

The New Madrid Earthquakes An Overview

BY

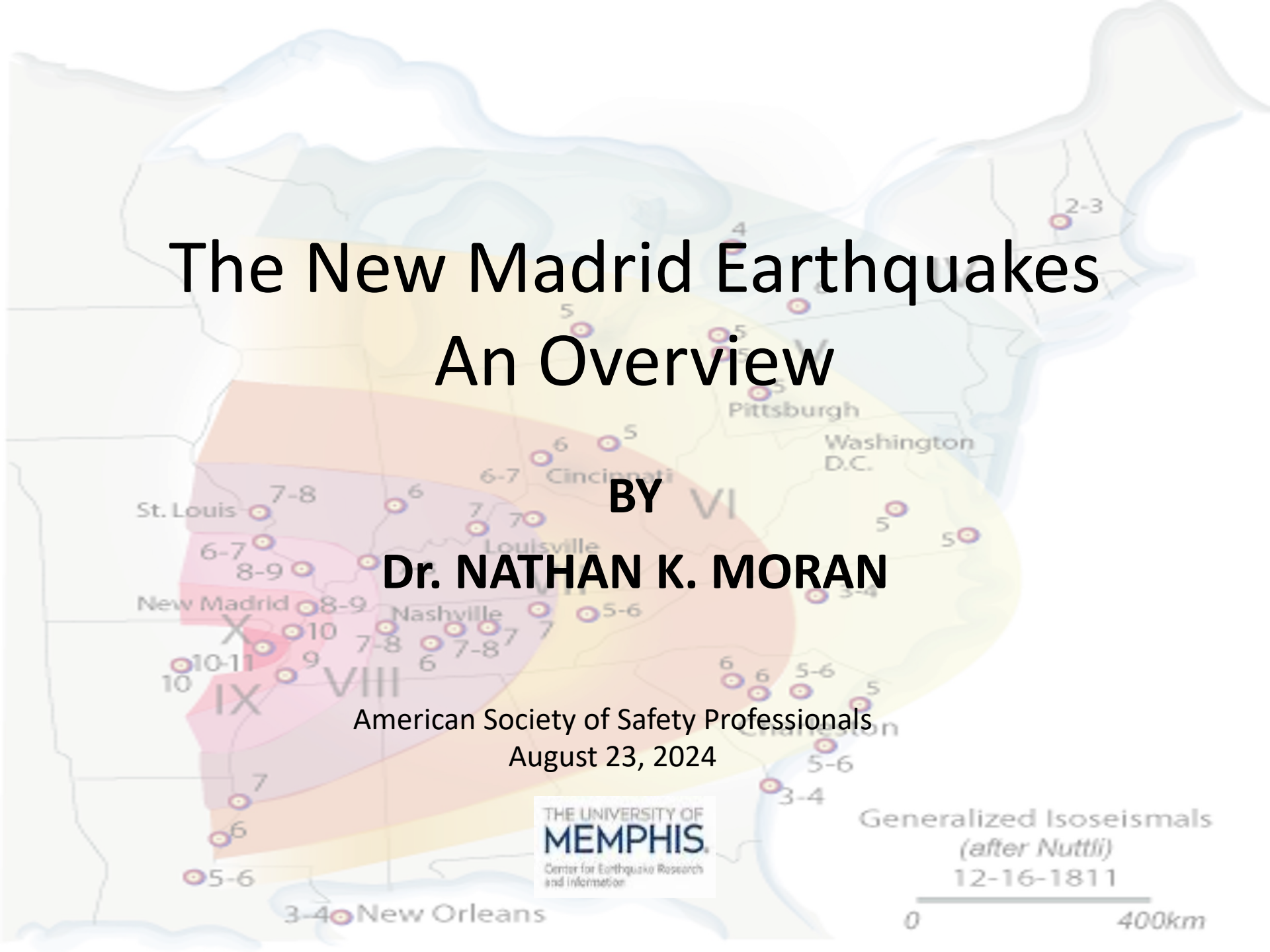
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American Society of Safety Professionals
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THE UNIVERSITY OF
MEMPHIS
Center for Earthquake Research
and Information

Generalized Iseoseismals
(after Nuttli)
12-16-1811

0 400km



A TREMENDOUS SHOCK!

- 212 YEARS SINCE THE NEW MADRID EARTHQUAKES.
- 3 MAJOR EARTHQUAKE EVENTS IN A THREE MONTH PERIOD.
- EARTHQUAKES FELT ACROSS UNITED STATES.



HISTORIC BACKGROUND

- NEW MADRID AREA STILL PART OF AMERICAN FRONTIER.
- LOUISIANA TERRITORY PURCHASED IN 1804
- POPULATION SPARSE AT LOCATION OF EARTHQUAKES.
- A WIDE VARIETY OF EYEWITNESSES.

