

Physical Geography: Landforms

Intro to Geography
Lehman College
GEH 101/GEH 501

Keith Miyake

Housekeeping

- Next class on **Wednesday 2/23**
- Quiz next week on Ch. 3-4
- Term papers...
- Website problems?

Earth's Dynamic Landforms

Two primary types of landform changes: **Endogenous** and **Exogenous**

Endogenous

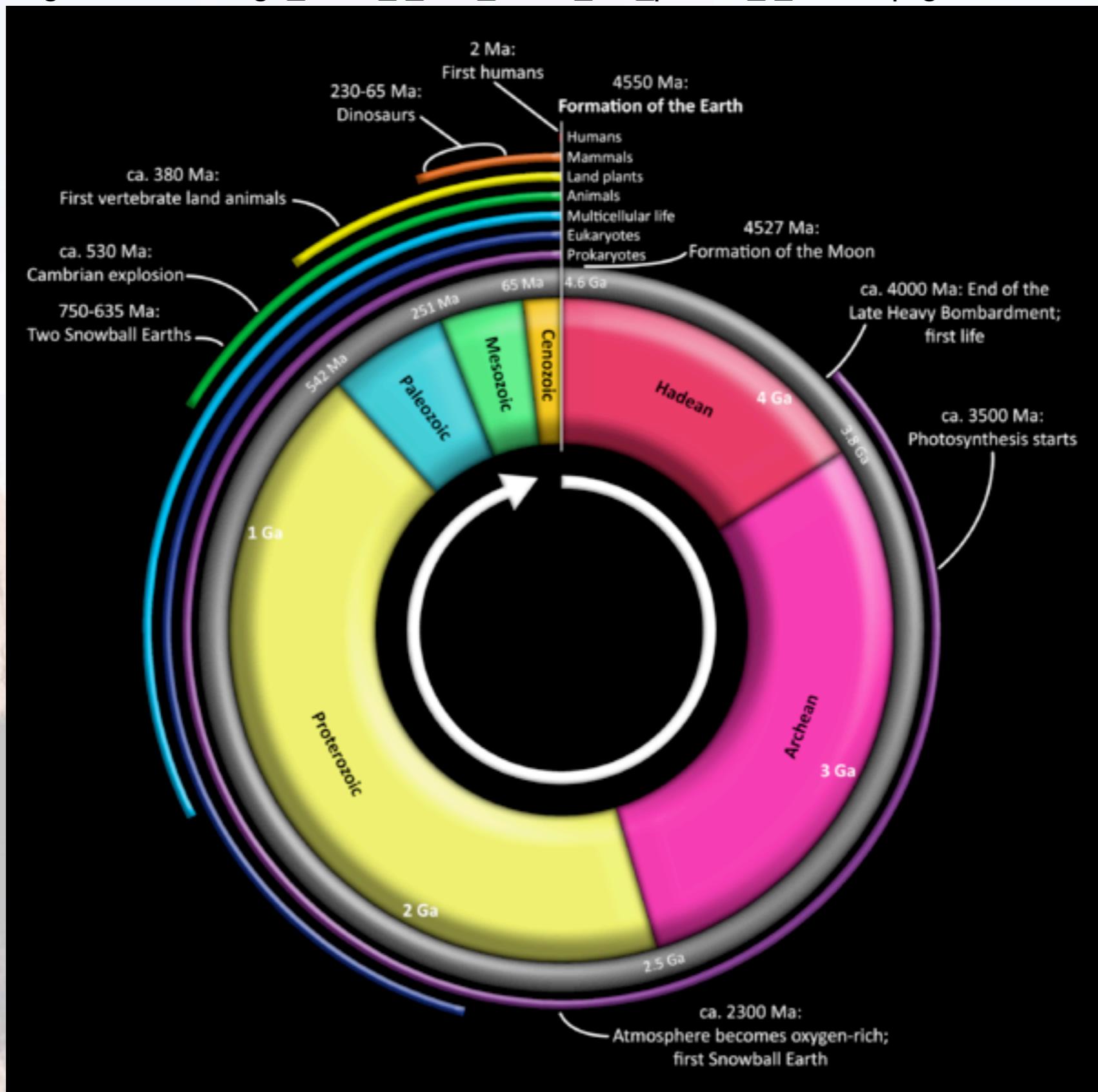


Comes from Within (Endo)
e.g., magma inside Earth

Exogenous



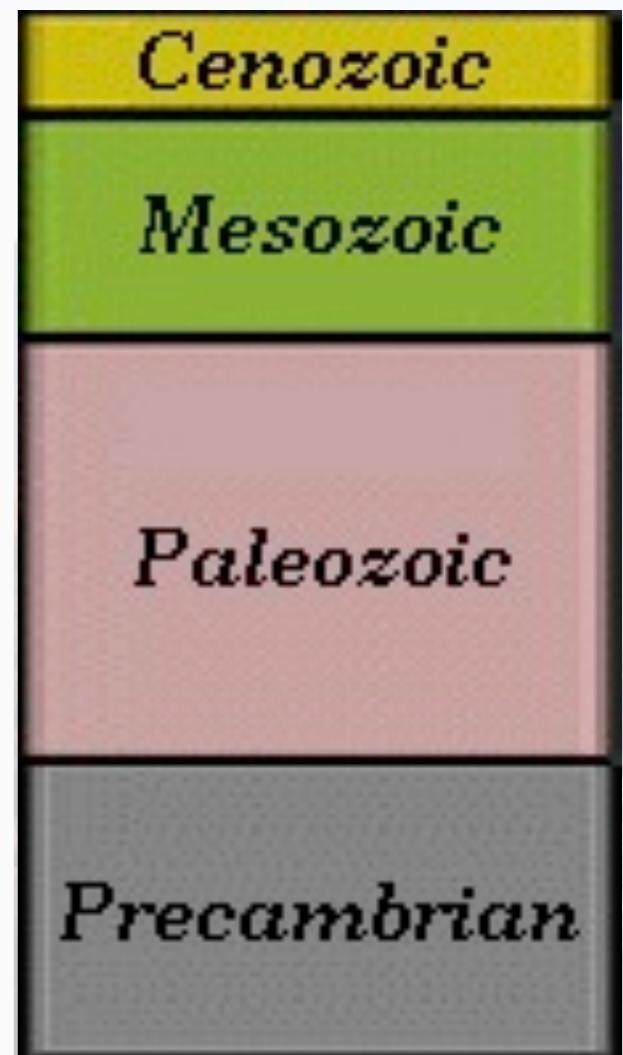
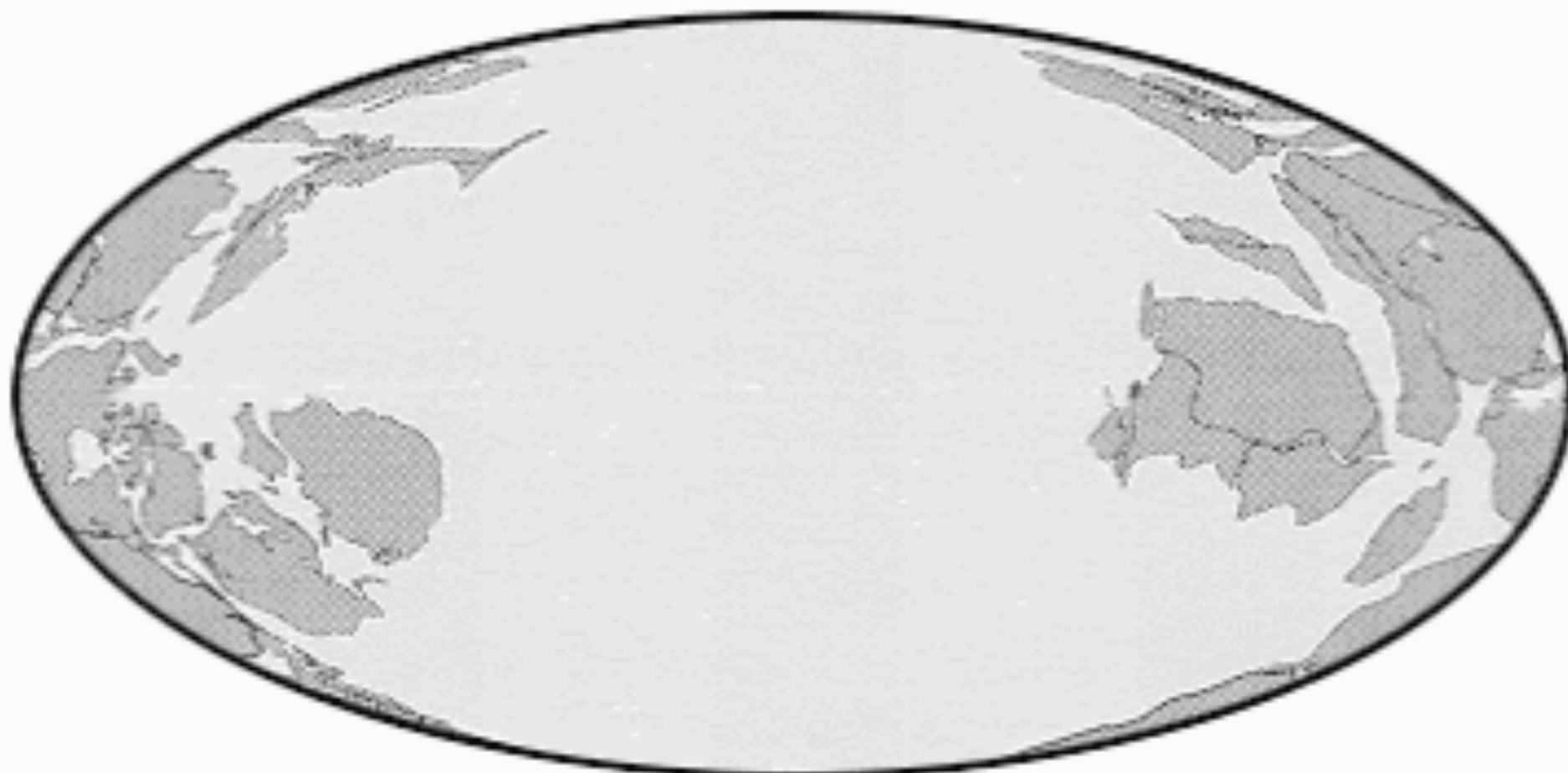
Comes from Outside (Exo)
e.g., weather on the surface



