

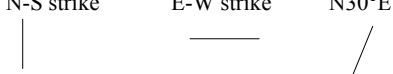
Structural Geology

- Consider different types of deformation, and using the laws (or principles) of Superposition, Original Horizontality, Cross-cutting Relationships, and Faunal Succession, to determine the geologic history.
 - Fault (fracture with offsetting motion)
 - Unconformity (buried surface of erosion)
 - Fold

Strike and Dip of a Planar Feature

- Strike (p. 347): compass direction of a line formed by the intersection of a dipping plane (a stratum or fault) and a horizontal plane.

N-S strike E-W strike N30°E



- Dip: measured at a right angle to the strike (true dip). The amount of dip is the angle between the dipping plane and a horizontal plane.

20° 65°



Structures related to stress type (p. 345)

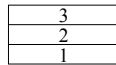
- Stress** (force per unit area) causes **strain** (deformation).
- Tensional stress: pulling apart, extension, stretching \longleftrightarrow
 - Normal fault, rift
- Compressional stress: pressing together $\longleftarrow \longrightarrow$
 - Fold, reverse fault, thrust fault (reverse fault with low-angle fault plane)
- Shear stress: tangential \longleftrightarrow
 - Strike-slip fault
- Vertically directed stress: Stress up or down
 - Uplift: dome
 - Subsidence: basin

Types of Unconformity (pp. 354, 355)

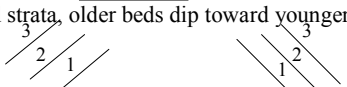
- A buried surface representing a period of time when erosion removed part of the rock record
 - Angular unconformity: surface of erosion between nonparallel strata
 - Disconformity: surface of erosion between parallel strata
 - Nonconformity: surface of erosion between sedimentary strata above, and igneous or metamorphic rock below

Rules for assigning relative age

- Superposition: in an undisturbed succession, younger strata overlie older strata.
- If beds are numbered, older beds are arbitrarily assigned numbers with smaller values.



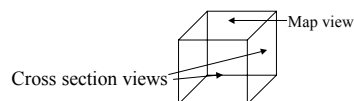
- In tilted strata, older beds dip toward younger beds.



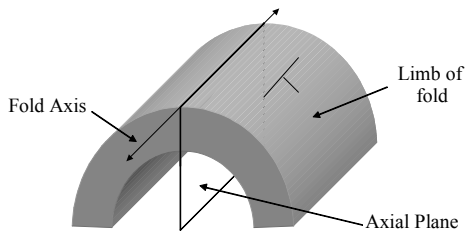
- In an eroded upfold (anticline), **older** rocks occupy the core in cross section and map view, whereas in an eroded downfold (syncline), **younger** beds occupy the core.

Views of structure (p. 346)

- Map view: pattern created by the intersection of rock units with the earth's surface
- Cross section: pattern created by the intersection of rocks with a vertical plane (for example, a cliff or road cut).



Parts of a Fold

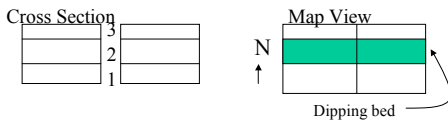


Folded Strata (p. 348)

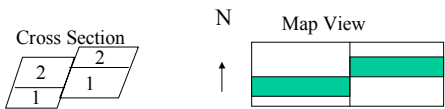
- A fold results from compression as stress is applied slowly, over a long period of time.
- Anticline: up-folded structure in which the limbs dip away from the center (axial plane).
- Syncline: down-folded structure in which the limbs dip toward the center (axial plane).
 - Anticlines and synclines may be symmetrical or asymmetrical.
- Dome: results from uplift; limbs dip away from the center in all directions.
- Basin: subsidence in which limbs dip toward the center in all directions.

Broken Rocks

- Joint: fracture with no appreciable displacement of beds (vertical or horizontal)



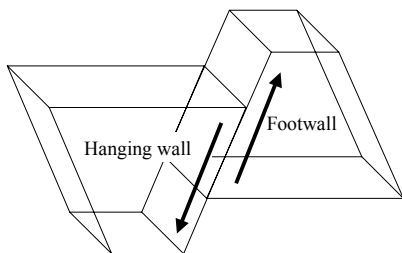
- Fault: fracture with appreciable displacement of beds along a plane that can be of any orientation



Dip-Slip Fault Terms (pp. 350-354)

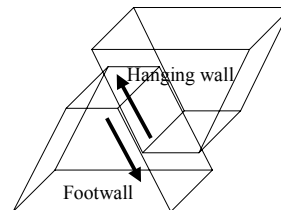
- Dip-slip fault: displacement is parallel to the dip of the fault plane
- Footwall: an old miner's term, used to describe the side of the fault that one could stand on
- Hanging wall: the wall that hangs above the footwall
- Normal fault: created by tension. The hanging wall moves down relative to the footwall.
- Reverse fault: created by compression. The hanging wall moves up relative to the footwall.
- Thrust fault: a reverse fault with a low-angle fault plane.

Normal Fault



- Hanging wall down relative to footwall.

Reverse Fault (or Thrust Fault)

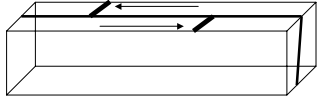


- Hanging wall up relative to footwall.
- Low-angle fault plane = thrust fault

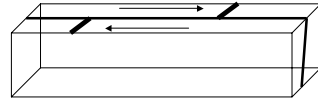
Strike-slip Fault

- Fault in which movement is parallel to the strike of the fault plane.






- Left lateral:



- Right lateral:



Map Symbols (p. 362)

- Inclined bed 
- Vertical bed 
- Horizontal bed 
- Syncline 
- Anticline 

Fault Slickensides

- Grooves on the fault face that indicate the general direction of movement.
 - Horizontal slickensides = parallel to strike movement. (Strike Slip Fault)
 - Vertical slickensides = perpendicular to strike movement. (Dip Slip Fault)