Physical Landscape I of the United States and Canada

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Physical Geography

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

Landforms and geologic processes

Atmospheric processes and climate.

Distribution of people and their works.

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.

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)

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.

GEOLOGIC PROCESSES

TECTONIC (building)
- Folding
- Faulting
- Volcanism

GRADATIONAL (reducing)
- Mechanical and chemical weathering
- Mass wasting
- Agents of Erosion

NATURAL PROCESSES
- Mass movements (gravity)
- Earthquakes (tension release)
- Volcanism (heat, pressure)
- Subsidence (sinking)

All are part of landscape development.
Folding

Forces at work: Compression, bending, breaking

Faulting

Forces at work: movement, tension, shearing, breaking

Volcanism

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

Plate Tectonics Theory

- The position of the continents today is a result of a single landmass -- 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.

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.
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.

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.

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).

Location of the Earth’s Plates and Directions of Movement

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”.

Focus on North America

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.
Physiographic Diagram of North America

- North America’s underlying geologic structure and its ongoing 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.

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.

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)

Steep-sloped Rounded Peaks
Southern Appalachian Mts., NC

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

Folded Appalachians
central Pennsylvania

- Folded Appalachians
- central Pennsylvania

Rocky Mts., Banff NP, Alberta

- Rocky Mts.
- Banff NP, Alberta

- Very steep sloped.
- Jagged peaks.
- Sharp ridge-line.
- Great range in relief within a short horizontal distance.
Fault Block Topography
Basin and Range, Nevada

Great Plains
North Dakota

Flat to rolling surface with minimum variation in elevation.

Hill Areas
Quebec City was built on a hilltop

Hills of eastern Tennessee

Colorado Plateau
Grand Canyon NP, Arizona

Subduction leads to the formation of volcanoes.

Volcanic Zone
Pacific Northwest

West Coast Volcanic Zone
Mt. St. Helens, WA

Crater Lake, OR

Mt. Rainier, WA

Mt. Shasta, CA
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

Atlantic Coastal Plain and Barrier Islands

Gulf Coastal Plain of Texas

Sandy Coast
Northeastern U.S.
Southern California Coast

- Torrey Pines beach, San Diego
- La Jolla, CA

Central California Coast

- Rugged, mountain-fringed coastal area of central California at Big Sur south of Monterey.
- Entrance to San Francisco Bay

Pacific Northwest Coast

- Oregon
- Northern California
- Inland straits of British Columbia

Coasts of Alaska

- Juneau
- Nome
- Anchorage
- Katmai NP

NEXT

PHYSICAL GEOGRAPHY – Glaciation