

Cairo University
Faculty of Engineering
Public Works Department
Soil Mechanics and Foundations Research Laboratory

Engineering Geology

Lecturer:

Dr. Sherif Akl



Acknowledgement

- Herbert Einstein
- Richard Bateman
- Mark Zoback
- Kshitija Nadgouda
- Earth and Science Teachers Association
- Attaullah Shah
- Pedram Rostami
- Frederick Ennin
- An introduction to Geophysical Methods
- www.geoengineer.org
- Erik Eberhardt
- Western Carolina University



Geologic Maps and Cross-sections

Lecture 5



Outline

- Geologic Maps
- Geologic Cross-sections
- Geologic Events



Geologic Maps

- Needed for complex projects even more when ground conditions are unusual.
- Assess feasibility and locations of further investigation.
- Start with description of surface geology.
 - Aerial Photos
 - Topographic Maps
 - Surface geology Maps



Aerial/ Satellite Photos

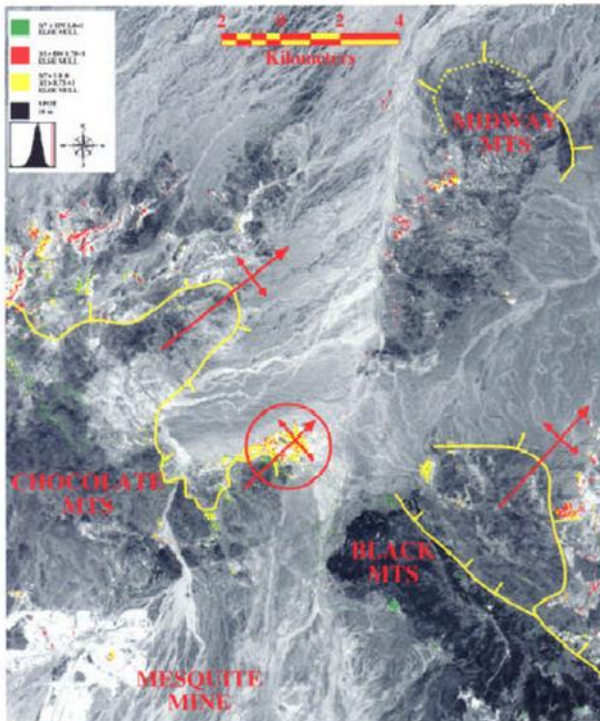
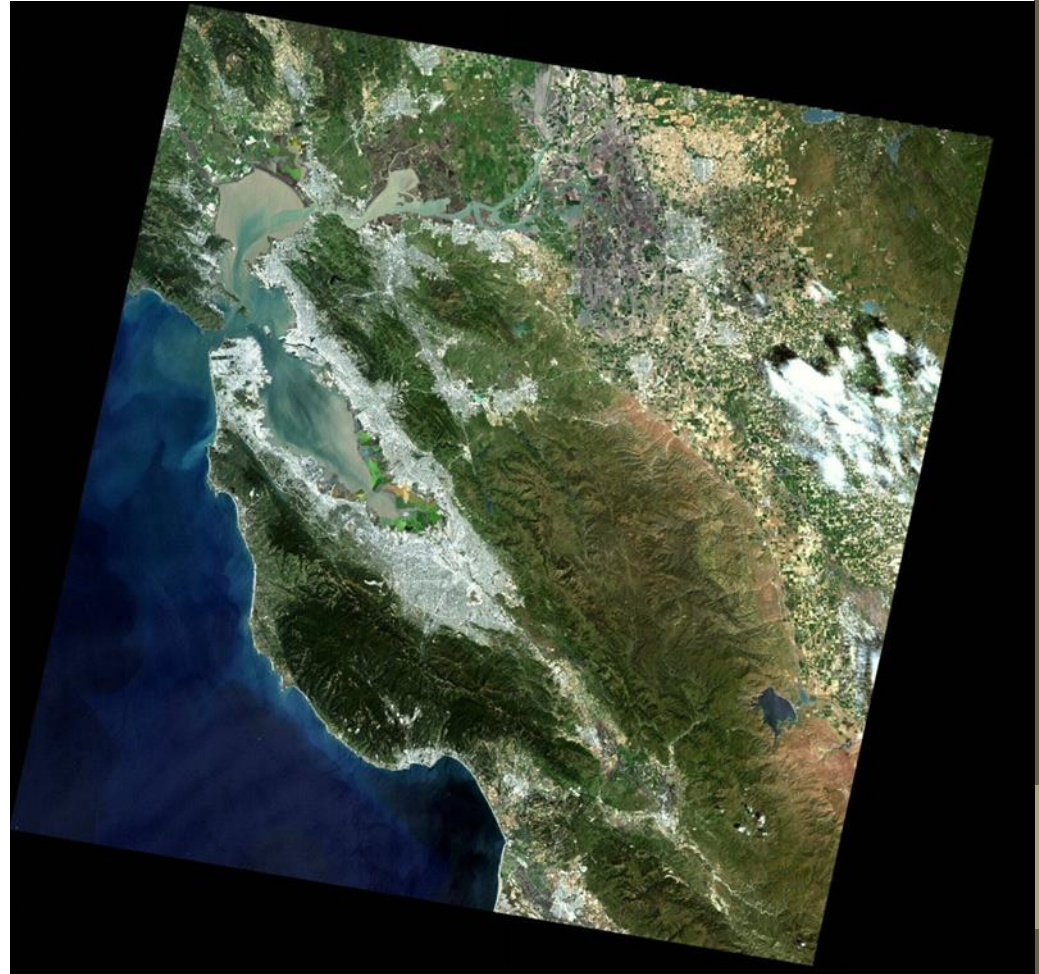
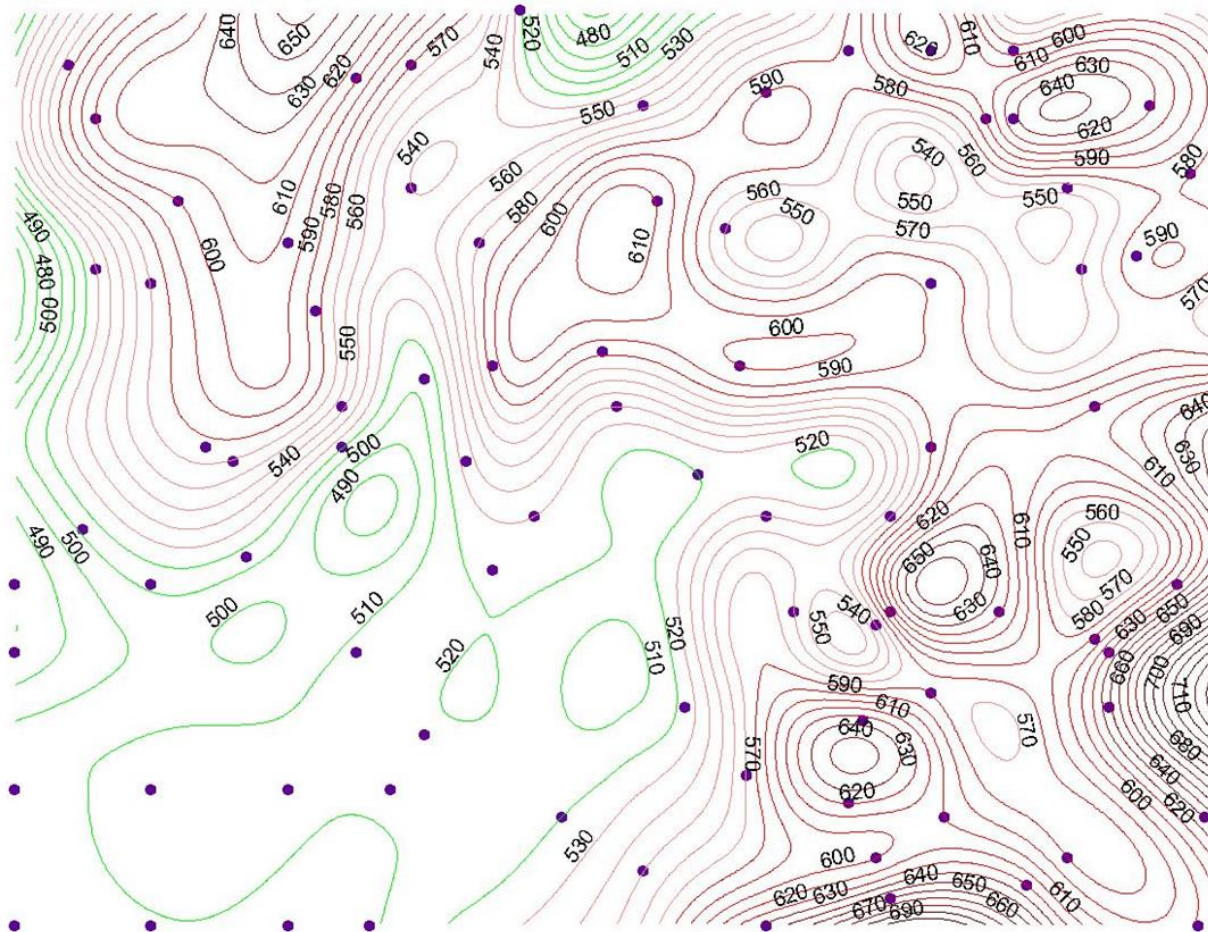


