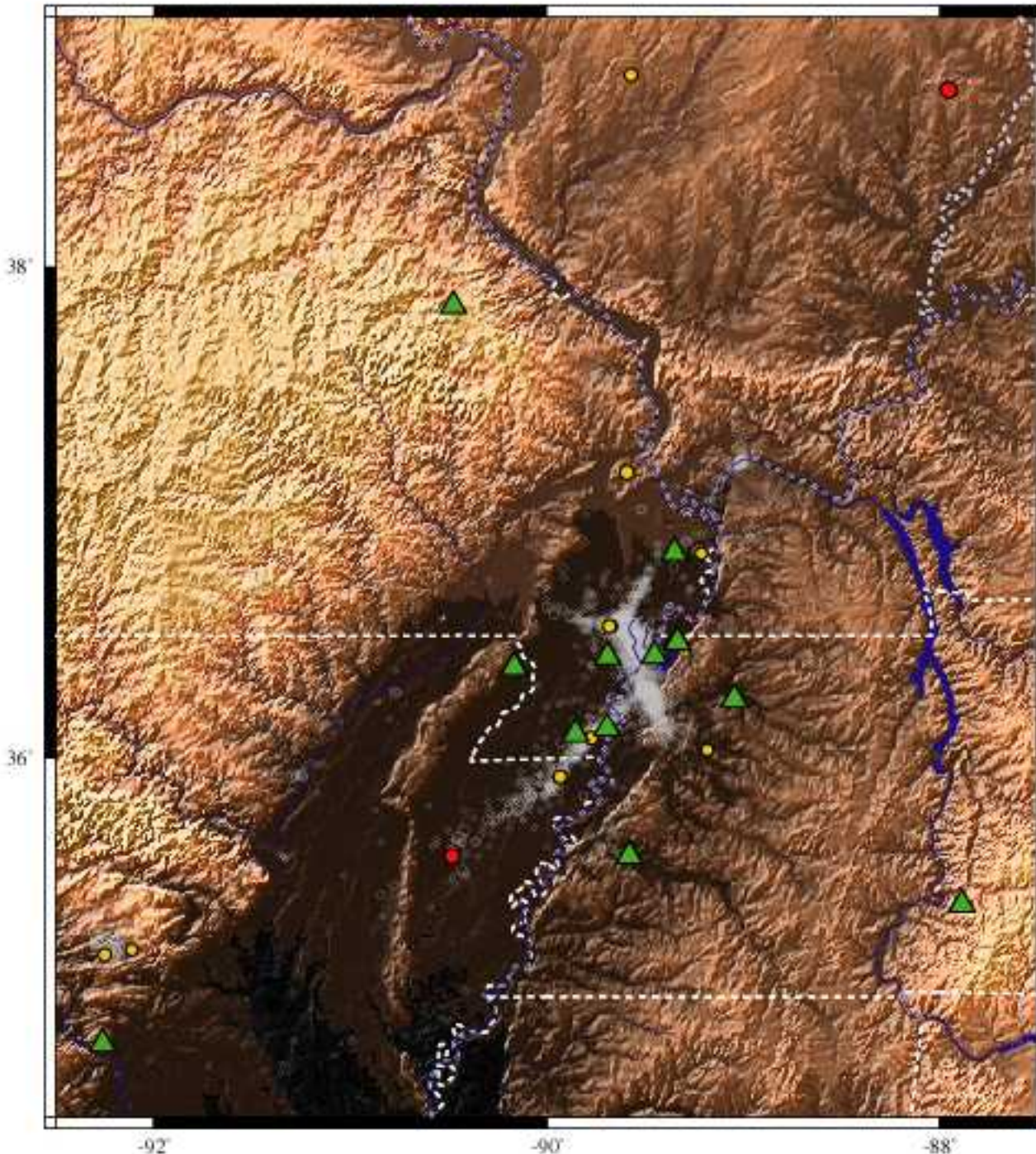


# Geodetic Detection of Active Deformation in the New Madrid Seismic Zone

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