

Chapter 30 Surface Processes



Did you read chapter 30 before coming to class?
A. Yes
B. No

Water Budget

- 70% of the surface area of the earth is water. Of all the water on earth
 - 97% is in the oceans
 - 2% is in ice
 - 0.7% is in ground water (underground)
 - 0.4% is water vapor
 - 0.01% is surface drainage

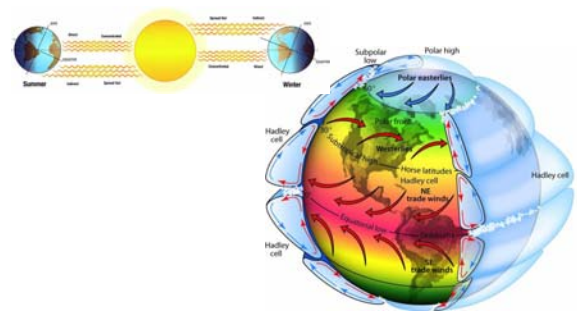


Hydrological System

- The hydrological system is powered almost completely by the sun
- 100,000,000,000,000 gallons of water per year cycle through the hydrologic system.
- The system of *erosion*.
 - Almost all erosion is done by the 0.01% of water that is surface drainage.
 - Also includes glaciers, ground water, ocean currents and waves, and wind and airborne dust.
- Plate tectonics builds mountains while the hydrologic system erodes them.



The sun powers the hydrologic system



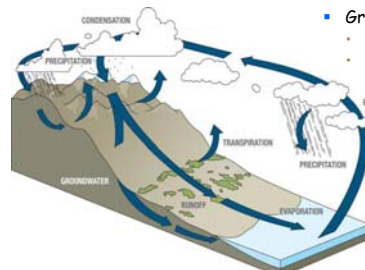
Hydrologic System

- System of moving water
 - Rivers
 - Oceans, Lakes
 - Glaciers
 - Groundwater
 - Water Vapor in Atmosphere
- Effects of Hydrologic System
 - Erosion
 - Transportation of Sediment
 - Deposition of Sediment
 - Creation of Numerous Landforms



Hydrologic System

- Solar Radiation
 - Average $\sim 342 \text{ W/m}^2 = \sim 342 \text{ joules/sec m}^2$
 - Causes evaporation
- Gravity
 - Pulls water down slopes
 - Causing erosion, transportation of sediment



Rivers

- Primary mechanism for erosion
- Move sediment from mountains to oceans
- Also carry dissolved ions (salts)
- Can be easily disturbed by human activity
 - Dams
 - Pollution
 - Irrigation



Stream gradient and erosion

- Explain how the velocity of the water in a stream is related to erosion and slope.

The Provo River

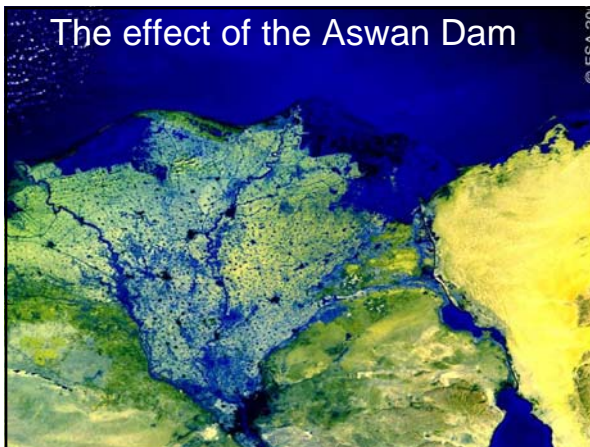


Deposition, River Deltas

- Silt carried by rivers drops out when the speed of the water changes.
- This occurs at river bends and especially at the mouth.

