

FIELD EXAMPLES OF FAULTS

I Main Topics

A Field examples of faults

B Field examples of faults that originated from joints and dikes

II Field examples of faults

A Recognition of faulting

1 Offset features (rock bodies & topographic features)

2 Juxtaposition of markedly different rock bodies

3 Fault gouge or breccia

4 Slickensides and slickenlines

B Recognition of recent or active faulting

1 Displaced features that are geologically young

a Fault scarps: vertically displaced ground surface resulting from dip-slip faulting (normal and reverse faults)

Beware of interpretation of *fault-line scarps*

b Offset topography (e.g., shutter ridges)

c Laterally offset streams (strike-slip faults)

d Offset cultural features

2 Fault topography

a Faceted spurs (normal faults)

b Sag ponds (strike-slip faults)

c Linear hillside benches (strike-slip faults)

3 Historic seismicity

4 Quaternary seismicity

5 Style of faulting (stick-slip vs. creep) can vary along faults

a Young" sedimentary rock \Rightarrow creepb Crystalline rock \Rightarrow stick slip.

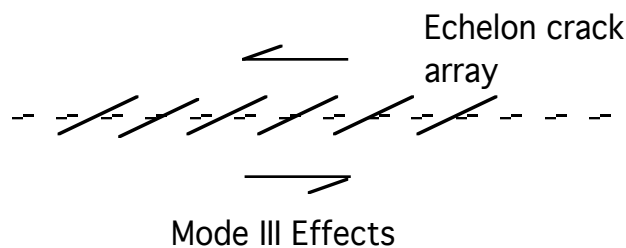
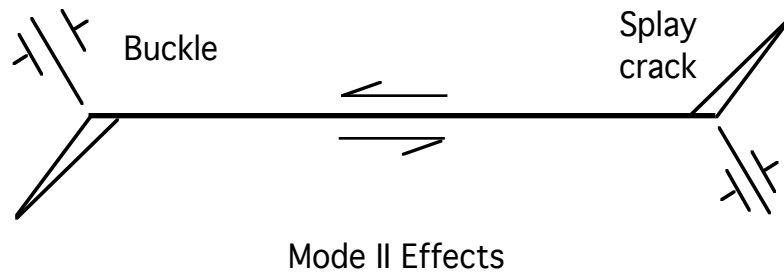
C Segmented structure of faults

1 Splay cracks or tail cracks (dilatant fractures) form at localized tensile stress concentrations.

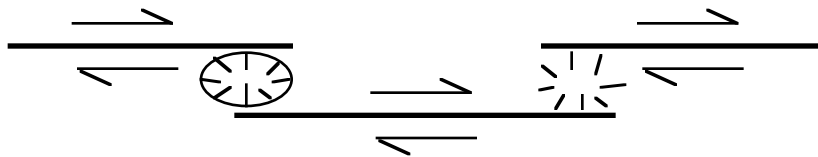
2 These cracks can link small faults together.

3 Several major geothermal fields occur at linkages between strike-slip faults.

- 4 Several major oil basins occur at dilatant steps along strike-slip faults ("mega-sag ponds")
- D Geomechanical effects of faulting
- 1 Splay cracks near ends of fault traces or ends of fault segment traces (mode II effect)
 - 2 Buckles (mode II effect)
 - 3 Echelon fractures (mode III effect)



- 4 The mean normal stress becomes more compressive at right steps between right-lateral faults (dilatant steps) and less compressive at right steps between left-lateral faults ("anti-dilatant steps") and vice-versa.



III Field examples of faults that originated from joints and dikes

References

- Segall, P. and Pollard, D.D., 1980, Mechanics of discontinuous faults: *Journal of Geophysical Research*, v. 85, p. 4337-4350.
- Brown, R. D., Jr., and Kockelman, W.J., 1983, *Geologic principles for prudent land use: a decisionmaker's guide for the San Francisco Bay region*: U.S. Geological Survey Professional Paper 946, 97 p.