The University of Memphis



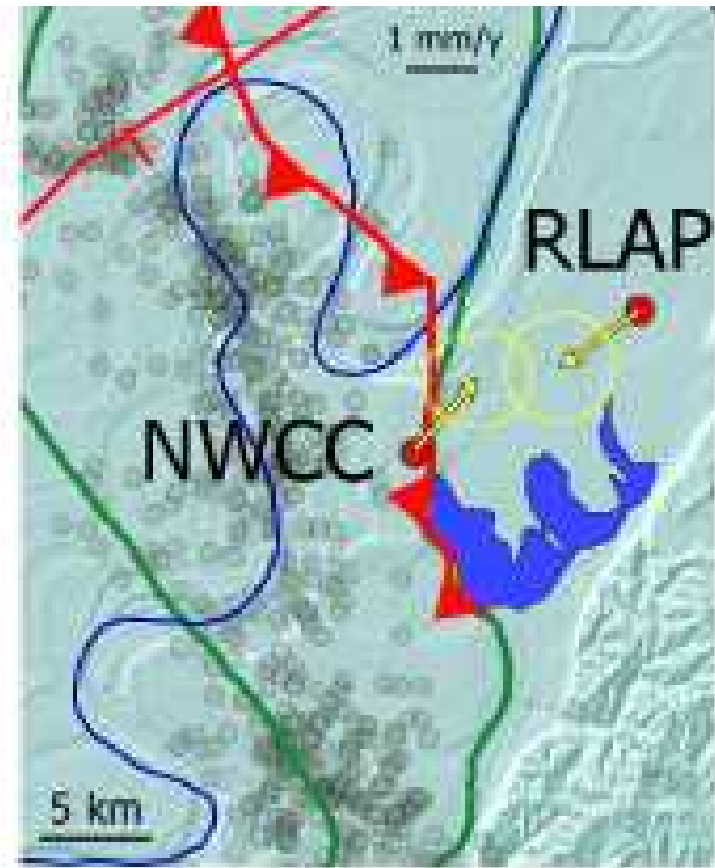
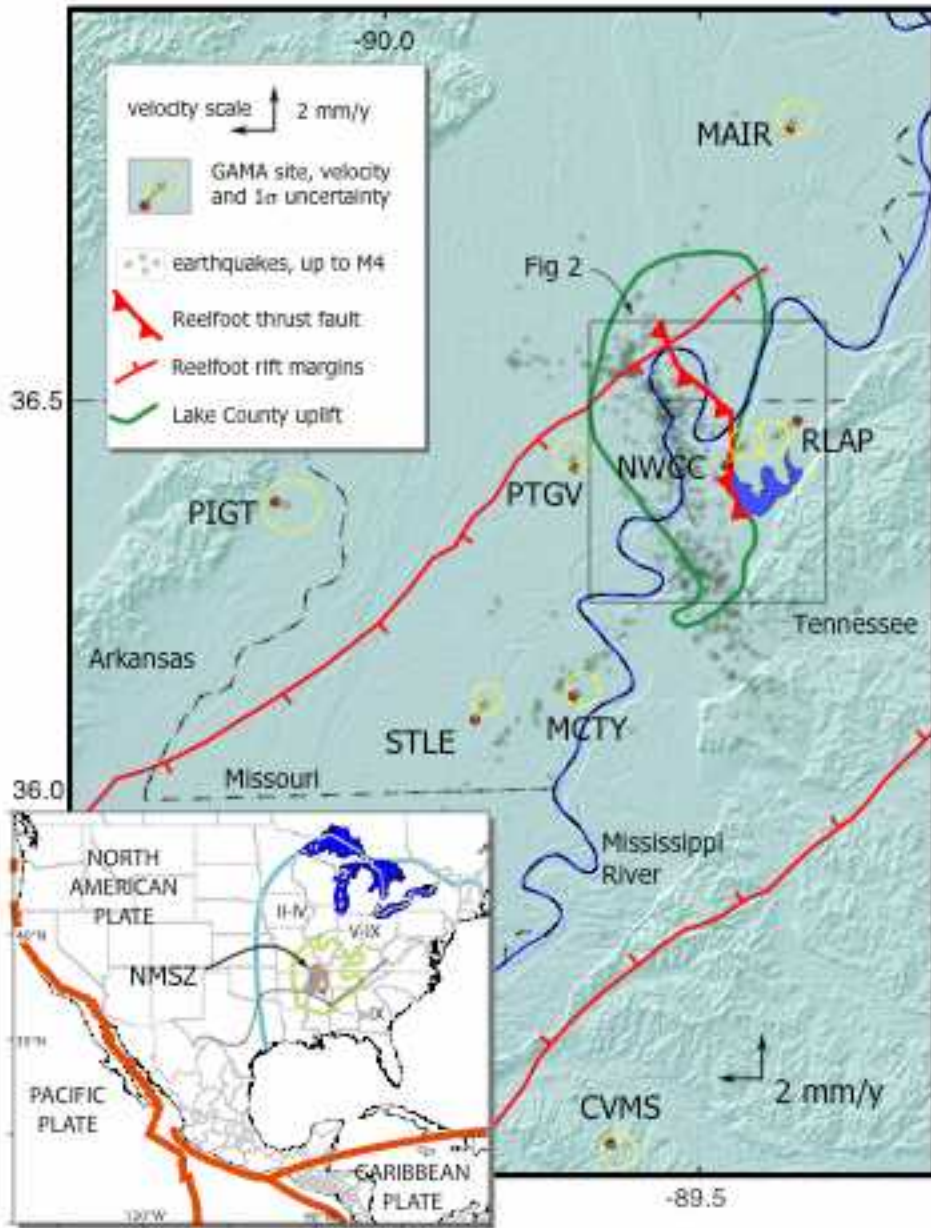
Continuous  
GPS

