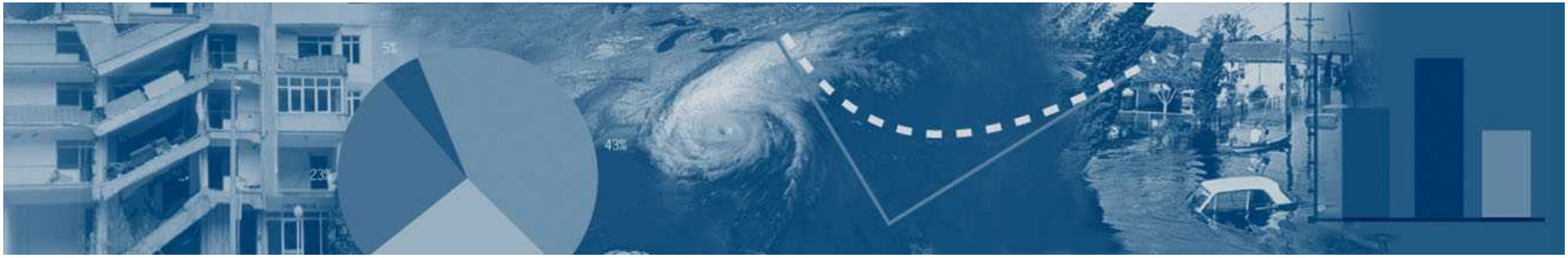

USGS Workshop on the 2007 CEUS Hazard Map Update: Some “user perspectives” from insurance loss modeling

Don Windeler

9 May 2006

Bringing Science to the Art of Underwriting™

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Insurance applications of the USGS NSHMP

- Inputs to loss estimation models used to ...
  - Develop estimates of average annual loss for pricing
  - Calculate probability of exceeding a given loss level
    - Reinsurance purchasing
    - Estimating necessary reserves
    - Reporting to regulators and rating agencies
    - Quantify catastrophe risk such that it can be combined with other business risks (credit, investment, market, etc.) into an enterprise-wide risk profile
- Impartial, openly reviewed aspects of the USGS hazard map project provide benefit when loss models are reviewed by intervenors

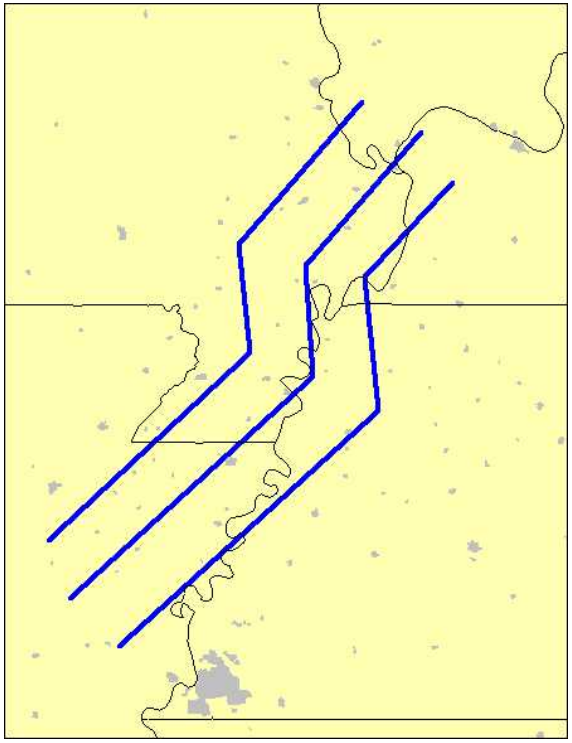
Key needs for application of NSHMP in loss models

- Access to raw input data for the maps
  - Slip rates for faults
  - Catalogs and smoothed gridded seismicity
  - Logic tree weights
  - Details on attenuation implementations and assumptions
- Specifics on model implementation
  - Documentation (final and “in development”)
  - Accessibility of scientists working on the mapping project
- Outputs
  - Hazard maps and curves
  - Deaggregations

