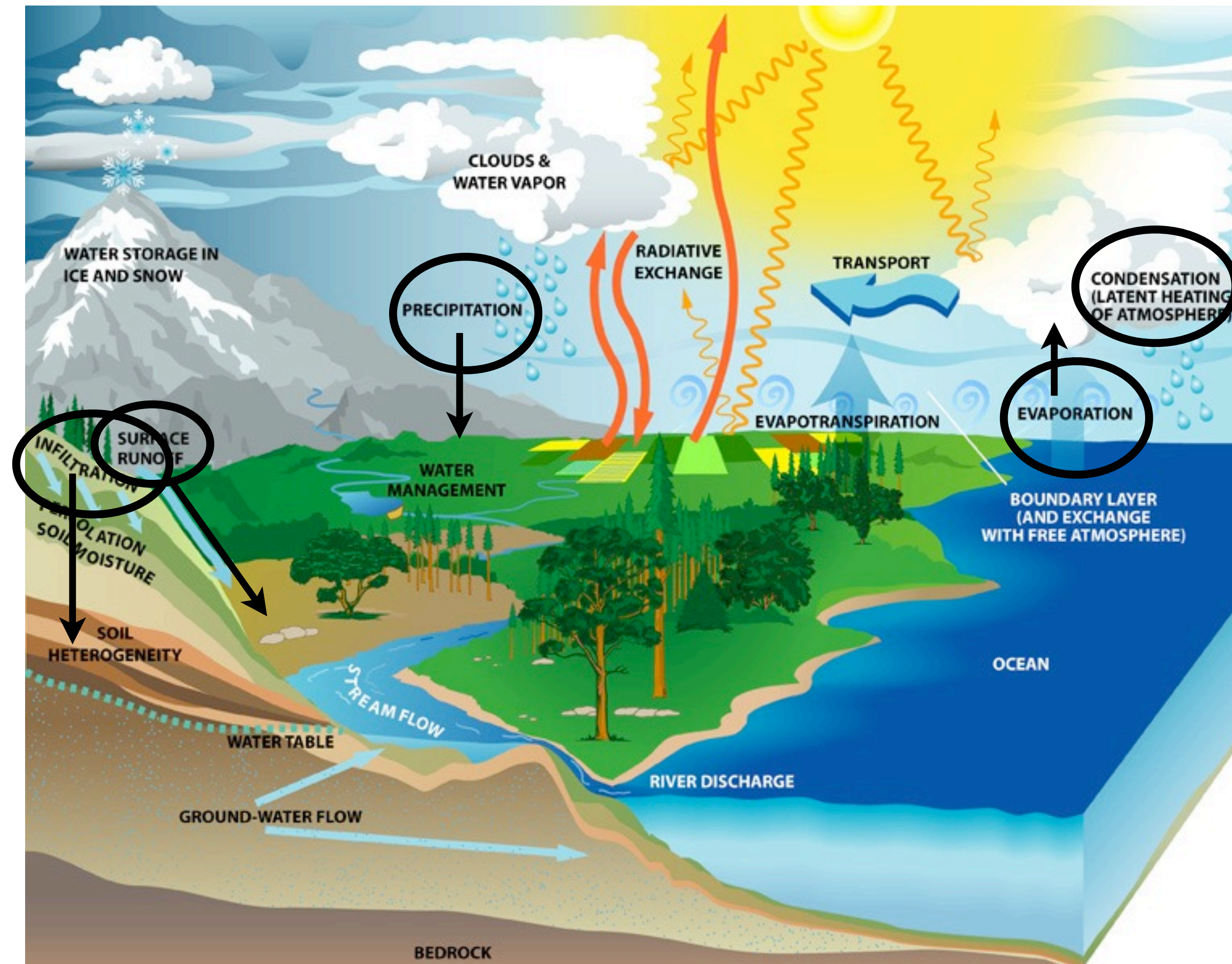


SURFACE PROCESSES

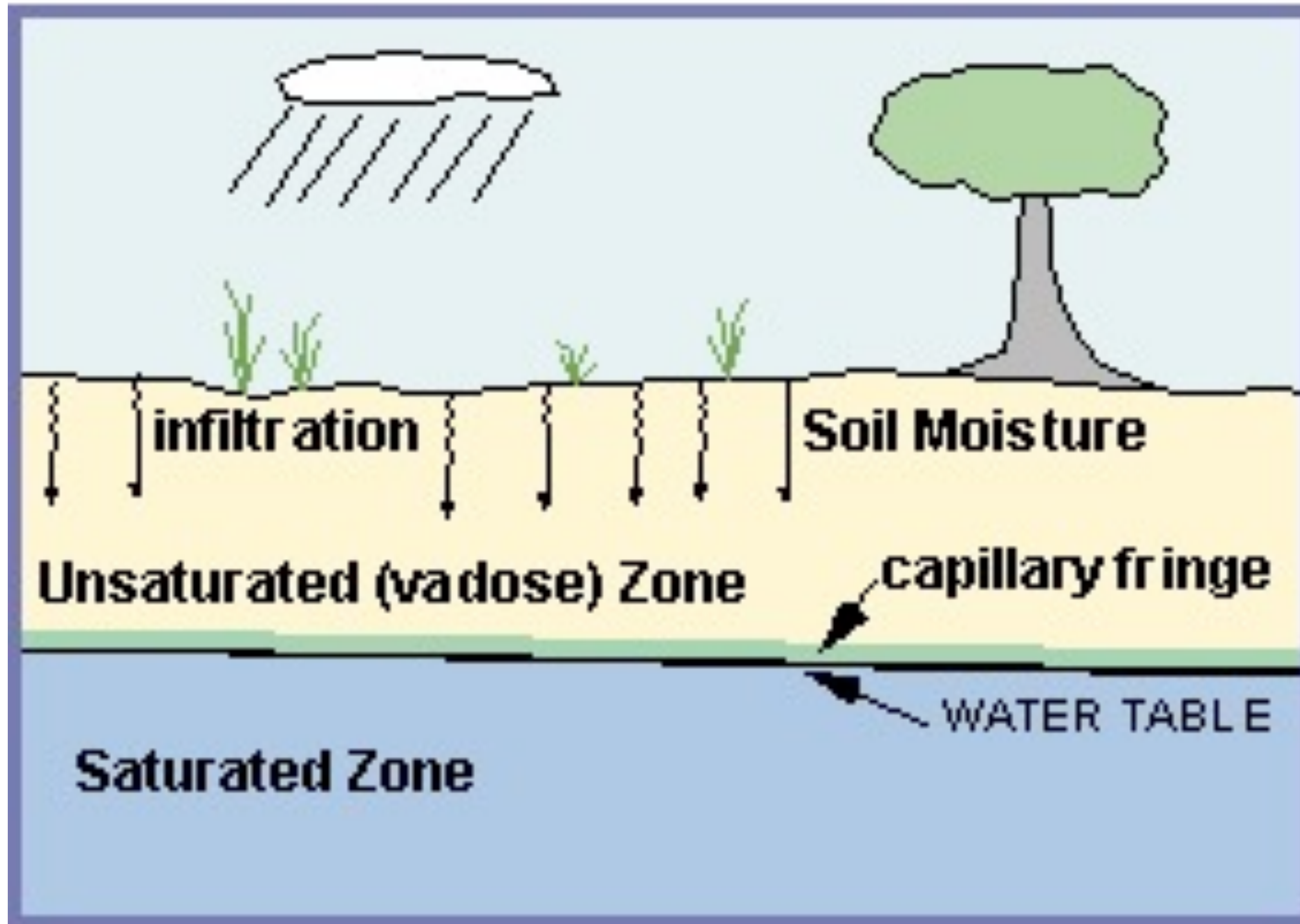
REVIEW



Hydrologic (Water) Cycle



Groundwater

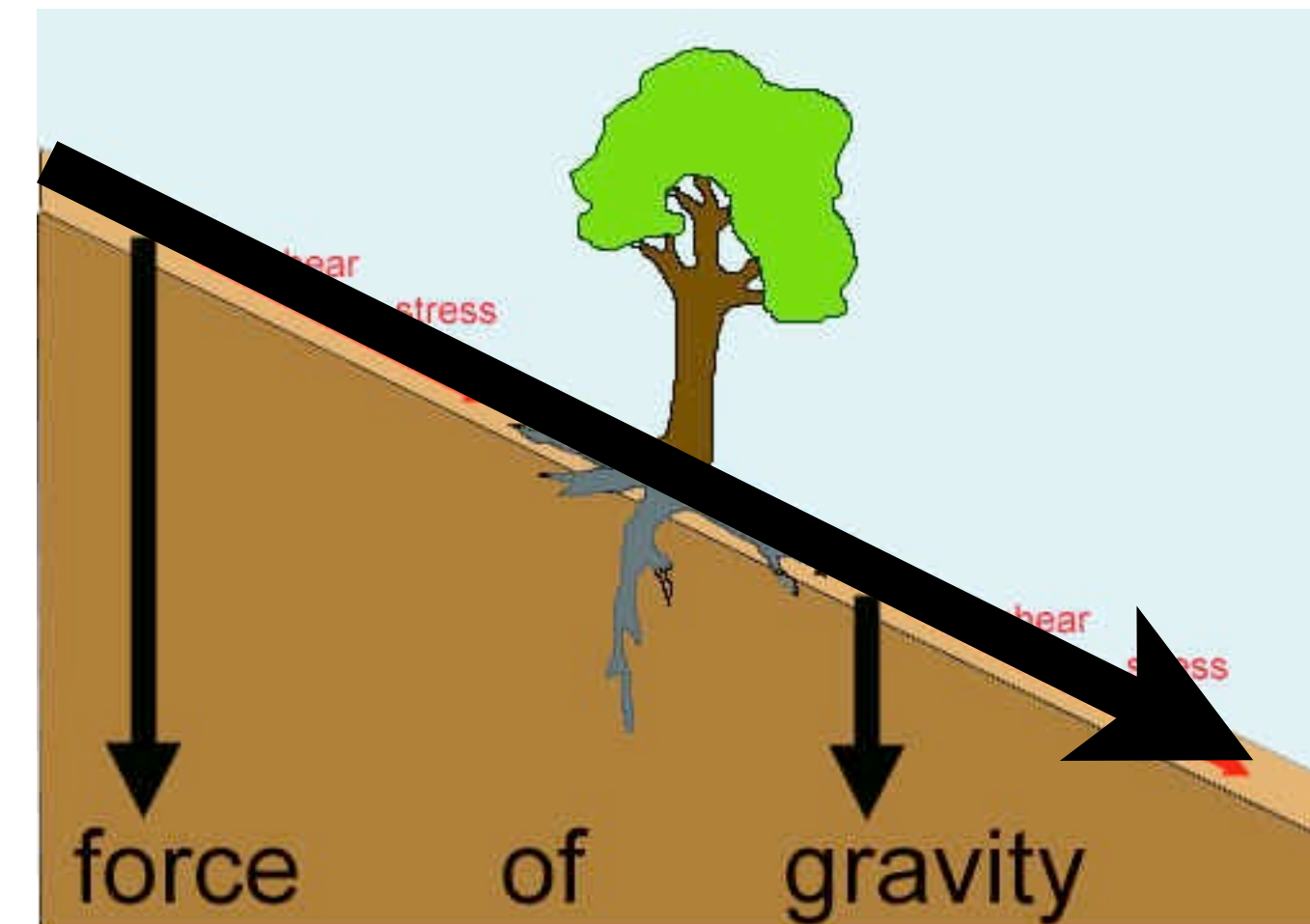
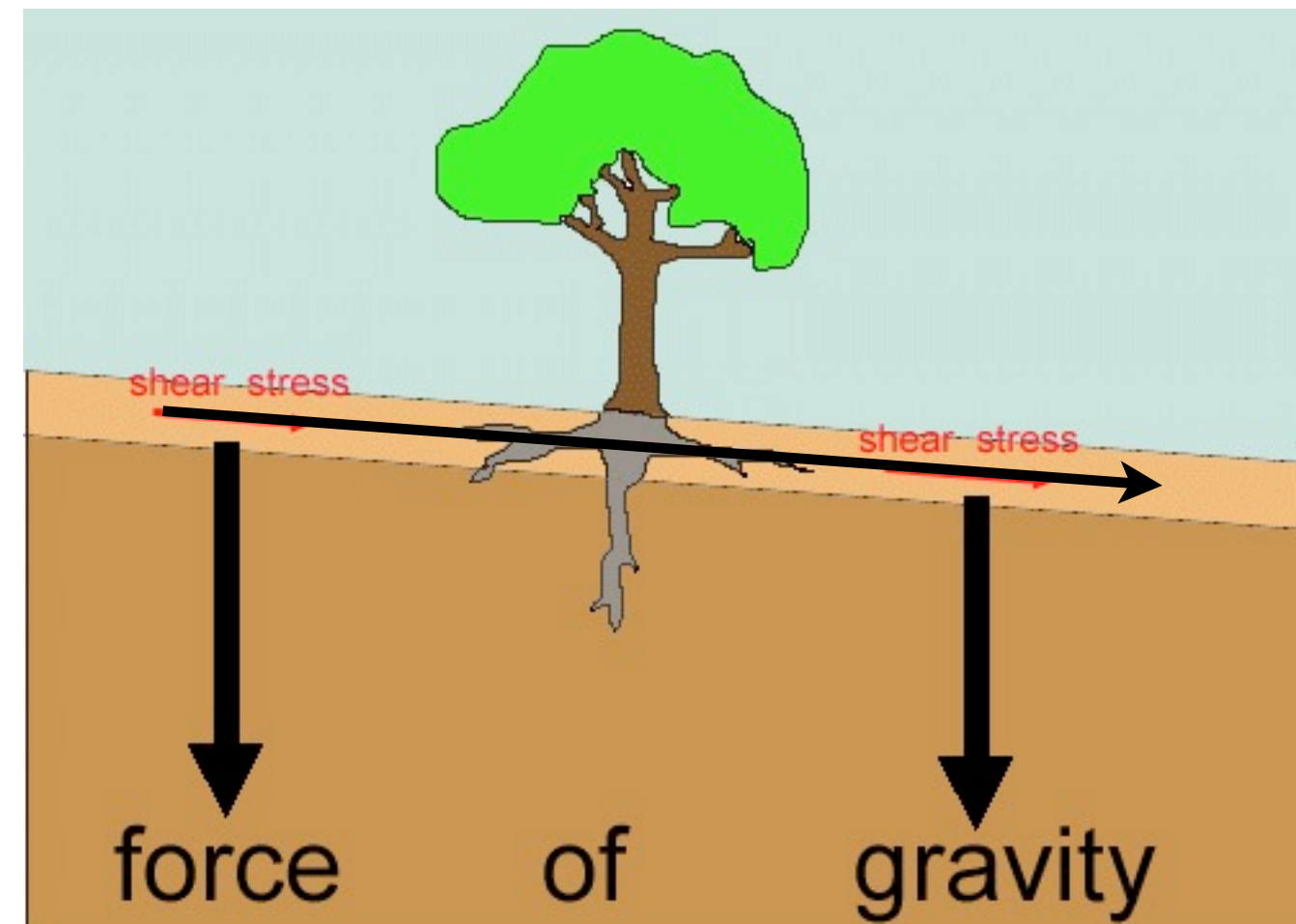


Factors Affecting Infiltration

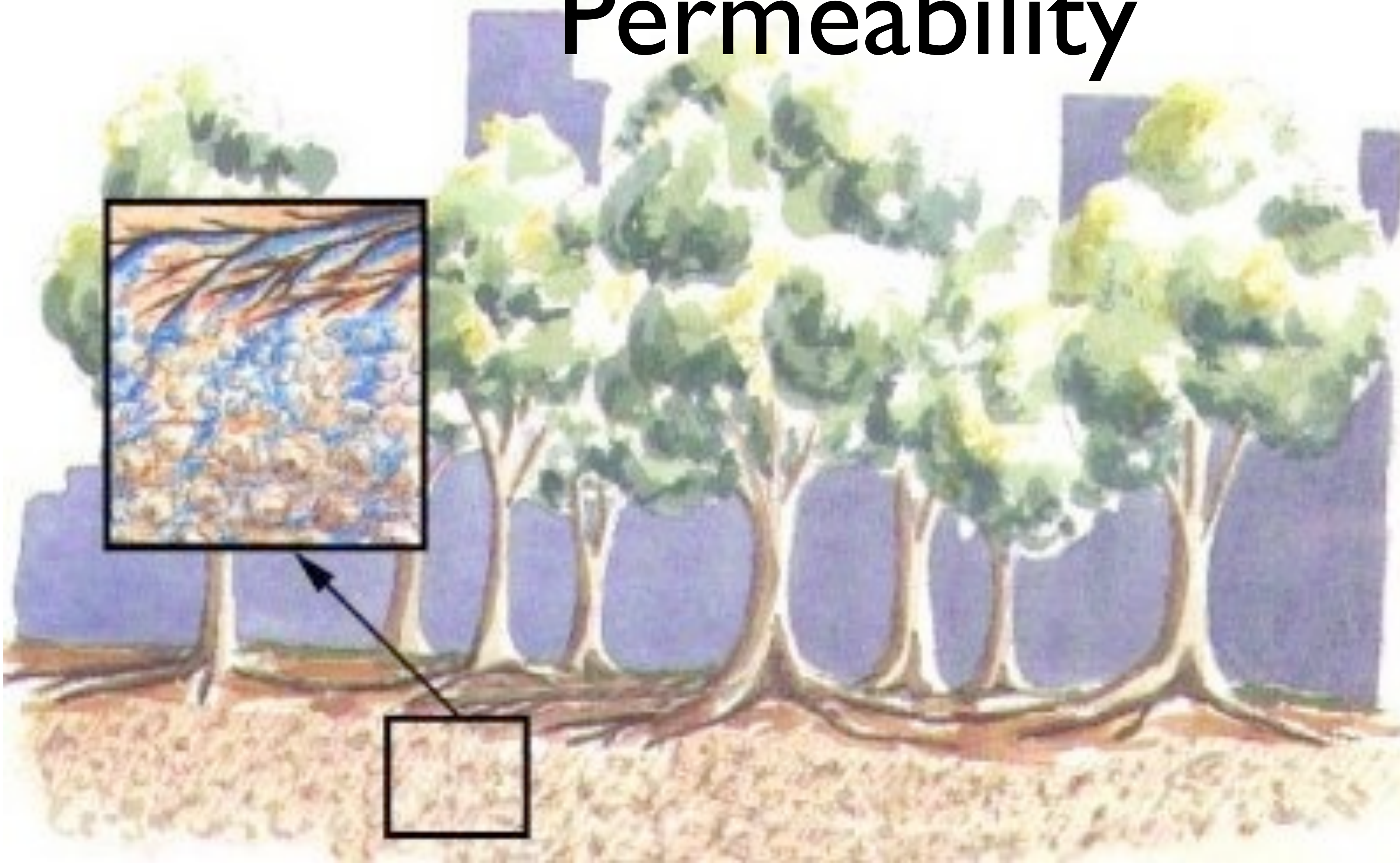
- The **more saturated** the ground, the less infiltration will occur.



- The **steeper** the slope or gradient, the less infiltration will occur.



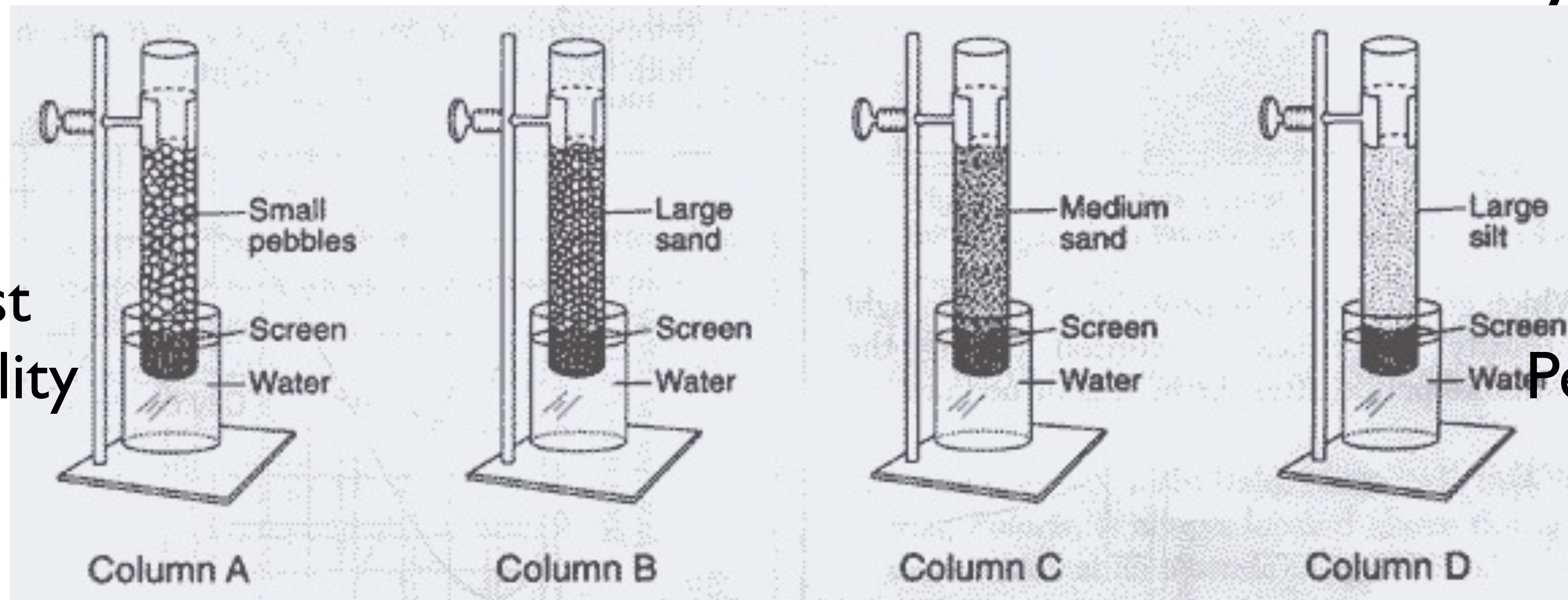
Permeability



Permeability

The Greater the Particle Size
The Greater the Permeability

Greatest
Permeability



Least
Permeability

Runoff

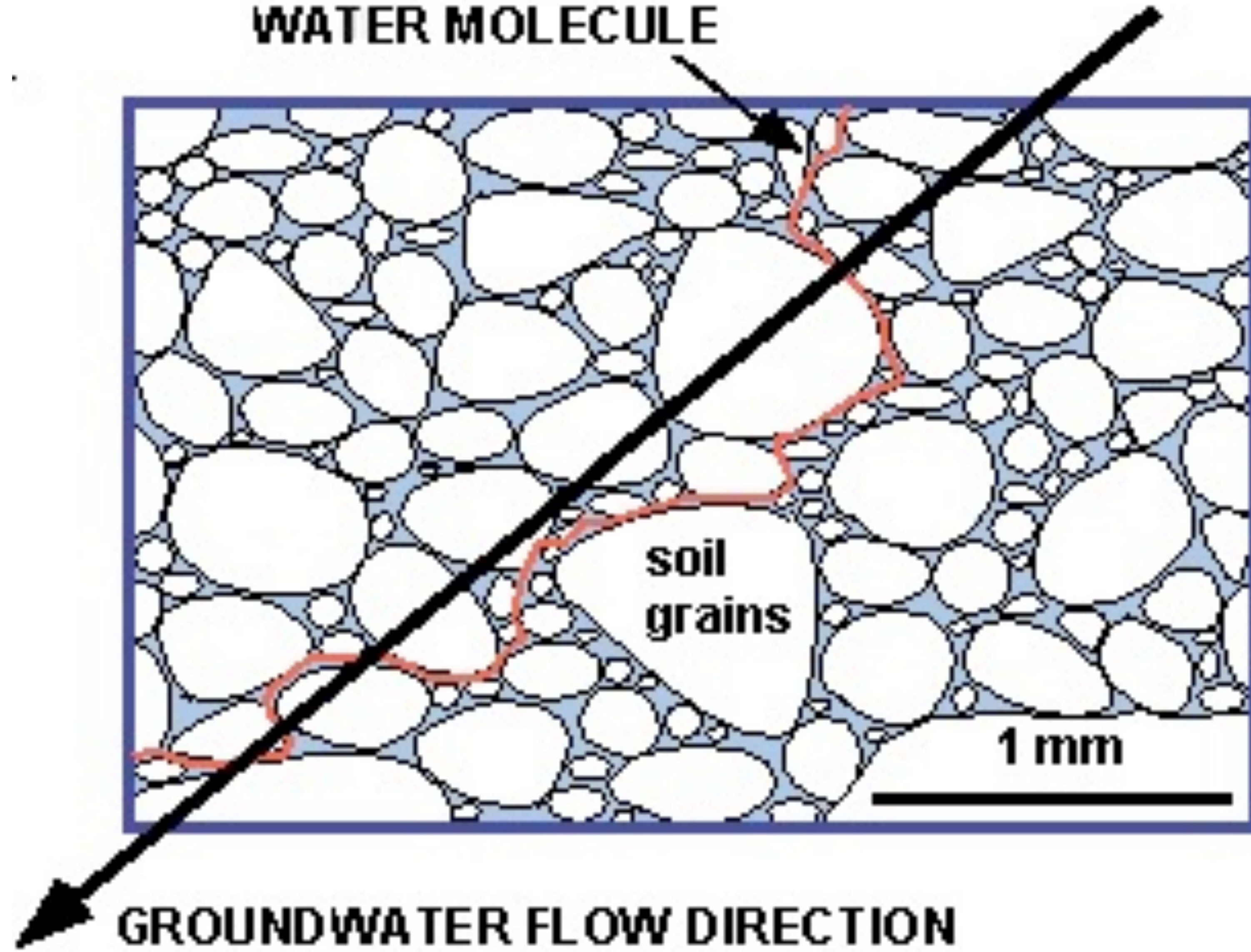
- Decrease infiltration, increase Runoff
- Affected by:
 1. The more **saturated** the ground is the greater the runoff.
 2. The **steeper** the slope the greater the runoff.
 3. The more **vegetation** the LESS the runoff.

