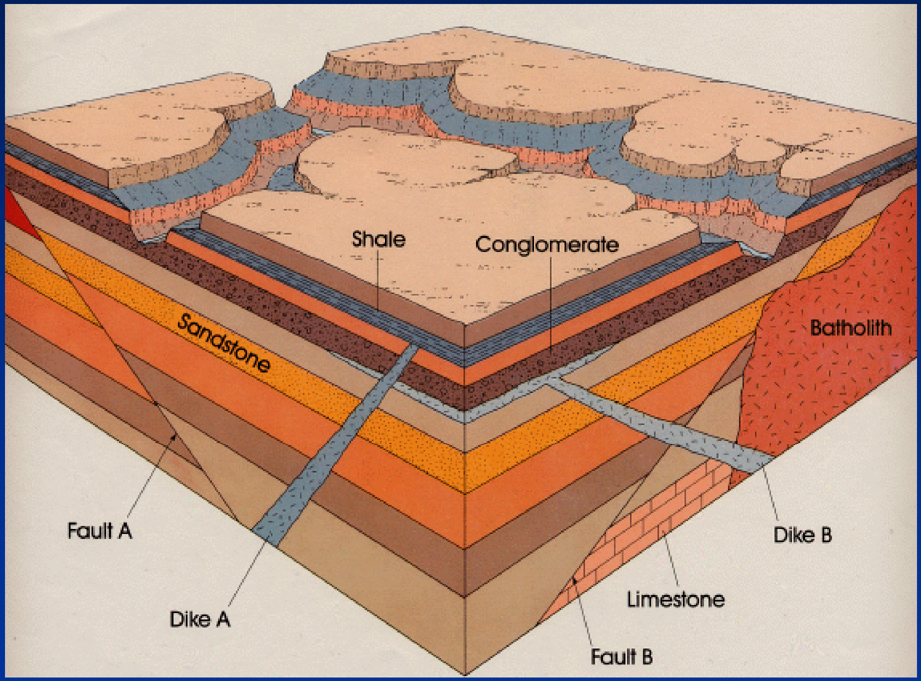
Geology Maps Lab



- EOSC105 Laboratory

Ray Rector: Instructor

Some General Geologic Terms of Structure

Outcrop: Exposure of bedrock at earths surface

Formation: mappable body of rock with definite age, lithology, and external boundaries (contacts)

Contact: Boundary between adjacent rock bodies or structural elements

Some General Geologic Terms of Structure

Fold: Layered rock units that are bent

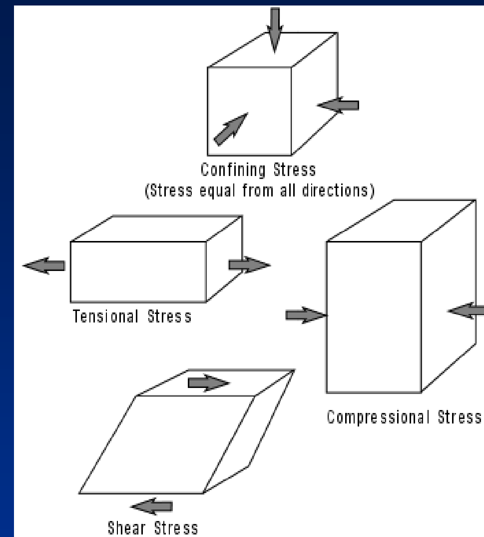
Fault: A planer disruption between adjacent blockd of rock with

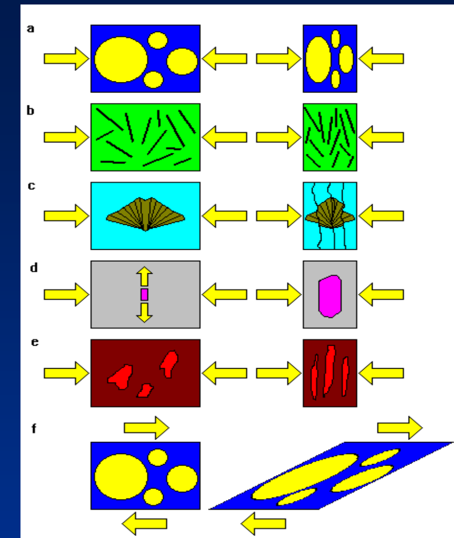
Contact: Boundary between adjacent rock bodies or structural elements

Origin and Nature of Rock Deformation

A. Stress Leads to Strain

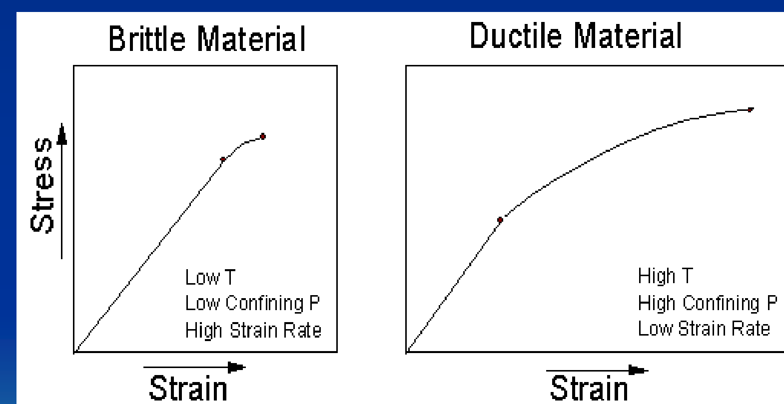
- ✓ Stress is an applied force over an area
- ✓ Strain is the deformation of a solid body





B. Different Types of Stress

- ✓ Tensional = pulling apart forces
- ✓ Compressional = pushing together forces
- ✓ Shear = grinding past each other force



C. Different Types of Strain

- ✓ Brittle = breaking into pieces
- ✓ Ductile = changing shape without breaking
- ✓ Elastic = deformed body returns to normal shape after stress released
- ✓ Plastic = deformed body remains deformed after stress released

Rocks strain in a predictable fashion, according to the amount and duration of strain under a given set of temperature-pressure conditions

Resultant Rock Strain from Specific Stresses

A. Undeformed Strata

- ✓ Original Horizontal layering

B. Compressional Stresses

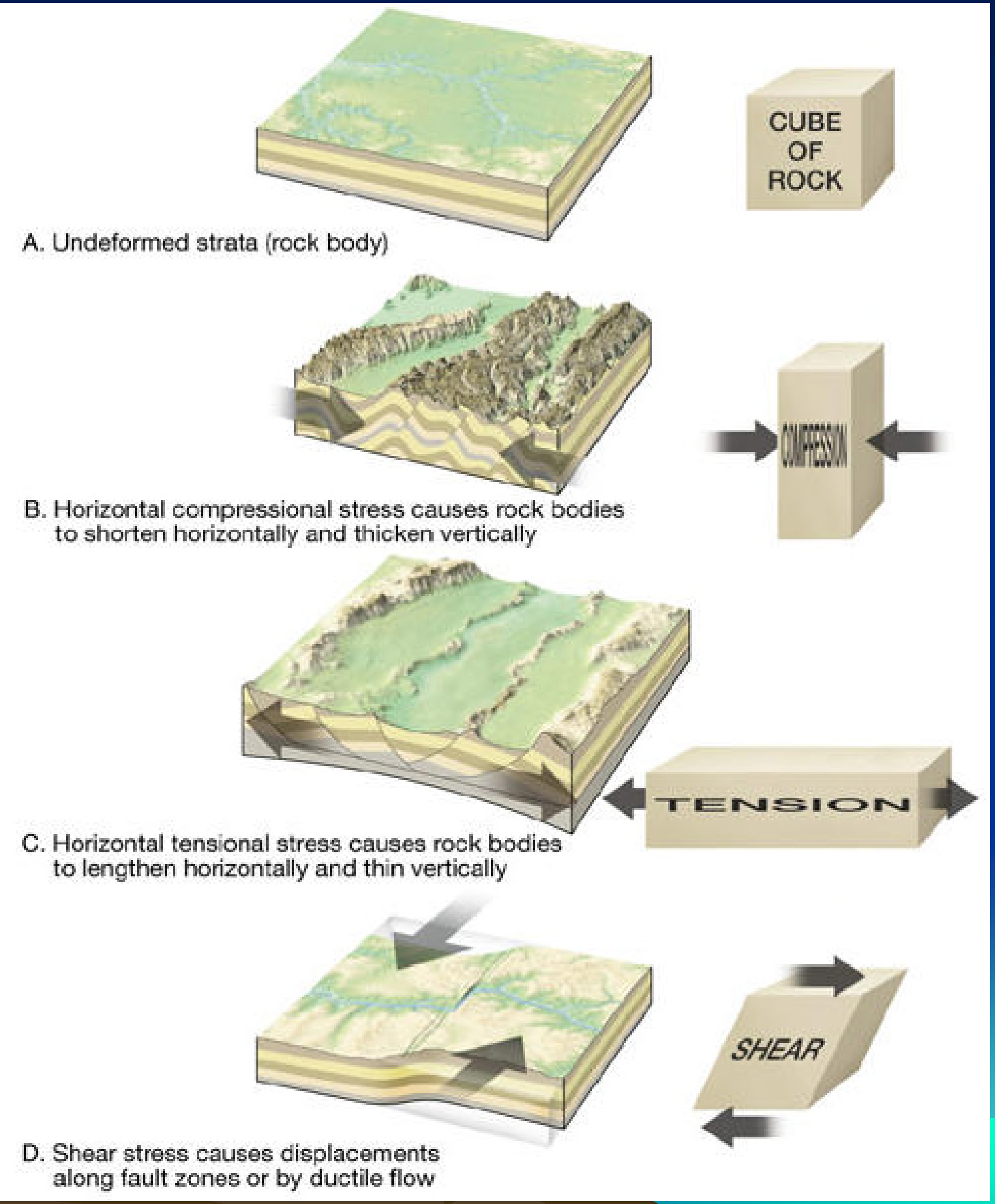
- ✓ Shorten horizontally
- ✓ Thicken vertically
- ✓ Folding and Reverse Faulting

