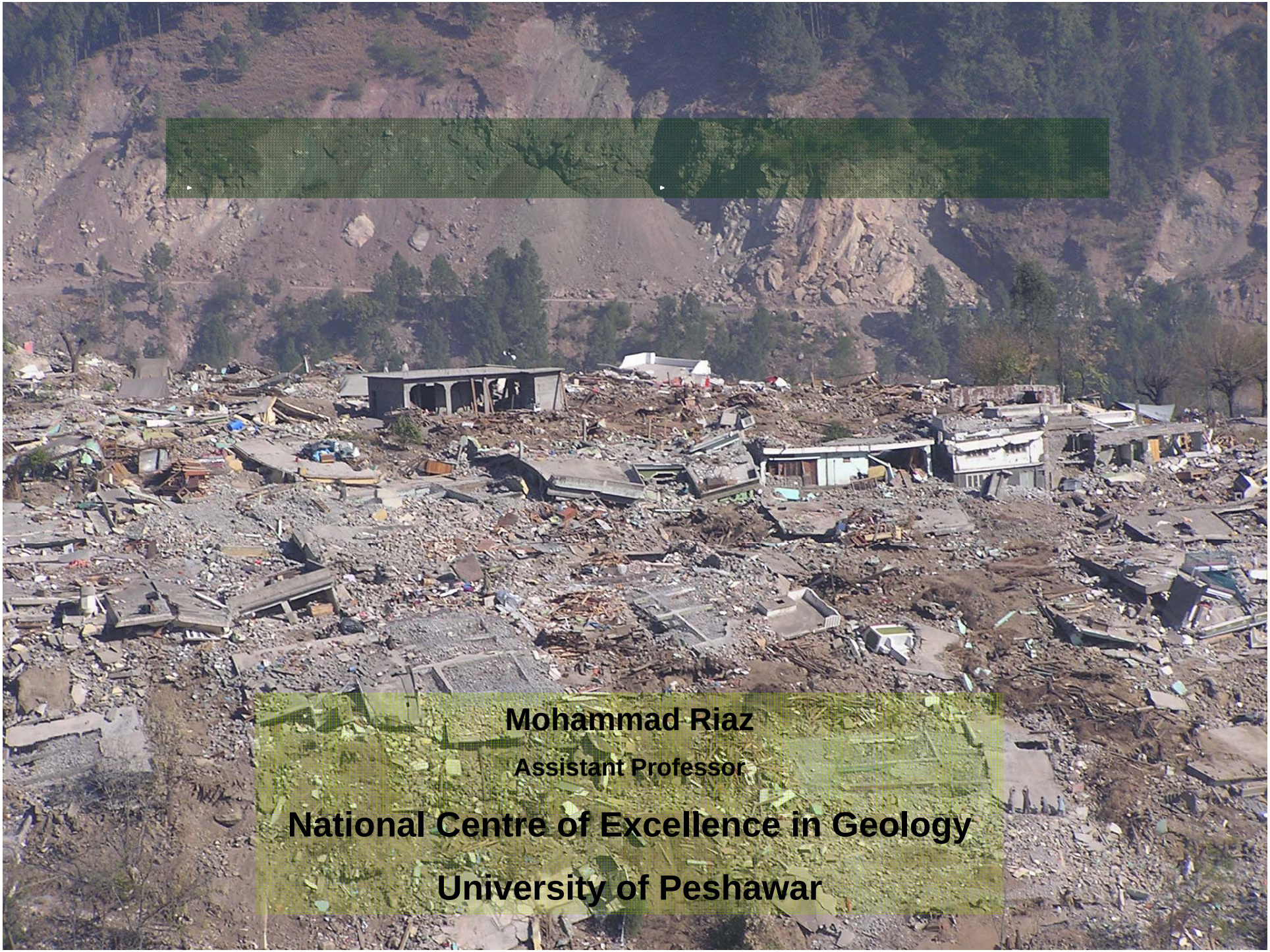

Mohammad Riaz

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