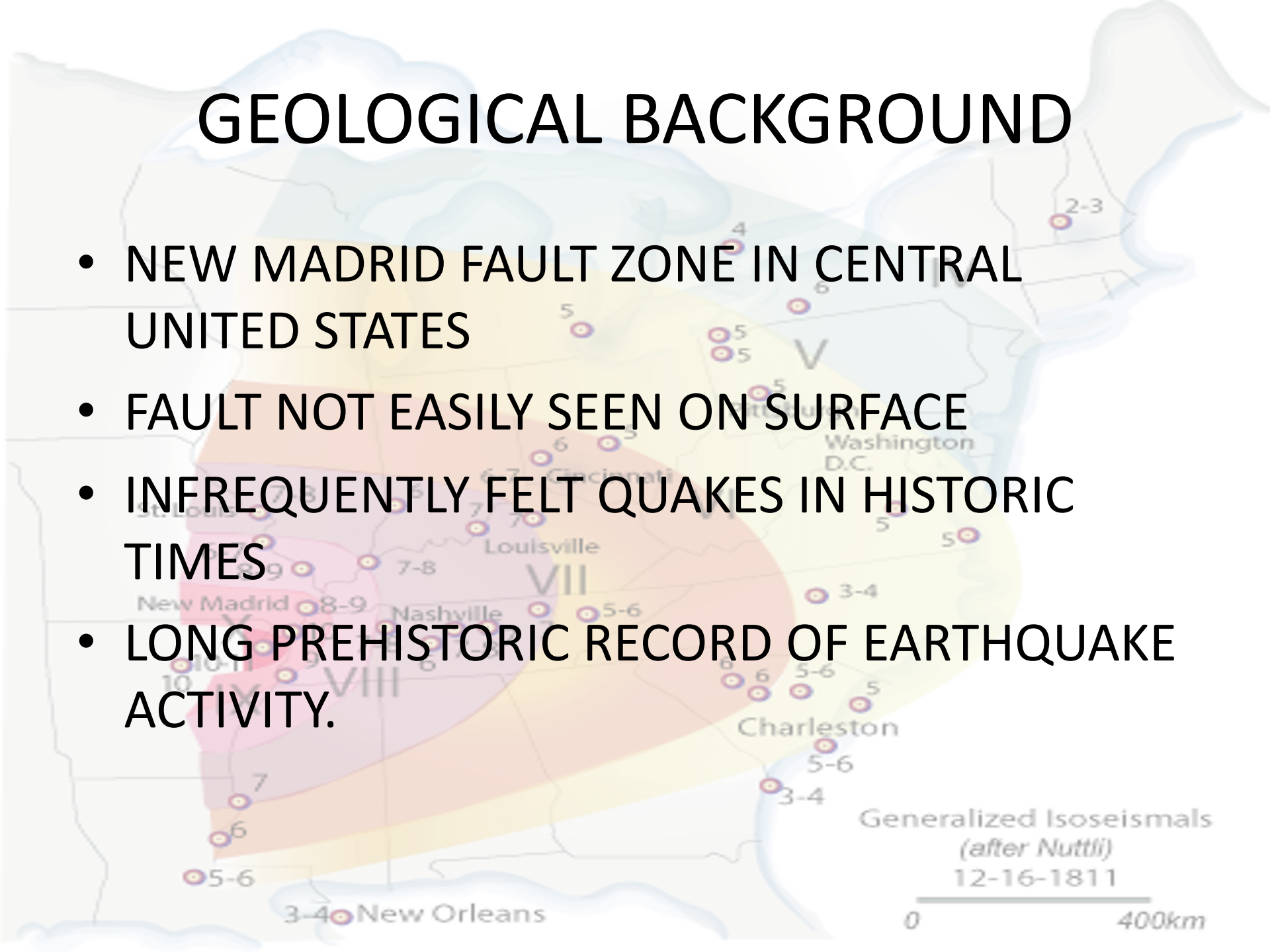


The United States in 1812



GEOLOGICAL BACKGROUND

- NEW MADRID FAULT ZONE IN CENTRAL UNITED STATES
- FAULT NOT EASILY SEEN ON SURFACE
- INFREQUENTLY FELT QUAKES IN HISTORIC TIMES
