

Geol. 111G Review for Exam 3
April 14, 2009

Absolute Geologic Time: Radiometric Dating

Radioactive Isotopes

Radioactive Decay

Decay Rates - Half life

Determining rock age from radioactive decay

Need to know: ratio of parent to daughter material and half life

Steps:

1. measure amount of parent and daughter material
2. determine number of half lives rock experienced
3. calculate the age= # of half lives X half life

Examples:

Potassium 40/Argon 40 dating

Radiocarbon dating: Carbon 14/Nitrogen 14

Deformation

Stress-rock pressure

Uniform/confining or lithostatic stress

Non-uniform/differential stress

tension

compression

shear

Strain -rock deformation

Elastic -elastic limit

Plastic-rocks bend/fold

Brittle-rocks break/fault, joint, fracture

Factors that influence plastic versus brittle strain/deformation

temperature

confining stress

time and strain rate

mineral composition -brittle versus plastic minerals

amount of water present in rock

Plastic Deformation-strike and dip of beds

Folds: limbs, axis,

types: anticline, syncline

Brittle Deformation

Joints

Faults: fault plane, footwall, hanging-wall

types: normal, reverse, thrust, strike-slip

Fault systems: Horst and Graben structure

Continued on back.....

Global Structural Styles

Convergent Plate Boundaries

Stress: compression

Structures: Folds and thrust/reverse faults

Examples:

Continent-Continent = Himalaya Mountains

Continent-Oceanic = Andes Mountains

Divergent Plate Boundaries

Stress: tension

Structures: normal faults, Horst and Graben systems

Example:

Continental rift = Rio Grande Rift

Strike-slip Plate Boundaries

Stress: shear

Structures: strike-slip faults

Example: San Andreas fault system

Earthquakes

Seismology -seismograph

Cause of earthquakes-Elastic Rebound Theory

Seismic waves

1. Body waves

Compressional: P-waves or primary waves; moves through solids, liquids or gas

Shear: S-waves or secondary; move through solids only

2. Surface waves

Locating earthquakes

Focus

Epicenter

Magnitude of earthquakes - Richter scale

Earthquakes and plate tectonics

Convergent plate boundaries -shallow & deep; low & high magnitude

Benioff zone

Divergent plate boundaries -shallow, low magnitude

Strike slip -shallow, low & high magnitude

seismically active versus seismic gap

Structure of the interior of the earth from seismic waves

Seismic wave velocity = depends on density and rigidity of material

= depends on temperature, pressure, & composition

Boundaries defined by seismic waves

Crust/mantle - Mohorovici Discontinuity (moho)

Mantle/core

Lithosphere/asthenosphere/mesosphere, core -liquid/solid