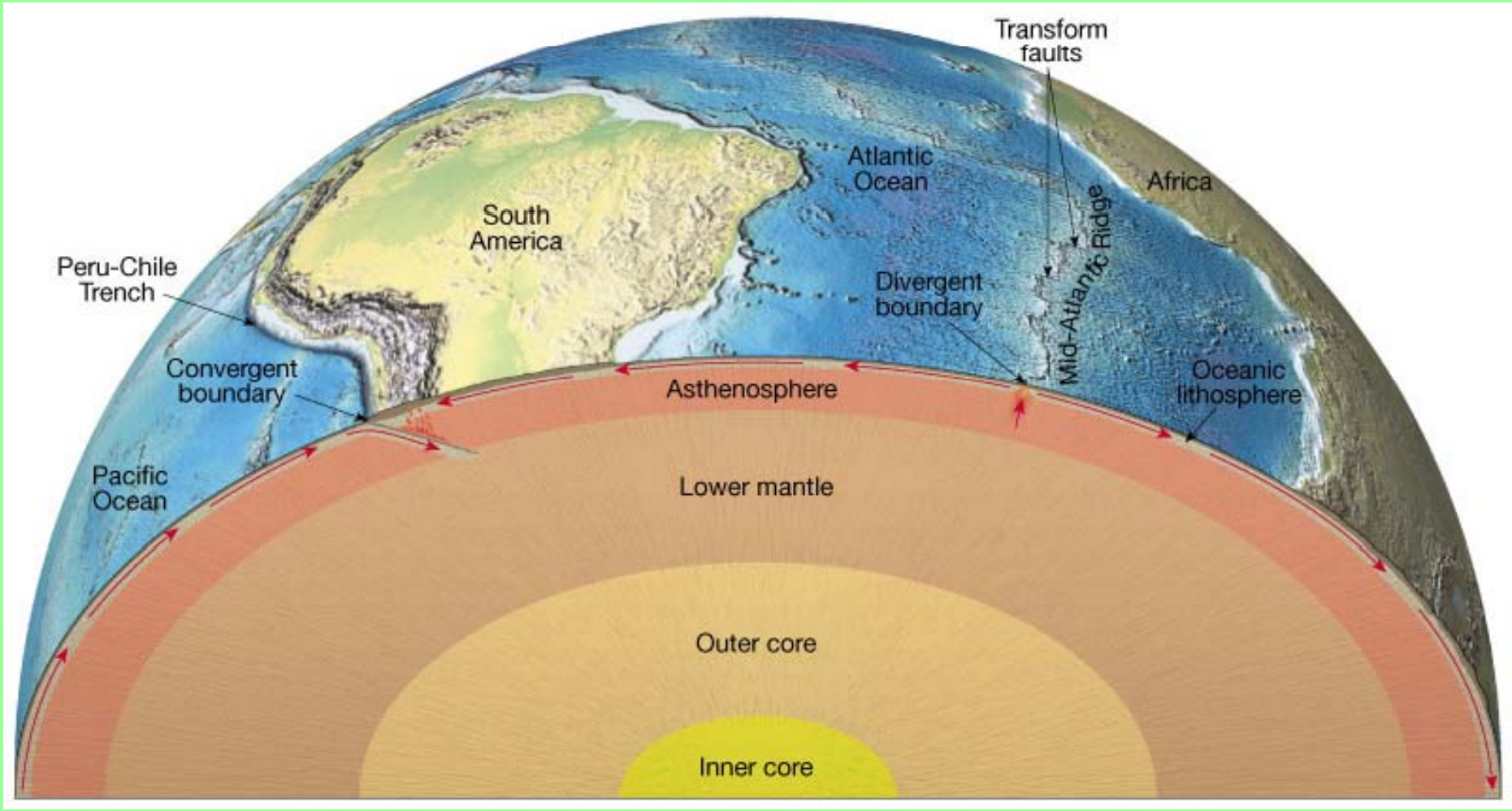
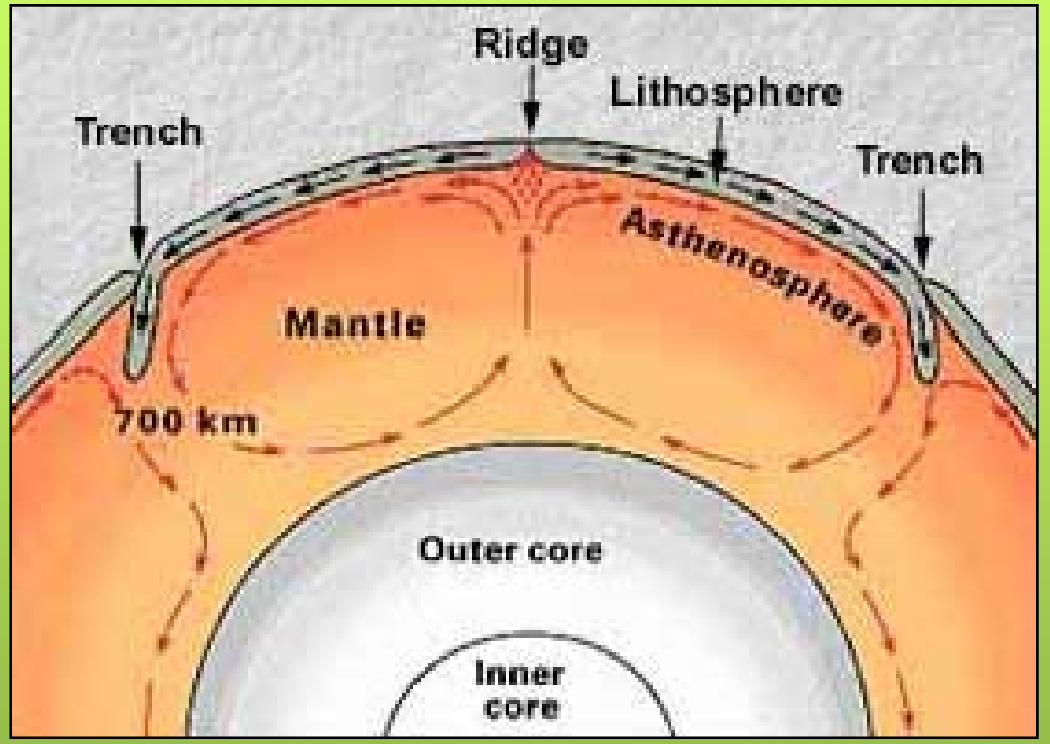
Earth Composition