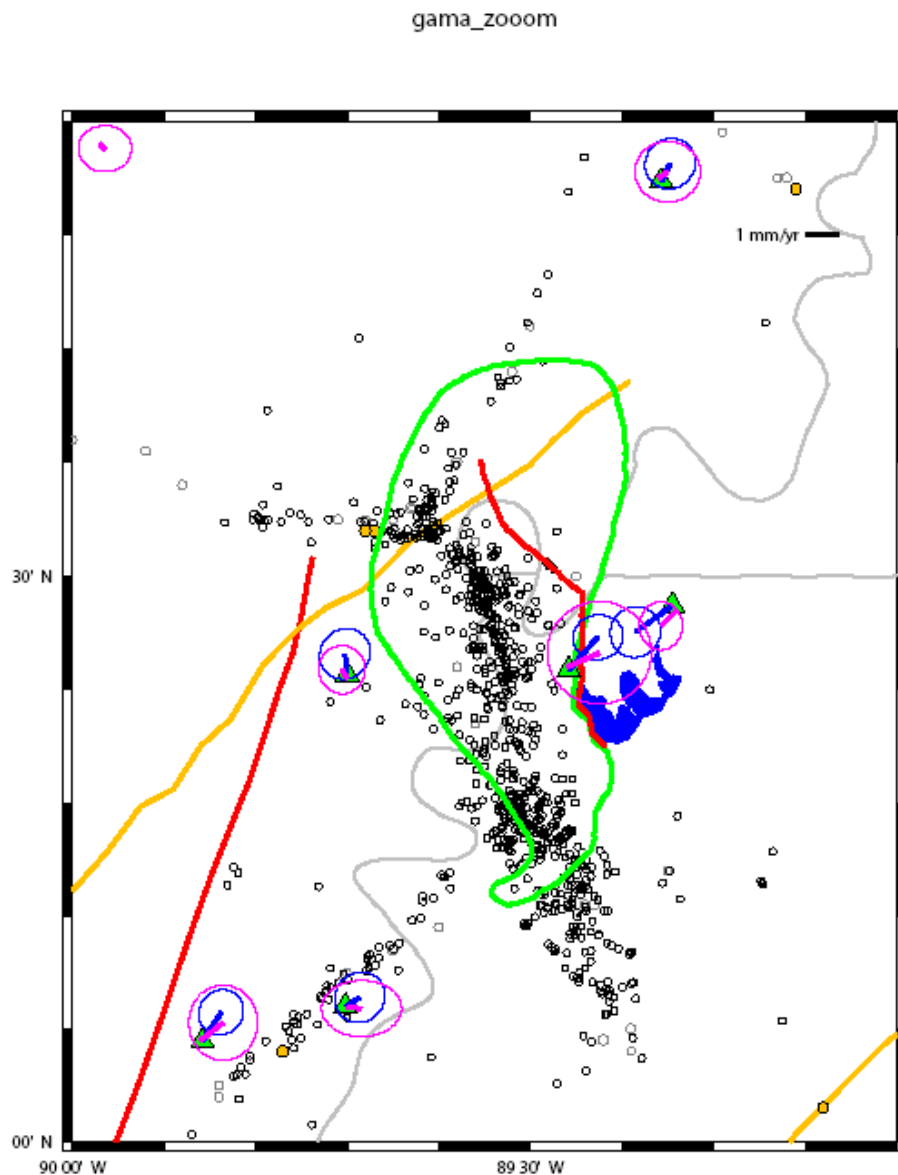
network for  
New Madrid  
Design

Local scale

Mid-scale

Regional  
scale



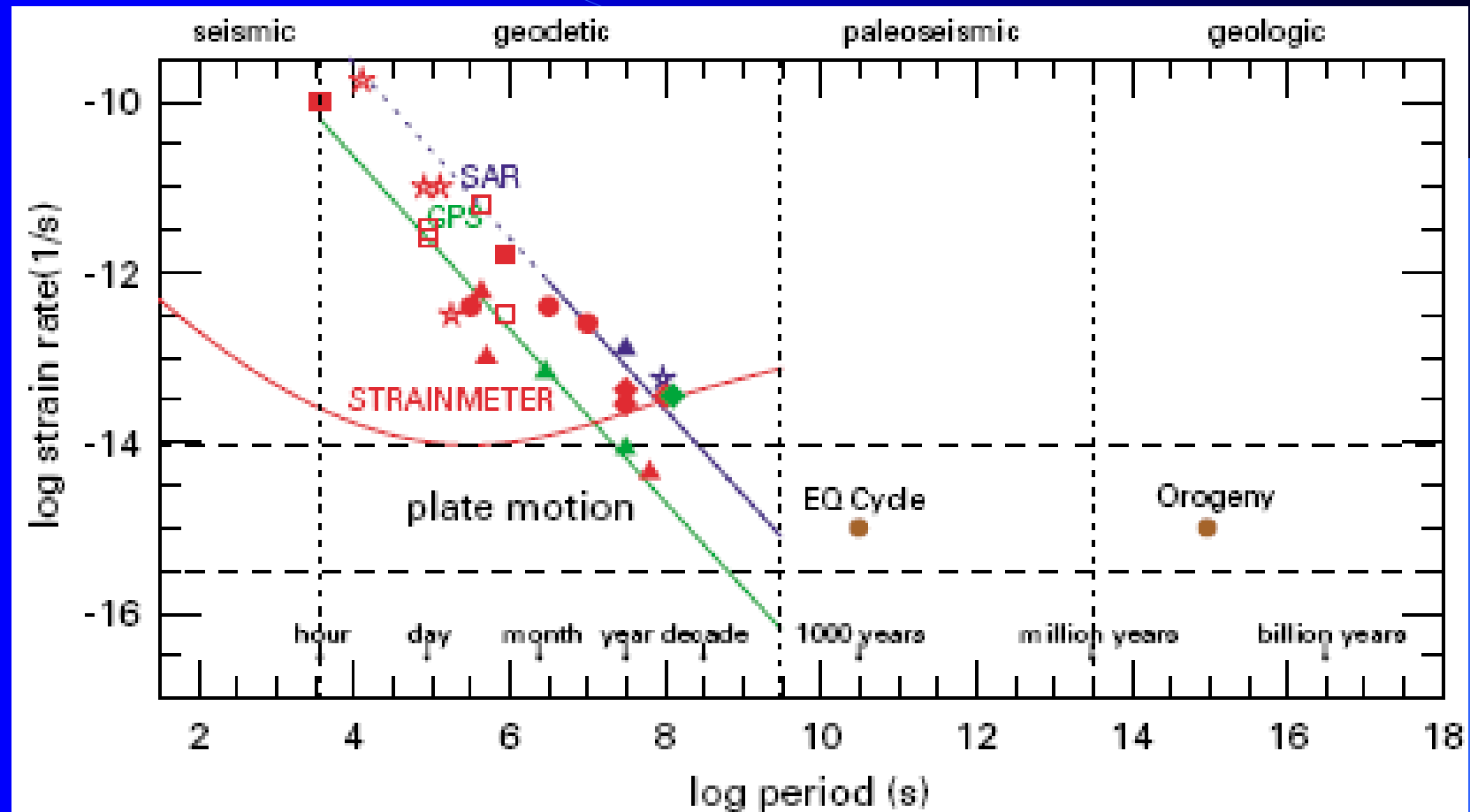


## Comparison with other results

- processing same data
- with same program
- Vectors - agree well
- Statistics - straddle