C. Tensional Stresses

- ✓ Lengthen horizontally
- ✓ Thin vertically
- ✓ Tilting and Normal Faulting

D. Shear Stresses

- ✓ Lateral displacement
- ✓ Strike-slip Faulting



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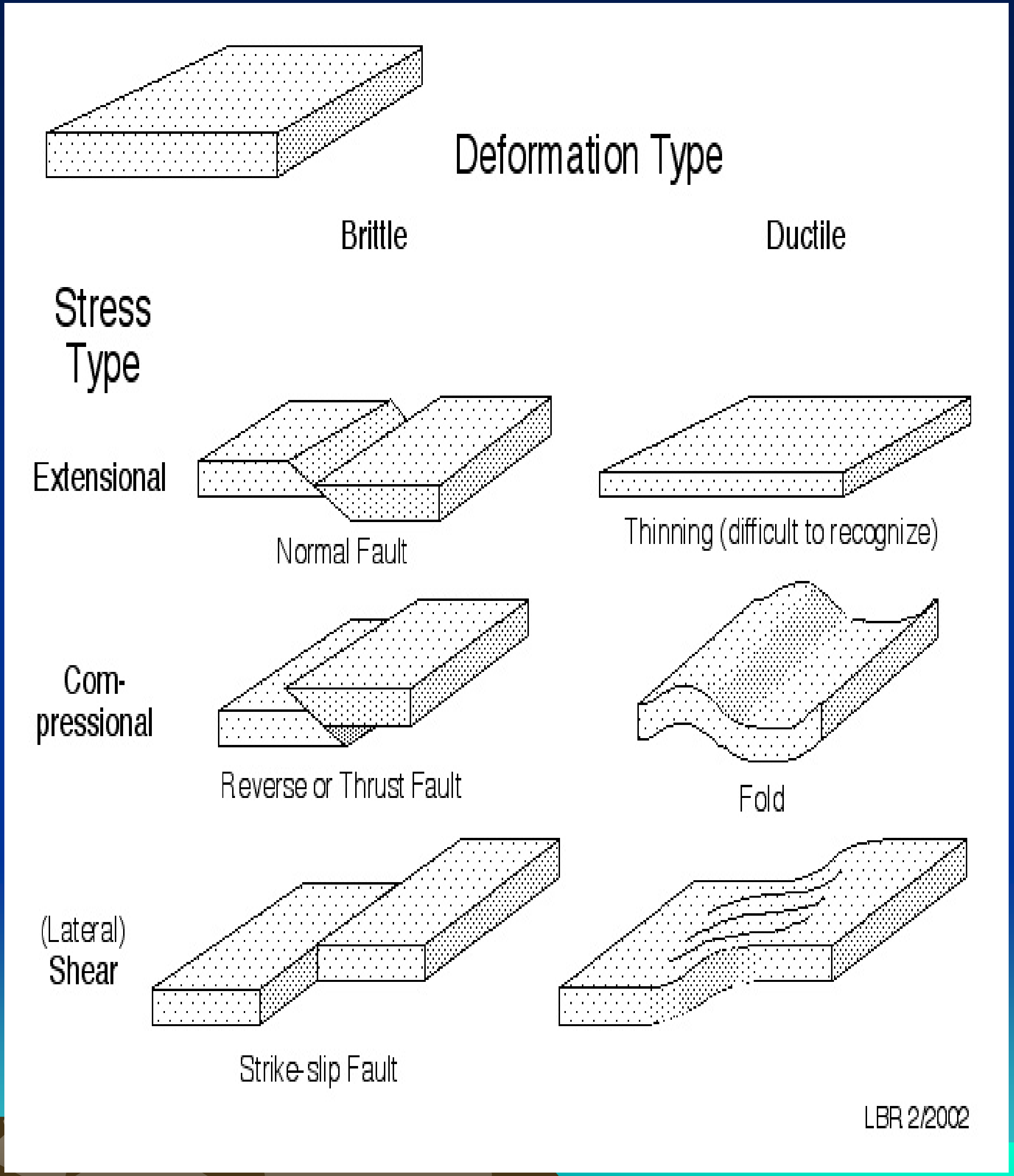