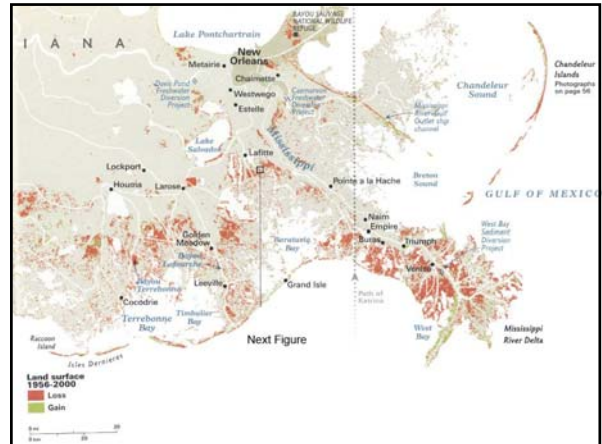
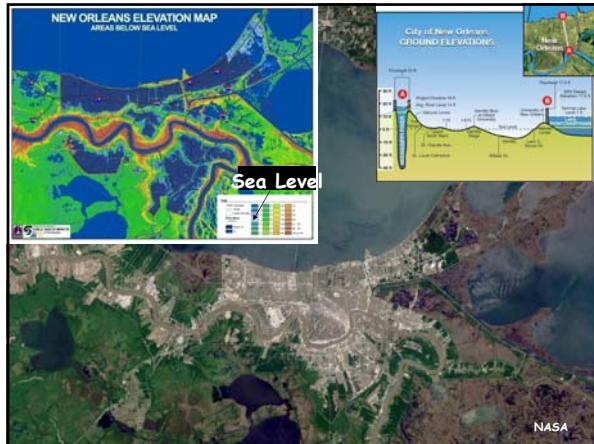


The effect of the Aswan Dam



The Mississippi River delta





Alluvial fans occur in arid regions

Groundwater

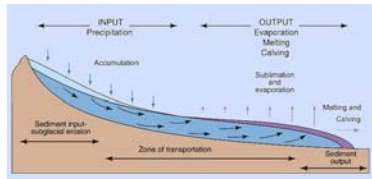
- Rocks can hold a lot of water!
 - Porosity
 - Permeability
- Groundwater is a major source of drinking and irrigation water

Water Table

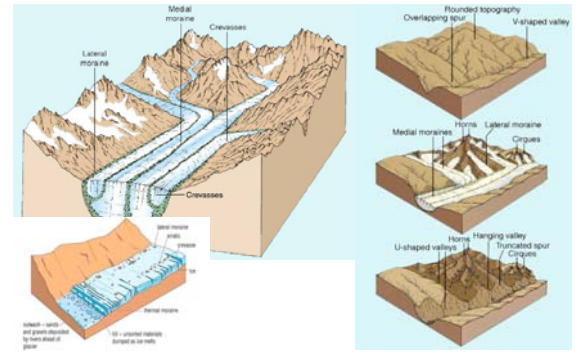
Ground water can have a residence time of months to thousands of years.

Glaciers

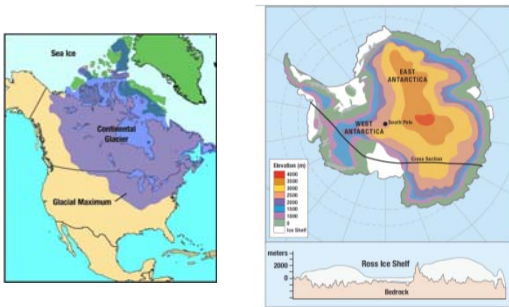
- Rivers of Ice
- Very effective agents of erosion
- Carve different topography than rivers



Glaciers form a distinctive topography



Continental glaciers can flow over flat ground



- Compare and contrast continental glaciers and alpine glaciers

Deserts

- Dominated by wind
 - Carries light-weight particles (sand & dust)
 - Leaves the rest behind
- Human effects
 - Desertification
 - Overgrazing
 - Poor Farming Practices
 - Destruction of Soil
 - Irrigation adds salts

