U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

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# EARTHQUAKES IN THE CONTERMINOUS UNITED STATES

## EPICENTERS

Earthquakes occur in the United States every day, although many are so small they can only be detected by sensitive seismographs. With current technology and instrumentation, more than 250 earthquakes of magnitude 3.5 and greater are located in or near the conterminous United States each year.

This map represents over 35,000 earthquakes that occurred from 1534 through 1991. The locations and magnitudes of virtually all pre-twentieth century earthquakes were estimated from reports of the shocks being felt or causing damage, rather than from seismographic data. Epicenters of these shocks may be in error by many tens of kilometers. Strong, pre-twentieth century shocks that affected regions with few permanent settlements may not have been recorded and would in that case not be plotted.

From the beginning of the twentieth century, earthquakes above magnitude 5¼ should be completely represented. Felt reports and damage observations were still used to estimate many epicenters and magnitudes of shocks in the early decades.

The map is most complete and epicenters most accurate for earthquakes that have occurred in recent decades. Within many seismically active areas, locations of shocks of magnitude 2.5 or greater occurring since the mid-1970s are nearly completely represented, due to the monitoring of these areas by regional seismograph networks. Considering the land area of the conterminous United States as a whole, locations of earthquakes of magnitude 4.0 or greater that have occurred since 1970 should be nearly completely represented.

On the map, earthquakes that have occurred since 1970 are distinguished from earlier events by the color of the epicentral symbol, as indicated in the legend. The size of each symbol is scaled according to earthquake magnitude.



*USGS* *NEIC*
United States Geological Survey
National Earthquake Information Center

| Magnitude | Historic Earthquakes | | Recent Earthquakes | |
|---|---|---|---|---|
| <4 | • | 1962–1969 | • | 1970–1991 |
| 4.0–4.9 | ○ | 1902–1969 | ○ | 1970–1991 |
| 5.0–5.9 | ○ | 1727–1969 | ○ | 1970–1991 |
| ≥6.0 | ○ | 1534–1969 | ○ | 1970–1991 |

○60 ○17 Notable Earthquakes

## EARTHQUAKES IN THE CONTERMINOUS UNITED STATES (1534–1991)

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Earthquake data prepared by Susan Goter. Elevation tint materials prepared by Gail Thelin. Relief shading developed by Gail Thelin and Richard Pike, for *Landforms of the Conterminous United States*, USGS Map I-2206, 1991.
Base map © Raven Maps & Images, 1992; used by permission.

**1992**

Scale 1:3,500,000. One centimeter equals 35 kilometers. One inch equals approximately 55 miles.
Albers Equal-Area Conic Projection. Small squares indicate county seats.

50 0 50 100 150 200 250 300 Miles
50 0 100 200 300 400 Kilometers
Feet 0 200 400 800 1000 1500 2000 2500 3000 3500 4000 4500 5000 5500 6000 6500 7000 8000 8500 10000
Meters 0 50 100 150 200 305 457 610 762 914 1067 1219 1372 1524 1676 1829 1981 2134 2438 2743 3048

### Notable Earthquakes

Below is a table of some of the many earthquakes that are of special interest because of their size and location. Although some of these earthquakes occurred in Canada and Mexico, they were large enough to either cause damage or be strongly felt in the United States. Earthquakes listed in the table are identified on the map by a bold circle labeled with the reference number.