Geologic Structures

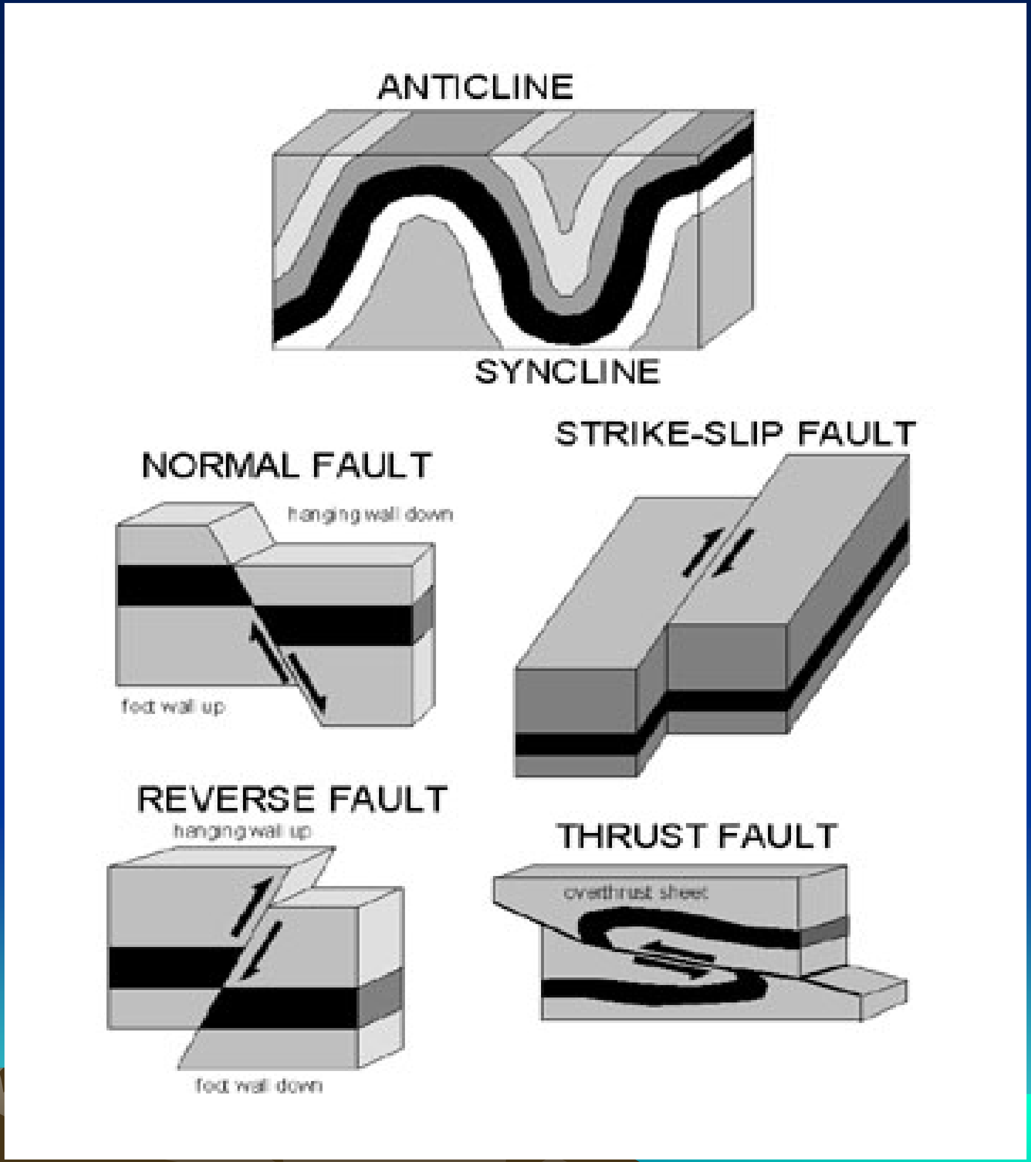
Rock Layering

Tilted Rock Layers

Folded Rock Layers

Faulted Rock Layers

Folds and Faults



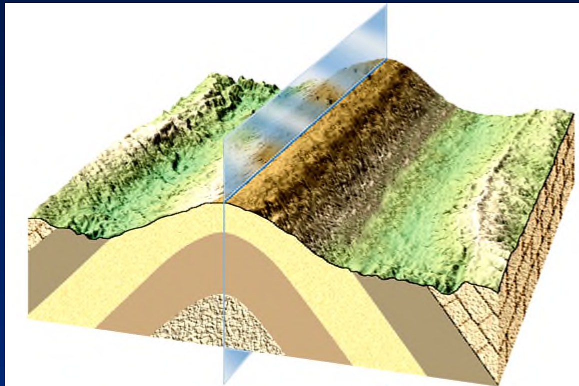
General Geologic Terms of Folds

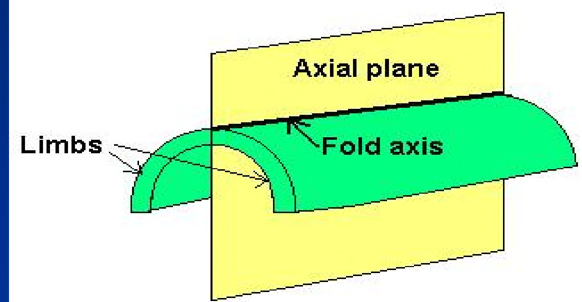
Folds: Buckled layers of rock formed by compressive stresses

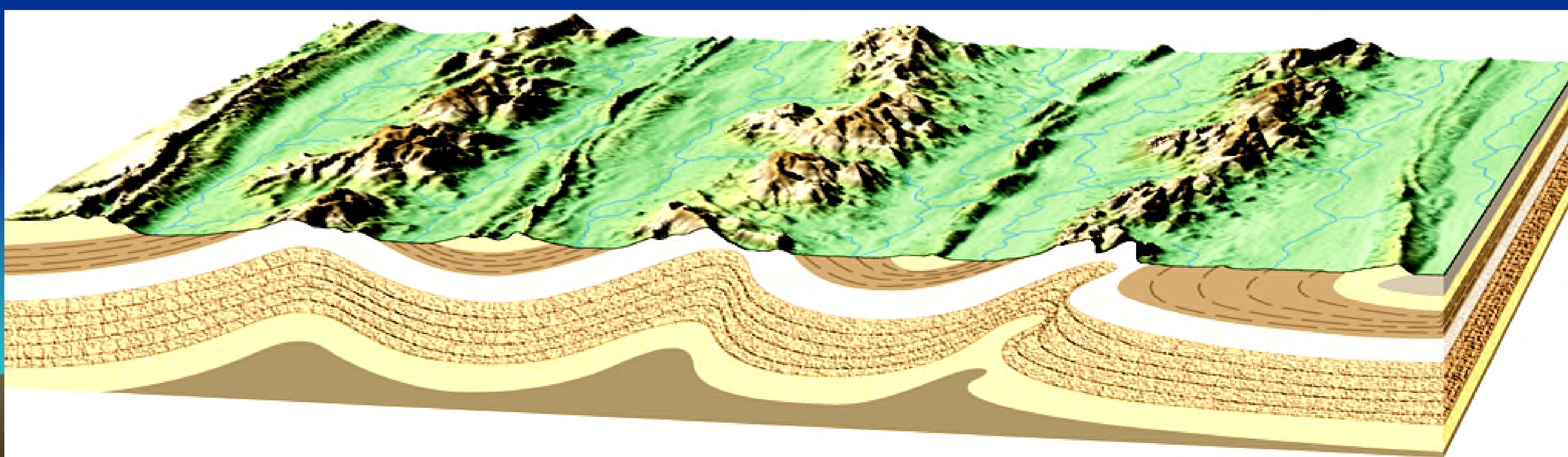
Anticline: Upwards-buckled fold with oldest rock at center and outward-dipping limbs

Syncline: Downwards-buckled fold with oldest rock at center and outward-dipping limbs

