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Magnitude 6 Earthquake Scenarios for the New Madrid-Wabash Valley Region

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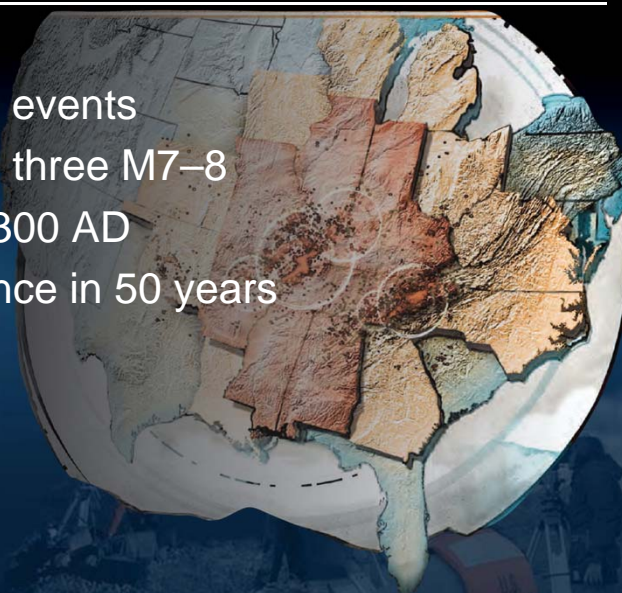
2012 EERI Annual Meeting / National Earthquake Conference 10–13 April
U.S. Department of the Interior
U.S. Geological Survey



Purpose

Catastrophic events

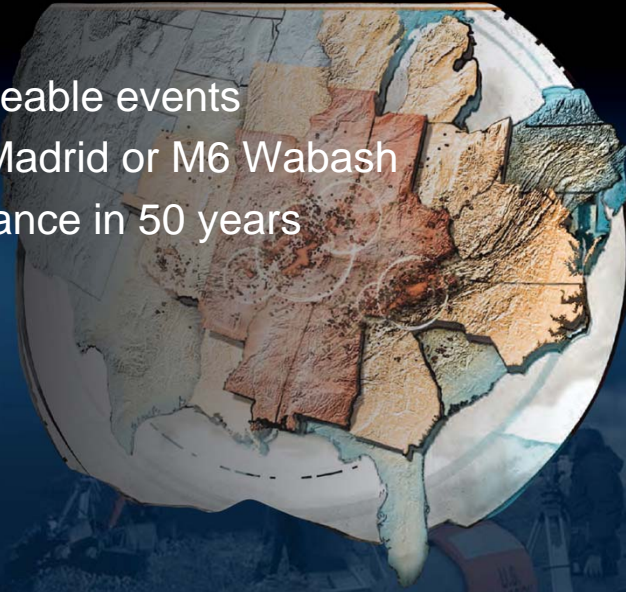
- 1811–1812, three M7–8
- 1450, 900, 300 AD
- 7–10% chance in 50 years



