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New Madrid Geodesy Workshop

Organized by: Oliver Boyd, Eric Calais, John Langbein, Harold Magistrale, Seth Stein, and Mark Zoback

March 4th, 2011

U.S. Department of the Interior
U.S. Geological Survey

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1811-1812 three earthquakes, magnitude 7.0-8.0 struck the New Madrid region over a two month period; thousands of aftershocks followed

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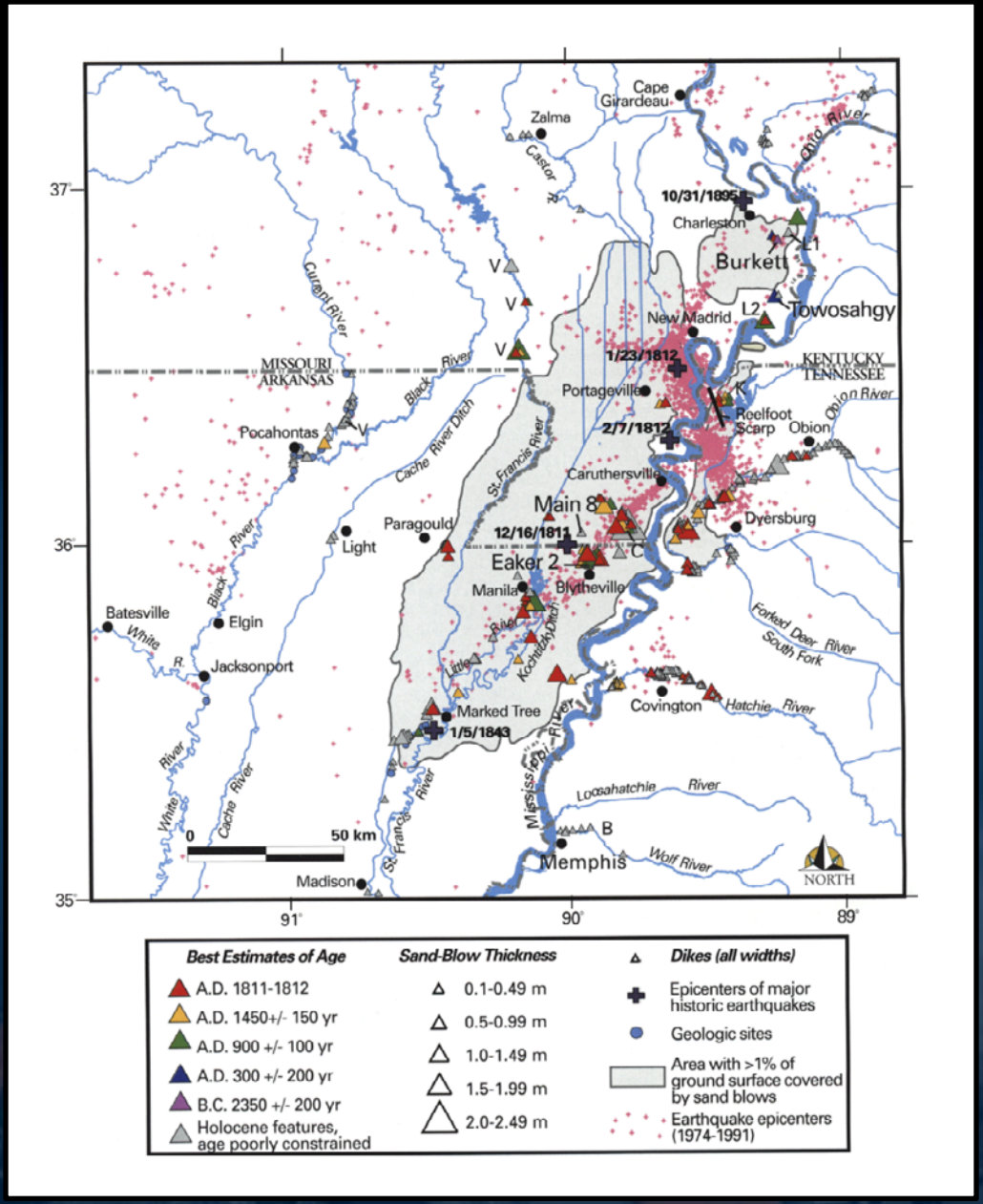
Evidence of past events

- numerous sand blows throughout the upper Mississippi River Valley
- changes in Mississippi River meanders
- damage to speleothems



