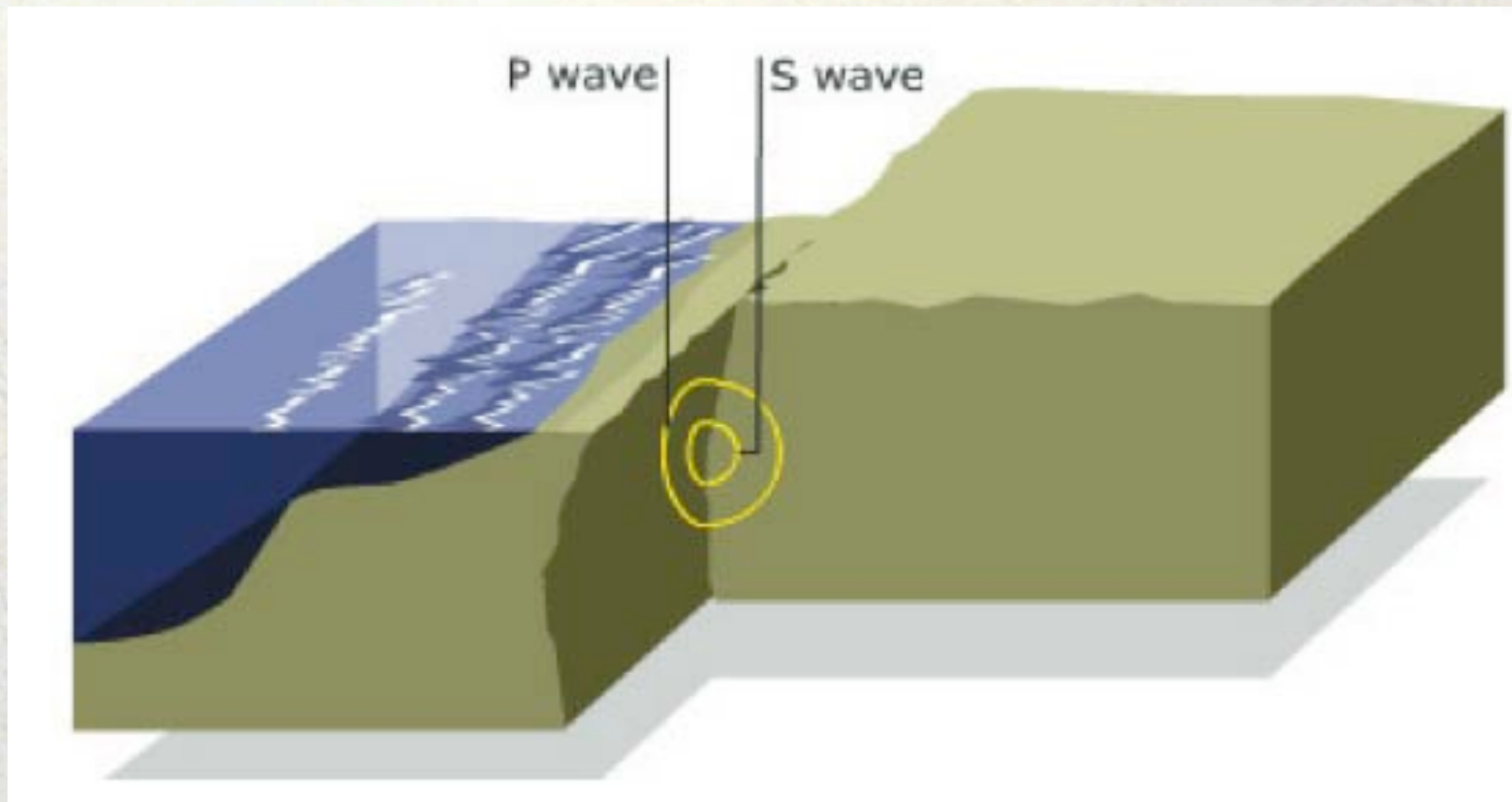


Characterization of active faults



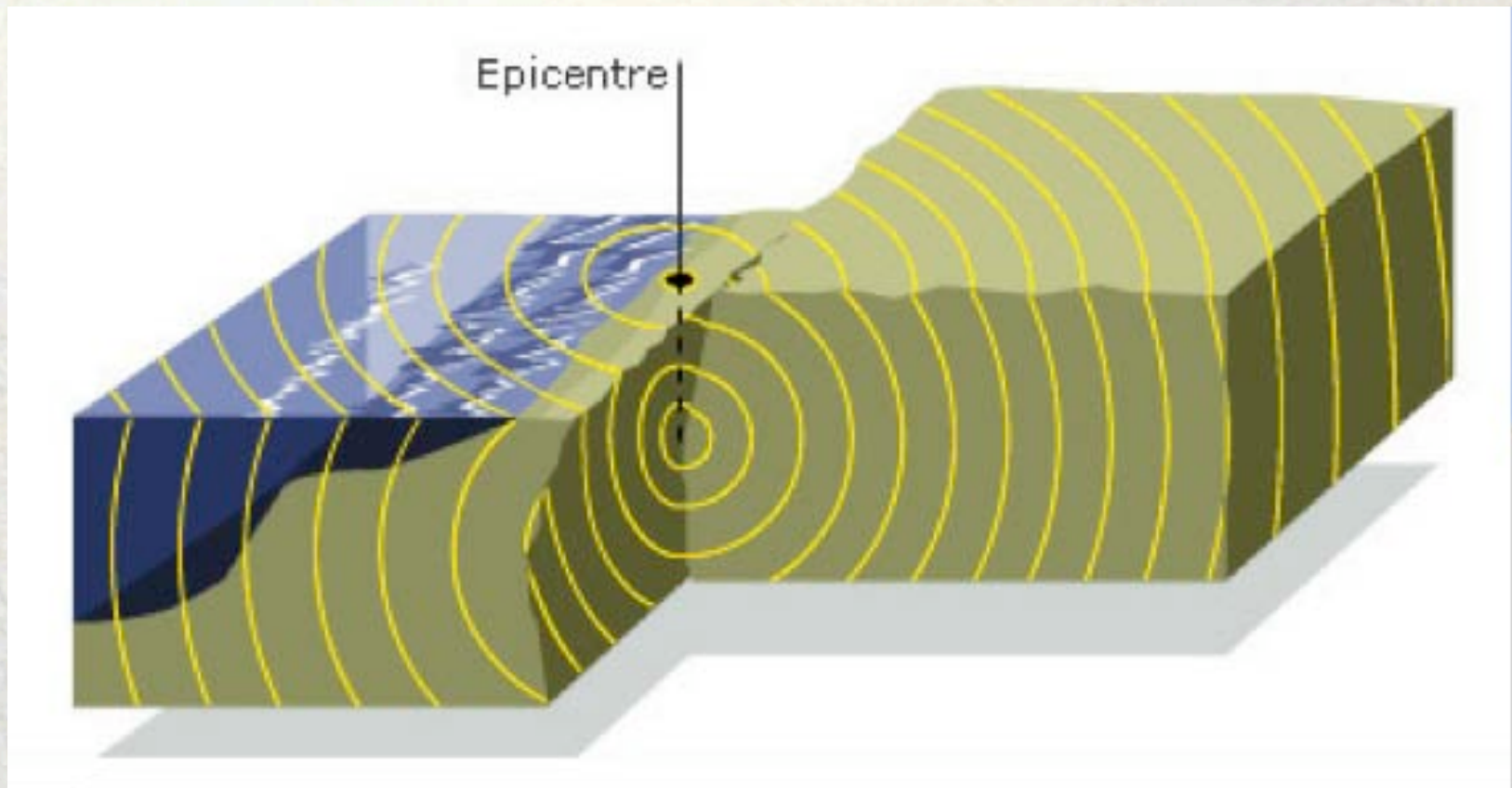
Kathy Haller

Coseismic deformation



