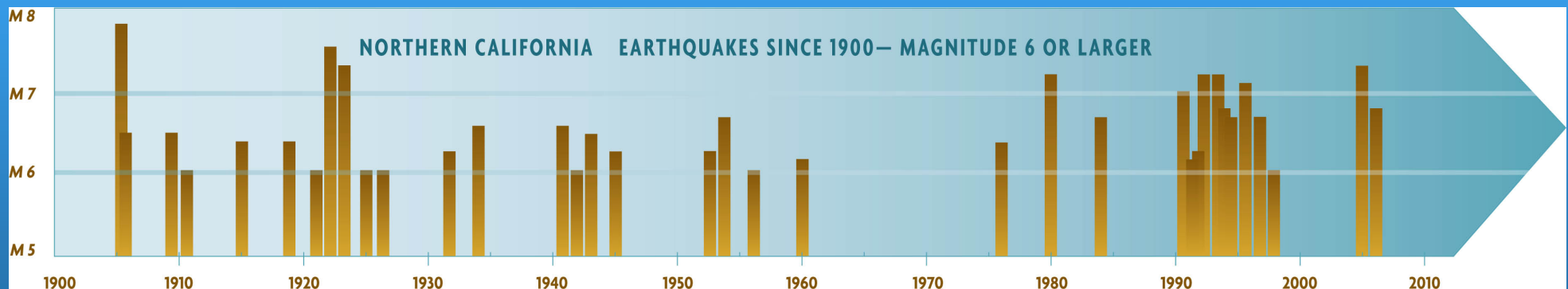


Many people lived in homes built of brick and unreinforced masonry and were asleep at the time of the earthquake. But casualties may have been even worse if the earthquake occurred on a Sunday because so many churches collapsed.

Could a similar earthquake happen here?

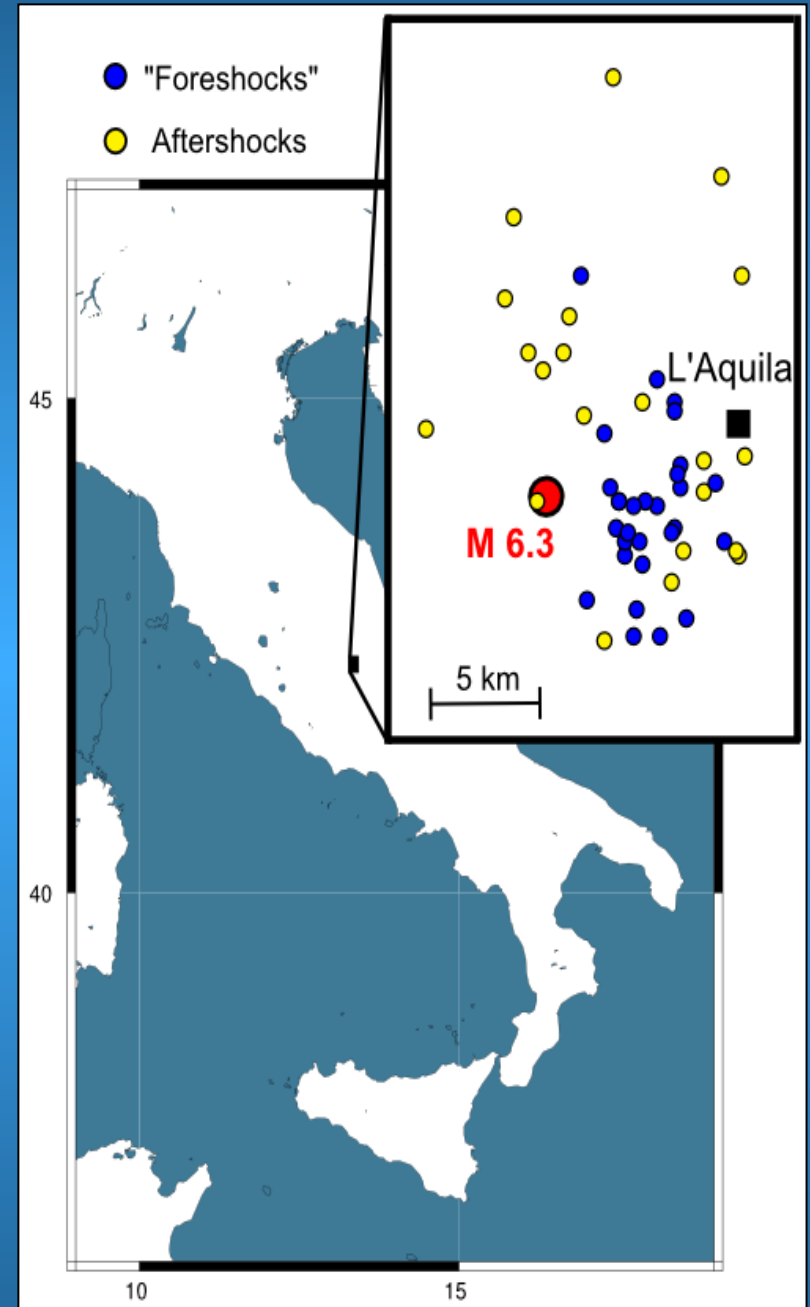
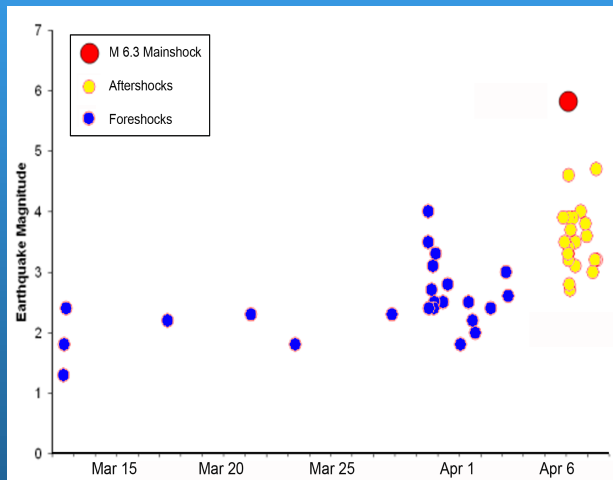
Nearly 40 earthquakes of similar size have occurred in our area in the past century. However the wood-frame building typical of North Coast construction is much more resilient to strong ground shaking. California Building codes have required structures be built to resist earthquake vibrations for over 75 years.

