

Chapter 10

What to know

Scarp

Characteristics of faults

Displacement

Where displacement is greatest

Earthquake scales

Seismicity MOR

Convergent

Tsunami

What Causes Earthquakes To Happen?:

Seismicity- earthquake activity

This can occur because of-

- o The sudden formation of a new fault. (fracture)
- o A sudden slip on an existing fault
- o A sudden change in the arrangement of atoms in the minerals of comprising rock
- o Movement of magma in a volcano
- o The explosion of a volcano
- o A giant landslide
- o A meteorite impact
- o Underground nuclear bomb testing

Hypocenter- focus or center of the earthquake

- Epicenter- The point on the surface of the earth above the hypocenter
- Faults occur due to the hypocenter, which cause the damage in an earthquake.

Foreshocks- a minor tremor before a major earthquake.

How Does Earthquake Energy Travel?:

❖ Travels in the form of waves (Seismic Waves)

- Body waves- travel through the interior of the earth
- Surface waves- along the earth's surface
- Compressional waves- waves where particles move parallel in the wave
- Shear waves- same as above but move perpendicular

Four basic types of seismic waves-

1. P-waves (primary)- Compressional body waves
2. S-waves (secondary)- shear body waves
3. R-waves (Rayleigh, name of a physicist)- surface waves that cause the ground to ripple up and down.
4. L-waves (love, a seismologist)- surface waves that cause the ground to ripple back and forth in a snake-like movement.

How Do We Measure and Locate Earthquakes:

Seismograph- systematically records ground motion from an earthquake happening anywhere on earth.

Mercalli Intensity Scale- defines the intensity of an earthquake

❖ Today we use the Richter Scale

Where and Why Do Earthquakes Occur?:

Seismic Belts- where earthquakes occur, because they don't occur everywhere on the world

Divergent Plate Seismicity-

- Takes place at shallow depths (less than 10 km)
- These earthquakes don't affect anything because they are deep in sea
- Only a few places worry about these (ex: Iceland)

Convergent Plate Seismicity-

- Several kinds of earthquakes take place here
 - Intermediate and deep focus earthquakes
- Wadati-Benioff Zone- deep sloping band of seismicity

How Do Earthquakes Cause Damage?:

❖ Ground shaking and Displacement

Seiche- the water's rhythmic movement

Predicting the "Big One":

Seismic Risk- predicting earthquakes

Annual Probability- the probability of an earthquake is about 1 in 510 or .2%

Chapter 12

Numerical age

Relative age

Fossils record

Unconformities (3types) → gap in geologic record

Radioactive decay

Dating → Clasts, metamorphism and igneous rock

12.1 Introduction

- **Geologic time** is the span of time since Earth's formation.
- **Deep time** is the immense span of geologic time.

12.2 Time: A Human Obsession

- Nothing important here.

12.3 The Concept of Geologic Time

- During the Renaissance, scientists began to speculate that geologic time might far exceed historical time.
- Archbishop James Ussher added up generations from the Old Testament and determined that the Earth was formed on October 23, 4004 BCE.
- Nicolaus Steno observed shark teeth in the mountains, concluded these were ancient animals in loose sediment, this then hardened into rock.
- James Hutton; **the principle of uniformitarianism**, states that physical processes we observe today also operated in the past and were responsible for the formation of the geologic features we see in outcrops. It implies that the present is the key to the past.