<http://news.bbc.co.uk/1/hi/sci/tech/4126809.stm>

Permanent surface deformation



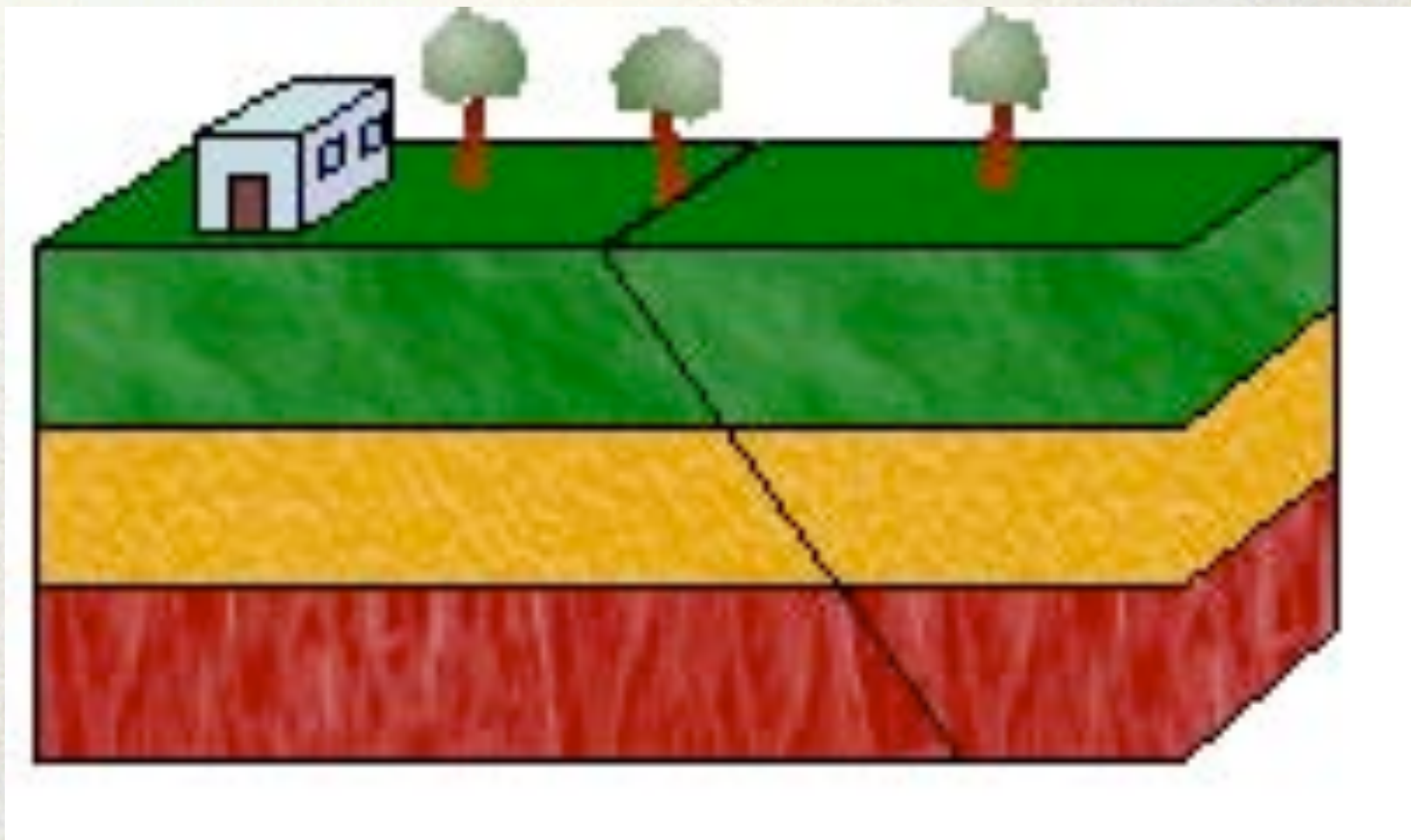
<http://news.bbc.co.uk/1/hi/sci/tech/4126809.stm>