Figure 7. A SPOT-Landsat TM ratio threshold merge of the area around the southern Chocolate Mountains illustrating extensional antiforms and areas of potential hydrothermal alteration highlighted in yellow.

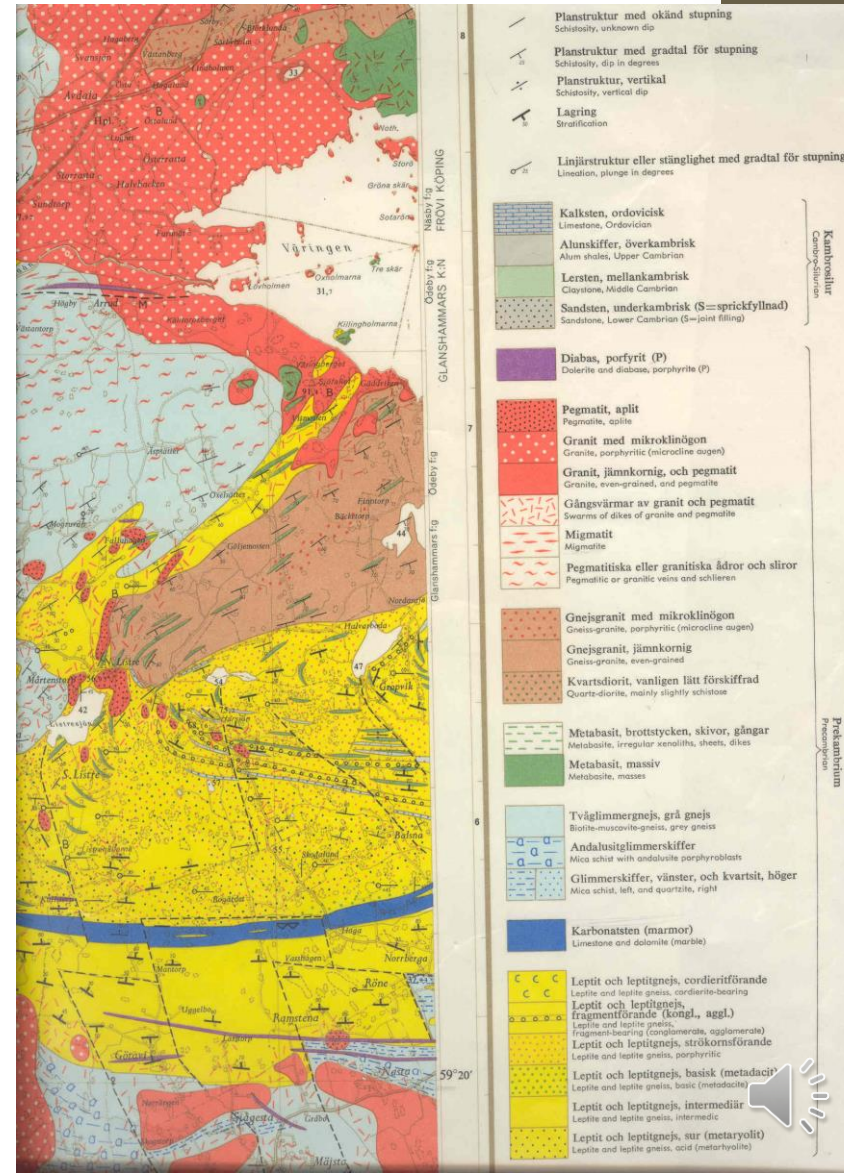


Topographic Maps



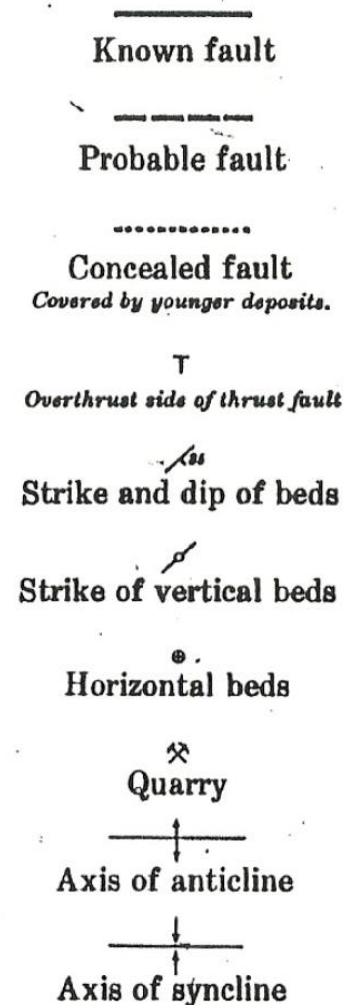
Surface Geologic Maps

- Rock structures are determined on the ground by geologists observing rock outcrops
- Outcrops are places where bedrock is exposed at the surface



Surface Geologic Maps

- Geologic maps use standardized symbols and patterns to represent rock types and geologic structures, such as tilted beds, joints, faults and folds



Mapping and Recording Techniques

- Direct Techniques
 - Bed Rock Exposures
 - Trenches
 - Exploration Shafts and Tunnels
 - Boreholes (Taking Core Samples and scanning images)
- Indirect Techniques
 - Water pressure tests (permeability – piezometers)
 - Geophysical Methods (Magnetic, Seismic)
 - Observing Joints and Faults

