

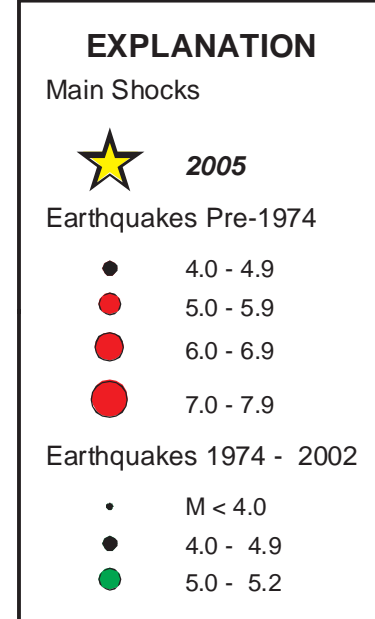
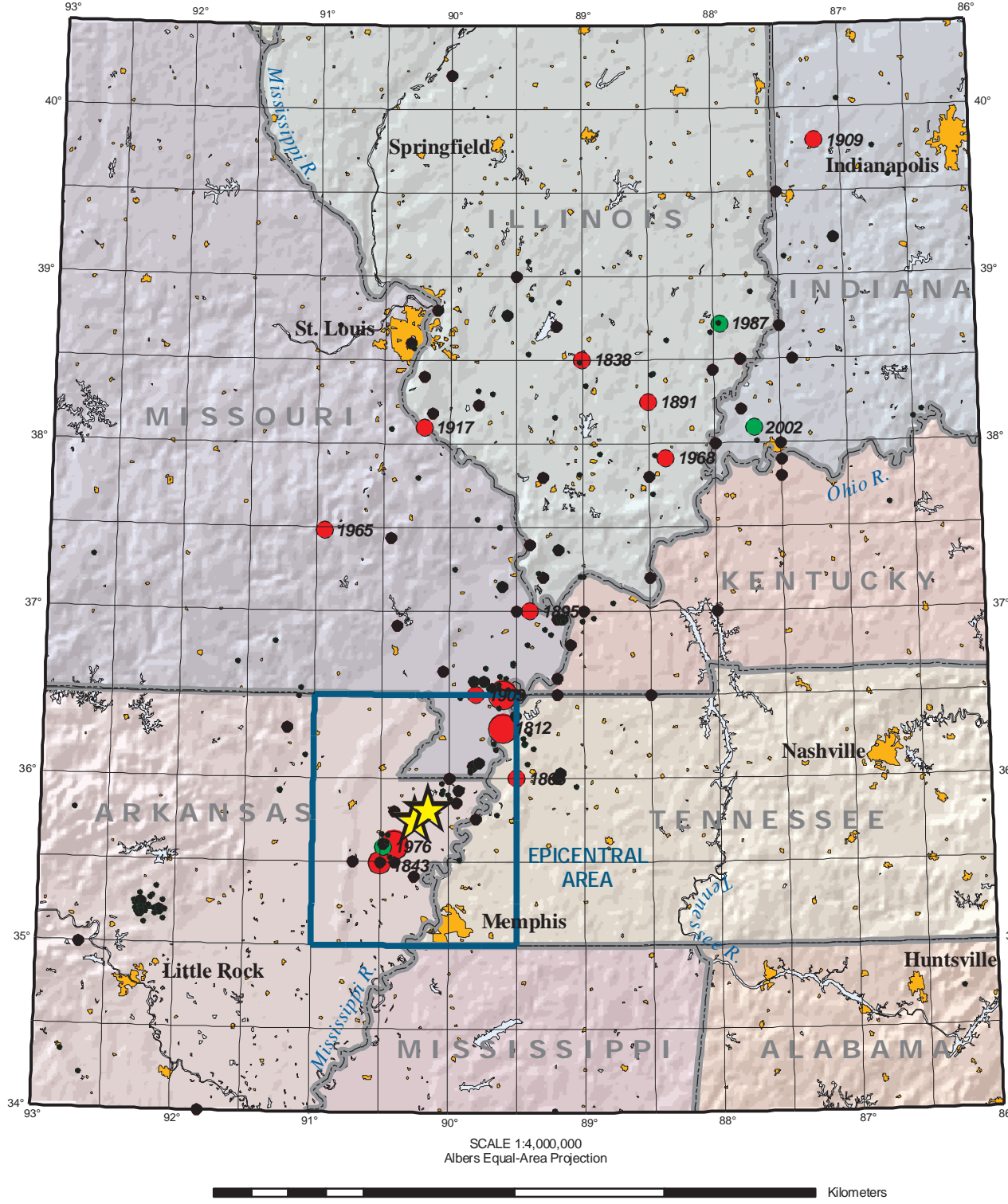
# Northeastern Arkansas Earthquakes of 10 February 2005 and 1 May 2005