Earthquake geology

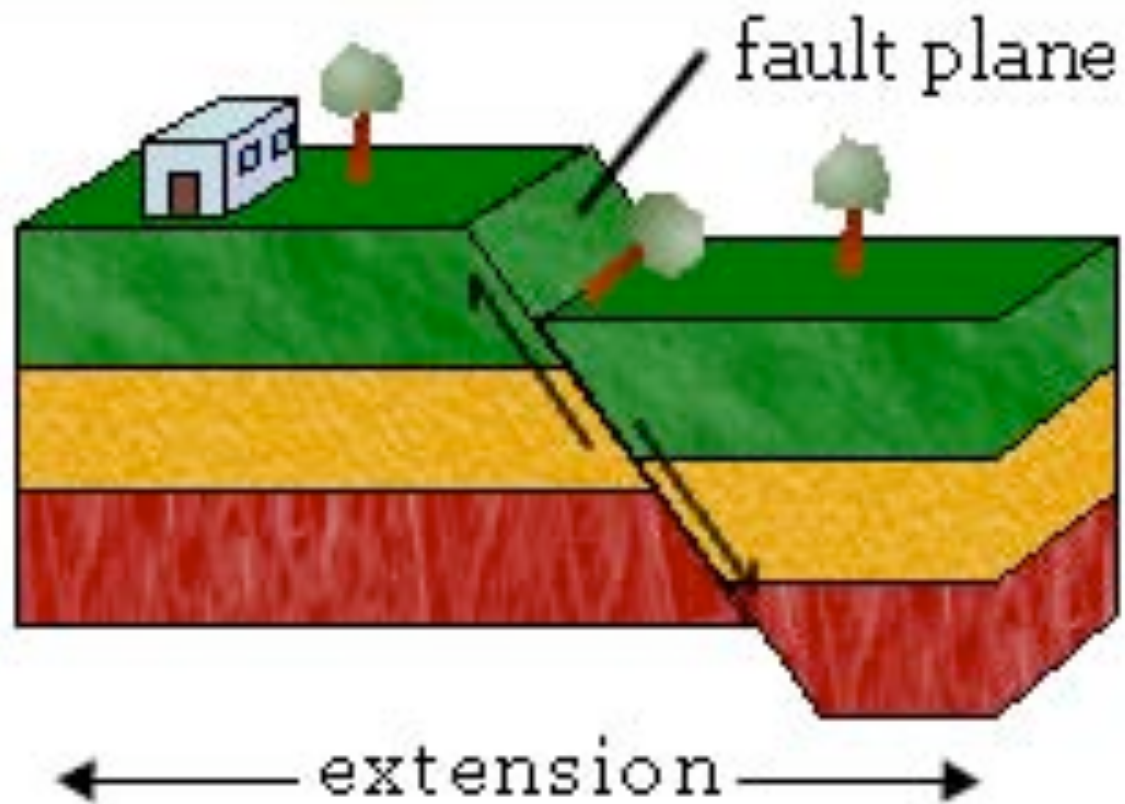


- Large earthquakes recur on geologically recognized faults
- Historic record is too short
- Past is the key to the future

