Rocks in the Crust Are Bent, Stretched, and Broken ...
...by directed stresses that cause Deformation.

Types of Differential Stress
Tensional, Compressive, and Shear

Strain is the change in shape and or volume of a rock caused by Stress.

Strain occurs in 3 stages: elastic deformation, ductile deformation, brittle deformation

Joints, Folds, and Faults
Type of Strain Dependent on ...

- Temperature
- Confining Pressure
- Rate of Strain
- Presence of Water
- Composition of the Rock

Dip-Slip and Strike-Slip Faults Are the Most Common Types of Faults.

Major Fault Types
Fault Block

• Decompression melting and high heat developed above a subducted rift zone.
• Former margin of Farallon and Pacific plates.
• Thickening, uplift, and tensional stress caused normal faults.
• Horst and Graben structures developed.

BASIN AND RANGE PROVINCE

Crustal Extension Formed the Basin and Range Province.

Fold Terminology
Anticline – convex upward arch with older rocks in the center of the fold

Evolution of a fold into a reverse fault

Outcrop patterns

Open (symmetrical)
Isoclininal
Asymmetrical
Overturned
Recumbent

Simple Folds

Monocline  Syncline  Anticline  Asymmetric Anticline  Fault

An eroded anticline will have older beds in the middle
An eroded syncline will have younger beds in middle
A layer of tilted rock can be represented with a plane. The orientation of that plane in space is defined with Strike-and-Dip notation.

- The Strike of a body of rock is a line representing the intersection of that feature with the plane of the horizon (always measured perpendicular to the Dip).
- Dip is the angle below the horizontal of a geologic feature.

Maps are two-dimensional representations of three-dimensional surfaces

- Geologic Structures are mapped to interpret stress history.
- Strike-and-Dip Symbols (among other geologic symbols and colors) are used to indicate, age, lithology, and structure.

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Geologic Map Showing Topography, Lithology, and Age of Rock Units in "Map View".

- "Law of V’s" - Plunging anticline points in direction of plunge
- Plunging syncline opens in direction of plunge
Pay attention to age relationships and strike and dip symbols

Describe the structures and stress

Draw the geologic map

How does chevron search for oil and natural gas?
  • http://www.youtube.com/watch?v=npPwVcdixRU

Three General Types of Mountains
  • Fold and Thrust Belts
  • Fault Block Mountains
  • Volcanic Mountains
Fold and Thrust Mountains

Fault Block Mountains

Volcanic Mountains

CASCADE MOUNTAINS

So... how would you figure out the Appalachians?