Tuttle and others, 2005

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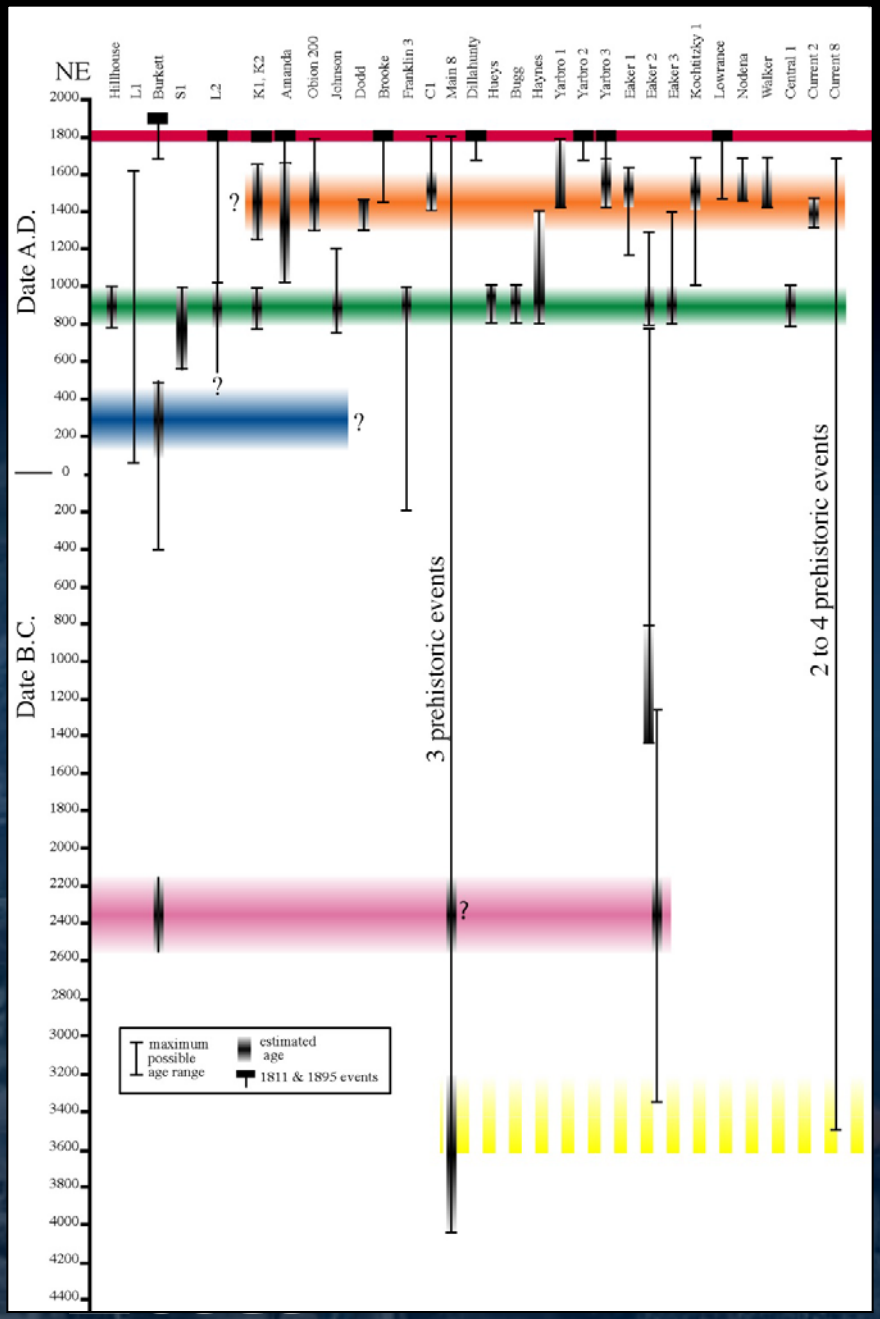


Tuttle and others, 2005

Regional Correlation of Geological Observations

Large events over the last 20,000 years include ~16,000 BC, 11,500 BC, 10,000 BC, 3500 BC, 2350 BC, 1620 BC, AD 300, AD 900, AD 1450, and AD 1811–1812.
(Tuttle and others, 2005; Holbrook and others, 2006; Panno and others, 2009)