Fold Basics







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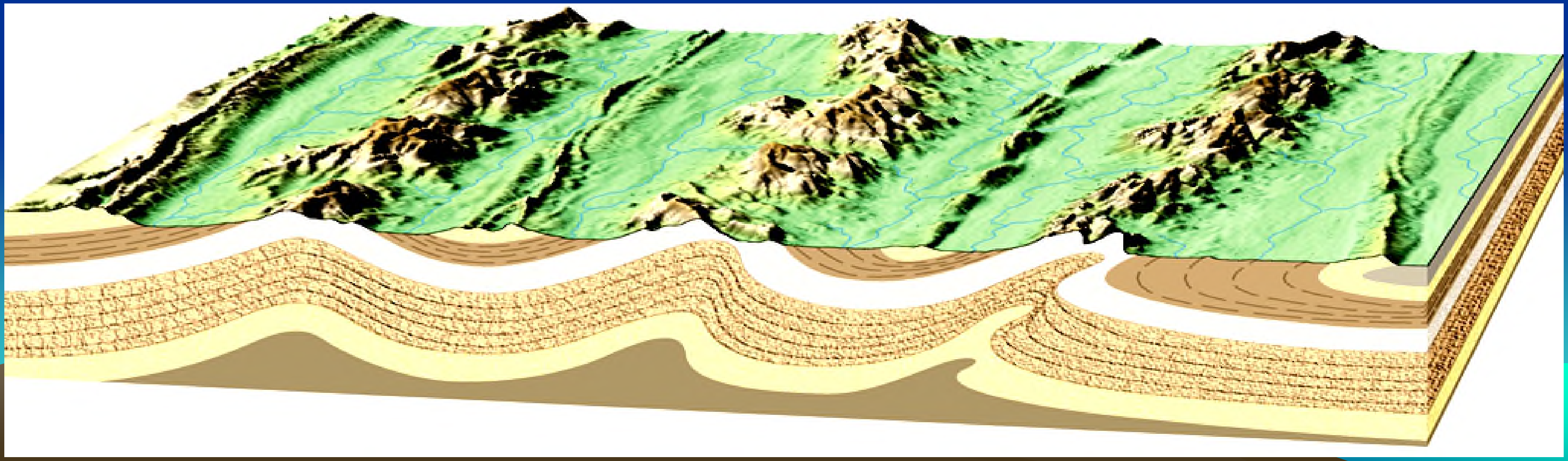
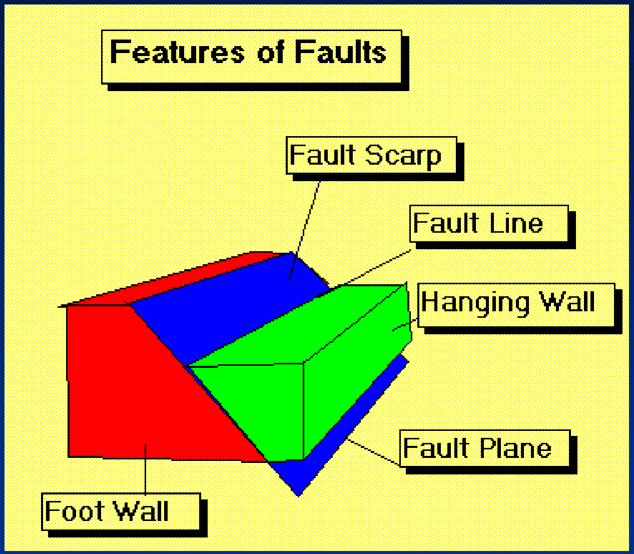
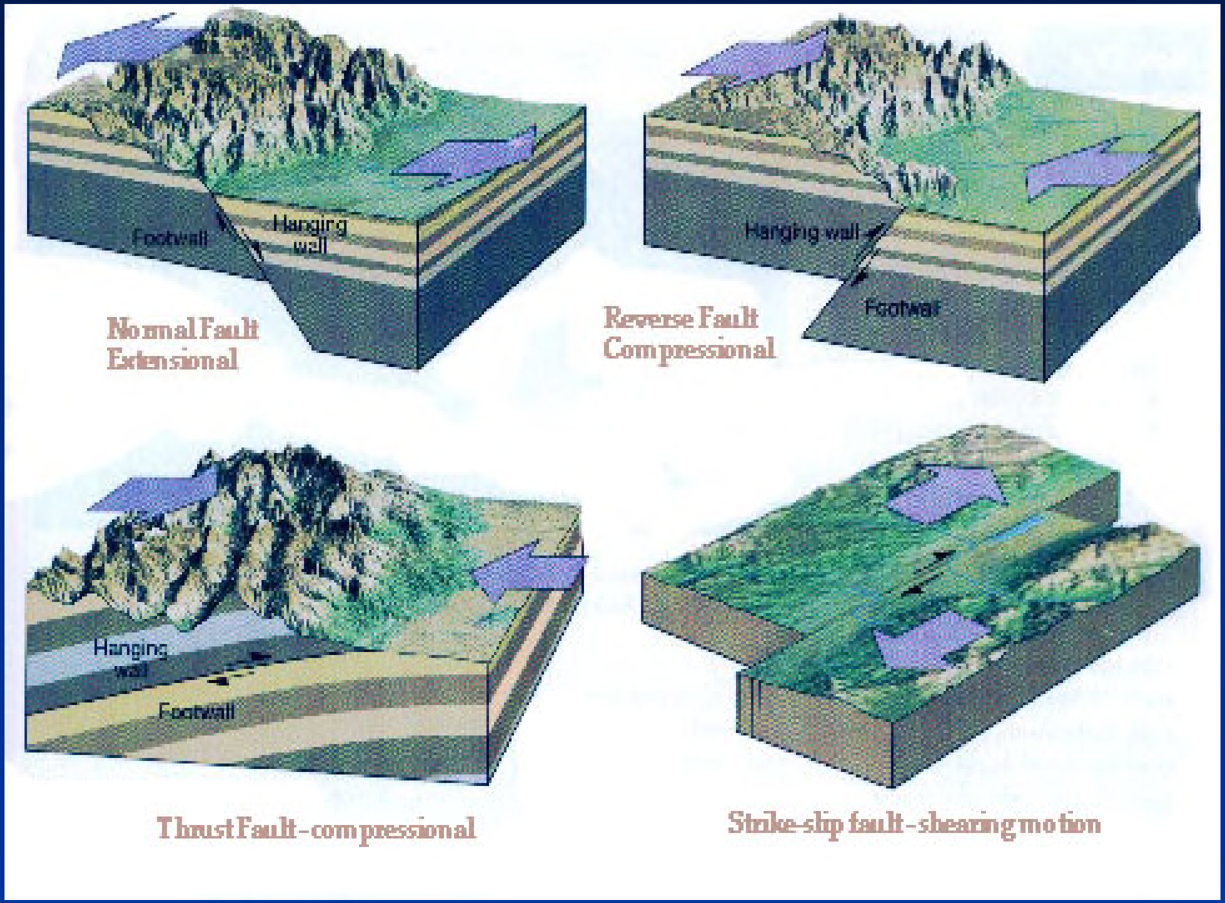
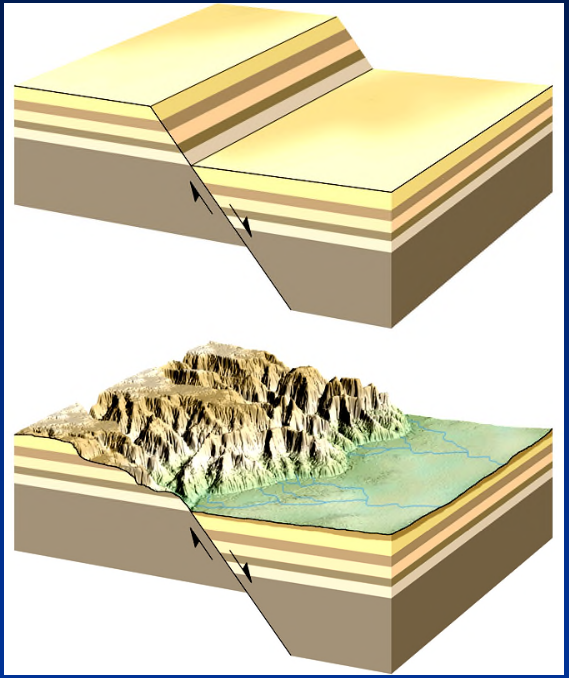


