

Mountain Building

I. Mountain belts

- A. Orogenesis refers to processes that collectively produce a mountain belt
- B. Most mountain building occurs at convergent plate boundaries
 - 1. Two types occur at subduction zones, related to the character of the overriding plate
 - a. Aleutian Type— island arcs
 - b. Andean Type— continental magmatic arcs
 - 2. continent-continent convergence has no subduction

II. Aleutian-type mountain building creates island arcs

- A. Where two oceanic plates converge and one is subducted beneath the other
- B. Volcanic island arcs forms
- C. Found in shrinking ocean basins, such as the Pacific
- D. e.g. Mariana, Tonga, Aleutian, and Japan arcs

III. Andean-type mountain building creates continental volcanic arcs

- A. Oceanic-continent crust convergence
- B. e.g. Andes Mountains
- C. Phases of development of Andean type mountain belt
 - 1. Passive margin
 - a. Prior to the formation of a subduction zone
 - b. e.g. East Coast of North America
 - 2. Active continental margins
 - a. subduction zone forms
 - b. Deformation process begin
 - c. Continental volcanic arc forms
 - d. Accretionary wedge forms
 - e. Example of inactive Andean-type orogenic belt--Sierra Nevada Range and California's Coast Ranges

IV. Continental collisions is third mechanism of mountain building at convergent plate margins

- A. Where two plates with continental crust converge
 - 1. India and Eurasian plate collision
 - 2. Himalayan Mountains and Tibetan Plateau
- B. No subduction and very little production of magma

- V. Continental accretion of small crustal fragments
 - A. Small crustal fragments collide with and accrete to continental margins
 - 1. Accreted crustal blocks are called terranes
 - 2. Occurred on western margin of North America
 - B. Likely crustal fragments to accrete
 - 1. Island arcs
 - a. Appalachian Piedmont terranes
 - b. Japan
 - 2. Sheared off continental fragments
 - a. Madagascar
 - b. Most of southwestern California

- VI. Mountain building at divergent boundaries
 - A. crustal extension results in high heat flow
 - B. high heat flow causes crustal uplift, allows volcanism
 - C. fault-block mountains characterized by normal faults

- VII. Principle of isostasy—buoyancy of crust
 - A. Floating crust in gravitational balance
 - 1. Function of thickness and density
 - 2. both contribute to presence of ocean basins and continental masses—different thickness and density
 - B. thickening crust at convergent margins contributes to uplift shown by wave-cut platforms high above sea level
 - C. When weight is removed from the crust by erosion or removal of thick ice sheets, crustal uplift occurs