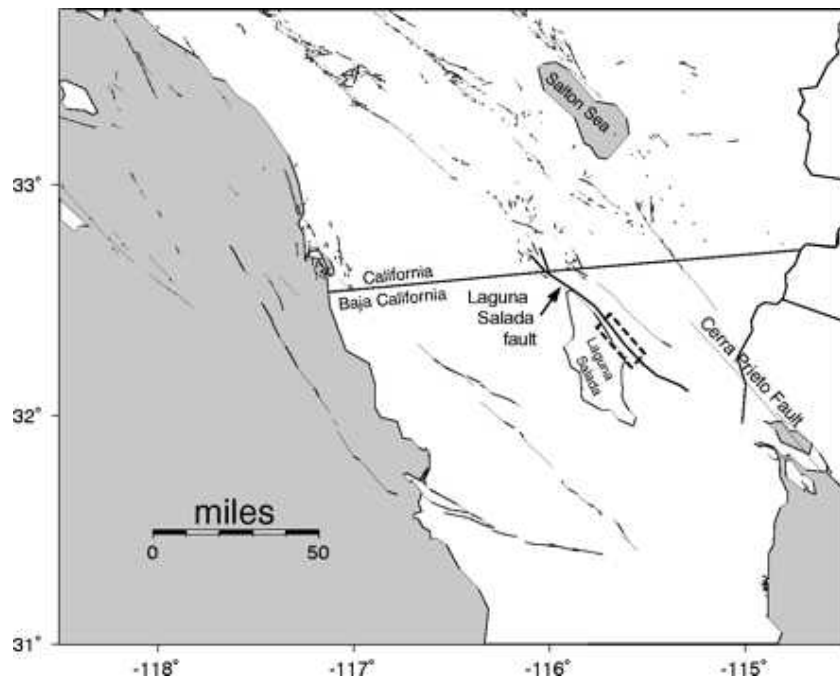
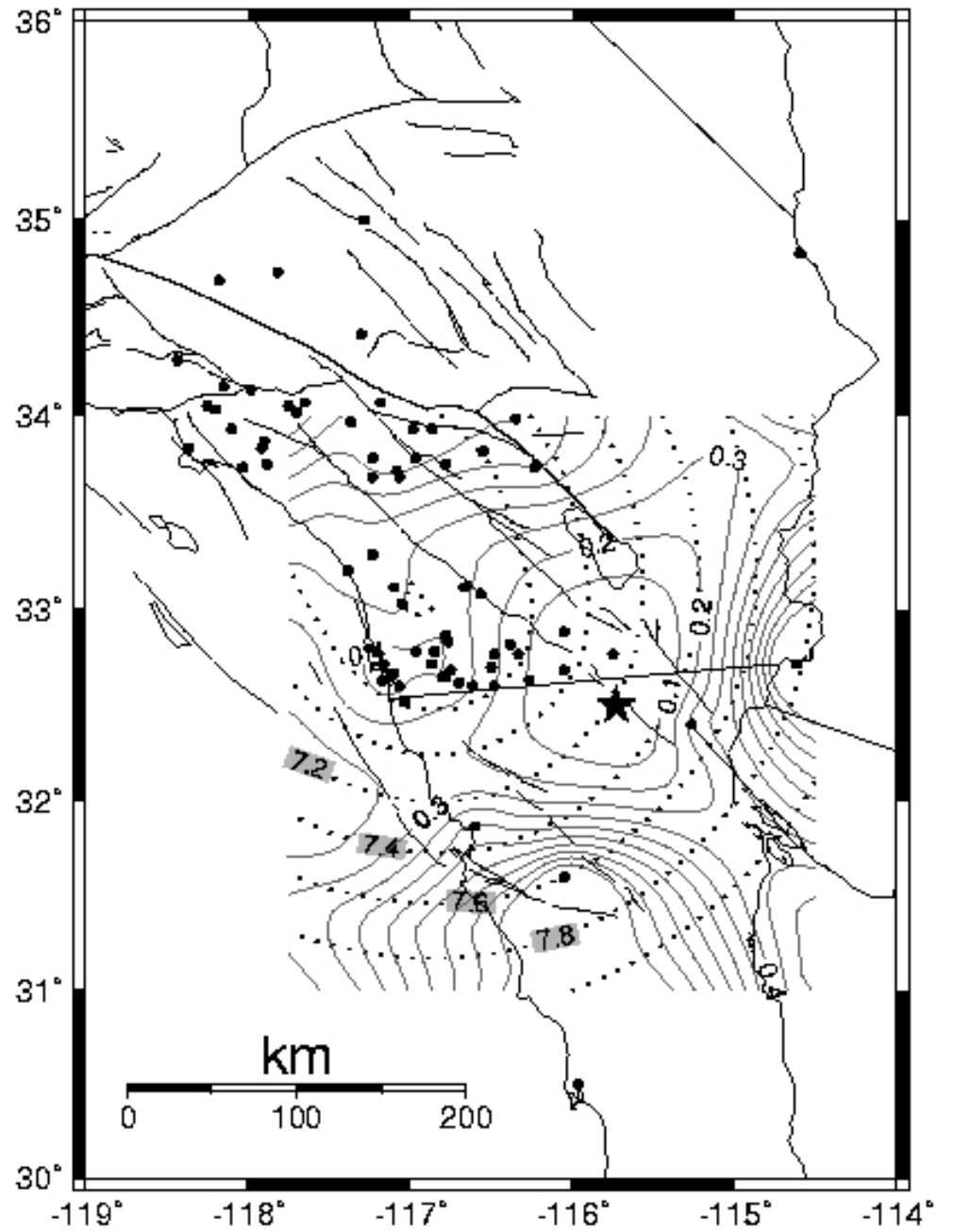