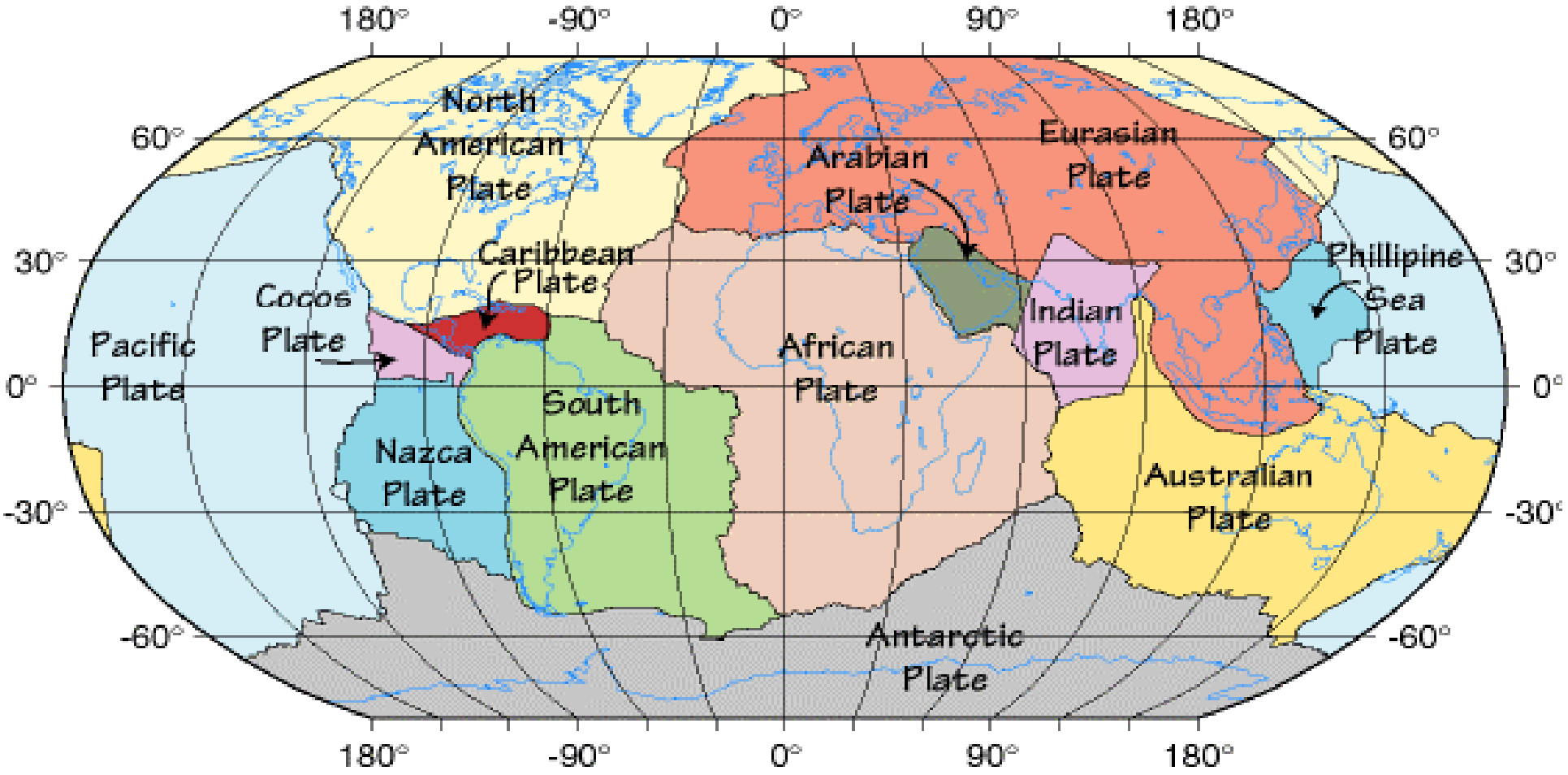
Core (15% area)
Mantle (84% area)
Crust (1%)