“In California, an earthquake like this one would not have killed a single person.” Franco Barberi, Italy's Civil Protection agency



Foreshocks and Aftershocks

All strong earthquakes are followed by aftershocks. The L'Aquila earthquake was followed by a number of aftershocks, including seven in the magnitude 5 range. Several caused additional damage. The L'Aquila earthquake was a little unusual because it was also preceded by a number of foreshocks - smaller earthquakes in the days before the earthquake. The rate of foreshocks increases March 28 - April 3. In hindsight, this pattern looks like a precursor to the main shock.



Figures adapted from Chris Rowan, University of Edinburgh

Rumors, claims and misinformation

“Italian Authorities Dismissed quake warning”

Whenever a major earthquake occurs, rumors fly. After the L' Aquila earthquake, Giampaolo Giuliani, an Italian physics technician, claimed to have predicted the earthquake and accused authorities of ignoring him. Giuliani studied radon gas. Radon is trapped in rocks and soils and some scientists believe that fractures before an earthquake causes radon levels to fluctuate. Giuliani predicted that an earthquake would occur on March 29 – within a 24 hour period – in the town of Sulmona, about 25 miles away from L' Aquila. Giuliani was enthusiastic about his prediction – contacting authorities and the public in Sulmona – and was reported to police for spreading a panic. An Italian official told reporters that if they had listened to Giuliani, they probably would have evacuated the residents of Sulmona to L'Aquila just in time for the earthquake.



Giampaolo Giuliani predicted a similar - sized earthquake on March 29 beneath a town 25 miles away from L' Aquila

Disrupted roads and bridges - Could it happen here?

YES!

Many roads and bridges were damaged in the earthquake. Other roads were blocked by landslides and debris. Rescue teams were unable to reach the remote villages for several days after the earthquake.

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.



Many bridges were damaged in the L'Aquila area



Thompkins Hill overpass damage from the 1980 Trinidad earthquake

Lessons from the L'Aquila, Italy Earthquake

Damage to historic buildings



Many 14th - 17th century buildings suffered irreparable damage

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

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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

CONGRATULATIONS TO THE NORTH COAST'S TSUNAMIREADY COMMUNITIES



CRESCENT CITY - 2002



REDWOOD NATIONAL & STATE PARKS - 2009



SAMOA - 2007



YUOK TRIBE & KLAMATH - 2009



ORICK - 2007

COMMUNITIES CURRENTLY
WORKING TOWARDS ATTAINING
TSUNAMIREADY STATUS

- SMITH RIVER
- MANILA
- HUMBOLDT STATE UNIVERSITY
- TRINIDAD
- TRINIDAD RANCHERIA

How to Survive a tsunami - Lessons from Indonesia

ABANDON BELONGINGS



Almost everyone on Simeulue Island knew

Surviving a Tsunami

Lessons from Aceh and Southern Java, Indonesia



Almost everyone on Simeulue Island knew