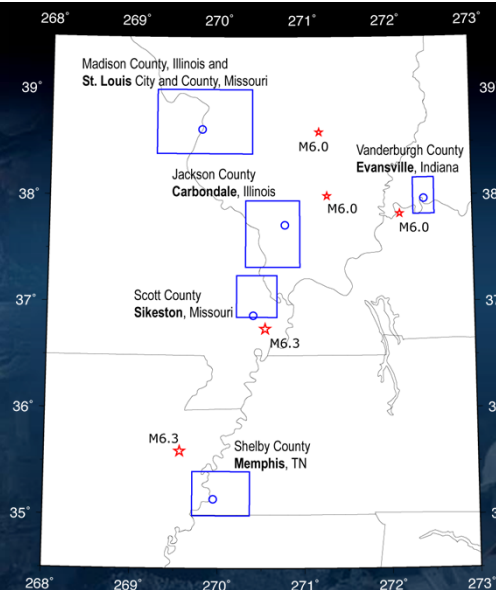
Purpose

More manageable events

- M6.3 New Madrid or M6 Wabash
- 35–50% chance in 50 years



Scenario Earthquakes

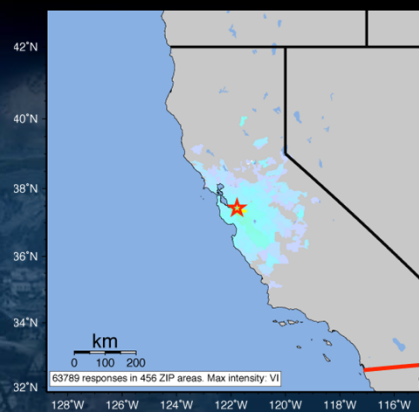


Scenario Earthquakes

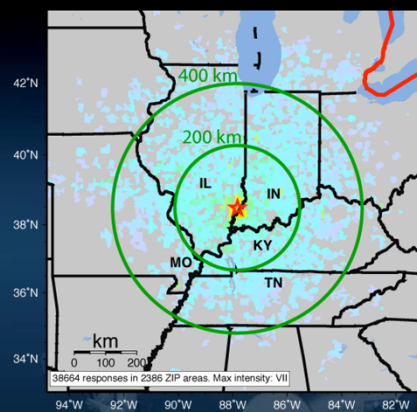
- Followed USGS modeling procedures for hard rock ground motions and then include the effect of near-surface geology.
- Maps of MMI, PGA, PGV and 1.0, 0.3, and 0.2 s S_a on a 1 km square grid.

Ground Motions: Rock and Soils

2007, M5.4 Alum Rock, California

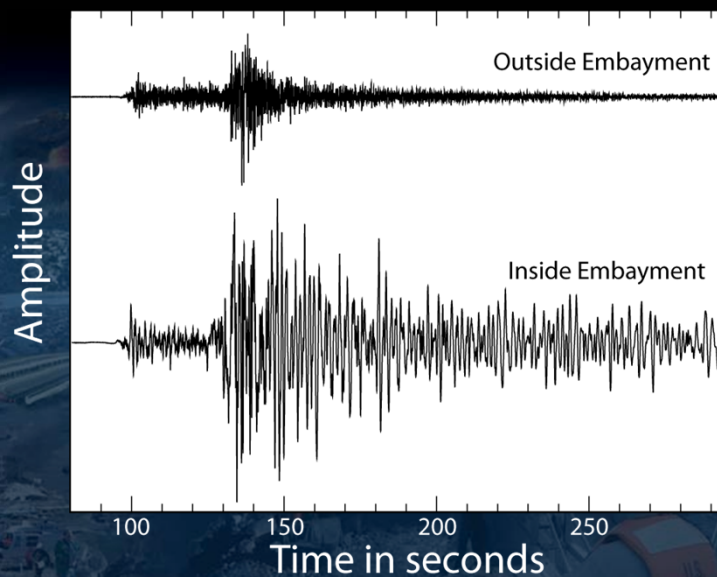


2008, M5.2 Mt. Carmel, Illinois

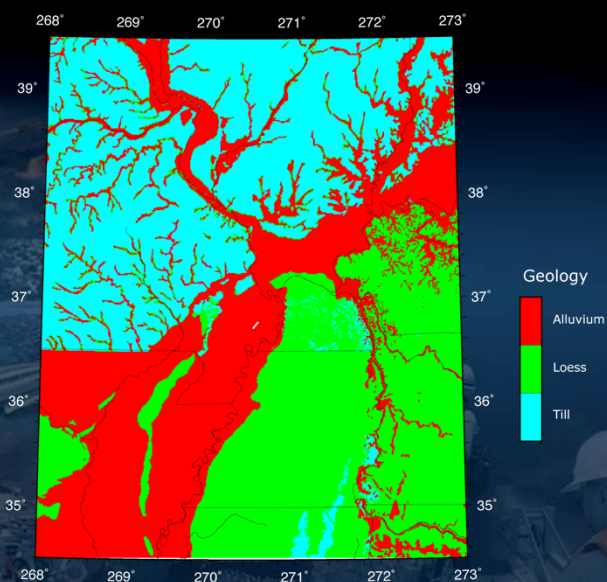


INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+
SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very heavy