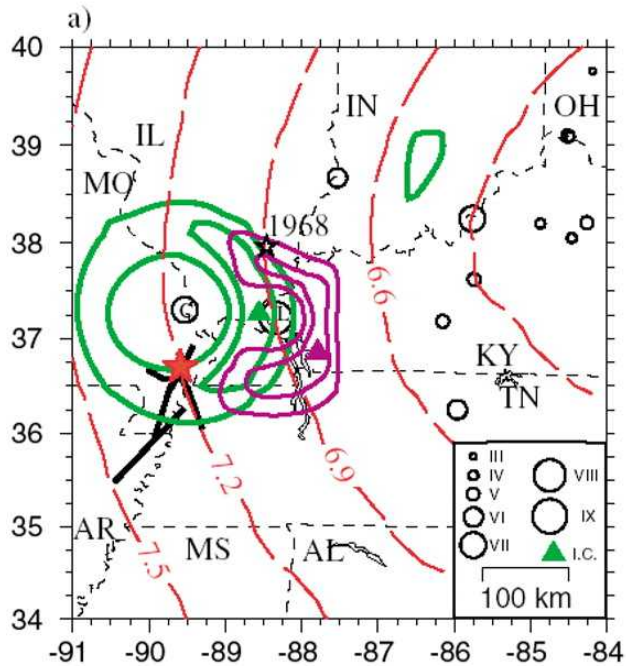
Historical Intensity Distributions: A Reality Check

