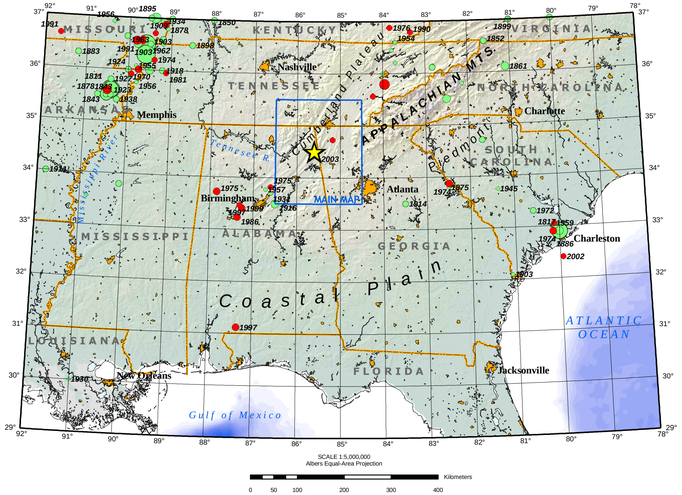
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

GENERAL INTEREST PRODUCT XXX

M4.6 Fort Payne, Alabama Earthquake of 29 April 2003

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

Earthquake History of the Southeastern U.S.