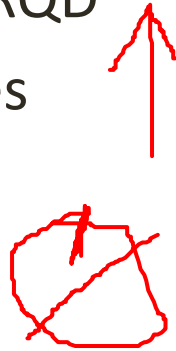


Trenches

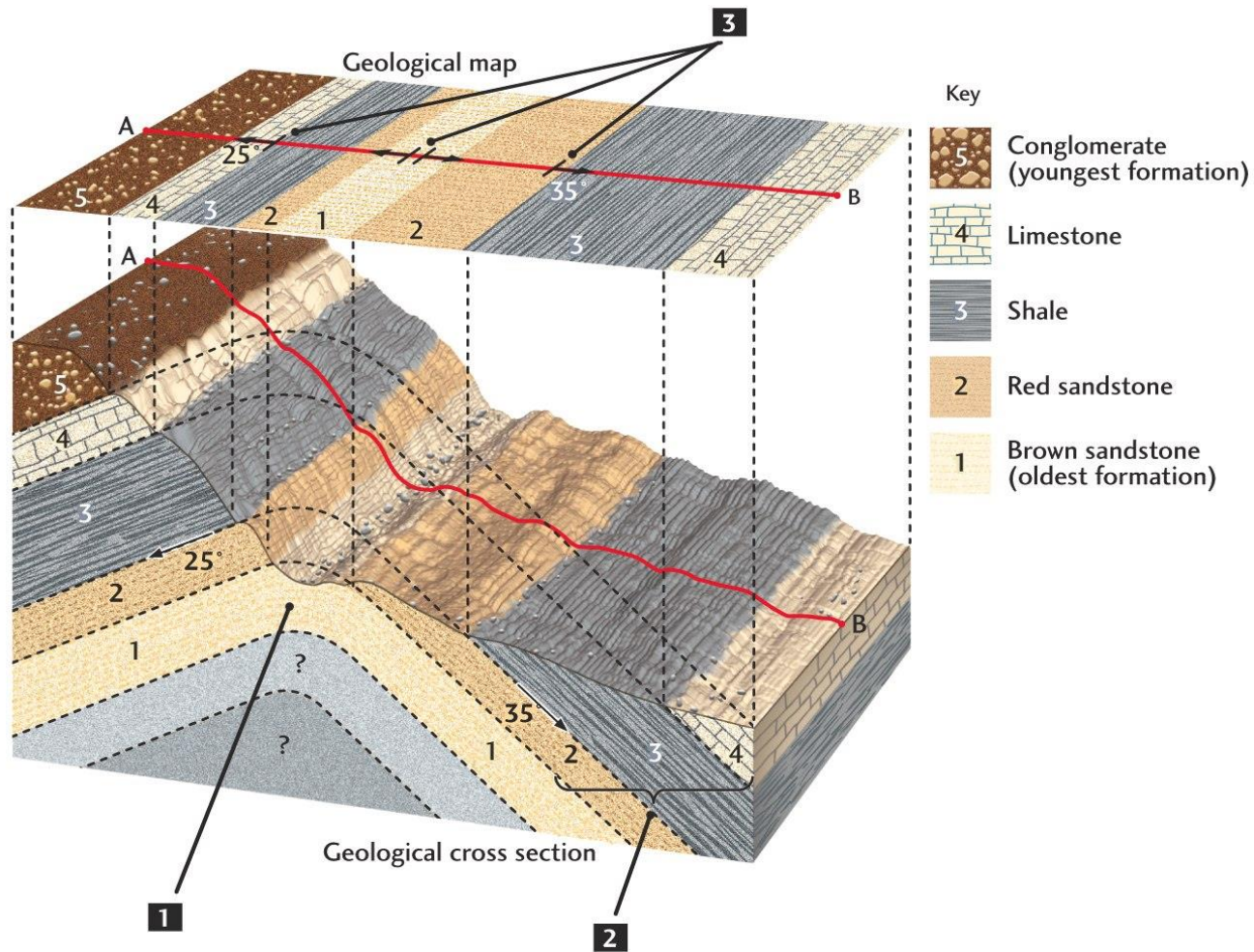


logging the cores

- core recovery
- rock quality, RQD
- oriented cores
- index test

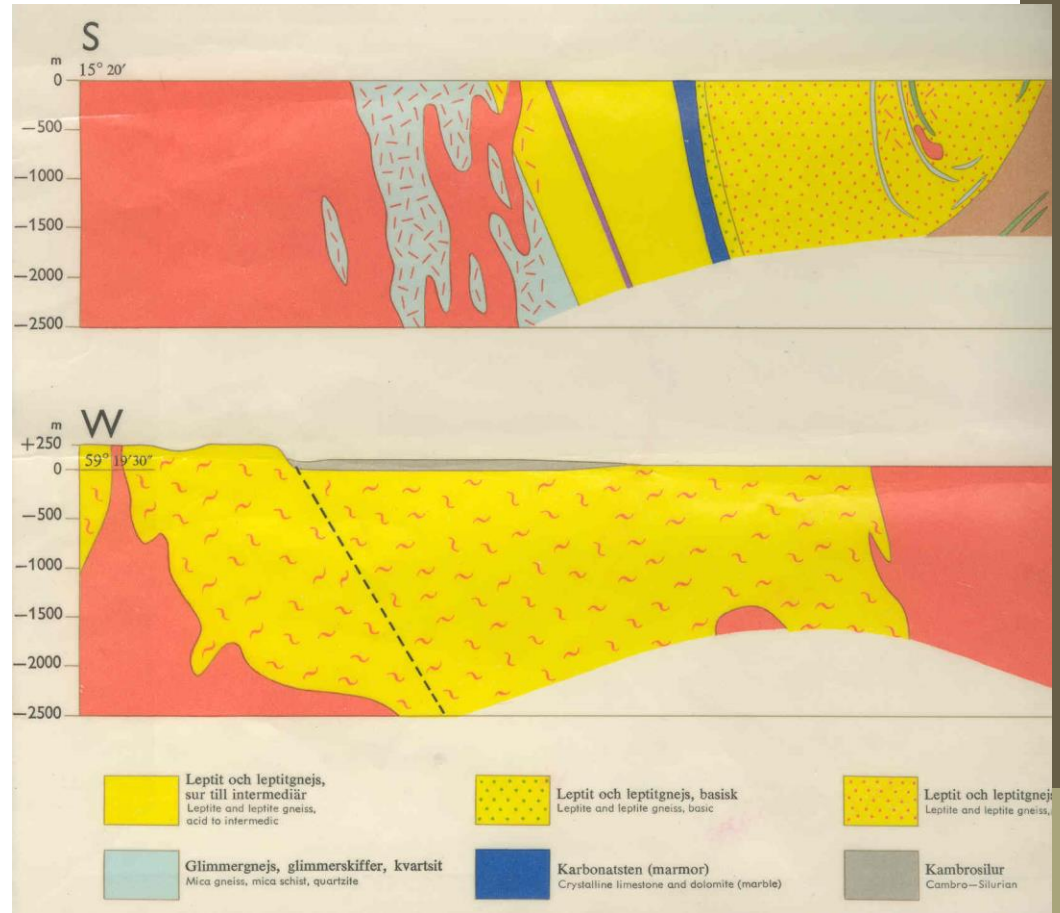


Estimate Cross-Section



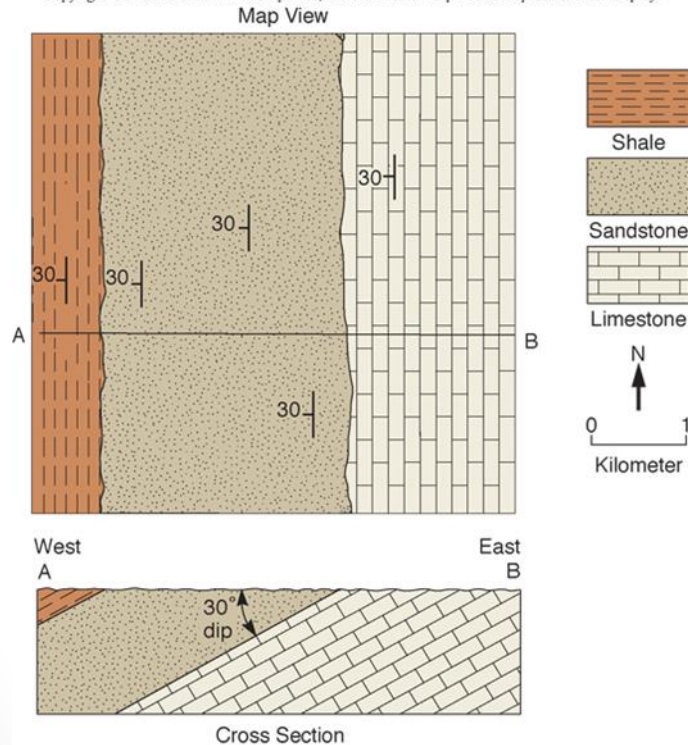
Geologic Cross-Sections

- stratigraphic relationship
 - oldest at bottom
 - youngest at top
- predicted subsurface continuation of the rocks and soils