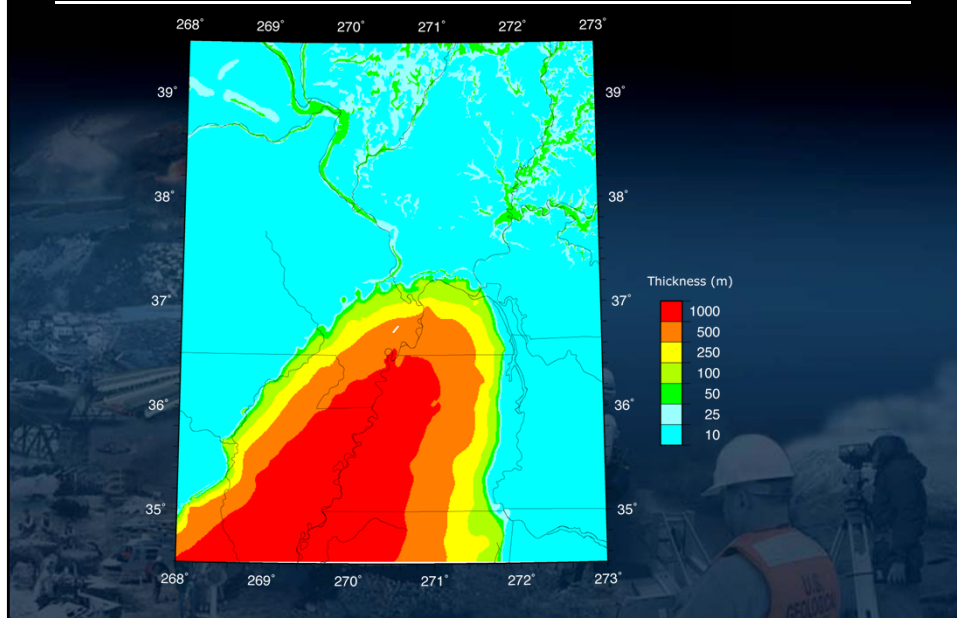
Ground Motions: Soil Amplification



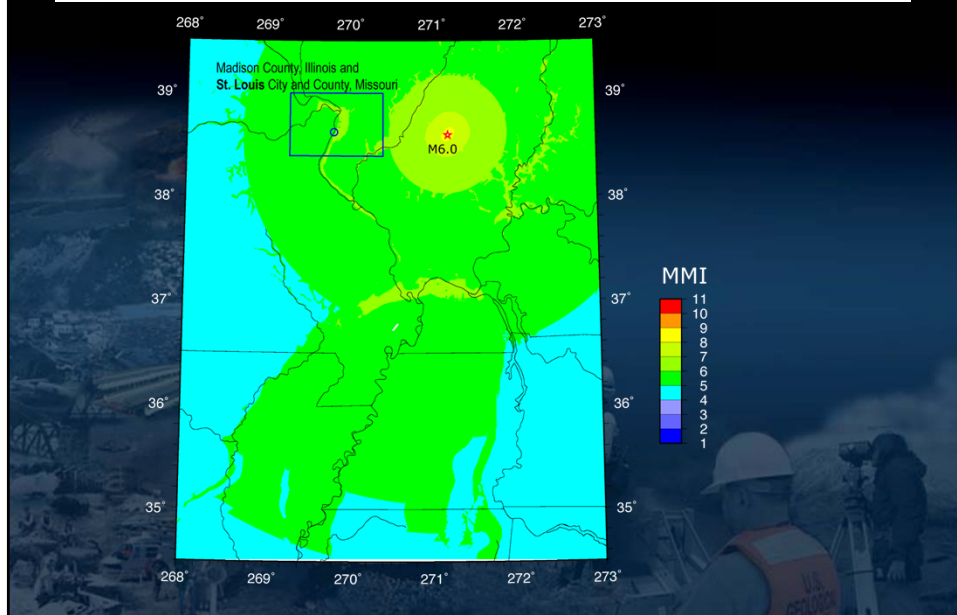
Surficial Geology



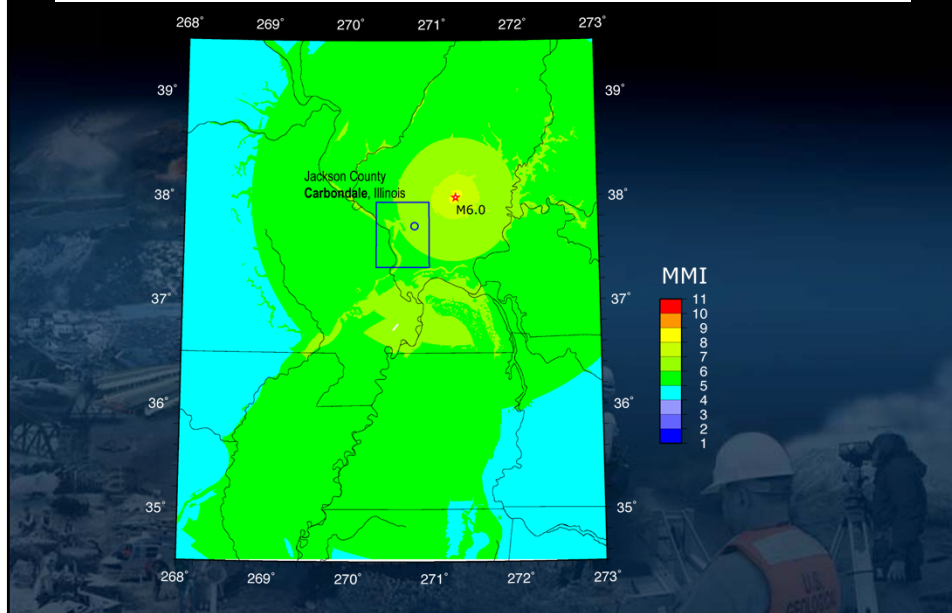
Sediment Thickness



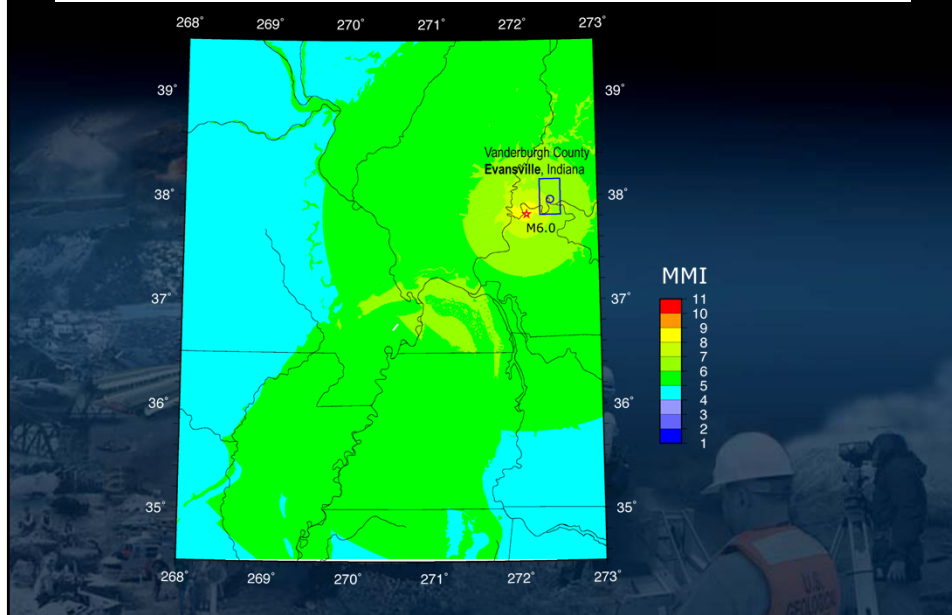
Scenario: St Louis



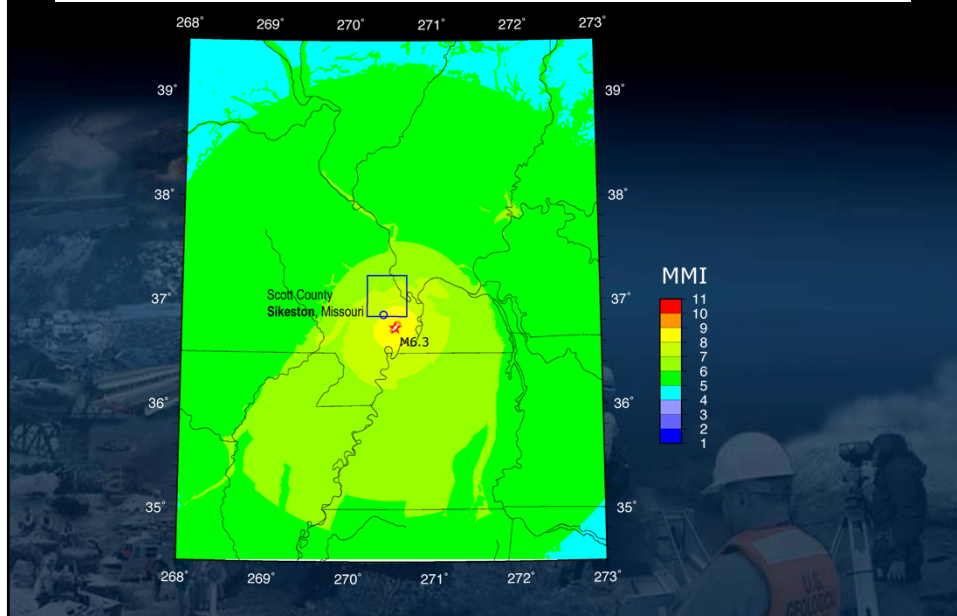
Scenario: Carbondale



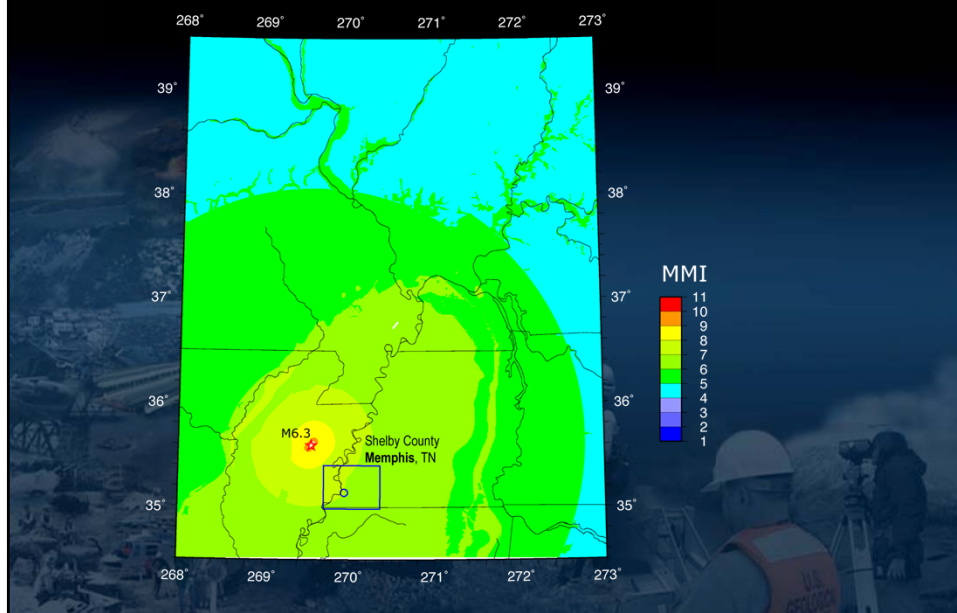
Scenario: Evansville