Susan Hough
USGS, Pasadena

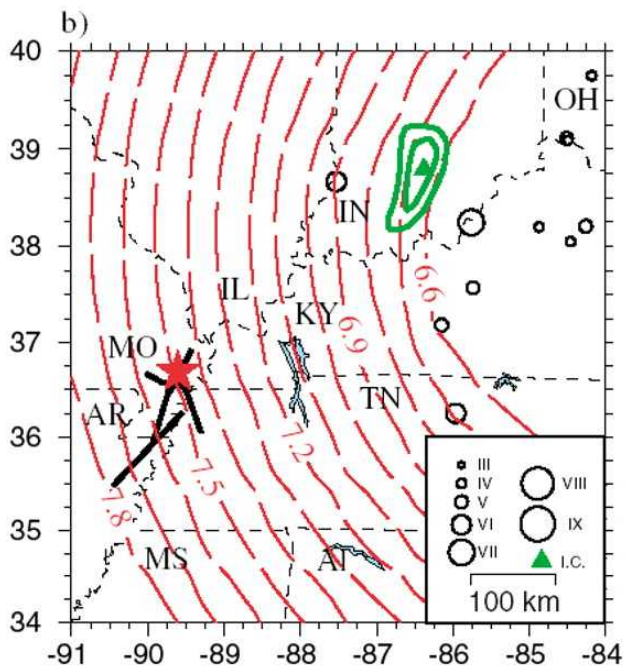


1892 Laguna Salada



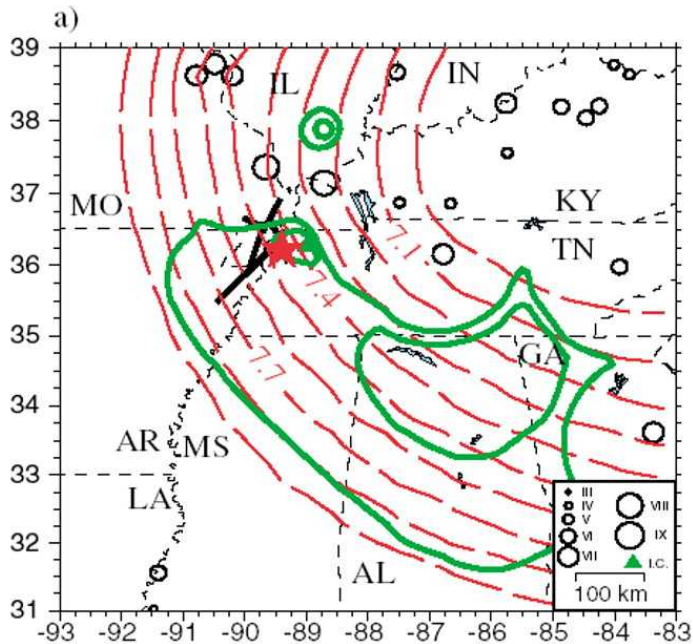


“Model 1” (Bakun et al., 2003):
 $M_1 = 7.2$ (6.8-7.8)

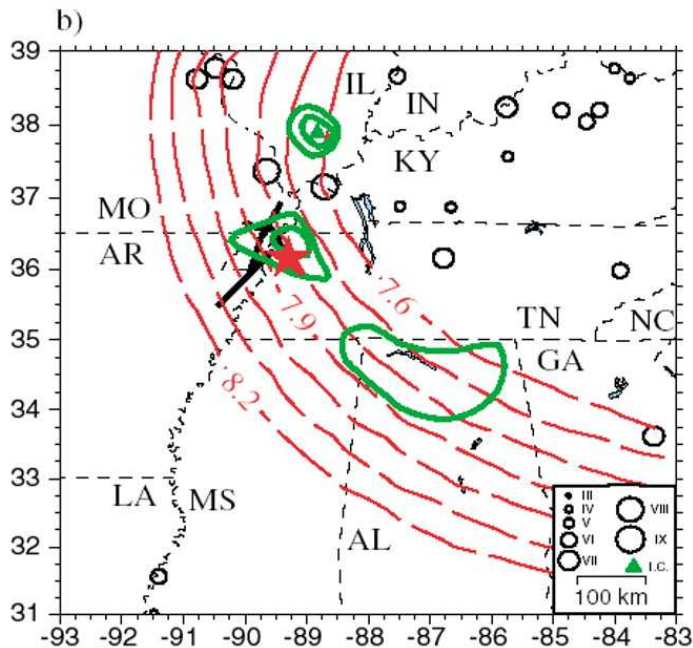


“Model 3” (Bakun and Hopper, 2004):
 $M_1 = 7.5$ (7.1-7.8)

“Preferred Solution”
 $M_1 = 7.5$ (7.1-7.8)



“Model 1” (Bakun et al., 2003):
 $M_1 = 7.4$ (7.0-8.1)



