NOTABLE WORLD EARTHQUAKES AND SEISMICITY
(Znacajni Protresi Svijeta i Njihova Snaga)

Year	AD--Date	Region	Deaths	Magnitude
856	December	Greece, Corinth	45,000	
856+	December 22	Iran, Damghan	200,000	
893+	March 23	Iran, Ardabil	150,000	
1038	January 9	China, Shensi	23,000	
1057		China, Chihli	25,000	
1138	August 9	Syria, Aleppo	230,000	
1268		Asia Minor, Silicia	60,000	
1290	September 27	China, Chihli	100,000	
1293	May 20	Japan, Kamakura	30,000	
1531	January 26	Portugal, Lisbon	30,000	
1556	January 23	China, Shensi	830,000	
1663	February 5	Canada, St. Lawrence River	Unknown	Maximum intensity X
1667	November	Caucasia, Shemakha	80,000	
1693	January 11	Italy, Catania, Sicily and Naples	60,000 (Catania and Sicily) 93,000 (Naples)	
1727	November 18	Iran, Tabriz	77,000	
1737	October 11	India, Calcutta	300,000	
1755	June 7	Northern Persia	40,000	
1755	November 1	Portugal, Lisbon	70,000	8.7
1783	February 4	Italy, Calabria	50,000	
1797	February 4	Ecuador, Quito	40,000	
1811	December 16	Missouri, New Madrid	Several	Maximum intensity X1
1812	December 21	California, offshore Santa Barbara	Several injuries	Maximum intensity X
1819	June 16	India, Kutch	1,543	
1822	September 5	Asia Minor, Aleppo	22,000	
1828	December 18	Japan, Echigo	30,000	
1857	January 9	California, Fort Tejon		Intensity X-X1
1868	August 13	Peru and Bolivia	25,000	
1868	August 16	Ecuador and Colombia	40,000 (Ecuador) 30,000 (Colombia)	
1872	March 26	California, Owens Valley	50	
1886	August 31	South Carolina, Charleston-Summerville	60	
1891	October 28	Japan, Mino-Owari	7,000	
1896	June 15	Japan, Riku-Ugo	22,000	
1897	June 12	India, Assam	1,500	8.7
1899	Sept. 3 and 10	Alaska, Yakutat Bay		7.8 and 8.6
1905		Italy, Calabria region	5,000	
1906	April 18	California, San Francisco	700	8.25
1908	December 28	Italy, Messina	120,000	7.5
1915	January 13	Italy, Avezzano	30,000	7
1920	December 16	China, Kansu	200,000	8.6
1923	September 1	Japan, Kwanto	143,000	8.2
1932	December 25	China, Kansu	70,000	7.6
1935	May 31	India, Quetta	60,000	7.5
1939	January 24	Chile, Chillan	30,000	7.75
1939	December 27	Turkey, Erzincan	23,000	8.0
1948	June 28	Japan, Fukui	5,131	
1948	October 5	USSR, Turkmenistan, Ashgabat	110,000	7.3
1949	August 5	Ecuador, Pelileo	6,000	6.9
1960	February 29	Morocco, Agadir	14,000	5.9
1960	May 21-30	Southern Chile	5,700	8.5

1962	**September 1**	**Northwest Iran**	**14,000**	**7.3**
1963	**July 26**	**Yugoslavia, Skopje**	**1,200**	**6.0**
1964	**March 28**	**Alaska**	**131**	**8.6**
1968	**August 31**	**Iran**	**11,600**	**7.4**
1970	**May 31**	**Peru**	**66,000**	**7.8**
1971	**February 9**	**California, San Fernando**	**65**	**7.4**
1972	**December 23**	**Nicaragua, Managua**	**5,000**	**6.2**
1975	**February 4**	**China, Liaoning Province**	**few**	**7.4**
1976	**February 4**	**Guatamala**	**22,000**	**7.9**
1976	**May 6**	**Italy, Friuli (Gemona)**	**965**	**6.5**
1976	**July 27**	**China, Tangshan**	**25,000**	**7.6**
1977	**March 4**	**Romania, Vrancea**	**2,000**	**7.2**
1977	**August 19**	**Indonesia, south of Sumbawa Island**	**100**	**8.0**
1979	**December 12**	**Near coast of Ecuador`**	**600**	**7.7**
1980	**October 10**	**Algeria, El Asnam**	**3,500**	**7.7**
1980	**November 23**	**Southern Italy**	**3,000**	**7.2**
1981	**June 11**	**Southern Iran**	**3,000**	**6.9**
1981	**July 28**	**Southern Iran**	**1,500**	**7.3**
1982	**December 13**	**Yemen**	**2,800**	**6.0**
1983	**May 26**	**Japan, Oga peninsula**	**107**	**7.7**
1983	**October 30**	**Turkey**	**1,342**	**6.9**
1985	**March 3**	**Chile, Valparaiso**	**177**	**7.8**
1985	**September 19**	**Mexico, Michoacan**	**9,500**	**7.9**
1989	**October 17**	**Northern California**	**62**	**7.1**
1990	**June 20**	**Iran**	**50,000**	**7.7**

