Geological Activity from Plate Tectonics Processes

Geological Stresses

Earth Science Study Guide

Types of Stress

Stress is the force per unit area that is placed on a rock. When stress causes a material to change shape, it has undergone **strain** or deformation. Rocks respond differently to stress based on rock type, surrounding temperatures, pressure conditions, and length of time under stress.

Study Tip

Stress on humans causes us to change habits or break down; stress on rocks also cause breaking and stretching.

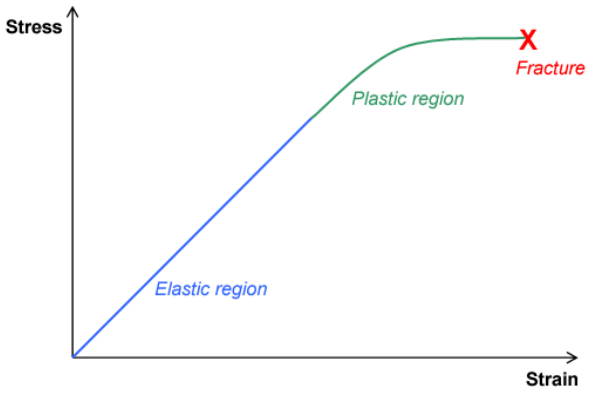
Type of Stress	Description
Confining Stress	• A rock that cannot move and cannot deform. • A deeply buried rock that is pushed down by the weight of all the material above it
Compression	• Squeezes rock together, causing rocks to fold or break. • Most common at convergent plate boundaries
Tension	• Rocks lengthen or break apart • A major type of stress at divergent plate boundaries
Shear	• Forces are parallel but moving in opposite directions • Most common stress at transform plate boundaries

Responses to Stress

Rocks have three possible responses to increasing stress

Response to Stress	Description
Elastic Deformation	Rock returns to its original shape when the stress is removed
Plastic Deformation	Rock does not return to its original shape when the stress is removed
Fracture	Rock breaks

As stress increases, a rock undergoes elastic deformation, plastic deformation, and fracture.



Conditions for Fracture

- At Earth's surface rocks are more likely to break quickly
- Deeper in the crust, rocks are more likely to deform plastically due to higher temperatures and pressures
- Sudden stress: break quickly

- Stress applied over time: plastic deformation

Concept Check

- What kinds of geologic stress are there?
- What are the three possible responses rocks have to stress?
- What conditions make it easier for a rock to fracture?
- What conditions make it easier for a rock to deform?