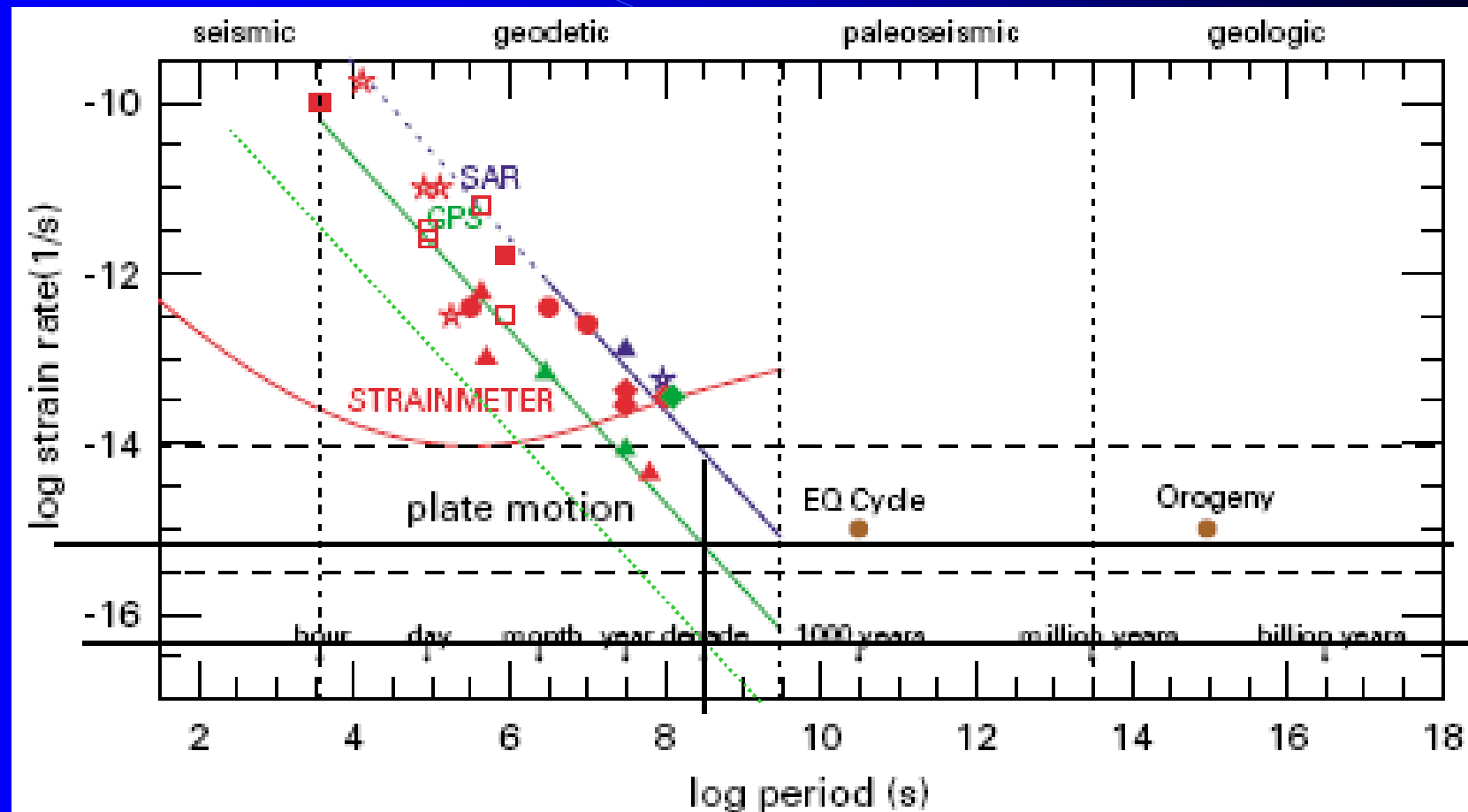
significant/not

# Strain-rate sensitivity thresholds vs period



GPS and INSAR detection thresholds for 10 km baselines, assuming 2 mm and 2 cm displacement resolution for GPS and INSAR, respectively (horizontal).

# Strain rates in stable plate interiors



bounded between

$3 \times 10^{20} - 10^{19}$  /sec and  $10^{17}$  /sec.

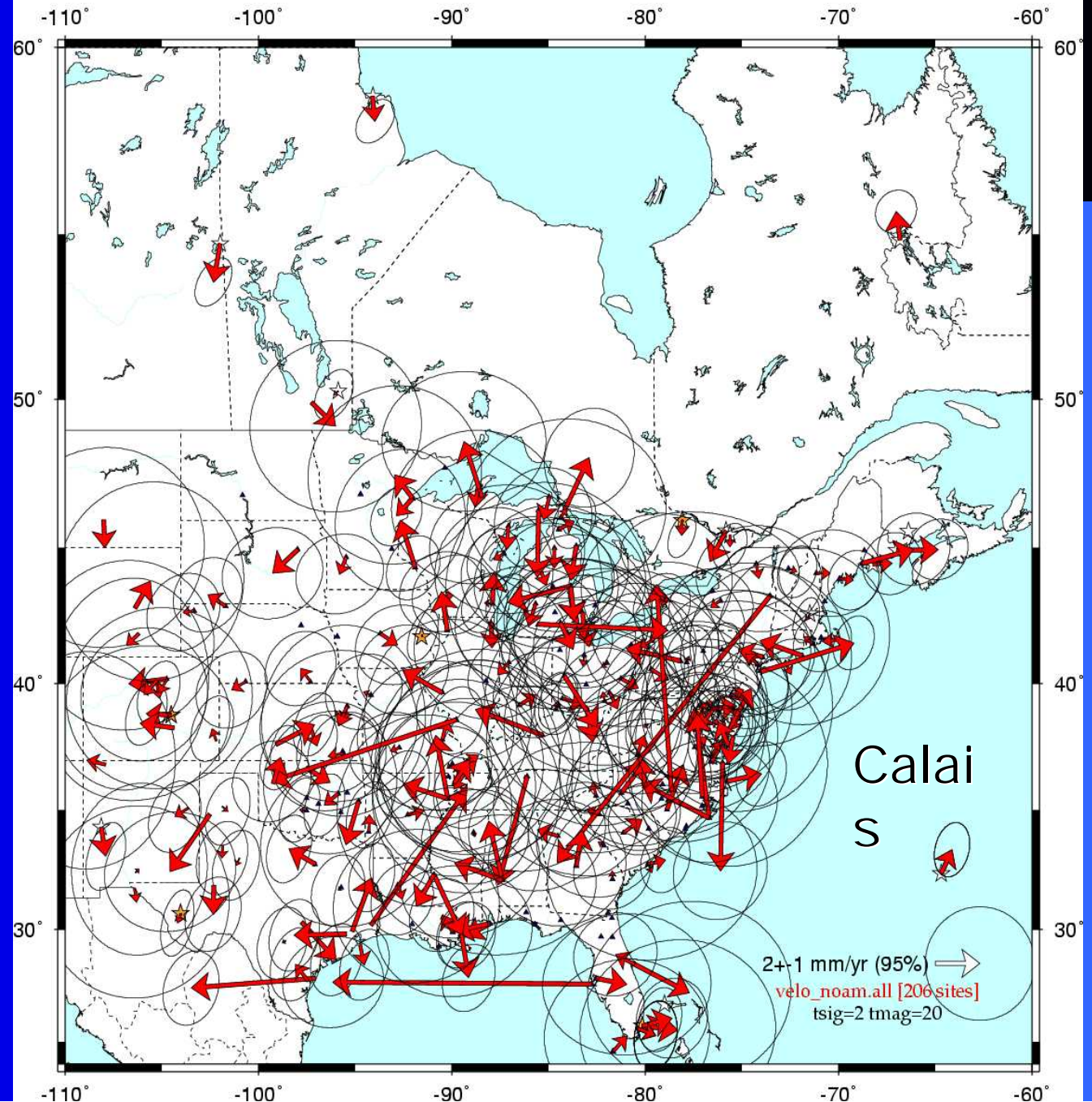
Gordon (1998)