Fault Terminology

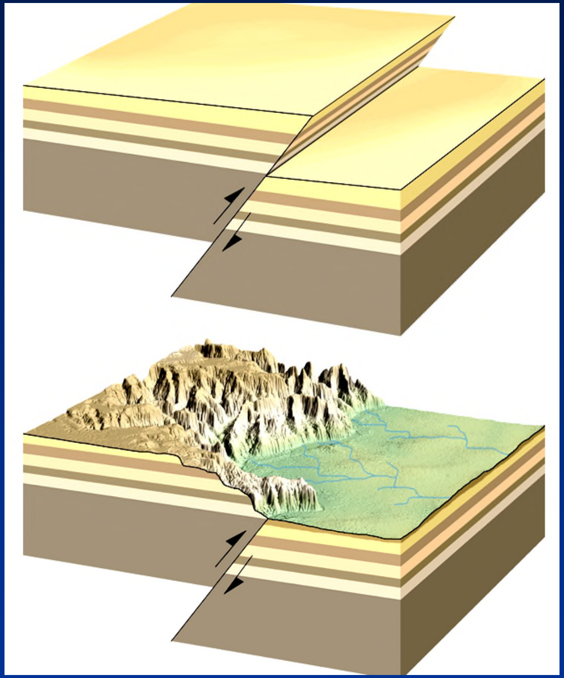




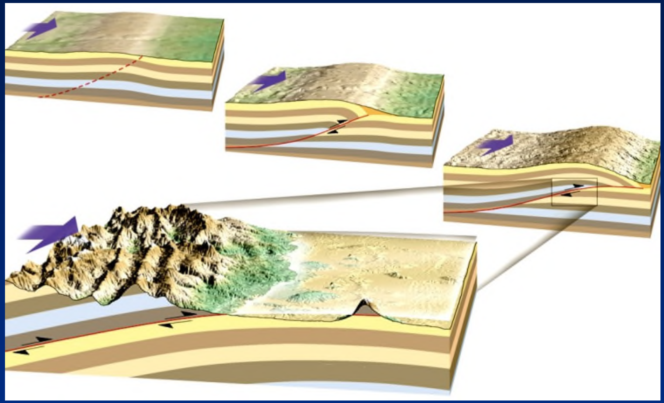
Types of Faults



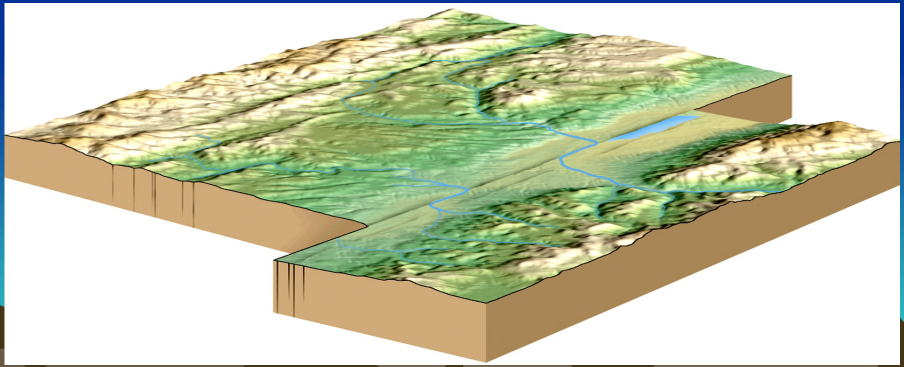
Normal Fault



Reverse Fault



Thrust Fault



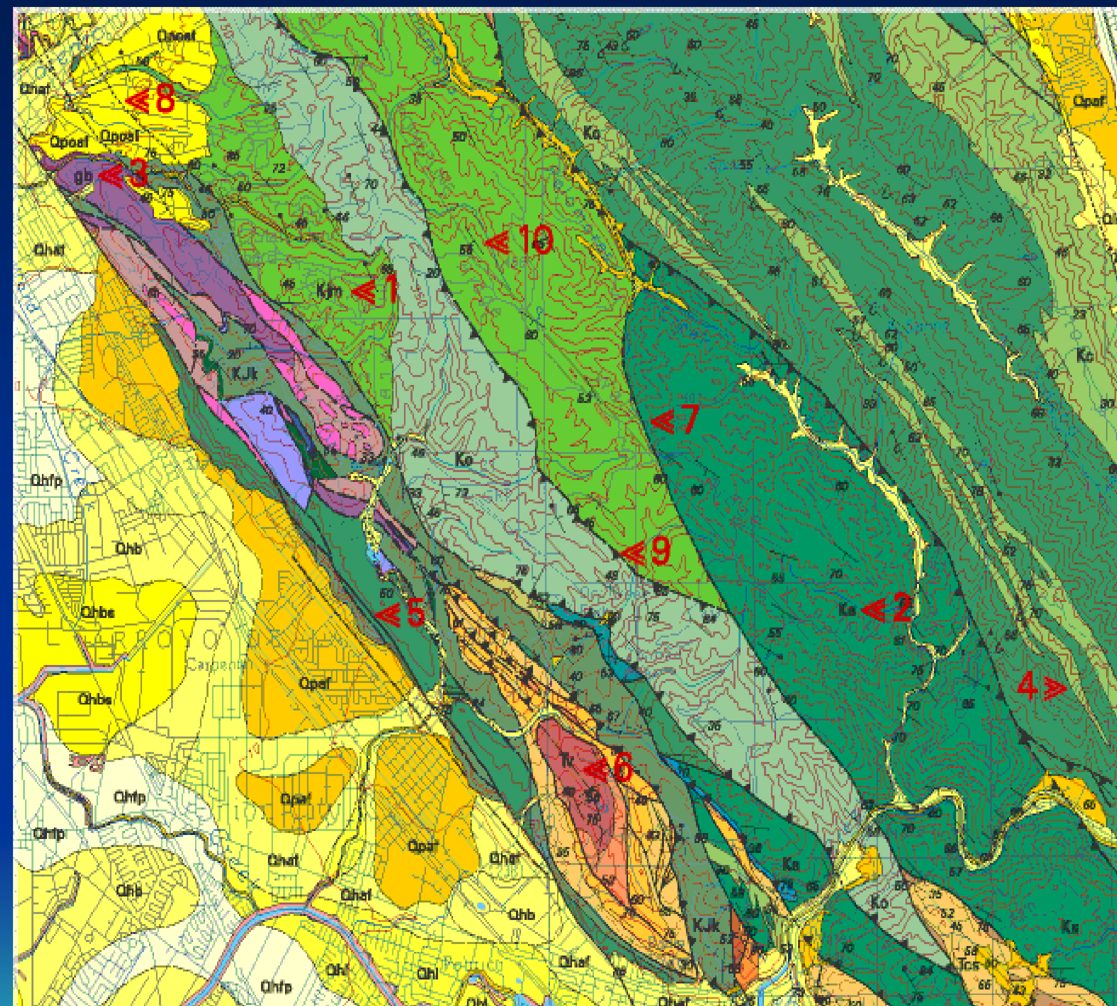
Strike-Slip Fault

What is a Geology Map

1) A map that displays the types of rocks and sediment exposed at the surface

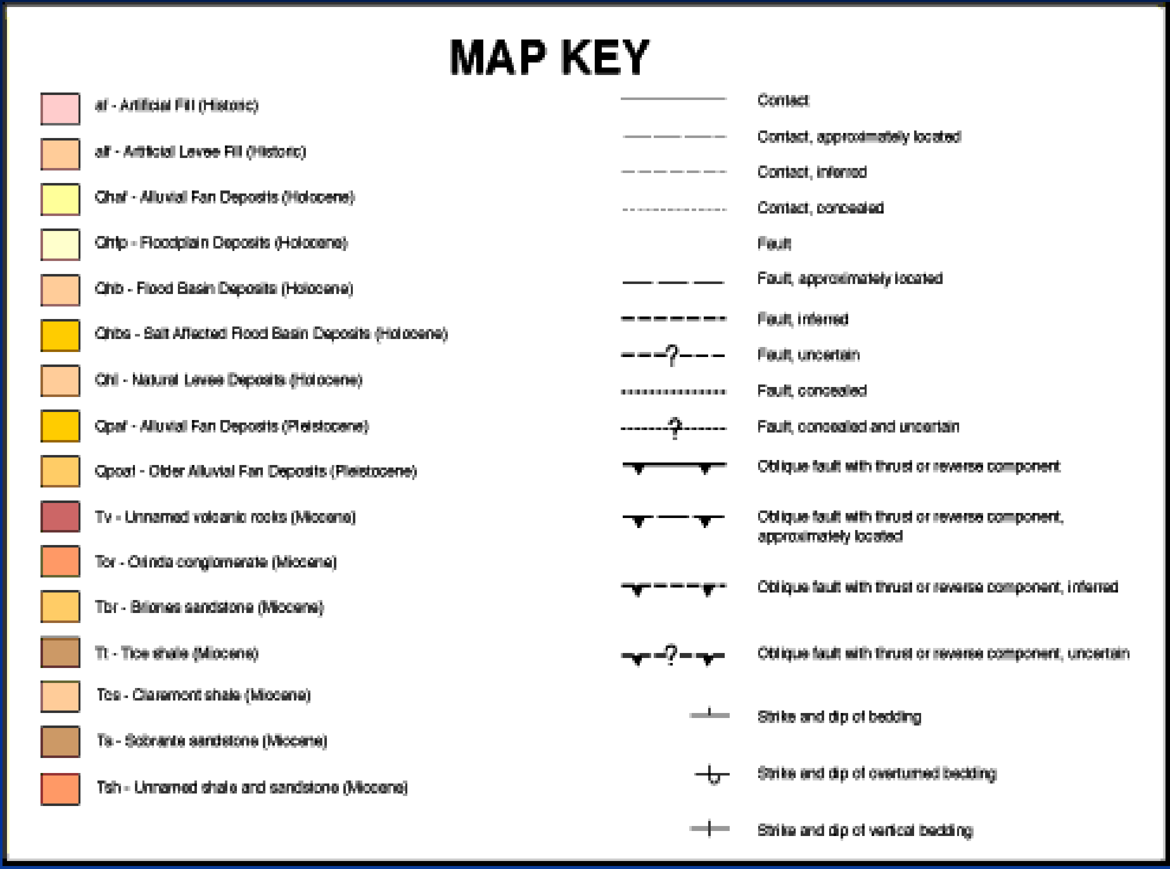
2) Displays the spatial orientation of rock units and rock structures like folds and faults.