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WHERE EARTHQUAKES OCCUR

Earthquakes in Past Times

Earthquakes can be violent, and they have been unpredictable. Their convulsions have so often produced helplessness and injury that people have always feared them. In many countries, popular legend attributed earthquakes to grotesque monsters that supported the Earth. In ancient Japanese folklore, for example, a great catfish (*namazu*) lay beneath the ground and caused earthquakes by thrashing its body. The namazu's activity was restrained by a god (*daimyojin)* who wielded a large stone mallet. But when the attention of the daimyojin wandered, the namazu moved and the ground shook.

The first systematic and nonmystical treatment of earthquakes occurred in Greece, where its people experienced Aegean volcanoes and earthquakes along the Mediterranean Sea, sometimes accompanied by "tidal" waves (*tsunamis).* A number of the Greek philosophers offered mechanical explanations for these natural events. Strabo, for example, noted that earthquakes occurred more frequently along the coast than inland. He, like Aristotle, suggested that earthquakes were caused by rushing subterranean winds, igniting combustible materials underground.

As the practice of writing spread, descriptions of severe earthquakes were recorded. The oldest of these are the Chinese records dating back 3000 years. This amazing catalog is thought to document every moderate to large earthquake in central China from 780 B.C. to the present. In Japan, the catalog of damaging earthquakes is not as long but is essentially without gaps from about 1600 A.D; less reliable lists are available back to about 416 A.D. Such historical catalogs are crucial to our understanding of the relation of earthquakes to the geological features of our planet and to our assessment of seismic hazards to large engineering structures such as dams and nuclear reactors.

In the western hemisphere, there is a well-documented history for the eastern past of the Alpine belt, from Greece to Afghanistan, for about 17 centuries. Even earlier than this, sporadic allusions to large earthquakes in the Mediterranean region are found in the Bible and in Arabic writings. It has been claimed that the first biblical mention of an earthquake is the experience of Moses on Mount Sinai. More definite references are probable the accounts of the collapse of the walls of Jericho about 1100 B.C. and perhaps the destruction of Sodom and Gomorrah. Palestinian earthquakes are associated with geological faults of the rift valley that runs from the Gulf of Eilat through the Dead Sea. Although in this century the Jordan Valley rift has been the site of only a few small to moderate earthquakes, historical studies indicate that the whole area suffers, on the average, two or three damaging earthquakes each century. There was a large earthquake on Corcyra Nigra in 319 B.C. where the entire area east of Corcyra Nigra (Kerkira Melaina) known as (R) Punctum, or (G) Acpa (Acra) went under the sea, reducing the area to a small island known today as Badija.

In the more recently settled parts of the world, such as the United States and Canada, the historical earthquake chronicles are, of course, quite short. One of the first accounts describes an earthquake that struck Massachusetts in 1638, toppling stone chimneys to the ground. Somewhat more extensive reports describe a large Canadian earthquake in the Three Rivers area of the lower St. Lawrence River on February 5, 1663. For California, there are descriptions dating back to 1800 by the Franciscan fathers who documented the development of the Spanish missions. Thus we know that a series of earthquakes in 1800 damaged Mission San Juan Bautista, and that 1812 was called "the Year of the Earthquakes" because of the great amount of seismic activity at that time.

Investigating earthquakes that happened long ago is frustrating work. There is a story of Professor George Louderback, a geologist at the University of California at Berkeley, who had a keen interest in disentangling the history of California earthquakes. The historical reports spoke of an earthquake on the morning of December 8, 1812 (a Tuesday), that destroyed Mission San Juan Capistrano, killing 40 American Indians attending Mass. Louderback asked: Why were they worshipping on Tuesday? He determined that that day was a holy day, so attendance was understandable. Further enquiry showed, however, that that particular holy day was currently not being celebrated in Rome. Why then were the American Indians in church on a Tuesday? Thus, historical enquiries sometimes lead to further puzzles.

