

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% is in the oceans & other saltwater bodies, 2.78% 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 |
| | | -- overland flow |

FLUVIAL SYSTEMS

* What is a fluvial system?

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

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* in some cases standing water such as lakes or ponds are included, but carryout 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 material + surface; erosion

Aggradation: the build of Earth's surface; desposition

** 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 (most popular)** 2) **trellis(anticline and syncline)** 3) **radial (mountains) composite vol.** 4) **parallel**

5) **annular (mountains) dome vol.** 6) **rectangular (faults, earthquake areas)** 7) **deranged** (glacier areas)

8) **centripetal** (do not need to know)

**** drainage basins may also be classified or arranged by a variety of the relationships between the streams that are contained within it; these include the size of the streams, lengths, slopes, area, & density**

Stream Ordering, Stream Lengths, Stream Slopes, Stream Area, & Drainage Density

**** Degradational Processes**

* streams erode surfaces in 3 main ways:

hydraulic action: the work of water itself, turbulence, the squeeze and release action of water (Colorado dam being emptied)

abrasion: the work of materials carried by the water hitting and 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 and gravel making it deeper

lateral erosion: erosion of the stream banks, thus increasing the width