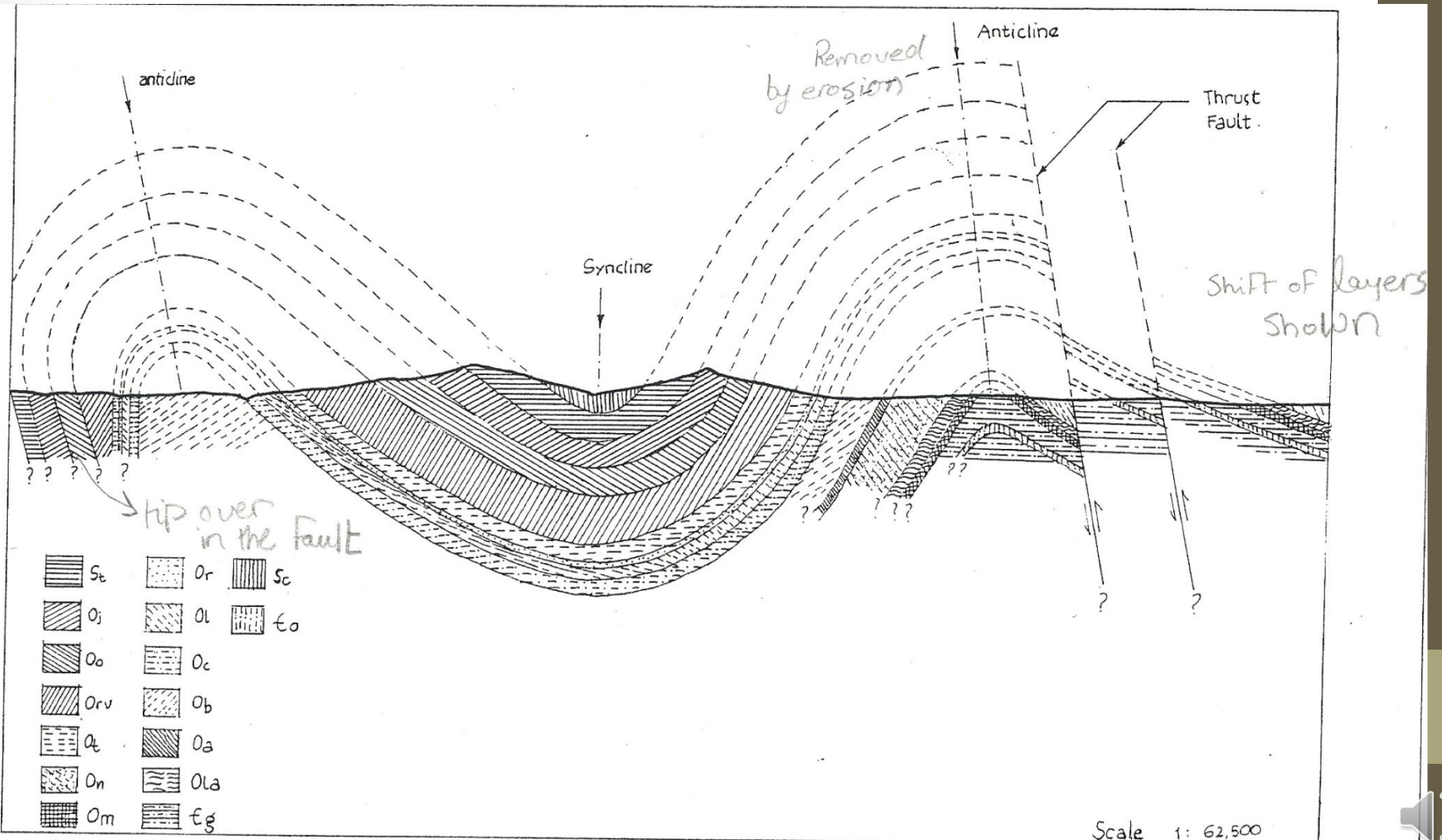


Stratigraphic Relation

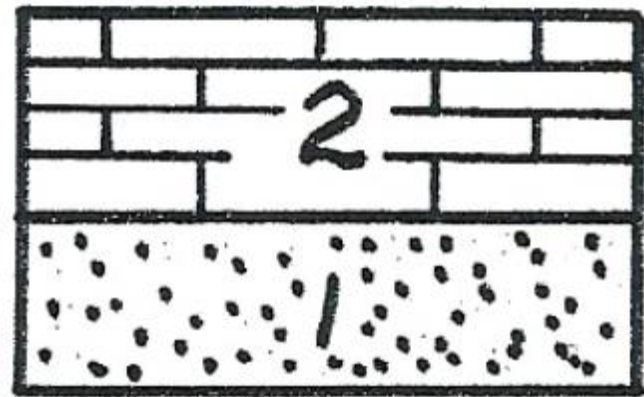
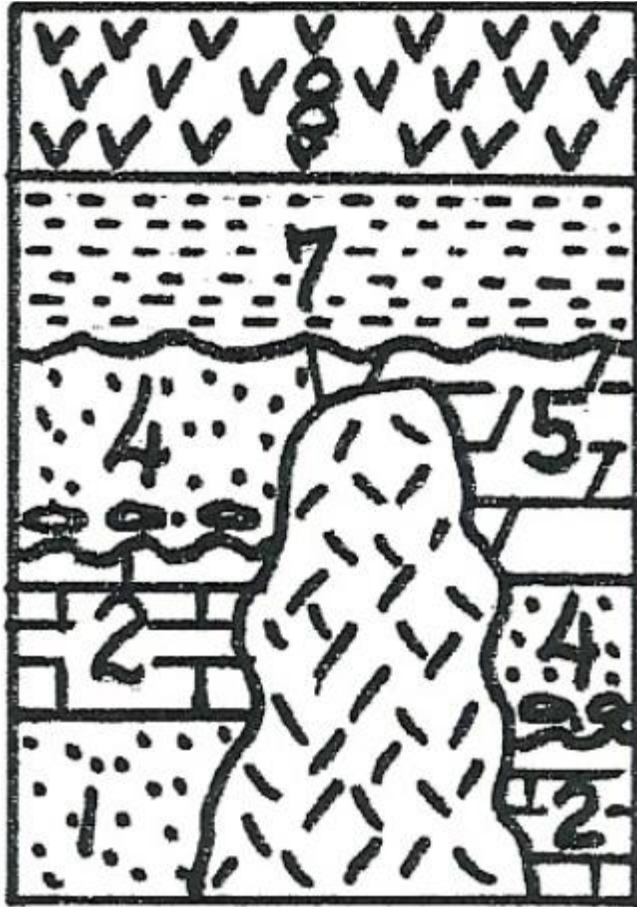
Copyright © The McGraw-Hill Companies, Inc. Permission required for reproduction or display.