The Plate Tectonics Theory

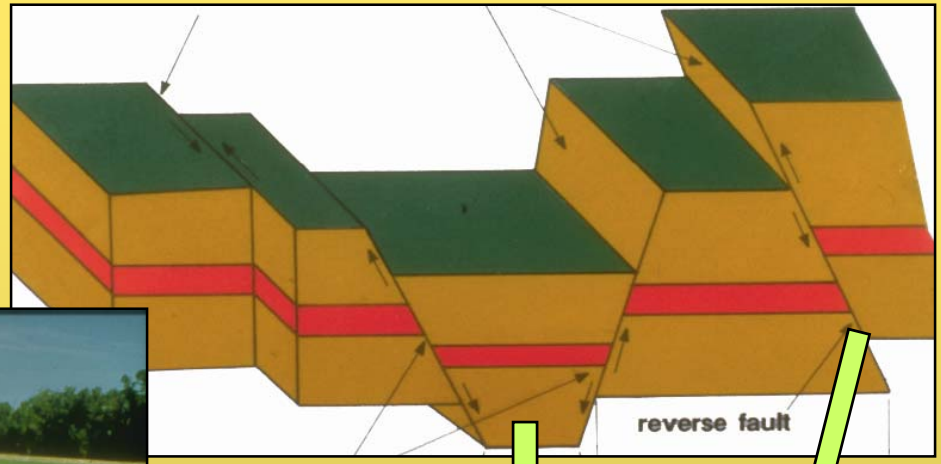


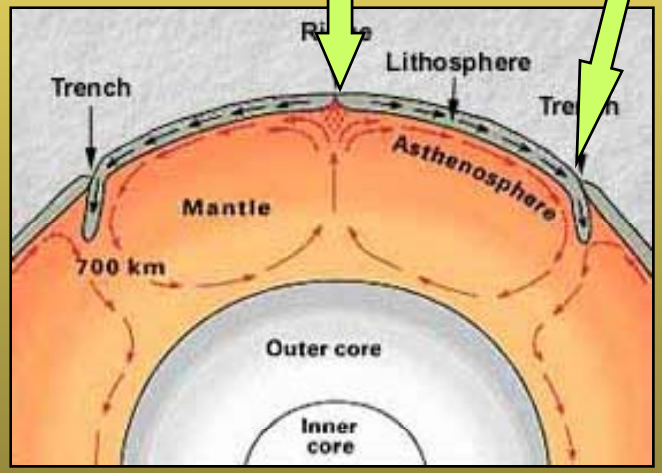
Currents Pattern of Plates




EURASIAN PLATE
INDIA
Today
10 million
years ago
SRI LANKA
38 million
years ago
Equator
55 million
years ago
INDIAN
OCEAN
71 million
years ago
"INDIA"
Land mass
SRI LANKA

How do faults form?





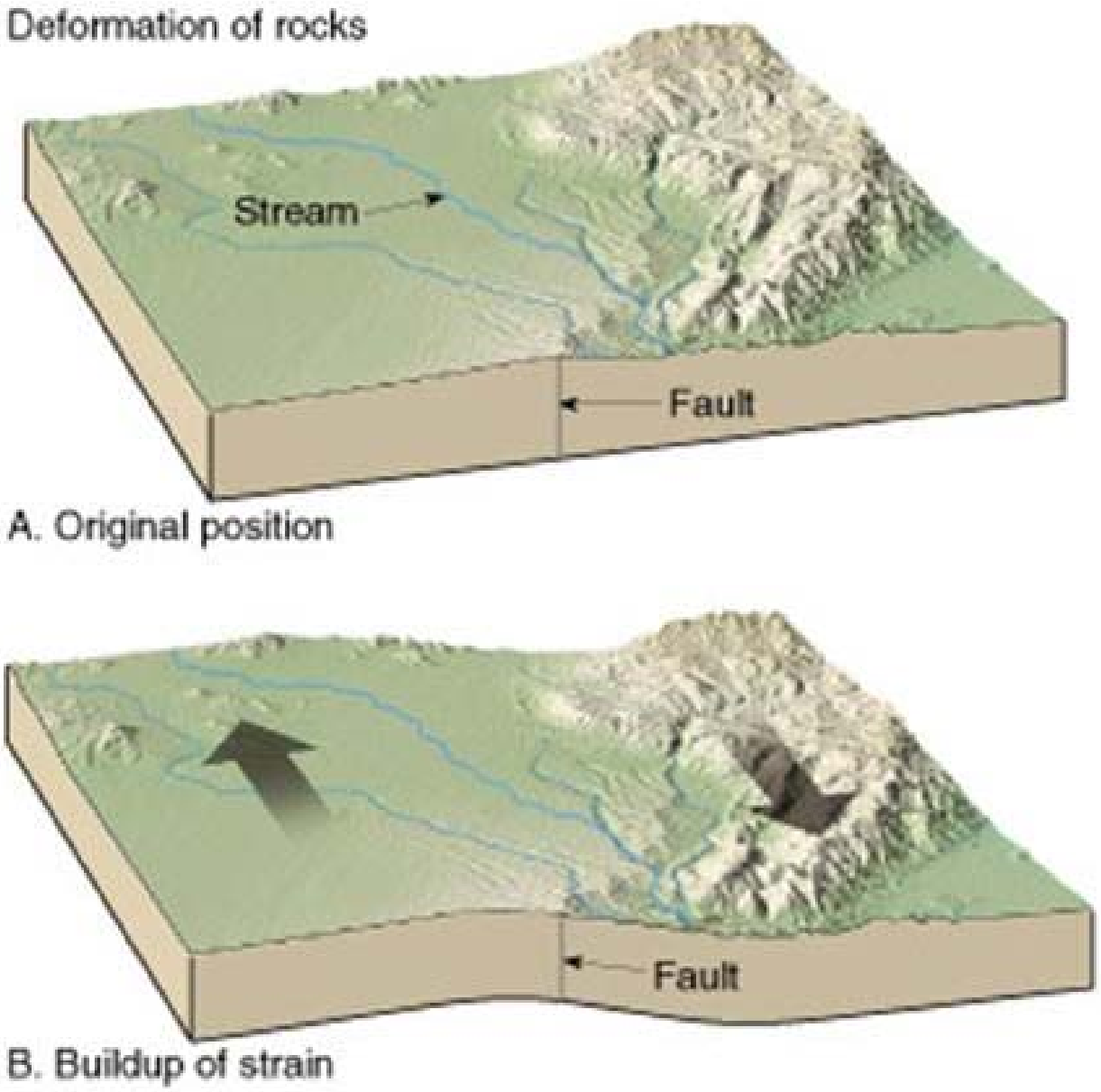
- Faulting is the sliding (grinding) past each other of plates. The friction causes earthquakes
- Seismicity commonly originates at shallow (~30km) depths
- Aseismic >70 km