## Horizontal velocities

Processing  
"noisy" data

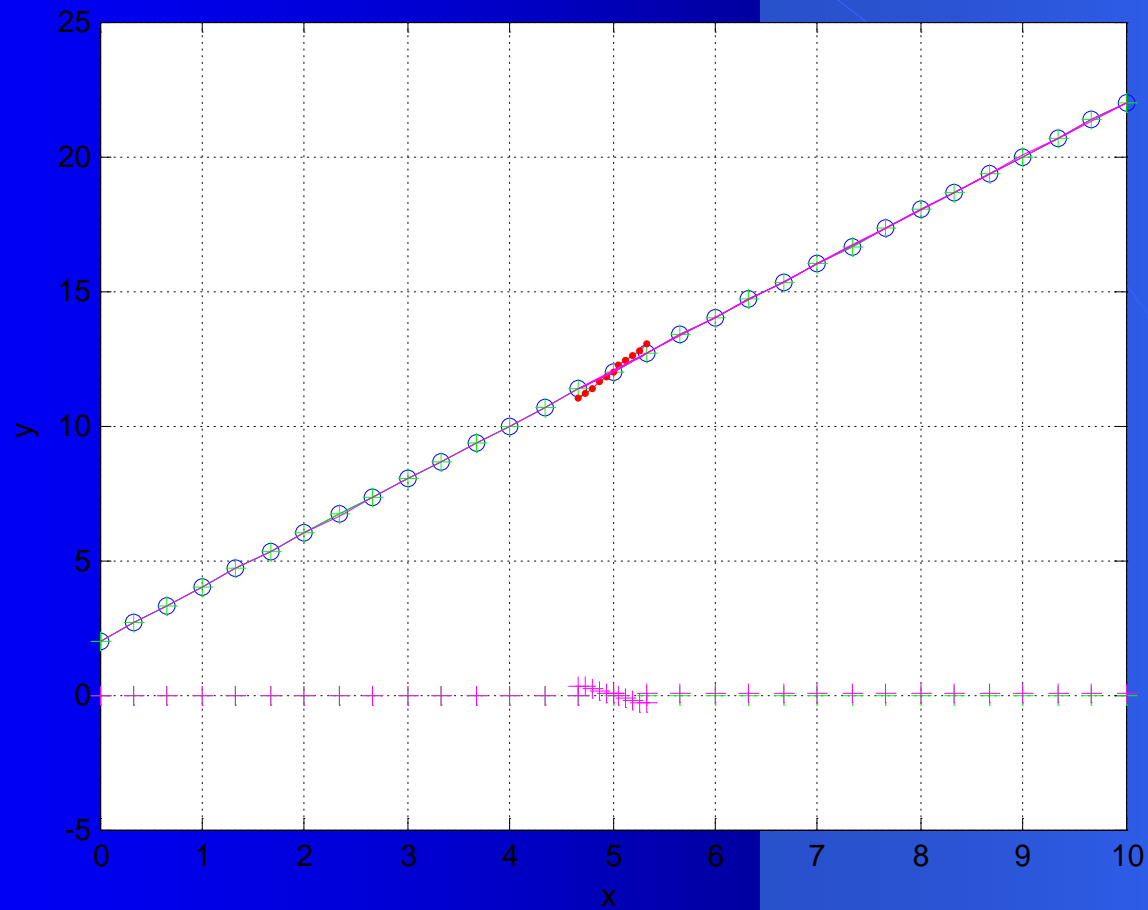
Law of large  
numbers  
(statistics) –

Large  
amounts of  
"bad" data  
will give  
good  
average



# Detecting small signal buried in larger signal

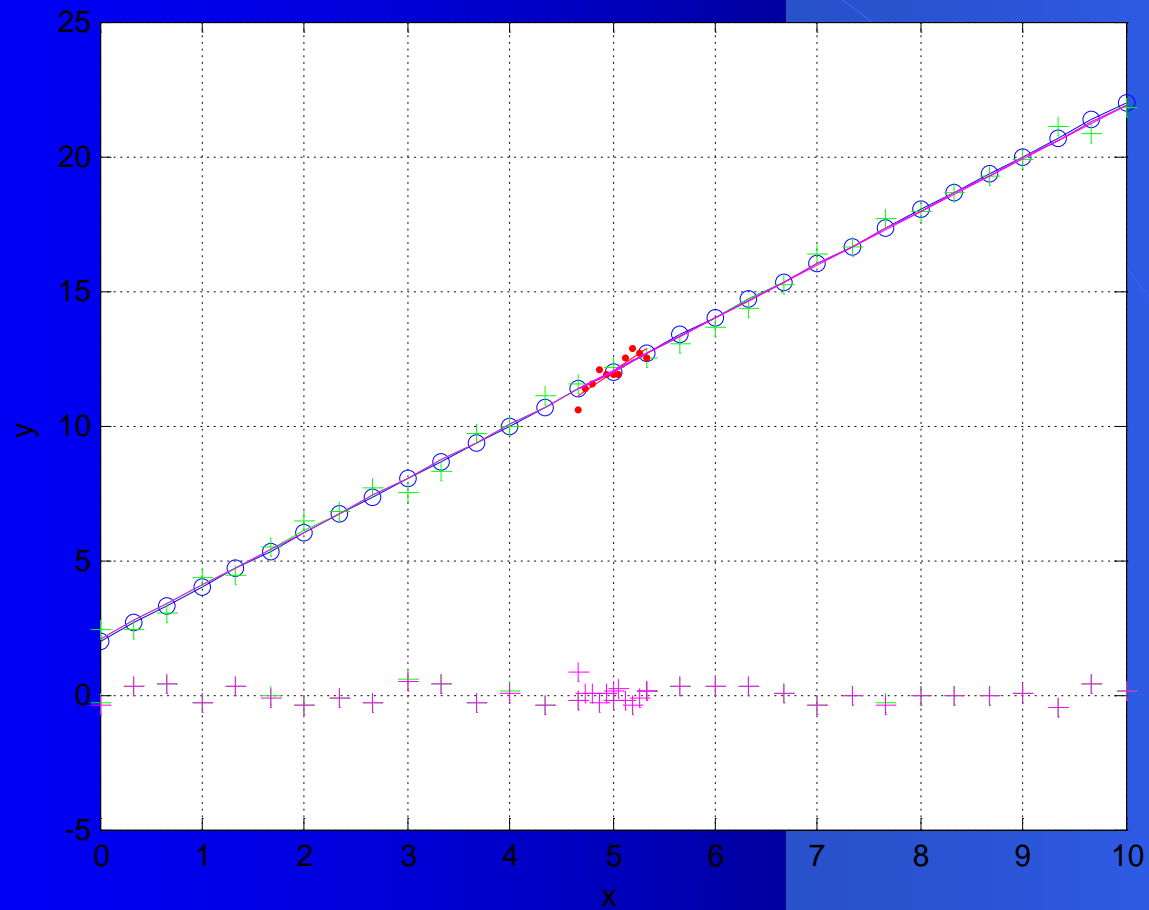
