

## SURFACE FAULTING (09)

## I Main Topics

A Recognition of surface rupture hazardB Characterization of surface rupture hazard

C Evaluation of surface rupture risk

D Assessment of surface rupture risk: is it tolerable?

## II Recognition of surface rupture hazard

A Nearly all documented surface ruptures have occurred near or along along pre-existing faults that have broken Quaternary deposits or have shown historic seismicity. Past is the key to the future.

B For many areas, the current tectonic regime is that of Quaternary time. The record of prior faulting may be inappropriate.

C Surface rupture is *generally* confined to a zone no more than a few hundred meters along the fault (20 m - 2 km range).D In California, surface faulting  $\Rightarrow$  moment magnitudes  $> 5.5-6$ .

E Most structures are not designed to accommodate rupture through their foundation. Exception: some earth-fill dams

F Geomorphic features along active faults

(See p. 29, 68, 85 of PP 1360)

## 1 Strike-slip faults

a Linear trace (linear valleys) narrow zone of deformation

b Fault scarp

c Sag ponds

d Deflected drainages

e Springs

f Shutter ridges

## 2 Dip slip faults

a Ragged arcuate trace, broad zone of deformation

b Fault scarp

c Springs

## III Characterization of surface rupture

A Distribution of active faults and trace geometry

1 What is "active"? Slemmons (1982) lists 30 definitions!

a CA: Evidence of Holocene offset ( $<10,000$  yrs)

b BuRec (dams): Slip in last 100,000 yrs

- c NRC: Multiple slip events in last 500,000 yrs
  - d PP 1360: evidence of late Quaternary activity (<750,000 yrs)
  - e Historical record and Holocene evidence of dormancy has not proven adequate to judge fault activity.
- 2 Evidence for activity
- a Historical surface faulting or creep
  - b Historical or contemporary seismicity
  - c Geodetic strain
  - d Geologic evidence (To be pursued later)
    - i Faulting or folding of Quaternary deposits
    - ii Geomorphic expression
- B Character of surface rupture: seismic rupture vs. aseismic creep
- C Likely sense and amount of rupture  
Characteristic earthquake model: local displacements repeat
- D Likely size and "timetable" of quakes
- E Slip rate
- F Fault geometry and segmentation
- IV Risk evaluation (to be discussed later; relies upon Quaternary record)
- V Risk assessment: It is generally not tolerable for new structures and critical facilities in California to be sited on faults considered active.

<http://www.trinet.org/hector/photos.html>

<http://www.scecdc.scec.org/lanplaya.html>