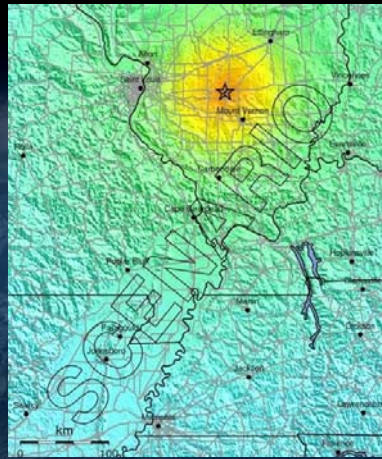
Scenario: Sikeston



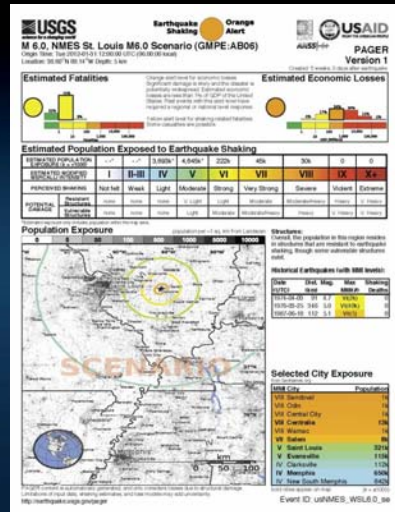
Scenario: Memphis



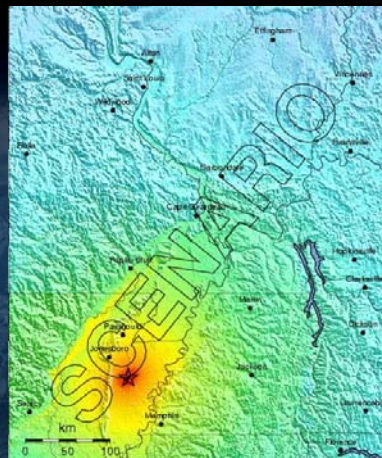
Scenario: St Louis



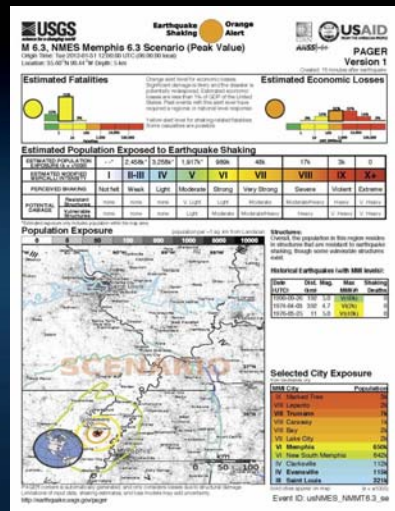
PERCEIVED SWAYING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Mod./Heavy	Heavy	Very Heavy
PEAK ACC.(g)	<0.03	0.3	2.8	6.2	12	22	40	75	>139
PEAK VEL.(cm/s)	<0.01	0.1	1.4	4.7	9.6	20	41	86	>178