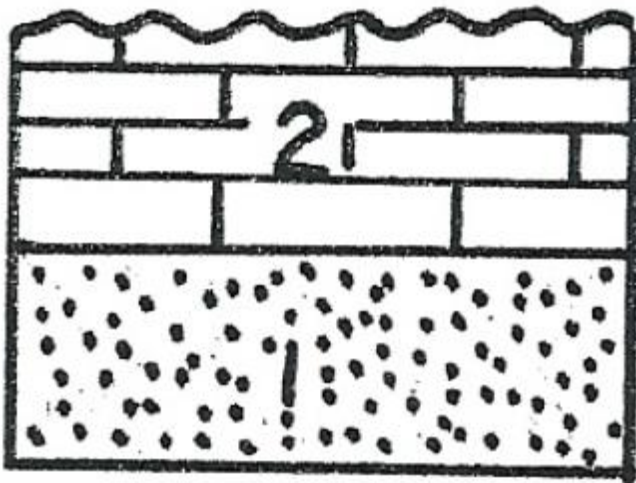
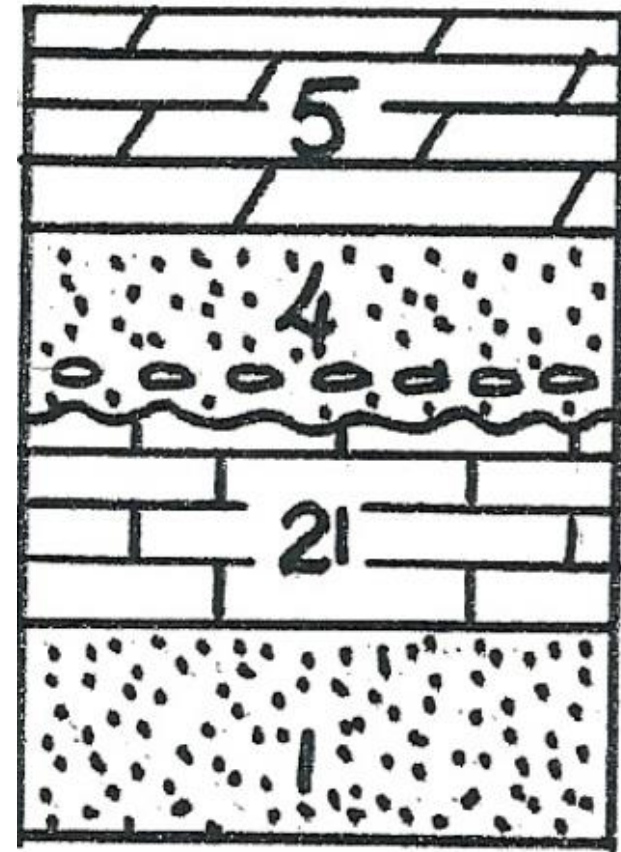
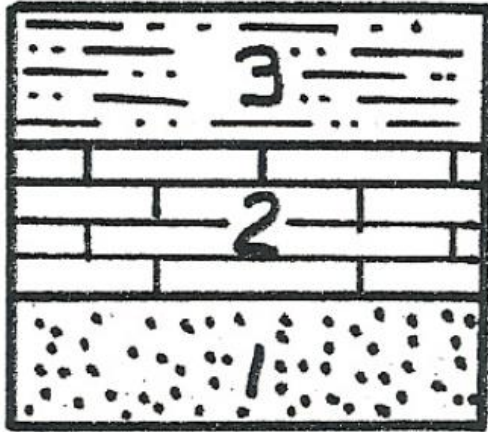
Estimate Continuation



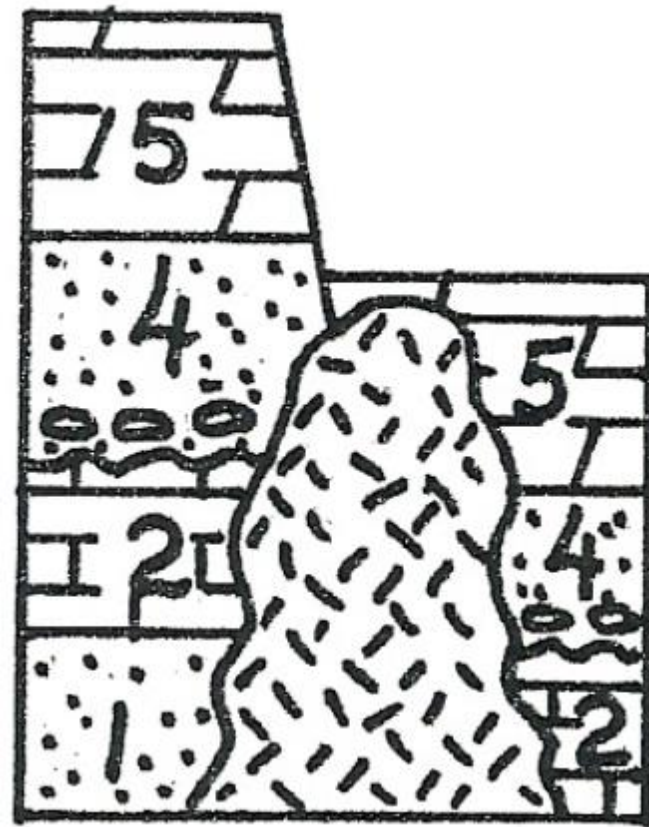
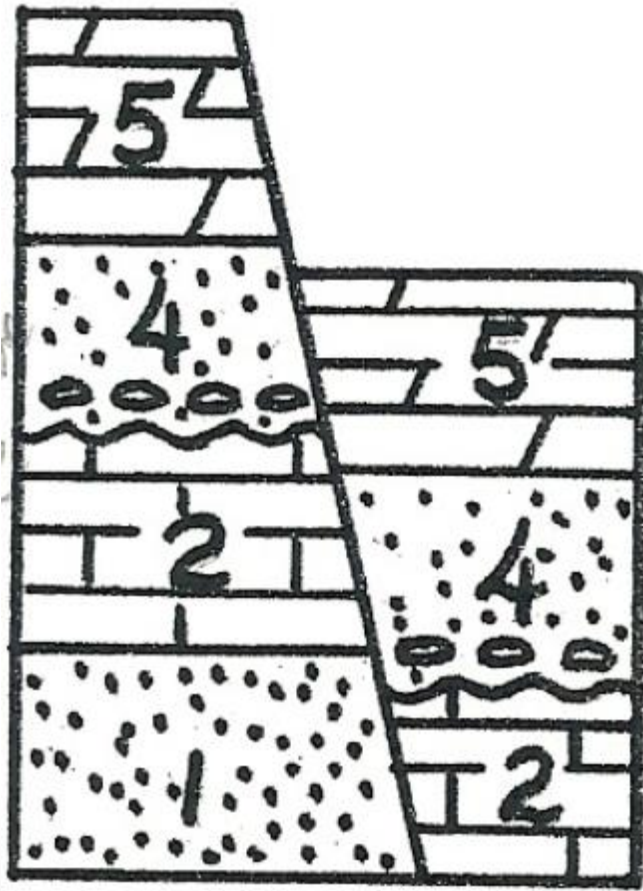
Infer Geologic Events



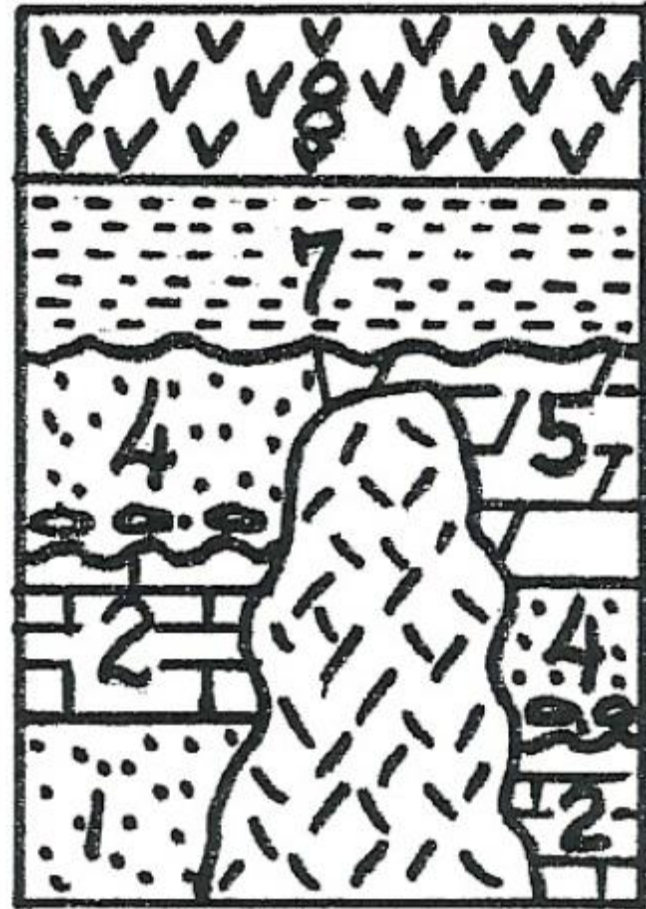
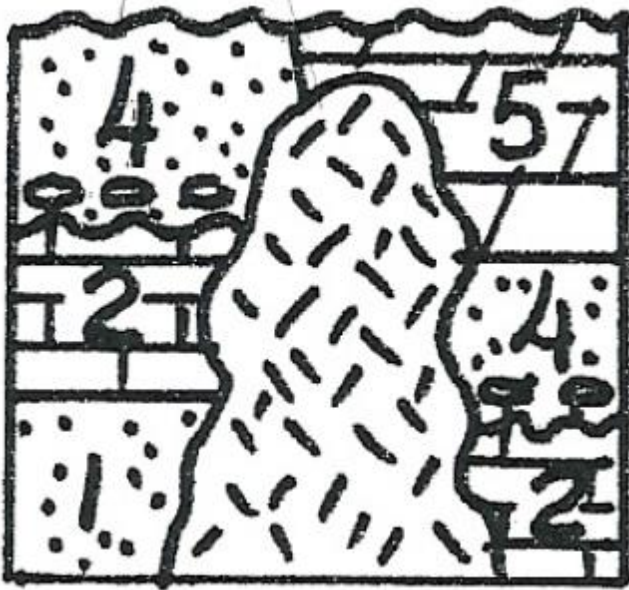
Infer Geologic Events