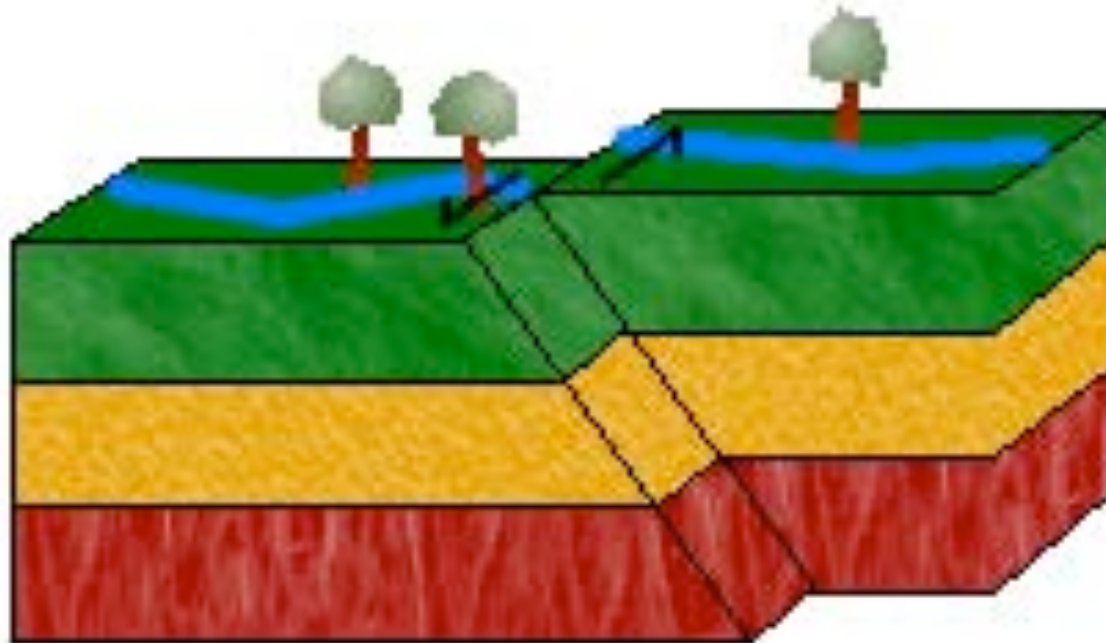
Initial conditions



Normal fault



Strike-slip fault



Paleoseismology



- The study of prehistoric earthquakes
 - multidisciplinary science
 - can extend the record to hundreds of thousands of years
 - when, where, and how large

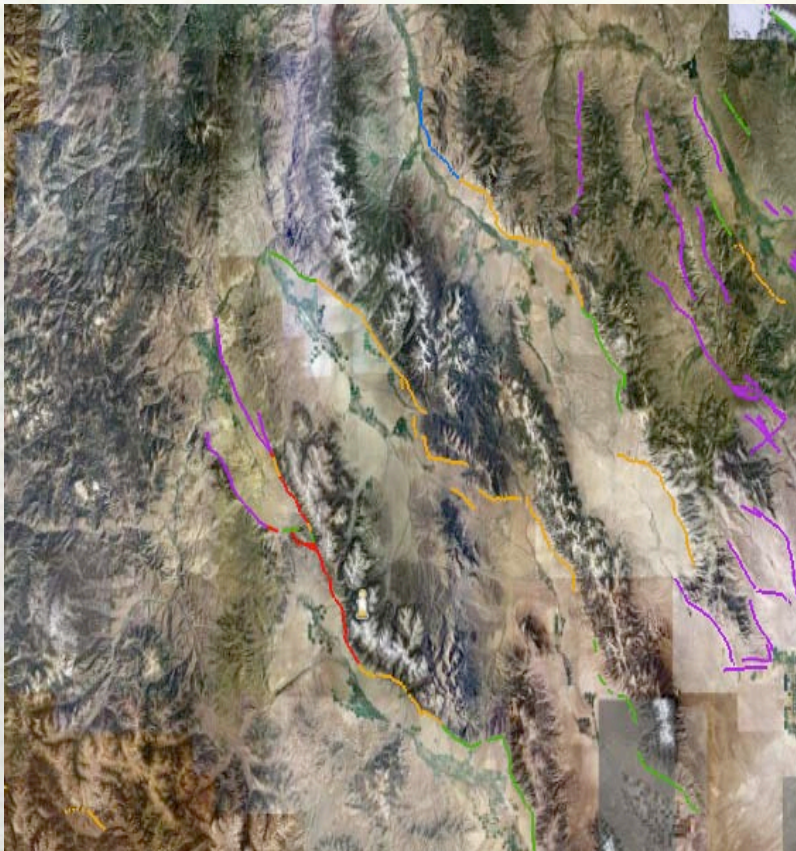
How large?