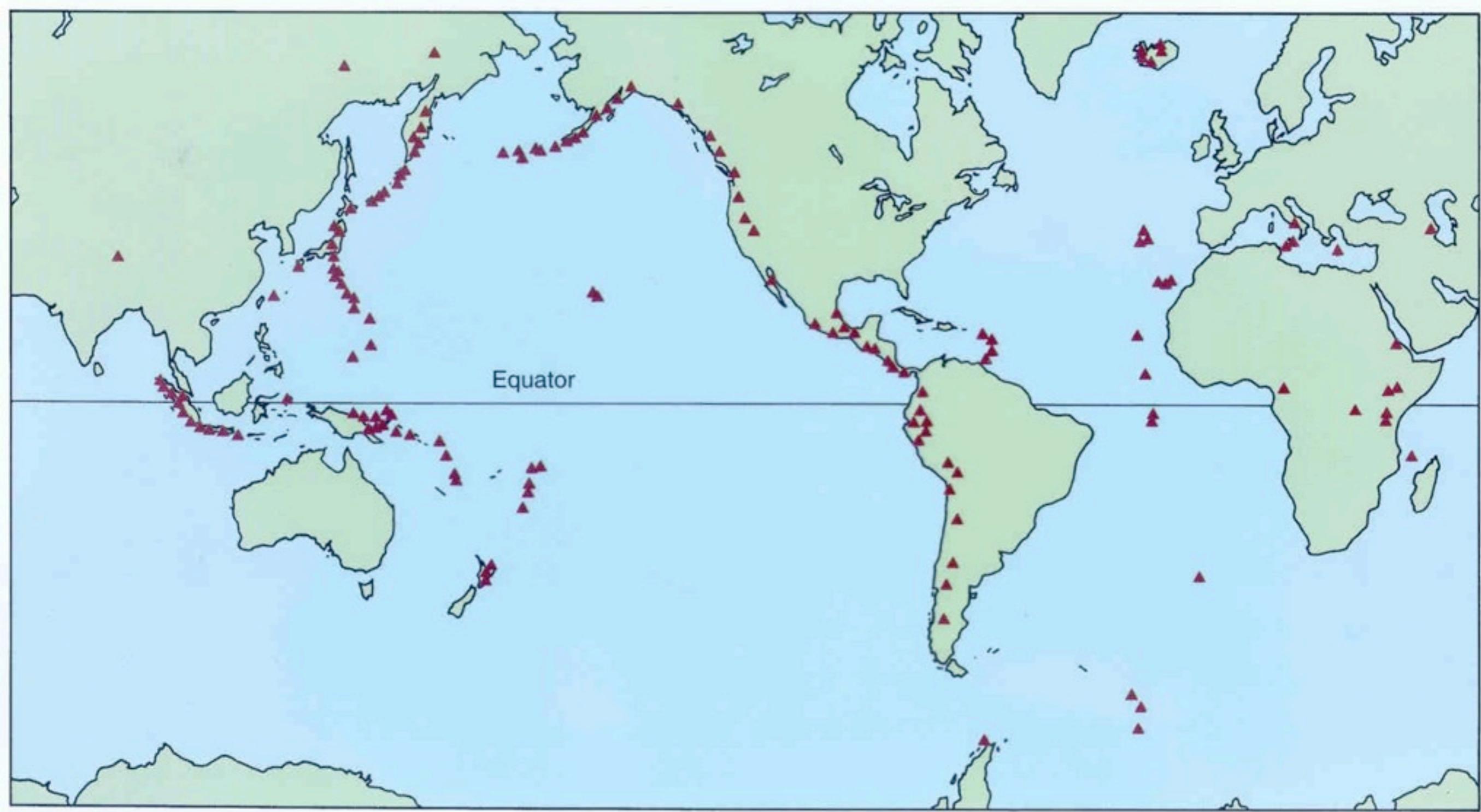
Geologic Time

Endogenous Processes (Inside the Earth)