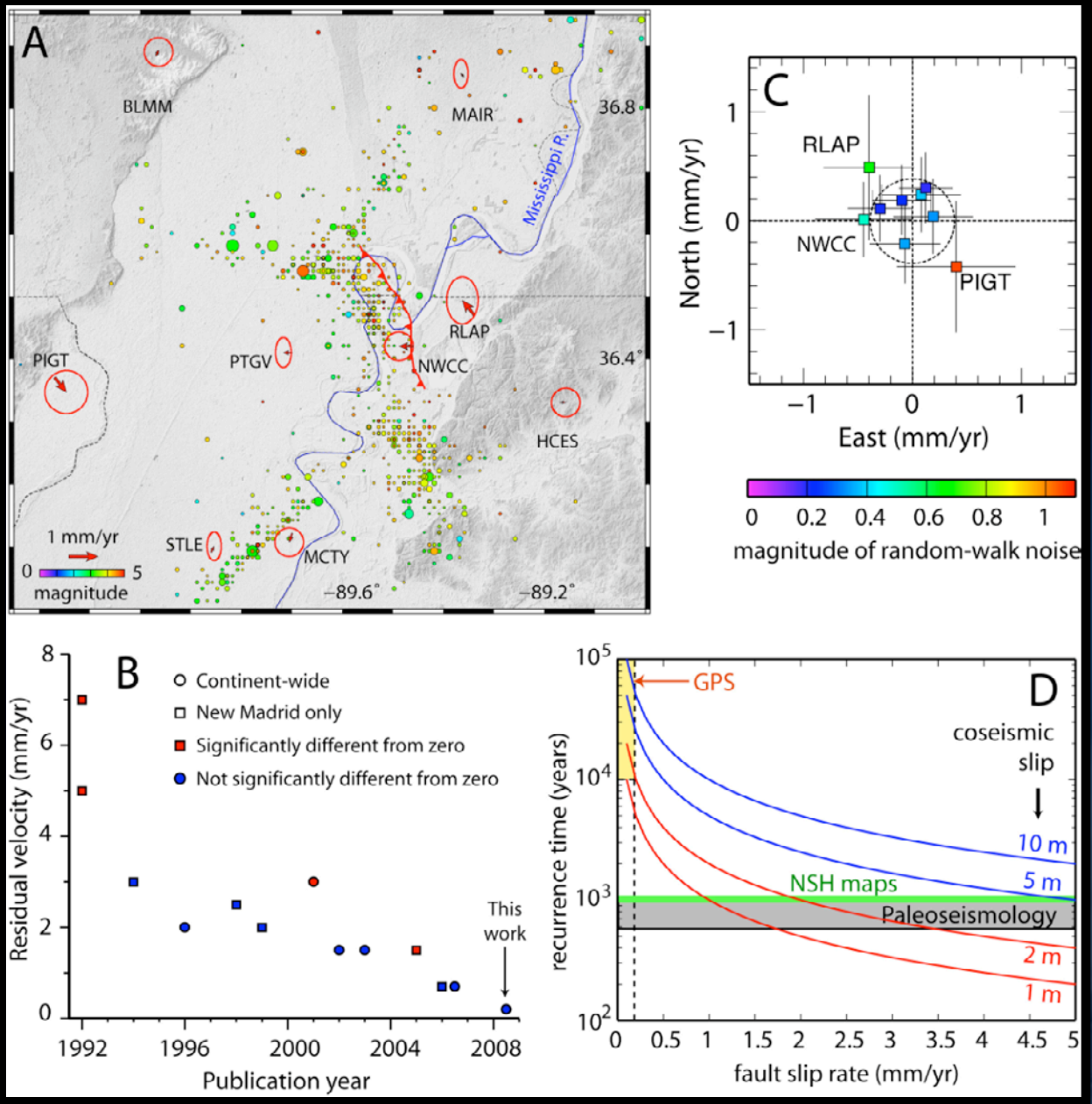
Repeat time of the most recent well studied events is ~ 500 yrs
(Tuttle and others, 2005)

Geodetic data

Are there significant motions?

Are the motions consistent with expectations?

What are the implications for seismic hazard?



From Calais and Stein, 2009

Agenda: Morning

8:10	Participant introduction; Name, experience, interest
8:30	**Geodetic Estimates and Uncertainties (Calais/Langbein)**
9:10	Discussion:
	What networks are available?
	What is the quality of monumentation?
	Should campaign sites be reoccupied?
	What's the signal to noise ratio?
	What are the sources of noise?
	How can signal to noise ratio be maximized?
10:10	**Strength and Stress (Zoback)**
10:30	Discussion:
	What is the rheology of the lithosphere in the CUS?
	What is the strength of and stress in the lithosphere?
	How do these quantities vary laterally and vertically?
11:00	Break
11:10	**Models of Stress and Strain (Freed/Liu)**
11:50	Discussion:
	What are the proposed models driving deformation?
	Is there localized or distributed deformation in the lower crust?
	What do existing models predict regarding surface deformation?
	Is the predicted deformation measureable and significant for seismic hazard?

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Agenda: Afternoon

2:00	Break-out sessions
	Observations:
	Can existing observations be improved?
	Should the existing network be modified or expanded?
	Modeling:
	Are existing models sufficient?
	What information is needed to better constrain existing models?
3:20	Report from break-out sessions
	Observations (Langbein)
	Modeling (Freed)
3:40	Final discussion:
	How do proposed models impact the seismic hazard?
	Should geodetic monitoring be improved around New Madrid and if so, how?
	What research tasks need to be addressed?
4:30	Adjourn

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