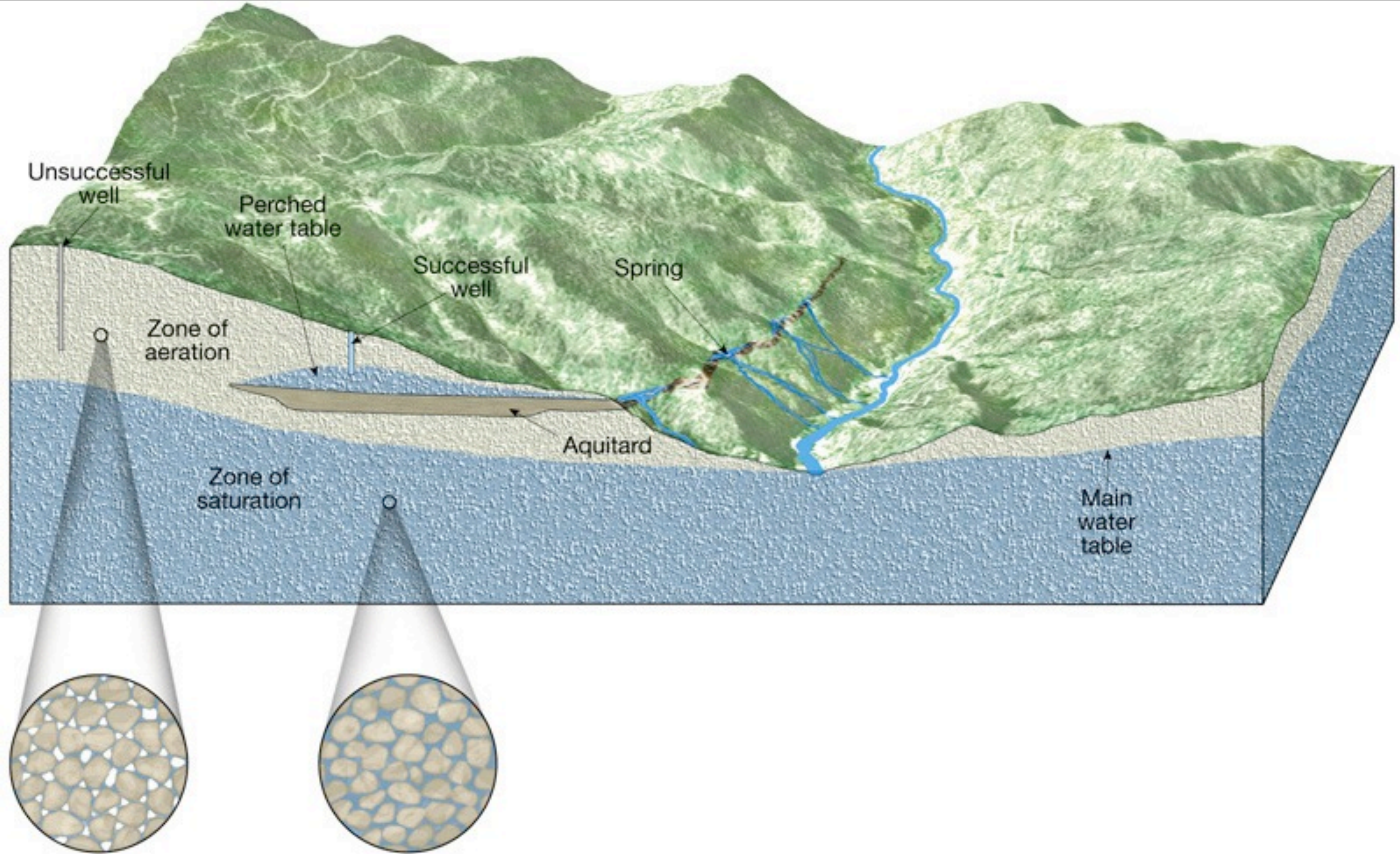
Impermeable Surface

- Bedrock is impermeable
- Land is impermeable in the winter when water freezes in the pore spaces.



**ACTUAL PATH OF
WATER MOLECULE**

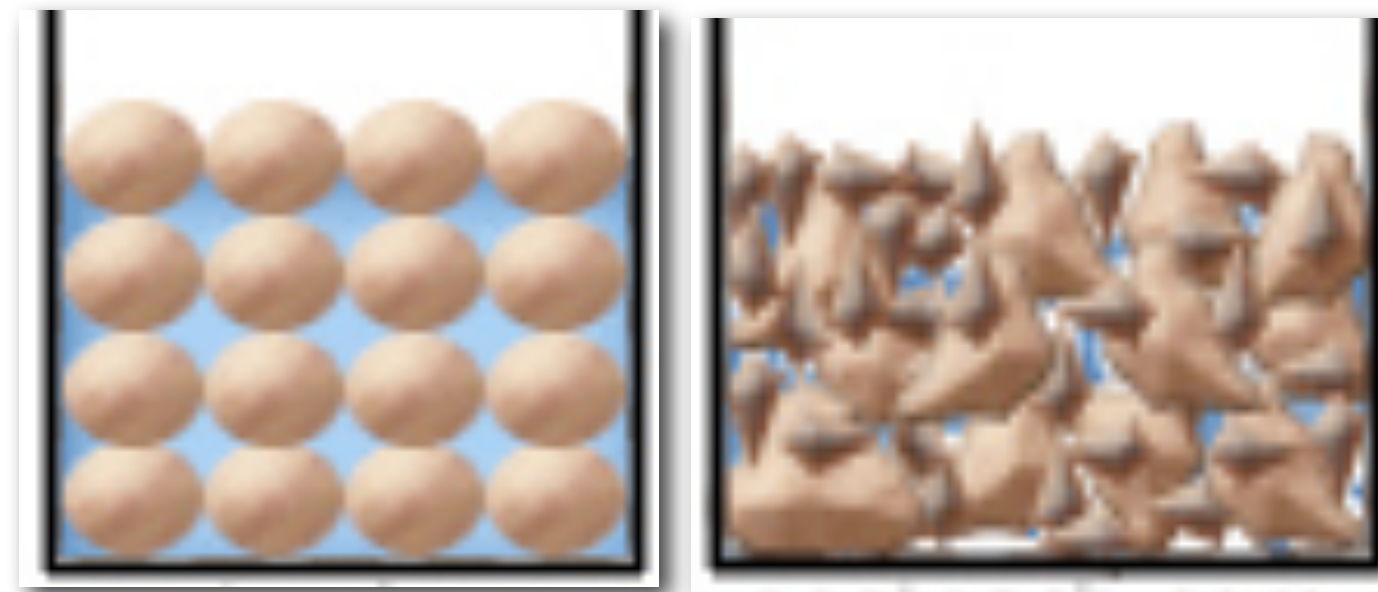




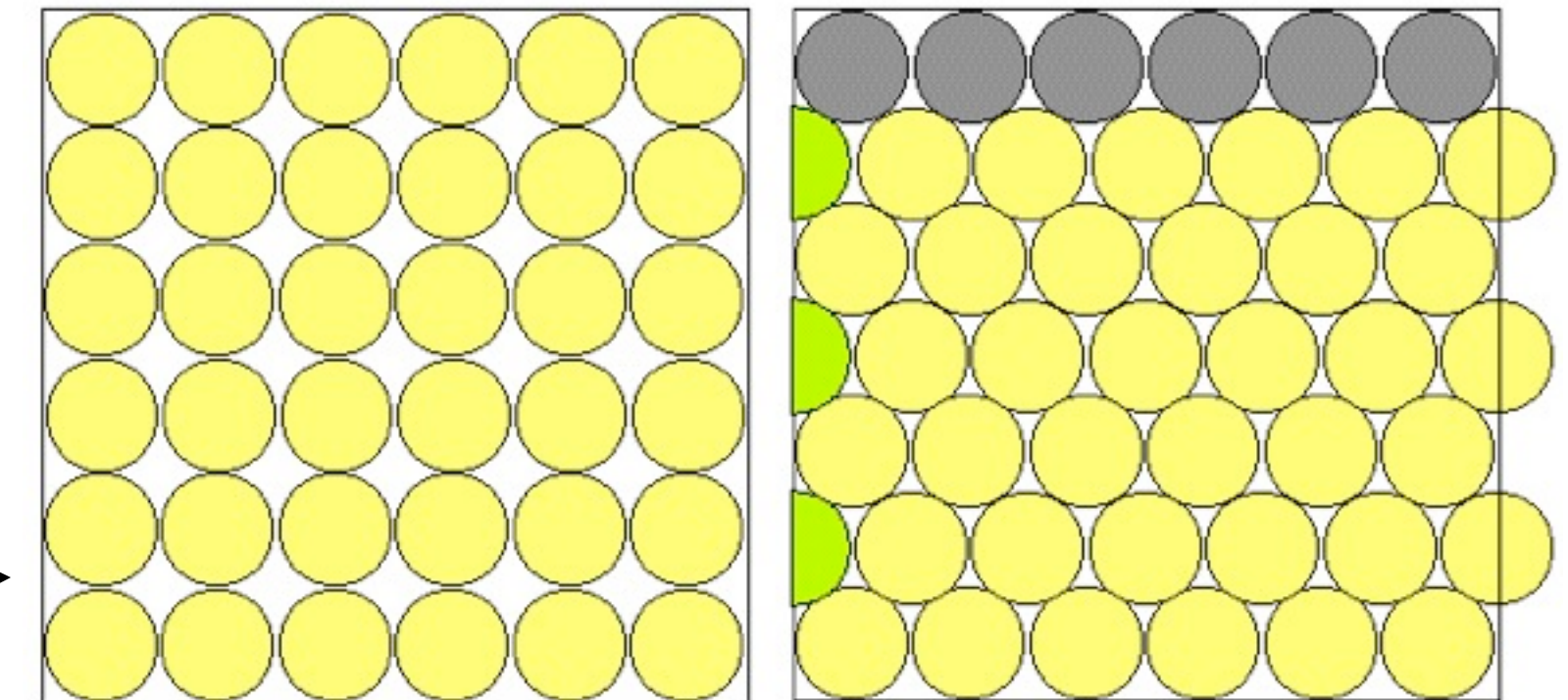
Porosity

- Porosity depends on three things:

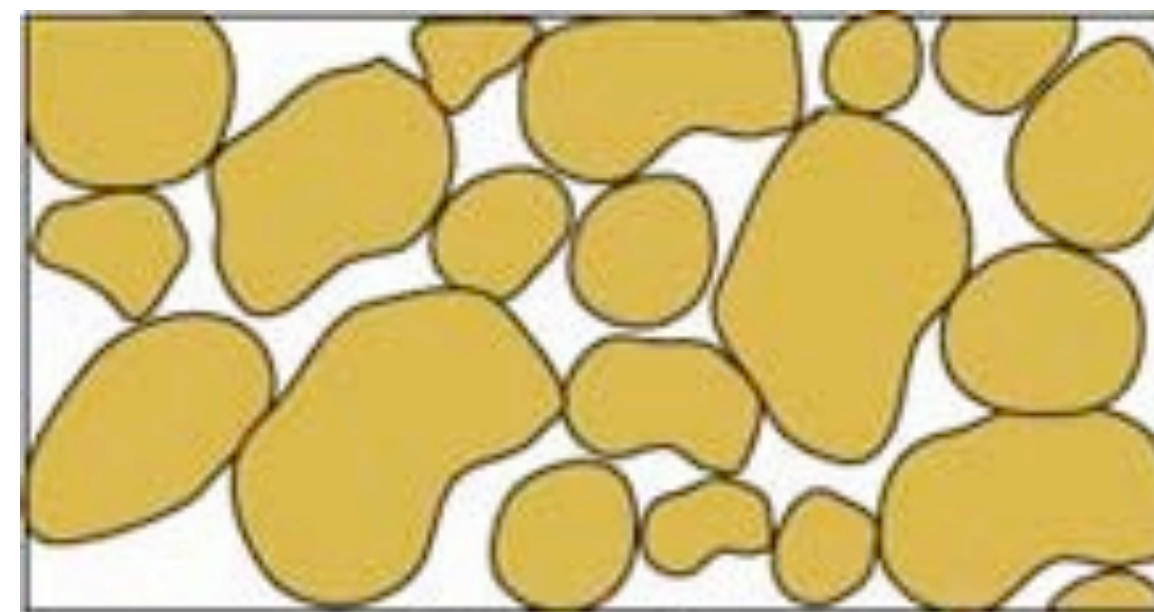
1. Shape



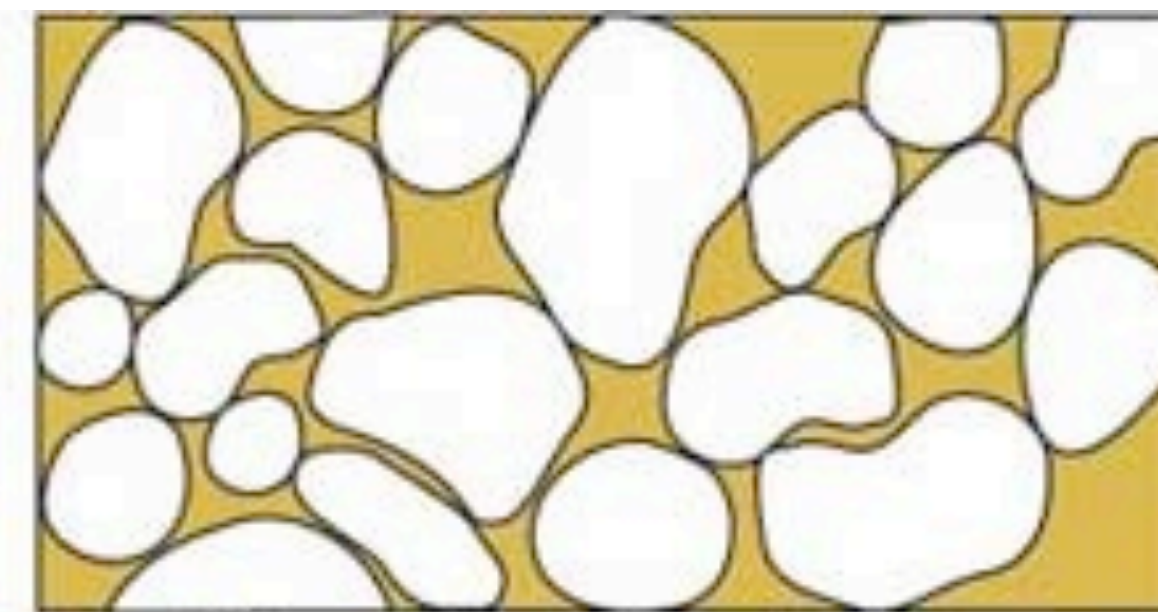
2. Packing



3. Sorting



Gravel
well sorted, high porosity

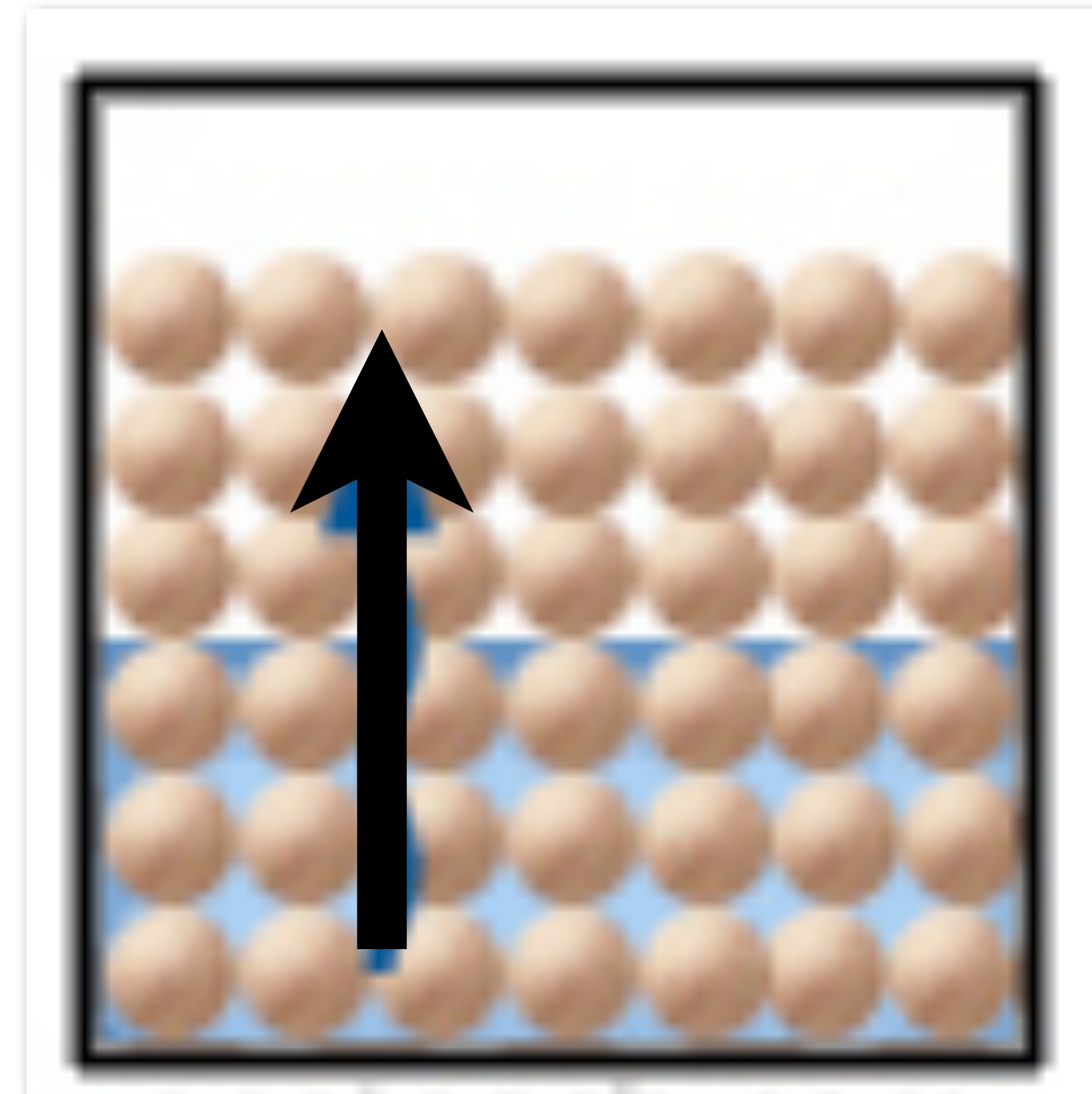
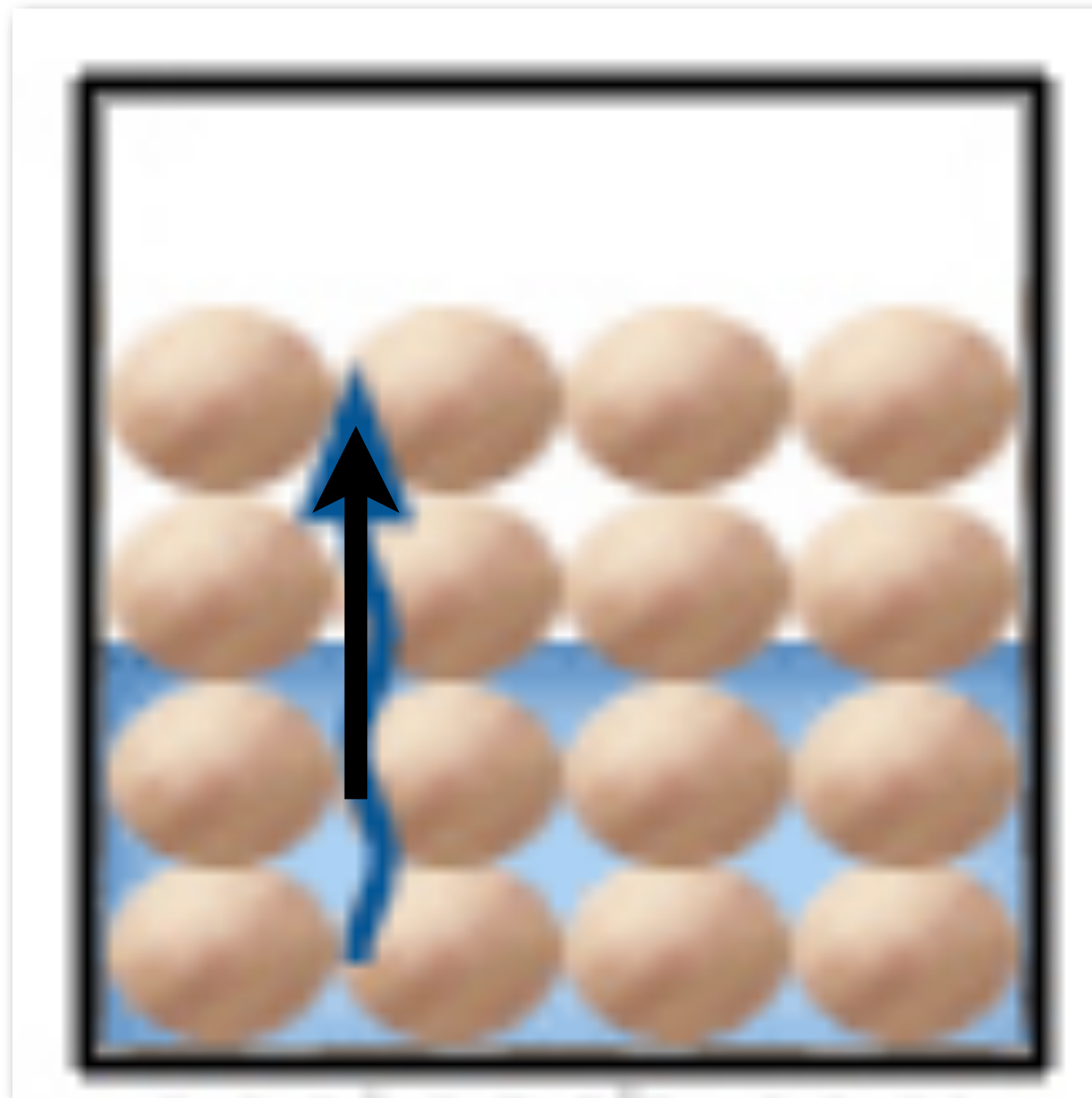


Gravel - Sand - Clay
poorly sorted, low porosity

Particle Size is NOT a factor

Capillarity

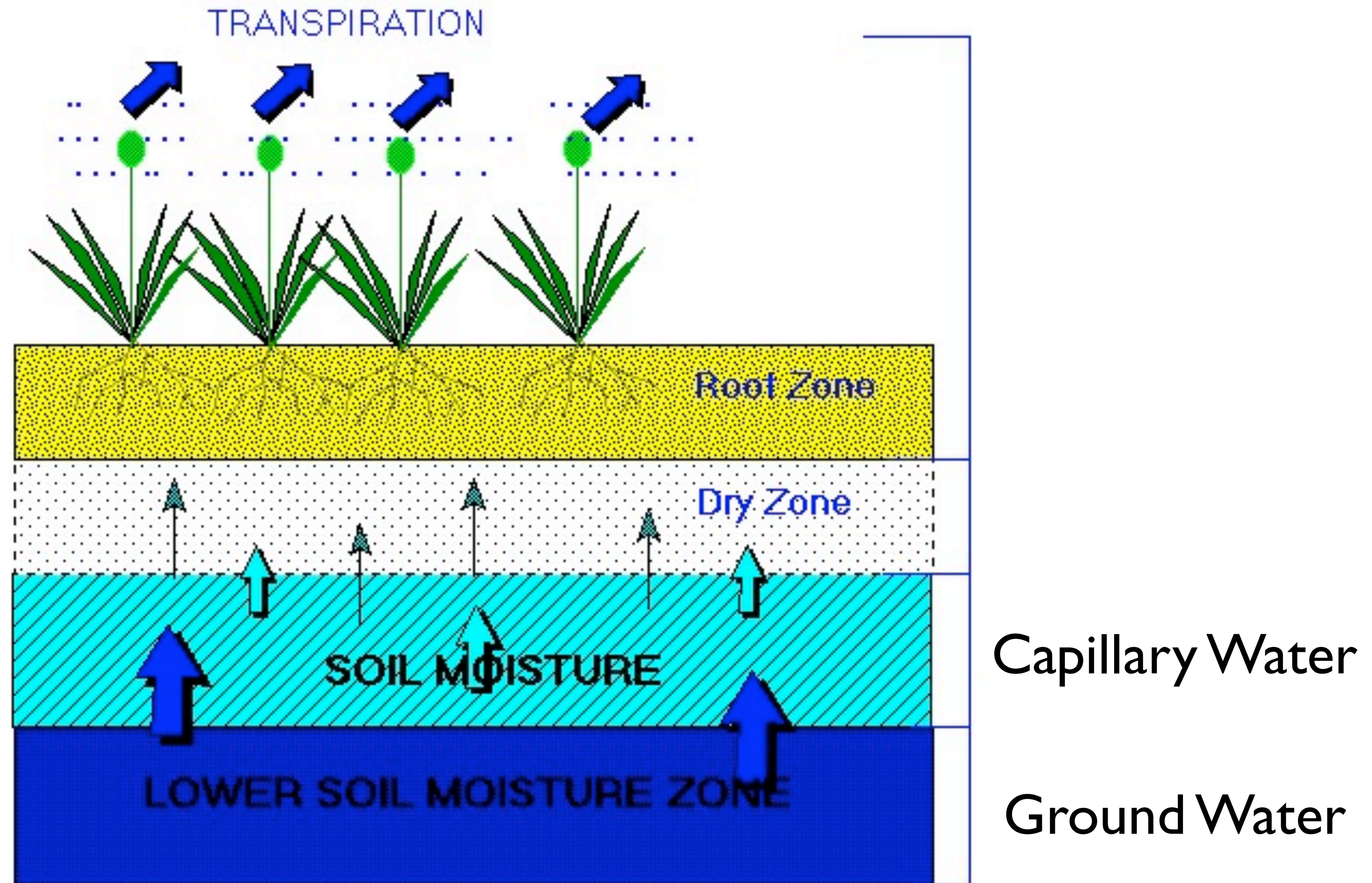
- The ability of water to move upwards through small openings in a material.
- The smaller the particle size, the greater the capillarity.