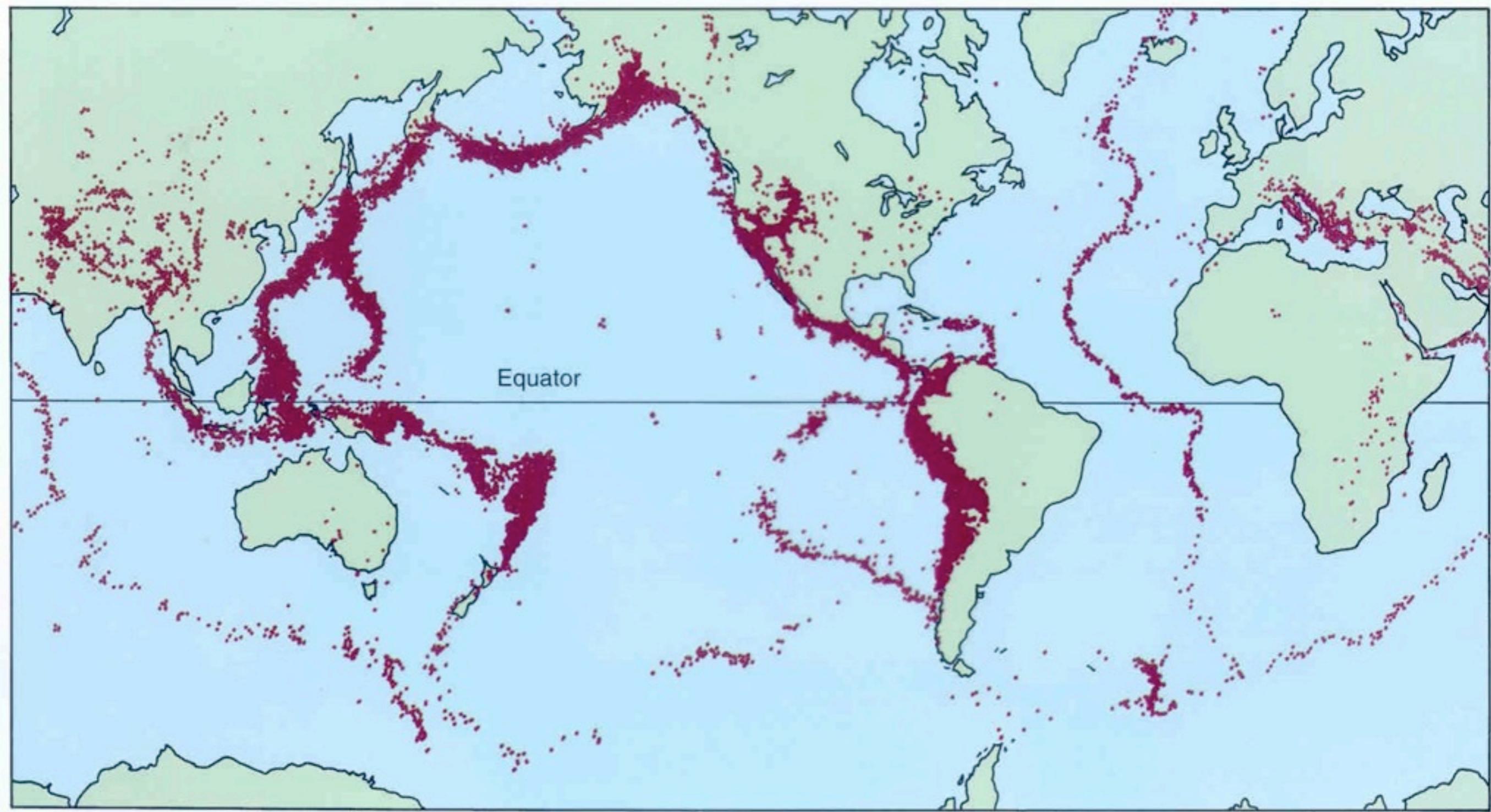
Plate Tectonics



World Volcanoes

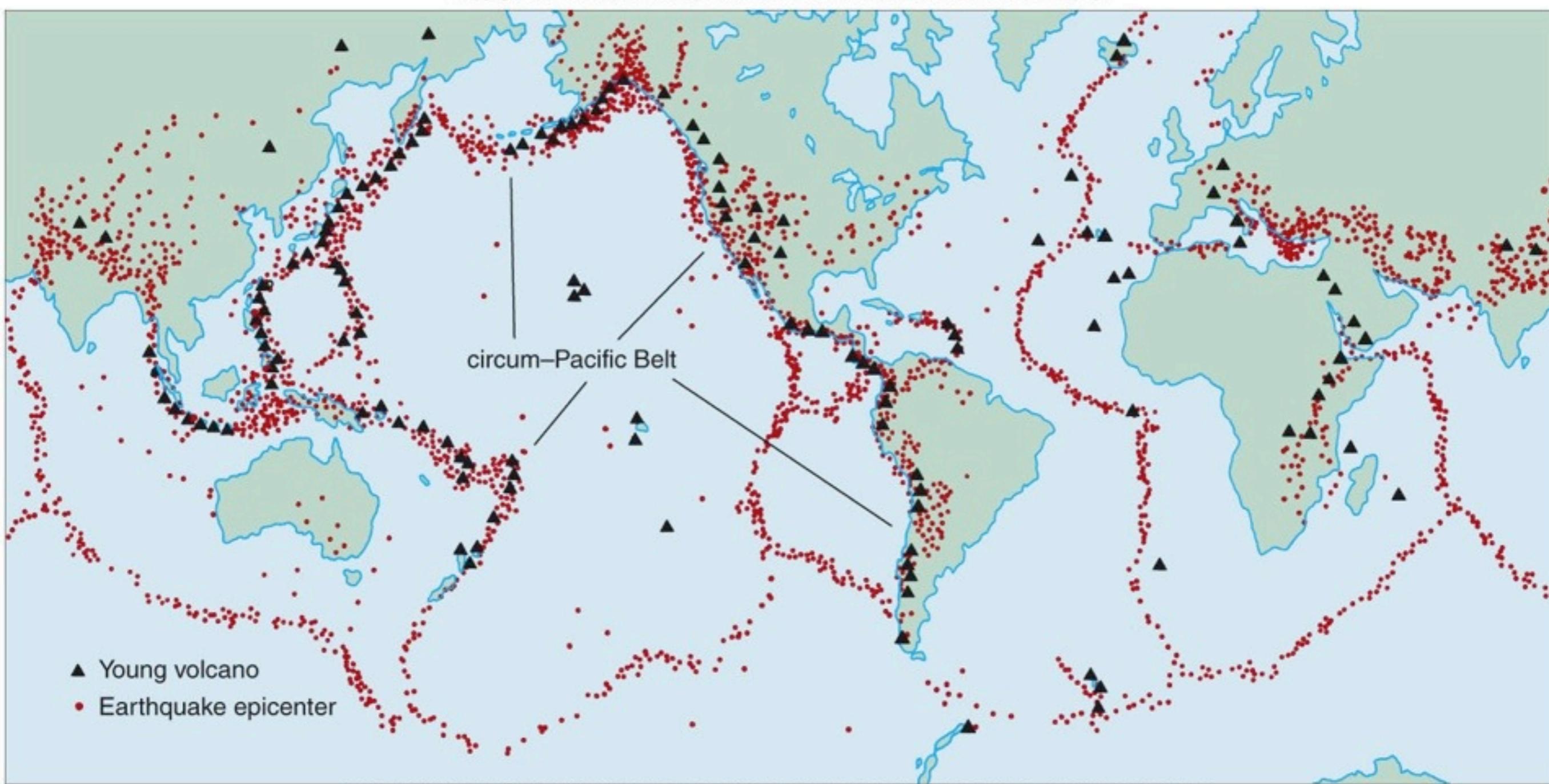


Earthquake Epicenters



Endogenous Landform Changes: Tectonic Forces

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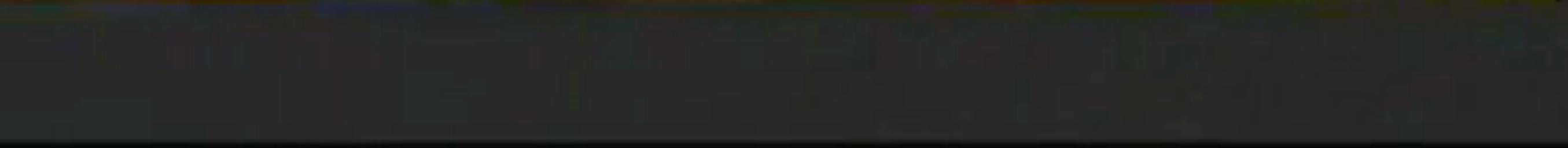
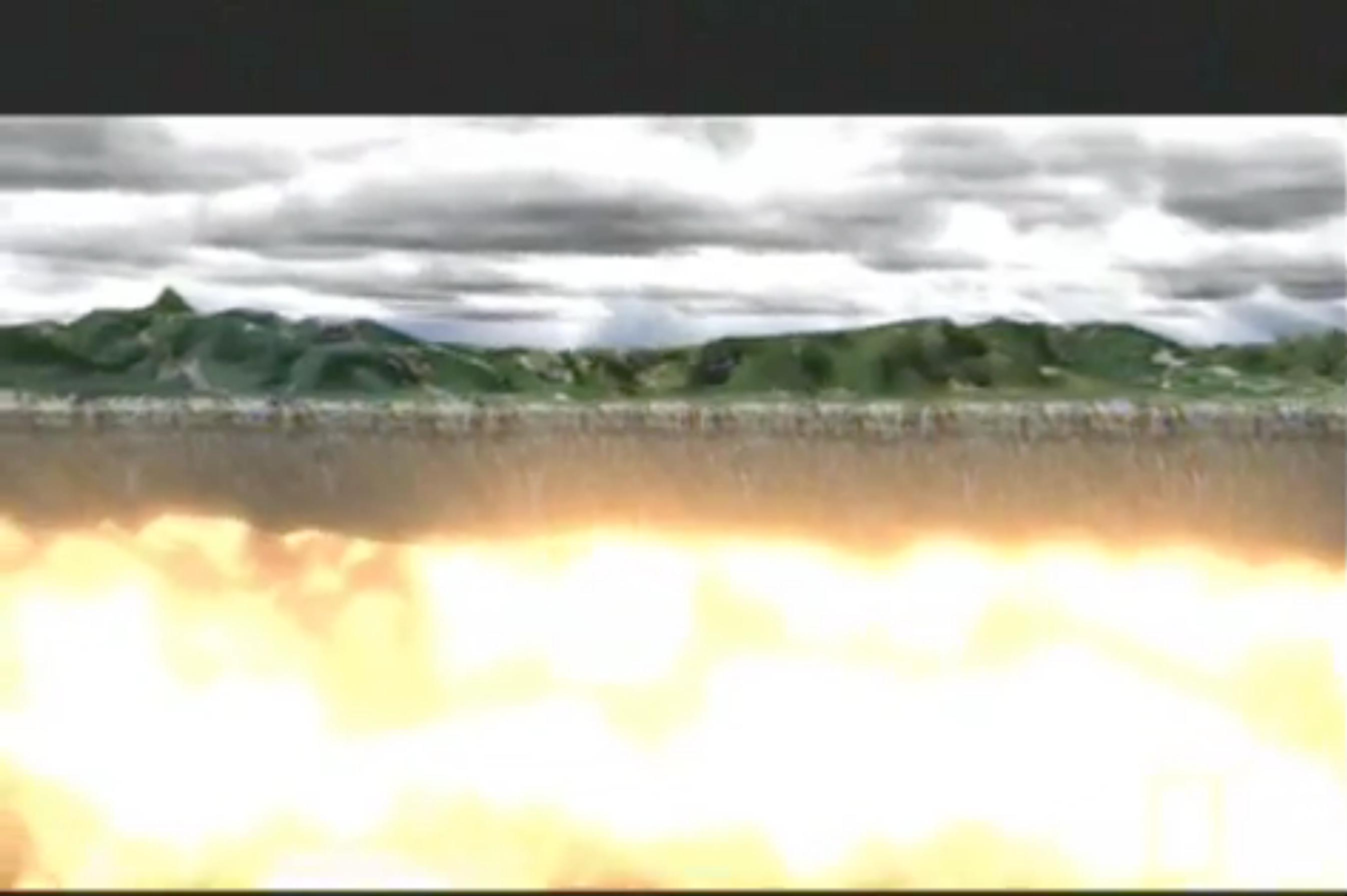