EXPLANATION

Main Shock 29 April 2003

2003

Recent Earthquakes 1973 - 2003

1975

Historic Earthquakes Pre-1973

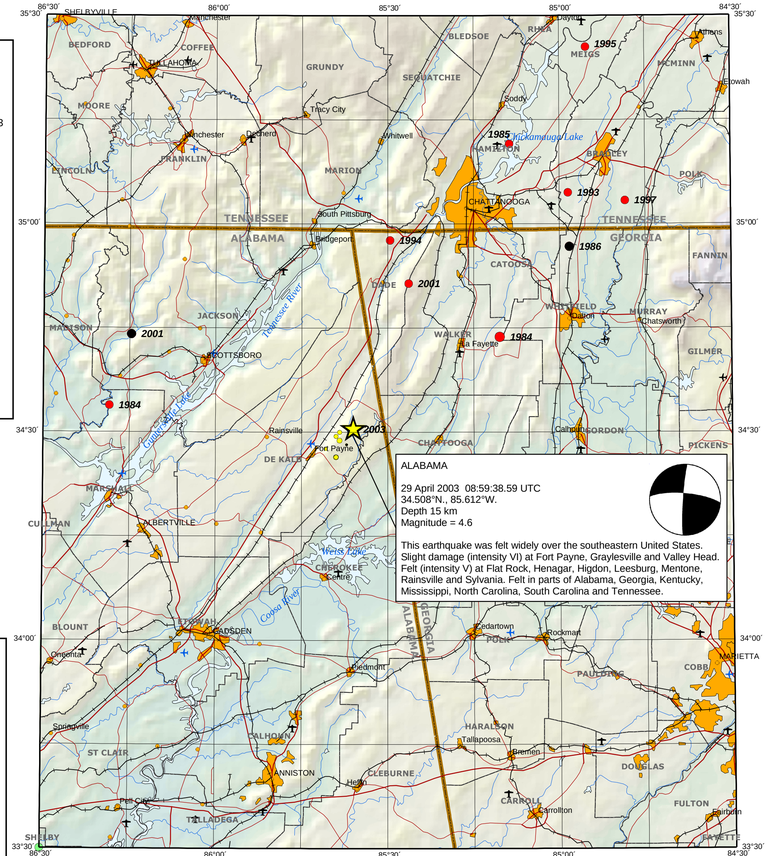
1914

Magnitude Classes

- M3.0 - 3.9
- 4.0 - 4.9
- 5.0 - 5.9
- 6.0 - 6.9
- 7.0 - 7.9
- 8.0 - 8.9

Urbanized Areas

Epicentral Area



EXPLANATION

Main Shock 29 April 2003

2003

Aftershocks 29 April 2003

Recent Earthquakes

1986

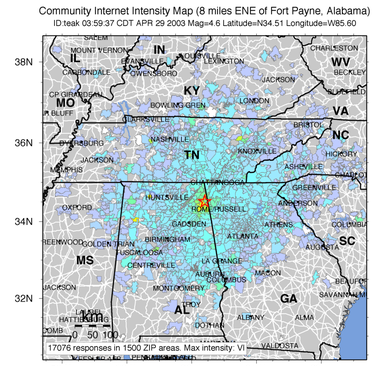
Magnitude Classes

- M1.0 - 1.9
- 2.0 - 2.9
- 3.0 - 3.9
- 4.0 - 4.9

Urbanized Areas

SCALE 1:1,000,000
Albers Equal-Area Projection
Kilometers
0 5 10 20 30 40

Internet Intensities



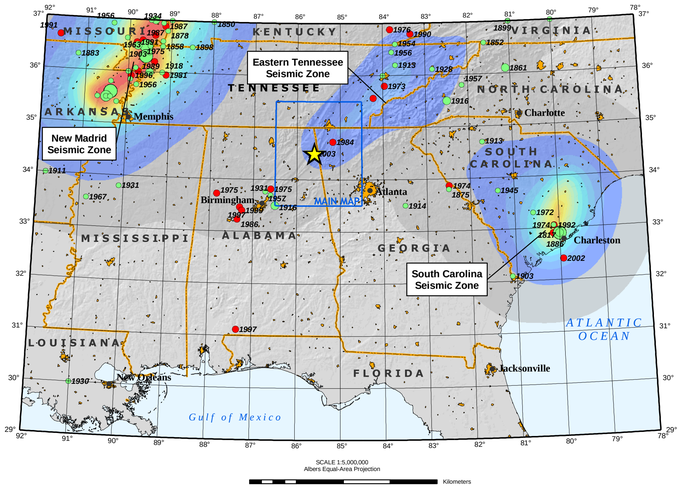
INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+
SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy

COMMUNITY INTERNET INTENSITY MAP

The Community Internet Intensity Map (CIIM) summarizes 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.

This map is found at:
http://pasadena.wr.usgs.gov/shake/cus/STORE/Xteak/ciim_display.html

Seismic Hazard of the Southeastern U.S.



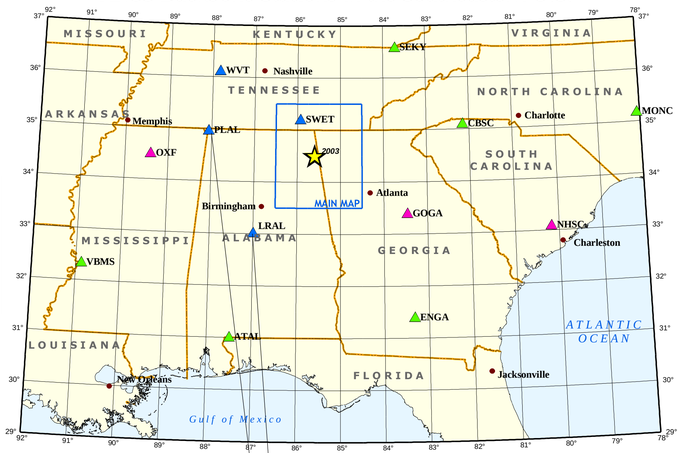
EXPLANATION

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
- 2 - 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

ANSS Backbone Stations in the Southeastern U.S.



EXPLANATION

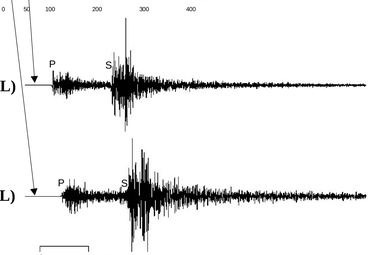
ANSS Seismic Stations

- Cooperating
- Planned
- USNSN

ADVANCED NATIONAL SEISMIC SYSTEM

The Advanced National Seismic System (ANSS) will be a nationwide network of at least 7000 shaking measurement systems, both on the ground and in buildings that will make it possible to provide emergency response personnel with real-time earthquake information, provide engineers with information about building and site response, and provide scientists with high-quality data to understand earthquake processes and solid earth structure and dynamics.