- LONG PREHISTORIC RECORD OF EARTHQUAKE ACTIVITY.



NEW MADRID SEISMIC ZONE



Regional Seismicity

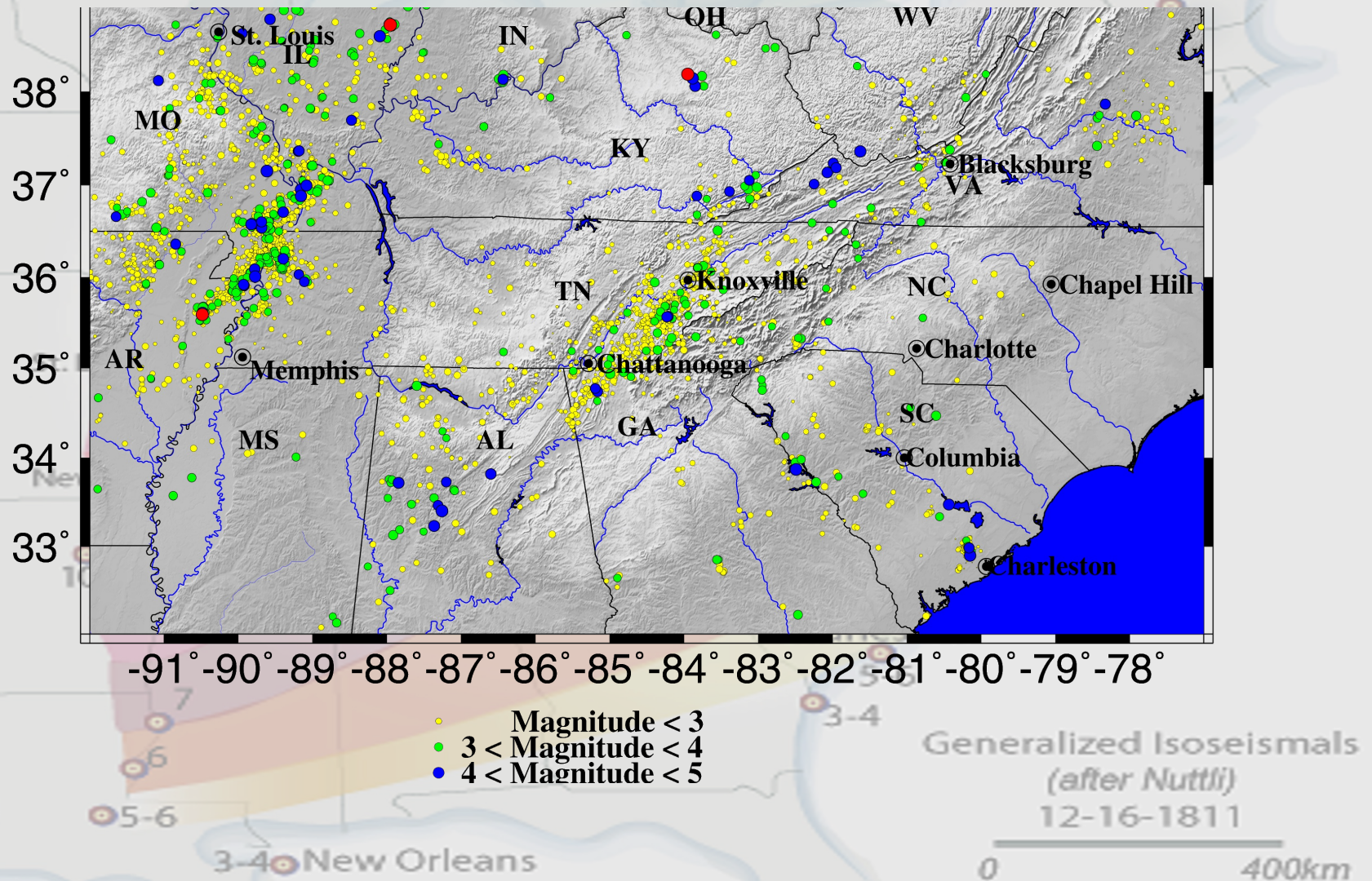
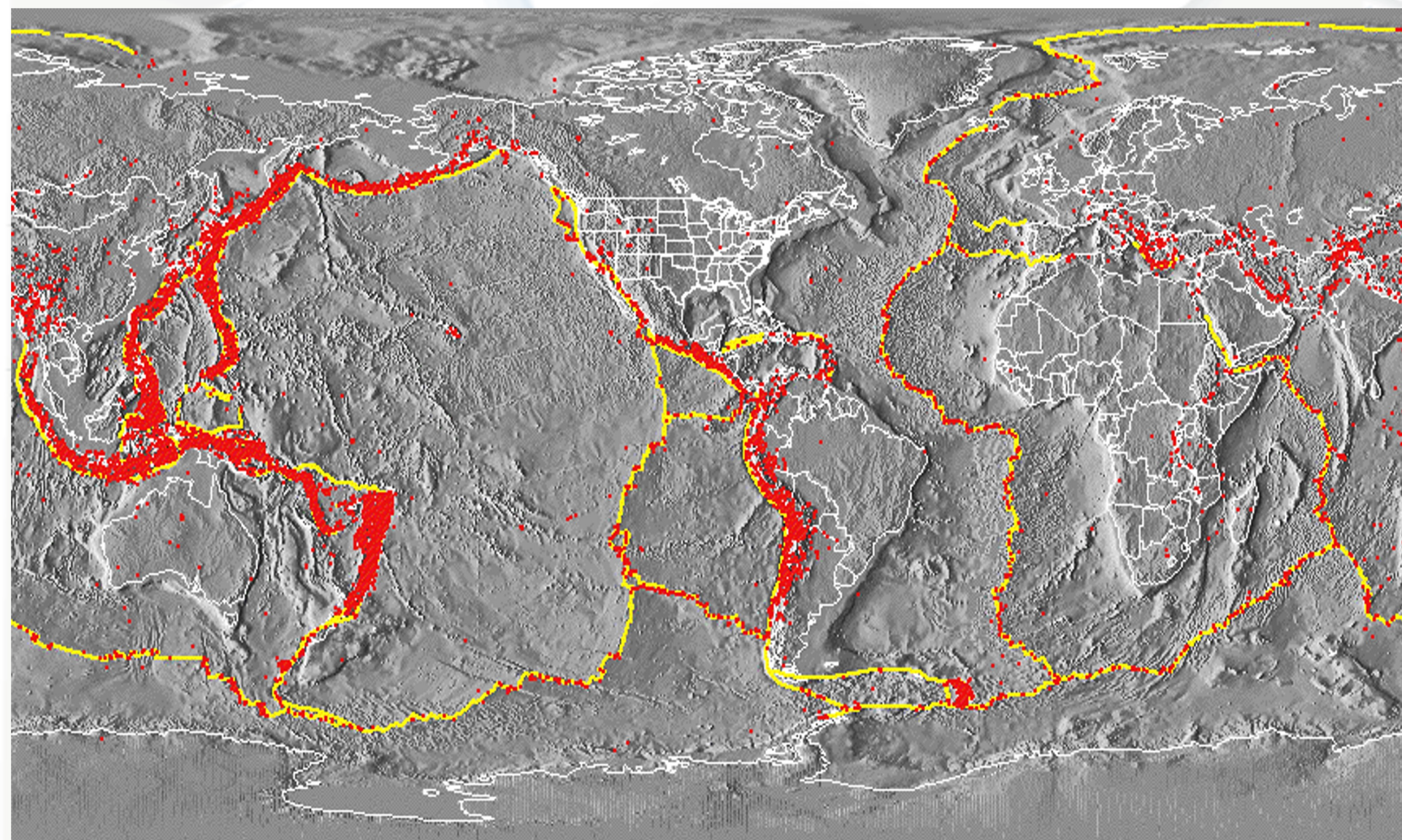
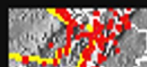