Infer Geologic Events



Infer Geologic Events



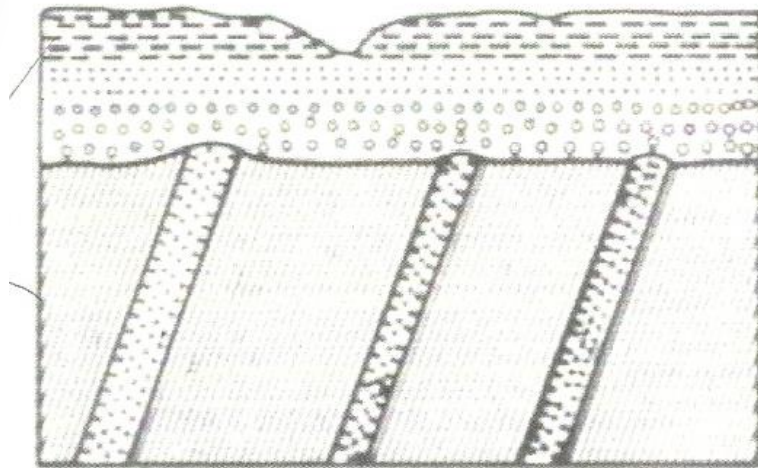
Unconformities





- Unconformity - surface that represents a gap in the geologic record
 - Disconformity - contact representing missing parallel beds of sedimentary beds
 - Angular unconformity - younger strata overlie an erosion surface on tilted or folded layers
 - Nonconformity - erosion surface on igneous or metamorphic rock



