

HYDROLOGIC SYSTEMS

* WATER (H₂O)

- * originally formed within the earth & brought to surface by *outgassing*
- * collected on surface after Earth cooled some 3.8 BYBP
- * reached equilibrium amount, 1.36 billion km³, some 2 BYBP
- * covers 71% of earth by area
- * constitutes 70% of our bodies (* water is an important part of our world)
- * other than gravity, is the **major agent of geomorphic change** on the Earth's surface

* Distribution

- * **97.22%(97%)** is in the oceans & other saltwater bodies, **2.78%(3%)** is freshwater
- * of this freshwater: **22%** is groundwater, **77%** is in ice & glaciers, about **1%** is in freshwater lakes & ponds, rivers & streams

** HYDROLOGIC CYCLE

- * *evapotranspiration* * *condensation* * *precipitation* * *run-off*

* Water Balance

Precip(input) = PET -- deficit + surplus + storage

- * Why important?
- * provides adequate water supply
- * is a major factor in weathering processes above & below the surface, & thus landform development
(Increased water == increased weathering)

* How?

Infiltration	vs	runoff
-- subsurface weathering		-- fluvial landscapes
-- regolith formation		-- degradation
-- karst formation		-- aggradation
		-- <i>overland flow</i>

FLUVIAL SYSTEMS

* What is a fluvial system?

- * Primarily this refers to “**running water**”

* rills, brooks, creeks, streams, rivers, & other water moving in a channel or watercourse

* May be a **permanent watercourse or temporary** (Intermittent)

*In arid regions intermittent channels are also known as arroyos, wadis, dry gulches, washes, etc.

* in some cases standing water such as lakes or ponds are included, but carry out more weathering than transport, and are more likely to be areas of aggradation

* **How do fluvial systems induce change on the landscape?**

* 2 main processes which occur:

Degradation: Wear down Earth's materials and surface; **erosion**

Aggradation: The build-up of Earth's surface; **deposition**

** Some Basics:

* start with **overland or sheet flow** which is the **runoff** during & after a rain; the water (precipitation) which doesn't soak in to the ground

* the runoff collects in channels, usually not permanent, called **rills**

* rills merge with other rills to form **brooks & creeks**, or into existing permanent watercourses

* brooks & creeks merge to form **streams & rivers**

* a watercourse has a **trunk** or **main section** with several **tributaries or branches**; usually the larger the watercourse, the more branches it has

* a network of watercourses forms a **drainage basin**

* separate basins are delineated by **drainage divides** which define a **watershed**, the catchment area of a **drainage basin**

* each basin or system can be classified on the basis of its drainage pattern

**** Drainage Patterns: a geometric arrangement of streams in a region or area**

* determined by: *slope, differing rock resistance to weathering & erosion, climatic & hydrologic variability, structural controls of landscape, relief of the land*

* 8 Common Patterns (know what they look like):

1) *dendritic*: looks like the limbs of a tree w/o leaves

2) *trellis*: caused by anticline and synclines; tiny streams

3) *radial*: composite volcanoes; straight out from the center

4) *parallel*: parallel branches of a tree

5) *annular*: dome features created by faults; consecutive circles

6) *rectangular*: has right angles

7) *deranged*: no real pattern

8) *centripetal*

**** Degradational Processes**

* streams erode surfaces in 3 main ways:

hydraulic action: The work of water itself, *turbulence*; the squeeze and release of action water

abrasion: The work of materials carried by the water hitting & dislodging other materials

corrosion: Materials being dissolved into the water

* this may take the form of either *downcutting, lateral erosion, or headward erosion*

downcutting: Erosion of the stream bed, often by sand & gravel, making it deeper