Plate Boundaries



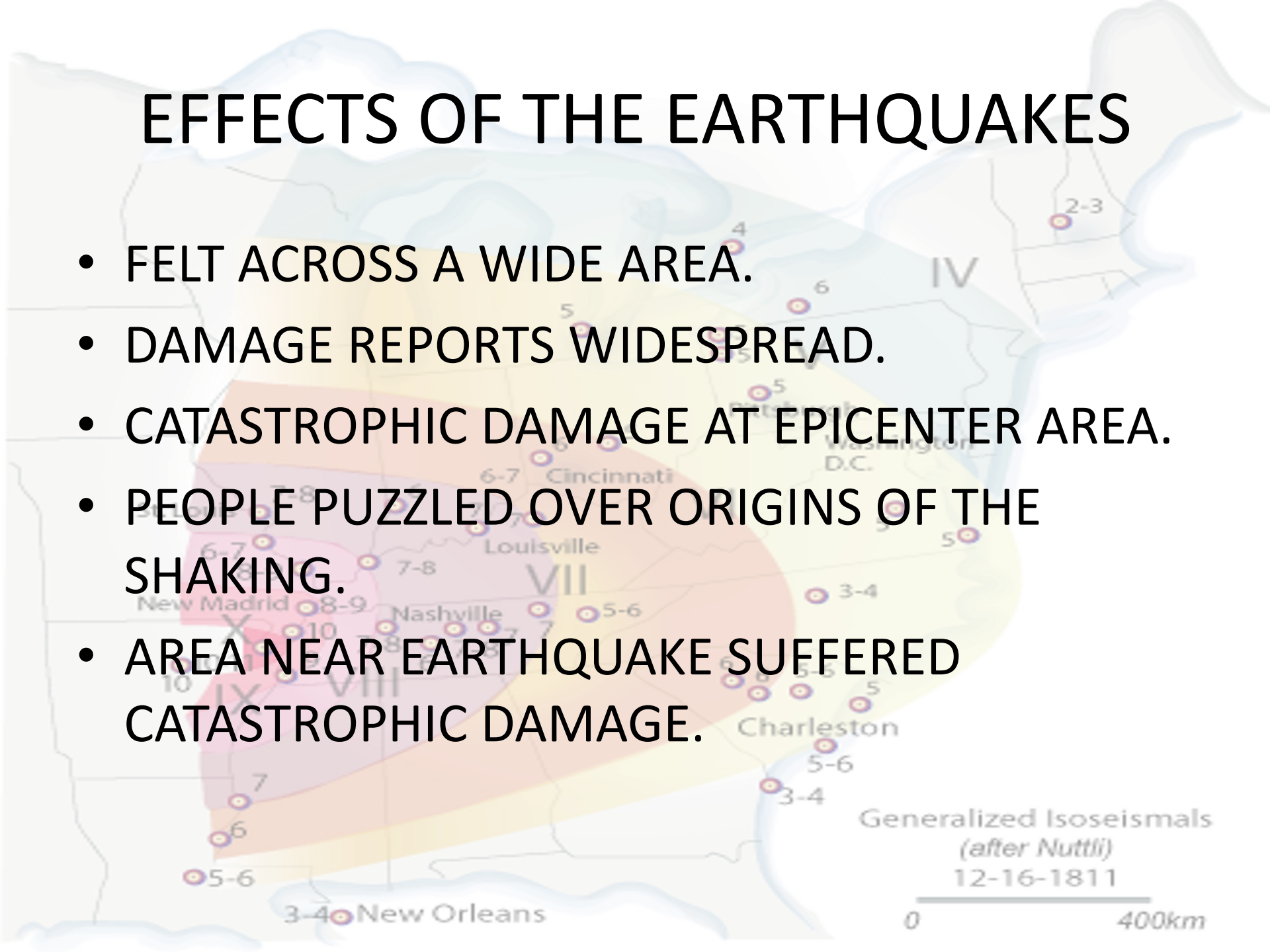
Crustal Plate Boundaries



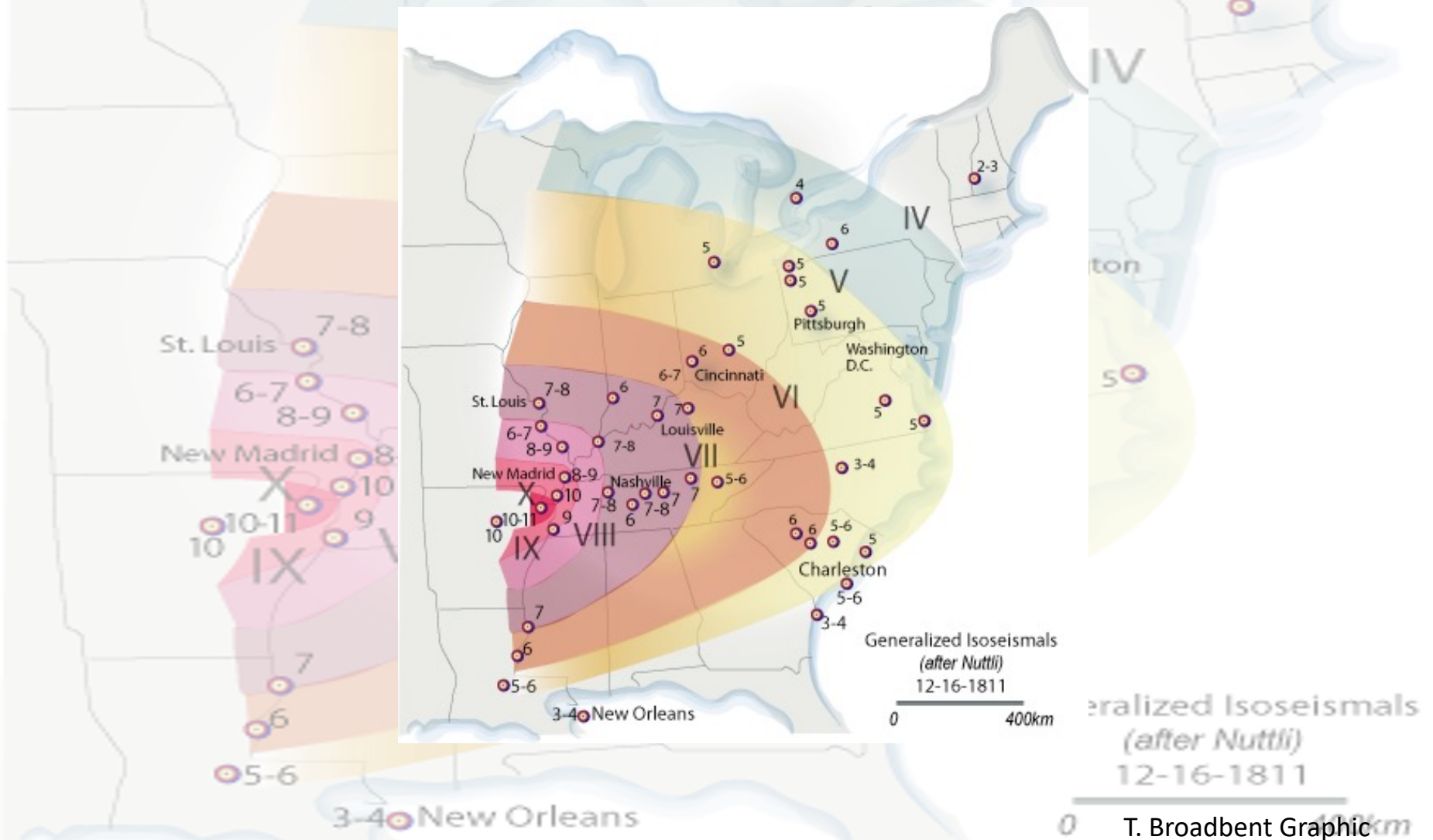
Earthquake Epicenters, $M > 5$, 1980-1990
Coastlines, Political Boundaries

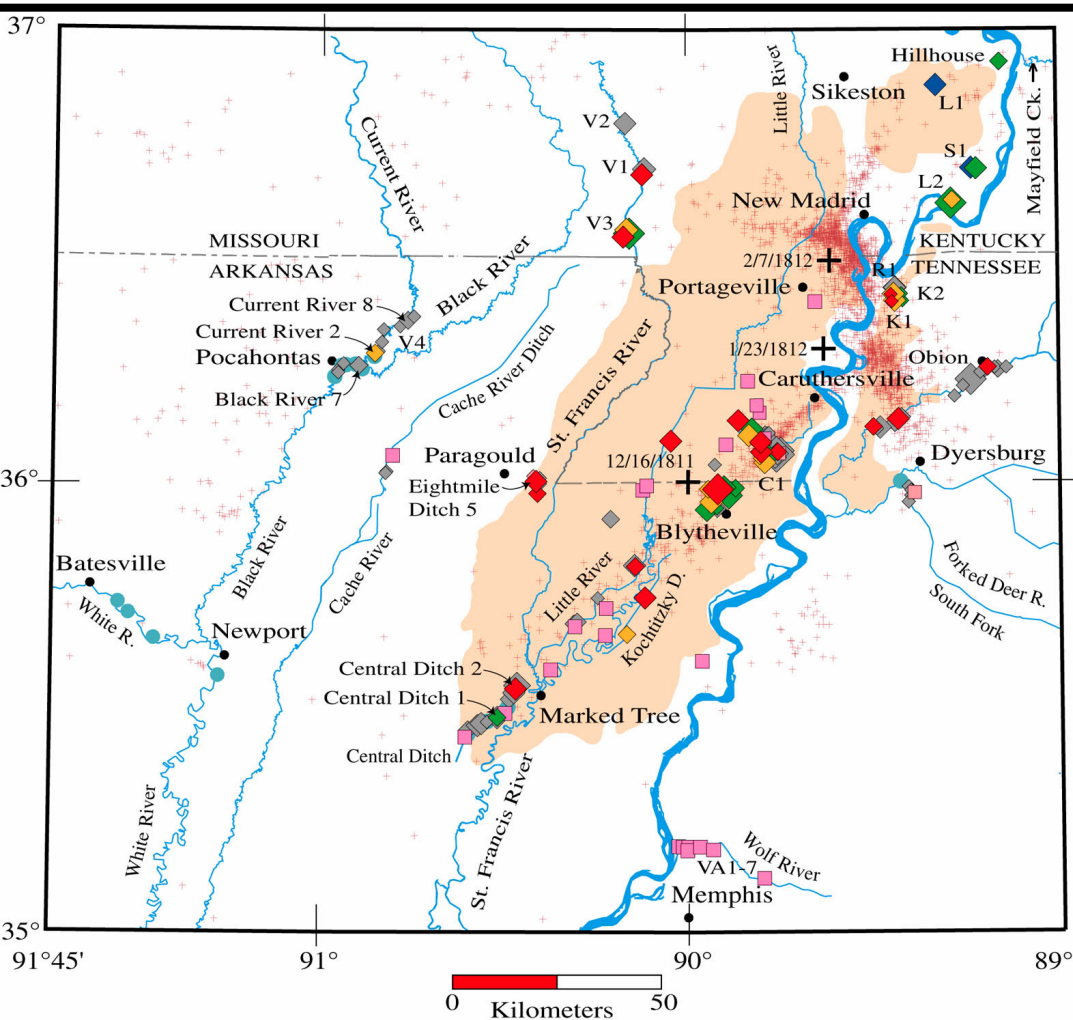
EFFECTS OF THE EARTHQUAKES

- FELT ACROSS A WIDE AREA.
- DAMAGE REPORTS WIDESPREAD.
- CATASTROPHIC DAMAGE AT EPICENTER AREA.
- PEOPLE PUZZLED OVER ORIGINS OF THE SHAKING.
- AREA NEAR EARTHQUAKE SUFFERED CATASTROPHIC DAMAGE.