More
Capillarity

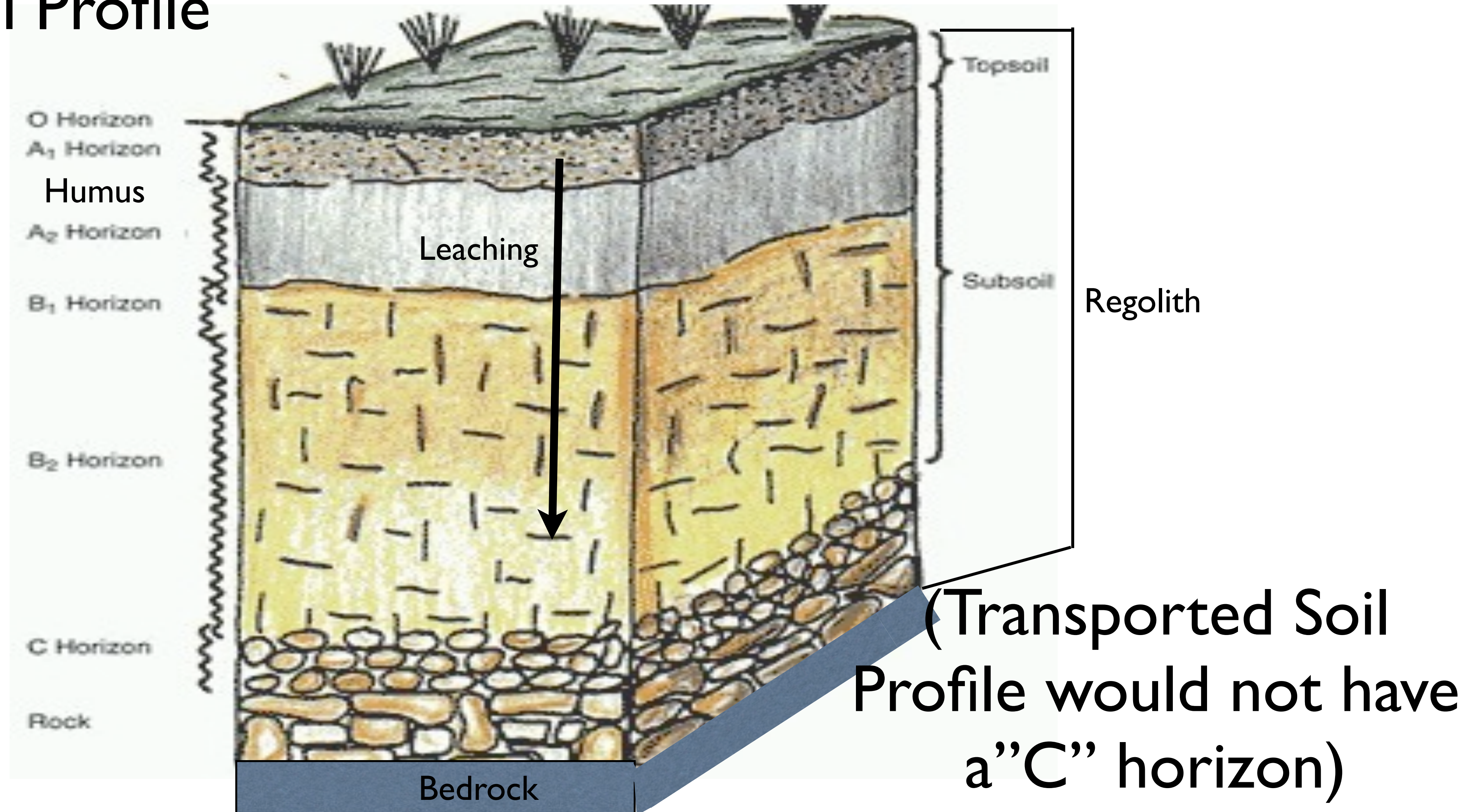
Water
Climbs
Higher

Capillarity

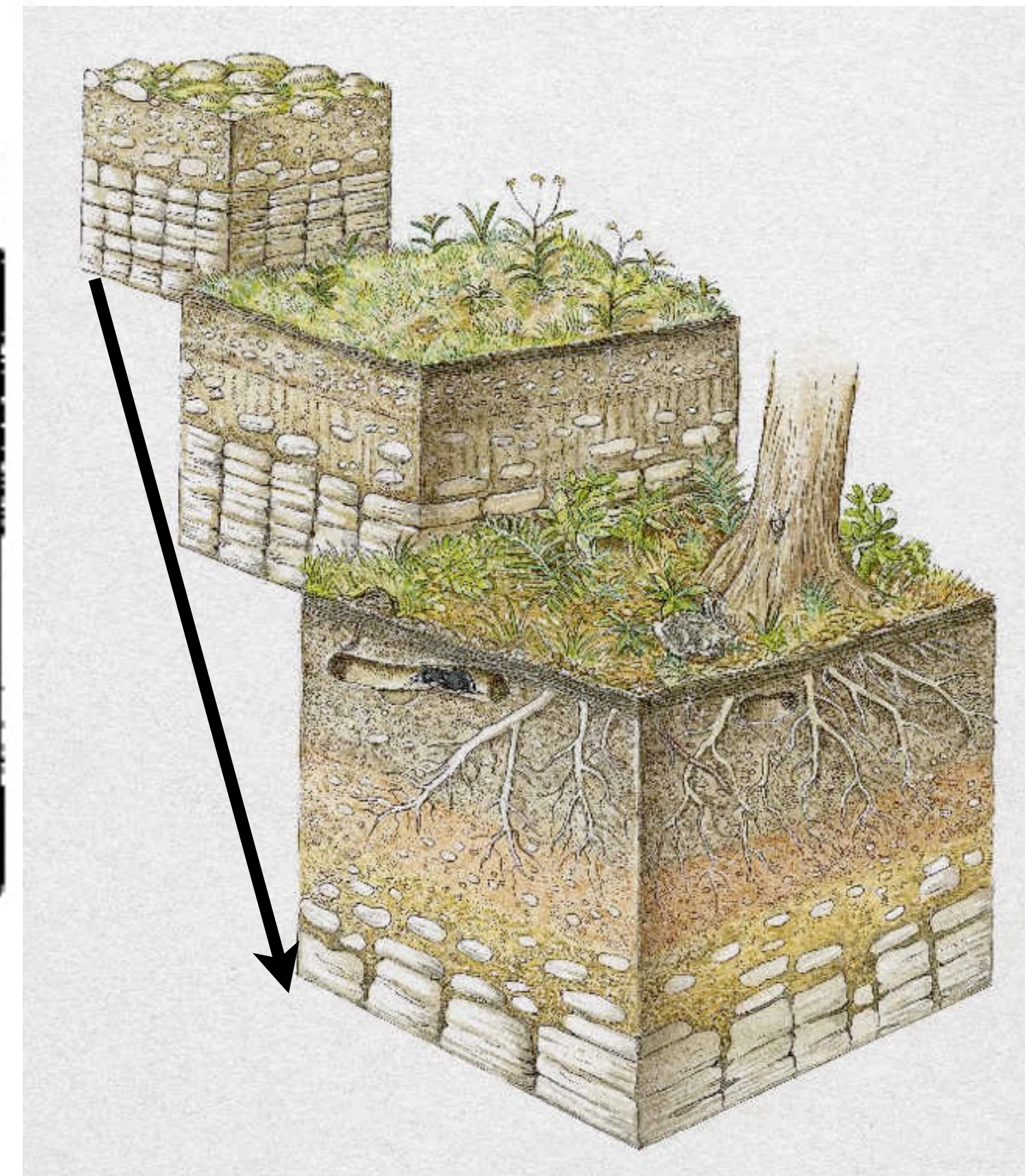
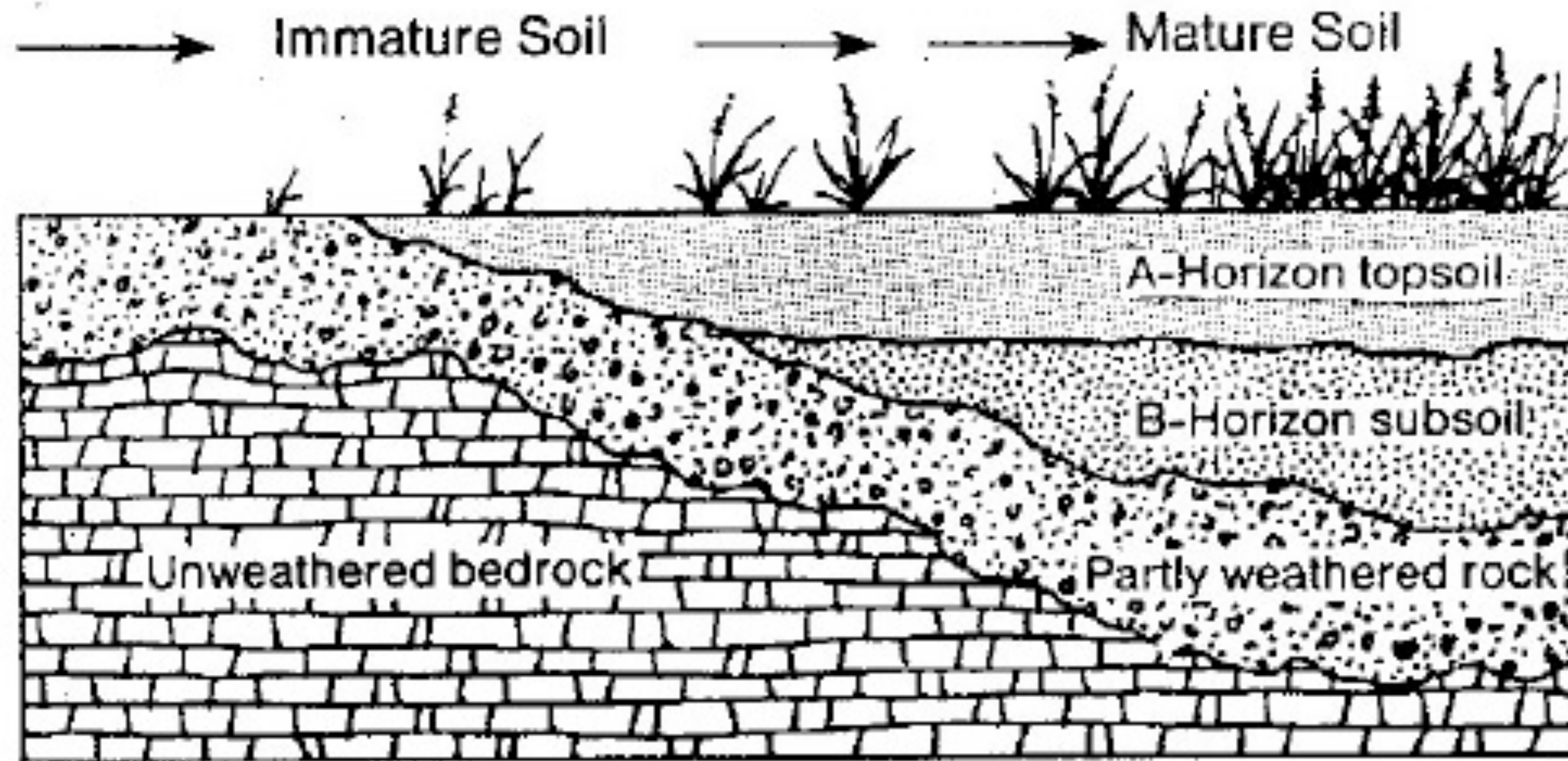


Soil Profile

Residual Soil Profile



Soil Development

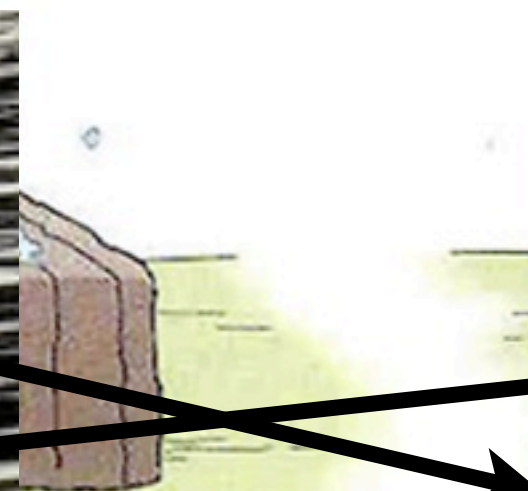
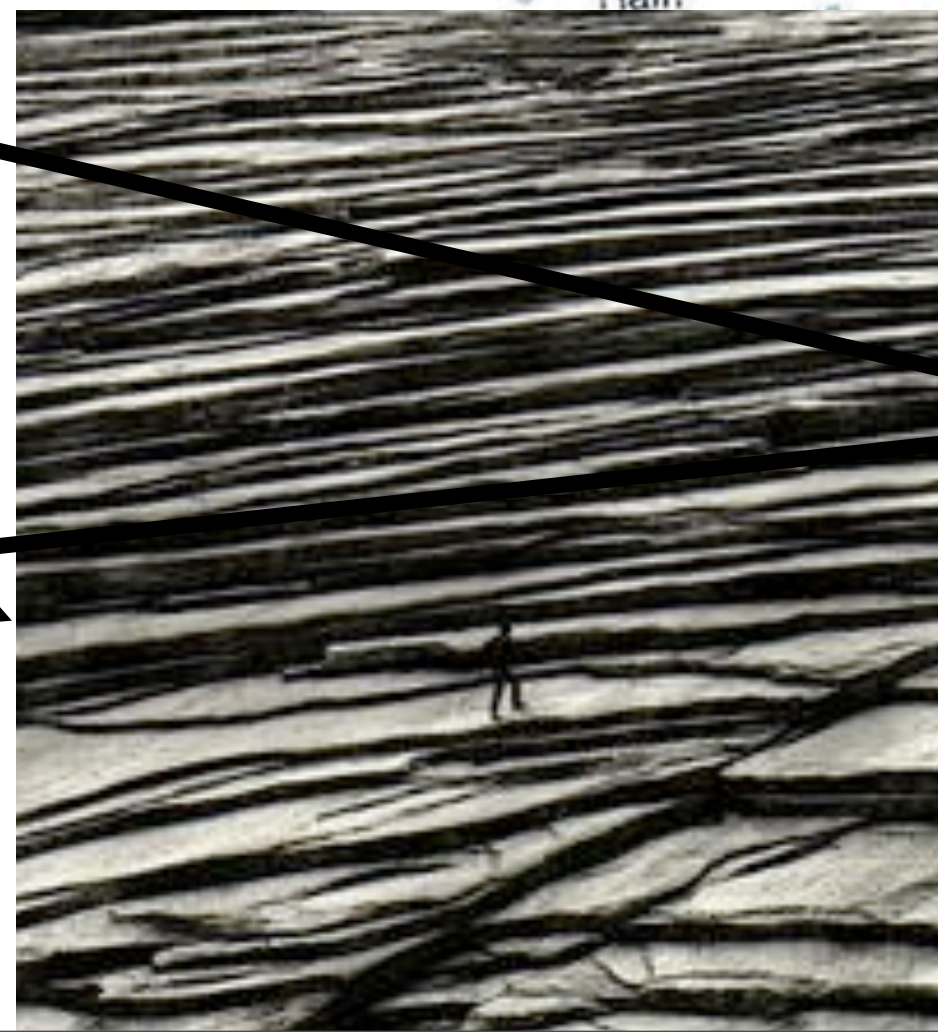


Weathering

- Weathering is the physical and chemical breakdown of rocks on or at the earth's surface into smaller fragments.

Physical Weathering

- When rock is cracked, split, or broken into pieces (sediments).
- Important types of physical weathering:
 - Frost Action (Ice Wedging)
 - Abrasion
 - Exfoliation
 - Biological



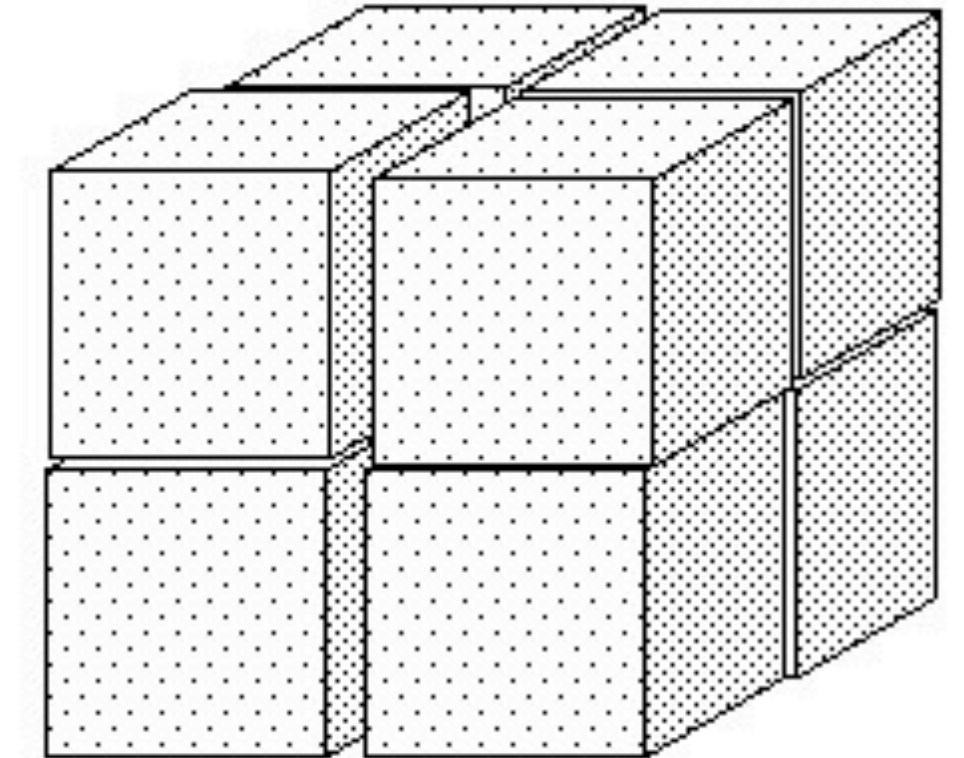
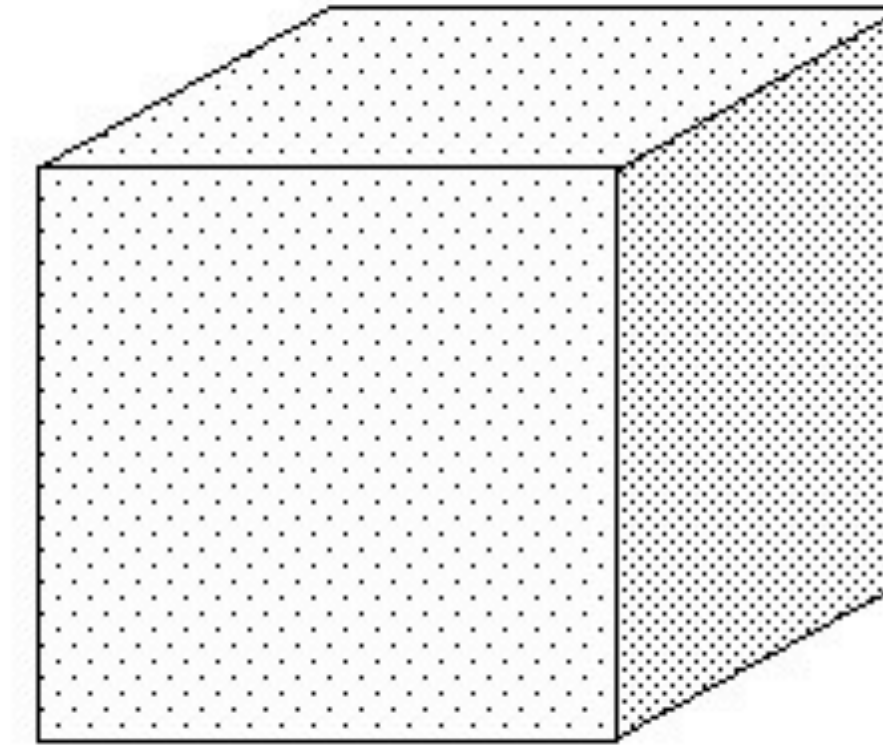
filtrates fractures in rock and freezes, the force of
great enough to break the rock into smaller pieces.

Chemical Weathering

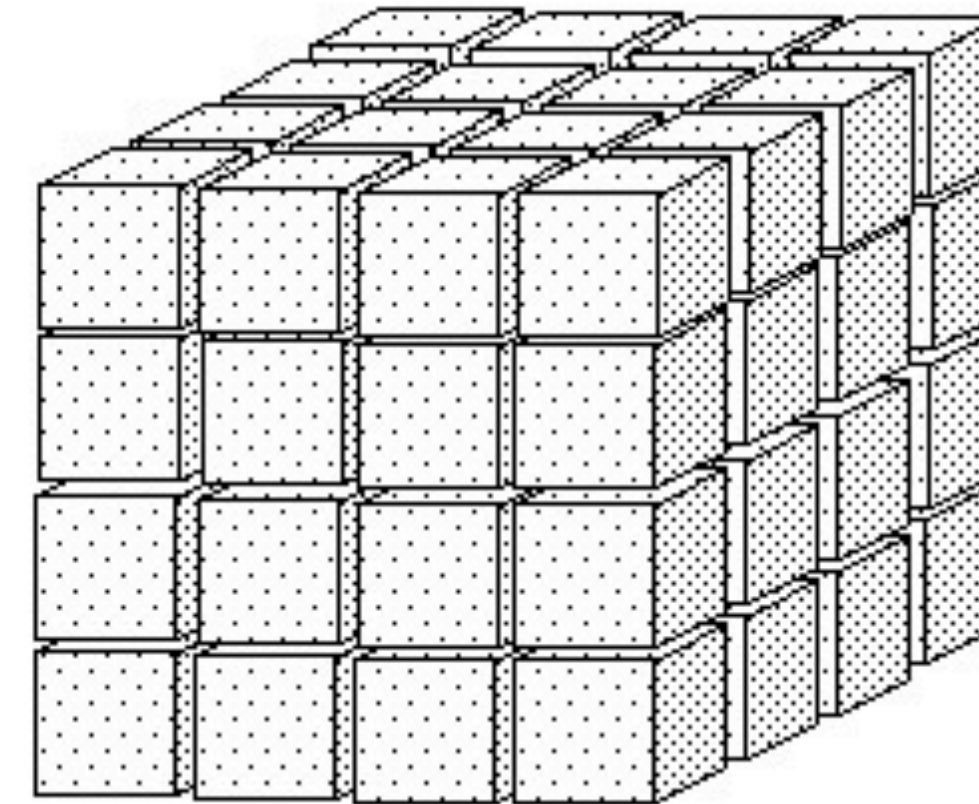
- When rock is broken down by chemical action resulting in a change in the composition of the rock.
 - Caused by:
 - Oxidation- $\text{Iron} + \text{Water} = \text{Iron Oxide (rust)}$
 - Hydration- $\text{Granite} + \text{Water} = \text{Sand Particles (feldspar dissolves)}$
 - Carbonation - $\text{Carbon Dioxide} + \text{Water} = \text{Carbonic Acid}$
 - Other acids, natural & man-made (acid rain)

Surface Area

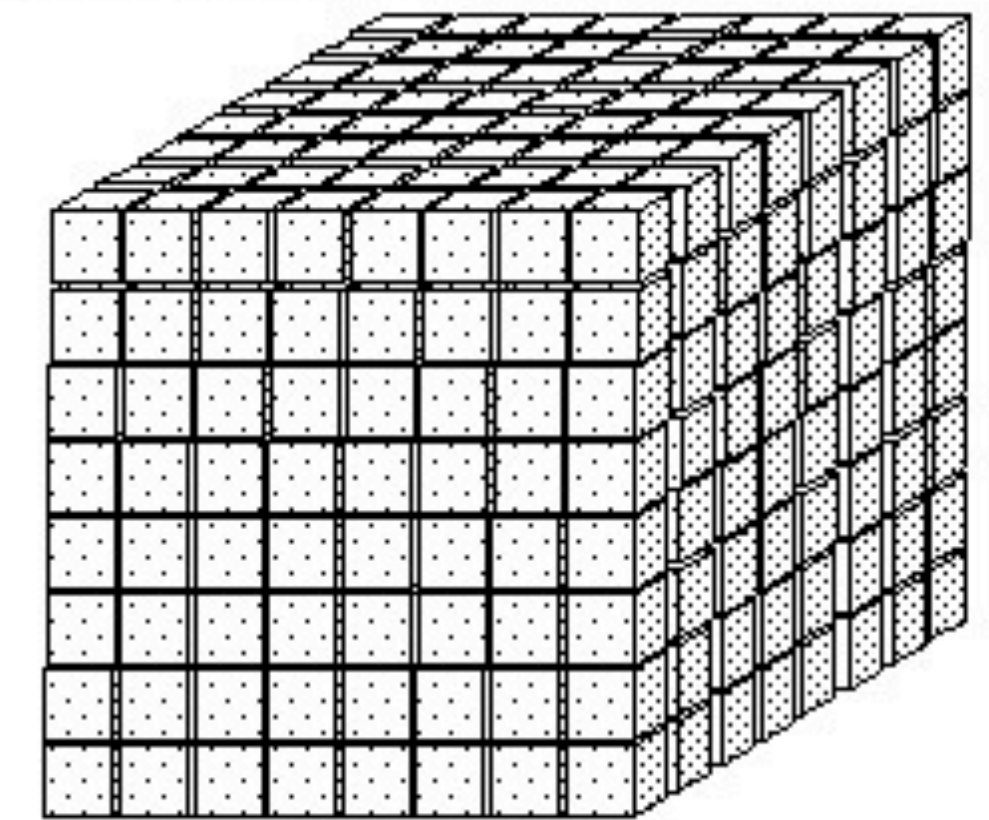
- The more exposed surface area the more weathering will occur.