Plate Tectonics

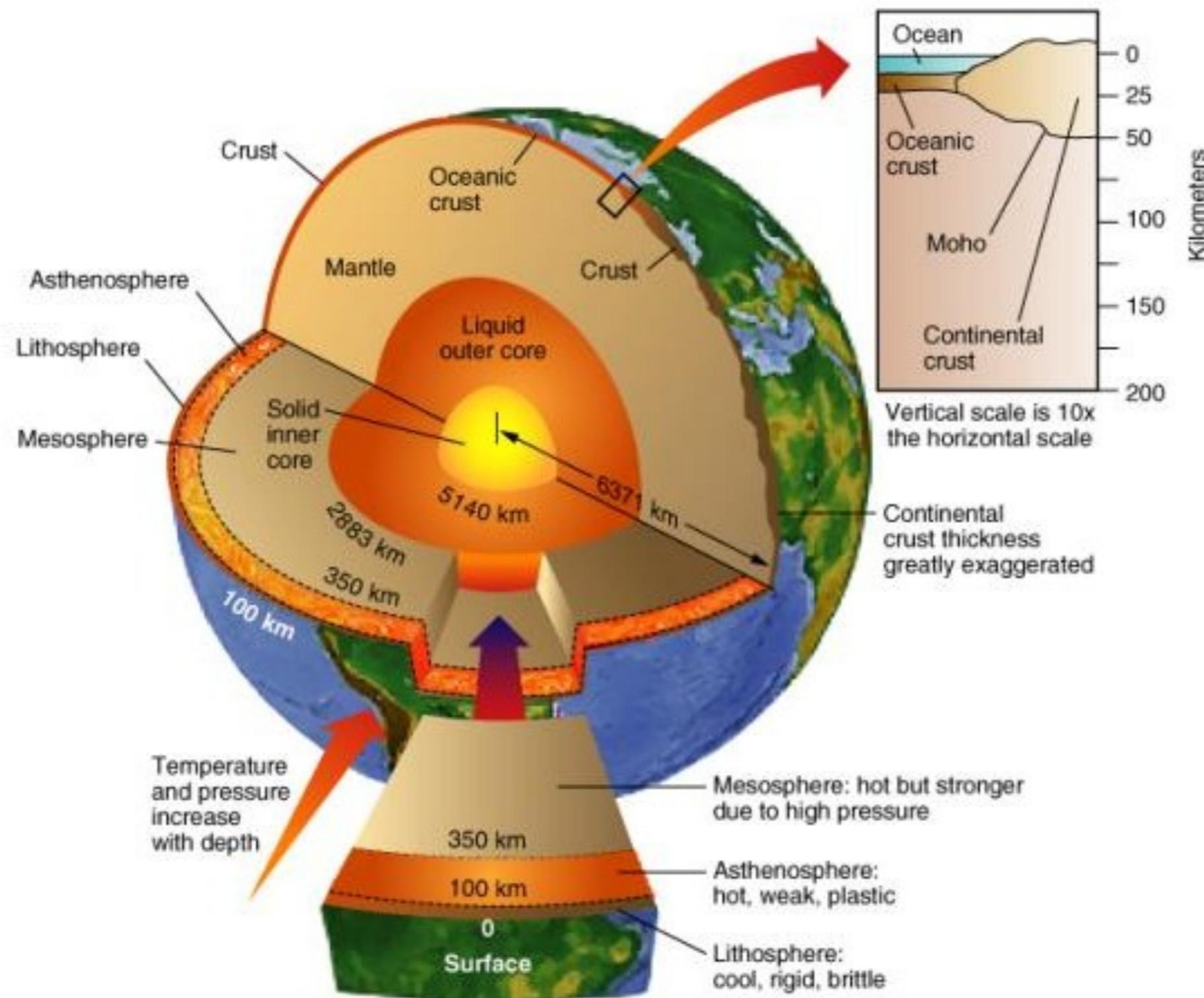


Plate Tectonics

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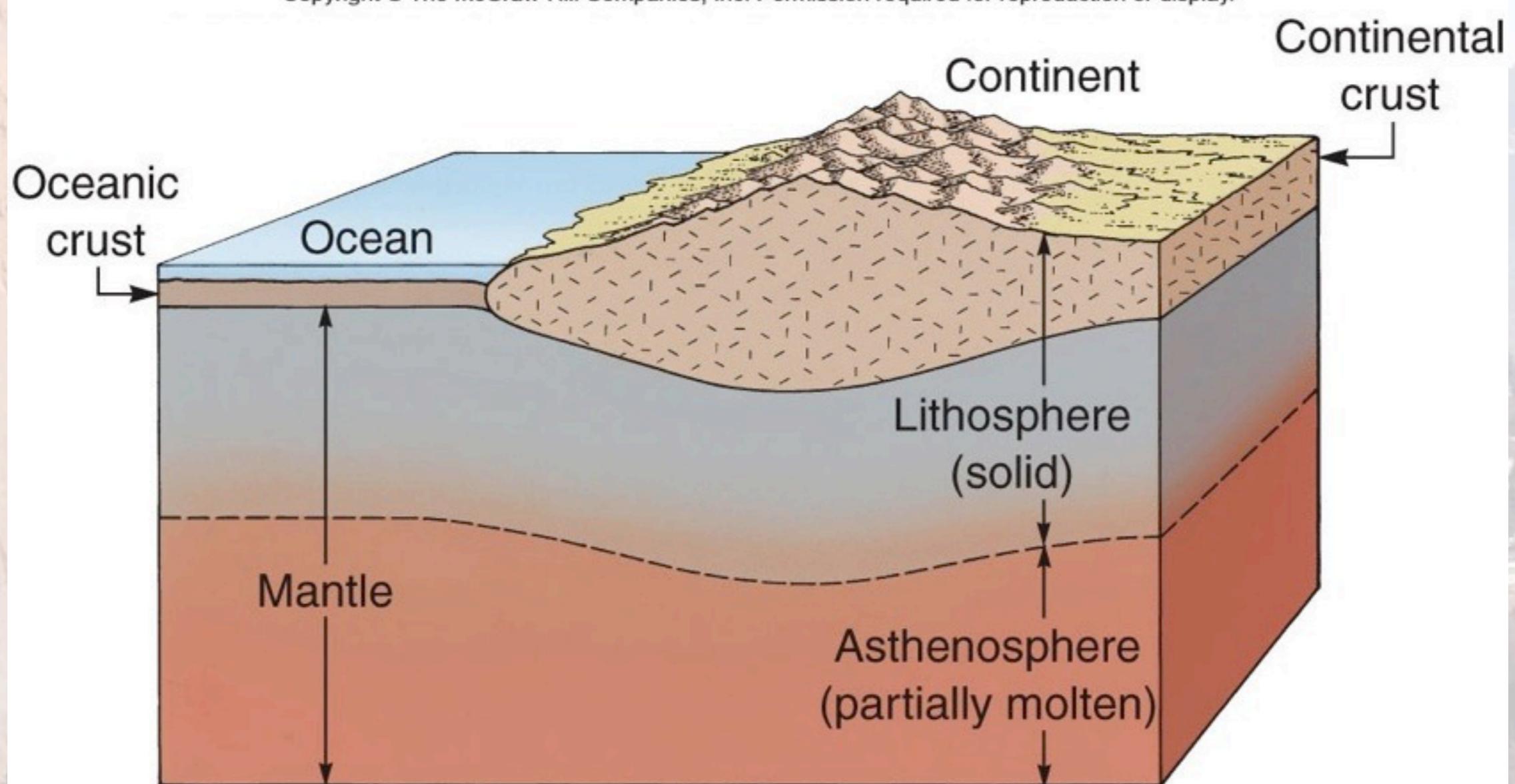
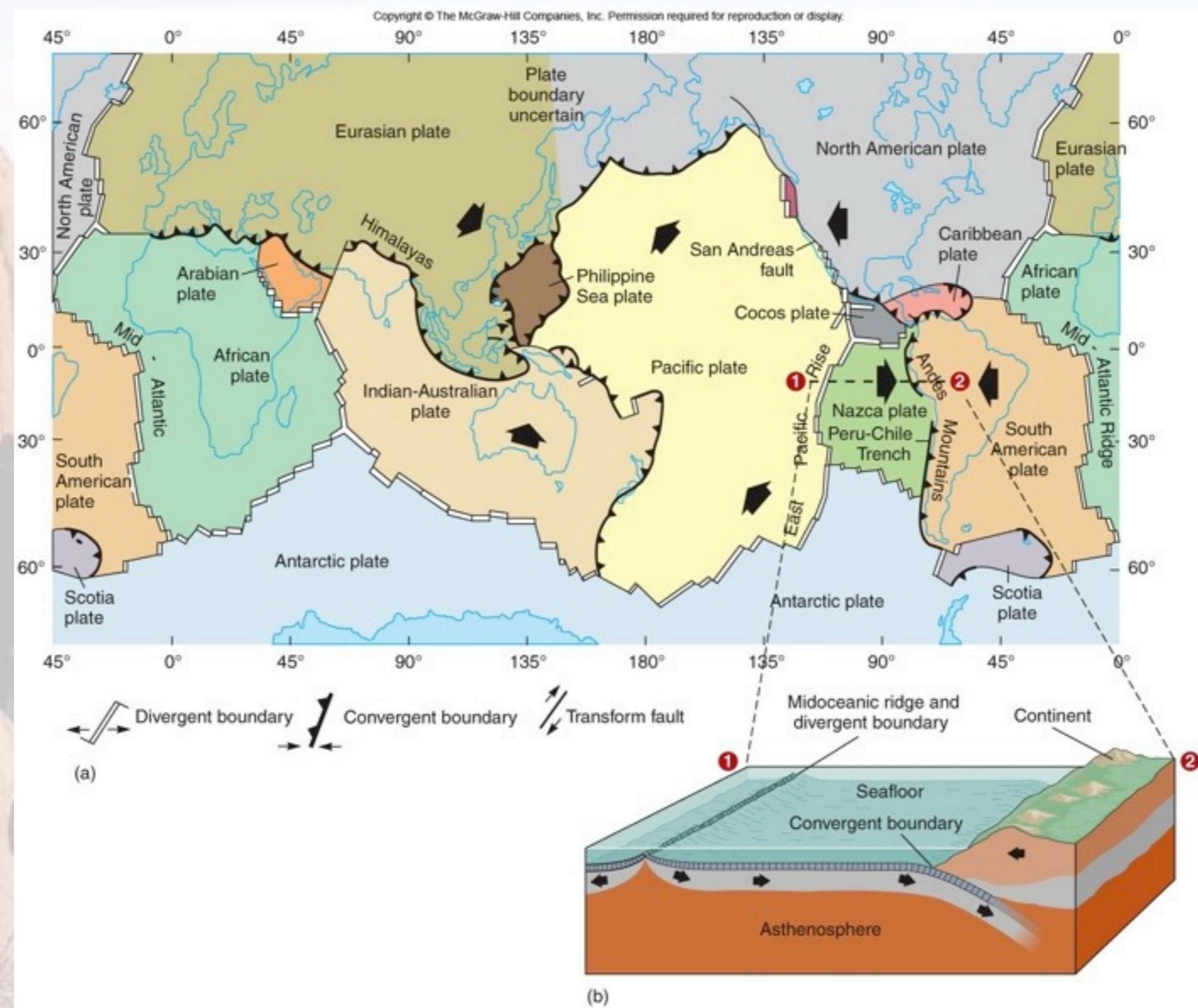
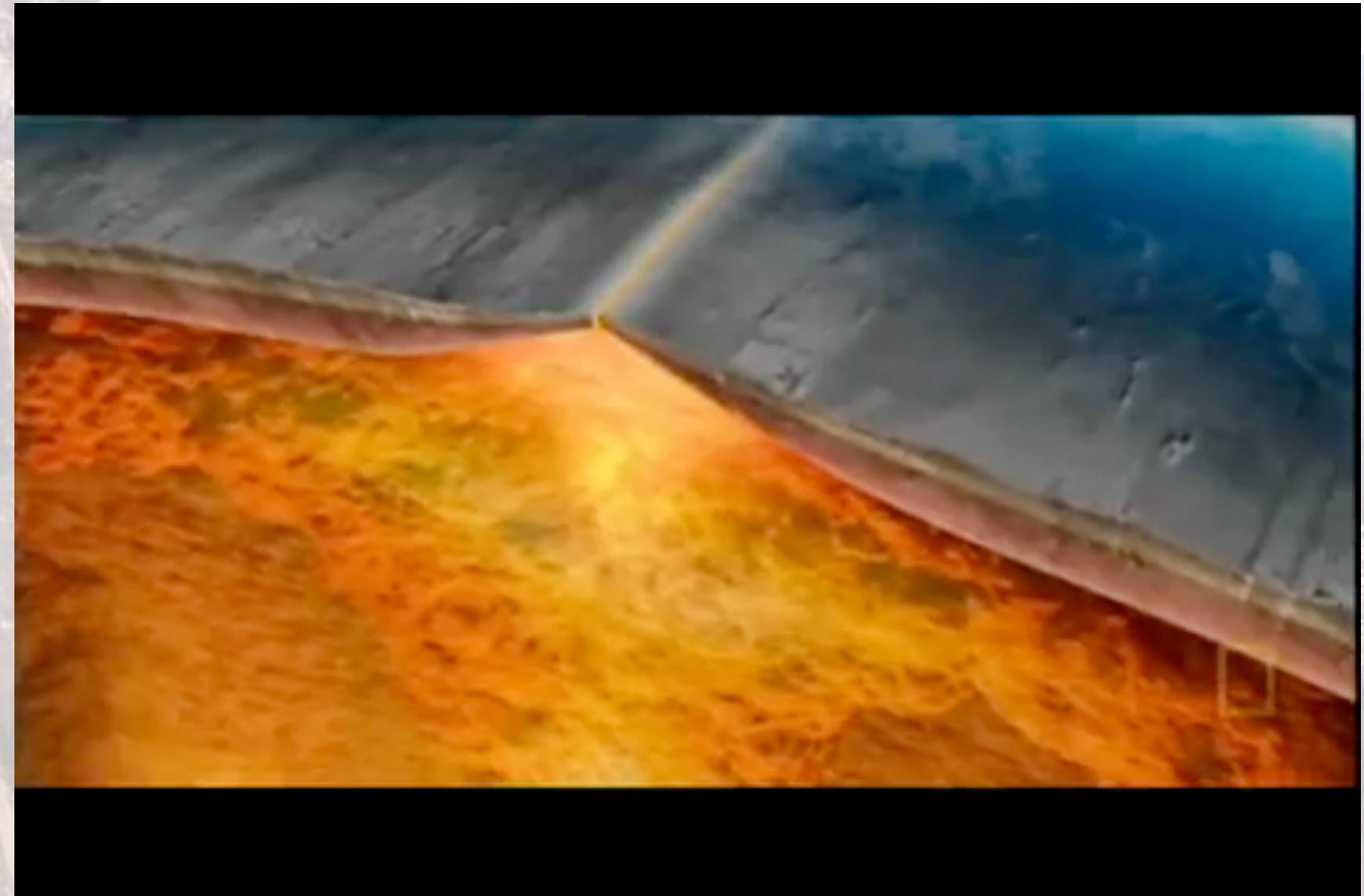


Plate Tectonics



Mechanics of Plate Tectonics

- Diastrophism
- Volcanism



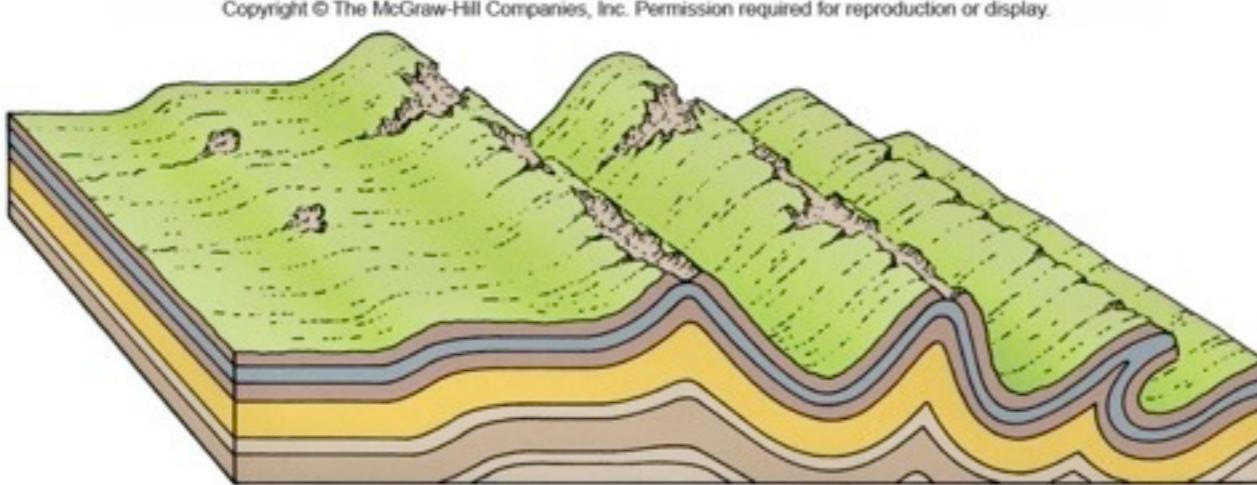
Source: National Geographic via youtube.com