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

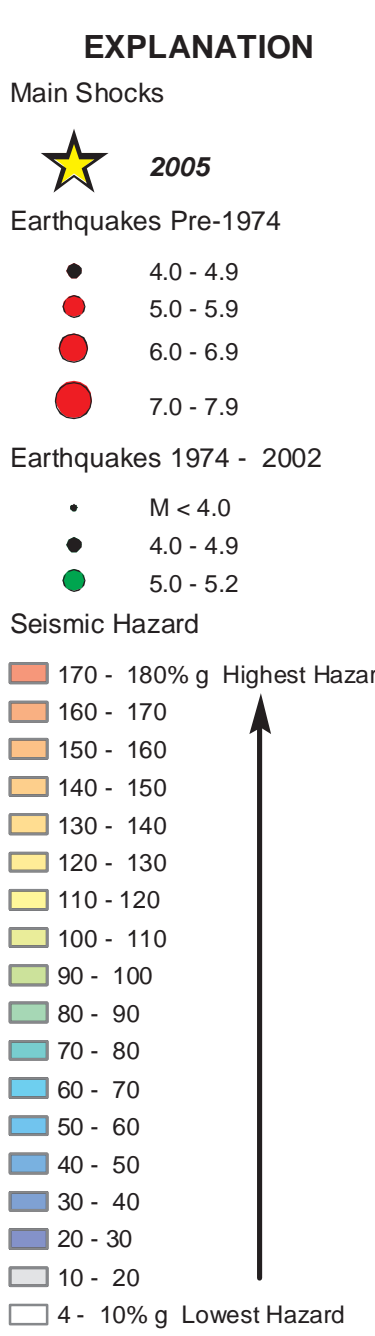
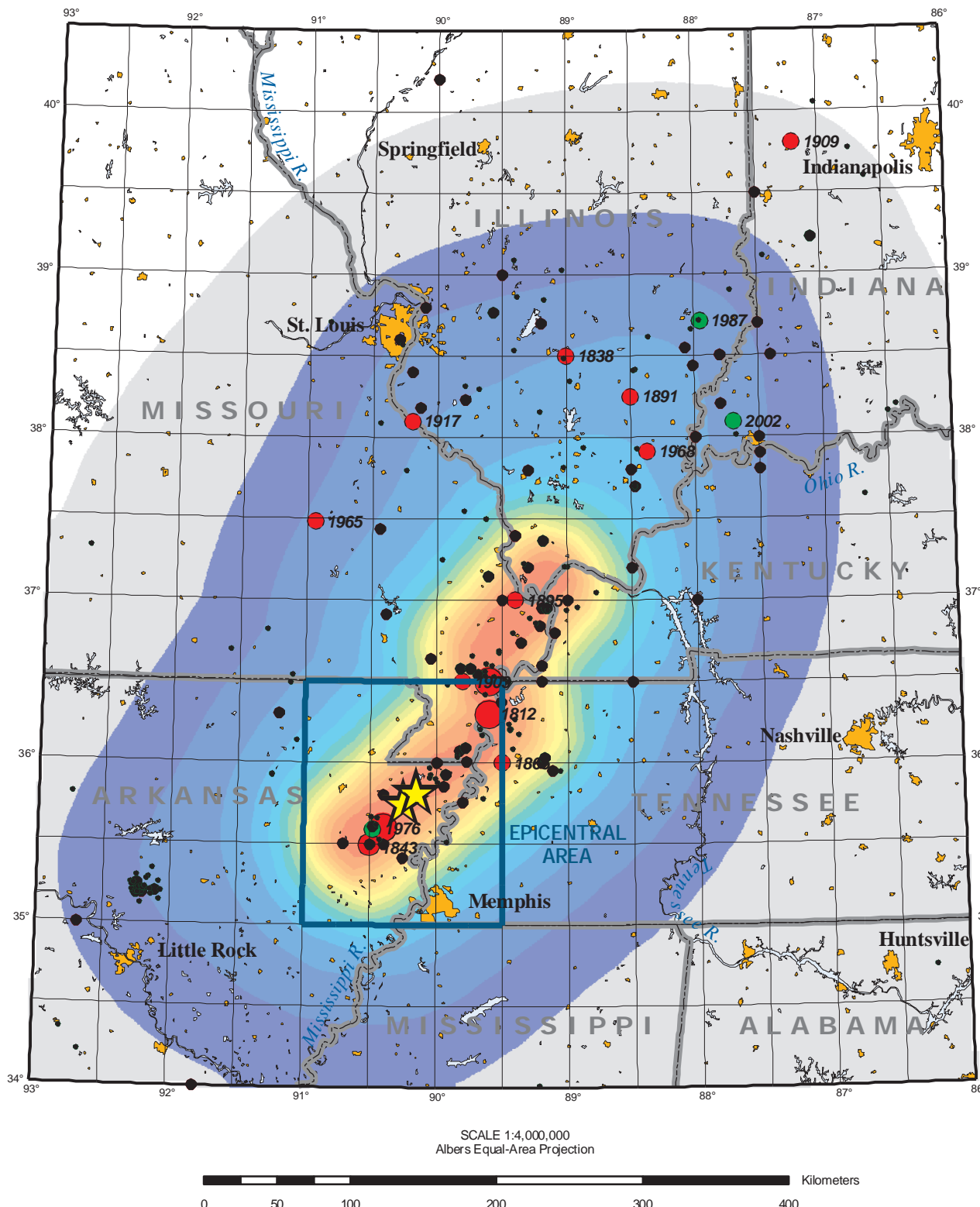