Felt Area of Earthquakes





USGS Paleo liquefaction sites in the New Madrid Seismic Zone

Area with > 1% of ground surface covered by sand blows

Earthquake epicenters (1974 - 1991)

BEST ESTIMATES OF AGES

◆ A.D. 1811-1812 ◆ A.D. 1530 ◆ A.D. 900 ◆ A.D. 500

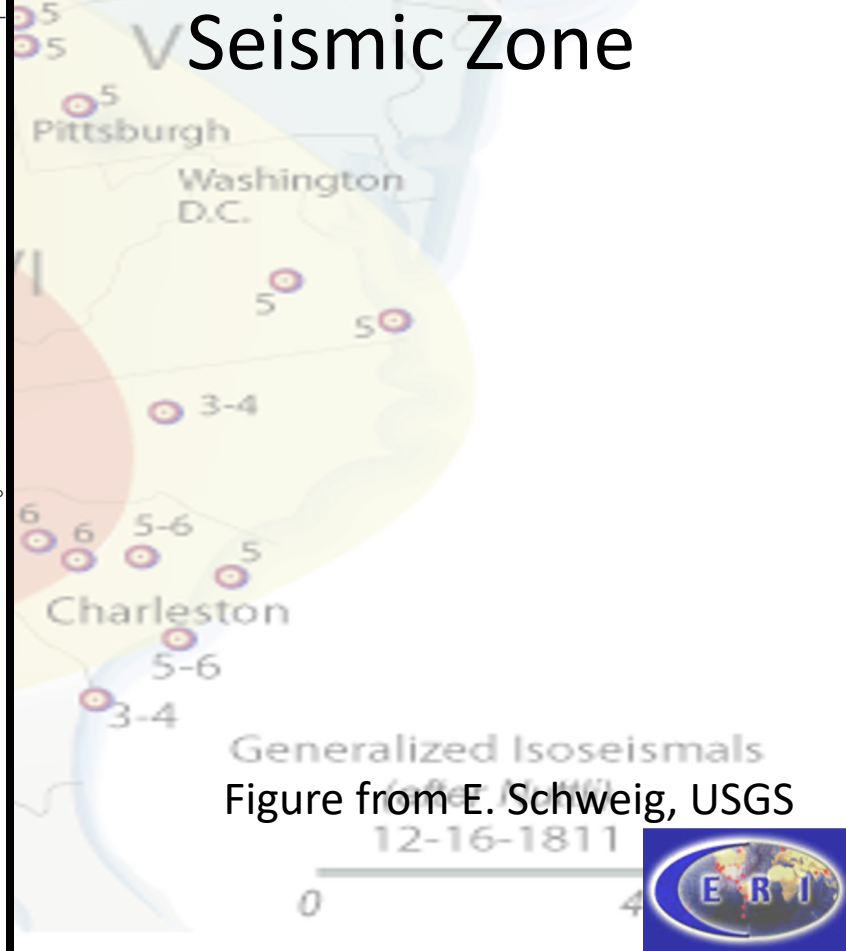
◆ Holocene features, age poorly constrained

◆ Liquefaction features under investigation

● Geological/Archeological Site

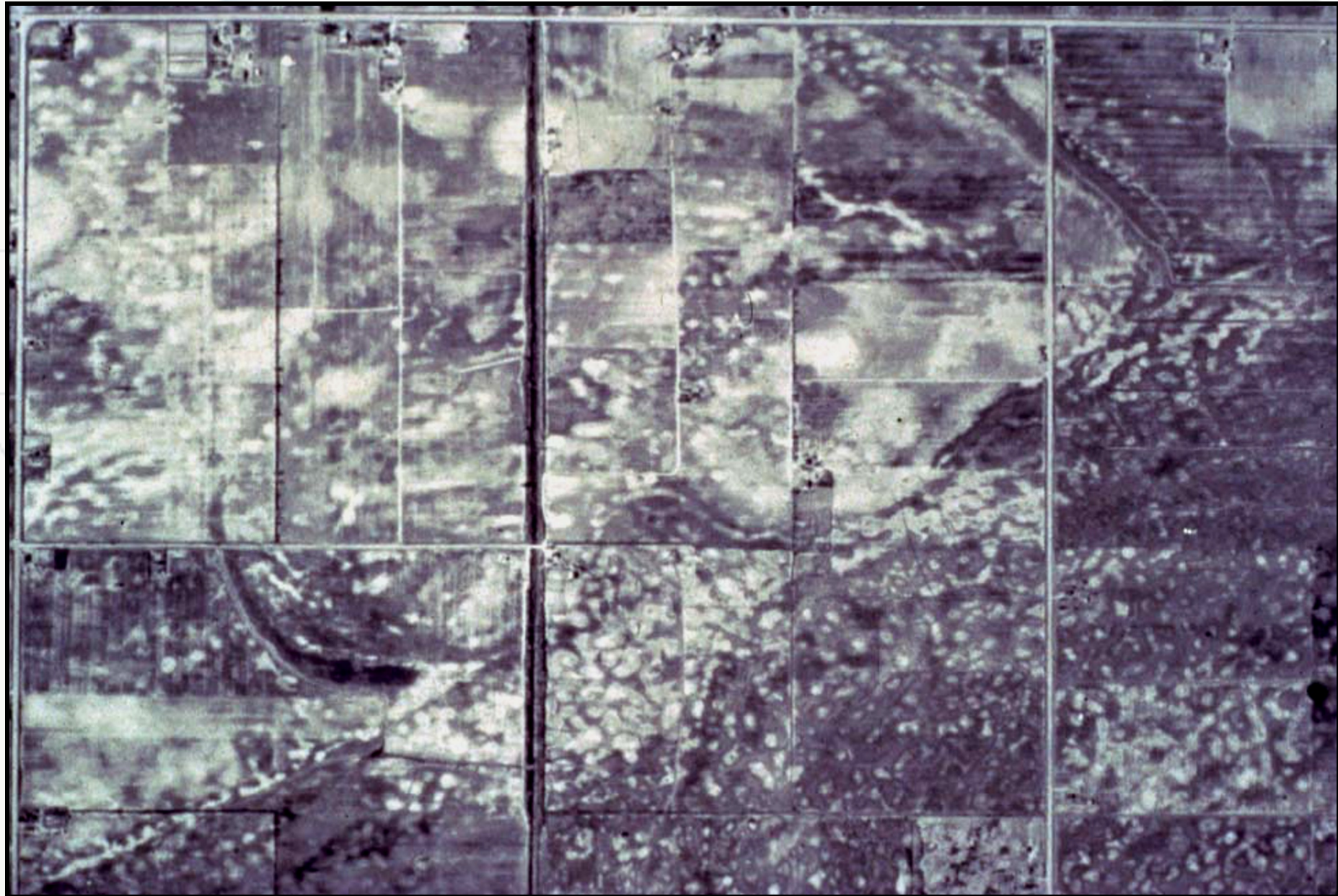
Dikes Thickness of sand blows (m)