Diastrophism

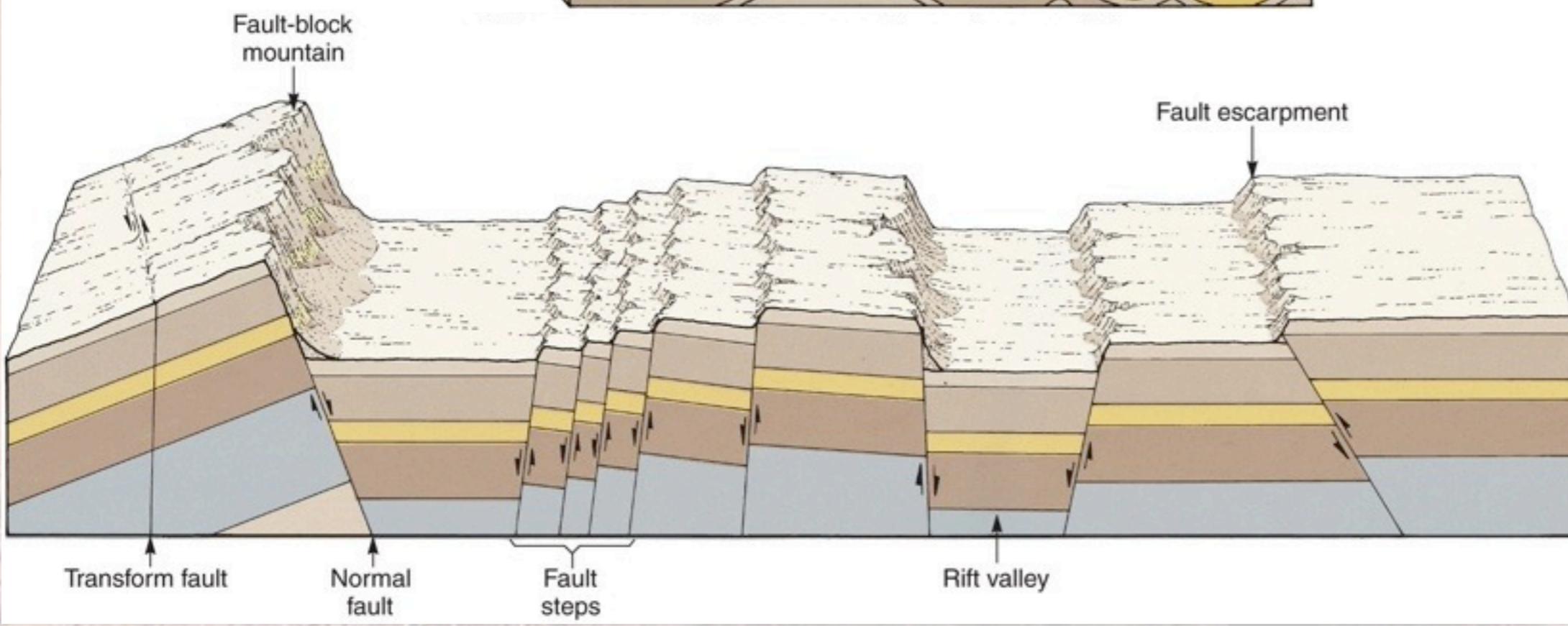
● Broad Warping



● Folding

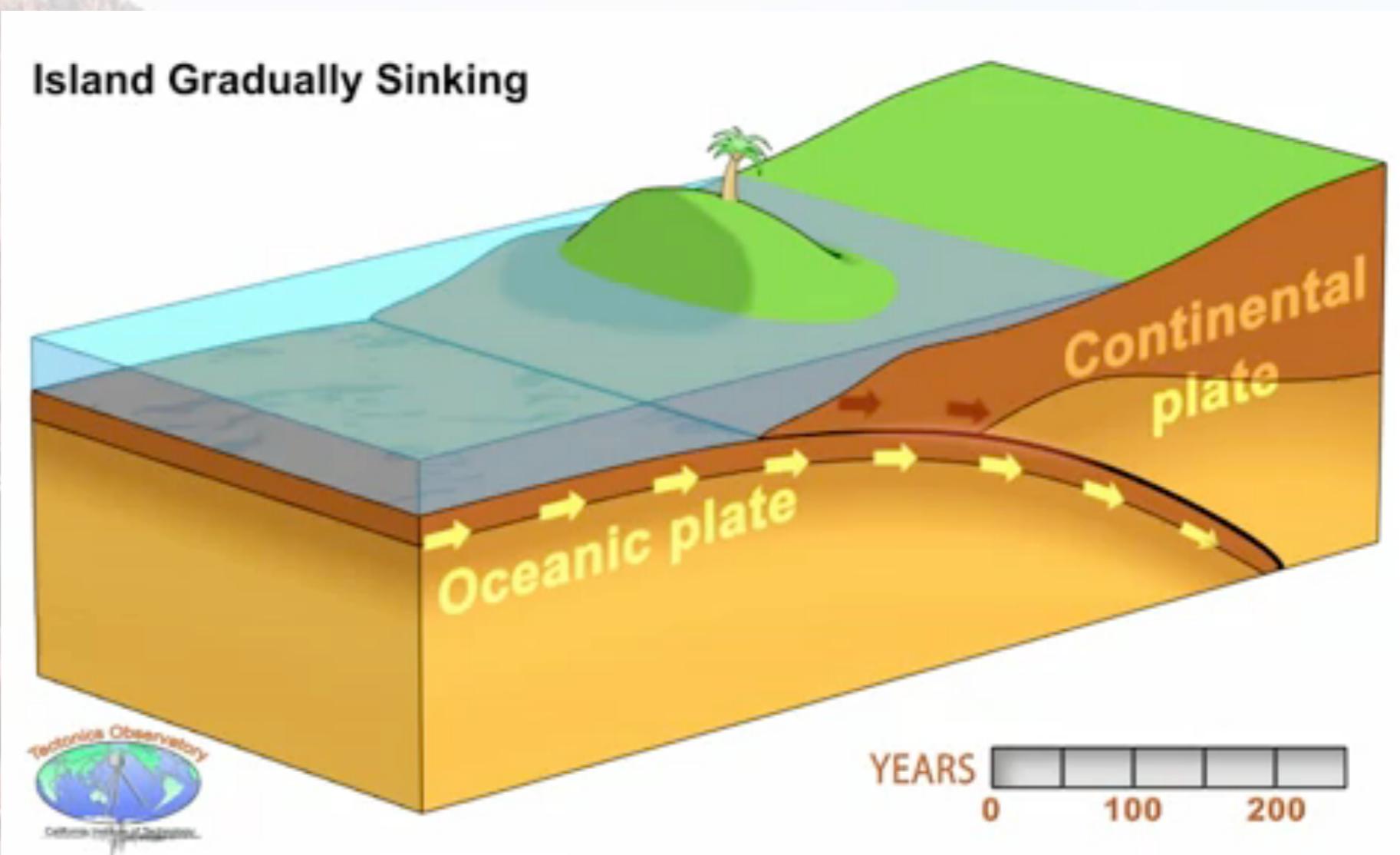


● Faulting



Faulting

- Earthquakes
- Tsunamis

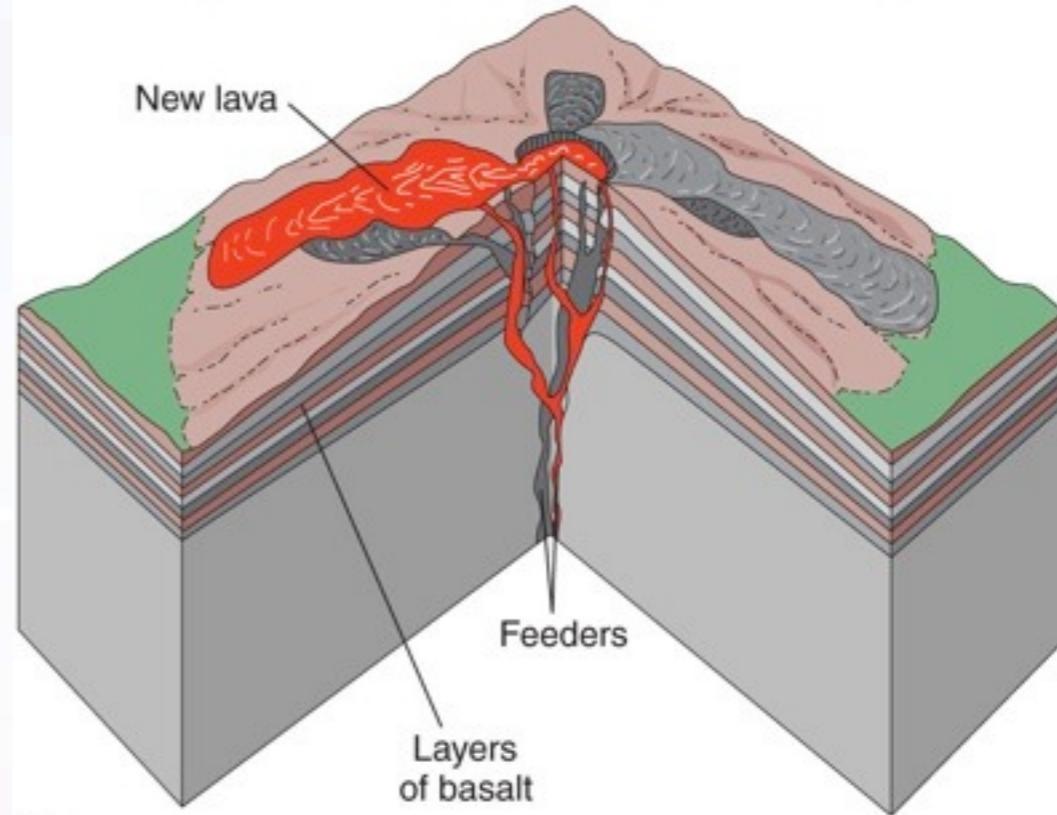


Source: <http://www.youtube.com/watch?v=4Xebwzb3dDE>

Volcanism

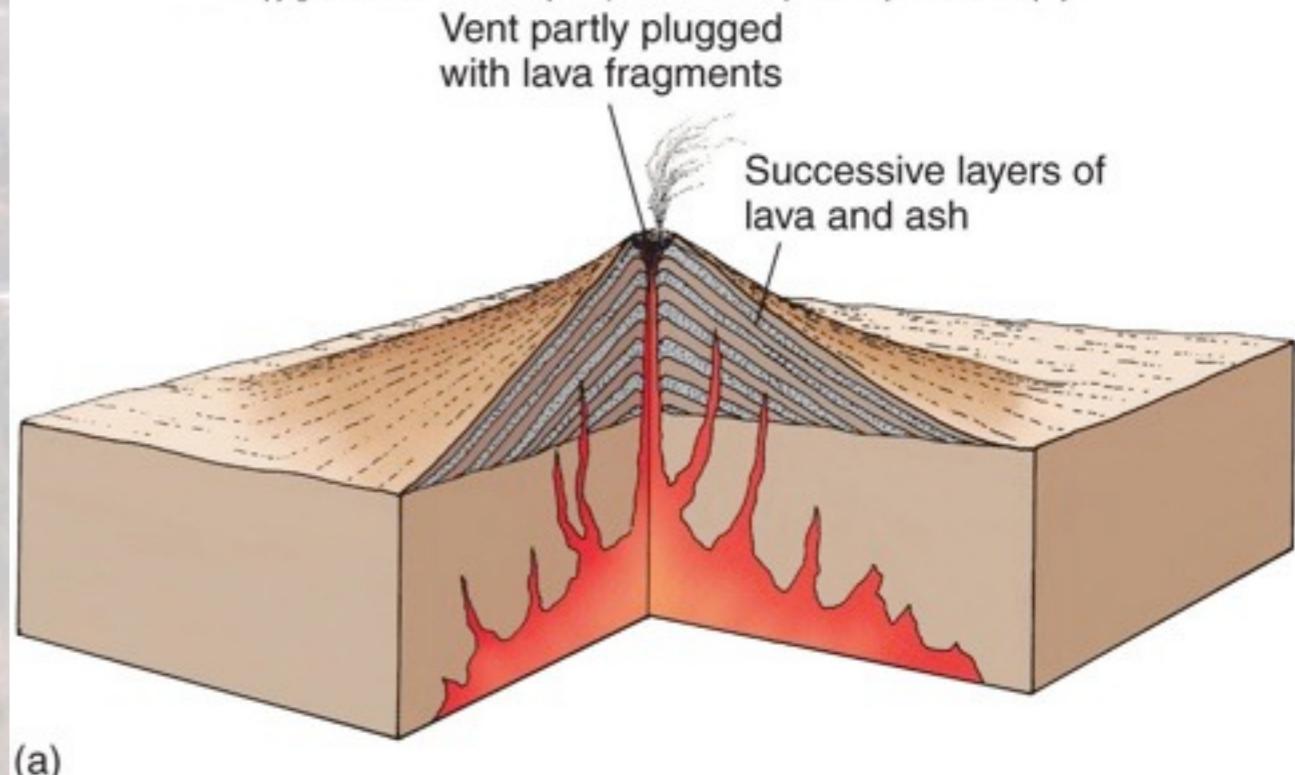
- Points at which magma surfaces
- Plate intersections and hot spots
- Volcanoes can be explosive or mellow
- Lava can flow without forming a volcano