3) Geology information is typically overlain on a topographic base map



Geology Map Key or Explanation

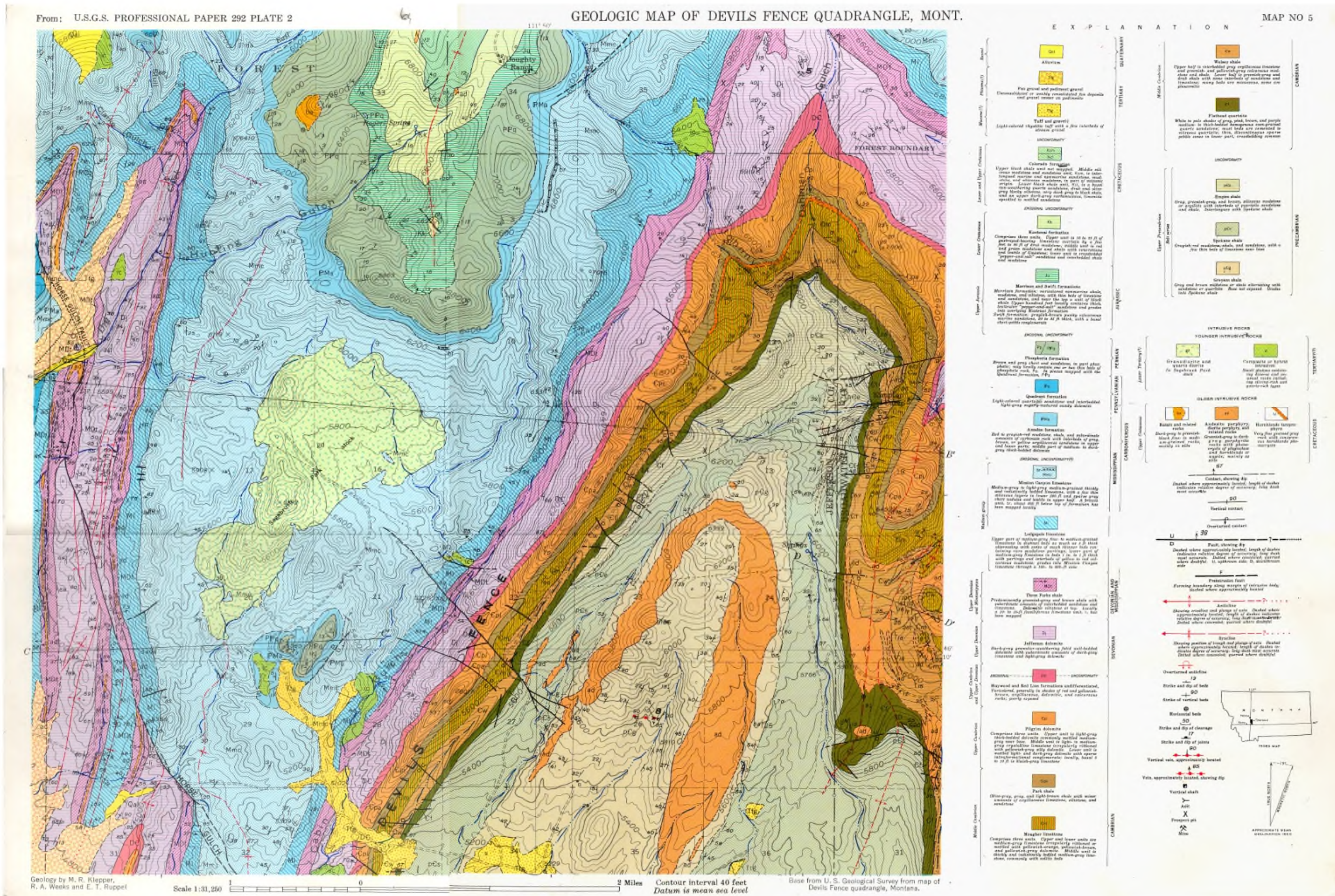
1) The map key lists and explains the geologic rock formations and the structural symbols
   - ✓ Rock Names
   - ✓ Rock Types
   - ✓ Rock Ages
   - ✓ Contacts
   - ✓ Strike and Dip
   - ✓ Faults and Folds



2) Each rock unit has a unique letter symbol and is color-coded

3) Map key is vital to understanding the accompanying geology map

Geologic Maps – Devil's Fence Quad



Rock Formations and Geologic Time

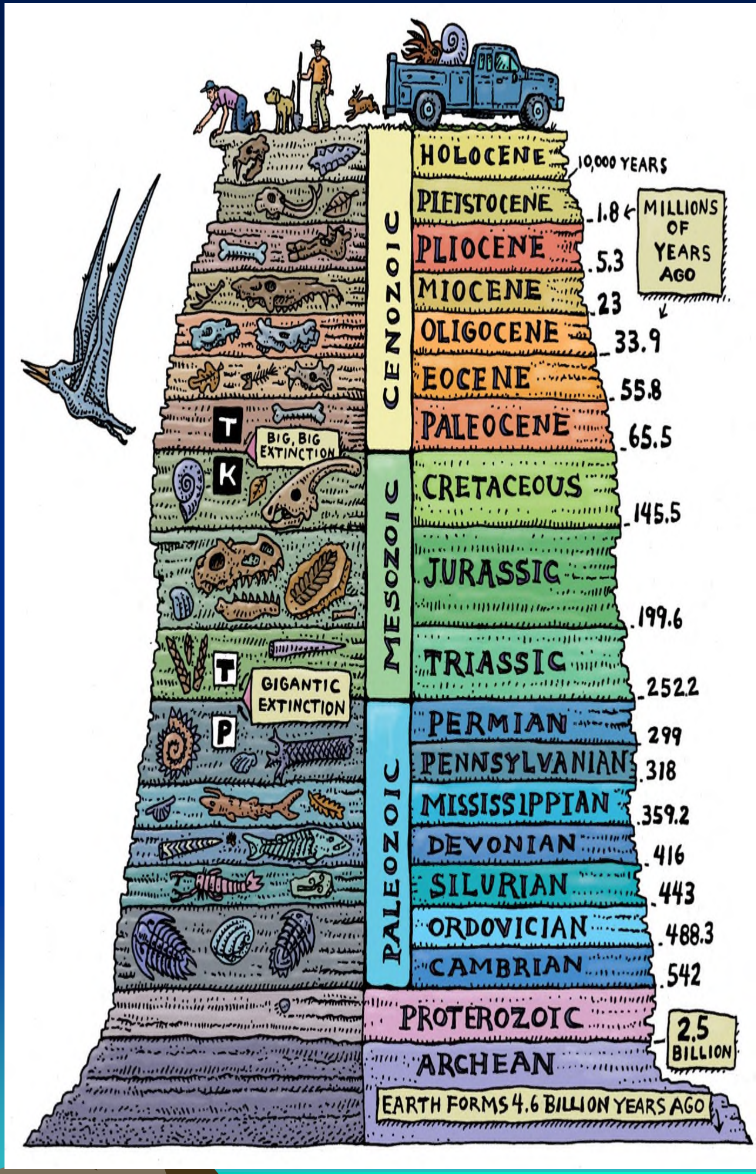
1) All geologic rock formations have a specific assigned age

2) All geologic rock formations have a specific range of lithology

3) Rock formations are listed in a temporally-ordered sequence in the "explanation" of a geologic map