No noise





# Detecting small signal buried in larger signal

## With noise



# Continuous GPS

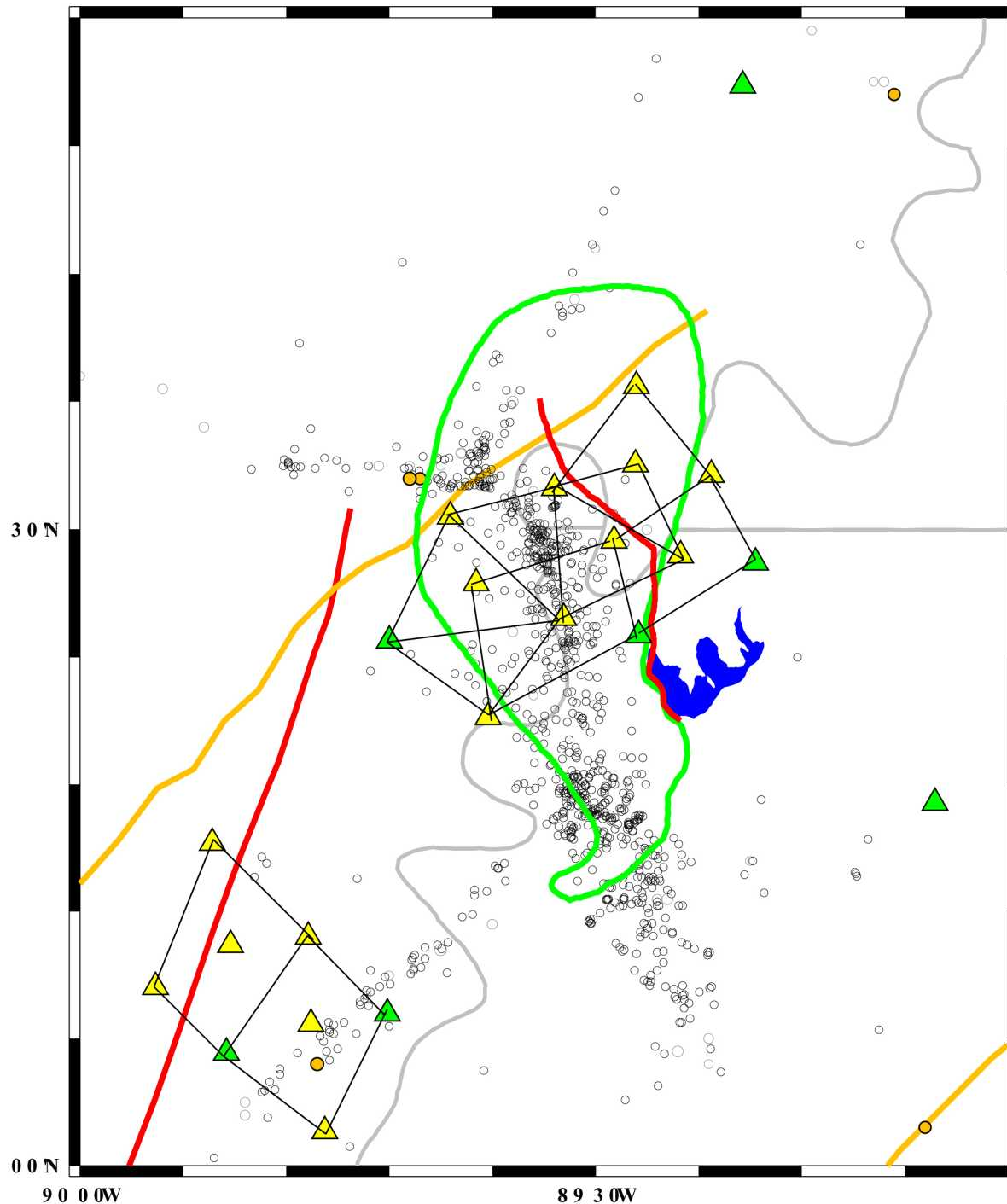
- Stable monuments -



# Continuous GPS

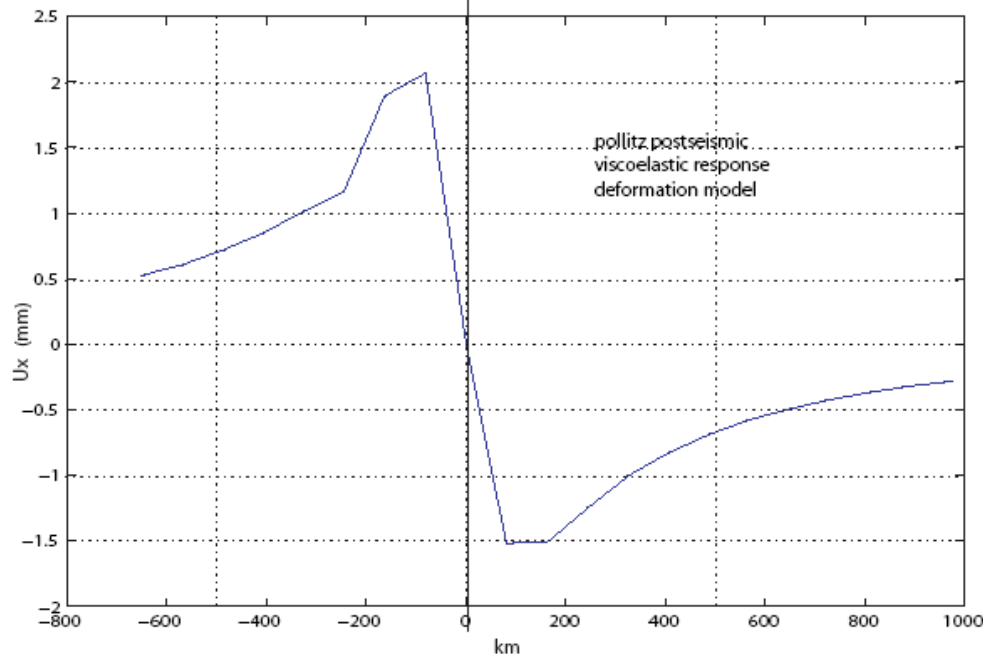
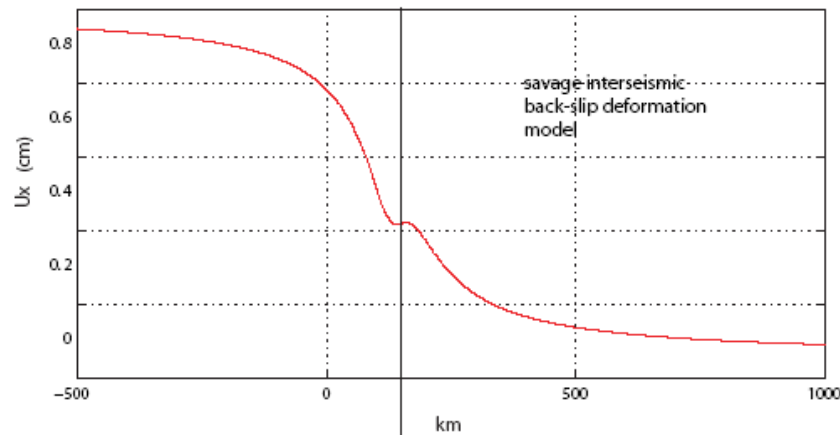