INSTRUMENTAL RISK	I	II-III	IV	V	VI	VII	VIII	IX	X+



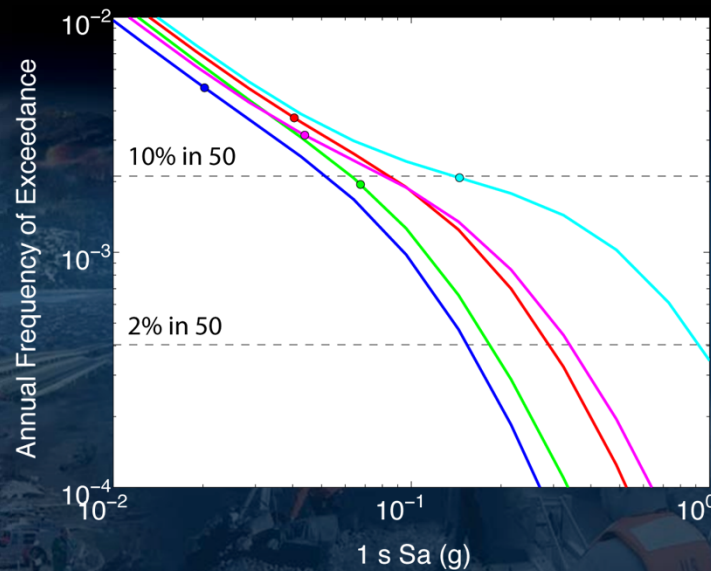
Scenario: Memphis



PERCEIVED SHAKING POTENTIAL DAMAGE	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
	none	none	none	Very light	Light	Moderate	Mod./Heavy	Heavy	Very Heavy
PEAK ACC (mg)	<0.03	0.3	2.8	6.2	12	22	40	75	>139
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INSTRUMENTAL	I	II-III	IV	V	VI	VII	VIII	IX	X



Exceedance Probability



Summary

- M6 or M6.3 scenario earthquakes for St Louis, MO, Carbondale, IL, Evansville, IN, Sikeston, MO, and Memphis, TN.
- Earthquakes have a 35–50% chance of occurring in the Wabash or New Madrid seismic zones.
- 1s Sa ground motions have a 10–20% chance of being exceeded at these sites in 50 years.
- 1s Sa between 0.01 and 0.25 g and MMI between V and VIII