# Physical Landscape I of the United States and Canada

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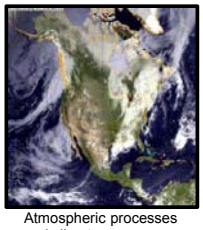
## Physical Geography

Landforms and geologic processes

**Physical landscape** (natural environment) sets the stage for human use (cultural landscape).



Atmospheric processes and climate.

Distribution of people and their works.

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## Definitions

**Geography:** the study of people living on the surface of the earth.

**Geology:** the scientific study of the earth and its processes.

**Geomorphology:** the study of the formation and shaping of landforms and landform regions.

**Topography:** the study of the **surface features** of a landform region.

*basis of visual landscape*

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## Physical Geography

We need to be aware of its parts and mechanisms.

- **geologic processes** (tectonic/gradational)
- **atmospheric processes** (weather/climate)
- **water resources** (surface/underground)
- **soils** (formation/fertility)
- **natural vegetation** (result of all of above)

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## Physical Geography

**For the US&C we also need to be aware of the role of:**

1. **Plate Tectonics** and **Continental Drift** and all **processes that shape** the natural landscape.
2. **Great Range of Latitude:** from polar to topical and its influence on **climate formation**, **vegetation** and **human response** (adaptation).
3. **Climate Change:** short term and long term trends, both **global cooling** (continental glaciation associated with the Ice Ages) and **global warming** (present-day situation).
4. **Water:** the chief **sculptor of landform features** and important for **well-being of people**.
5. **Human Impact: effect of people** and their works on the natural landscape.

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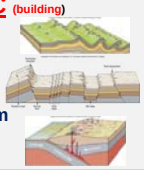
## GEOLOGIC PROCESSES

**TECTONIC** (building)

1. **Folding**
2. **Faulting**
3. **Volcanism**



**NATURAL PROCESSES**

1. **Mass movements** (gravity)
2. **Earthquakes** (tension release)
3. **Volcanism** (heat, pressure)
4. **Subsidence** (sinking)

**GRADATIONAL** (reducing)

1. **Mechanical and chemical weathering** (changes in place)
2. **Mass wasting** (gravity shifting)
3. **Agents of Erosion**

erode → transport → deposit
⇩ ⇩ ⇩
(take → move → place)

- Running water
- Moving ice
- Wind
- Wave action
- Longshore currents

**All are part of landscape development.**

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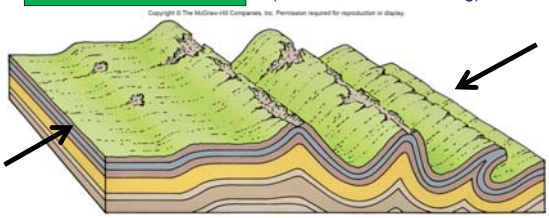
## Folding

**Folding is the crumpling of the surface upon impact** (collision; mountain building).



**Forces at work:** Compression, bending, breaking

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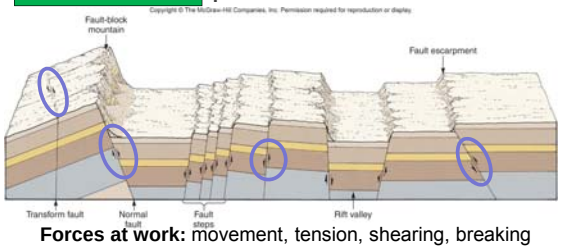
## Faulting

**Release of stress (pressure) is faulting. Earthquakes are a result of the process.**




**Forces at work:** movement, tension, shearing, breaking

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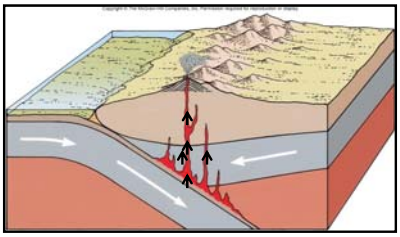
## Volcanism

**Volcanism is when great pressure and heat is able to melt rock.**

**Forces at work:** melting; movement of molten material **(oozing);** build-up of gasses under pressure **(explosion).**



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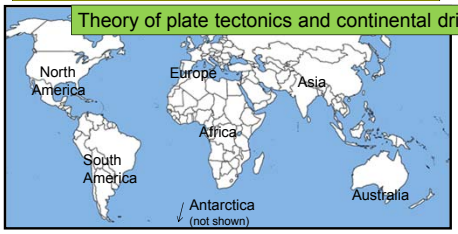
## Shape and Position of the Continents Today

How did they get to be shaped and positioned?

Theory of plate tectonics and continental drift.

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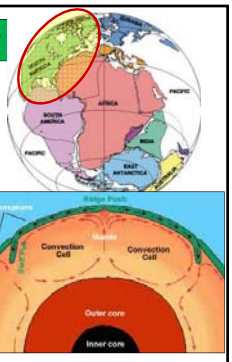
## Plate Tectonics Theory

- The position of the continents today is a result of a single land-mass -- called **Pangaea** -- being separated along the lithospheric cracks (called **plate boundaries)** by the movement of **convection cells** within the mantle.
- Each segment has slowly been repositioned **(shifted).**
  - Movement of the plates continues to occur.

