Inside Earth: Chapter 2- Earthquakes

Section 4: Monitoring Faults

Guide For Reading

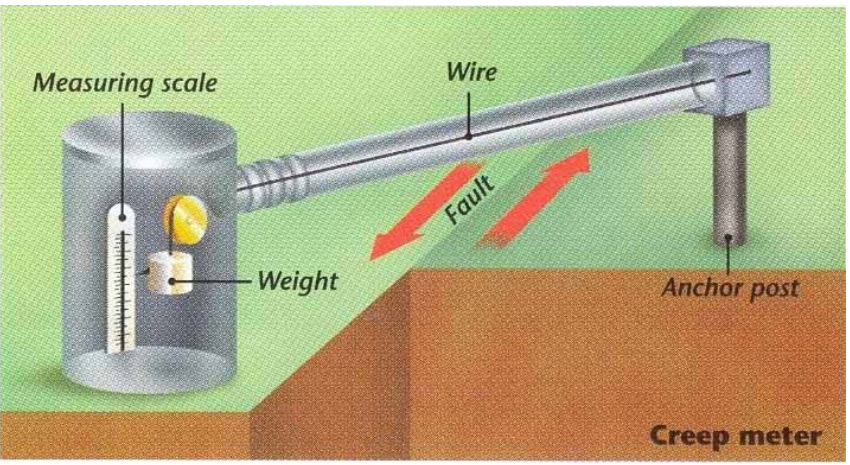
- How do geologists monitor faults?
- How do geologists determine earthquake risk?

Why is the town of Parkfield, CA so fascinating to Geologists?

- The town had a strong earthquake about every 22 years from 1857-1966

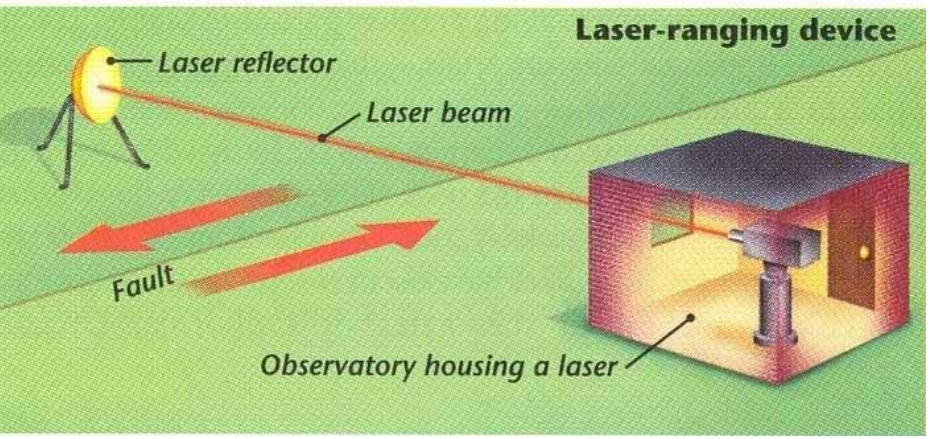
- Scientists have not found a place on Earth where earthquakes have been so regular

Creep Meter



- Measures movement along a strike-slip fault
- A wire is attached to both sides of the fault
- The wire is attached to a measuring scale
- As the fault moves the wire stretches, and a reading is taken from the measuring scale

Laser-Ranging Devices



- Uses a laser beam to detect plate movement
- The device calculates the time needed for the laser beam to bounce off a reflector and return back to the house

Figure 26: How are a laser-ranging device and a creep meter (figure 25) similar? How are they different?

Figure 25 A creep meter can be used to measure movement along a strike-slip fault.

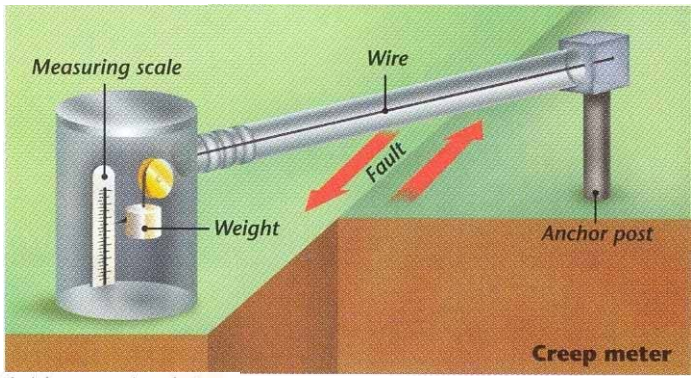
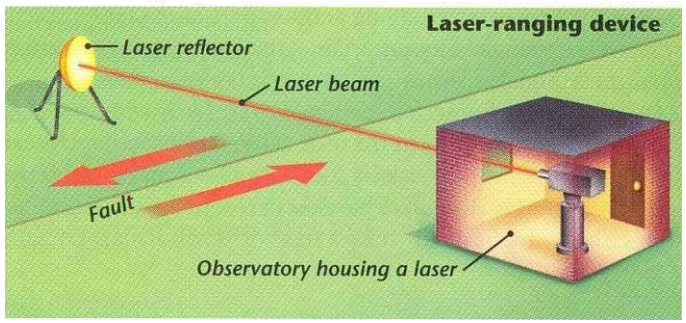


Figure 26 A laser-ranging device monitors fault movement by bouncing a laser beam off a reflector on the other side of the fault.

