

MEDC Earthquake Case Study - L'Aquila, Italy, 2009

The earthquake caused damage to between 3,000 and 11,000 buildings in the medieval city of L'Aquila. Several buildings also collapsed. 308 people were killed by the earthquake and approximately 1,500 people were injured. Twenty of the victims were children. Around 65,000 people were made homeless.

Most of the inhabitants of L'Aquila abandoned their homes and the city itself; in the city centre of L'Aquila, and the nearby village of Paganica which was also badly damaged, many streets were impassable due to fallen masonry. The hospital at L'Aquila, where many of the victims were brought, suffered damage in the 4.8 aftershock which followed the main earthquake an hour later. Powerful aftershocks, some only slightly weaker than the main shock, were felt throughout the following 2 days.

Villages in the valley along Strada Statale 17 just outside L'Aquila suffered the greatest damage while medieval mountain hill towns lying high above the valley suffered little damage. Onna was reported to be mostly leveled with 38 deaths among the 350 residents.

Many of L'Aquila's medieval buildings were damaged. The apse of the Basilica of Saint Bernardino of Siena, L'Aquila's largest Renaissance church, was seriously damaged, and its campanile collapsed.

While most of L'Aquila's medieval structures suffered damage, many of its modern buildings suffered the greatest damage, for instance, a dormitory at the university of L'Aquila collapsed. Even some buildings that were believed to be "earthquake-proof" were damaged. L'Aquila Hospital's new wing, which opened in 2000 and was thought capable of resisting almost any earthquake suffered extensive damage and had to be closed.

Around 40,000 people who were made homeless by the earthquake found accommodation in tented camps and a further 10,000 were housed in hotels on the coast.

National aid:

Many Italian companies have offered some sort of help. All Italian mobile companies sent free minutes and credit to all their pre-paid customers in Abruzzo, suspended billing to all post-paid customers and extended their coverage with additional mobile base stations to cover homeless camps. In addition, some companies sent free mobile phones, SIM Cards and chargers for those who lost their mobiles, and set up a national unique number to send donations to, by placing a call or sending an SMS. Poste Italiane sent to homeless camps some mobile units acting as Postal Office, to allow people to withdraw money from their accounts as well as their retirement.

Many companies, such as pay-tv SKY Italia, suspended billing to all customers in Abruzzo, and offered some decoders to homeless camps to allow them to follow the funerals and the news. Ferrovie dello Stato offered railway sleeping carriages to host some homeless people, and offered free tickets to all people and students living in Abruzzo. AISCAT (Associazione Italiana Società Concessionarie Autostrade e Trafori) declared that all toll-roads in Abruzzo would be free of charge. All tax billing for all Abruzzo residents has been suspended by the government, as well as mortgage payments.

International aid

Prime Minister of Italy Silvio Berlusconi refused foreign aid for the emergency, saying that Italians were "proud people" and had sufficient resources to deal with the crisis. However he singled out the United States, announcing that he would accept aid for reconstruction: "If the United States wants to give a tangible sign of its solidarity with Italy, it could take on the responsibility of rebuilding heritage sites and churches. We would be very happy to have this support." and suggested the USA help rebuild "a small district of a town or a suburb".

Did a Technician Accurately Forecast the L'Aquila Earthquake--Or Was It a Lucky Guess?

Italian technician Giampaolo Giuliani wants an apology after his publicly denounced prediction for an earthquake came true. Does he deserve it?

By Stuart Fox

Yesterday, a magnitude 6.3 earthquake struck L'Aquila, Italy, killing more than 150 people, injuring some 1,000, and leaving thousands of people homeless. Soon after the deadly temblor hit, news outlets including Time magazine, Reuters, and The New York Times reported Italian authorities had previously removed from the Internet a warning that a big quake was imminent. The prediction had been posted weeks earlier by a technician at the Gran Sasso National Laboratory in Abruzzi, Italy.*

The technician, Giampaolo Giuliani, who could not be reached for comment, had predicted that a massive earthquake would strike based on measurements of radon emissions. Skeptical Italian officials--believing that he was sowing unwarranted panic--publicly refuted the warnings and admonished Giuliani in court.

Did authorities err in contradicting Giuliani's prediction? Could lives have been saved had they heeded the warning?

"I am skeptical of the claim," says Shawn Larsen, a geophysicist at Lawrence Livermore National Laboratory in California. "Radon has been claimed to be a precursor of earthquakes for some time, since the late 70s. However, there has been no concrete evidence that it is indeed a predictor of earthquakes."

According to John Rundle, director of the California Institute for Hazard Research, a joint program between different University of California (U.C.) schools, the frequent release of that gas results in far too many false alarms to make the system trustworthy. Radon has been associated with seismic events, and earthquakes can cause the release of radon and other ground gases. The problem is, he says, many phenomena other than large earthquakes also result in radon release, including rainfall and atmospheric pressure changes.

"It has too many false positives to be useful," says Rundle, a professor of physics, geology and engineering at U.C. Davis. ""We actually do forecasting but we do that using probabilities. We can't say that an earthquake is going to happen at this point in time and space."

Rundle is an expert in forecasting quake probability over a range of time, and even published a map in 2006 identifying the spot of yesterday's earthquake as a likely target for a magnitude 7.0 or greater earthquake. That forecast identifies a 10-year-span rather than a single day or time when an earthquake might occur.

In fact, no current technique can accurately predict the timing of an earthquake more narrowly, Rundle says. For instance, in 1983 the U.S. Geological Survey (USGS) noticed that magnitude 6.0 earthquakes struck Parkfield, Calif., every 30 years or so. After observing the fault, the USGS predicted that another earthquake would strike between 1988 and 1993. There was another earthquake at Parkfield—but not until 2004.

The only technique that shows the promise of one day predicting earthquakes more precisely, according to both Rundle and Larsen, involves measuring electromagnetic (EM) radiation released by quartz veins compressing under the stress that precedes earthquakes. But they note that technique remains years away from practical use, because scientists still have problems separating the electromagnetic (EM) radiation released by the quartz from EM radiation generated by other nearby sources.

The bottom line, according to Larsen and Rundle: If anything, Giuliani made a lucky guess.

"The ability to predict an earthquake would be tantamount to saying what the weather is going to be like in this city next November," Larsen says. "Maybe someone will find something in the future, but so far, that has not happened."

*Correction (4/8/09): Giuliani was originally identified as a seismologist in the headline and throughout the story.