- Stable monuments? -





What we  
need ----

- Longer time series providing more accurate velocities
- Larger number stations providing higher

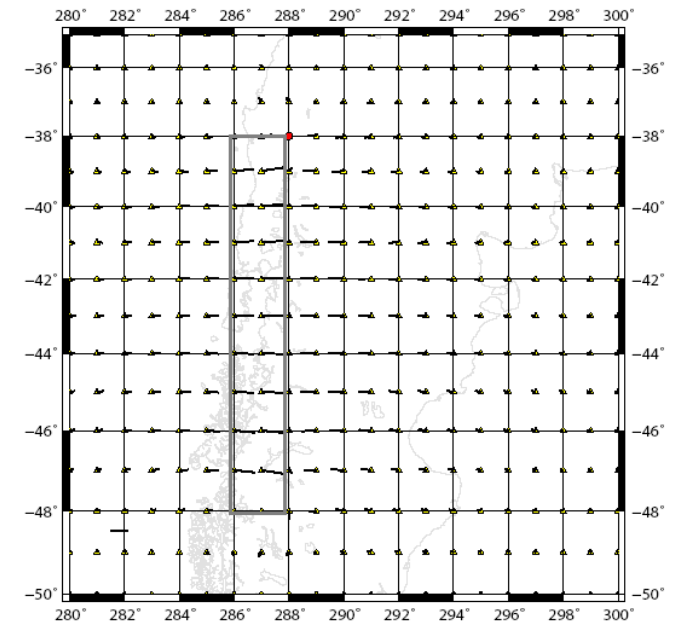
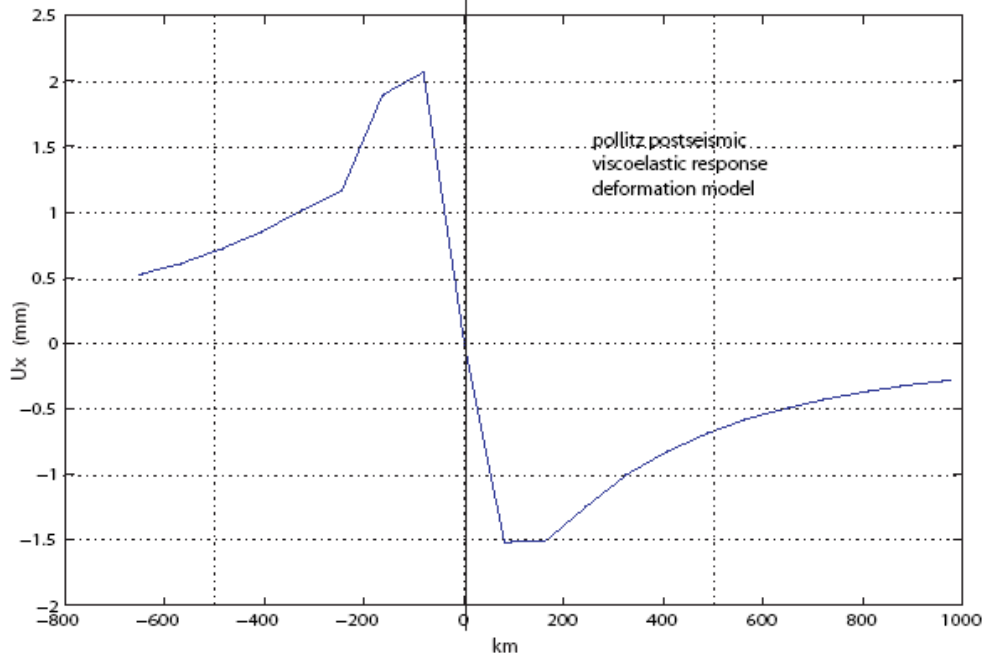
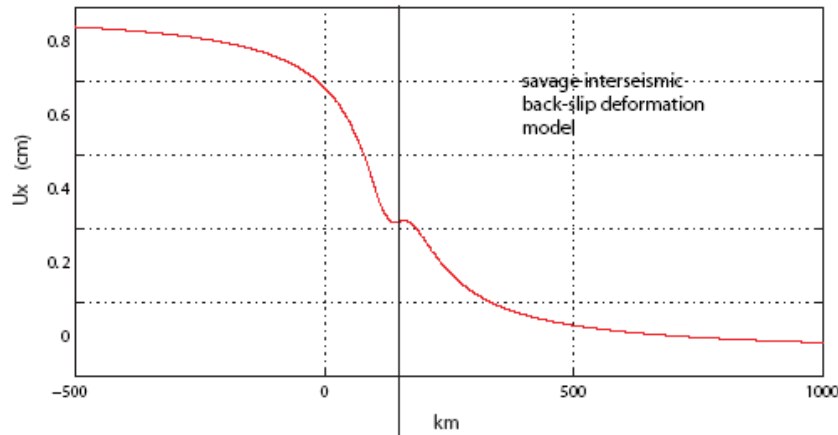


