

G 457 – Volcanoes and Earthquakes

March 31, 2010 – Faults

What is a fault? A fault is a fracture in rock where one side has shifted laterally, vertically, horizontally, or a combination of these movements.

Fault Zones: Faults rarely occur as a single crack. Faults are often classified in zones where a network of faults interacts on each other by independent geologic stressors. These faults may move independently, or at differing rates that can be affected by adjacent faults (ex. seismic creep).

Types of Strain

Elastic: Deformed rocks will return to previous form after stress is released. (Class ex. Rubber Band)

Ductile: Deformed rocks will retain deformed shape and not return to previous form after stress is released. (Class ex. Credit Card)

Brittle: The rock will break if stress is too great. (Class ex. Stick)

Fault Terms

Strike: The direction of a horizontal line on a surface of the fault.

Fault Scarf: The steep cliff formed from a dip-slip fault. These cliffs are prone to erosion, and streams can often be found near these areas.

Hanging wall: The rock above fault line

Footwall: The rock below fault line

Seismic Creep: Generally constant rate of movement along fault over time and may alternate between periods of faster or slower movement.

Fault Breccia: Forms by friction of two sides of fault, rock fragments are angular.

Fault Gouge: Rocks are formed by friction of two sides of the fault, but cannot be classified.

Fault Types

Dip-Slip Faults

Normal Fault: The hanging wall is lower relative to the footwall; extensional stress is caused thinning the crust.

Thrust Fault: The hanging wall is higher relative to the footwall, compressional stress thickens the crust. The dip angle is low between 20-30%, any higher than the fault is considered a

Reverse Fault.

Reverse Fault: A high angle (above 30%) thrust fault.

Other Faults

Strike-Slip Fault: Movement of the rock on each side of the fault is parallel to the strike. The movement will be either **Left lateral** (on each side of the strike the movement will be to the left) or **Right Lateral** (on each side of the strike the movement will be to the right). Stress in these faults is referred to as shear stress, and does not change the thickness of the crust.

Oblique-slip faults: These faults have characteristics of both Dip-slip and Strike slip faults, must shift vertically and laterally.

Additional Fault Information & Images:

<http://www.uwgb.edu/dutchs/EarthSC102Notes/102QUAKES.HTM>

<http://www.iris.edu/gifs/animations/faults.htm> - Fault Animations