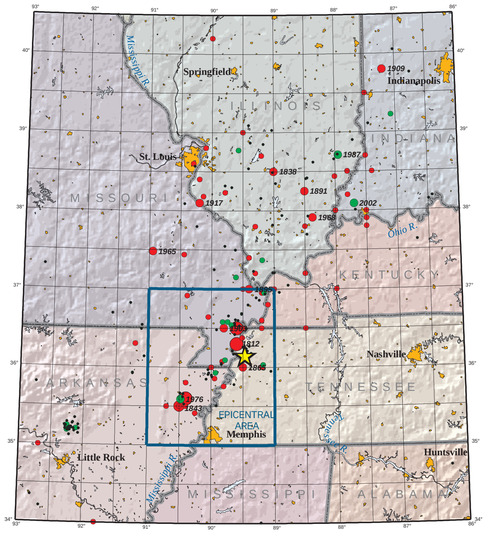
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

EARTHQUAKE SUMMARY MAP XXX

M3.9 Northwestern Tennessee Earthquake of 2 June 2005

Prepared in cooperation with the University of Memphis Center for Earthquake Research and Information and the Saint Louis University Earthquake Center

Earthquakes in the Central U.S.



EXPLANATION

Main Shock

2005

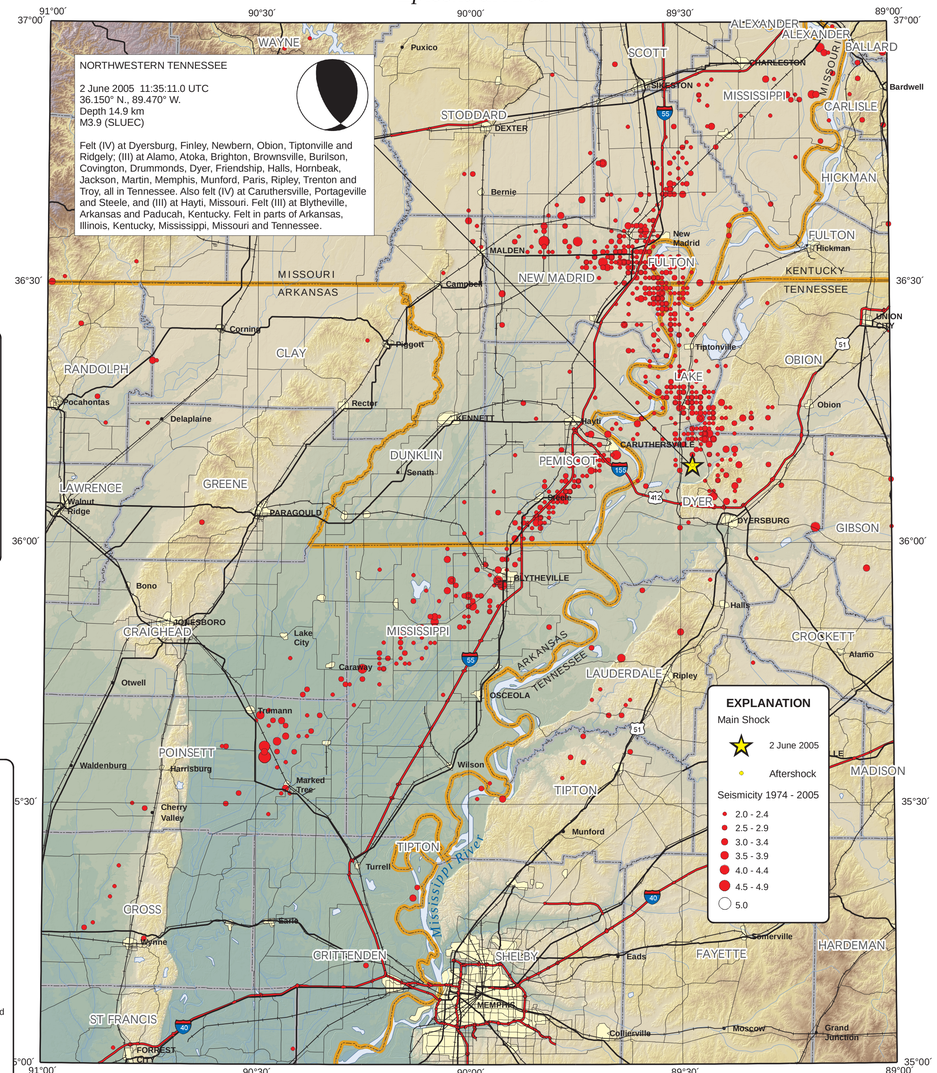
Earthquakes Pre-1974

- 4.0 - 4.9
- 5.0 - 5.9
- 6.0 - 6.9
- 7.0 - 7.9

Earthquakes 1974 - 2002

- M < 4.0
- 4.0 - 4.9
- 5.0 - 5.2

Epicentral Area



SCALE 1:600,000
Albers Equal-Area Conic Projection
Kilometers
0 10 20 40 60 80
Miles
0 10 20 40 60 80