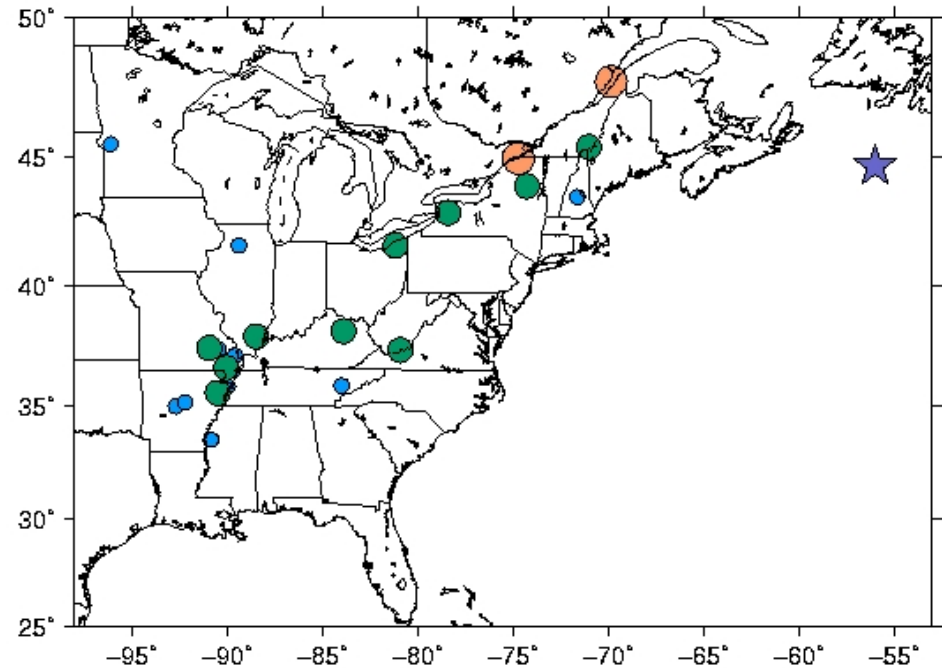
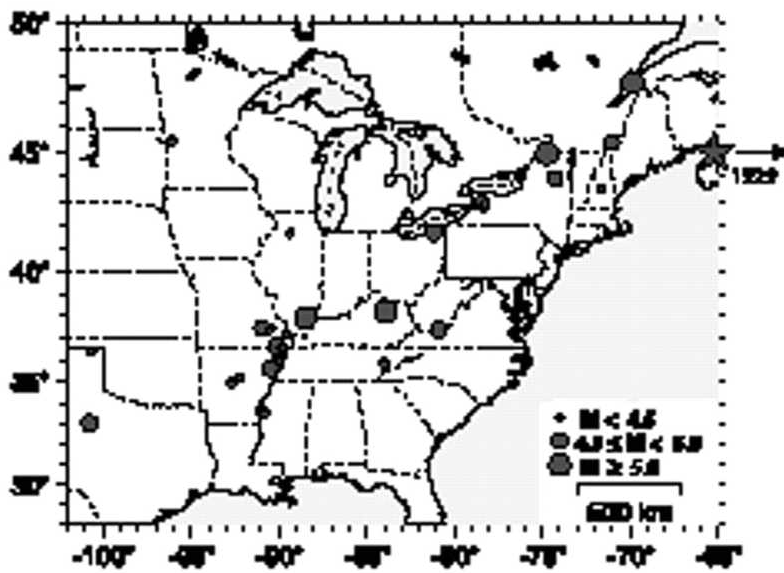
“Model 3” (Bakun and Hopper, 2004):
 $M_1 = 7.8$ (7.4-8.1)

“Preferred solution”
 $M_1 = 7.8$ (7.4-8.1)

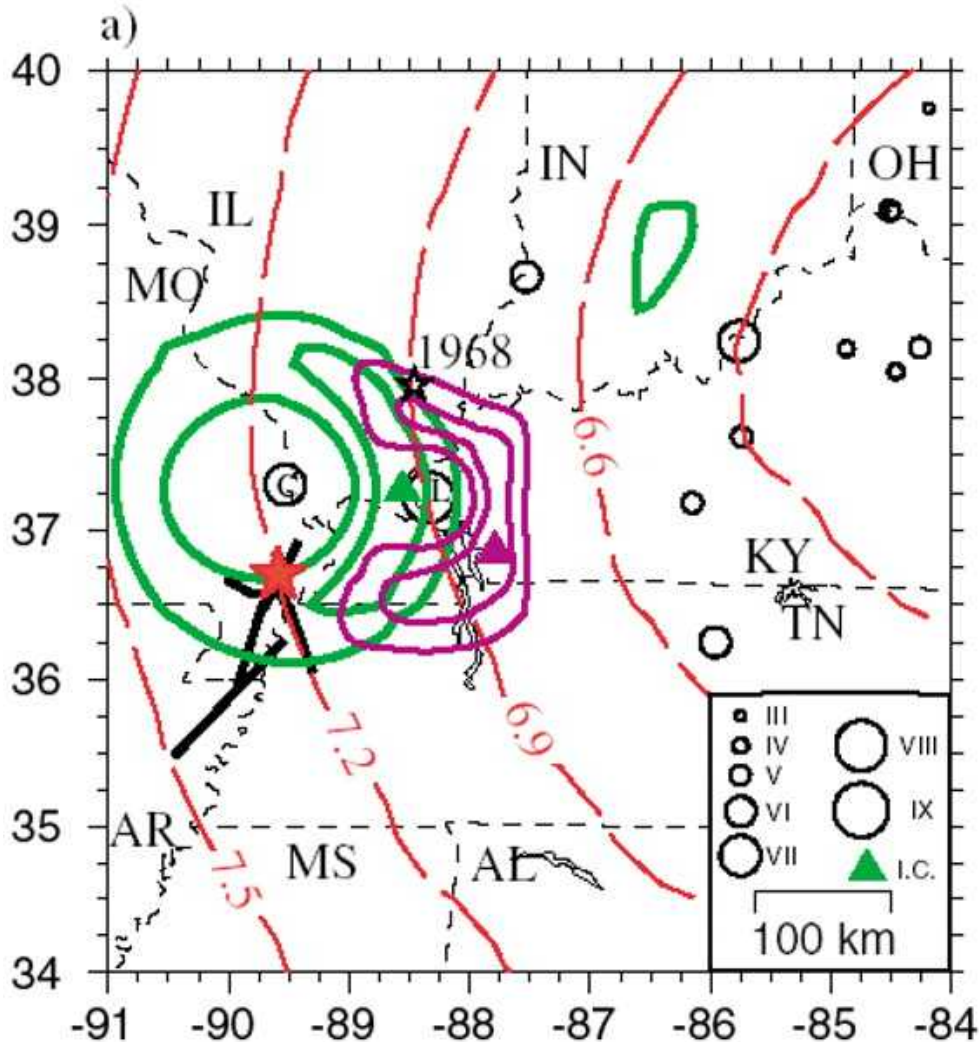
“Model Uncertainties?”