Reverse Fault

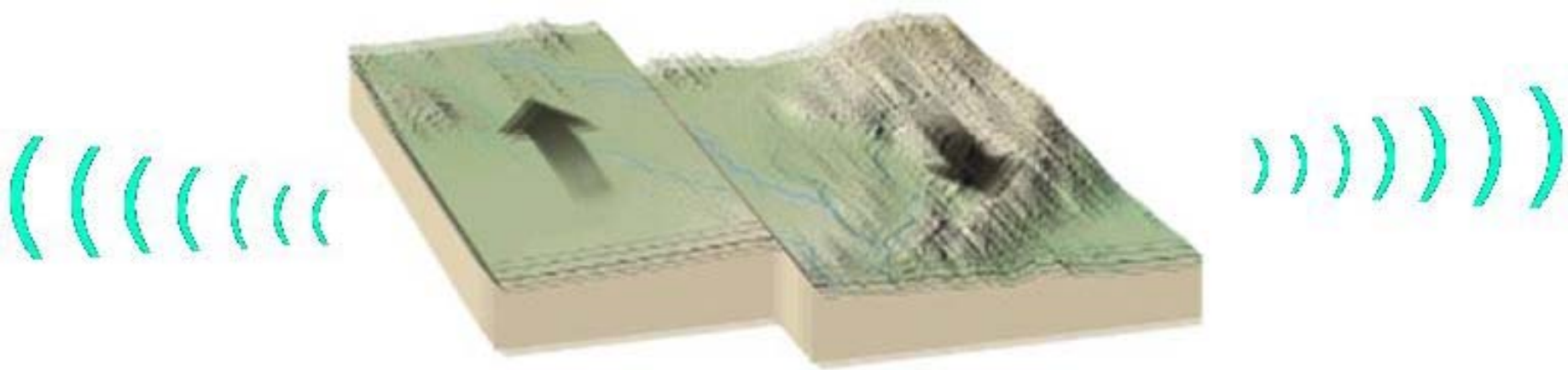
Normal Fault

Strike Slip Fault

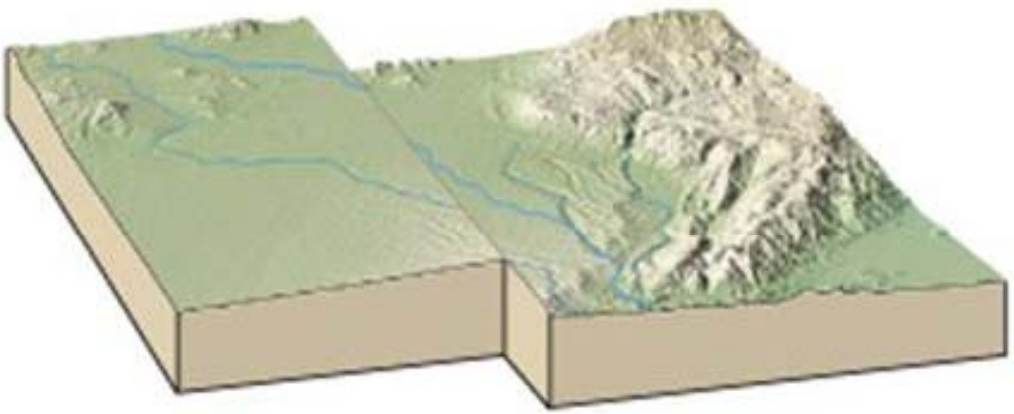
How do earthquakes generate?



