Ch 2 Sec 1: Forces in Earth’s Crust

Guide for Reading

■ How does stress in the crust change Earth’s surface?
■ Where are faults usually found, and why do they form?
■ What land features result from the forces of plate movement?

The movement of Earth’s plates creates enormous forces that squeeze or pull the rock in the crust. A force that acts on rock to change its shape or volume (the amount of space a rock takes up) is stress. Stress adds energy to the rock. The energy is stored in the rock until it changes shape or breaks.

Three different kinds of stress can occur in the crust—tension, compression, and shearing. Tension, compression, and shearing work over millions of years to change the shape and volume of rock.

**Tension** pulls on the crust, stretching rock so that it becomes thinner in the middle.  ← →  (divergent boundaries)

**Compression** squeezes rock until it folds or breaks.  → ←  (convergent boundaries)

**Shearing** pushes a mass of rock in two opposite directions.  → ← (transform boundaries)

Rock breaks and slips apart or changes shape.

When enough stress builds up in rock, the rock breaks, creating a fault. A **fracture** is a break in the rock. A **joint** is a fracture where rock movement doesn’t occur. A **fault** is a break in the rock of the crust where rock surfaces slip past each other. Most faults occur along plate boundaries, where the forces of plate motion push or pull the crust so much that the crust breaks.

**There are three main types of faults:**
1. **normal faults** - Tension causes a normal fault. Divergent boundary. In a **normal fault**, the fault is at an angle, and one block of rock lies above the fault while the other block lies below the fault. The block of rock that lies above is called the **hanging wall**. The rock that lies below is called the **footwall**. Vertical rock motion. Rio Grande rift valley.

2. **reverse faults** - Compression causes reverse faults. Convergent boundary. A **reverse fault** has the same structure as a normal fault, but the blocks move in the opposite direction. Vertical rock motion. Rocky Mtns.

3. **strike-slip faults** - Shearing creates strike-slip faults. Transform boundary. In a **strike-slip fault**, the rocks on either side of the fault slip past each sideways, with little up or down motion. Horizontal rock motion. Ex. San Andreas Fault.

Over millions of years, the forces of plate movement can change a flat plain into landforms such as anticlines and synclines, folded mountains, fault-block mountains, and plateaus.

**Folded mountains**: Rock can bend without breaking. A fold in rock that bends upward into an arch is an **anticline**. A fold in rock
that bends downward to form a valley is a **syncline**. Anticlines and synclines are found on many parts of the Earth’s surface where compression forces have folded the crust. The collision of two plates can cause compression and folding of the crust over a wide area. There are parallel ridges and valleys.

Ex. Appalachian mountains, Himalayan mountains, Alps in Europe.

**Fault Block Mountains**: Tension force pulls rock apart causing normal faults. Two normal faults cut through a block of rock, the hanging wall between each slips downward, the rock between moves upward, forming a fault-block mountain. Ex. The Great Basin in Salt Lake Utah.

**Plateau**: The forces that raise mountains can also uplift, or raise plateaus. A **plateau** is a large area of flat land elevated high above sea level. It consists of many flat areas that is wider than it is tall. Ex. The Colorado Plateau in the “four corners” region of Az, Utah, Co. and New Mexico.