Lecture Outline Fri. March 23 and Mon. March 26, 2018

Key Points for today

- Understand the hydrologic cycle and be able to identify the different water reservoirs.
- How does flowing water move and deposit sediment?
- How do rivers and streams evolve to form valleys and floodplains?

Chapter 14 – Running Water: The Geology of Streams and Floods

The Water Cycle – be familiar with the hydrologic cycle and the different reservoirs where water is stored

The Earth's Water Cycle -List the following water reservoirs from largest to smallest %.
Salt water

- _____

Fresh water

- _____
- _____
- _____
- _____
- Biosphere

Initial runoff: "_____" thin sheets of water
depends on: intensity/duration of rainfall,
soil texture/previous moisture;
hill slope
vegetation
next: _____

Streams and Drainage Systems

- Why are they important to study?
  - _____, _____, _____, _____

Running water & stream flow

Types of flow: Water particles flow

Laminar
- in straight paths
- parallel to channel
- _____

turbulent
- erratic fashion
- swirling, whirlpool like
- _____
- _____

Highest velocity towards center of channel

Erosion, transport and deposition all depends on the energy of the moving water (in your own words)
_____
_____
_____
_____

Stream transport mechanisms:

- in solution (dissolved in water)

- in suspension
- bed load (along bottom**)**

Dissolved load is all the _____.
Suspended load – _____ in the water column.
Bed load - _____
_____.

- Lower water velocities form ripples
- Higher water velocities form dunes (types of sedimentary structures)

Stream velocity is not constant

- Deposition is more likely at lower velocities. Settling (deposition) occurs when velocity slows, grains in suspension are no longer supported and they settle to the bottom. Different sized particles require different settling velocities.
- Erosion is more likely at higher velocities – the products are formed from chemical or physical weathering.
  - Abrasion

Stream erosion
Over time streams can erode rock just like sandpaper. Ex. Slot canyon and potholes formed by abrasion.

Stream
Any _____whose flow is confined to a _____.

- Stream channel
- Flood plain

_____are the most common surface landform on Earth, there are 2 types:

V-shaped - stream down cutting, rapids, waterfalls

Wide valleys - follows down-cutting to base level, energy directed side-to-side. "meanders"

Streams cut downward to a_____ – which is the downward limit to which a stream can cut or erode host rock.
Ultimate base level: _____

Stream Channel Patterns

- Straight
- Braided
- Meandering

Straight Channel

- **_____**
- Forms on steep to low slopes, usually comprise small segments associated with other channel types

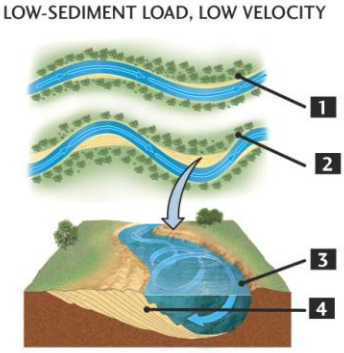
Braided Channel

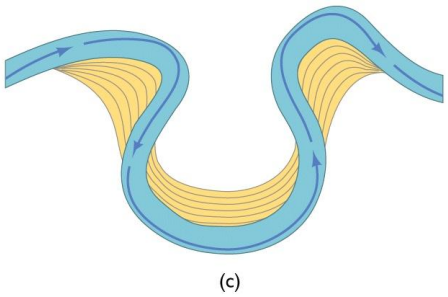
- _____
- Channels split apart and rejoin
- Common to streams that _____ of sediment.

A braided stream in Alaska

Meandering Channel

- Meander – to wander
- One main (trunk) channel that _____.
- Forms on _____through easily eroded bedrock.





Development of a Meandering Stream

- Strongest currents occur at the outside of the curve; erosion occurs forming a _____
- Velocity slowest on inside of curve so deposition occurs forming a _____

Meander cutoffs and Oxbow lakes

- Meanders migrate over time, the rate depends on the erodibility of the sediments.
- If _____, the river will take the higher gradient course. Forms an oxbow lake
- silt and clay will deposit in former channel connectors _____

Incised river channels are formed when there was a change in base level to an established river system. Base level can change by:

(1) Uplift of the land - plate tectonics
(2) Sea level drop – _____

Monday March 26, 2018

Chapter 14 – Running Water continued

Questions?

Key Points for today

- What are the different stream drainage patterns and what does each indicate about rock or material it erodes?
- Flooding, will it happen here? Understand where not to build.

Drainage Networks

Drainage basin – area of land which funnels all the water into streams draining the area

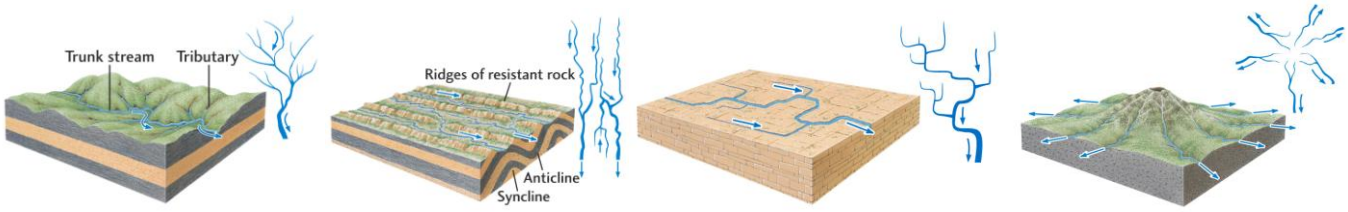
_____- ridge of high ground along which rain runs off one side or the other

Tributary streams feed trunk streams

Drainage Patterns (need to be able to recognize drainage pattern from photo or diagram)

Surface drainage is controlled by the underlying materials and structures that the water flows over.

- _____ = flat lying layers or similar rock type
- Trellis = _____
- Rectangular = rock units cut by _____
- _____ = high mountain Peak (volcanoes)



Factors that Influence Stream Flow

Velocity = distance water travels divided by time. (ft/s, m/s) – speed

ex: slow =1 ft/s, fast 35 ft/sec

_____ = change in elevation divided by distance. (ft/mi) – slope

Discharge = **volume** of water passing a point on the stream bank per unit of time. (ft^3/s, m^3/s)

Flooding

_____ –ridges of coarse material built up during periods of flooding that act to confine the stream within its banks

Recurrence interval –_____

Depends on:

- Climate
- Width of Floodplain
- Channel Size

Flood Frequency Curve

- Probably the most <u>misunderstood</u> concept about floods.
  - The flood frequency curve is based on _____ (includes flooding)
  - A flood with a 10 year recurrence interval has a 1 in 10 chance of happening in <u>any</u> given year.
  - The occurrence of a 10 year flood does <u>not</u> mean there will be no flooding for 9 more years
  - You <u>can</u> have more than one 10-year flood in a 10 year period.

Other Features of Streams

_____– Marks previous level of floodplain, formed by renewed down cutting to lower base level.

Alluvial Fans - _____. Form where streams adjust velocity when leaving a narrow valley for a broad relatively flat area.

Deltas – Triangular shaped deposits of sediment deposited as streams enter the ocean (and velocity slows).

<u>Effects of Building a Dam</u>:

a) Original profile graded to regional base level
b) Dam forms new local base level
c) Deposition upstream and erosion downstream