Jan. 23, 1812: **7.2 vs 7.5**

Feb. 7, 1812: **7.4 vs 7.8**



True Uncertainties?



"Model 1"

$M_1 = 7.2$ (6.8-7.8)

...assuming NMSZ
location!

"Optimal location"

$M_1 = 6.8$ (6.6-7.1)

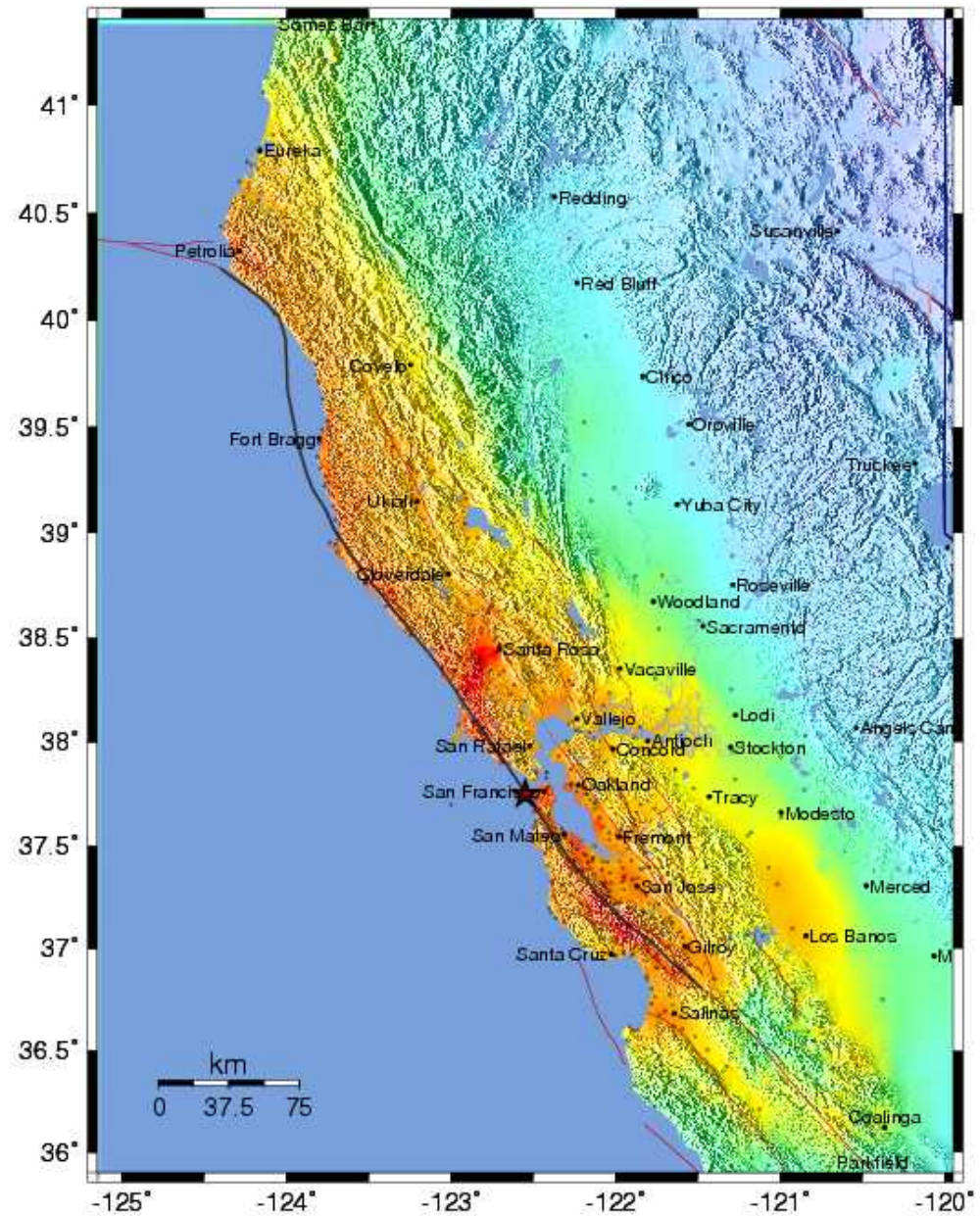
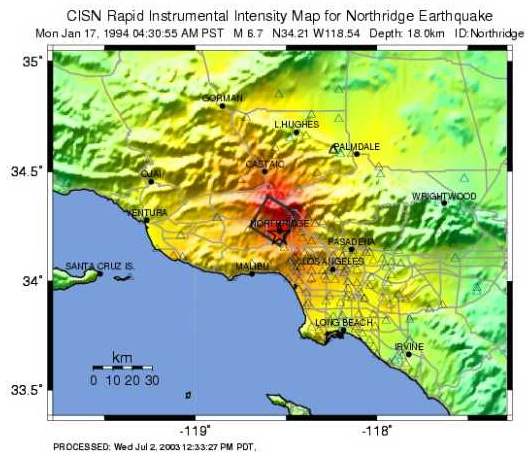
Uncertainty in the Uncertainties: Jan. 23, 1812 event