| No. | Locality | Date[1] | Magnitude[2] |
|---|---|---|---|
| 1 | St. Lawrence River region, Canada | February 5, 1663 | 7.0 |
| 2 | East of Cape Ann, Massachusetts | November 18, 1755 | 6.1 |
| 3 | St. Lawrence River region, Canada | December 6, 1791 | 6.0 |
| 4 | New Madrid region | December 16, 1811 | 8.6 |
| 5 | New Madrid region | January 23, 1812 | 8.4 |
| 6 | New Madrid region | February 7, 1812 | 8.7 |
| 7 | Southern California | December 21, 1812 | 7.2 |
| 8 | San Francisco, California | June 1838 | 7.0 |
| 9 | New Madrid region | January 5, 1843 | 6.0 |
| 10 | California/Mexico border | November 29, 1852 | 6.6 |
| 11 | Fort Tejon, California | January 9, 1857 | 8.3 |
| 12 | Western Nevada | March 15, 1860 | 7.0 |
| 13 | St. Lawrence River region, Canada | October 17, 1860 | 6.0 |
| 14 | Hayward, California | October 21, 1868 | 6.8 |
| 15 | St. Lawrence River region, Canada | October 20, 1870 | 6.5 |
| 16 | Owens Valley, California | March 26, 1872 | 8.0 |
| 17 | Cascade Mountains, Washington | December 15, 1872 | 7.4 |
| 18 | California/Oregon border | November 23, 1873 | 7.0 |
| 19 | Bear Lake Valley, Utah | November 10, 1884 | 6.3 |
| 20 | Charleston, South Carolina | September 1, 1886 | 6.9 |
| 21 | Bavispe, Sonora, Mexico | May 3, 1887 | 7.0 |
| 22 | Charleston, Missouri | October 31, 1895 | 6.2 |
| 23 | Giles County, Virginia | May 31, 1897 | 5.8 |
| 24 | Cape Mendocino, California | April 16, 1899 | 7.0 |
| 25 | Southern Utah (Richfield) | November 14, 1901 | 6.5 |
| 26 | Pine Valley, Utah | November 17, 1902 | 6.3 |
| 27 | San Francisco, California | April 18, 1906 | 8.3 |
| 28 | Socorro, New Mexico | July 12 & 16, November 15, 1906 | 6.3 |
| 29 | Hansel Valley, Utah | October 6, 1909 | 6.3 |
| 30 | Pleasant Valley, Nevada | October 3, 1915 | 7.8 |
| 31 | Elsinore, Utah | September 29 & October 1, 1921 | 6.3 |
| 32 | Cape Mendocino, California | January 31, 1922 | 7.3 |
| 33 | Cape Mendocino, California | January 22, 1923 | 7.2 |
| 34 | St. Lawrence River region, Canada | March 1, 1925 | 7.0 |
| 35 | Three Forks, Montana | June 28, 1925 | 6.8 |
| 36 | Santa Barbara, California | June 29, 1925 | 6.3 |
| 37 | Lompoc, California | November 4, 1927 | 7.5 |
| 38 | Mount Livermore, Texas | August 16, 1931 | 6.4 |
| 39 | Cedar Mountain, Nevada | December 21, 1932 | 7.2 |
| 40 | Long Beach, California | March 11, 1933 | 6.3 |
| 41 | Hansel Valley (Kosmo), Utah | March 12, 1934 | 6.6 |
| 42 | California/Mexico border | December 31, 1934 | 7.1 |
| 43 | Helena, Montana | October 12–, November 28, 1935 | 6.3 |
| 44 | Quebec/Ontario border, Canada | November 1, 1935 | 6.2 |
| 45 | Imperial Valley, California | May 19, 1940 | 7.1 |
| 46 | Massena, New York | September 5, 1944 | 5.9 |
| 47 | Olympia, Washington | April 13, 1949 | 7.1 |
| 48 | Kern County, California | July 21, 1952 | 7.8 |
| 49 | Dixie Valley, Nevada | December 16, 1954 | 7.2 |
| 50 | Eureka, California | December 21, 1954 | 6.6 |
| 51 | Hebgen Lake, Montana | August 18, 1959 | 7.7 |
| 52 | Northern Utah (Logan) | August 30, 1962 | 5.7 |
| 53 | Seattle, Washington | April 29, 1965 | 6.5 |
| 54 | Borrego Mountain, California | April 9, 1968 | 7.1 |
| 55 | San Fernando, California | February 9, 1971 | 6.5 |
| 56 | Pocatello Valley (Idaho/Utah border) | March 28, 1975 | 6.2 |
| 57 | Yellowstone National Park, Montana | June 30, 1975 | 6.1 |
| 58 | Imperial Valley, California | October 15, 1979 | 7.0 |
| 59 | Offshore Eureka, California | November 8, 1980 | 7.2 |
| 60 | Miramichi, New Brunswick, Canada | January 9, 1982 | 5.8 |
| 61 | Coalinga, California | May 2, 1983 | 6.7 |
| 62 | Borah Peak, Idaho | October 28, 1983 | 7.3 |
| 63 | Loma Prieta, California | October 18, 1989 | 7.1 |

[1]Dates are given in Greenwich Mean Time.
[2]For a single earthquake, different seismographic or intensity data usually imply slightly different magnitudes. The magnitudes given in this table are those preferred by the compilers of the Decade of North American Geology map.

### Principal Sources of Earthquake Data

Decade of North American Geology (DNAG) database (1534–1985)
U.S. Geological Survey, Preliminary Determination of Epicenters (1986–1991)

The earthquake locations are based on data provided by seismologists at universities and regional and national facilities throughout the United States and the world. The software used to plot epicenter symbols was developed by Madeleine Zirbes.

### Additional Reading

Coffman, J.L., von Hake, C.A., and Stover, C.W., eds., 1982, Earthquake History of the United States, NOAA Publication 41-1, with supplement, 258 p.
A history of the prominent earthquakes in the United States from historical times through 1982.

Engdahl, E.R., and Rinehart, W.A., 1991, Seismicity Map of North America Project, *in* Slemmons, D.B., and others, eds., Neotectonics of North America: Geological Society of America, Decade Map Volume 1, p. 21–27.
An explanation of the DNAG database.

For sale by U.S. Geological Survey, NEIC Maps,
Box 25286, Federal Center, MS 306, Denver, CO 80225

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