Marryat Creek, Australia earthquake
1986, M 5.8

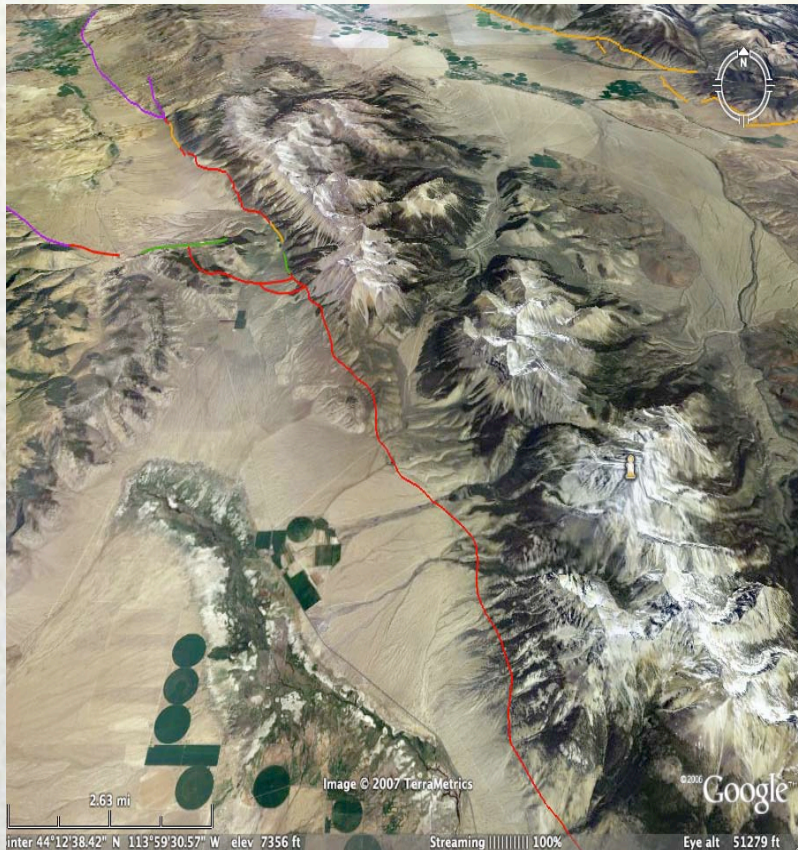
- Only 10% M5 rupture the surface
 - Average and maximum offset about 5 cm
- Over 50% M6.2 rupture the surface
 - Average 30 cm; maximum 40 cm
- And 100% M7.6 rupture the surface
 - Average >280 m; maximum 590 cm

Regional investigations



- Tools
 - Remote sensing
- Sub-parallel topography
 - High ranges with intervening basins

Fault-scale studies



- Tools
 - Tectonic geomorphology
 - Geologic mapping
 - Relative age dating techniques