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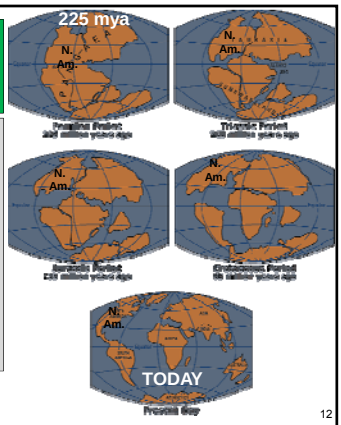
## Continental Drift

**Oldest rock units** on today's continents line up on the map of Pangaea.

➢**Similar geologic layers** and **fossil beds** on the continents are linked when the continents are brought back to their Pangaea positions.

✓***Note the position of North America on each map.***

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## Plate Tectonics

❖ **This movement results in unique zones by**

a. Creating gaps that allow new crust to form **>>>** called **spreading zones**.

b. Forcing plates to move against each other after they collide and deforming **>>>** called **orogenic zones** (areas of mountain building).

c. Pushing old crust back into the earth **>>>** called **subduction zones**.

✓ It is responsible for **earthquakes** and **volcanic activity.**

➢ This movement created the phenomena that gives us our **present-day surface features**.

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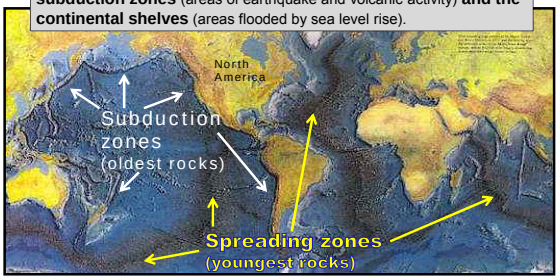
## Earth's Surface without Water

**Note underwater mountain ranges** (which mark spreading zones), **subduction zones** (areas of earthquake and volcanic activity) **and the continental shelves** (areas flooded by sea level rise).

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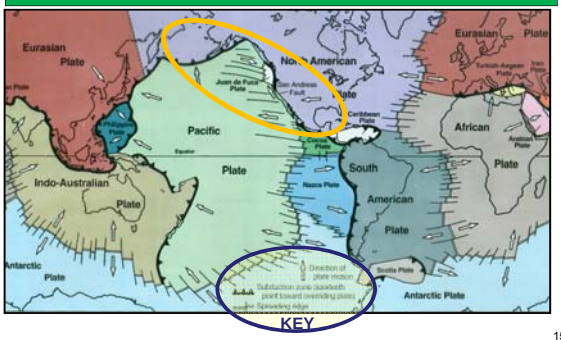
## Location of the Earth's Plates and Directions of Movement

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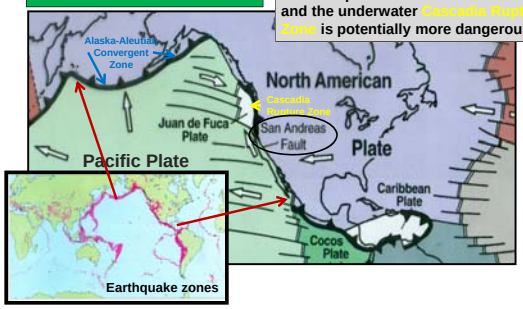
## Focus on North America

**The San Andreas Fault Zone is North America's most famous fault line. The Alaska-Aleutian Convergent Zone creates spectacular volcanic scenery and the underwater Cascadia Rupture Zone is potentially more dangerous.**

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## Because of Plate Tectonics…

✓ The N.American plate is **moving westward** and **meeting resistance** from Pacific, Juan de Fuca and Cocos plates.

- **Western North America's** surface features are **younger and steeper** (angular) than the Eastern North America.
- **Eastern North America's** features are **older and more worn down** (rounded).

✓ **Earthquakes** are more common in the west.

✓ **Eruptive volcanic activity** is a western phenomena.

✓ Volcanic **Hawaiian Islands** are **not near** a plate boundary but located on a plate that is **moving over a "hot spot".**

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## Because of Plate Tectonics…

✓ The **eastern coast** has a **wide, extensive** continental shelf and coastal plain.

✓ The **western coast** has a **narrow or non-existent** continental shelf and coastal plain.

- **The eastern coast exhibits many coastal marshes, swamps and barrier islands.**
- **The western coast has few of each.**

➢ **Also, the western coast has fewer inlets** and **estuaries** (important as safe, natural anchorages) **than the east coast.**

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## Physiographic Diagram of North America

❖ North America's **underlying** geologic structure and its **on-going** dynamic processes (formation and change) have shaped the land surface features of North America

- In turn, they influence running water, soil formation, natural vegetation and human perception.