EXPLANATION

Main Shock

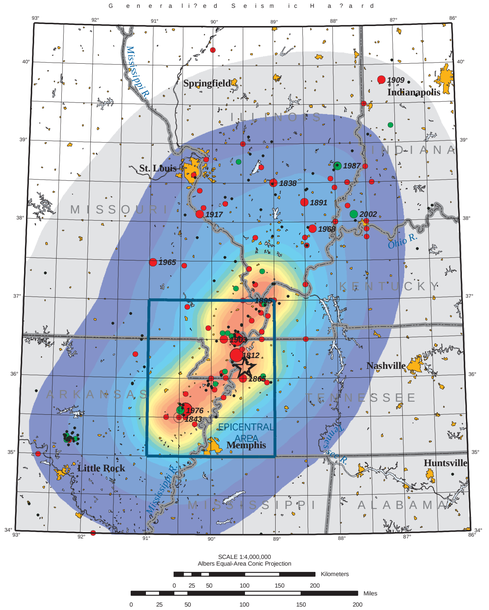
2 June 2005

Aftershock

Seismicity 1974 - 2005

- 2.0 - 2.4
- 2.5 - 2.9
- 3.0 - 3.4
- 3.5 - 3.9
- 4.0 - 4.4
- 4.5 - 4.9
- 5.0

Generalized Seismic Hazard



EXPLANATION

Main Shock

2005

Earthquakes Pre-1974

- 4.0 - 4.9
- 5.0 - 5.9
- 6.0 - 6.9
- 7.0 - 7.9

Earthquakes 1974 - 2002

- M < 4.0
- 4.0 - 4.9
- 5.0 - 5.2

Seismic Hazard

- 170 - 180% g Highest Hazard
- 160 - 170
- 150 - 160
- 140 - 150
- 130 - 140
- 120 - 130
- 110 - 120
- 100 - 110
- 90 - 100
- 80 - 90
- 70 - 80
- 60 - 70
- 50 - 60
- 40 - 50
- 30 - 40
- 20 - 30
- 10 - 20
- 4 - 10% g Lowest Hazard

Seismic hazard is expressed as peak ground acceleration (PGA) on firm rock, in percent g, expected to be exceeded with a probability of two percent in a 50-year period.

DATA SOURCES

EARTHQUAKES AND SEISMIC HAZARD
USGS, National Earthquake Information Center
University of Memphis Center for Earthquake Research and Information (CERI)
Saint Louis University Earthquake Center (SLUEC)

BASE MAP
NIMA and ESRI, Digital Chart of the World
USGS, EROS Data Center

ONLINE RESOURCES
http://earthquakes.usgs.gov
http://www.ceri.memphis.edu
http://www.eas.slu.edu/Earthquake_Center

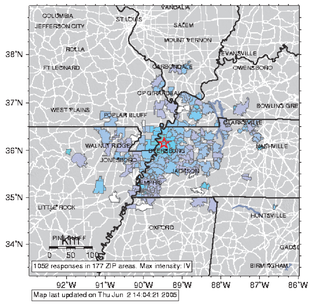
DISCLAIMER

Base map data, such as place names and political boundaries, are the best available but may not be current or may contain inaccuracies and therefore should not be regarded as having official significance.

LARGEST EARTHQUAKES IN THE CENTRAL U.S.

YR	MO	DY	LAT	LON	MAGNITUDE
1811	12	16	35.6	-90.0	7.3-8.0
1811	12	16	35.6	-90.0	7.3-8.0
1812	1	23	36.3	-89.6	7.3-8.0
1812	2	7	36.5	-89.6	7.3-8.0
1838	6	9	38.5	-89.0	5.2
1843	1	5	35.5	-90.5	6.3
1865	8	17	36.0	-89.5	5.0
1891	9	27	38.25	-88.5	5.2
1895	10	31	37.0	-89.4	6.6
1903	11	4	36.5	-89.8	5.1
1909	9	27	39.8	-87.2	5.1
1917	4	9	38.1	-90.2	5.1
1965	10	21	37.479	-90.944	5.1
1968	11	9	37.911	-88.373	5.5
1974	3	27	38.550	-90.130	5.6
1976	3	25	35.590	-90.480	5.0
1977	1	3	37.550	-89.790	5.0
1987	6	10	38.713	-87.954	5.1
1990	9	26	37.165	-89.577	5.0
1991	5	4	36.564	-89.823	5.0
2002	6	18	38.069	-87.680	5.0

USGS Community Internet Intensity Map (10 miles NNW of Dyersburg, Tennessee)
ID:737_05 06:33:11 CDT JUN 2 2005 Mag=4.0 Latitude=N36.15 Longitude=W89.47



INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+
SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
DAMAGE	none	none	none	Very light	light	Moderate	Moderate/Heavy	Heavy	Very Heavy

DISCUSSION

EARTHQUAKES IN THE NEW MADRID SEISMIC ZONE

The New Madrid seismic zone of southeast Missouri and adjacent States is the most seismically active in North America east of the Rockies. During the winter of 1811- 1812, three very large earthquakes devastated the area and were felt throughout most of the Nation. Hundreds of aftershocks, some severely damaging by themselves, continued for years. Prehistoric earthquakes similar in size to those of 1811- 1812 occurred in the middle 1400's and around 900 A.D. Strongly damaging earthquakes struck the southwestern end of the seismic zone near Marked Tree, Arkansas in 1843 (magnitude 6.3), and the northeastern end near Charleston, Missouri in 1895 (magnitude 6.6). Since 1900, moderately damaging earthquakes have struck the seismic zone every few decades. About twice a year people feel still smaller earthquakes that do not cause damage.