Pieces half the original size.
Twice the surface area

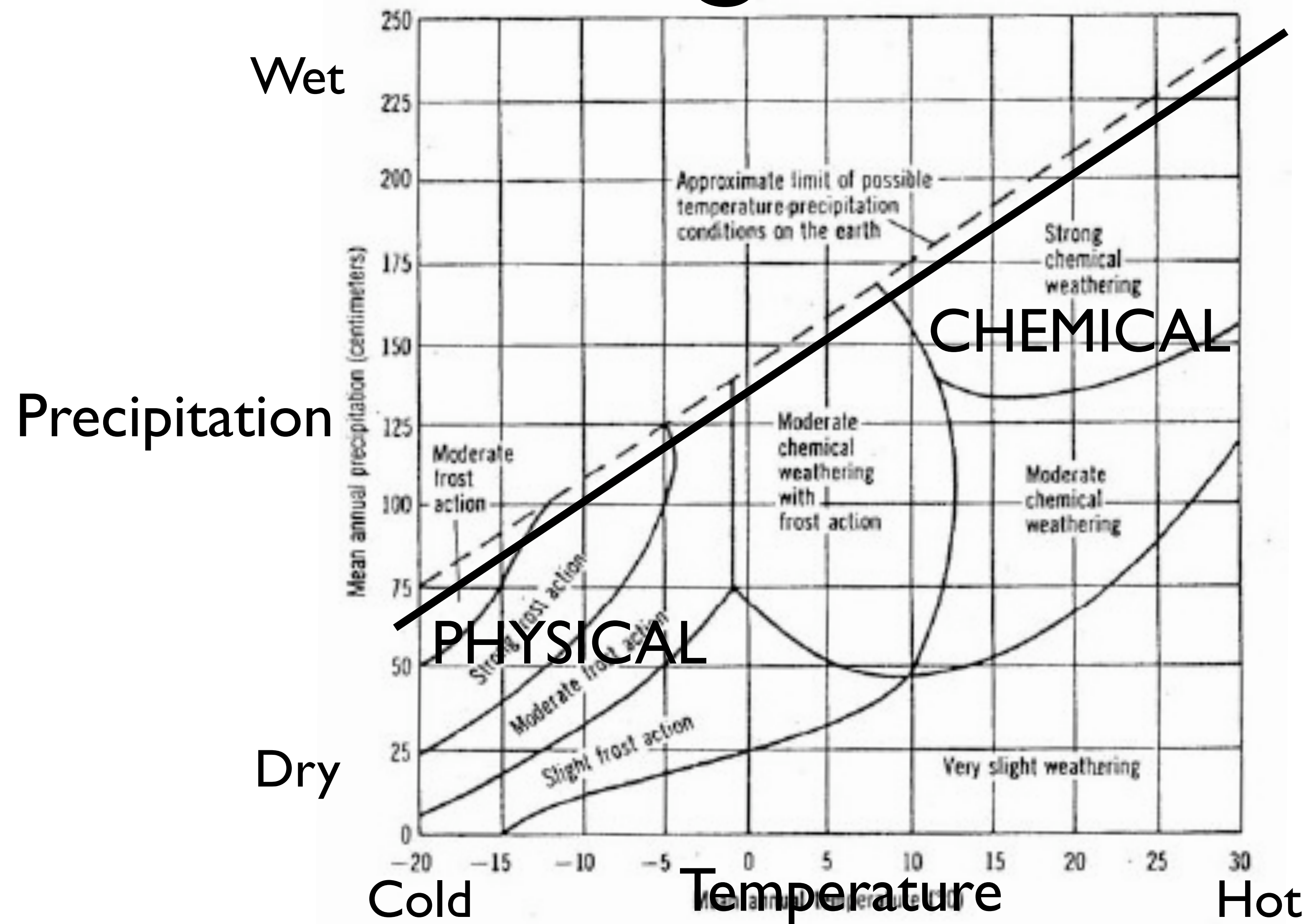


Pieces one quarter the original size.
Four times the surface area



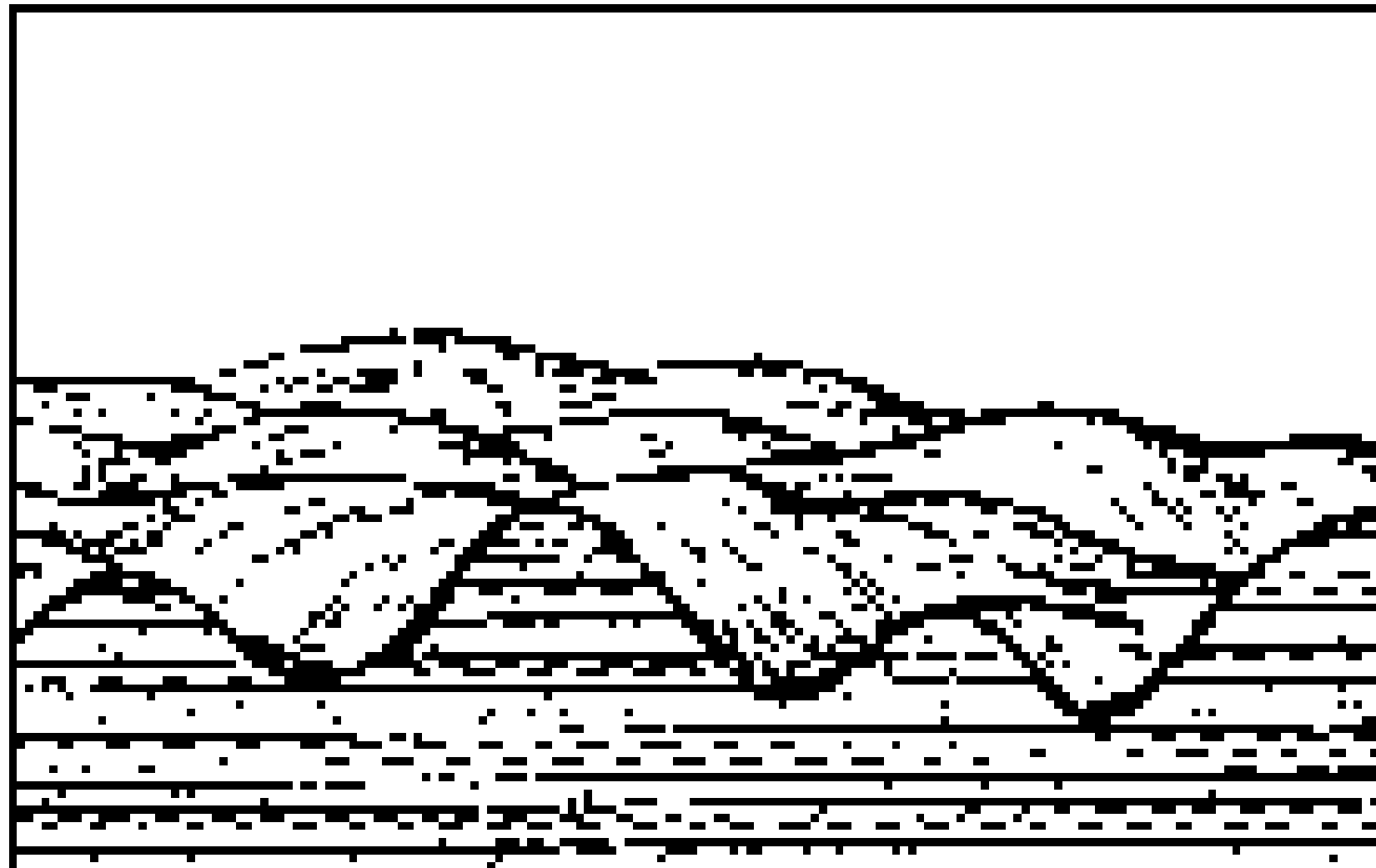
Pieces one eighth the original size.
Eight times the surface area

Weathering and Climate



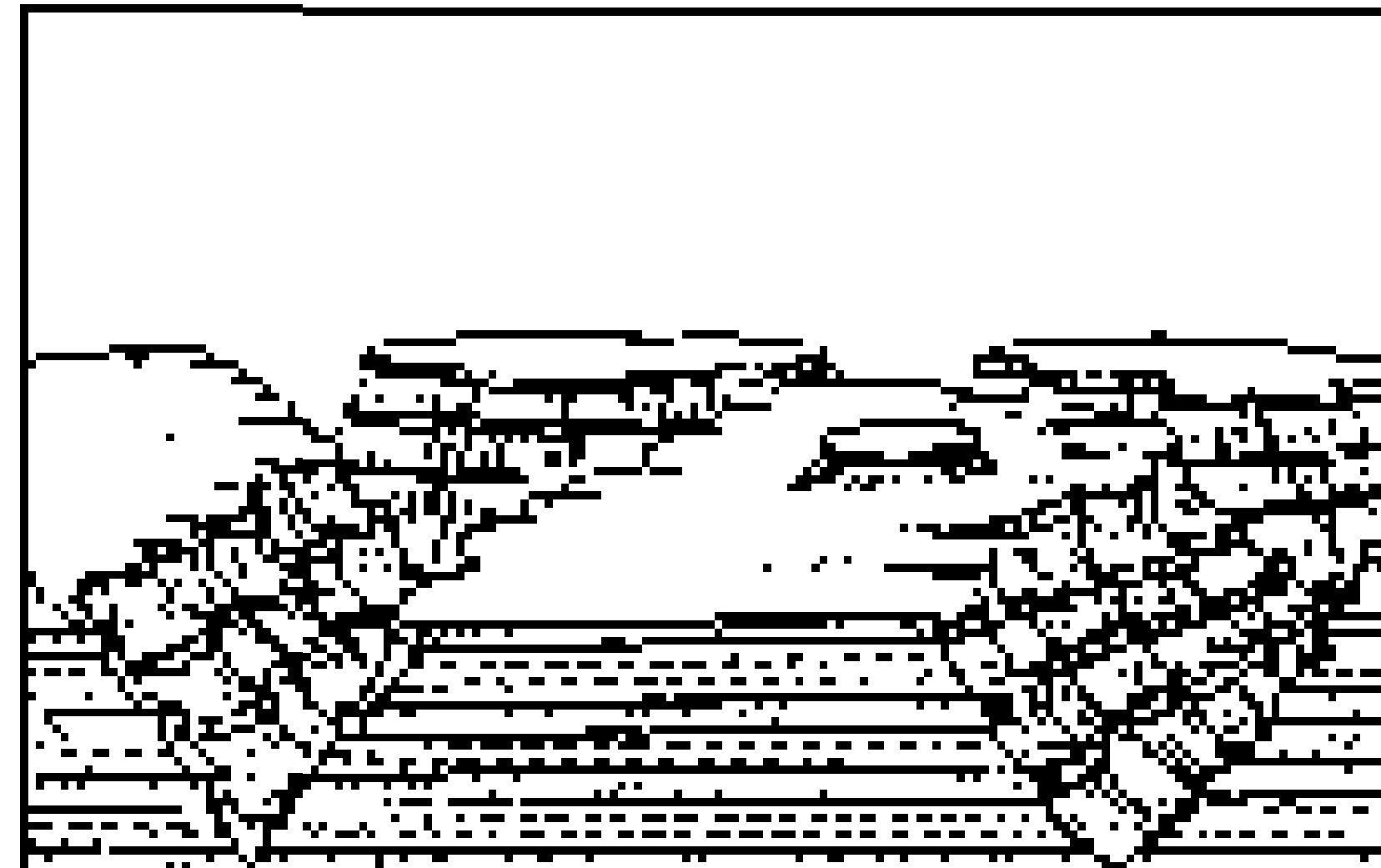
Humid vs Arid

Landscape A



Smoothed & Rounded

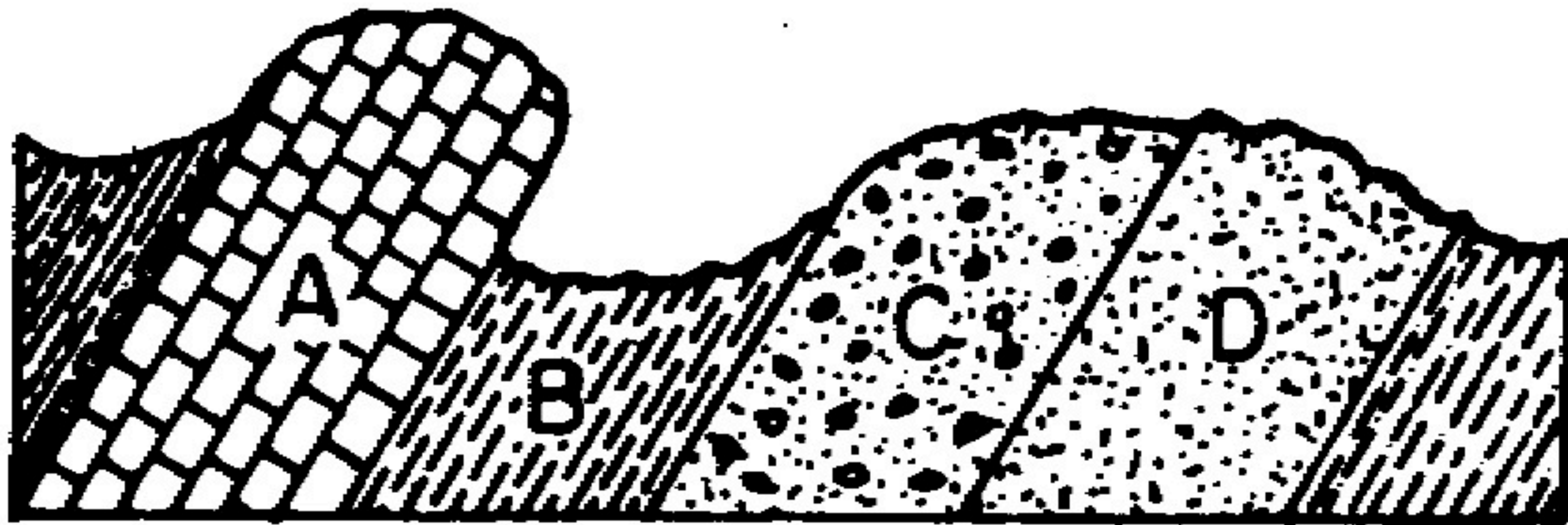
Landscape B



Angular

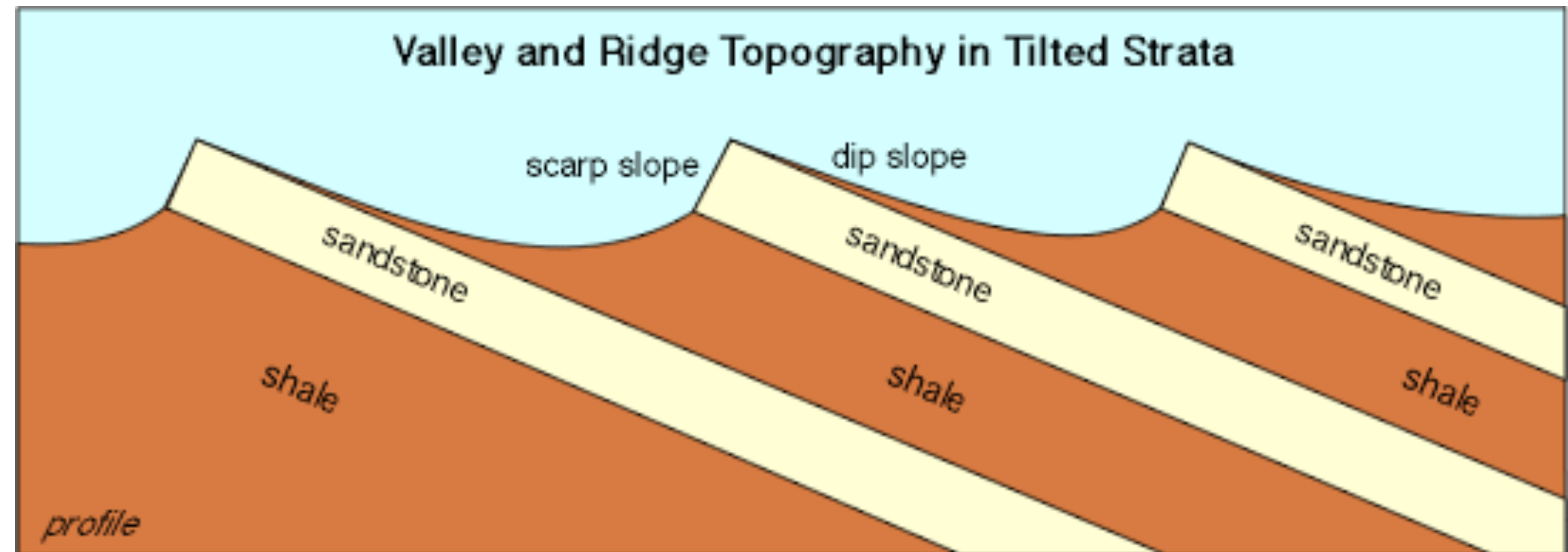
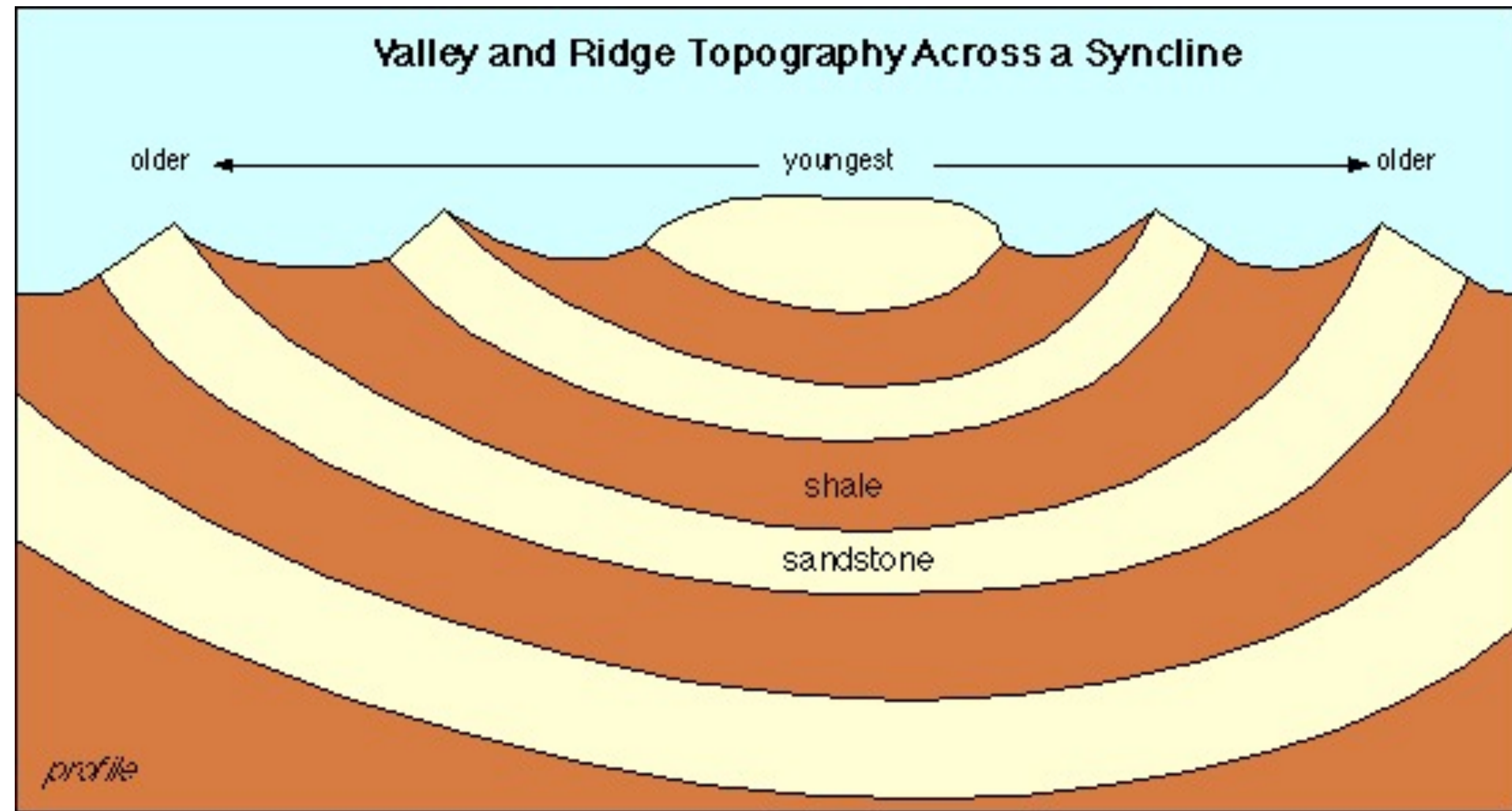
Mineral Composition

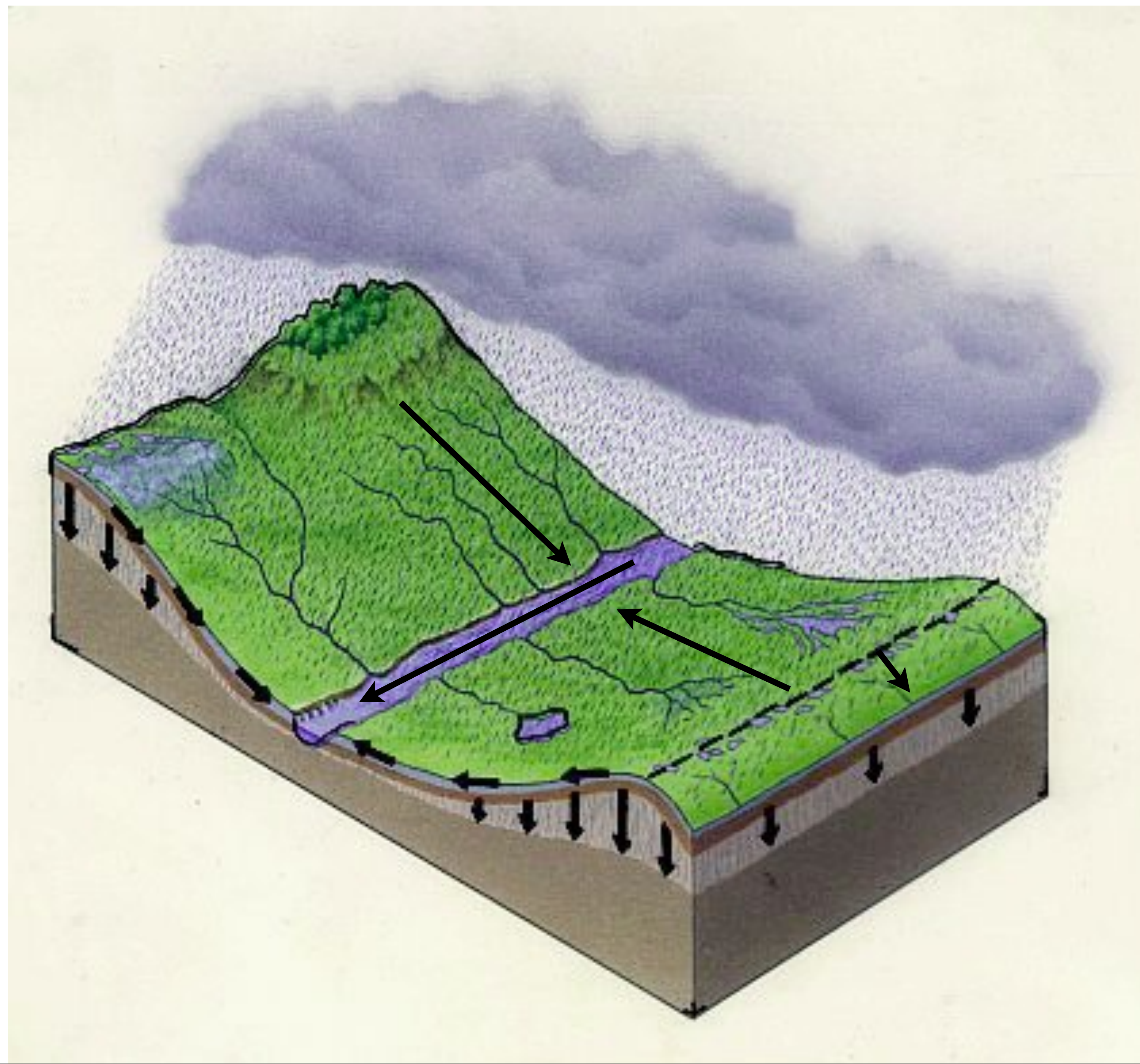
The harder the mineral (the more resistant to weathering),
The longer it will remain.

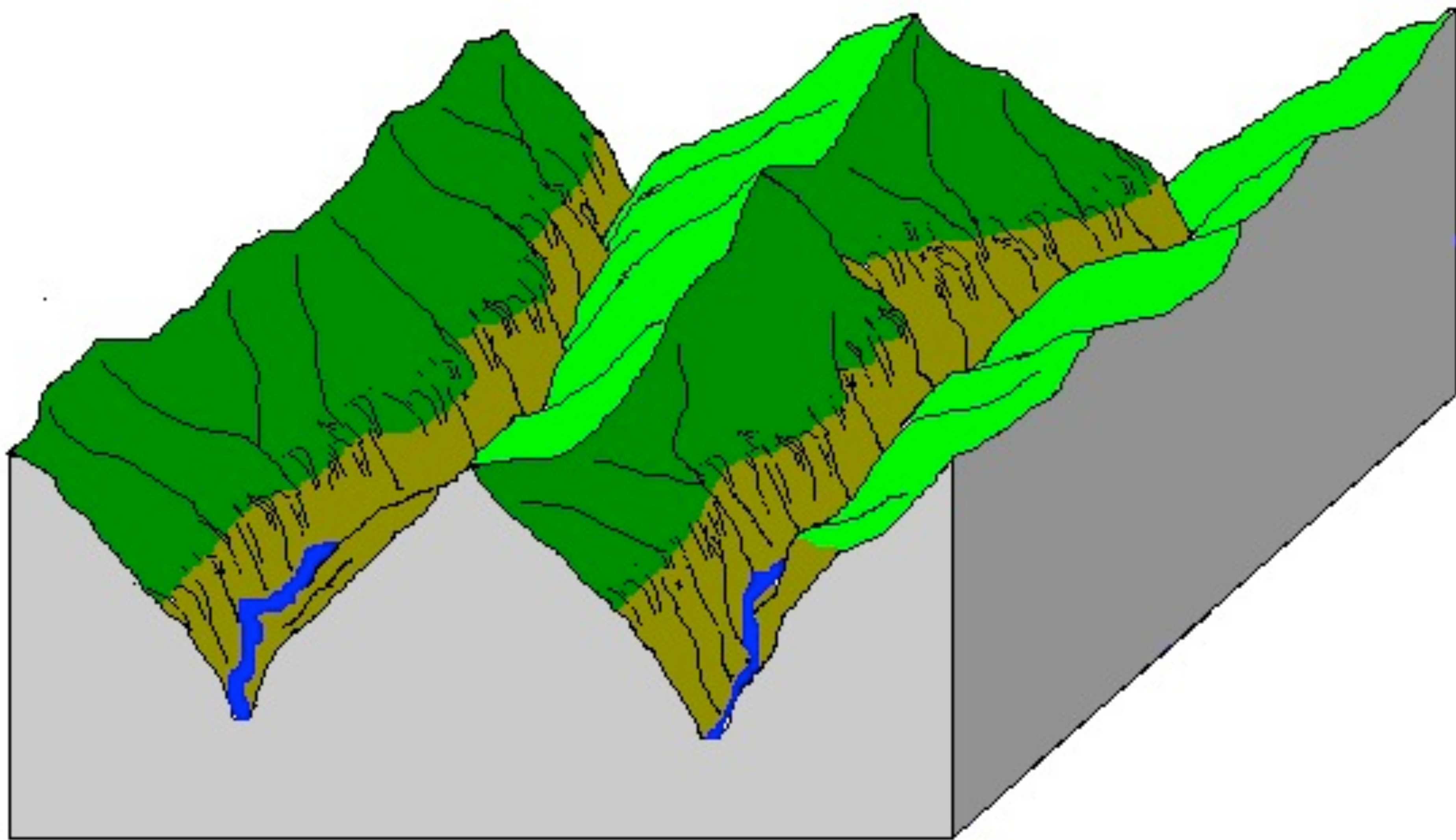


Rock A is most resistant therefore it weathered (and eroded) the least,
(the most remains).