➢ **Together they create physiographic regions.**


http://mapmaker.rutgers.edu/355/raisznorthamerica1000.jpeg

## Physiographic Regions of the US&C

Based on the **bedrock geology** and the **surface geomorphology,** we can divide the US&C into distinct **physical regions**.


*From Birdsall, Regional Landscapes of the US&C*

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## Topographical Units

**All the geological processes** -- combined with various atmospheric processes **-- give us distinct landforms within the physiographic regions**:

1. **Mountains**
2. **Plains**
3. **Hills**
4. **Plateaus**
5. **Coastlines** (has a relationship to sea level)

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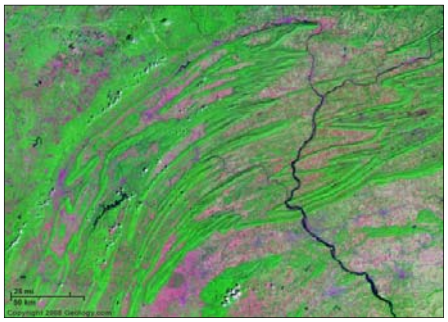
## Steep-sloped Rounded Peaks Southern Appalachian Mts., NC

## Folded Appalachians central Pennsylvania



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## Rocky Mts., Banff NP, Alberta

Very steep sloped.
Jagged peaks.
Sharp ridge-line.
Great range in relief within a short horizontal distance.

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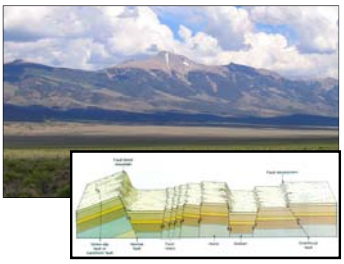
## Fault Block Topography
## Basin and Range, Nevada

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## Great Plains
North Dakota

**Flat to rolling surface with minimum variation in elevation.**

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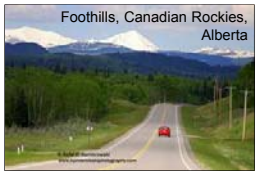
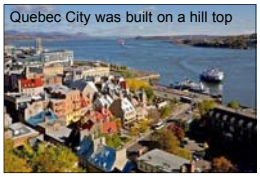
## Hill Areas

Foothills, Canadian Rockies, Alberta



Sand Hills, Nebraska

Quebec City was built on a hill top



Hills of eastern Tennessee

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## Colorado Plateau
Grand Canyon NP, Arizona

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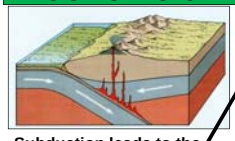
## Volcanic Zone
Pacific Northwest



**Subduction leads to the formation of volcanoes**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## West Coast Volcanic Zone





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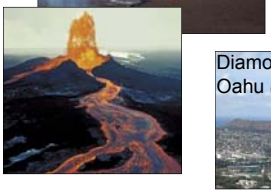
## Hawaii Volcanoes

The volcanic activity of Hawaii is related to a "hot spot" not a plate boundary.

Kilauea, Hawaii (active)

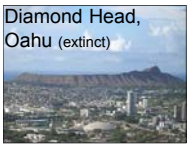




Mauna Loa
Hawaii's largest volcano and world's tallest mountain



Diamond Head, Oahu (extinct)





## Lava Flows

Lava moving toward the ocean to create new land and changing Hawaii's coastline.

A **black sand beach** is created from lava that is quickly cooled as it hits the ocean or wave pulverized basalt (hardened lava) or wave-separated cinders washed ashore.



## Rocky Coast
Maine



## Sandy Coast
Northeastern U.S.




## Atlantic Coastal Plain and Barrier Islands




## Gulf Coastal Plain of Texas


## Southern California Coast

< Laguna Beach, CA

Torrey Pines beach, San Diego

< La Jolla, CA

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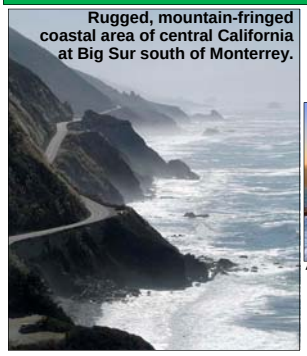
## Central California Coast



Rugged, mountain-fringed coastal area of central California at Big Sur south of Monterrey.

^Entrance to San Francisco Bay

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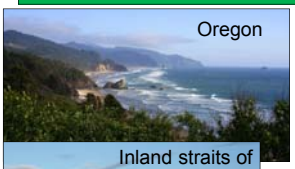
## Pacific Northwest Coast



Oregon

Inland straits of British Columbia

Northern California

Mountains rise out of the sea. There is no coastal plain and beaches are small and inaccessible.

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## Coasts of Alaska

Juneau

Nome

Katmai NP

Anchorage

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## NEXT

PHYSICAL GEOGRAPHY – Glaciation

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