Tectonic geomorphology

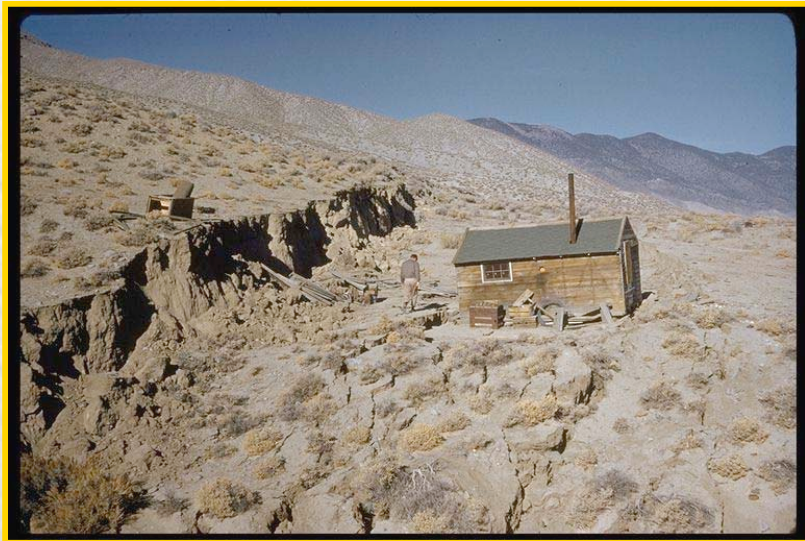


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Geologic relations



Fault scarps



Lateral offset of stream



Detailed site investigations

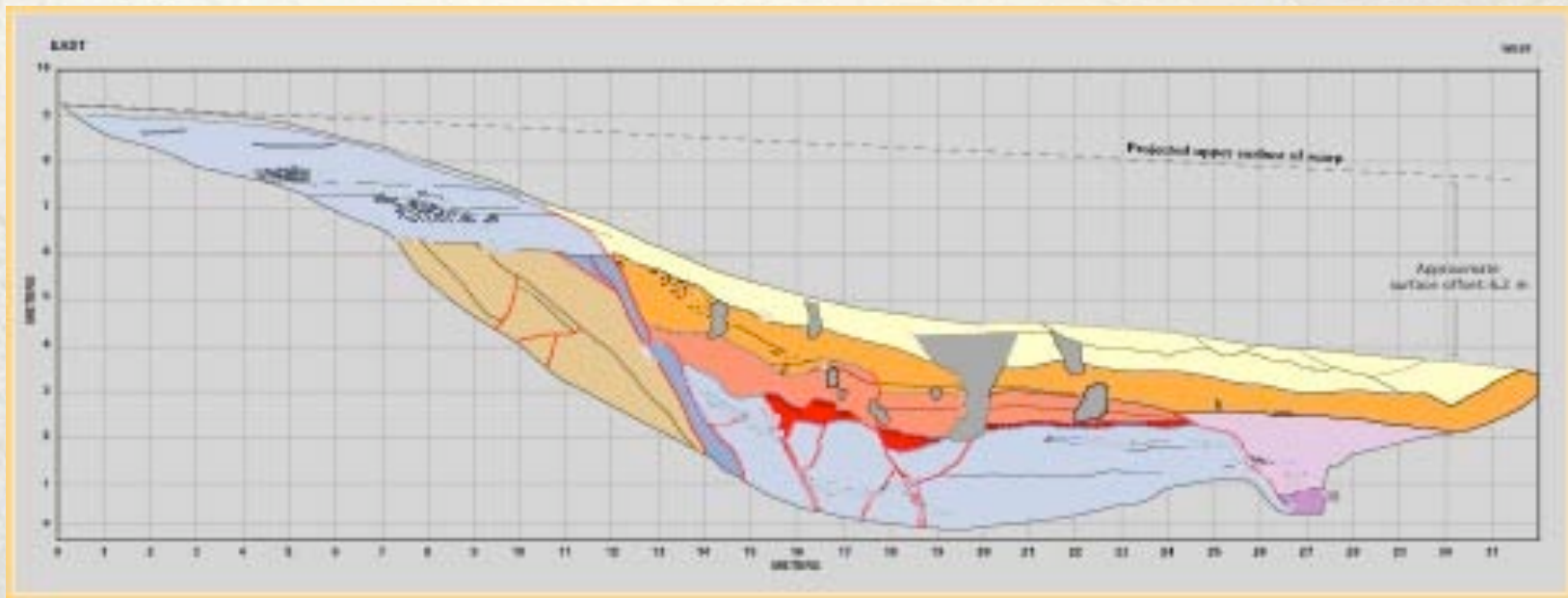


- Trenching
 - Archeological style excavations

Field techniques



Characterizing paleoearthquakes

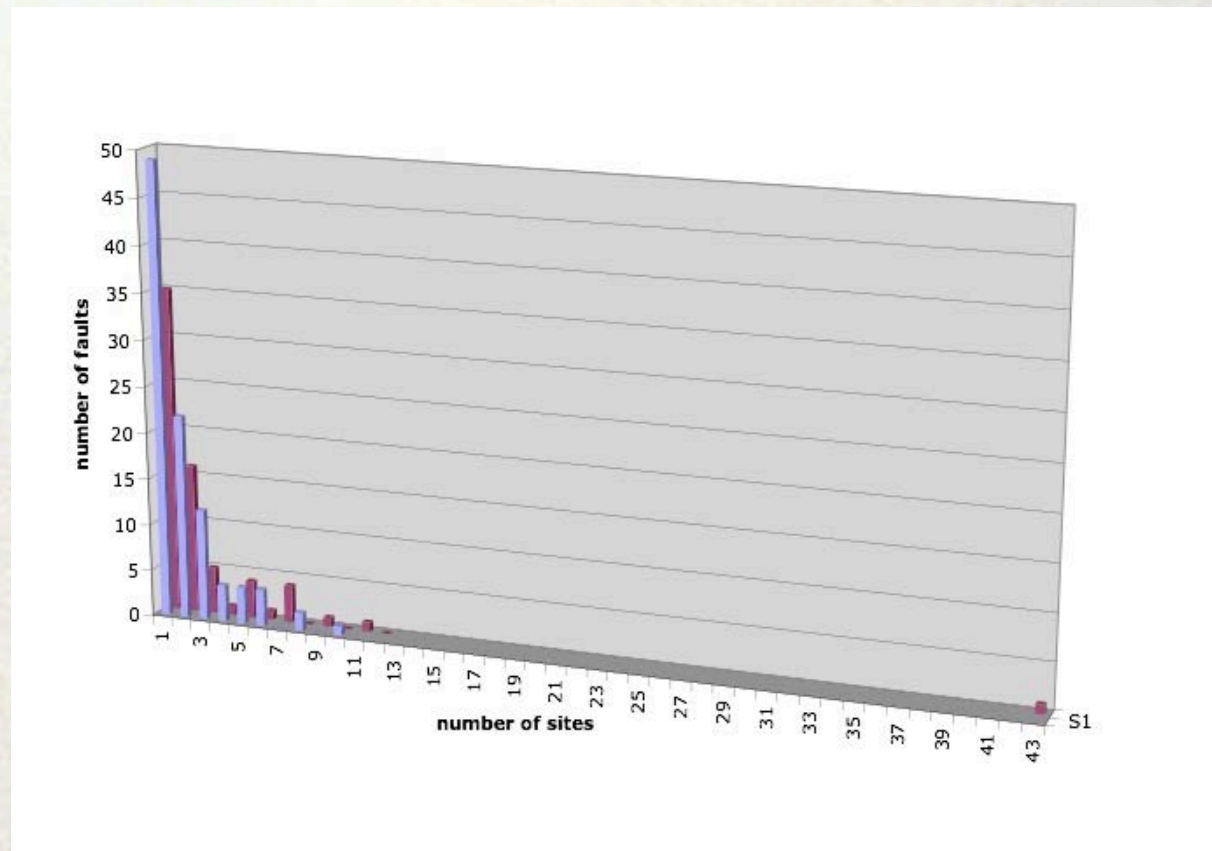


Dating paleoearthquakes



- **Isotopic (^{14}C)**
- **Cosmogenic (^{210}Pb , ^{36}Cl)**
- **Radiogenic (luminescence)**
- **Biological (lichenometry)**
- **Geomorphic (relative age)**
- **Correlation (tephrochronology)**