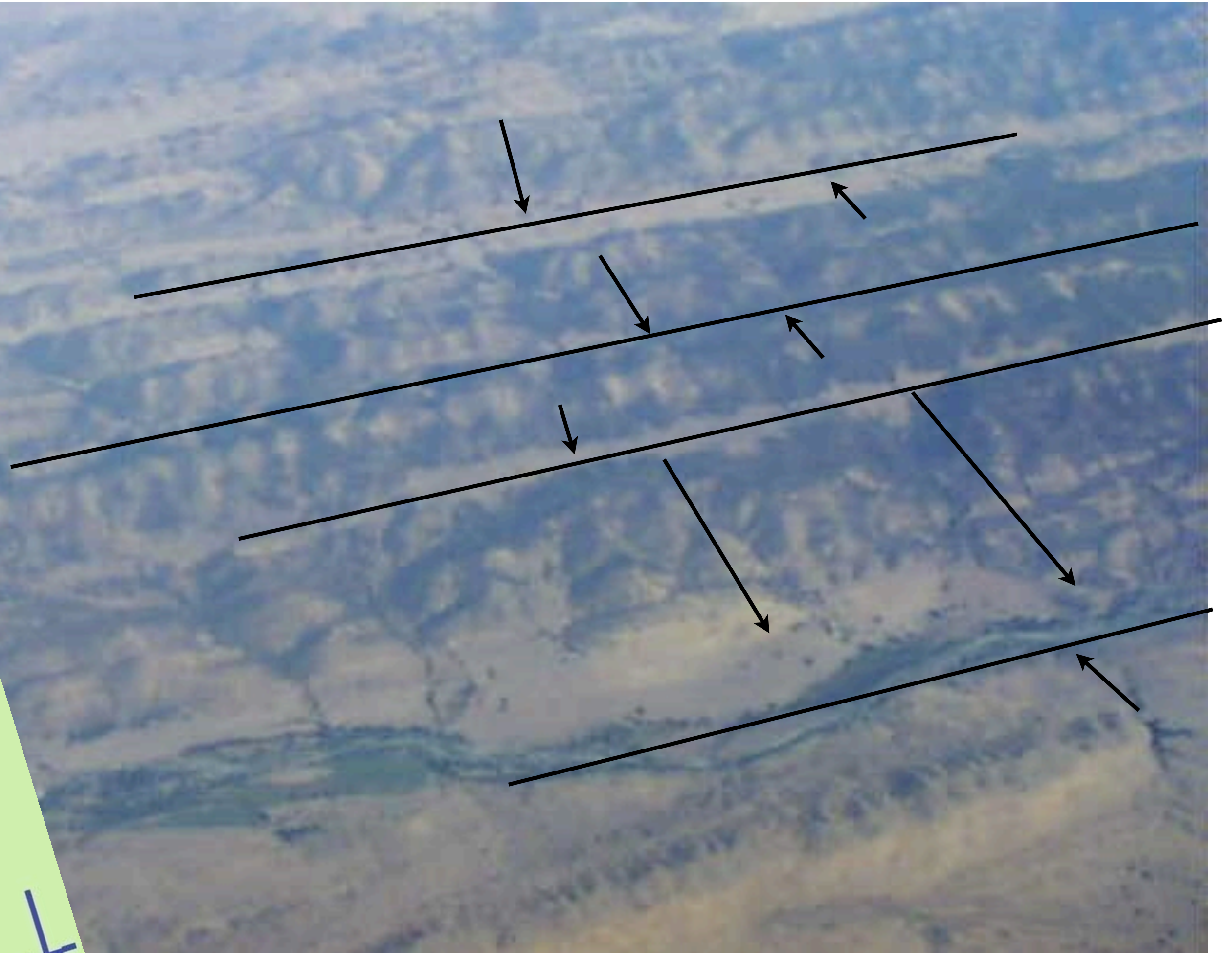
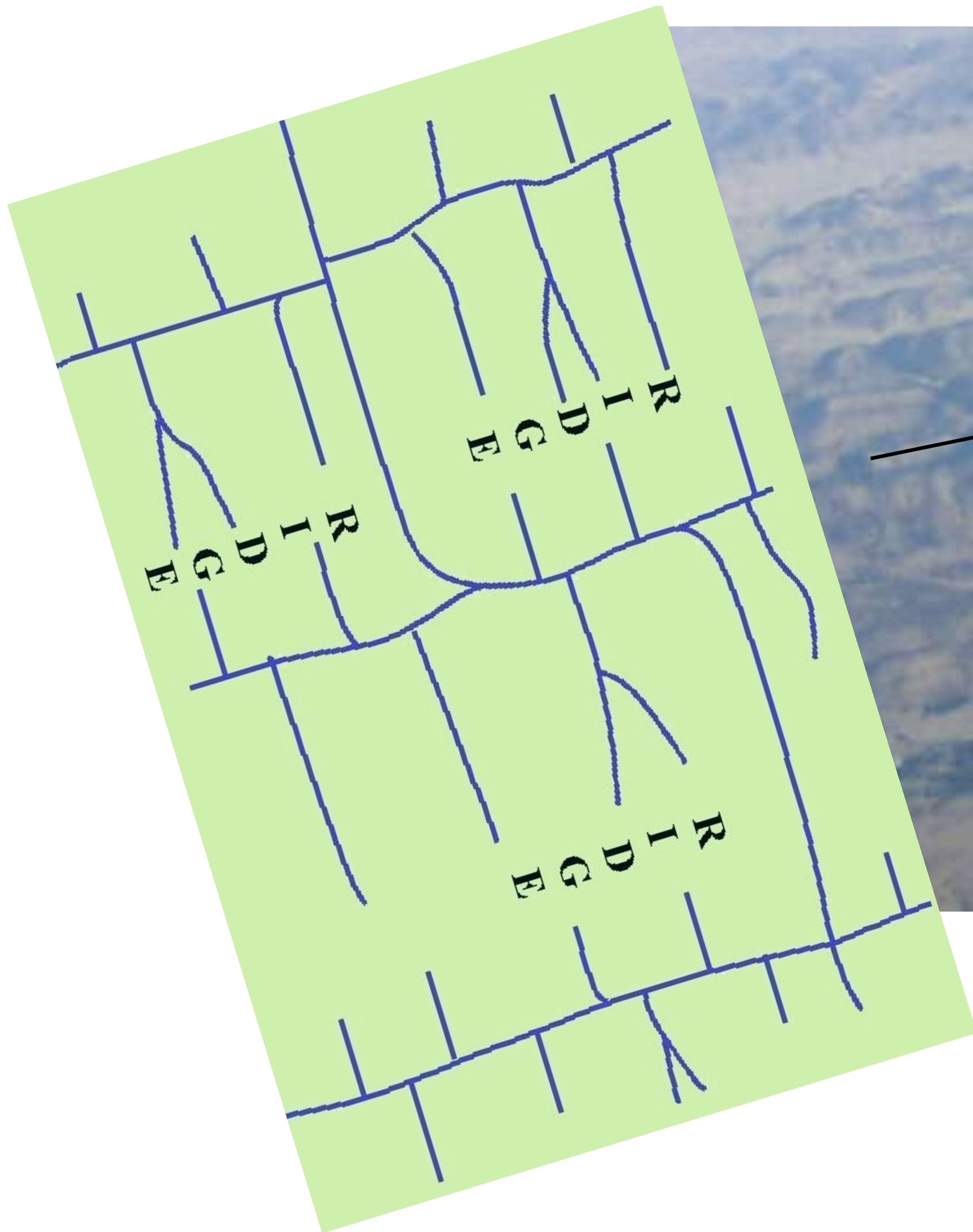
Water will follow
the path
downstream along
the path of the
least resistant
(darker brown)
bedrock.



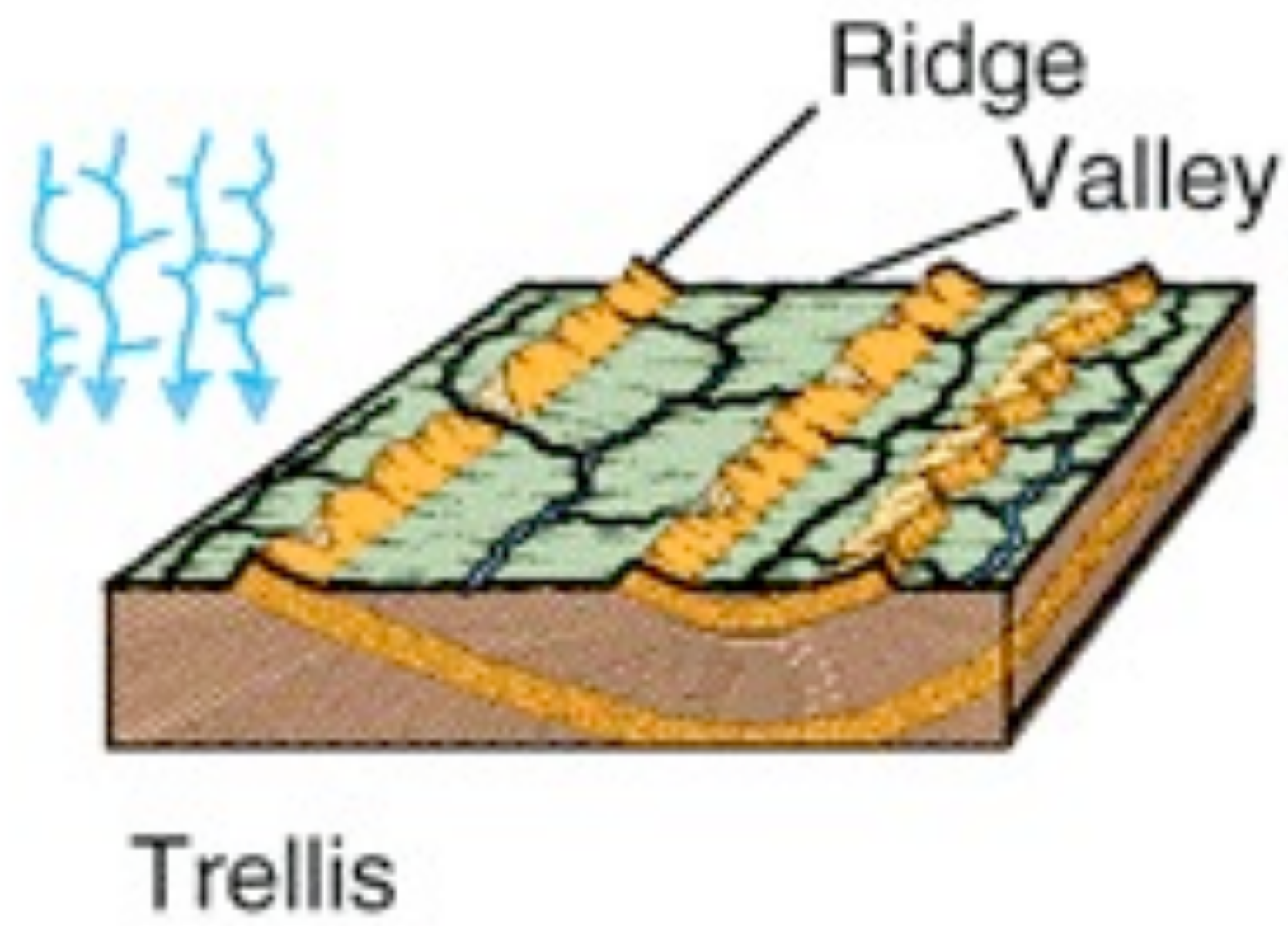
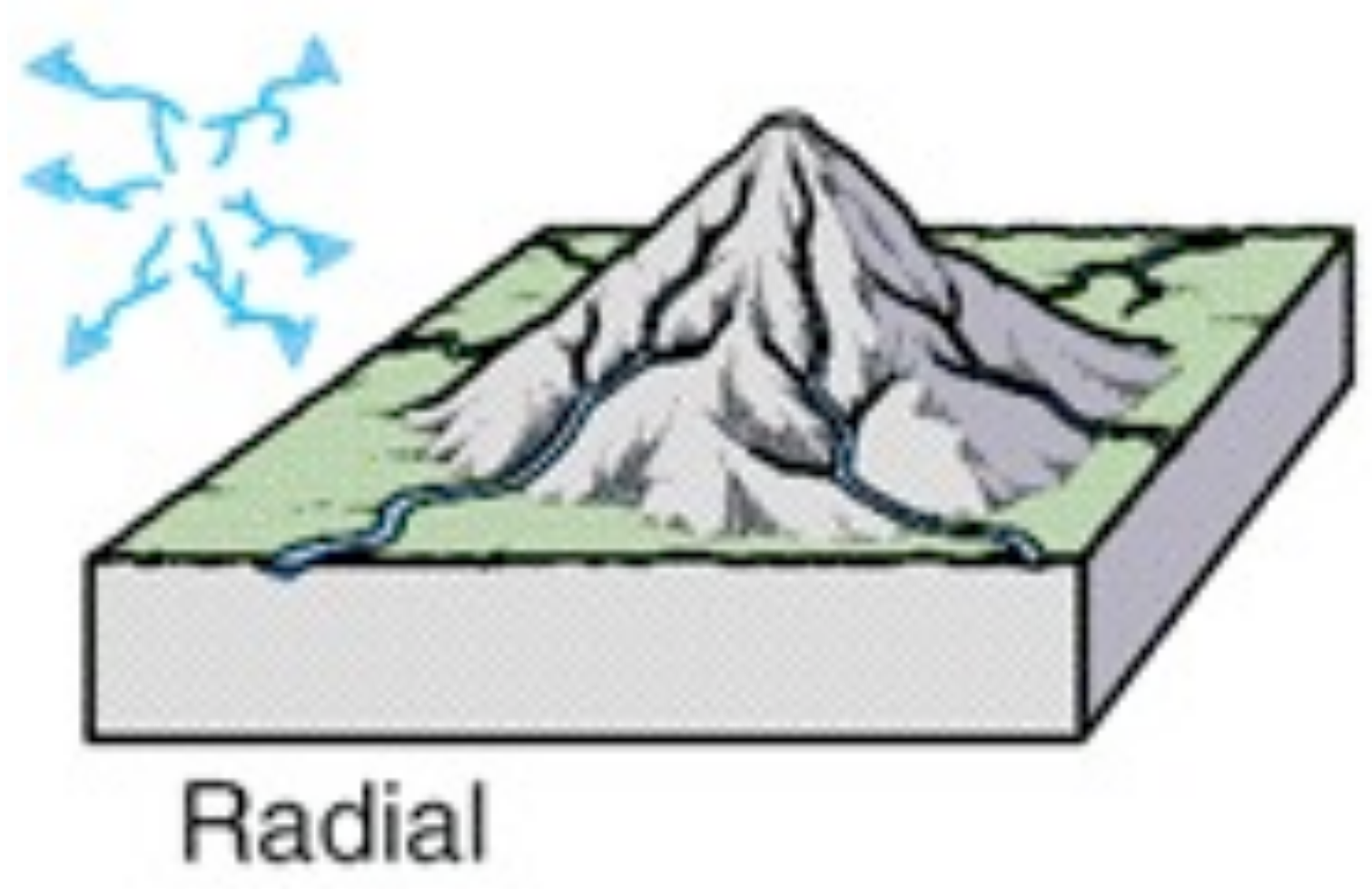
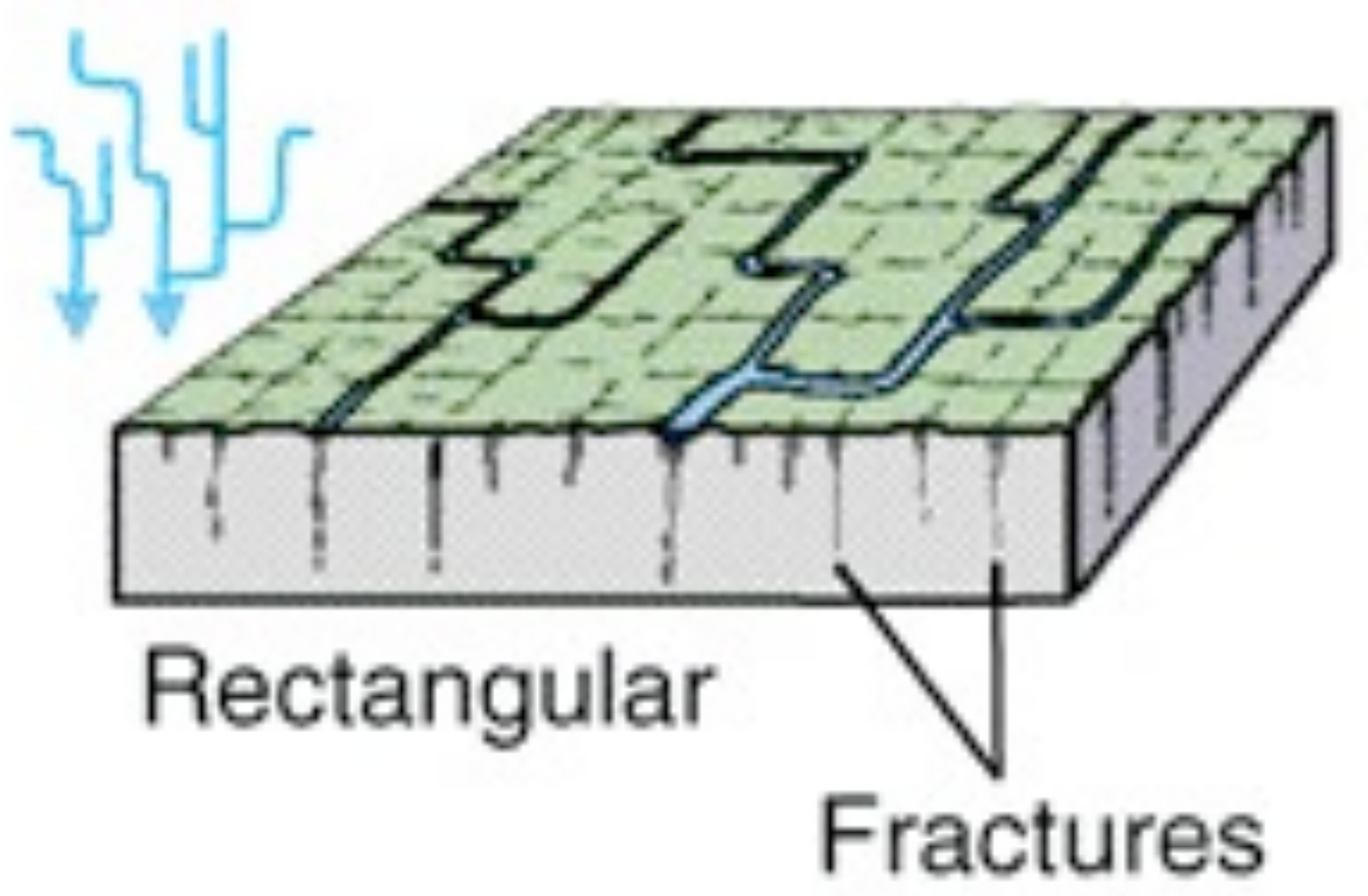
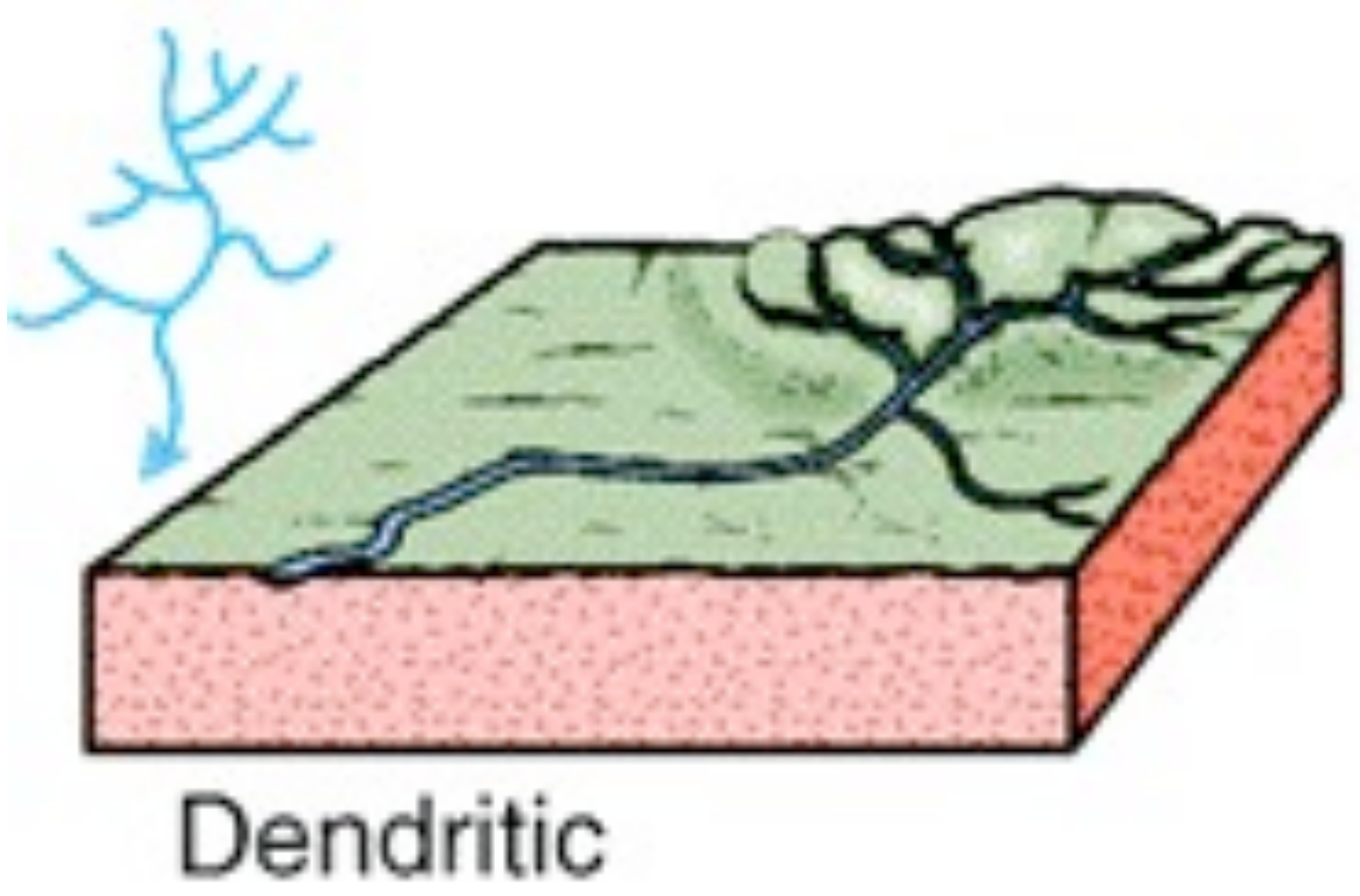