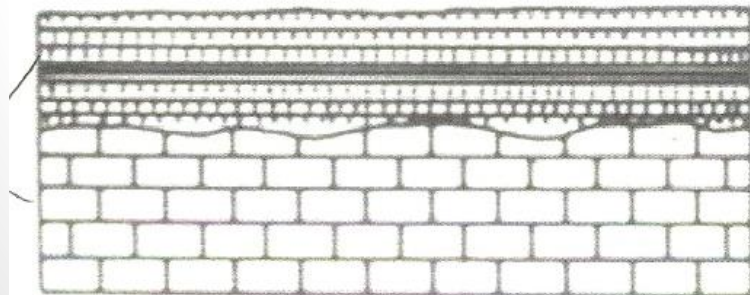
Types of Unconformities

Angular Unconformity

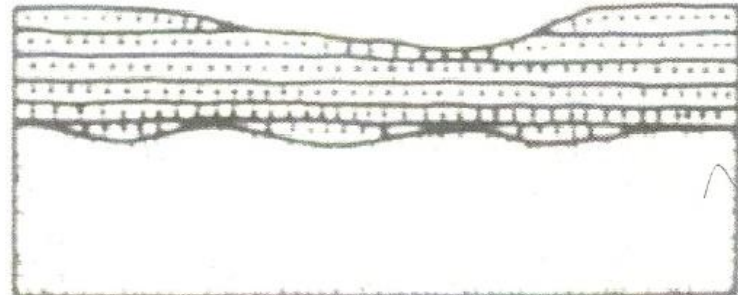


-  Sandstone
-  Shale
-  Limestone
-  Granite

Disconformity



Non-Conformity

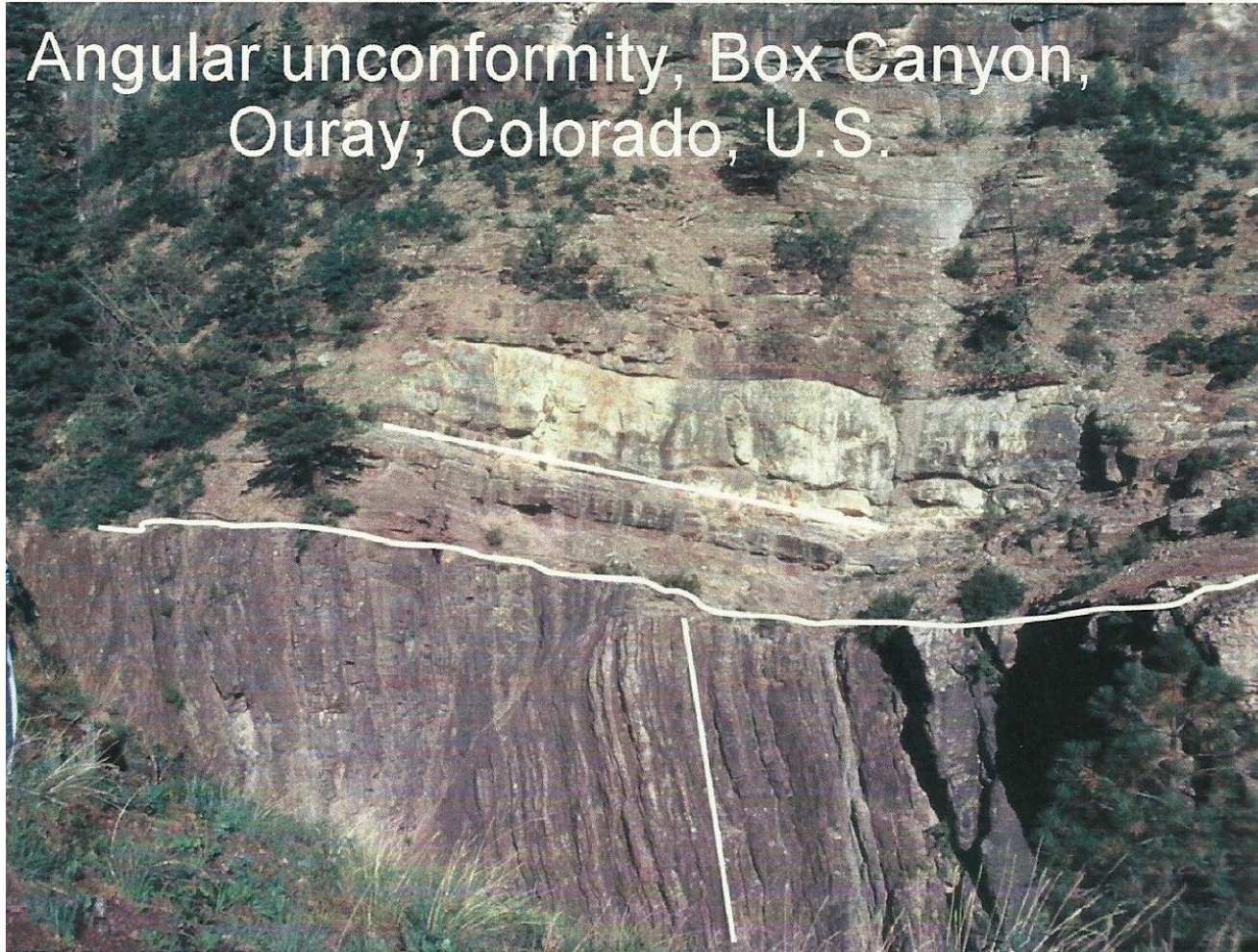


Angular Conformity

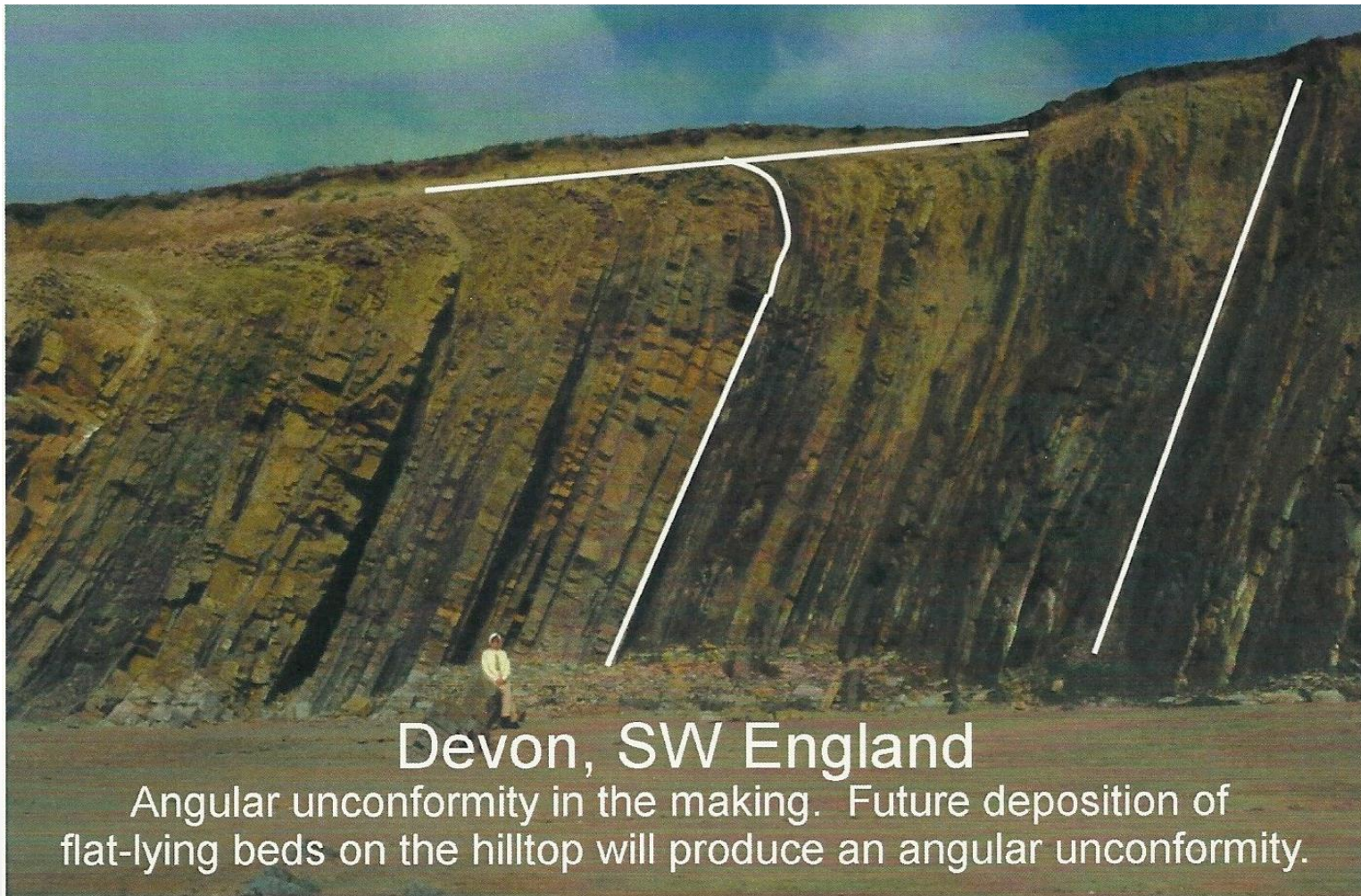


Angular Conformity

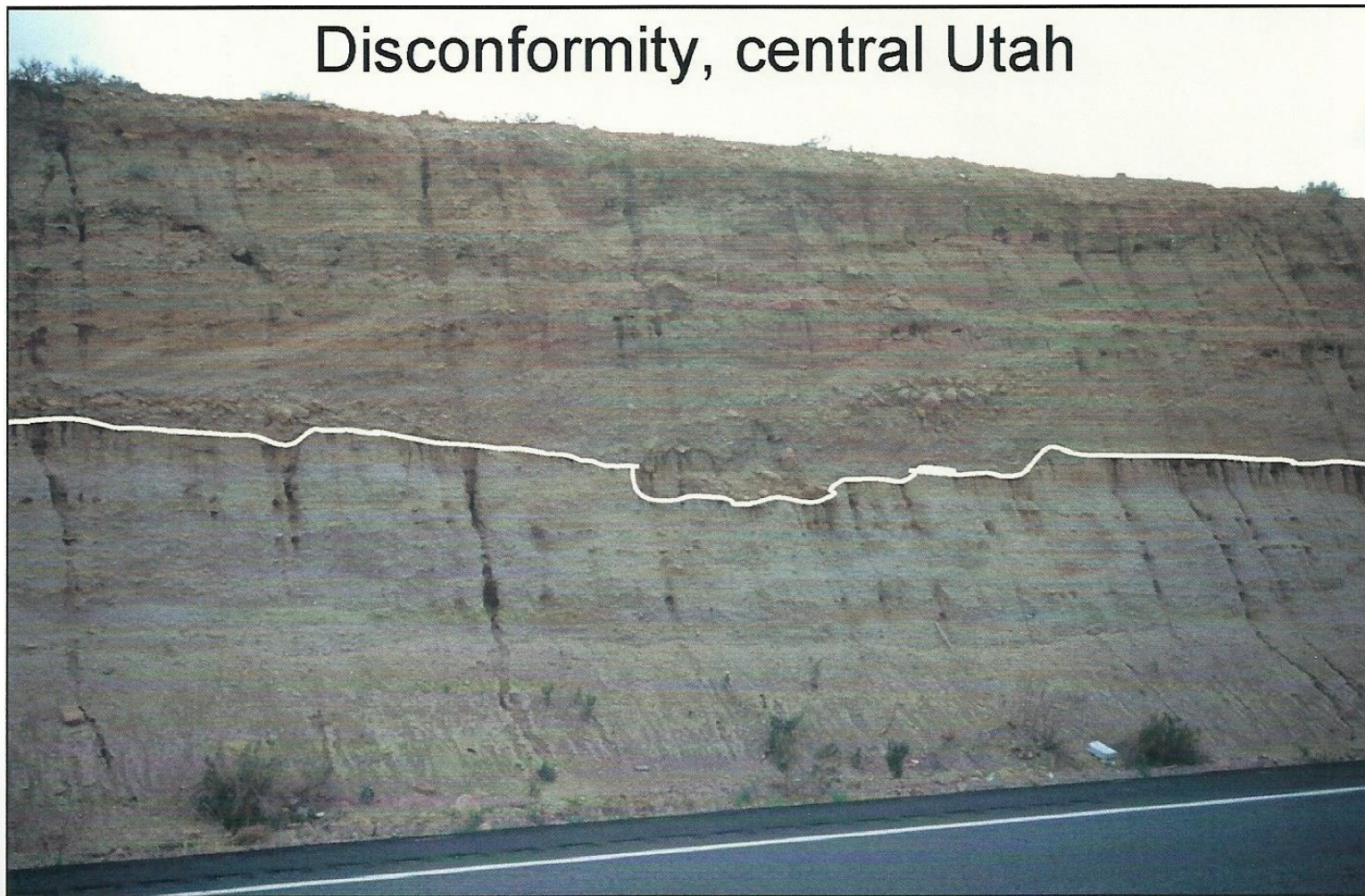
Angular unconformity, Box Canyon,
Ouray, Colorado, U.S.