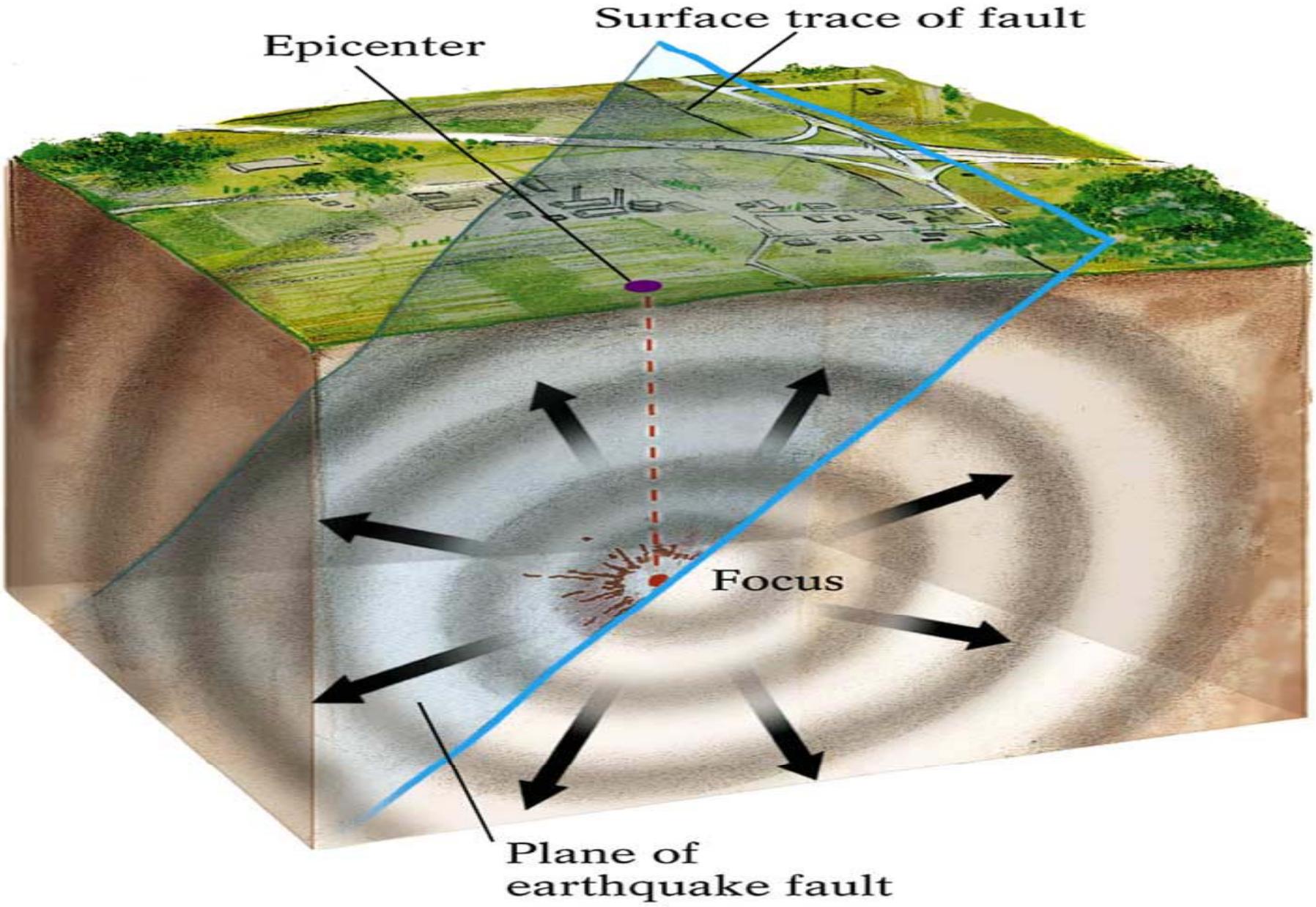
How do earthquakes generate?



C. Slippage



D. Strain released


Surface trace of fault
Epicenter
Focus
Plane of
earthquake fault

Earthquake types

- Natural
  - Volcanic
  - Tectonic
  - Landslide (e.g. Mantaro River, Peru,1974)
- Anthropogenic
  - Rock burst (e.g. deep South African mines)
  - Reservoir-triggered (e.g. Koyna reservoir, India)
  - Explosion (nuclear & large conventional)

TABLE 16.3 Earthquake Magnitude and Energy Equivalence

Earthquake Magnitude	Energy Released* (Millions of Ergs)	Approximate Energy Equivalence
0	630,000	1 pound of explosives
1	20,000,000	
2	630,000,000	Energy of lightning bolt
3	20,000,000,000	
4	630,000,000,000	1000 pounds of explosives
5	20,000,000,000,000	
6	630,000,000,000,000	1946 Bikini atomic bomb test
		1994 Northridge Earthquake
7	20,000,000,000,000,000	1989 Loma Prieta Earthquake
8	630,000,000,000,000,000	1906 San Francisco Earthquake
		1980 Eruption of Mount St. Helens
9	20,000,000,000,000,000,000	1964 Alaskan Earthquake
		1960 Chilean Earthquake
10	630,000,000,000,000,000,000	Annual U.S. energy consumption

*For each unit increase in magnitude, the energy released increases about 31.6 times.
SOURCE: U.S. Geological Survey.