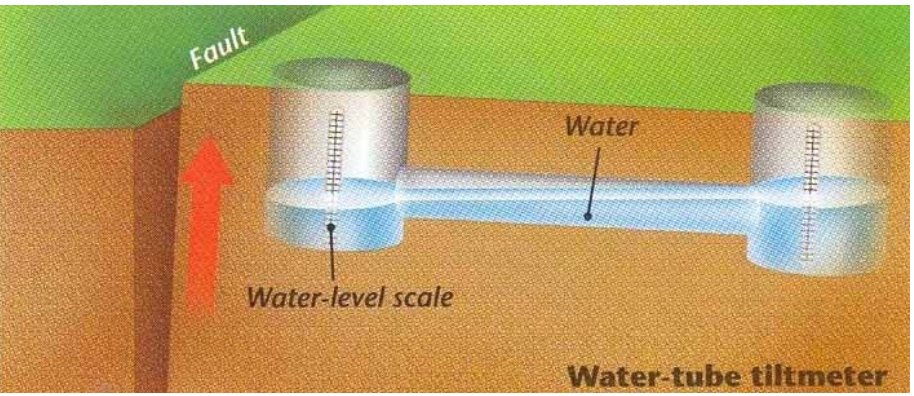


- Similarity
  - Both measure movement along a fault
- Differences
  - A creep meter measures horizontal movement only
  - A laser-ranging device measures any change in distance from the reflector
  - A creep meter provides gross measurements
  - A laser-ranging device provides precise measurements

What type of ground movement does a tiltmeter measure?

- Vertical movement

Water-Tube Tiltmeter



- Measures vertical movement along a fault
- Two bulbs filled with liquid connected by a hollow stem
- If the land rises or falls the liquid all goes into 1 bulb
- Geologists read the scales inside the bulbs to determine fault movement

How are satellites used to measure ground movement?

- Radio waves from the satellite are bounced off the ground
- As the waves echo back into space, the satellite records them
- The time it takes the waves to go round trip provides precise measurements in every change in Earth's surface

Checkpoint (Page 80): What do fault-monitoring instruments measure?

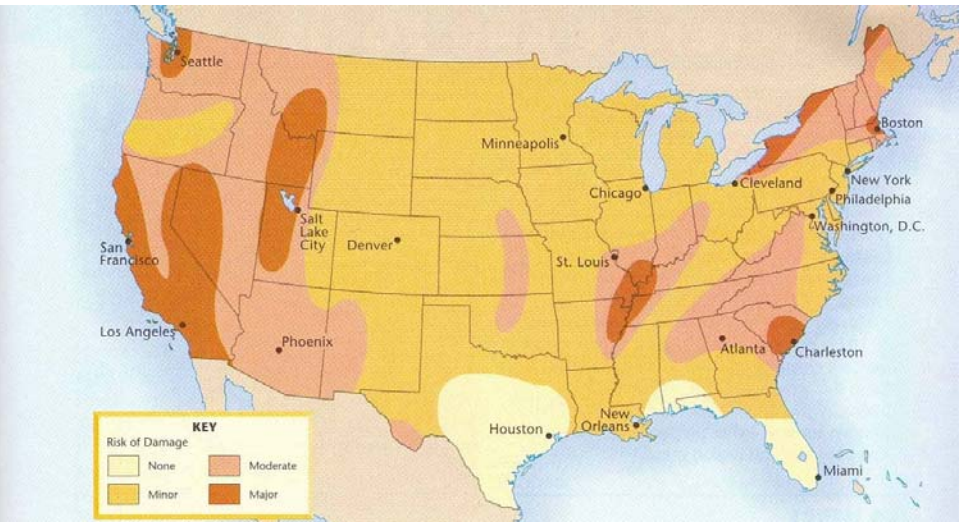
- Fault monitoring instruments measure the movement of the ground along a fault including:
  - Horizontal movement
  - Tilting
  - Changes in elevation

Guide For Reading: How do geologists monitor faults?

- Geologists monitor faults by putting instruments in place that measure stress and deformation in the crust

- These instruments include:
  - Creep meters
  - Laser-ranging devices
  - Water tube tiltmeters

Figure 28: Where are damaging earthquakes least likely to occur? Most likely to occur?



- Least likely
  - Areas in the map with no shading
- Most likely
  - Areas on the map with the darkest shading

Why are earthquakes most likely to occur in the areas that you listed in the previous slide?

- The earthquakes risk is high in areas such as California, Oregon, Washington, and Alaska because these locations are where or near where the Pacific and North American plates meet

Guide For Reading: How do geologists determine earthquake risk?

- Geologists can determine earthquake risk by locating where faults are active and where past earthquakes have occurred