## Community Internet Intensity Maps

### Earthquakes in the Central U.S.

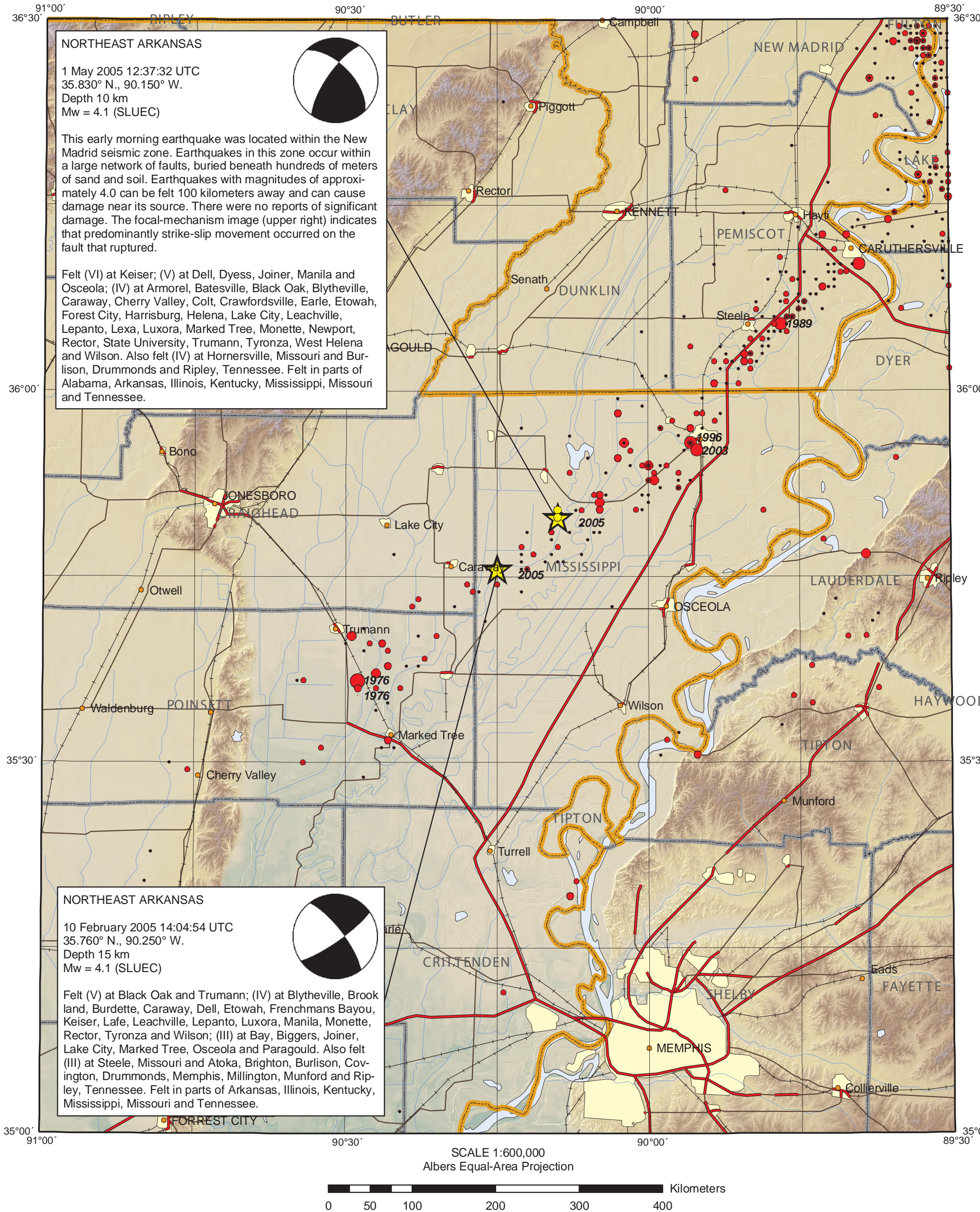


### Generalized Seismic Hazard



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.

### Epicentral Area



**NORTHEAST ARKANSAS**  
1 May 2005 12:37:32 UTC  
35.830° N., 90.150° W.  
Depth 10 km  
Mw = 4.1 (SLUEC)

This early morning earthquake was located within the New Madrid seismic zone. Earthquakes in this zone occur within a large network of faults, buried beneath hundreds of meters of sand and soil. Earthquakes with magnitudes of approximately 4.0 can be felt 100 kilometers away and can cause damage near its source. There were no reports of significant damage. The focal-mechanism image (upper right) indicates that predominantly strike-slip movement occurred on the fault that ruptured.

Felt (VI) at Keiser; (V) at Dell, Dyess, Joiner, Manila and Osceola; (IV) at Amorel, Batesville, Black Oak, Blytheville, Caraway, Cherry Valley, Colt, Crawfordsville, Earle, Etowah, Forest City, Harrisburg, Helena, Lake City, Leachville, Lepanto, Lexa, Luxora, Marked Tree, Monette, Newport, Rector, State University, Trumann, Tyrone, West Helena and Wilson. Also felt (IV) at Hornersville, Missouri and Burlington, Drummonds and Ripley, Tennessee. Felt in parts of Alabama, Arkansas, Illinois, Kentucky, Mississippi, Missouri and Tennessee.

**NORTHEAST ARKANSAS**  
10 February 2005 14:04:54 UTC  
35.760° N., 90.250° W.  
Depth 15 km  
Mw = 4.1 (SLUEC)

Felt (V) at Black Oak and Trumann; (IV) at Blytheville, Brookland, Burdette, Caraway, Dell, Etowah, Frenchmans Bayou, Keiser, Lefe, Leachville, Lepanto, Luxora, Manila, Monette, Rector, Tyrone and Wilson; (III) at Bay, Biggers, Joiner, Lake City, Marked Tree, Osceola and Paragould. Also felt (III) at Steele, Missouri and Atoka, Brighton, Burlington, Covington, Drummonds, Memphis, Millington, Munford and Ripley, Tennessee. Felt in parts of Arkansas, Illinois, Kentucky, Mississippi, Missouri and Tennessee.