Dikes	Thickness of sand blows (m)
◆	All widths
◆	0.1-0.5
◆	0.6-1.0
◆	1.1-1.5
◆	1.6-2.0
◆	2.1-2.5



Generalized Isoseismals
Figure from E. Schweig, USGS

Sand blows in the St. Francis river basin of Arkansas



3-4 New Orleans

0

400km

Overprinting of sandblow events near New Madrid, MO

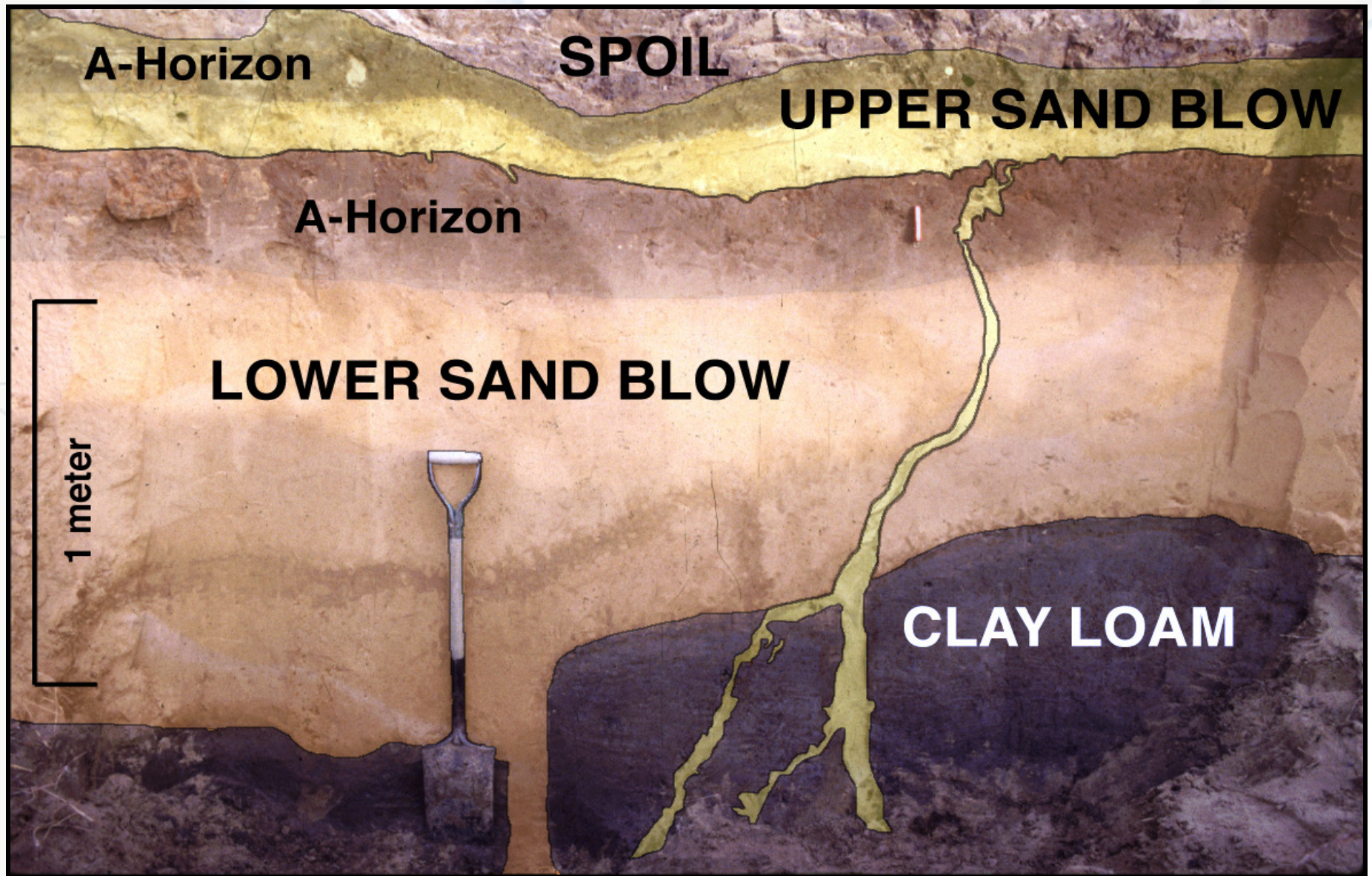


Photo courtesy of E.S. Schweig

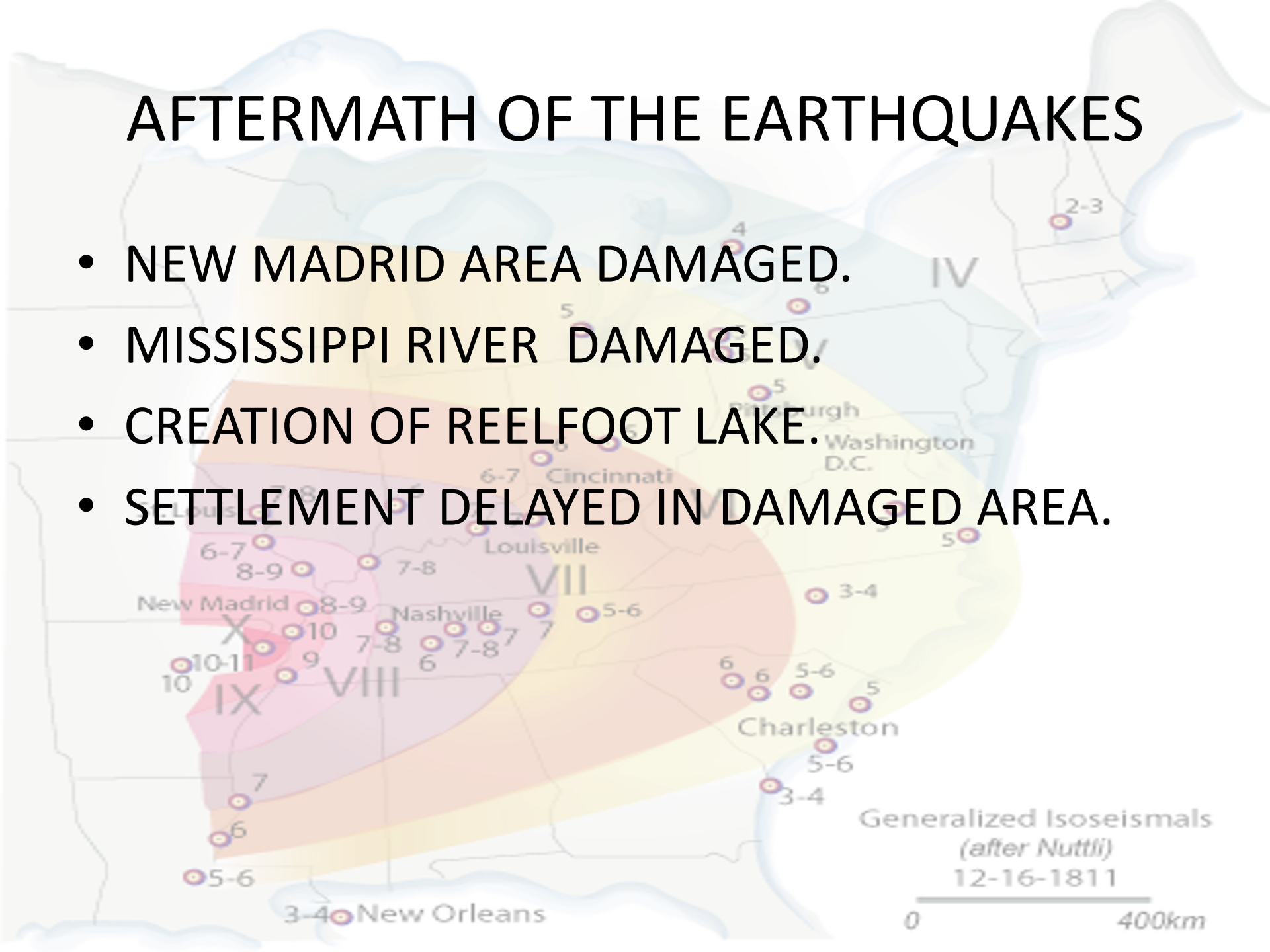
3-40 New Orleans

0

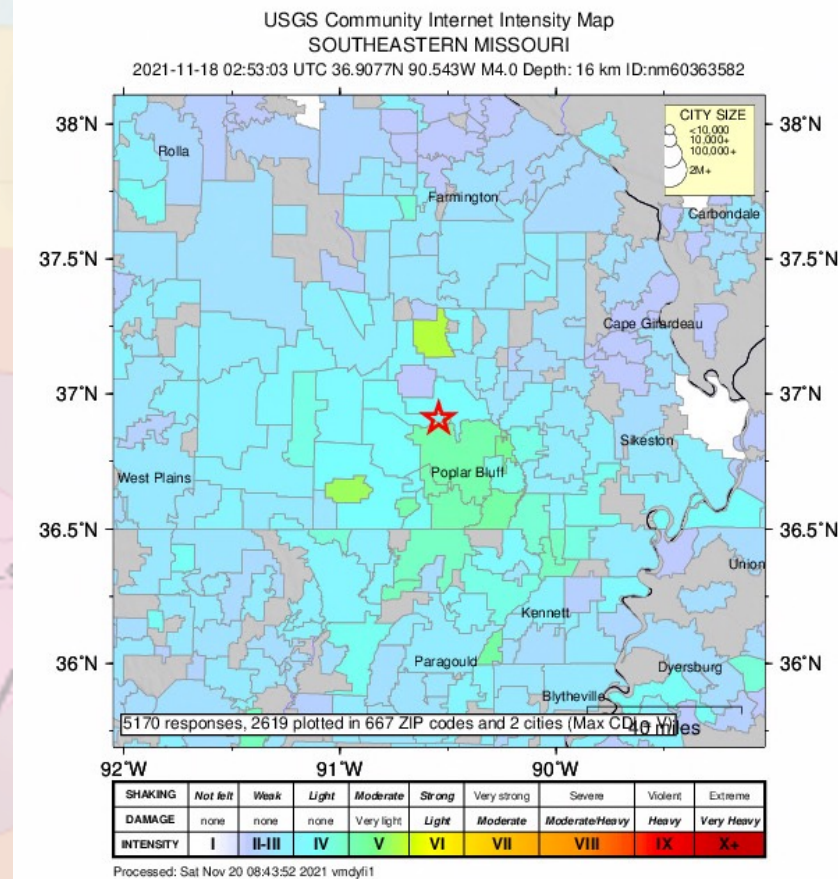