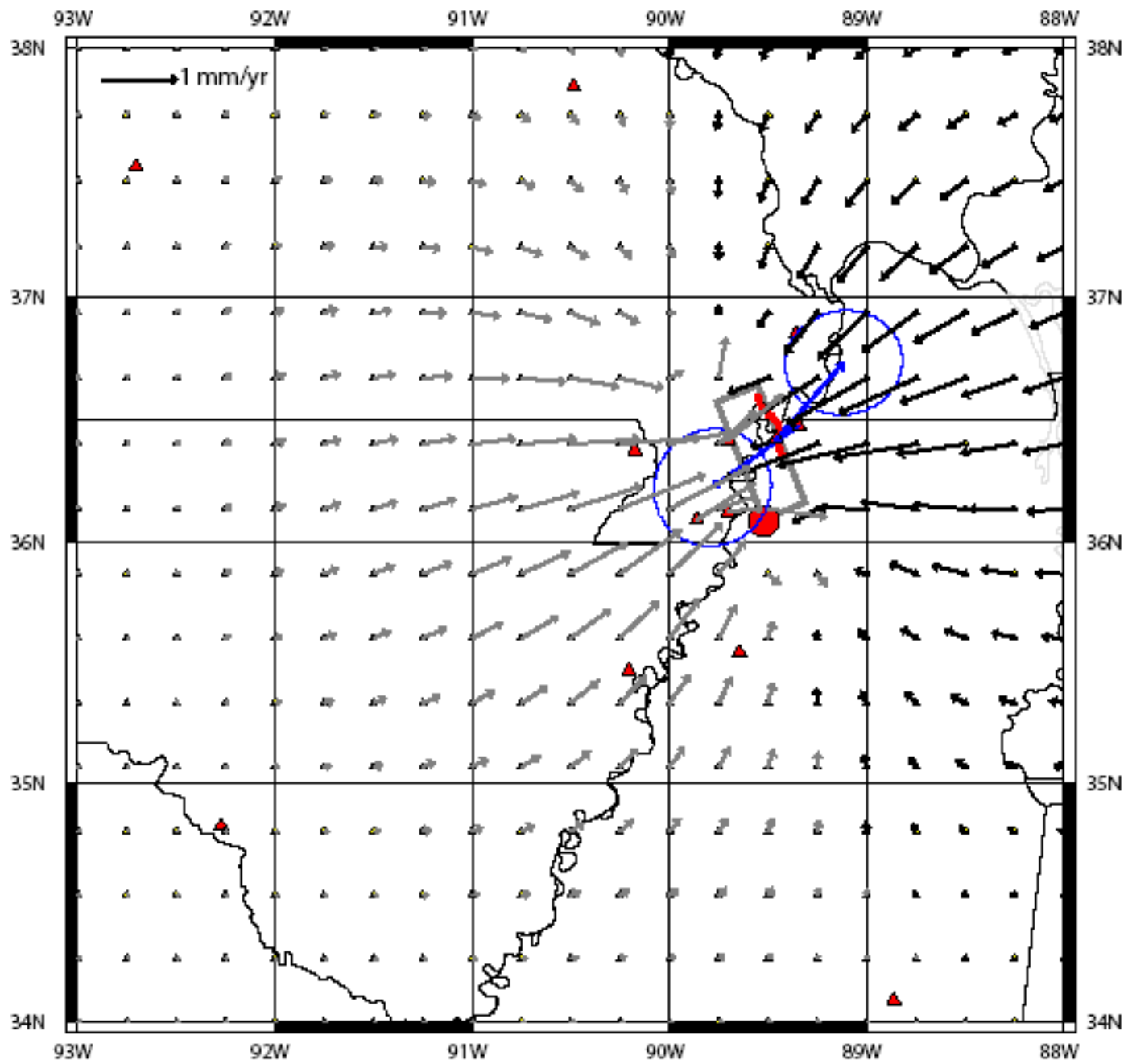
Interseismic vs.  
Postseismic  
"relaxation"

Shape  
determined by  
fault geometry

Velocities scale  
linearly with  
interseismic rate  
and slip in  
earthquake

Who "wins"  
depends on relative  
magnitudes at any  
given time





## Conclusions:

- GPS at (just past) threshold to detect strain signals
  - GPS can provide important, but not dominant component to seismic hazard estimation
- GPS can provide kinematic data to test dynamic models for what drives seismicity