

Structural Geology - the study of rock deformation.

Features of rock deformation are collectively referred to as structure or structural features.

Stress and strain - terms used to describe the type of rock deformation

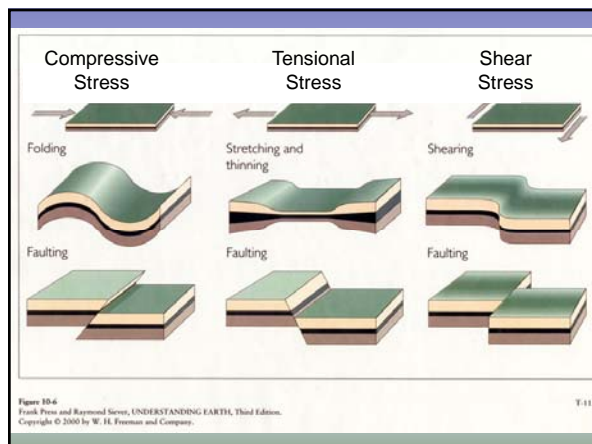
Stress: *force* applied to a body/unit area

2 Types:

- 1. Uniform or confining stress** - force on a body that is equal in all directions.
Does not usually deform a rock (change shape) but may result in a change in size.
- 2. Differential stress** - stress that is not equal in all directions and is caused by tectonic forces.
Usually causes a change in shape, but not in size.

3 Types of Differential Stress:

- 1. Tension** - a stretching stress.
Rocks have very little strength under tensional stress and break apart easily.
- 2. Compression** - a squeezing stress.
Rocks are relatively strong under compression.
- 3. Shear** - stress operates in opposite directions across the body



Strain:

Deformation or change of shape a rock body experiences when under differential stress.

Strain is proportional to Stress.

Large Stress = Large Strain

3 Types of Strain

1. Elastic strain /deformation - recoverable strain.

2. Plastic strain/ ductile deformation - permanent strain.
When stress exceeds the strength of the rock the rock will bend or fold

3. Brittle strain/deformation - permanent strain.
When stress exceeds the strength of the rock the rock will break or fracture.

Elastic strain /deformation = recoverable strain.

When stress is removed, object regains original shape. (Ex: rubber band).

elastic limit - limiting stress beyond which the rock can not return to its original shape and will be permanently deformed.

Depends on type of rock involved and temperature.

Plastic strain/ ductile deformation = permanent strain.

When rock is stressed beyond elastic limit and when stress is removed, object remains deformed by bending (Ex: cheese).

Brittle strain/deformation - permanent strain.

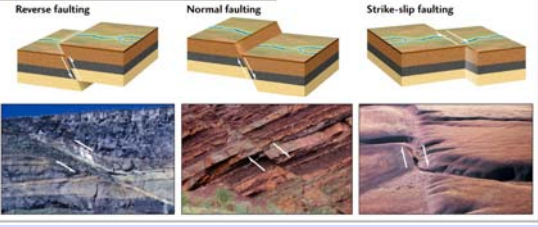
When stress exceeds the strength of the rock the rock will break or fracture (Ex: Chalk).

Factors that influence the type of permanent strain in rocks experiencing the same amount of stress:

- 1. Temperature**
- 2. Confining stress**
- 3. Time and strain rate**
- 4. Composition** - important in 2 ways:
 - 1. Mineral composition**
 - 2. Amount of water in rock**

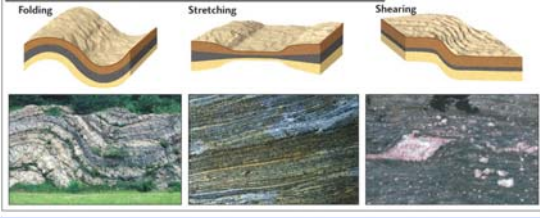
Brittle Strain

Brittle materials change a little and then break suddenly.

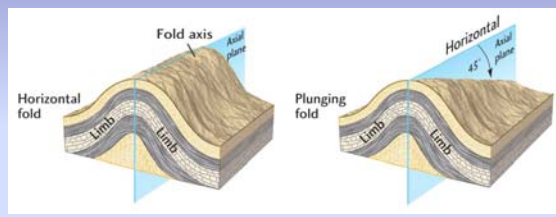


Plastic Strain

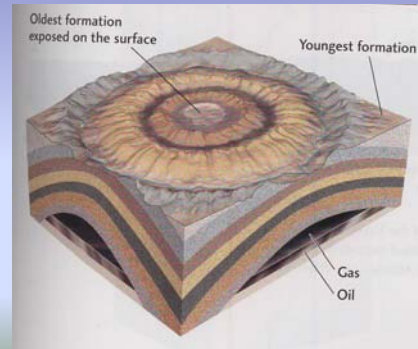
Ductile materials undergo smooth, continuous plastic deformation and do not spring back to their original shape when the deforming force is released.



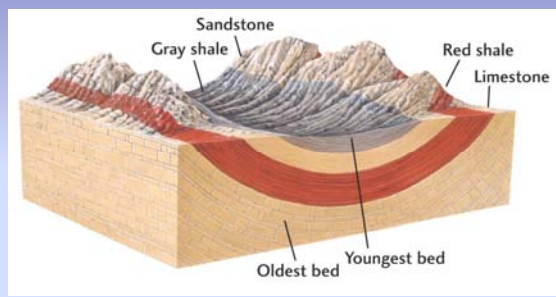
Plastic Strain: Folding



Anticline Fold



Syncline Fold



Asymmetrical folds