By the mid-nineteenth century, documentation in California was fairly detailed. In the description of the great earthquake of January 9, 1857, for example, several independent references were made to extensive cracking of the Earth in central California near the settlement of Fort Tejon. This earthquake was one of the first indications of rupture on what is now called the San Andreas fault. The Fort Tejon shock is the most recent great earthquake to occur along the southern portion of the San Andreas.

Nota Bene:

In pre-historic time, earthquakes were not recorded until the about the middle of the 16th century. What references that do exist were collected by church notices, private notices, etc.

During my work as a mechanical Engineer in a 40-story high-rise building, I was in charge of scheduling earthquake and fire drills every month. I posted written plans for each engineers' duties in the event of fires or earthquakes. These plans were posted on the walls and were in practice as follows:

Protection in an Earthquake

Before an Earthquake

At Home

Have a battery-powered radio, flashlight, and first-aid kit in your home. Make sure everyone knows where they are stored. Keep batteries on hand.
Learn first aid.
Know the location of your electric fuse box and the gas and water shut-off valves (keep a wrench nearby). Make sure all responsible members of your family learn how to turn them off.
Don't keep heavy objects on high shelves.
Securely fasten heavy appliances to the floor, and anchor heavy furniture, such as cupboards and bookcases to the wall.
Devise a plan for reuniting your family after an earthquake in the event that anyone is separated.

At School

Urge your school board and teachers to discuss earthquake safety in the classroom and secure heavy objects from falling. Have class drills.

At Work

Find out if your office or plant has an emergency plan. Do you have emergency responsibilities? Are there special actions for you to take to make sure that your workplace is safe? Know the location of fire extinguishers.

During an Earthquake

Stay calm. If you are indoors, stay indoors; if outdoors, stay outdoors. Many injuries occur as people enter or leave buildings.
If you are indoors, stand against a wall near the center of the building, or get under a sturdy table. Stay away from windows and outside doors.
If you are outdoors, stay in the open. Keep away from overhead electric wires or anything that might fall (such as parapets and cornices on buildings).
Don't use candles, matches, or other open flames.
If you are in a moving car, stop away from overpasses and bridges and remain inside until the shaking is over.

At Work

Get under a desk or sturdy furniture. Stay away from windows.
In a high-rise building, protect yourself under sturdy furniture or stand against a support column.
Evacuate if told to do so. Do not use elevators. Use stairs instead.

At School

Get under desks, facing away from windows.
If on the playground, stay away from the building.
If on a moving school bus, stay in your seat until the driver stops.

After an Earthquake

Check yourself and people nearby for injuries. Provide first aid if needed.
Check water, gas, and electric lines. If damaged, shut off valves or main circuit breakers.
Check for leaking gas by odor only. If it is detected, open all windows and doors, shut off gas meter, leave

immediately, and report to authorities.
Turn on the radio for emergency instructions. Do not use the telephone--it will be needed for high-priority messages.
Do not flush toilets until sewer lines are checked.
Stay out of damaged buildings.
Wear boots to protect against shattered glass and debris.
Approach chimneys with caution.

At Work or School

Follow the emergency plan, or instructions given by someone in charge.
Stay away from beaches and waterfront areas where tsunamis could strike, even long after the shaking has stopped.
Do not go into damaged areas unless authorized. Martial law against looters has been declared after a number of earthquakes.
Expect aftershocks; they may cause additional damage.
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Appendix:

A.} After 1990 many other earthquakes have occurred. One of those happened in Kobe, Japan in 1995. That tremor measured 7.2 and resulted in the deaths of 6,000 people.

B.} The largest volcanic eruption ever recorded occurred on April 27, 1883 A.D on Krakatoa Island between Borneo and Sumatra. More than 37,000 people were killed and the eruption threw up a billion cubic feet of sea water 20 miles up into the ozone. The sky was dusty red and dark for three months and a tidal wave (tsunami) reached Madagascar causing great damage and loss of life.

C.} In 79 A.D. Mount Vesuvius erupted and destroyed the ancient towns of Pompeii and Herculaneum, burying them under tons of volcanic ash. Both towns have been partially uncovered by modern excavation revealing their art and culture shown by relics of the citizens and inhabitants of Pompeii.

To the memory of the destroyed town of Punctum (Akra) on the island of Corcyra Nigra (Kerkira Melaina) Korcula 319 B.C.

Marko Marelich
Retired Mechanical Engineer
San Francisco, California USA
(allthecookies@mindspring.com)