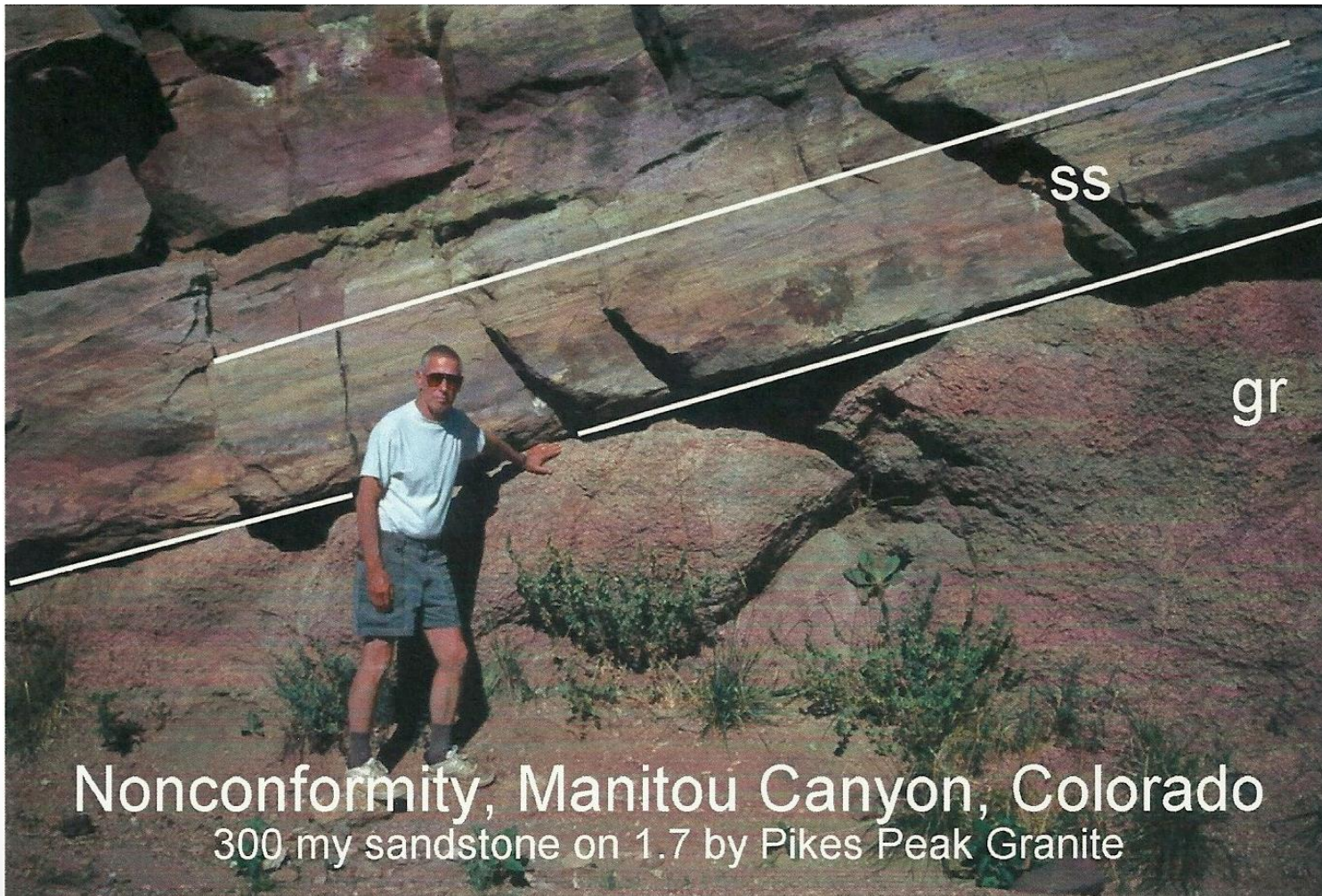
Angular Conformity



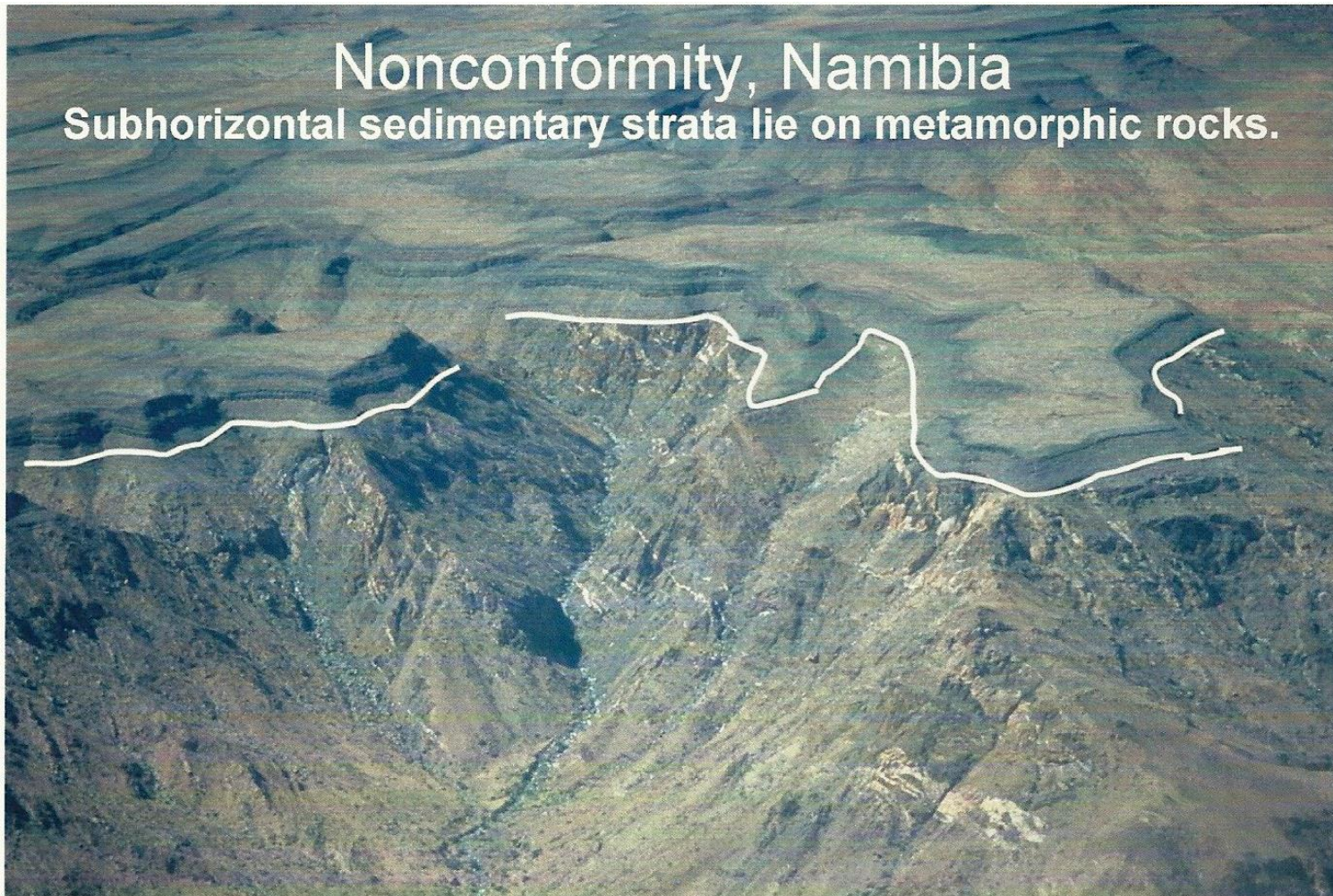
Disconformity



Nonconformity



Nonconformity



THANK YOU