Representative Digital Seismograms



ONLINE RESOURCES

USGS Earthquake Program
http://earthquake.usgs.gov
Community Internet Intensity Map (CIIM)
http://pasadena.wr.usgs.gov/shake/cus/html/background.html
Advanced National Seismic System (ANSS)
http://www.anss.org
Center for Earthquake Research and Information
http://www.ceri.memphis.edu
Saint Louis University Earthquake Center
http://www.eas.slu.edu/Earthquake_Center
Earthquake History of Alabama
http://neic.usgs.gov/neis/states/alabama/alabama_history.html
Geological Survey of Alabama
http://www.gsa.state.al.us/

DATA SOURCES

EARTHQUAKES AND SEISMIC HAZARD
USGS, National Earthquake Information Center
CERI, University of Memphis
SLUEC, Saint Louis University
IASPEI, Centennial Catalog (1900 - 1999)
Handbook of Seismology and Earthquake Engineering
Global Seismic Hazard Assessment Program

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

DISCUSSION

TECTONIC SETTING AND SEISMICITY CONTEXT

The Eastern Tennessee seismic zone, which extends from southwest Virginia to northeast Alabama, is one of the most active earthquake areas in the Southeast. Although the zone has not had a large earthquake in historic times, a few earthquakes have caused slight damage. The largest recorded earthquake in this seismic zone was a magnitude 4.6 that occurred in 1973 near Knoxville. Sensitive seismographs have recorded hundreds of earthquakes too small to be felt in this seismic zone. Small, non-damaging, felt earthquakes occur about once a year.

Earthquakes in the central and eastern U.S., although less frequent, are typically felt over a much broader region than the western U.S. East of the Rockies, an earthquake can be felt in an area as much as ten times greater than a similar magnitude earthquake in the western U.S. For example, a magnitude 4.0 eastern U.S. earthquake typically can be felt at many locations as far as 100 km (60 mi) from where it occurred, and it might or might not cause damage near its source. A magnitude 5.5 eastern US earthquake usually can be felt as far as 500 km (300 mi) in most directions and can cause damage out to 40 km (25 mi).

FAULTS

At plate boundaries, earthquakes can commonly be related to specific faults or fault systems. In contrast, in the eastern Tennessee seismic zone the relation between faults and earthquakes is more enigmatic. The Eastern U.S. is far from the plate boundaries, the nearest of which are in the center of the Atlantic Ocean and in the Caribbean Sea. No active faults are known to reach the surface in the region, although the area is laced with ancient faults that developed as the Appalachian Mountains formed several hundred million years ago. The larger faults, particularly those that have been exposed at the Earth's surface by erosion, are likely to have been mapped by geologists. Unknown but probably numerous smaller or more deeply buried faults remain undetected. Even those faults that are mapped at the surface are poorly located at earthquake depths. Accordingly, few, if any, earthquakes in the eastern Tennessee seismic zone can be linked to known faults, and it is difficult to determine if a specific fault could still slip and cause an earthquake. As in most other areas east of the Rockies, the best guide to earthquake hazards in the seismic zone is the earthquakes themselves.

DISCUSSION
(continued)

PAST EARTHQUAKES IN ALABAMA

The documented history of small earthquakes in Alabama spans about 100 years and includes about a half dozen small- to moderate-sized damaging events. The largest recent earthquake recorded in the State was a magnitude 4.9, which occurred south of the Eastern Tennessee seismic zone near Atmore, Alabama, on October 24, 1997. For an in-depth summary of historical earthquake activity in the State, see the Earthquake History of Alabama (see Online Resources at bottom of map).

SEISMIC MONITORING IN ALABAMA

The U.S. Geological Survey works in cooperation with the Center for Earthquake Research and Information (CERI) at the University of Memphis to monitor seismicity in the Alabama region. In response to the 1997 magnitude 4.9 Atmore, Alabama earthquake, the U.S. Geological Survey in cooperation with the State Survey of Alabama installed a seismic monitoring station near Birmingham, Alabama in 2001. This station is a key part of an upgraded seismic monitoring network being implemented by the USGS as part of its Advanced National Seismic System (ANSS). Additional stations are planned for the southeastern U.S., pending the allocation of Federal funds.

IMPACT OF THE 29 APRIL 2003 EARTHQUAKE

This earthquake produced very limited damage. Cracked foundations and bricks fallen from chimneys were reported at Fort Payne. The water system at Valley Head also reported muddy water. Some schools in the region were closed as a precaution.

PUBLIC RESPONSE TO THE 29 APRIL 2003 EARTHQUAKE

Thousands of web surfers recorded their observations of this earthquake on a USGS internet site designed to compile public observations into an integrated shaking map for the epicentral region. This "Did You Feel It" web site not only provides a concise summary of the distribution of perceived shaking, but it also provides researchers with data they need to supplement limited seismic recordings. The public is encouraged to visit the "Did You Feel It" site and record their own observations.

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.

Map prepared by U.S. Geological Survey
National Earthquake Information Center
23 June 2003
Map not approved for release by Director USGS