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(b)

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(a)

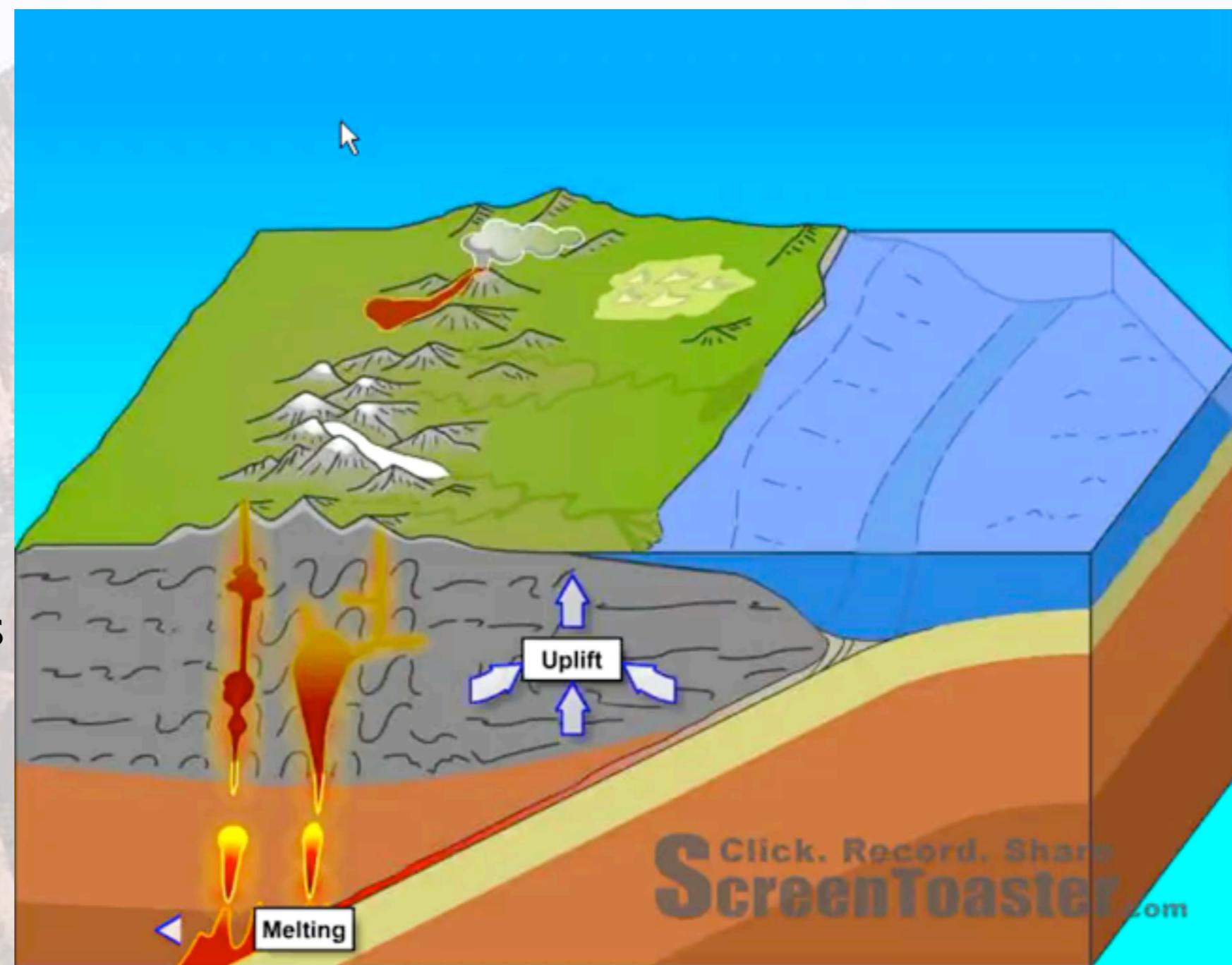
Types of Rocks

- * Igneous
- * Sedimentary
- * Metamorphic

Devil's Postpile National Monument
Mammoth Lakes, CA
Eastern Sierra Nevada Mountains

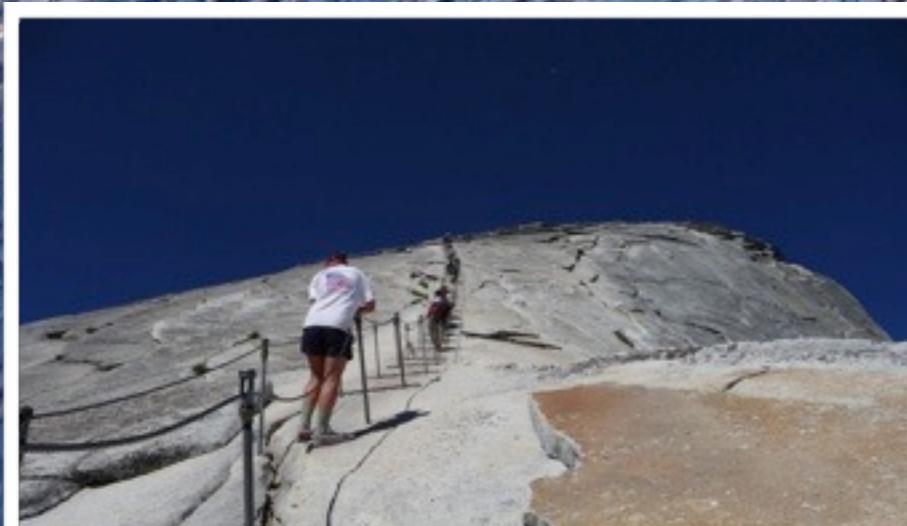
Rock Cycle

- Building up:
 - plate tectonics
 - creates igneous, metamorphic rocks
- Breaking down:
 - gradational processes
 - creates sedimentary rocks