**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

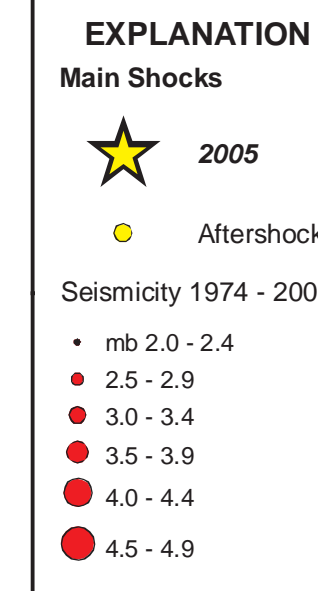
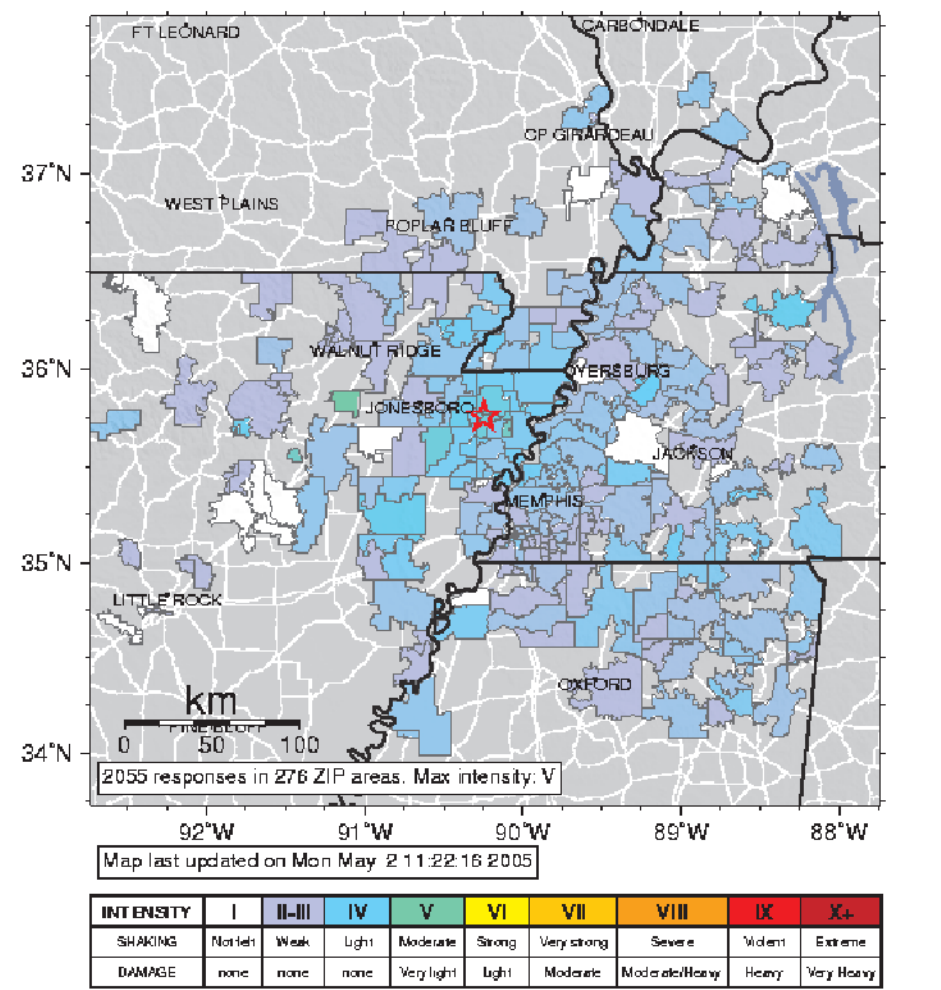
**ONLINE RESOURCES**  
<http://earthquakes.usgs.gov>  
<http://www.ceri.memphis.edu>  
[http://www.eas.slu.edu/Earthquake\\_Center](http://www.eas.slu.edu/Earthquake_Center)

**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.



ANSS station SFTN (Shelby Forest, Memphis, Tennessee)

10 February 2005  
USGS Community Internet Intensity Map (22 miles WSW of Blytheville, Arkansas)  
ID: 722\_03\_06:54:54\_CST\_FEB 10 2005 Mag=4.1 Latitude=35.83 Longitude=90.15