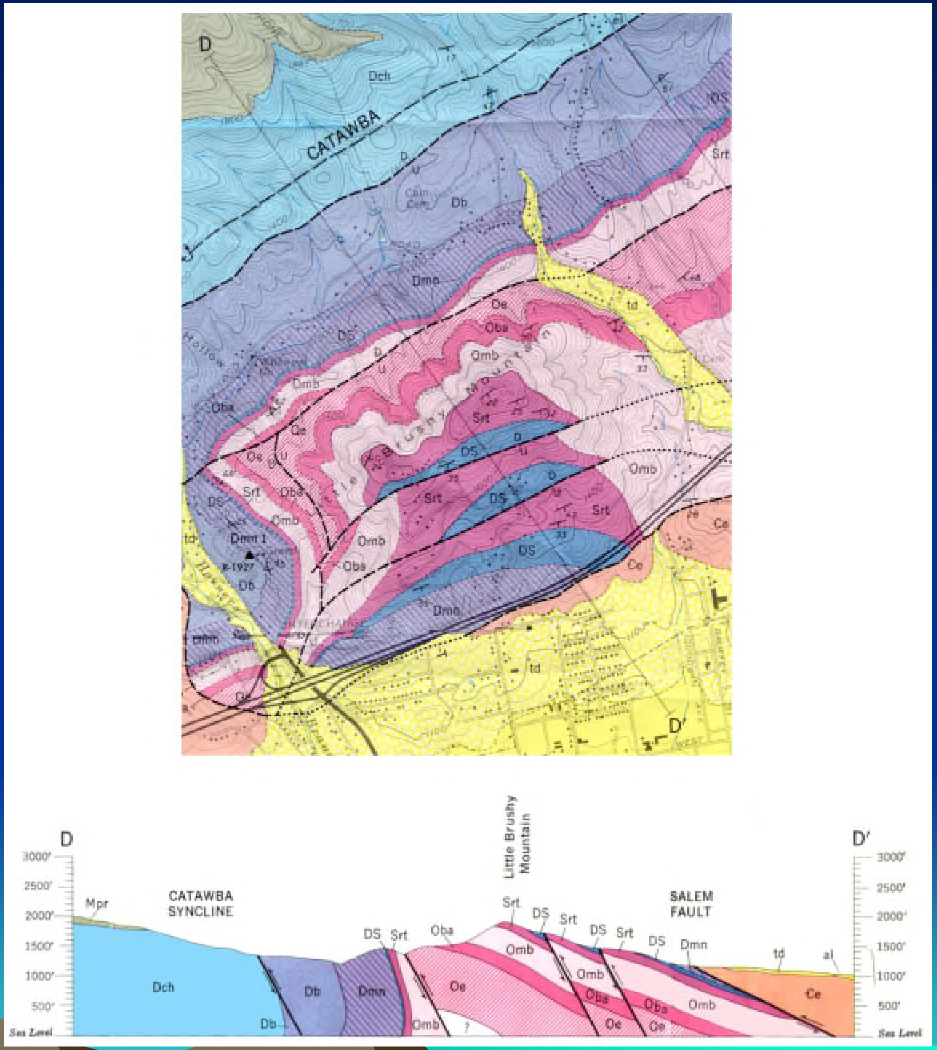
4) Each rock formations has an assigned geologic period

5) Geologic period assignments of formations are further divided into lower (older), middle, and upper (younger)



Rock Formations and Contacts on a Geologic Map

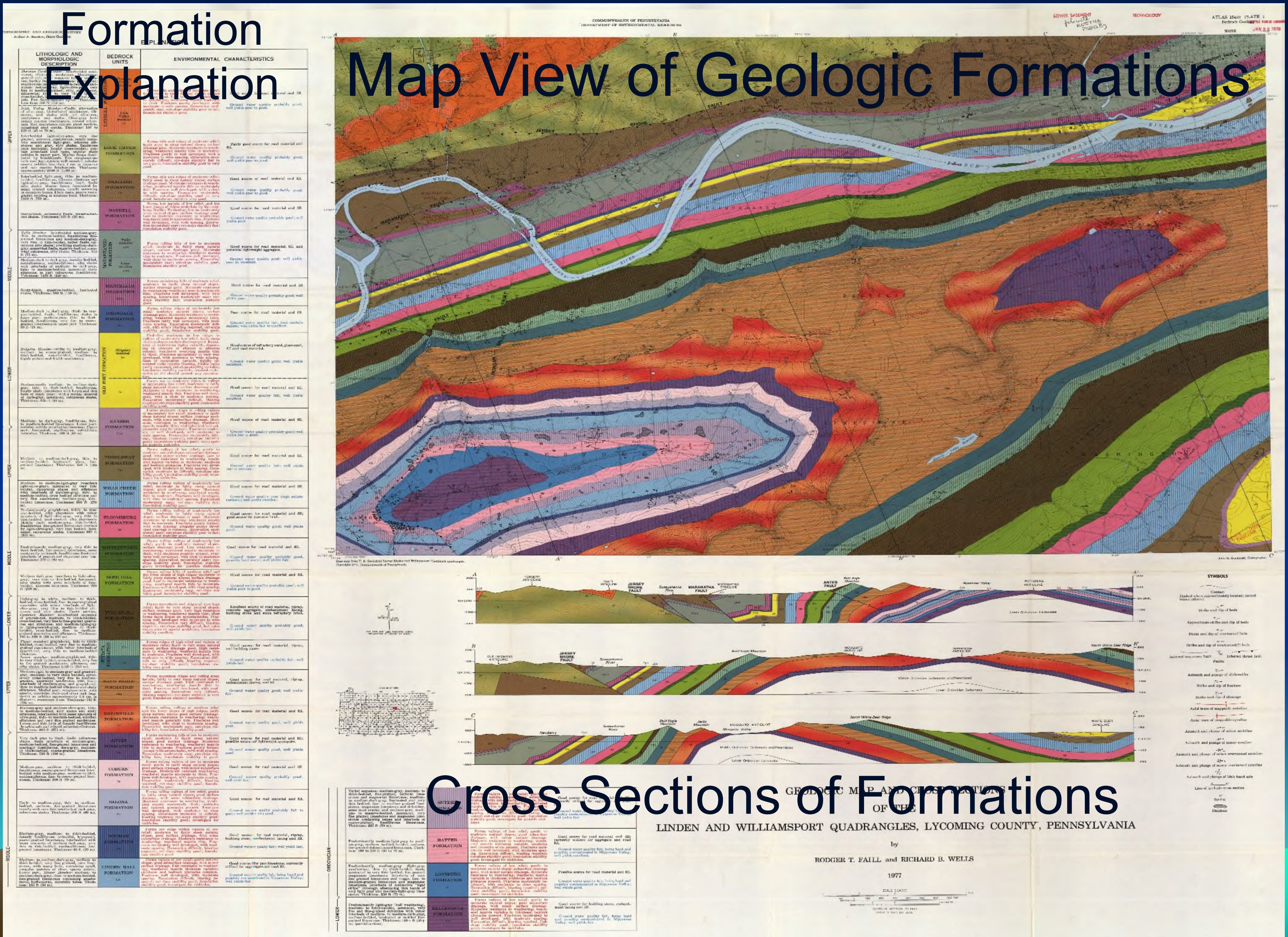
1) Rock formations, contacts and structural elements are illustrated in a geologic map and cross sections



2) A geology map depicts the types of rock that crop out at the earth's surface over a given area of the earth, including the type of contact between adjacent rock formations.