400km

AFTERMATH OF THE EARTHQUAKES

- NEW MADRID AREA DAMAGED.
- MISSISSIPPI RIVER DAMAGED.
- CREATION OF REELFOOT LAKE.
- SETTLEMENT DELAYED IN DAMAGED AREA.



4.0 Earthquake in Missouri



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Earthquake-related Geohazards

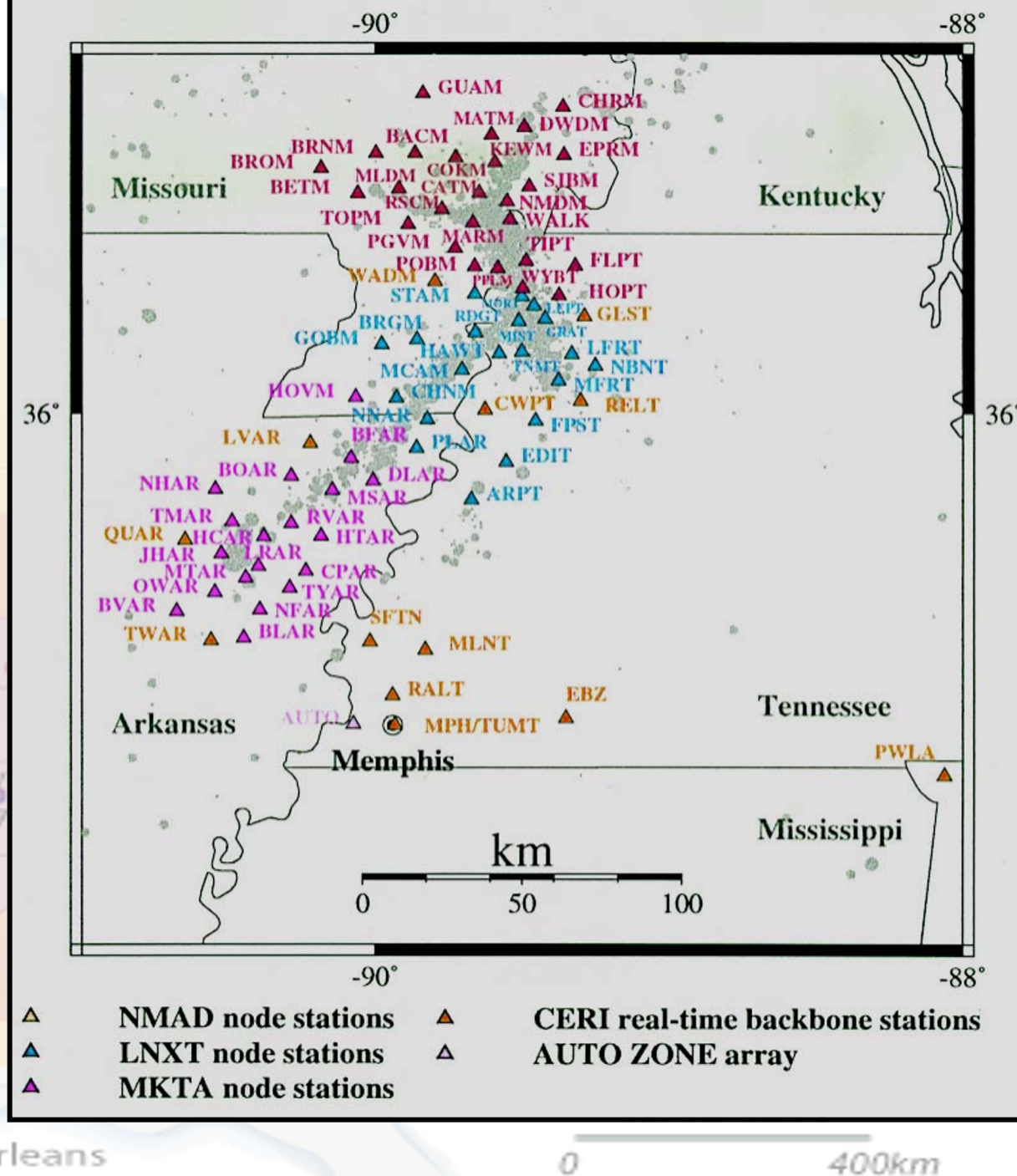
- Strong shaking & aftershocks
- Landslides (slope movement)
- Land subsidence/inundation/flooding
- Liquefaction
- Lateral spreading