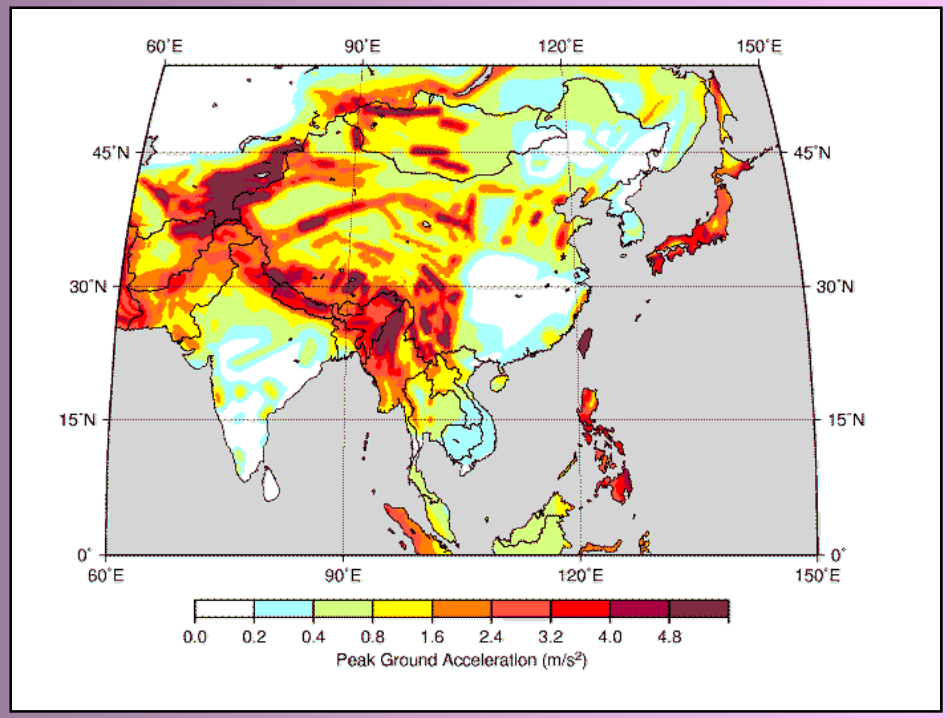
The Bikini atomic test (21k-ton) was about the same as Hiroshima Bomb (20 k-ton)

Relation of danger to faults

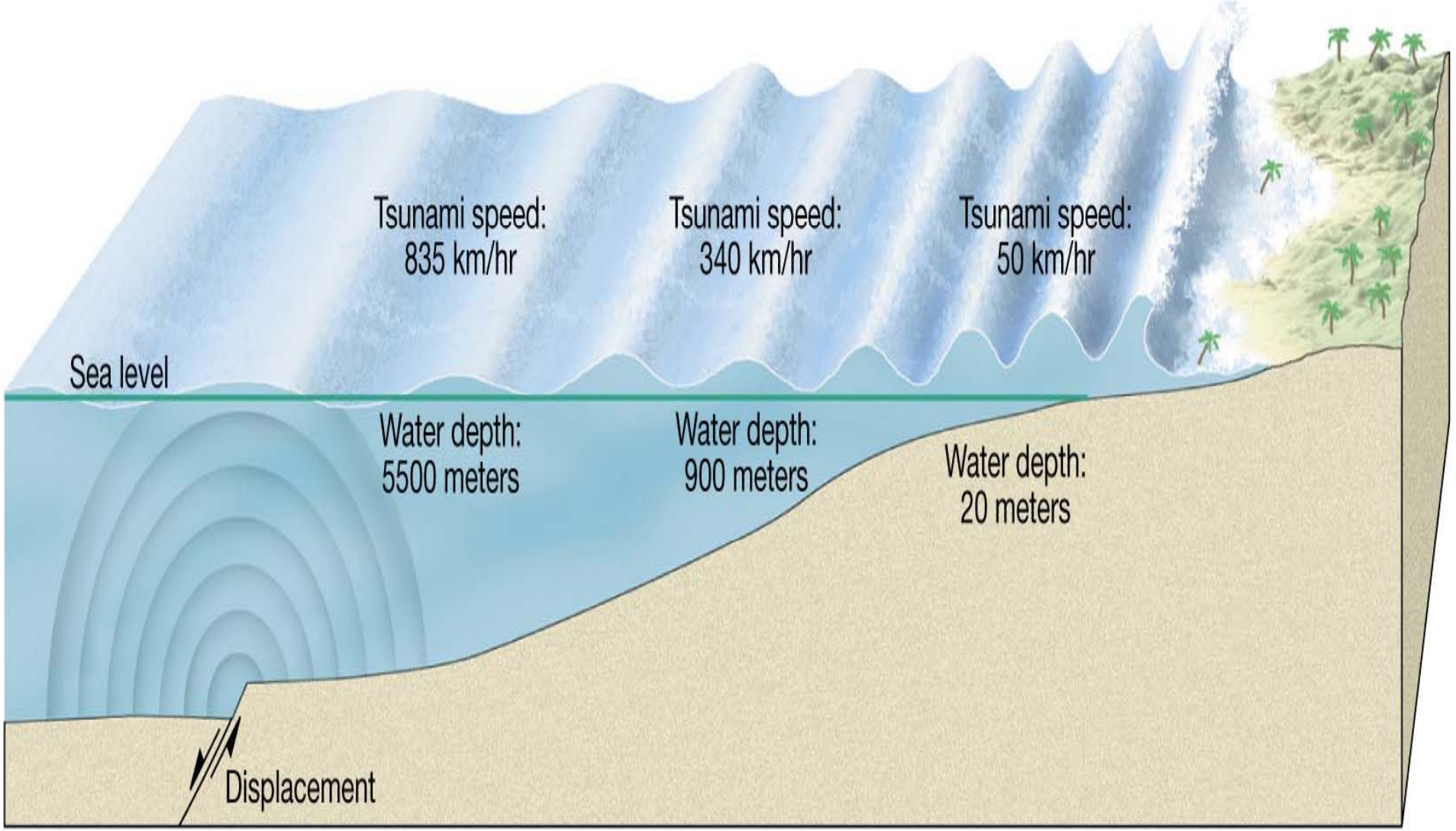
- Worst danger near faults
- Most damage within 50 km
- Occasional pockets of damage out to 100-200 km from rupture
  - Usually due to very soft soil
- M < 6.5 form circular isoseismals
- Long rupture: elongated isoseismals