- Preferred: 7.1-7.8
- Model uncertainties: 6.8-7.8
- Full uncertainties: 6.6-7.8

Northridge, 1994

San Francisco, 1906

1906 Earthquake, M7.8, Depth 10 km, Epicenter N37.75 W122.55



Realities

- Formal uncertainties are huge (especially considering model uncertainties)
- True uncertainties even bigger
- Not enough calibration from eastern North American events to analyze 1811-1812
- Need for “synergistic” approach

Reality Check(s):

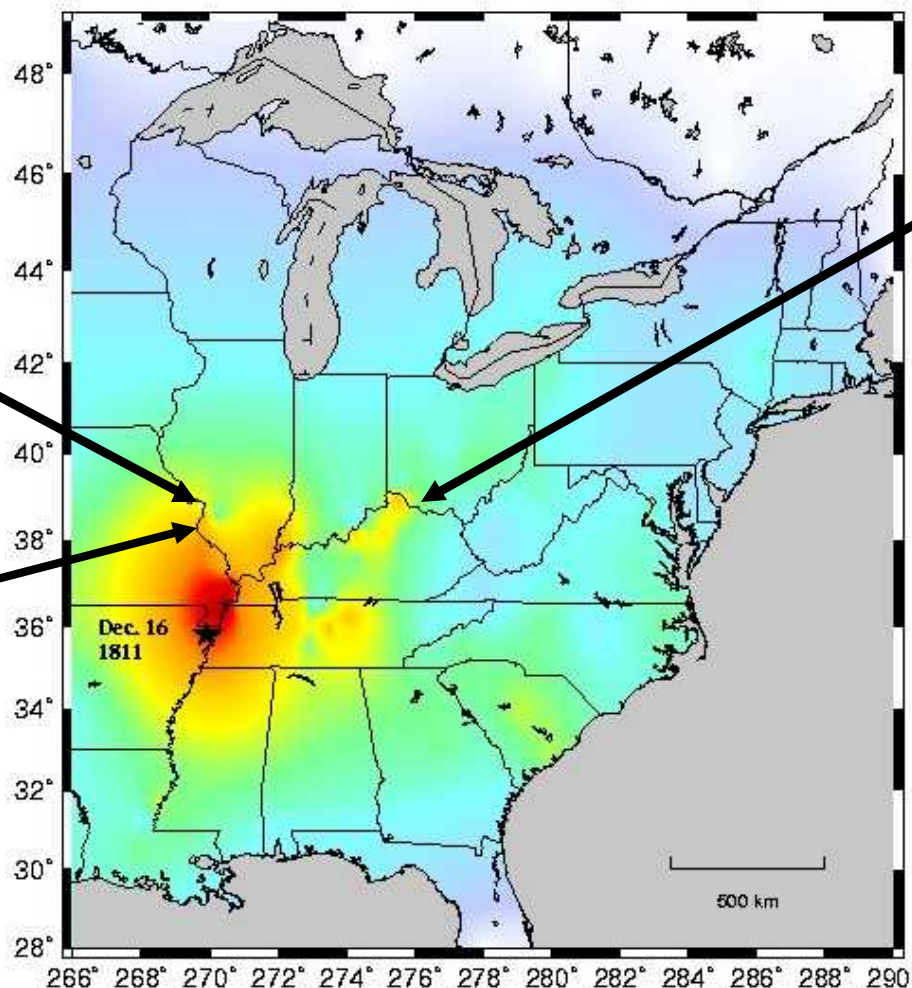
What Actually Happened in 1811-1812?