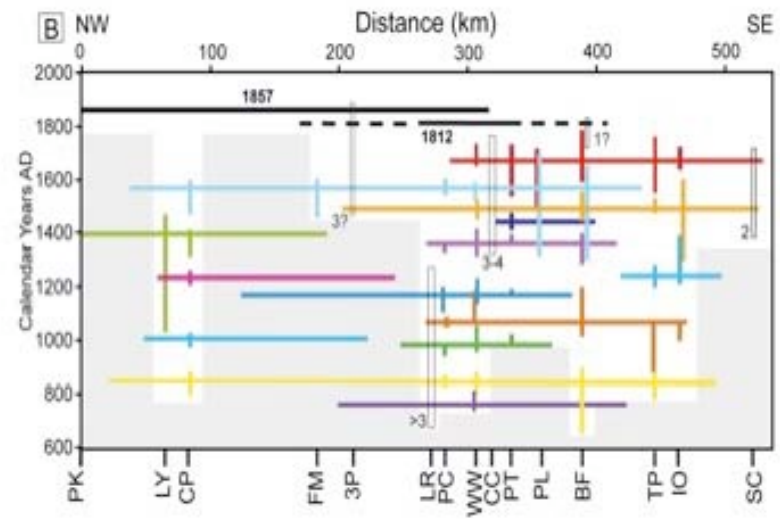
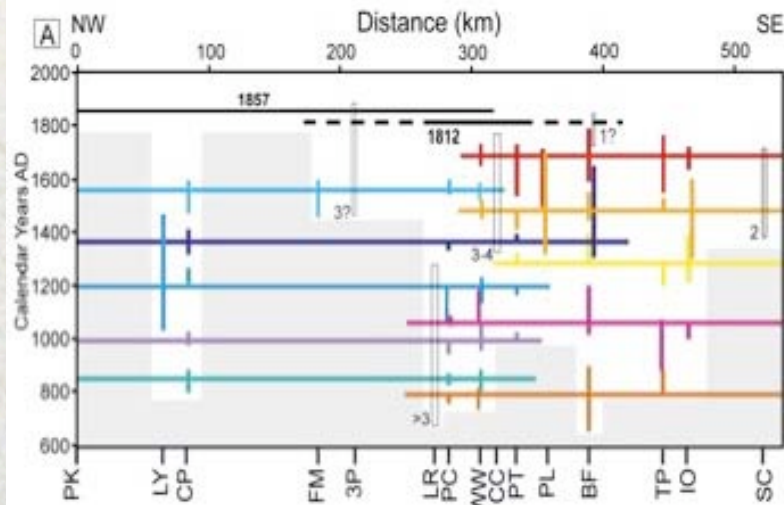
Fault characterization from point data



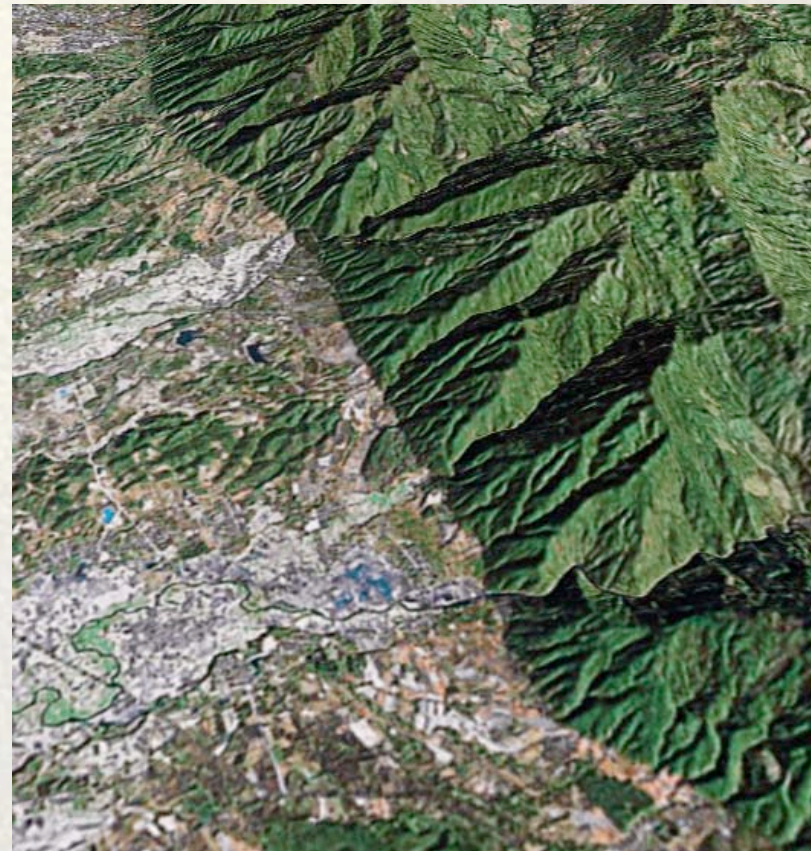
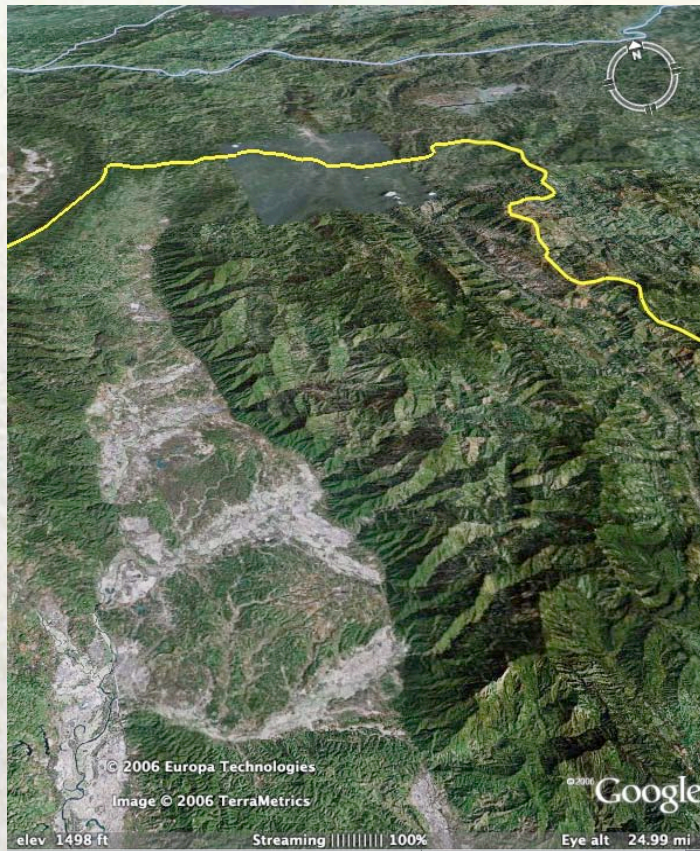
214 paleoseismic sites in California