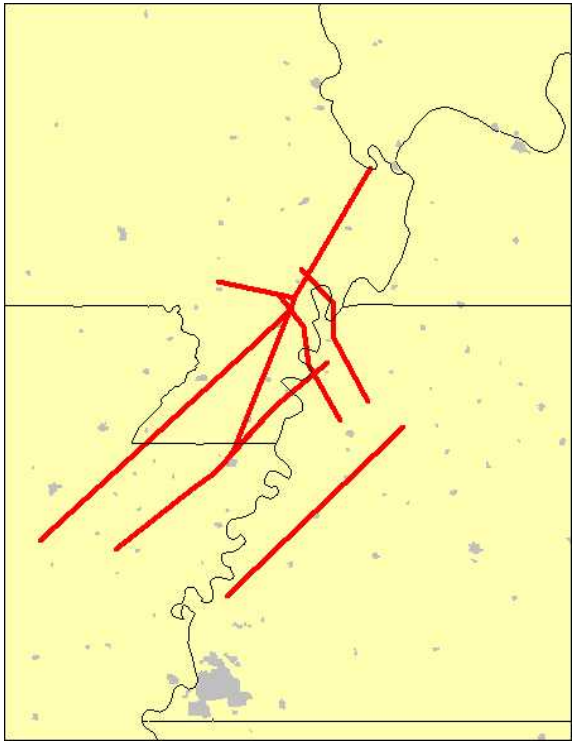
Some thoughts & issues

- New Madrid source geometry – why only pseudo faults?
- Clusters / dependent events
- Long period hazard & seismic sources

New Madrid seismic zone source geometry



USGS 2002
"pseudofaults"

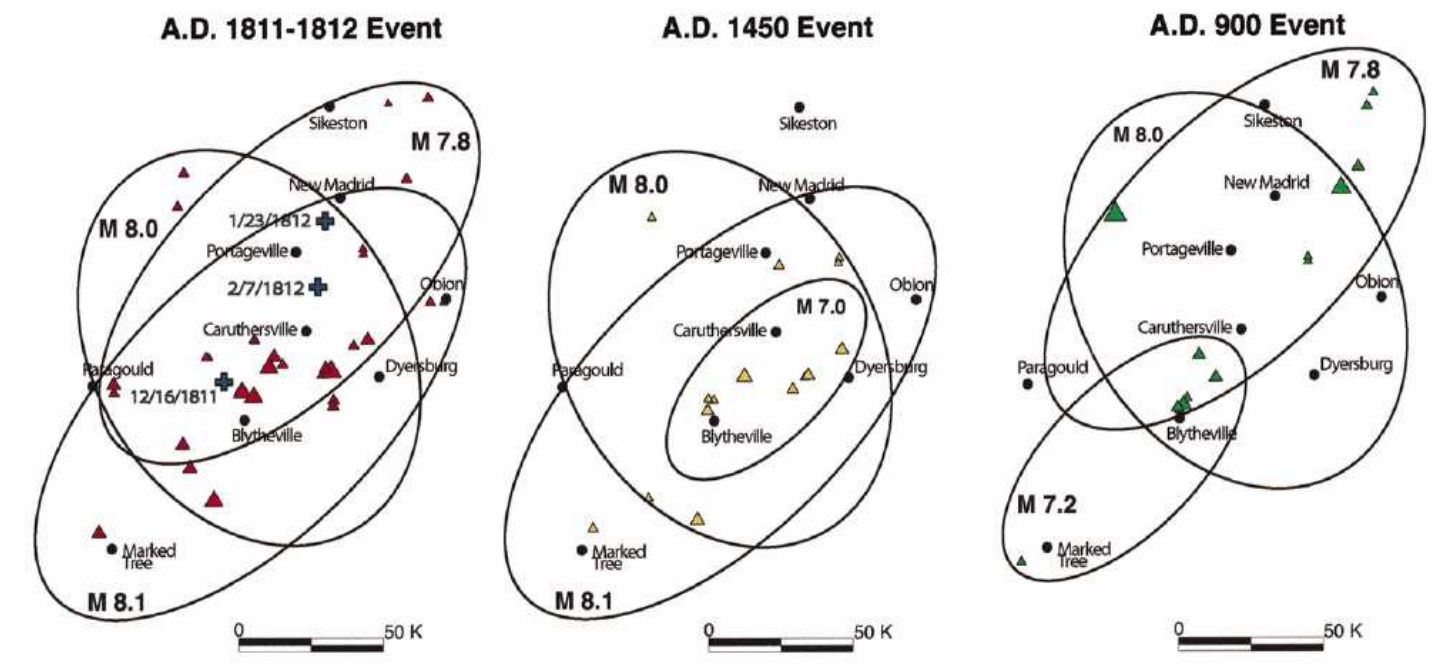


Cramer 2001
"actual" faults

- Cramer (2001) uncertainty study showed the greatest individual variation in ground motion was related to location of the events
- This was for sites inside the NMSZ – less variation for sites at a distance

Clustering of events

- Paleoseismic evidence suggest multi-segment ruptures are the norm rather than the exception
- Current USGS hazard maps consider a single event, albeit with a rupture extent similar to the full length of the 1811-12 series



Source: Tuttle and others (2002). Bull. Seis Soc America 92: 2080-2089

Implications of multiple events

- Engineering: progressive damage to buildings
- Insurance: the “72 hour rule”
- Emergency response & planning:
  short-term, probabilistic ShakeMaps?

USGS 2002 2% in 50yr Hazard maps