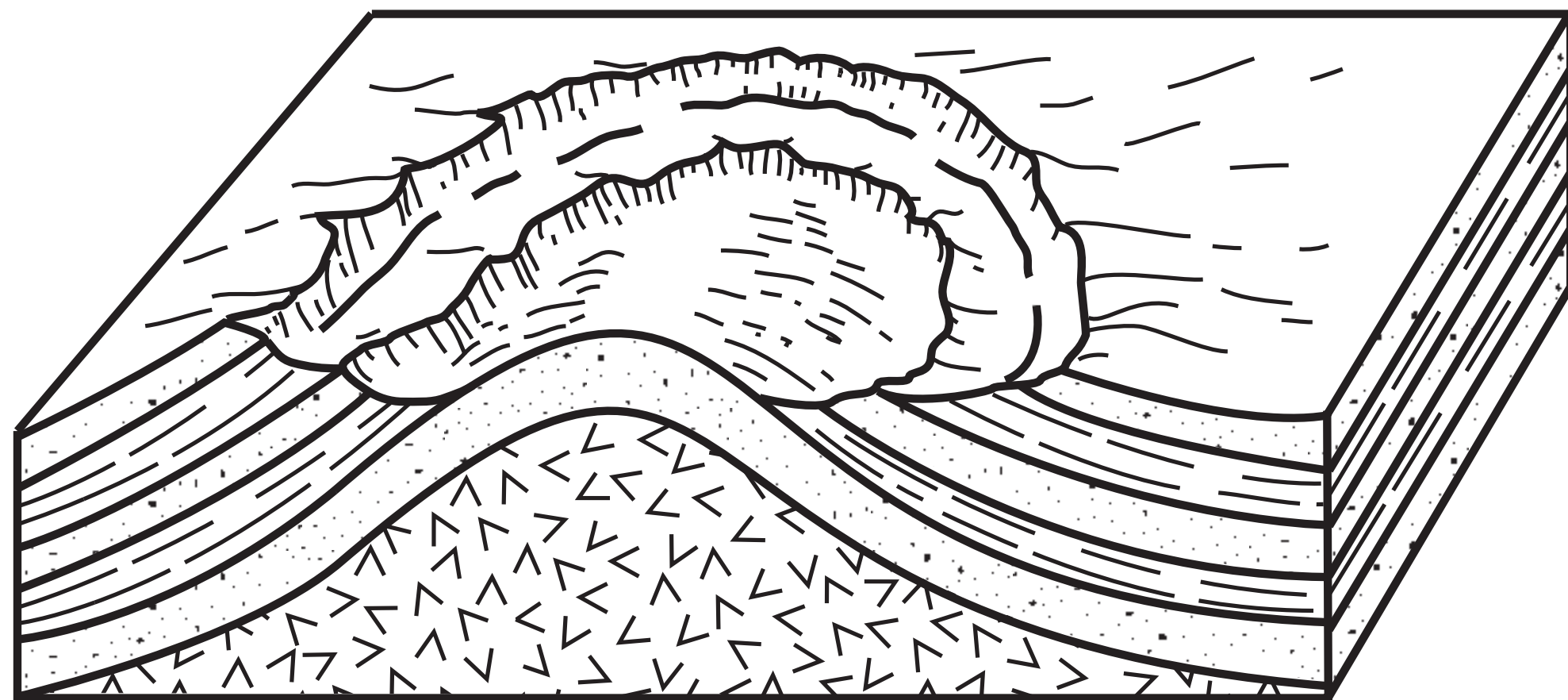
Rivers form “V” shaped Valleys



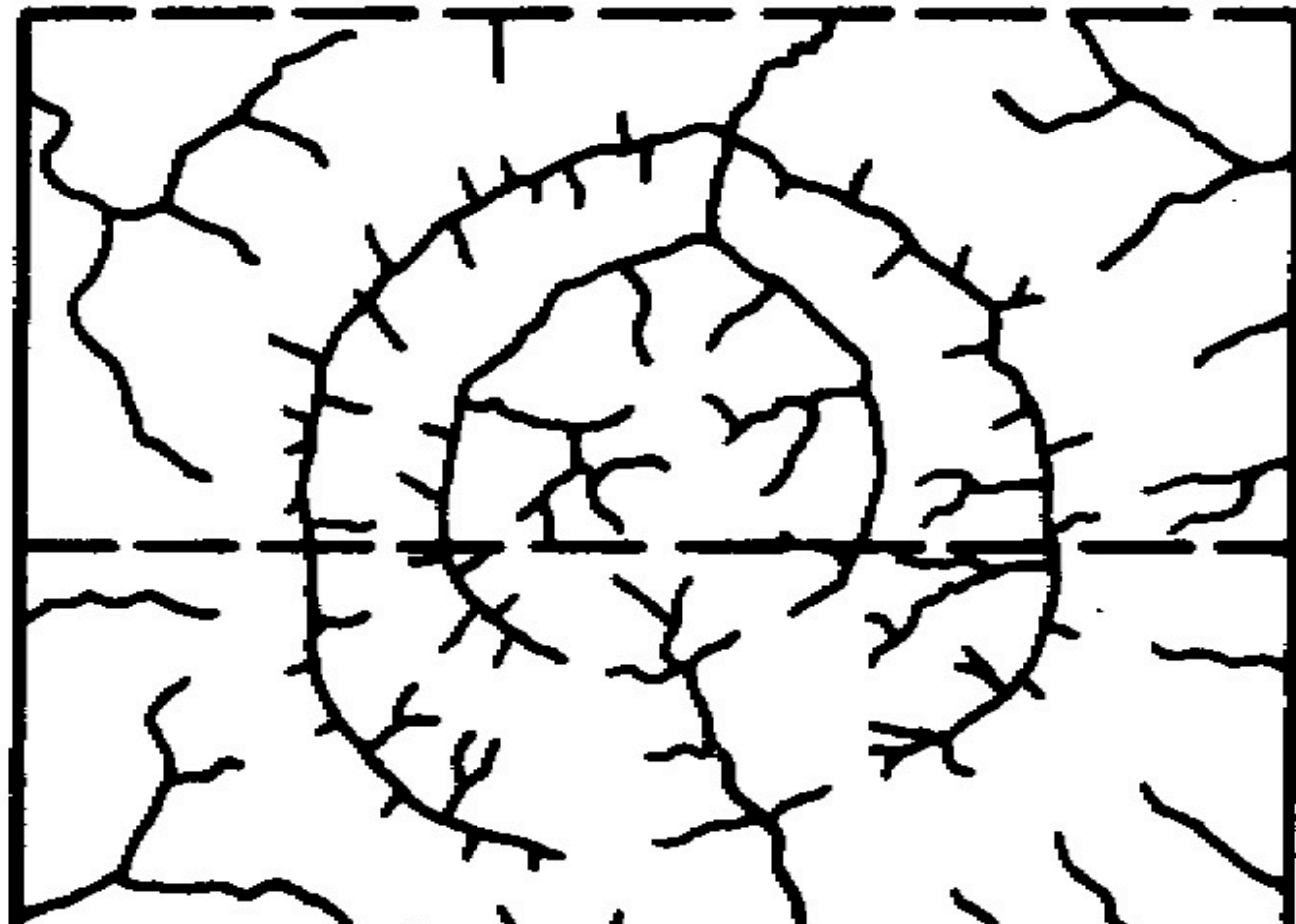
STREAM
DRAINAGE
PATTERNS



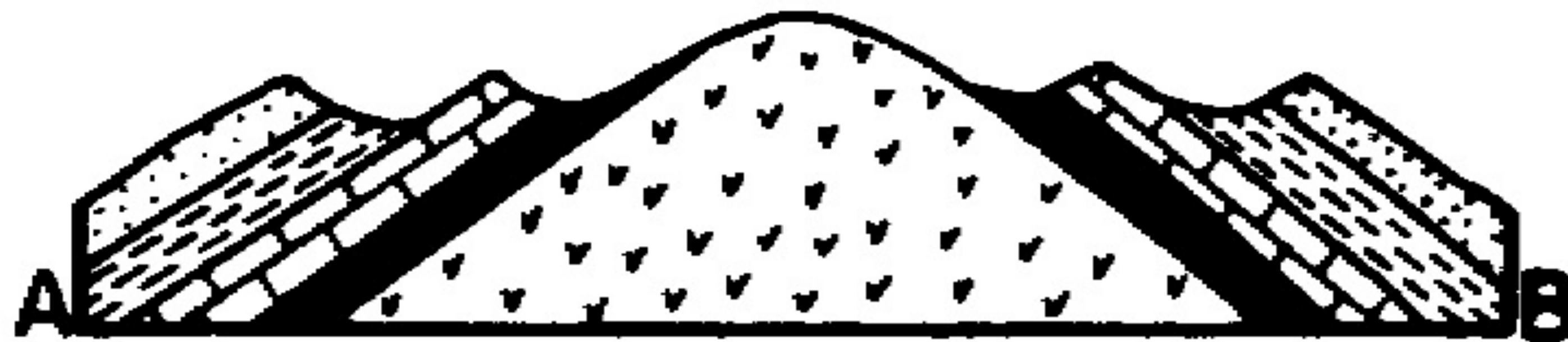
Annular Drainage Pattern



A



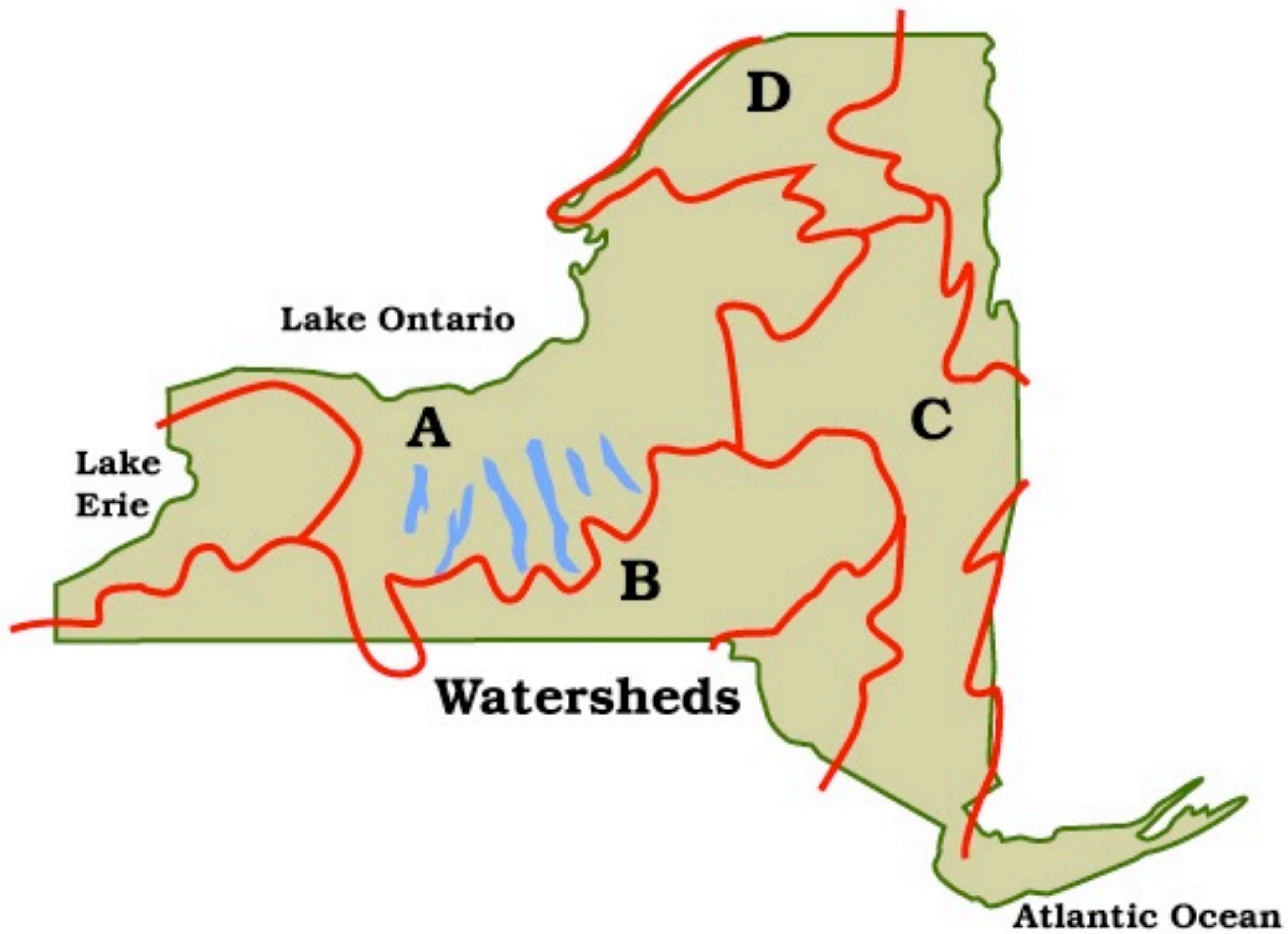
B



A

B









EROSION

The agents of erosion include:

- ▶ Running Water,
- ▶ Wind,
- ▶ Glaciers &
- ▶ Gravity (mass wasting).

the W's will Sort

the G's will NOT

- ▶ **EROSION INCREASES WITH VELOCITY and VOLUME**
- ▶ **GRAVITY IS THE UNDERLYING FORCE BEHIND ALL EROSION.**

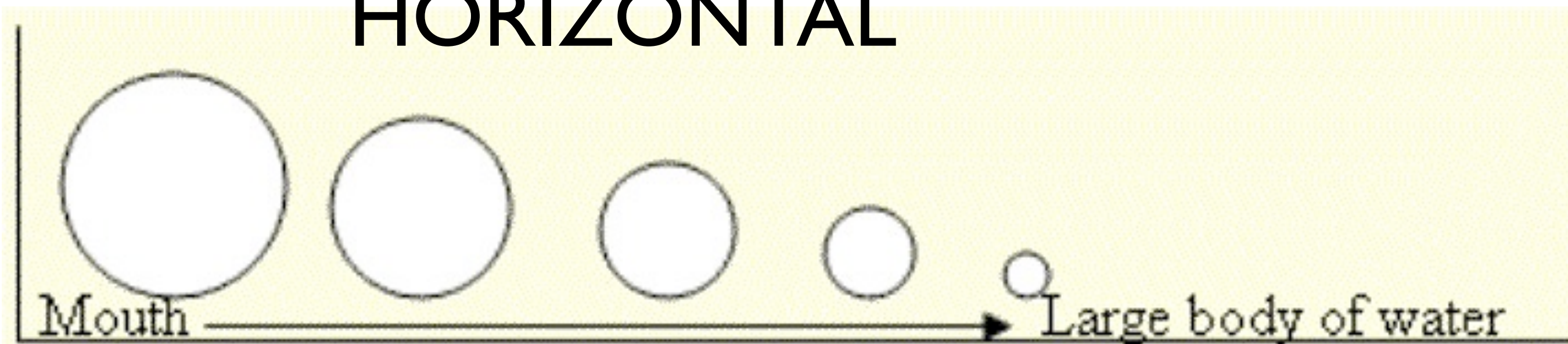
DEPOSITION

- ▶ Deposition occurs when velocity decreases.
- ▶ The rate of Deposition Increases:
 - ▶ with increasing **Density**
 - ▶ with increasing **Size**
 - ▶ with more **Spheroid Shape**

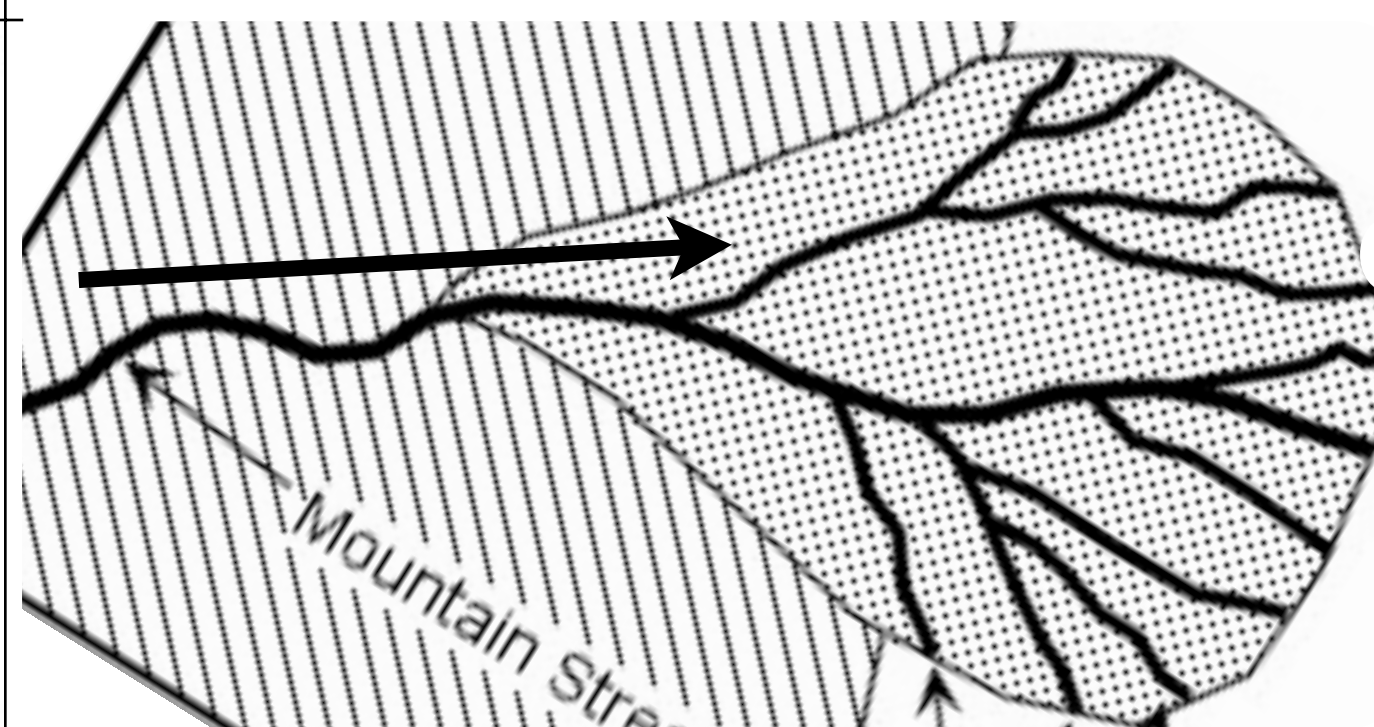
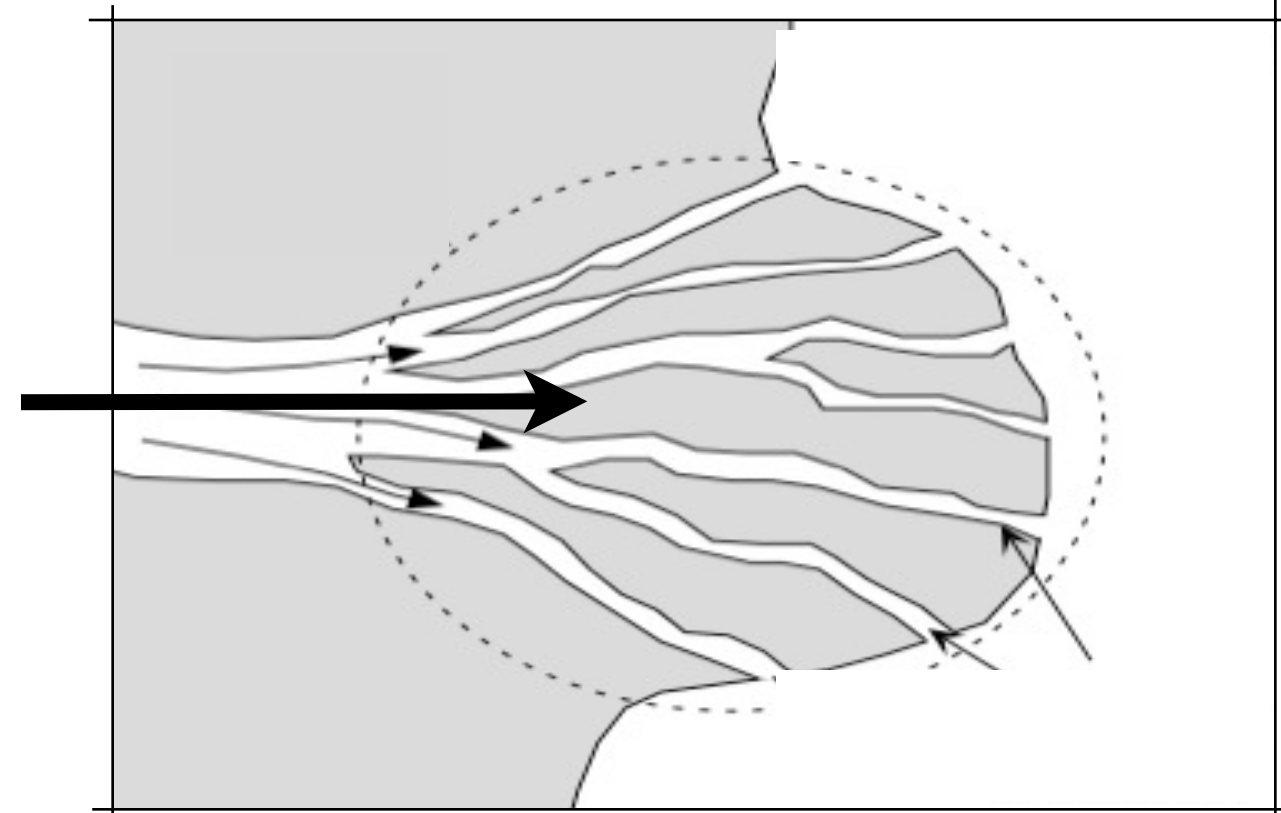
SORTING

Sediments that are deposited according to their size, shape and density.

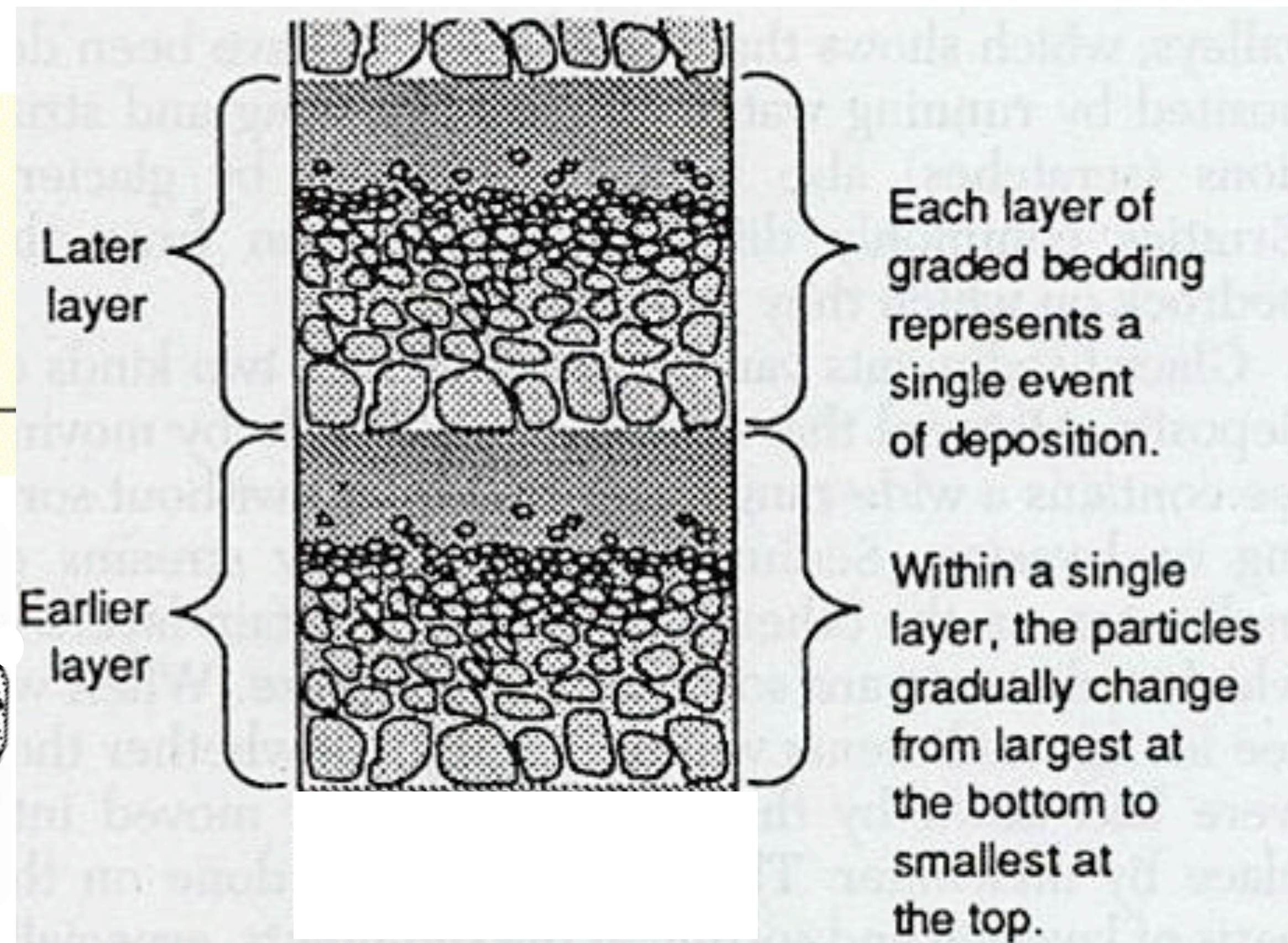
HORIZONTAL



Stream Flow Direction



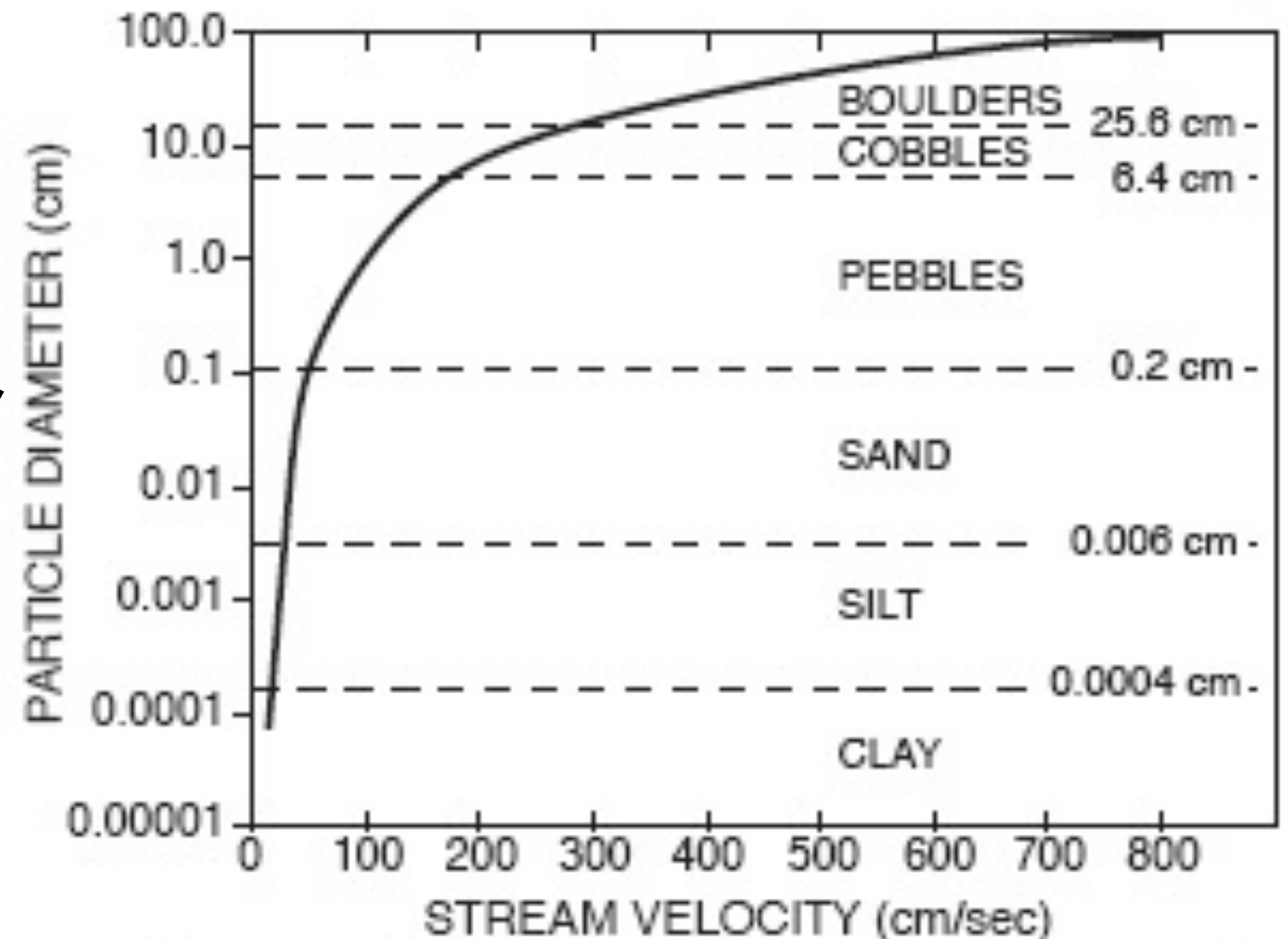
VERTICAL



Stream Carrying Power

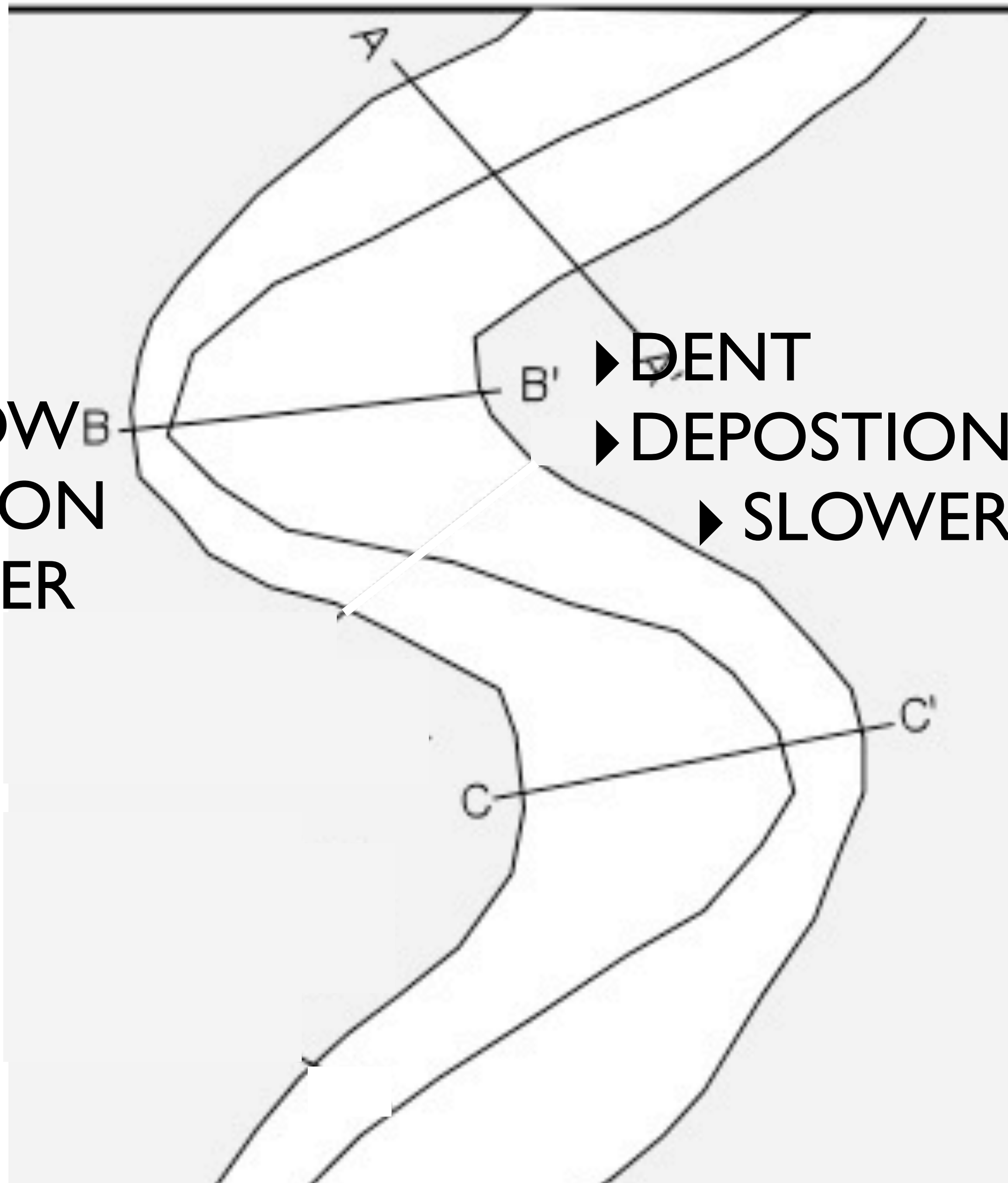
- ▶ Increase **Gradient**,
Increase **Velocity**
- ▶ Increase **Discharge** (volume),
Increase **Velocity**
- ▶ Increase **Velocity**,
Increase **Carrying Power**