Igneous Rock

Forms from cooling magma



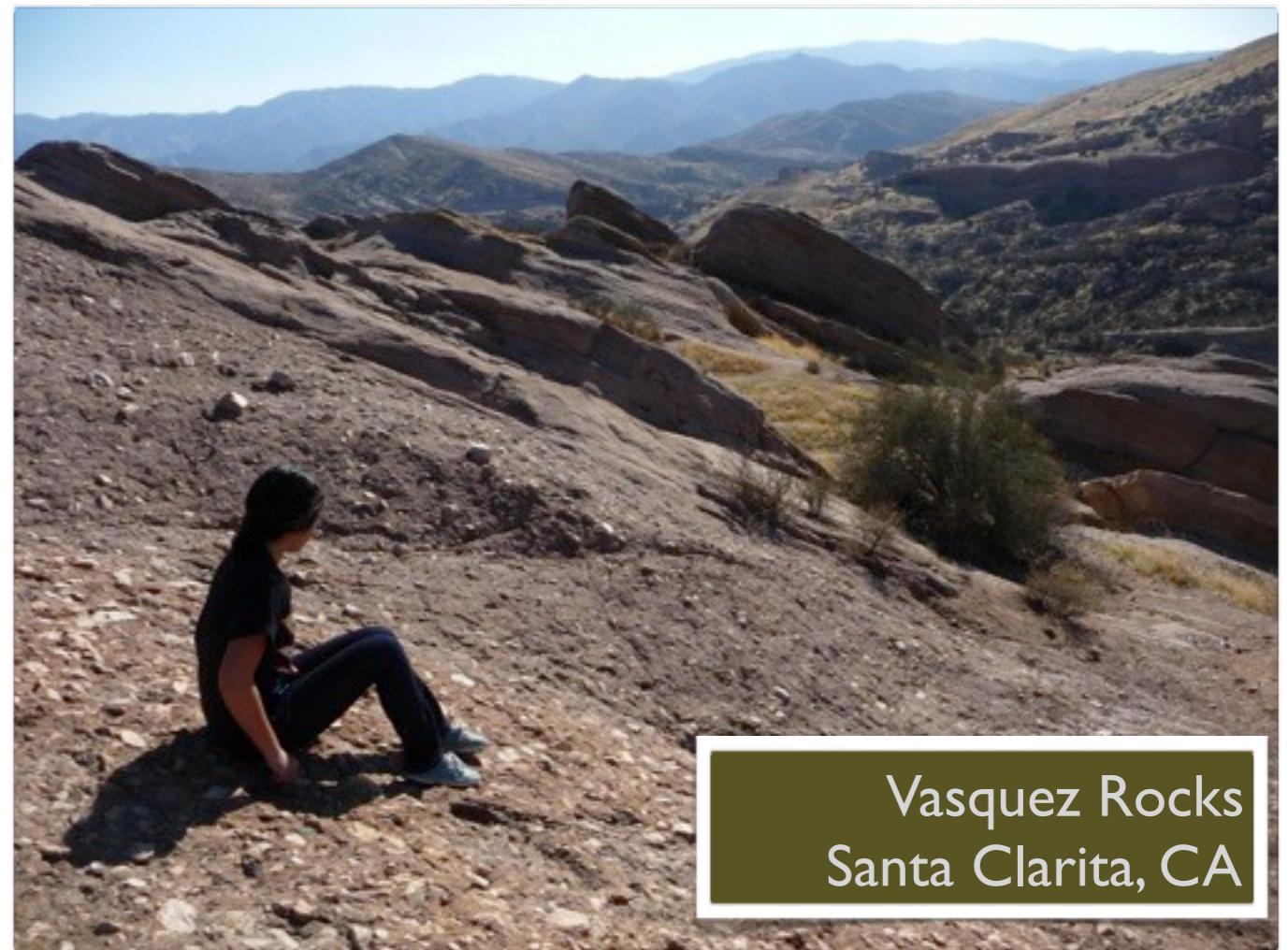
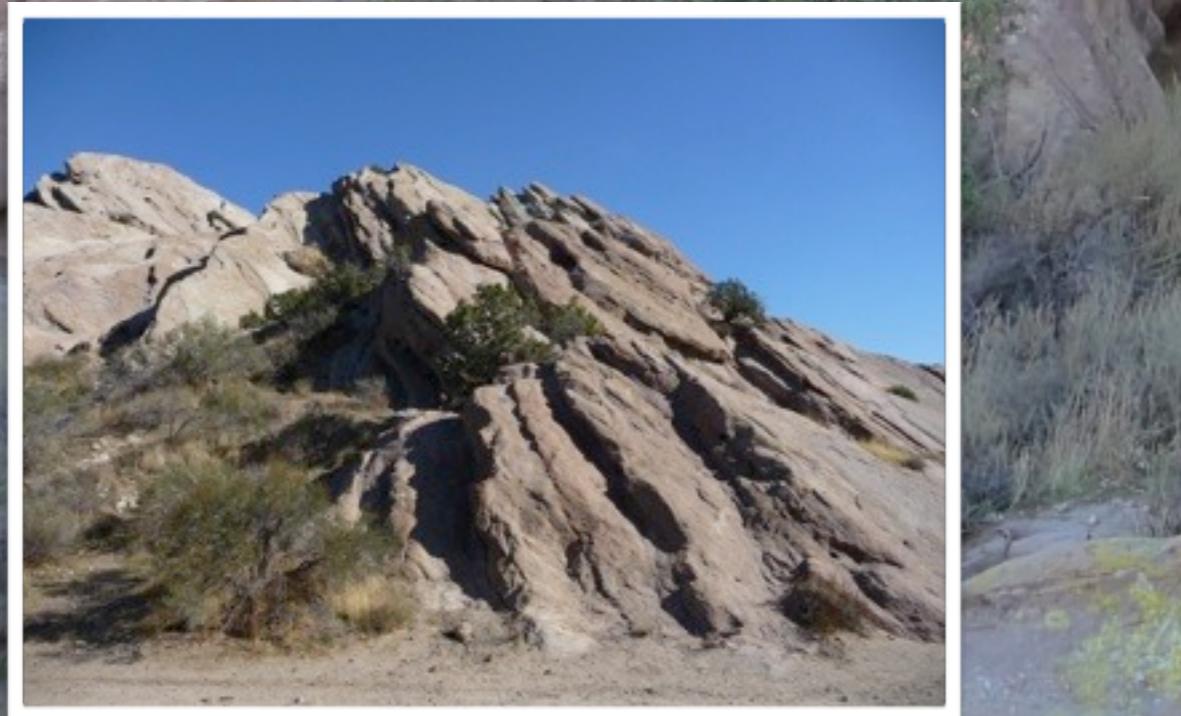
Half Dome
Yosemite National Park, CA



Mt. Whitney
Elevation: 14,505 ft.
Sierra Nevada Range, CA

Sedimentary Rock

Eroded gravel, sand, silt, clay, dust, and organic matter



Vasquez Rocks
Santa Clarita, CA

Metamorphic Rock

Formed over time when extreme heat, pressure, and/or chemical reactions cause the mineral structure to change



Folded Metamorphic Rocks
Kings Canyon National Park, CA

Not All Rocks Are Created Equal

- Different types of rocks and soils have different structural properties
- Stand up to weathering differently
- Allow for different land uses
- Why are all of the skyscrapers on Long Island in LIC and Downtown Brooklyn?



Exogenous Processes (on the outside of the Earth)

Gradational Processes



Source: <http://www.flickr.com/photos/hcarr/3634841720/>

- Weathering
- Mass movement (Gravity)
- Erosion and **Glaciers**

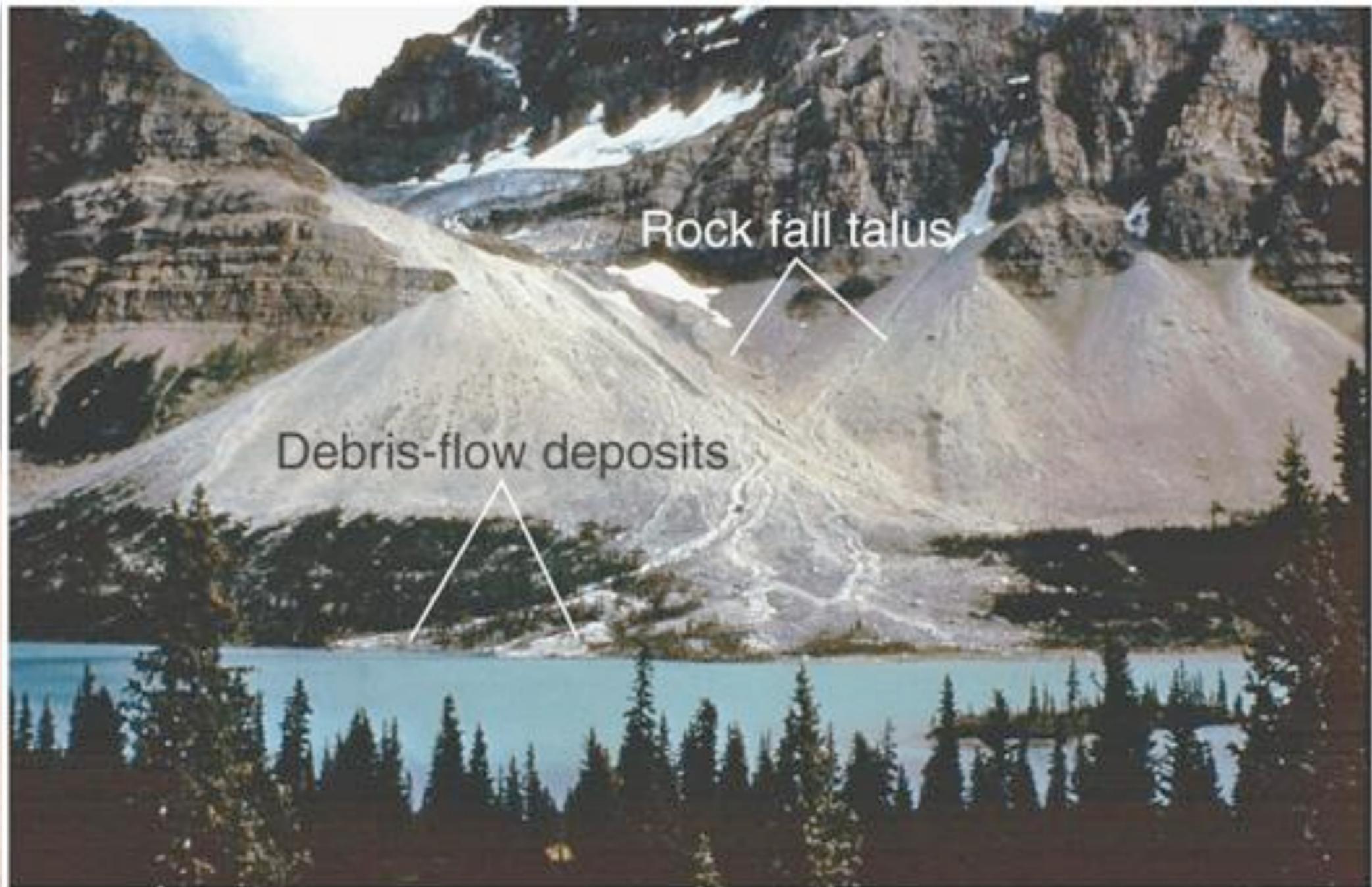
Central Park Boulders

Weathering

Process by which rocks are broken down and fragmented

- Mechanical
 - frost
 - salt formation
 - biological
- Chemical
 - oxidation
 - hydrolysis
 - carbonation

Mass Movement (Gravity)



Erosion

Rocks are moved and broken down by various processes and deposited elsewhere

- Running water
- Groundwater
- Glaciers
- Wind

Streams

- Both flowing water and alluvium cause erosion
- Shaped by landforms as much as they shape landforms
- Rate of erosion controlled by grade, water volume, and natural and unnatural impediments to flow
- Create canyons, waterfalls, floodplains, buttes and mesas, lakes, etc.