**LARGEST EARTHQUAKES IN THE CENTRAL U.S.**

YR	MO	DY	LAT	LN	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

### 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 1400s 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.

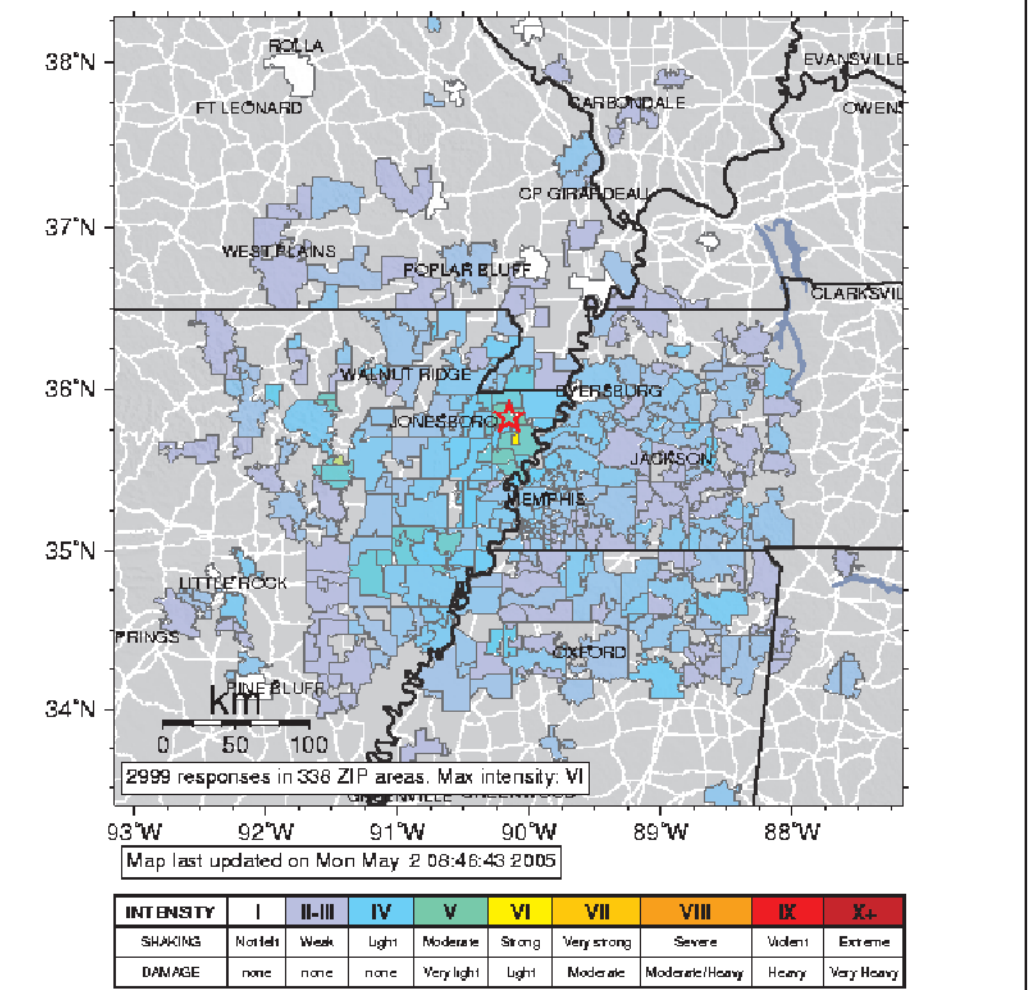
Earthquakes in the central and eastern U.S. are typically felt over a much broader region than in the western U.S. East of the Rockies, an earthquake can be felt over an area as much as ten times larger than a similar magnitude earthquake on the west coast. A magnitude 4.0 eastern U.S. earthquake typically 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 400 km (250 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.