Relationship of Transported Particle Size to Water Velocity

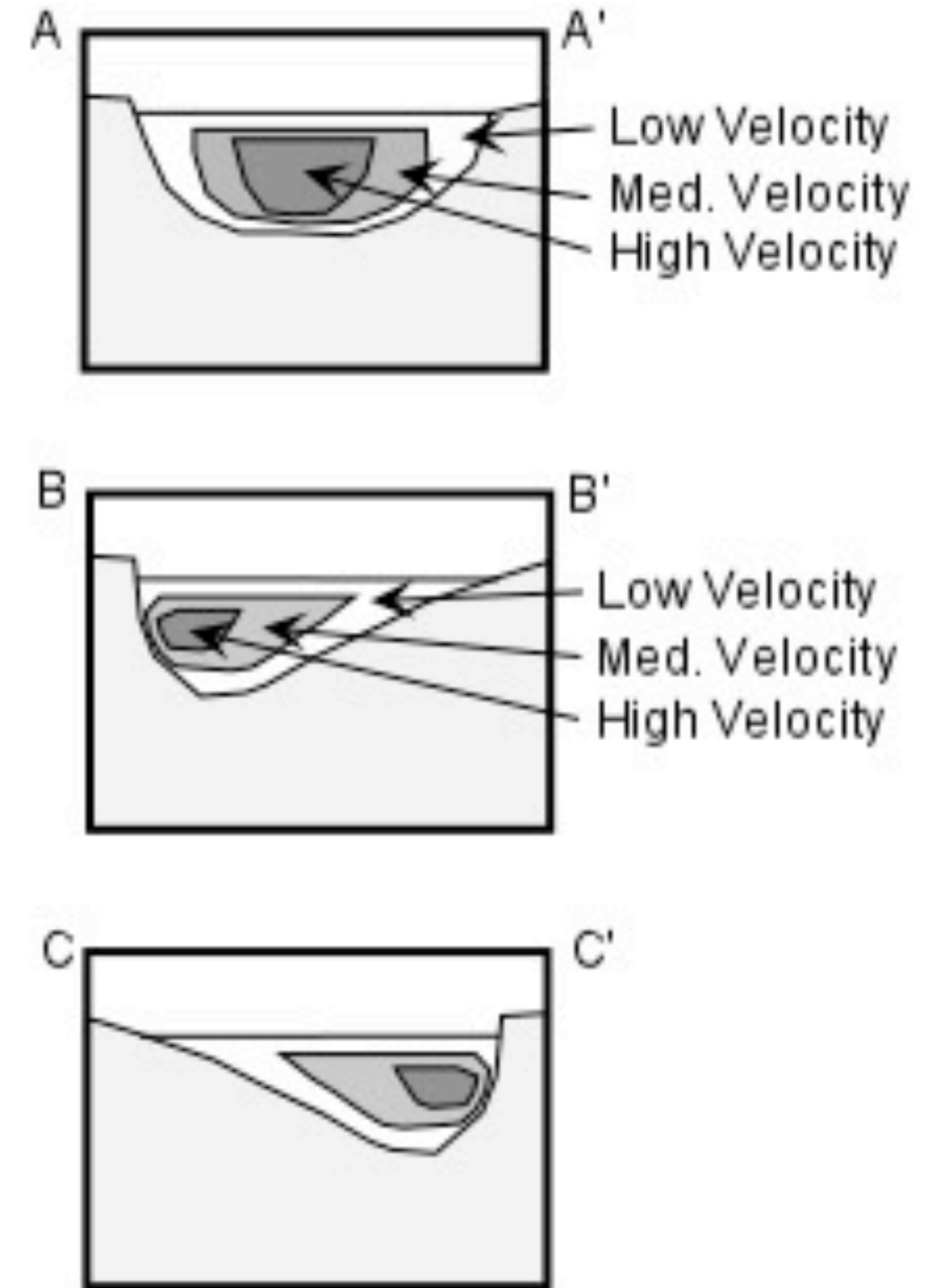


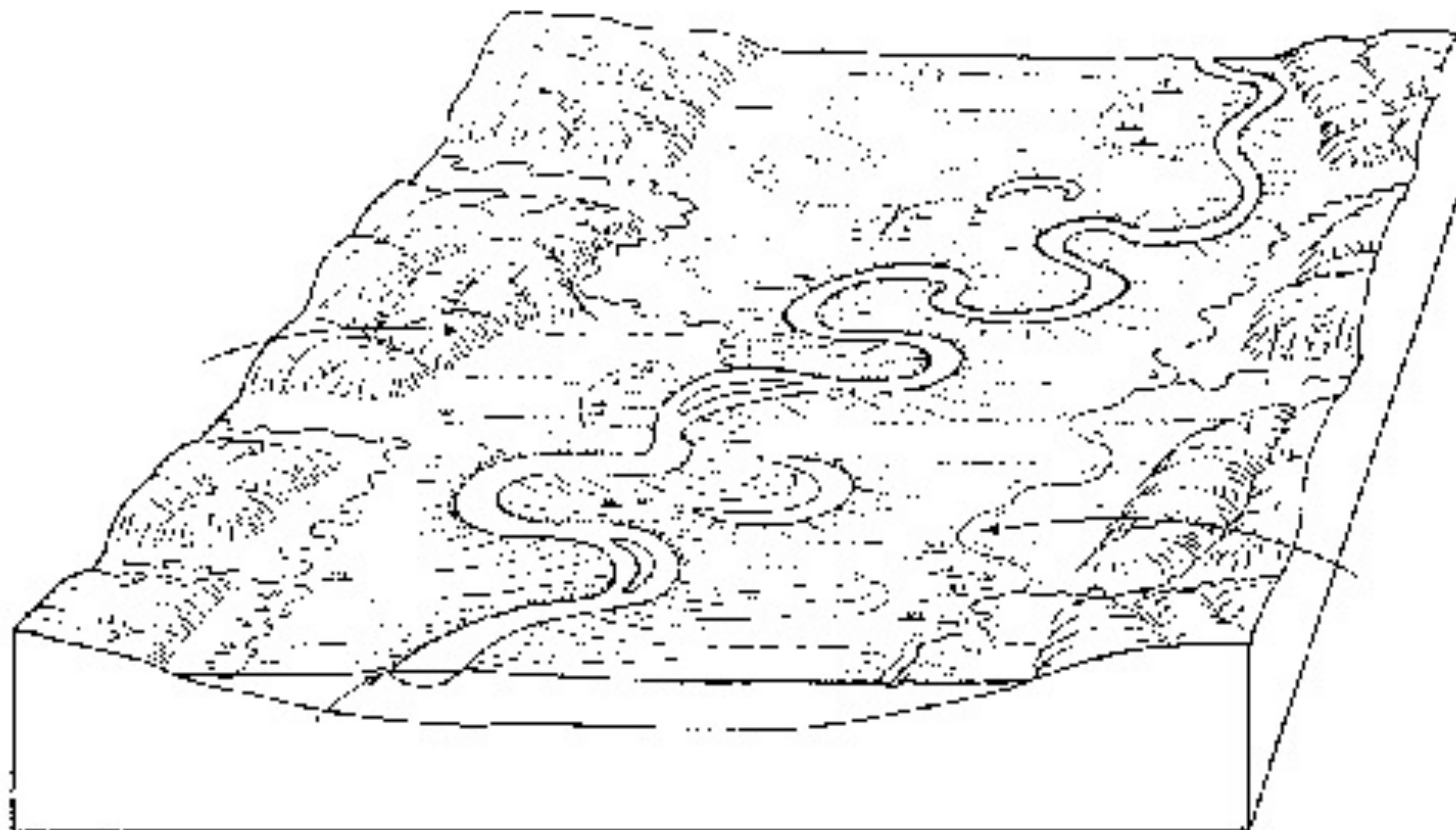
*This generalized graph shows the water velocity needed to maintain, but not start, movement. Variations occur due to differences in particle density and shape.

- ▶ ELBOW
- ▶ EROSION
- ▶ FASTER

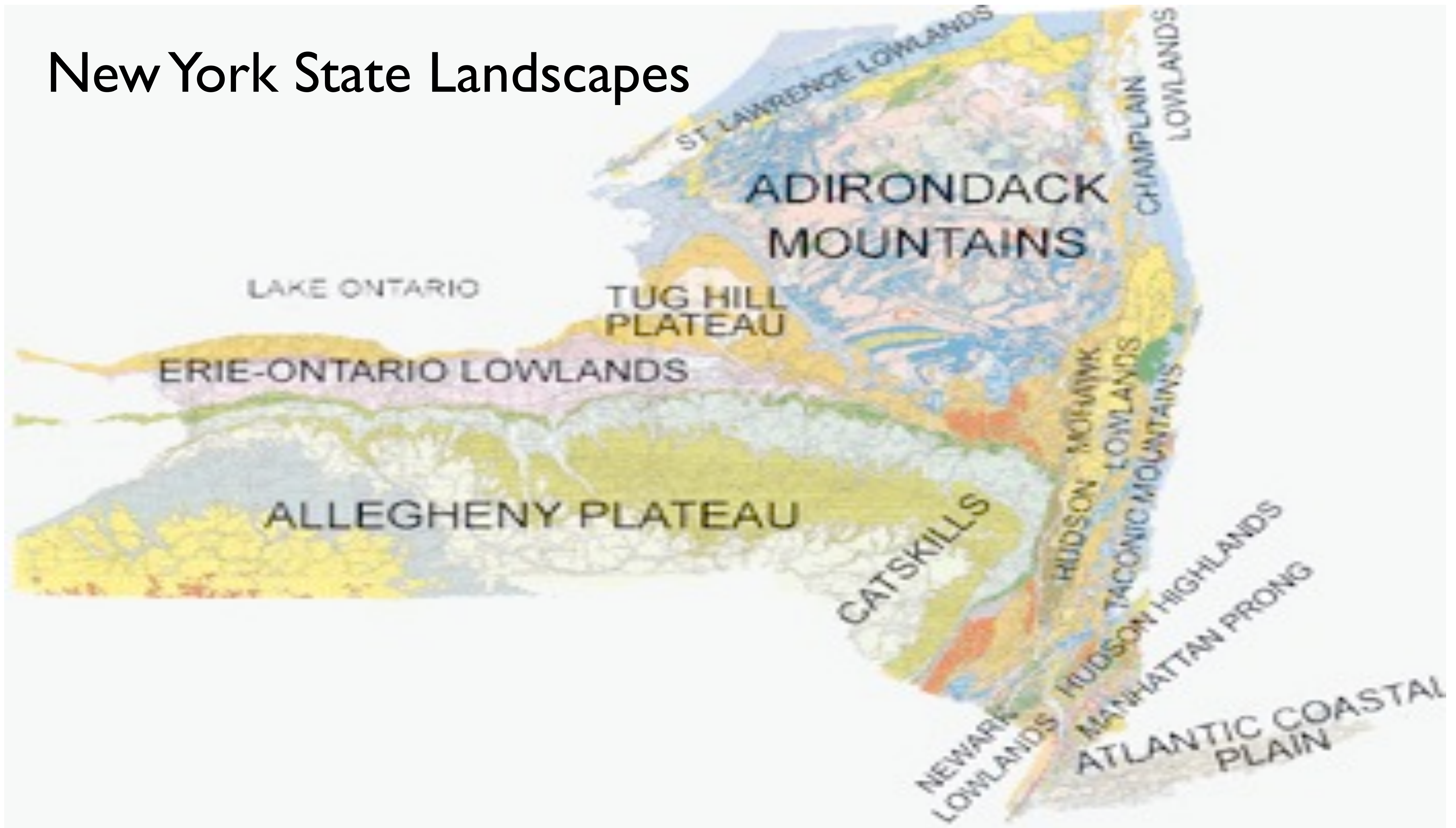


- ▶ DENT
- ▶ DEPOSITION
- ▶ SLOWER

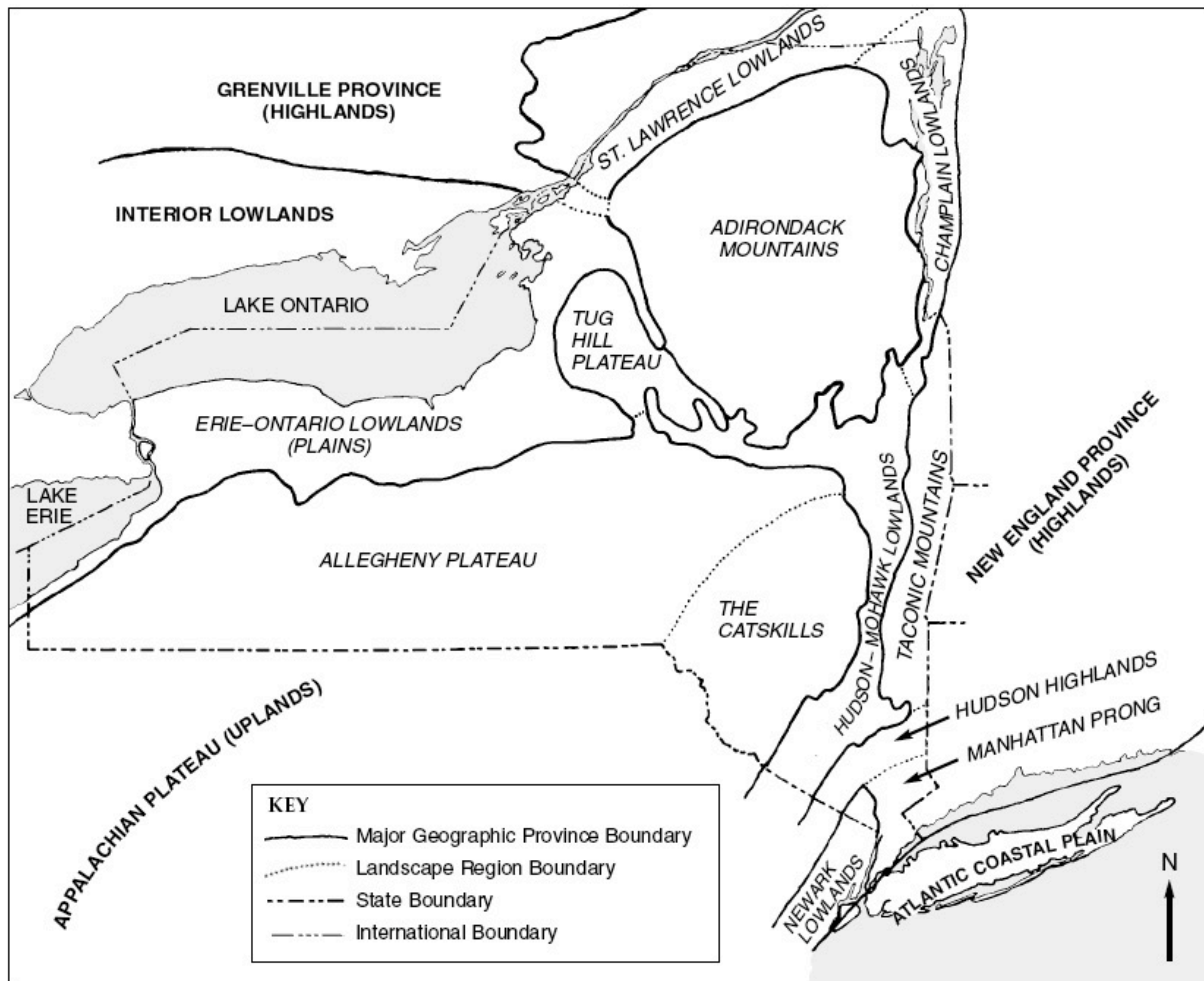




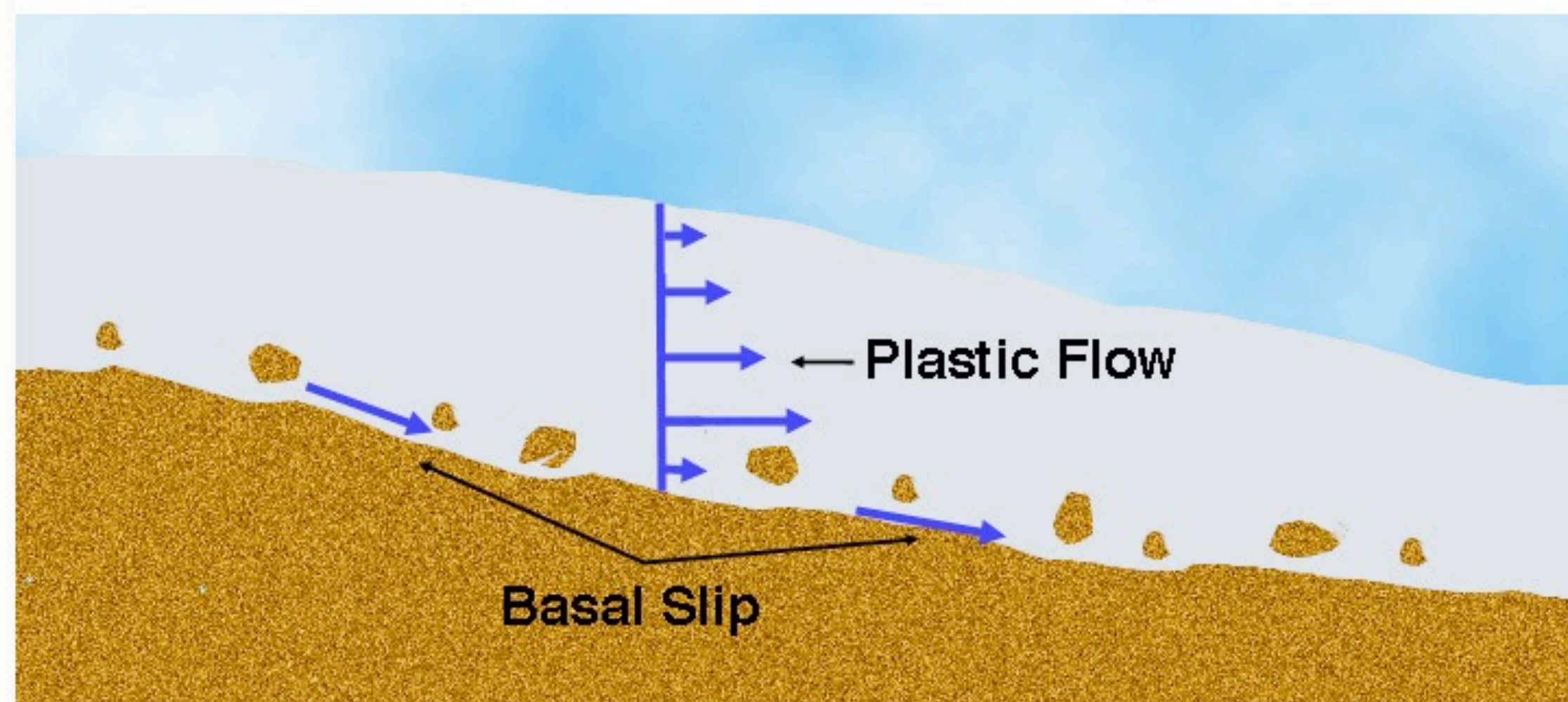
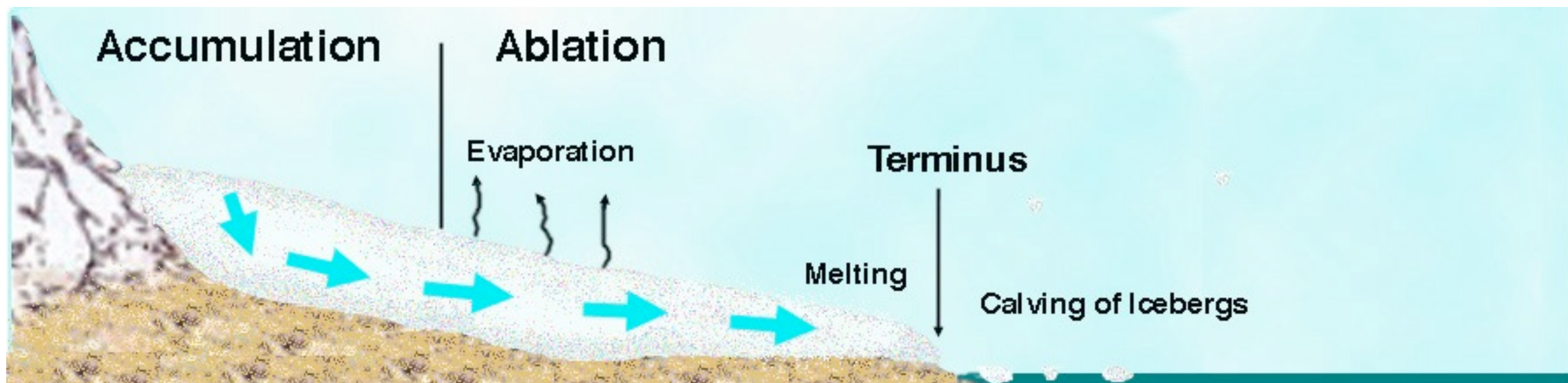
New York State Landscapes