Source: <http://www.al.nrcs.usda.gov/technical/photo/wet.html>



Source: <http://www.travelet.com/wp-content/uploads/2008/10/grand-canyon3.jpg>

Groundwater

- Water collects below the ground surface
- Lakes, streams, marshes form where water table is higher than the ground surface
- It flows like surface water and causes chemical weathering/erosion
- Creates sinkholes and caves

Guatemala Sinkhole
1 June 2010



Source: <http://www.bbc.co.uk/news/10200440>

Glaciers



Island Pass, Lyell Canyon,
and Cathedral Peak along
the John Muir Trail, CA

- Huge sheets of slow moving ice: they're heavy and scrape the ground like a brick dragged across the gym floor

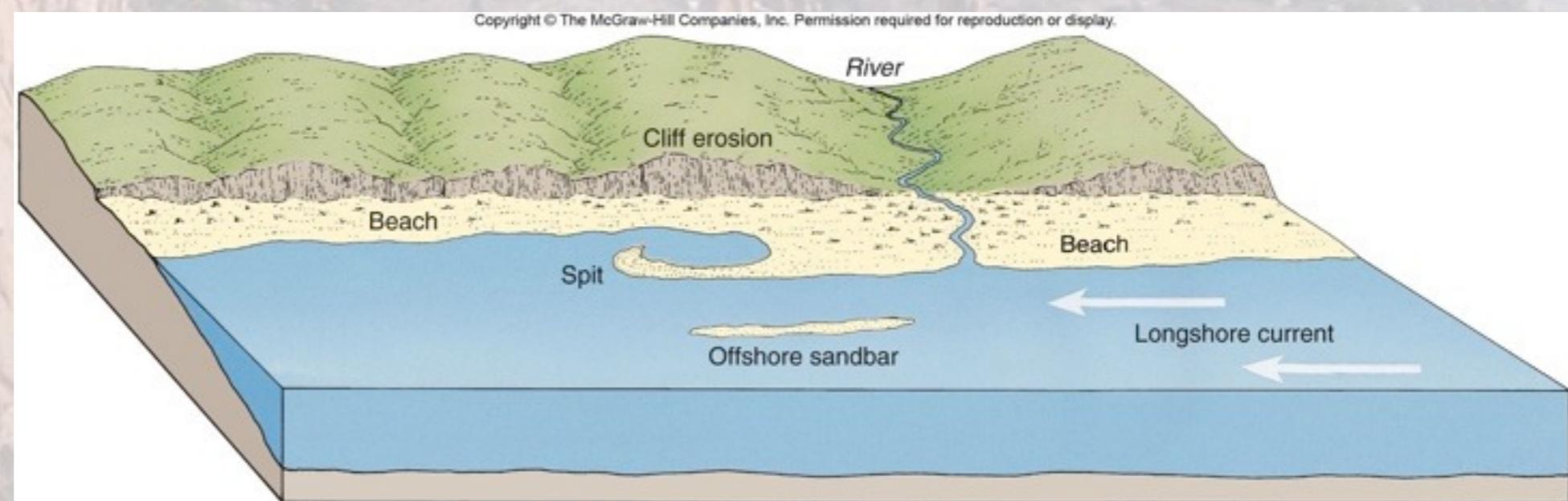
- Leave deposits (till) along (eskers) and at the end (moraines) of their paths

- Carve rock into arêtes, cirques, and fjords

- Form when annual snowfall exceeds snowmelt

Coastal Erosion and Landforms

- Cliffs
- Beaches & sandbars
- Reefs
- Atolls



Wind

- Most significant in arid areas lacking vegetation
- Dunes
- Loess

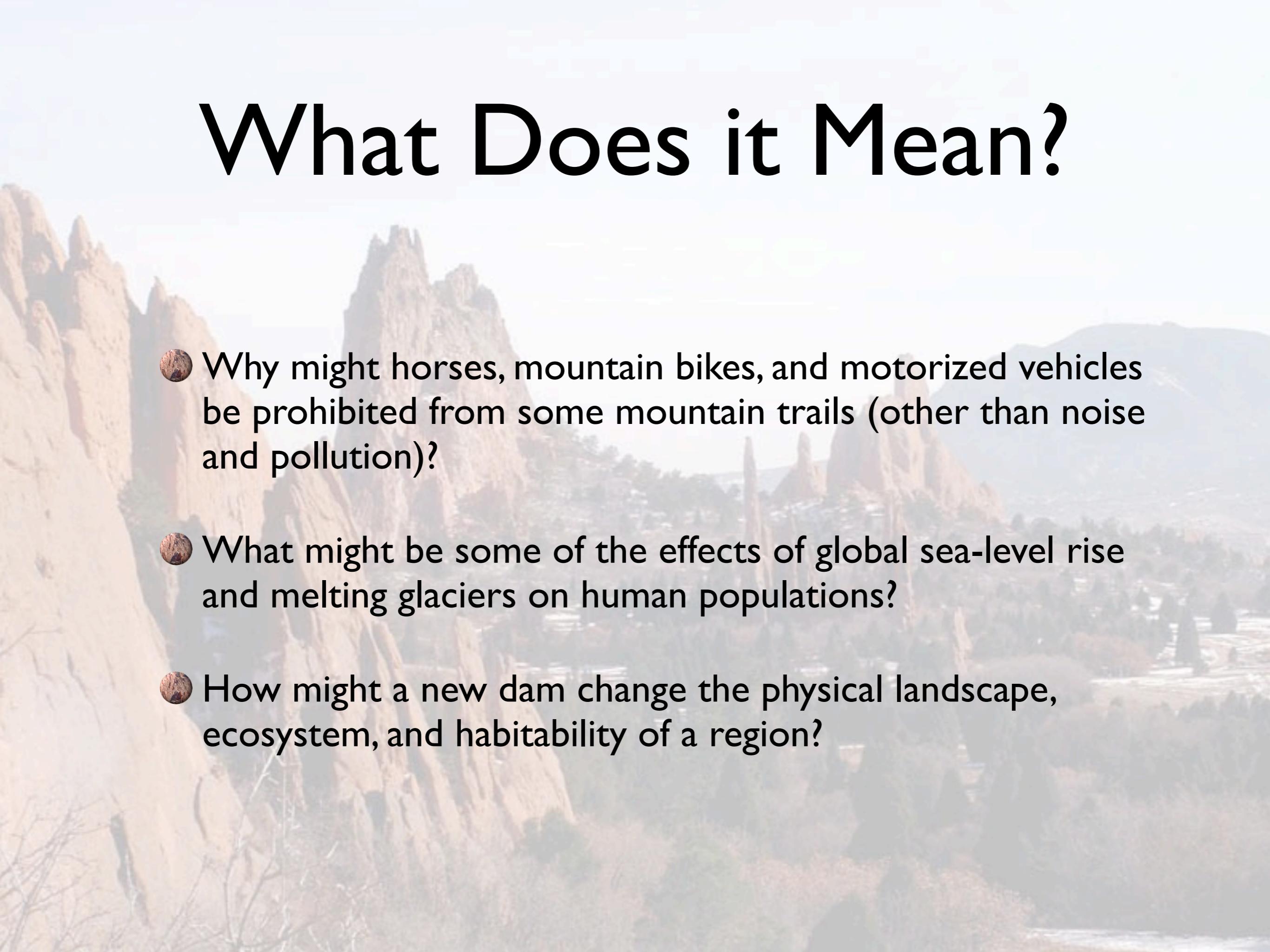


Landform Regions



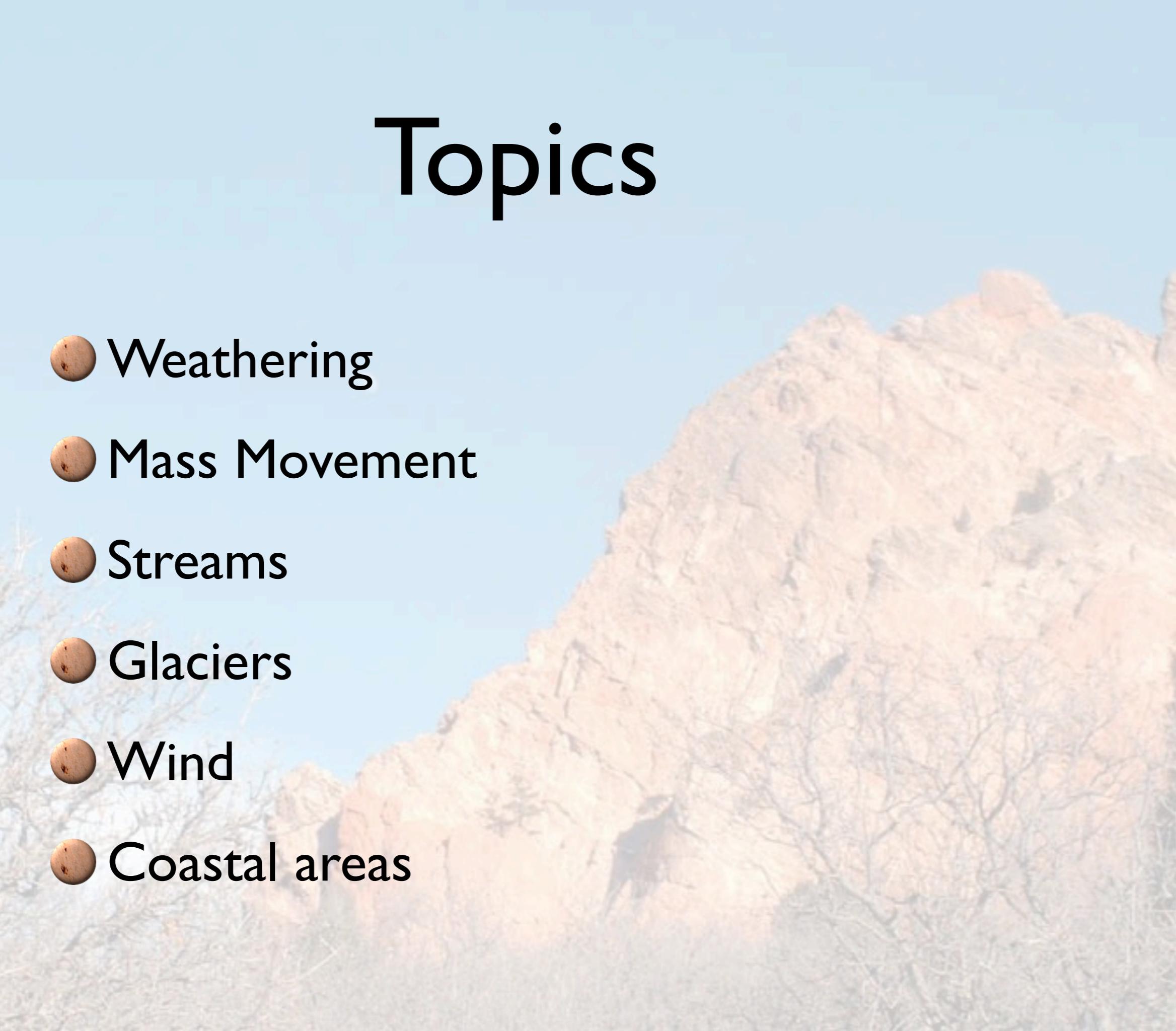
- Formal Regions
- Similar physical characteristics
- Plains, mountains, deserts, plateaus

What Does it Mean?

- 
- Why might horses, mountain bikes, and motorized vehicles be prohibited from some mountain trails (other than noise and pollution)?
 - What might be some of the effects of global sea-level rise and melting glaciers on human populations?
 - How might a new dam change the physical landscape, ecosystem, and habitability of a region?



Topics



- Weathering
- Mass Movement
- Streams
- Glaciers
- Wind
- Coastal areas



Mini-Lectures

- Describe the process/phenomena
- Key Terms
- How does it relate to landform change?
- Give some examples of places where this process can be seen
- Impact to humans and ecosystems
- Human impacts on the process