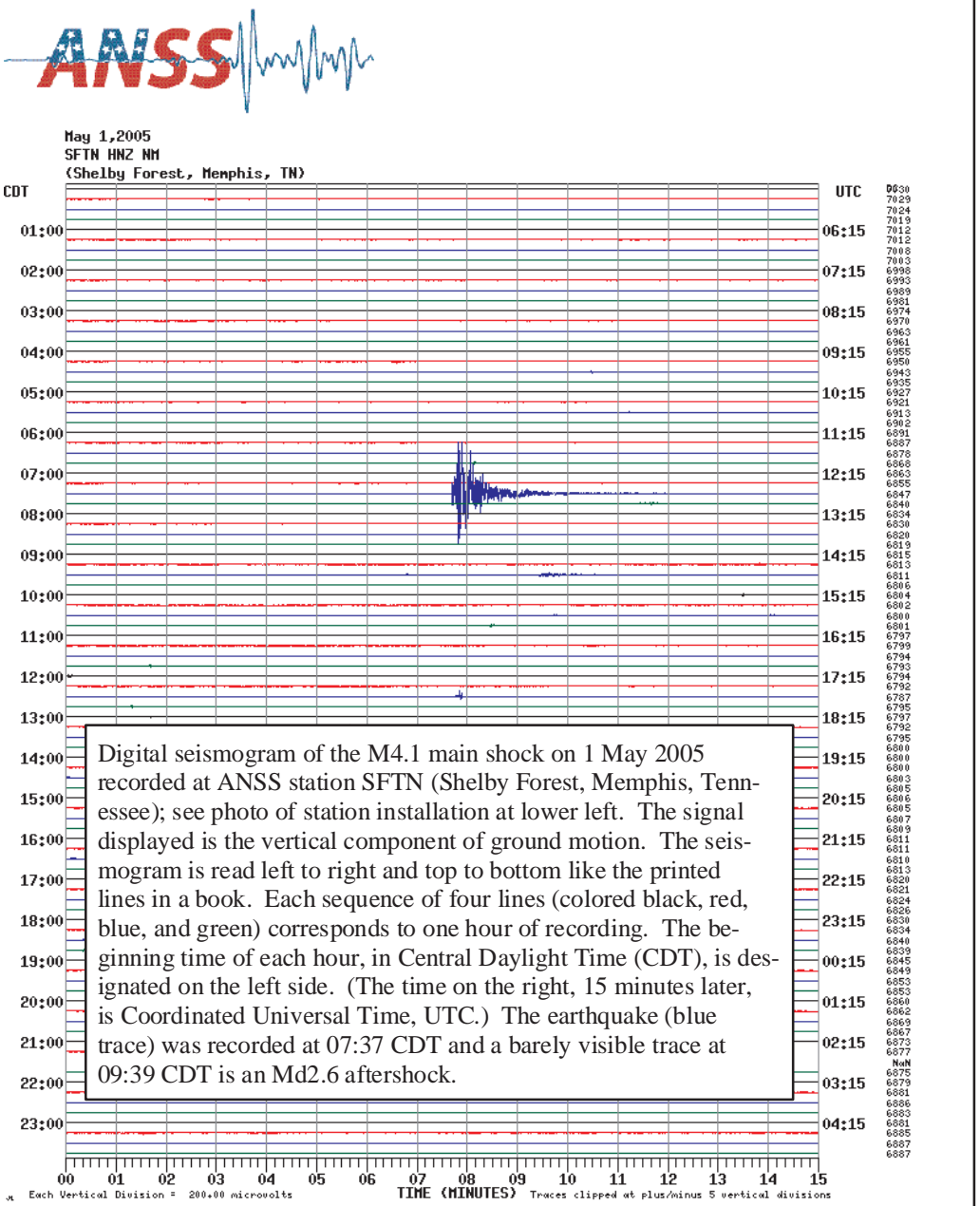
The network of faults in the seismic zone is buried beneath hundreds of thousands of feet of sand and mud. Four of the largest faults are recognized as alignments of abundant small earthquakes, and movements along two of these faults dammed rivers and created lakes during the earthquakes of 1811-1812. 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.

1 May 2005  
USGS Community Internet Intensity Map (15 miles WSW of Blytheville, Arkansas)  
ID: 722\_03\_06:54:54\_CST\_MAY 1 2005 Mag=4.1 Latitude=35.83 Longitude=90.15



### COMMUNITY INTERNET INTENSITY MAPS

The Community Internet Intensity Maps (CIM) summarize the online questionnaire responses provided by Internet users. An intensity number is assigned to each community from which a filled-out CIM 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 M4.1 main shock on 1 May 2005 recorded at ANSS station SFTN (Shelby Forest, Memphis, Tennessee); see photo of station installation at lower left. 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 07:37 CDT and a barely visible trace at 09:39 CDT is an M2.6 aftershock.

### 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 May 2005  
Map not approved for release by Director USGS