Earthquakes in the central and eastern U.S. are typically felt over a much broader region than in the western U.S. East of the Rockies, an earthquake can be felt over an area as much as ten times larger than a similar magnitude earthquake on the west coast. A magnitude 4.0 eastern U.S. earthquake typically can be felt at many places as far as 100 km (60 mi) from where it occurred, and it infrequently causes damage near its source. A magnitude 5.5 eastern U.S. earthquake usually can be felt as far as 500 km (300 mi) from where it occurred, and sometimes causes damage out to 40 km (25 mi).

FAULTS

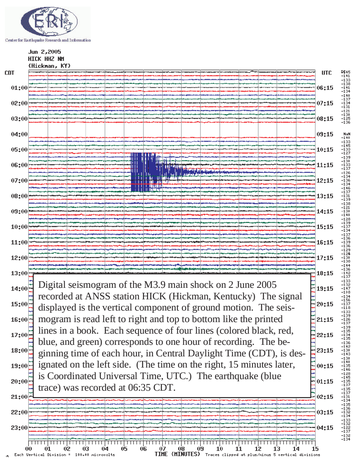
Earthquakes everywhere occur on faults within bedrock, usually several miles deep. The earthquakes of the New Madrid seismic zone occur within a large network of faults called the Reelfoot rift. The rift formed about 500 million years ago, when this region was stretched in the northwest- southeast direction. Along a northeast- southwest zone at least 70 km (40 mi) wide and 500 km (300 mi) long, the rocks in the rift were slowly dropped down about 1-2 km (1 mi) along some of the faults. Now the region is undergoing east- west shortening, and the ancient faults of the Reelfoot rift are being reactivated to generate earthquakes. Today the Reelfoot rift and the New Madrid seismic zone are 2,000 km (1,200 mi) from the nearest plate boundary, which is in the Caribbean Sea.

The network of faults in the seismic zone is buried beneath hundreds to thousands of feet of sand and mud. Four of the largest faults are recognized as alignments of abundant small earthquakes, and movements along two of these faults dammed rivers and created lakes during the earthquakes of 1811-1812. A few more deeply buried faults were detected during oil and gas exploration, and a few small faults are known from geologic mapping. However, many earthquakes occur away from the few known faults, so there must be additional, unknown faults that can generate earthquakes in the seismic zone. Accordingly, the best overall guide to seismic hazard in the New Madrid seismic zone is the earthquakes themselves.

ANSS station SFTN (Shelby Forest, Memphis, Tennessee)

COMMUNITY INTERNET INTENSITY MAPS

The Community Internet Intensity Maps (CIIM) summarize the online questionnaire responses provided by Internet users. An intensity number is assigned to each community from which a filled-out CIIM questionnaire was received; each intensity value reflects the effects of earthquake shaking on the people and structures in the community. The color-coded ZIP Code zone on the map represents the average of the individual intensity values in that ZIP Code zone.



Digital seismogram of the M3.9 main shock on 2 June 2005 recorded at ANSS station HICK (Hickman, Kentucky) The signal displayed is the vertical component of ground motion. The seismogram is read left to right and top to bottom like the printed lines in a book. Each sequence of four lines (colored black, red, blue, and green) corresponds to one hour of recording. The beginning time of each hour, in Central Daylight Time (CDT), is designated on the left side. (The time on the right, 15 minutes later, is Coordinated Universal Time, UTC.) The earthquake (blue trace) was recorded at 06:35 CDT.

DATA SOURCES FOR TABLE

USGS National Earthquake Information Center (NEIC):
Significant U.S. Earthquakes (1838 - 1986)
Preliminary Determination of Epicenters (1987 - 2002)
Johnston, A.C., 1996, Seismic moment assessment of earthquakes in stable continental regions - III. New Madrid 1811-1812, Charleston 1886 and Lisbon 1755: Geophysical Journal International, v. 126, p. 314-344. (1843, 1895)
Frankel, A.D., Petersen, M.D., Mueller, C.S., Haller, K.M., Wheeler, R.L., Leyendecker, E.V., Wesson, R.L., Harmsen, S.C., Cramer, C.H., Perkins, D.M., and Rukstales, K.S., 2002, Documentation for the 2002 Update of the National Seismic Hazard Maps: U.S. Geological Survey Open-File Report 02-0420, 39 p. (1811, 1812)

Magnitudes are approximate; authorities differ on exact values.

Map prepared by U.S. Geological Survey
National Earthquake Information Center
6 June 2005
Map not approved for release by Director USGS