Earthquake Hazard Potential

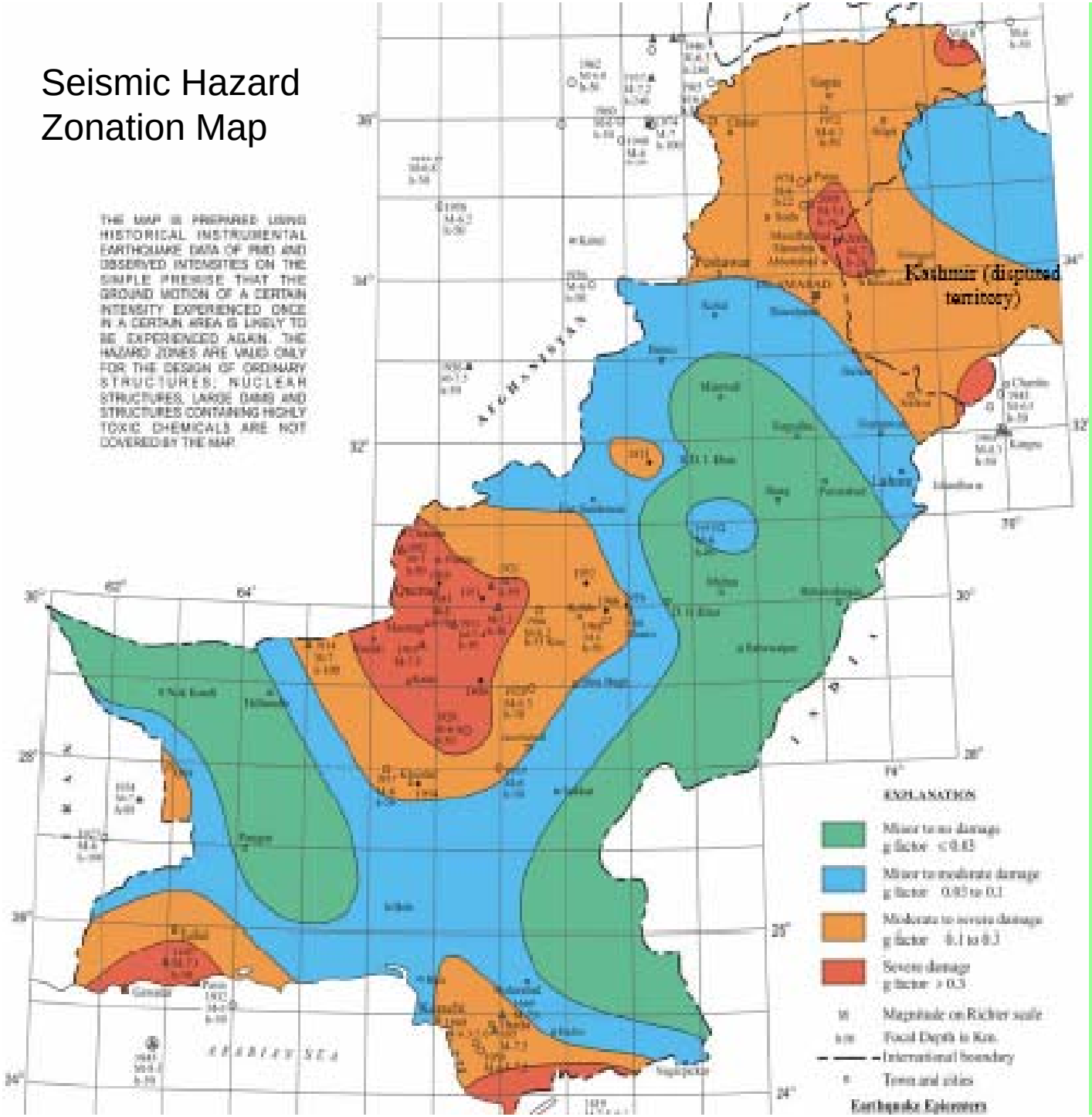
- Geology
- Peak Ground Acceleration (PGA)
- Active faults



Formation of a tsunami



Seismic Hazard Zonation Map




Thank You