Internal structure of the San Andreas fault at Parkfield, California

Martyn J. Unsworth, Peter E. Malin, Gary D. Egbert, and John T. Booker

*Geology*, April 1997

Meghan Graham

April 02, 2007

ASU EarthScope Seminar
Motivation

- Interesting near-surface direct current (DC) resistivity measurements in the Parkfield area.
- Low seismic velocities near this area.
- This is the location of 6 moderate earthquakes within the last 150 years

(USGS)
Data and Methods

- Magnetotelluric (MT) data taken along a 4 km section of the San Andreas fault
  - Low frequencies sample deeper depths
- Seismic data taken for the SW portion

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Data and Methods Continued

- Resistivity is plotted versus frequency
- Smoothing models are used to make best fit predictions
Data and Methods Continued

- A low resistivity zone beneath Middle Mountain
  - Around 500 m wide
  - Extend to around 4 km
- Seismic reflection data showing the top of Salinian Granite

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Implications

- Fluid present in the rock
  - Brine with 30,000 ppm chloride
  - Require a porosity between 9-30% or a 30 m wide zone of fluid
- A very porous rock layer contributing to the fluid content
- Active contribution to the earthquakes and topography in this area

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Additional Thoughts

- How do the processes in this study help to find and identify electromagnetic precursors to major earthquakes?
- How active is the role of the fluid in the earthquake cycle of this area?
- How precise are the deeper observations of resistivity?