St. Louis

No lives have been lost, nor has the houses sustained much injury, a few chimneys have been thrown down.

Louisiana Gazette,
Dec. 21, 1811

Ste. Genevieve
Shocks felt,
caused no damage
Rozier, 1850



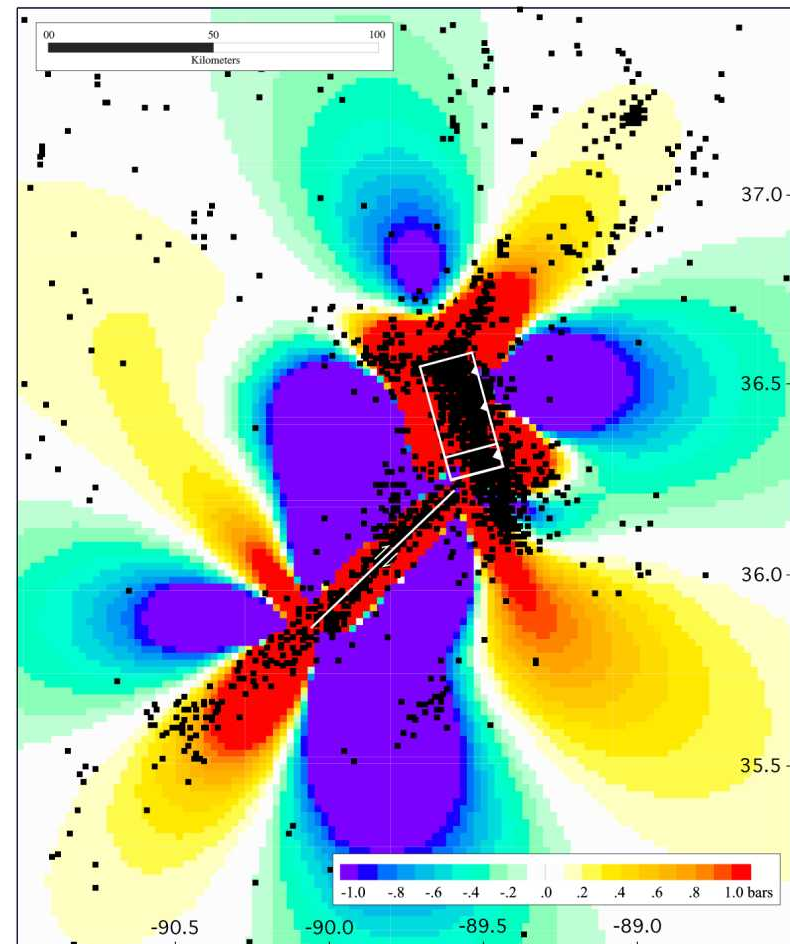
Kentucky hills south of Cincinnati:
Many families ...slept during the shock...
Daniel Drake, 1815

Speaking of Reality Checks...