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CERI Seismic Network

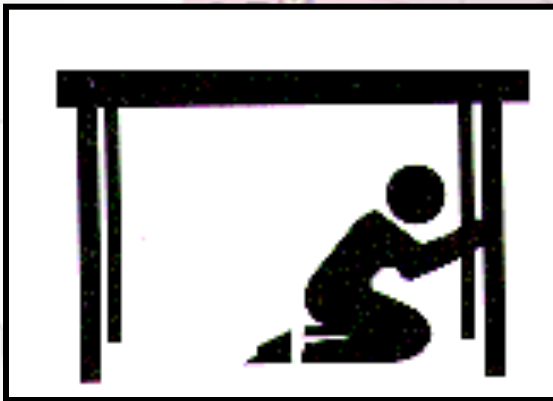


Remember What To Do During An Earthquake:

DUCK

COVER

HOLD



DUCK under a desk or table.

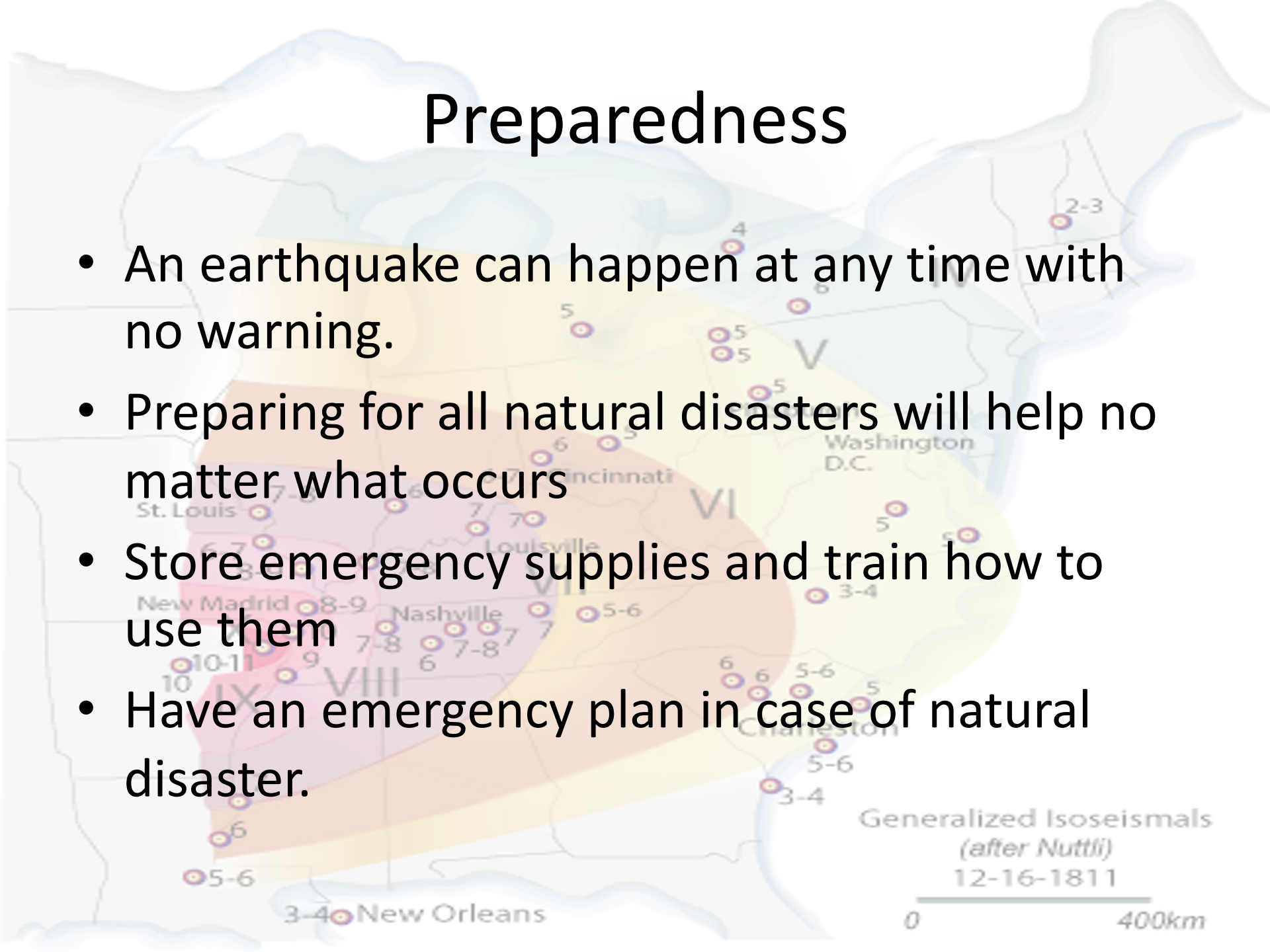
Take **COVER**, protect your head and eyes.

Hold onto the legs of the desk or table to prevent it from moving.



Preparedness

- An earthquake can happen at any time with no warning.
- Preparing for all natural disasters will help no matter what occurs
- Store emergency supplies and train how to use them
- Have an emergency plan in case of natural disaster.



Credits

- Research: Dr. Nathan K. Moran and Dr. Arch Johnston
- Graphics :Tanya Broadbent
- Support: Center for Earthquake Research and Information, University of Memphis
- Website: New Madrid
Compendium:<http://www.ceri.memphis.edu/compendium/>