Summary Notes: Gerson et al., 1993
Indicators of Faulting Events and Periods of Quiescence in Desert Alluvial Fans

I. Introduction

A. Study Site
1. Dead Sea Rift
2. Alluvial Fans cut by faults at surface

B. Purpose
1. methods in examining faults in a geomorphic context
2. Identify stages of faulting

C. Geologic Setting
1. rift valley /tectonics (Dead Sea, extension of Red Sea)
2. Mean annual precipitation ~30 mm
3. Pleistocene fans on valley marin
   a. debris flow facies
   b. hyperconcentrated flow facies

II. Methods
A. Surficial Mapping (scale: 1:5000)
1. Fan Surface Identification
   a. elevation
   b. surficial characteristics
      (1) soils development
      (2) pavement development
2. Identification of Fault Scarps
   a. Fresh vs. Degraded

B. Fan / Fault Trenching
1. i.d soils, faulted stratigraphy, textural i.d. of sediments

III. Fault Event Identification Criteria
A. Topographic Expression of Faults
1. Features
   a. Fault Scarps
   b. Fault Saddles
2. Morphometric measurments
   a. scarp angles
   b. scarp height

Basic assumption: the scarp height and angle will decline through time due to diffusive mass wasting processes (cree
slope wash, etc.)

B. Soil Development Indices on Fault Scarps

1. Assumption: Soil Properties Change with Time

a. With increasing time, arid soils and sediments:

(1) >desert varnish
(2) > calcium carbonate content
(3) > silt content (aerosolic influx)
(4) < is salt content
(5) > soil horizonation

C. Displacement of Alluvial Fan Stratigraphy

D. Buried Paleosols and Colluvial Sequences along fault scarps
1. Scarps become unstable, associated with slope processes

E. Clast Orientation / Slickensides

IV. Interpretations: Phases of Fault Activity

A. Basic Principles
1. Offset Stratigraphy
a. Cross-cutting relations
b. Over-lapping relations
2. Necessary: method of dating sediment record

B. Fault Activity
1. marked by breaks in stratigraphic / sedimentologic record
a. poorly developed soils indices indicate activite

C. Fault Stability
1. marked by soil development
2. > soil weathering indices imply stability

Moral of Story: the key to documenting ancient fault activity requires:

dateable deposits OR
dateabel geomorphic surfaces