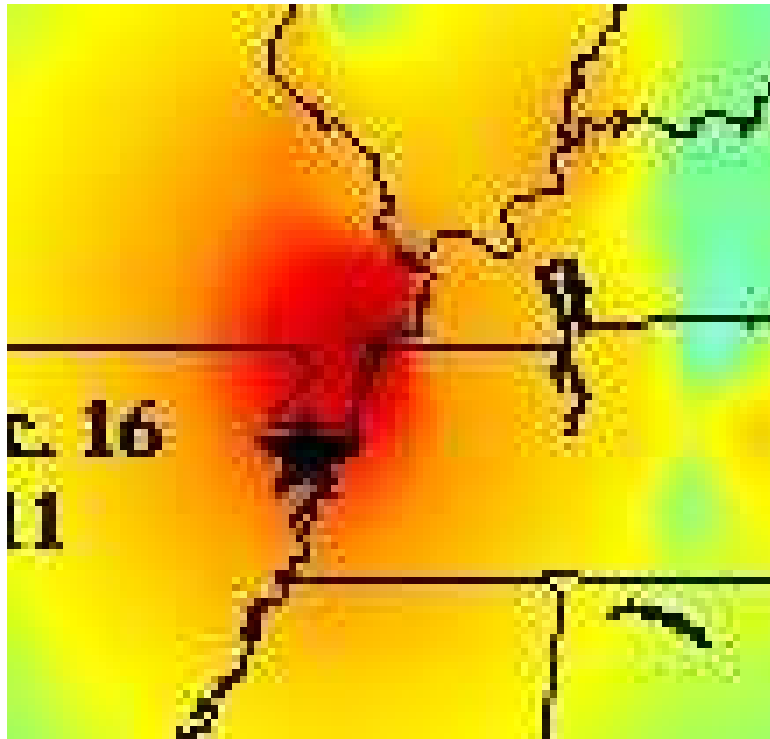
Other Information

- Faulting scenarios
- Fault area/scaling relations
- Stress transfer

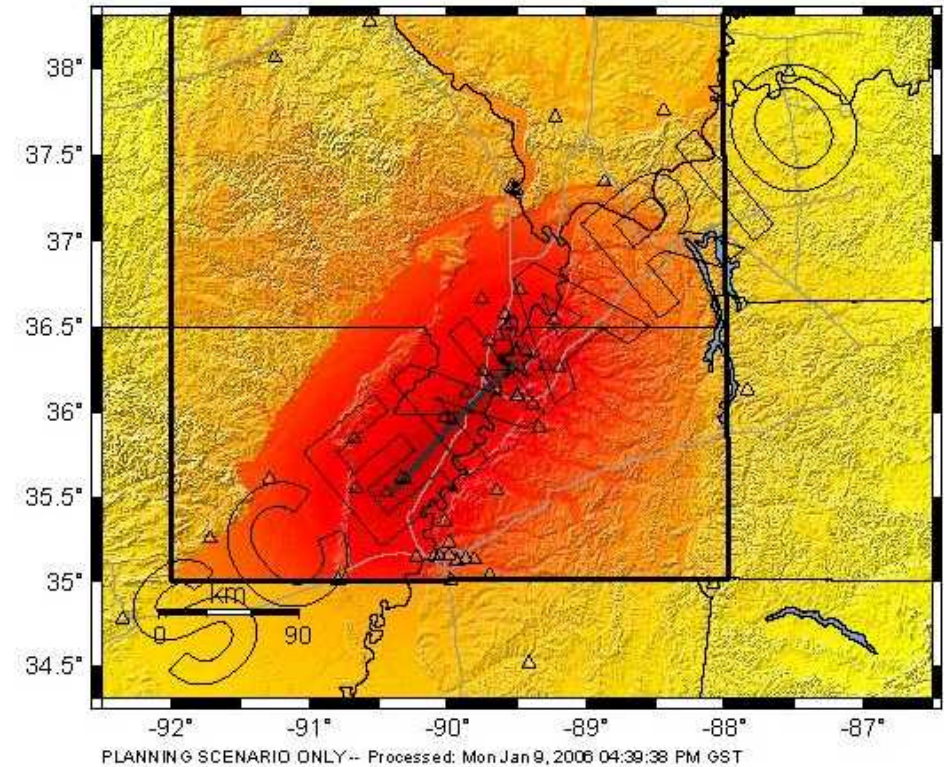


Mueller et al., Nature, 2005

“Ground Truth”



Dec. 16, 1811
M=7.2 (Hough et al., 2000)



Scenario
(Brackman and Withers, 2006)

M7.4