3) Contacts types include depositional, erosional, intrusion, and tectonic/fault

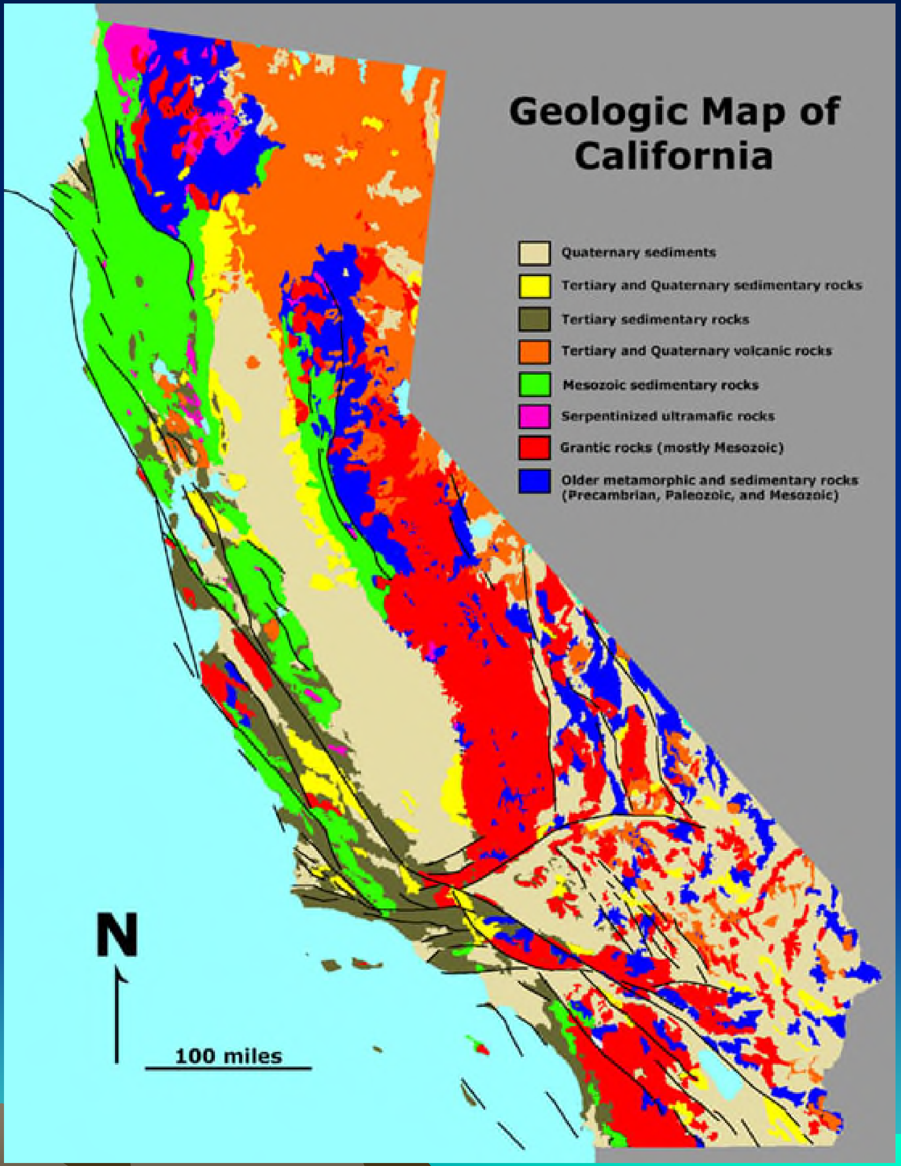
A Complete Geologic Map



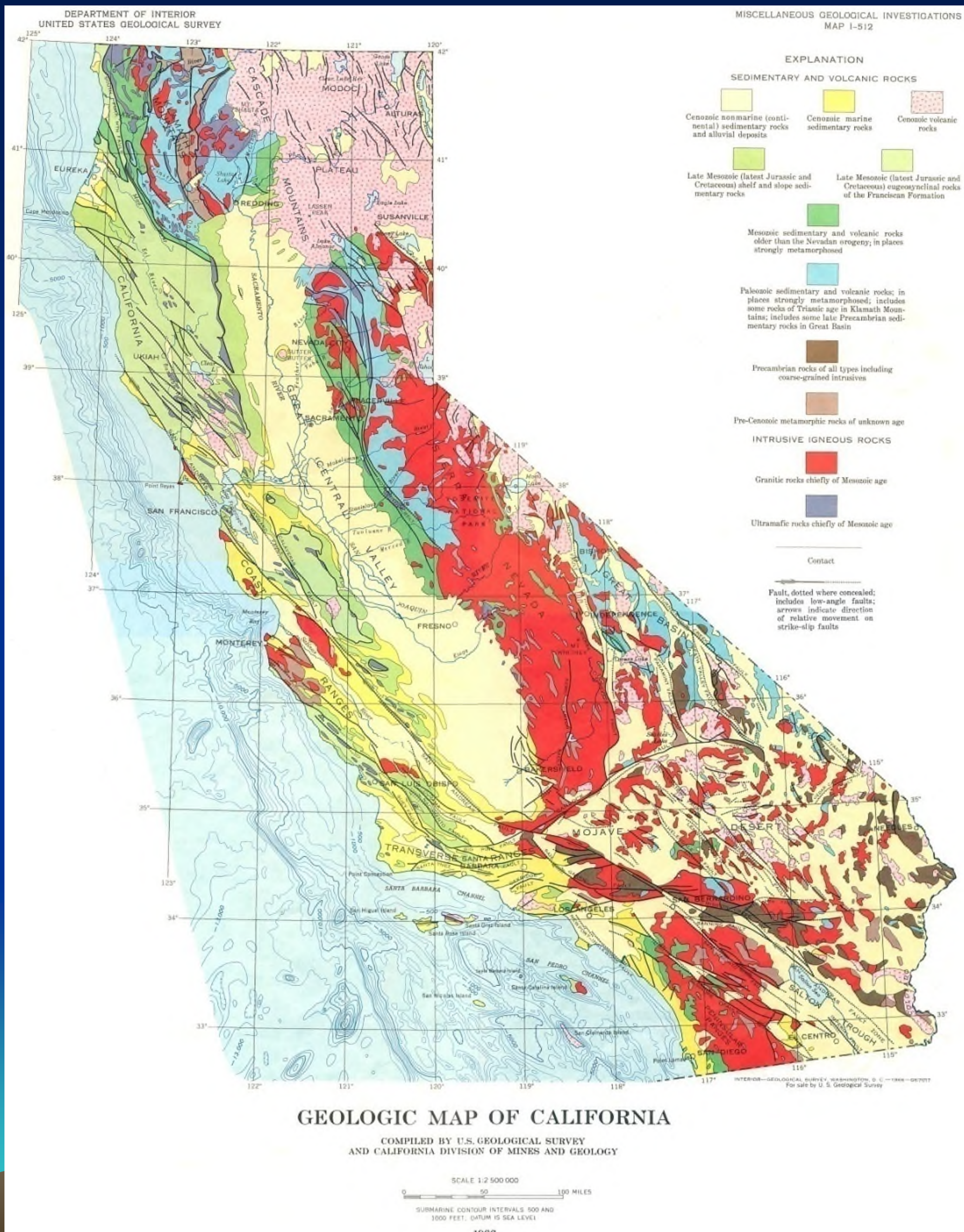
Usefulness of Geology Maps

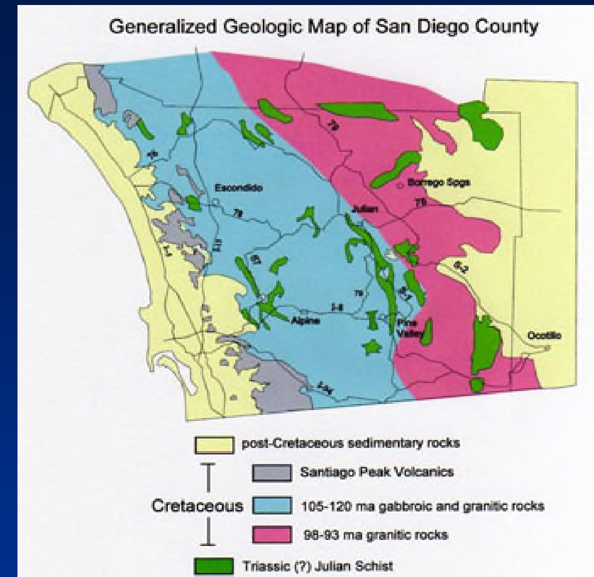
1) Geology maps have many vital uses:
   - ✓ Mineral Prospecting
   - ✓ Engineering
   - ✓ Faullting/Earthquakes
   - ✓ Natural Hazards
   - ✓ Historical geology
   - ✓ Landform studies

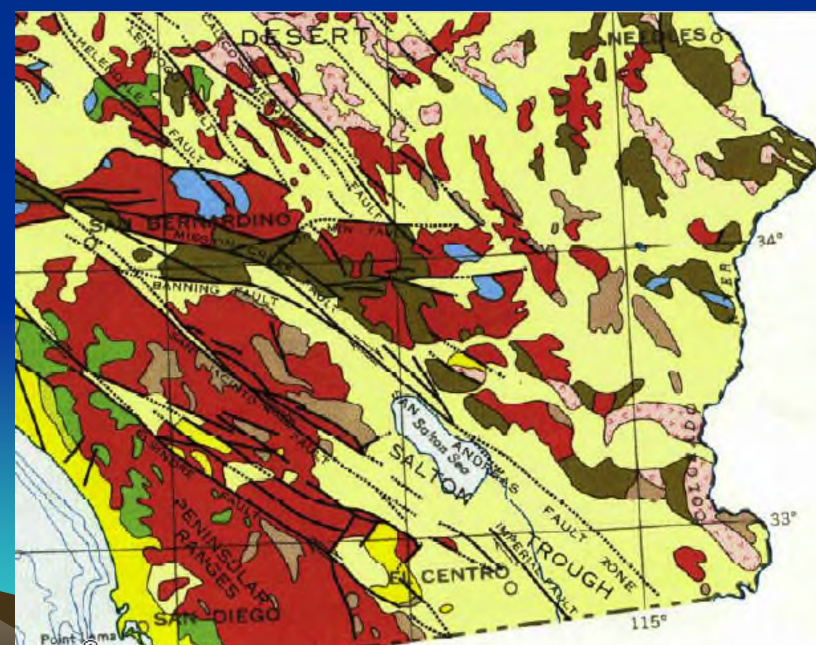
2) Geology maps are even useful when buying a home. Why?



Geologic Maps of California







Geologic Maps – Artwork?