Correlation of paleoearthquakes

From Weldon et al.:

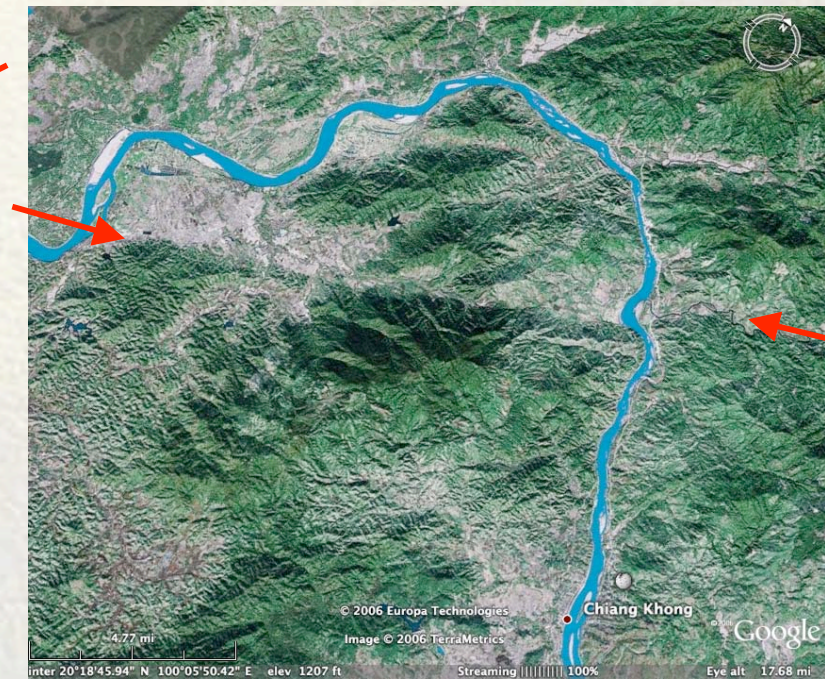
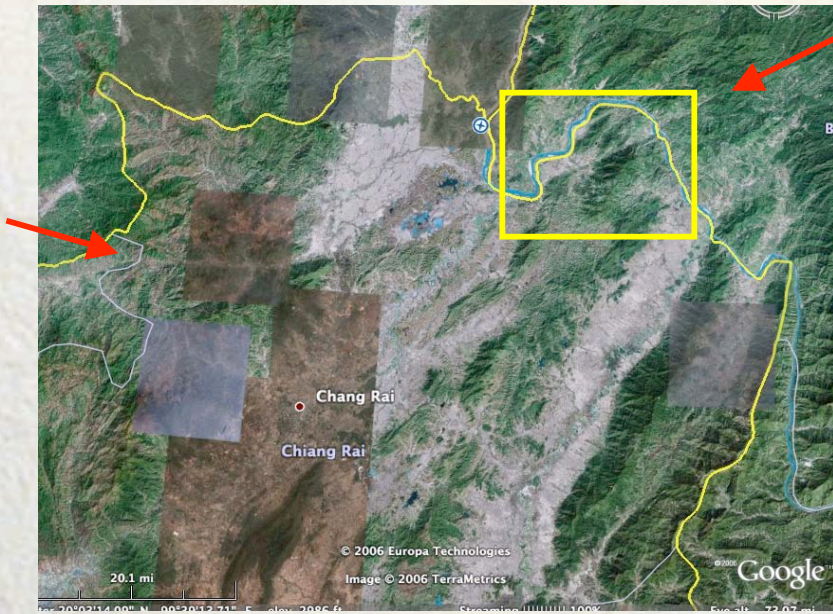


Active range front Pua fault



Images from Google Earth

Mae Chan



Images from Google Earth