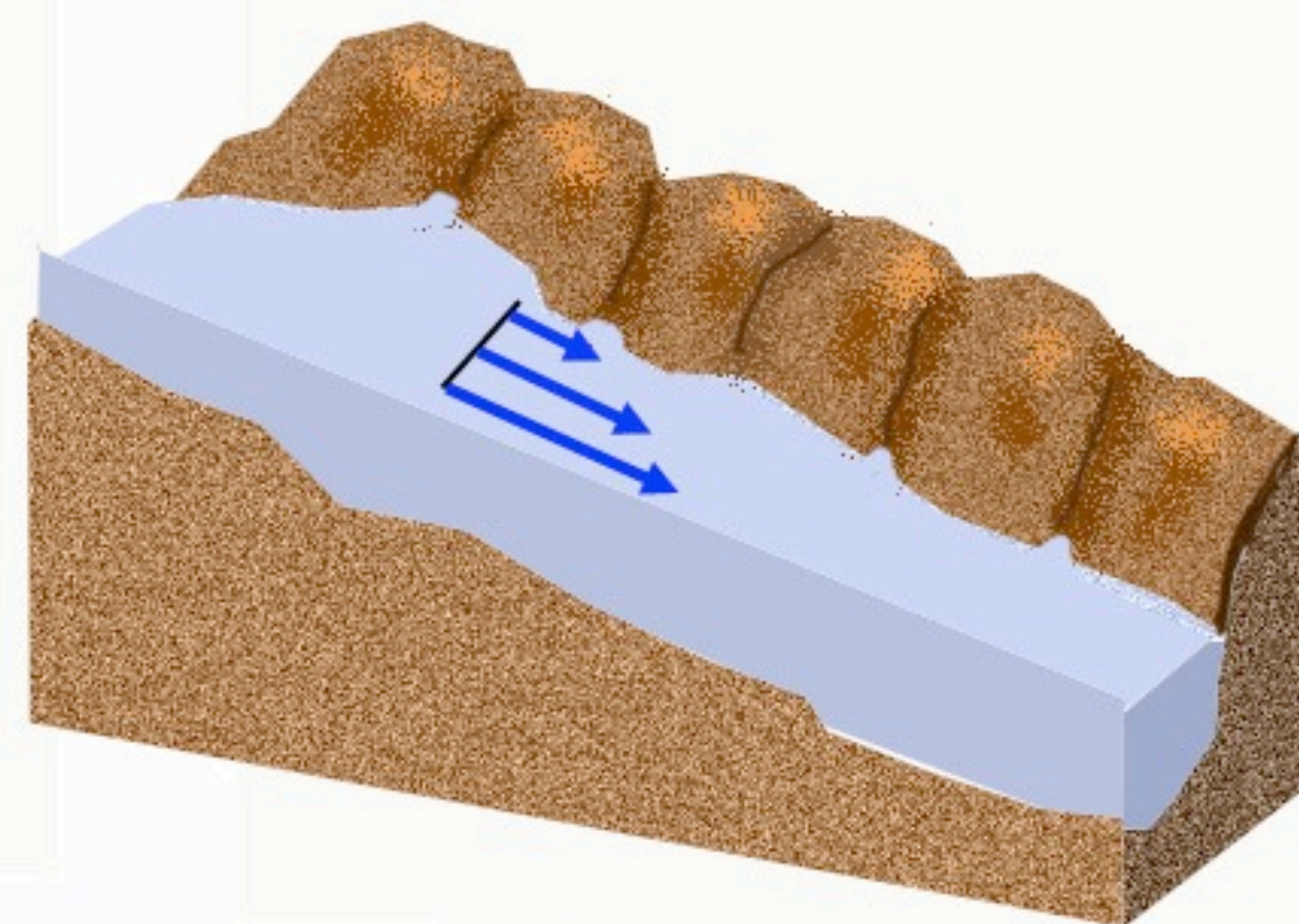
Generalized Landscape Regions of New York State



Glaciers

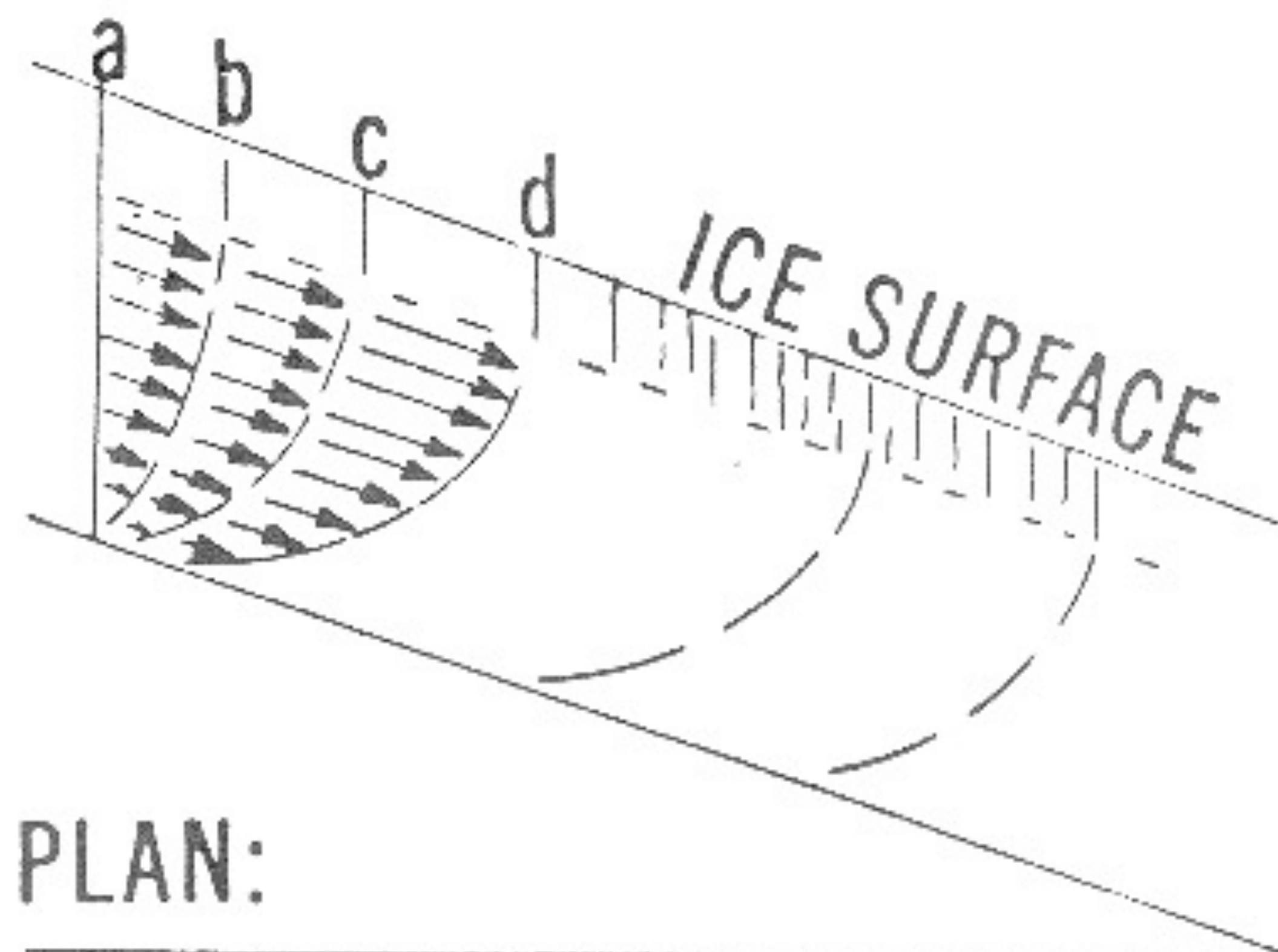


A

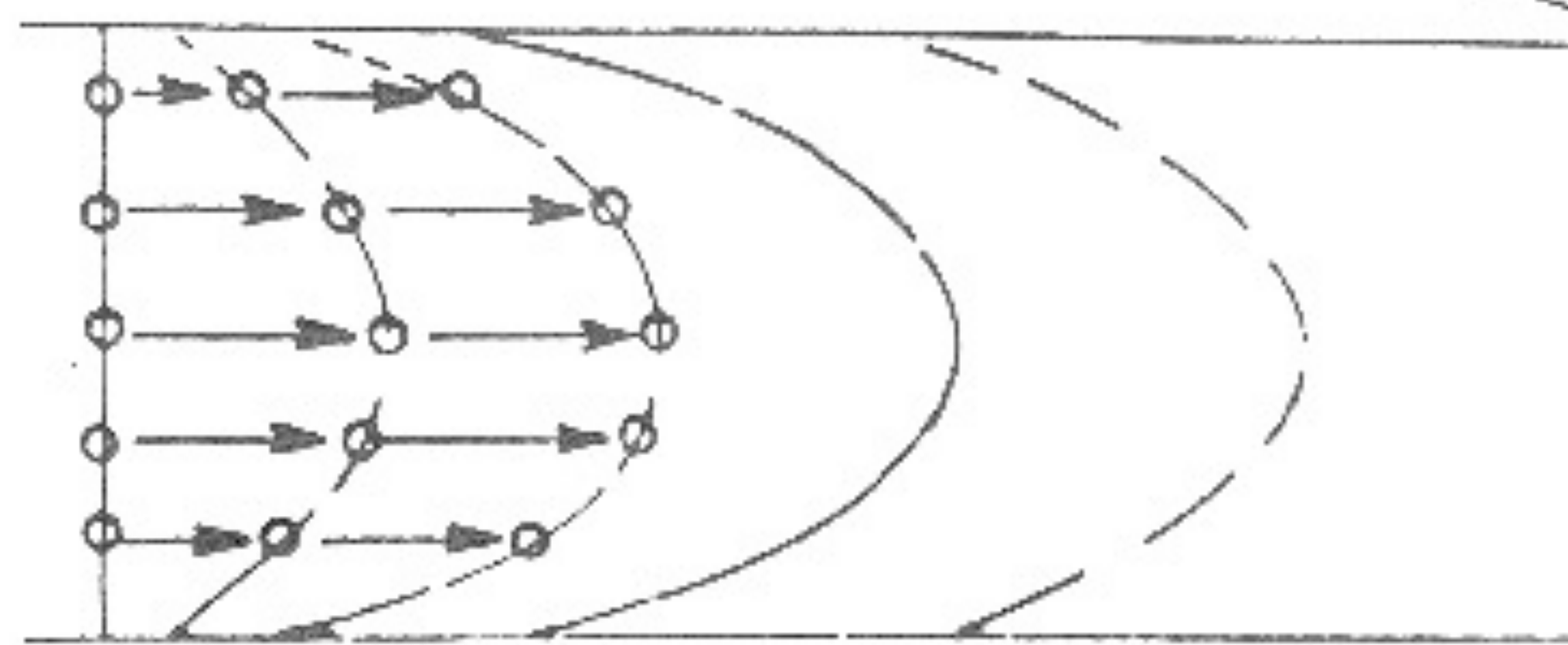


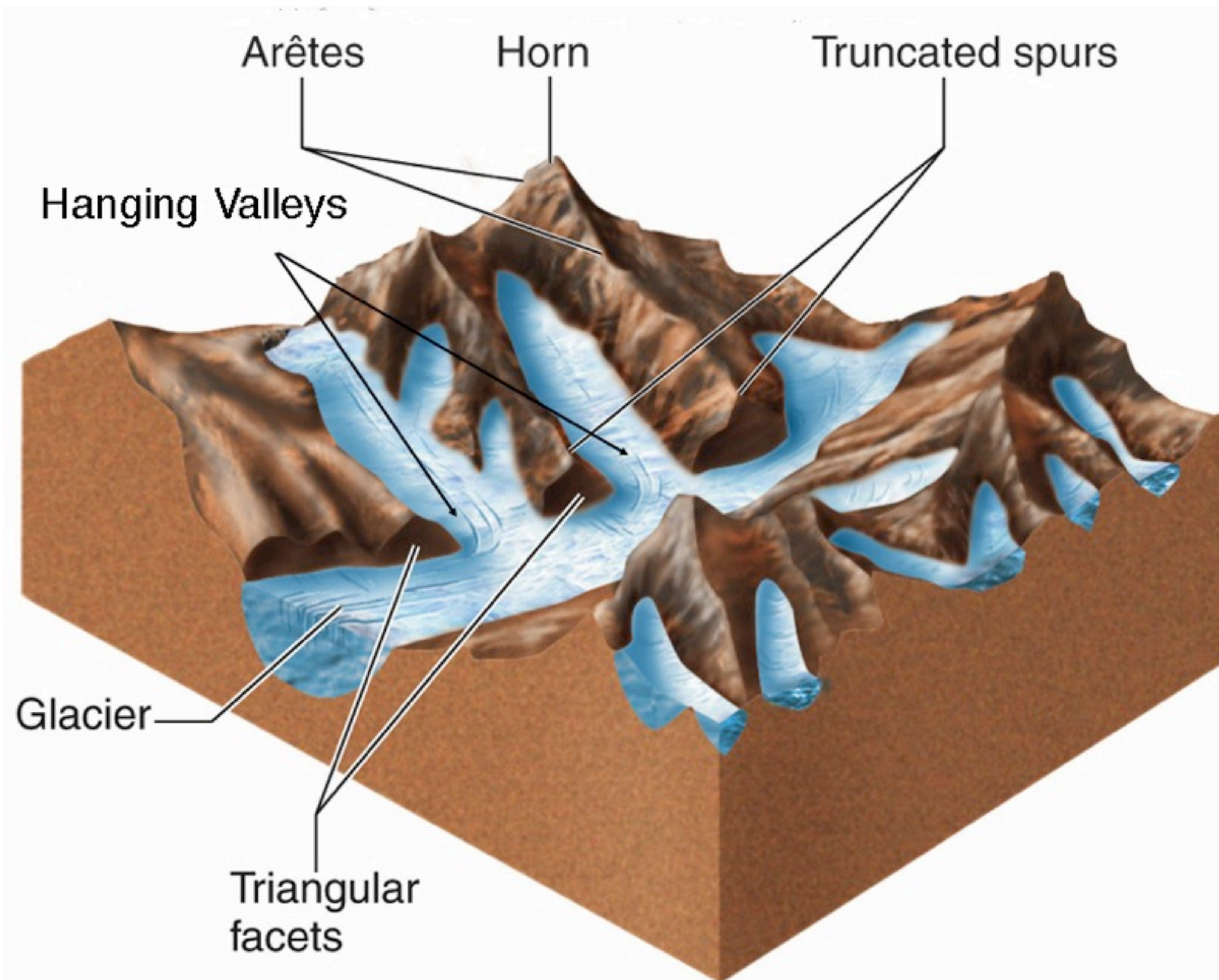
B

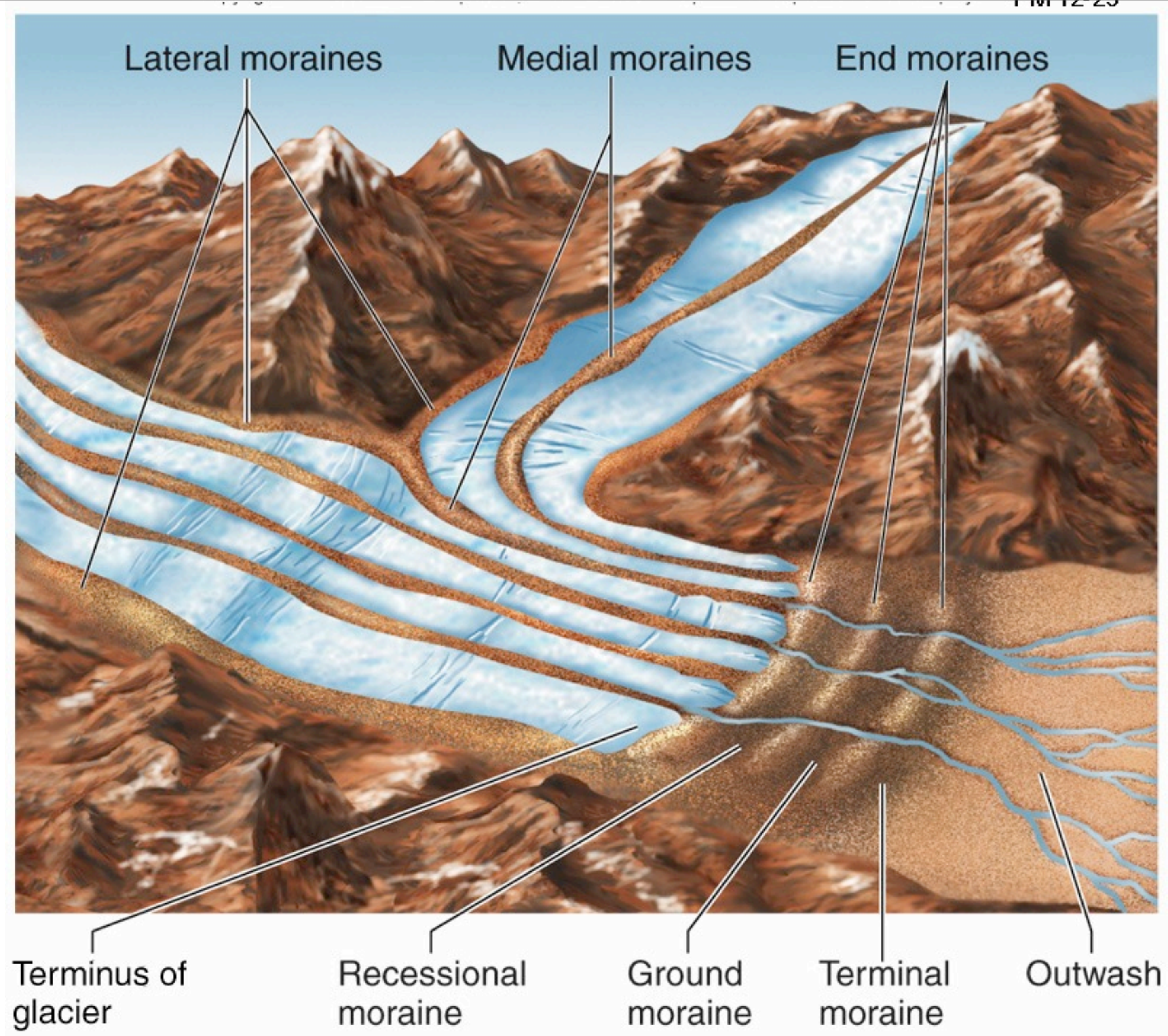
CROSS SECTION:



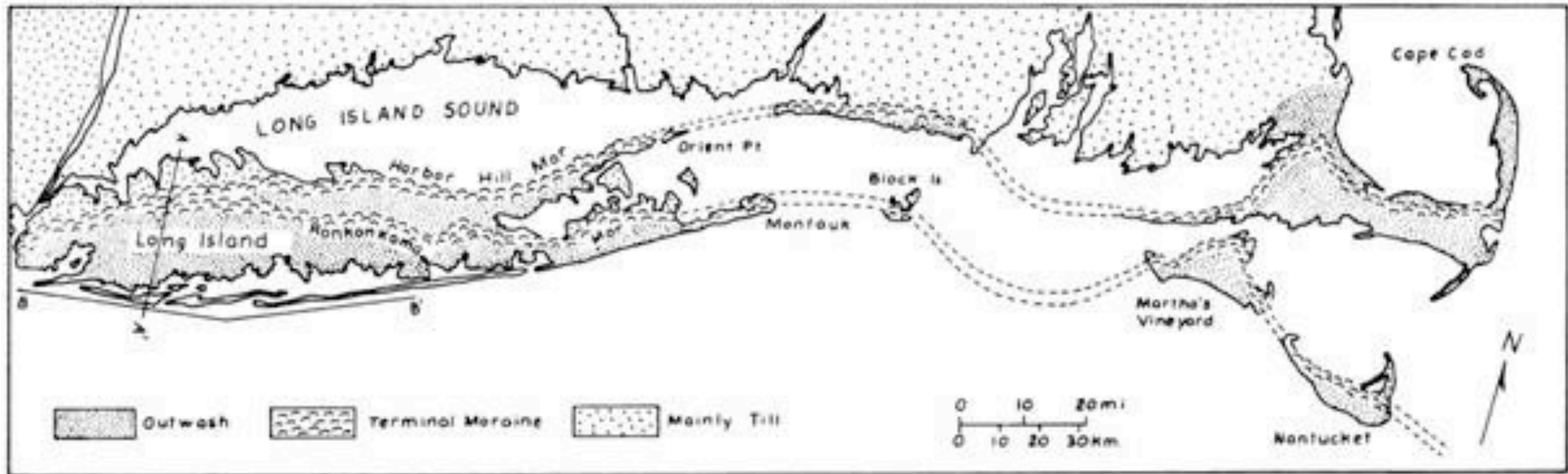
PLAN:

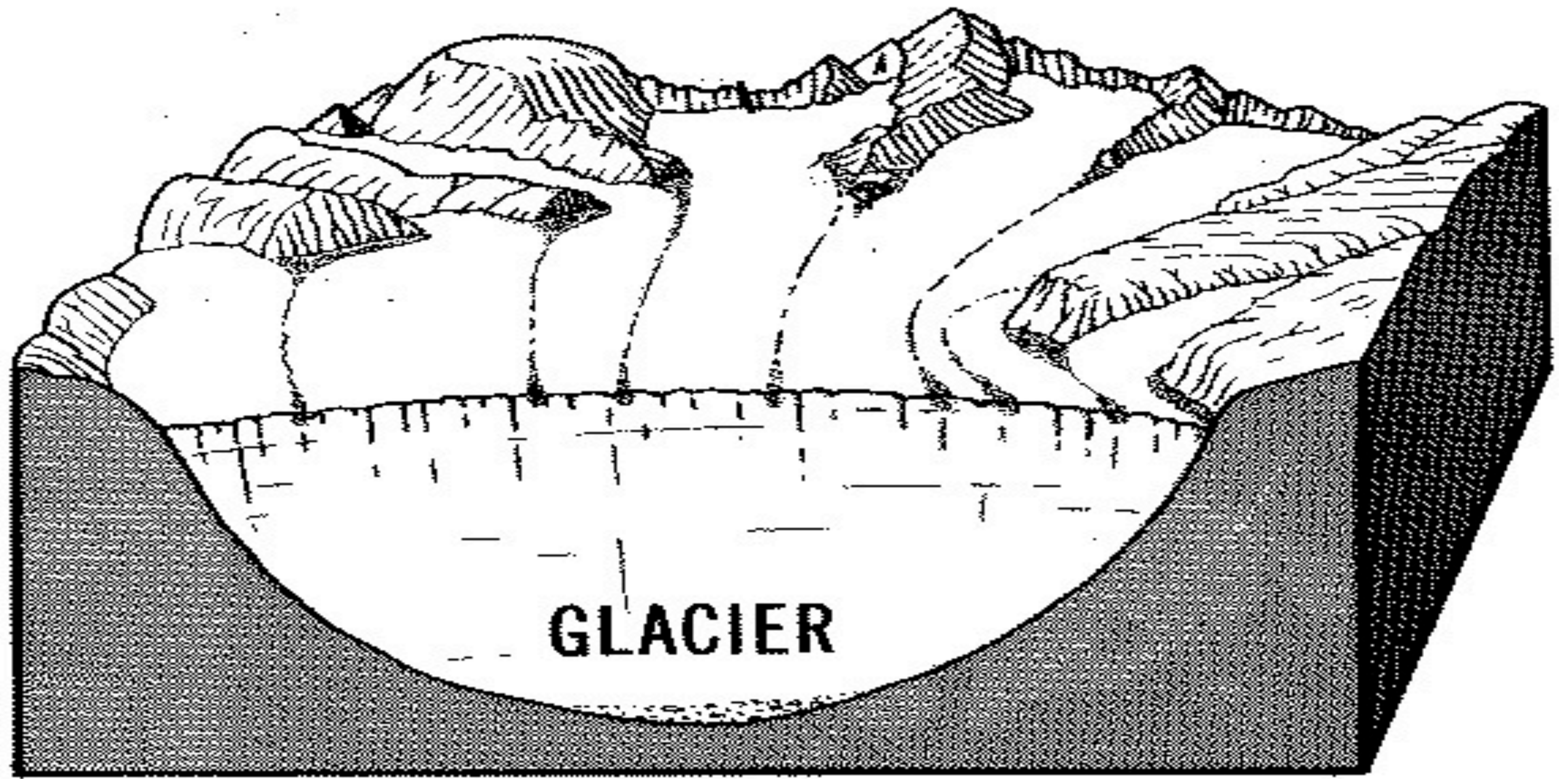


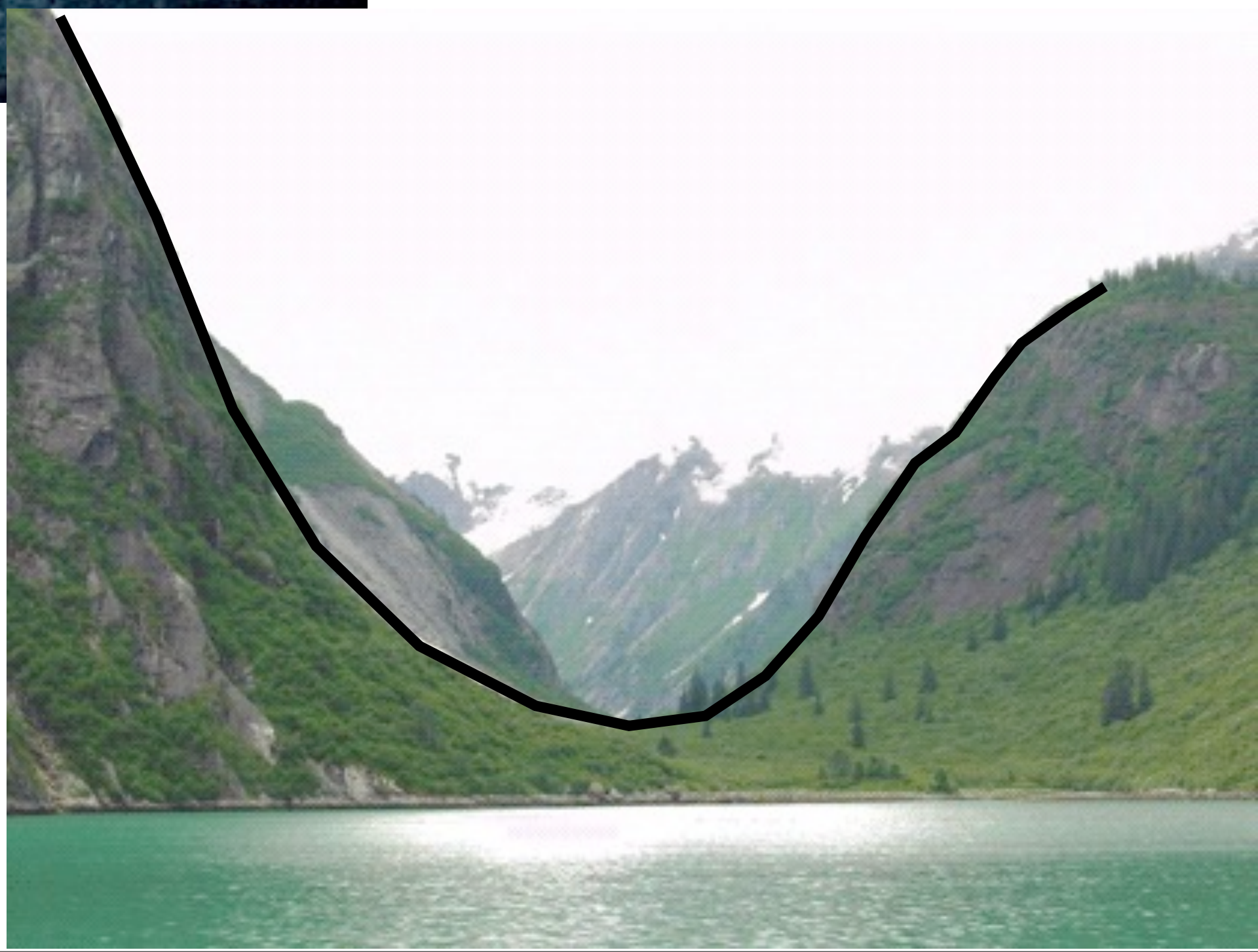




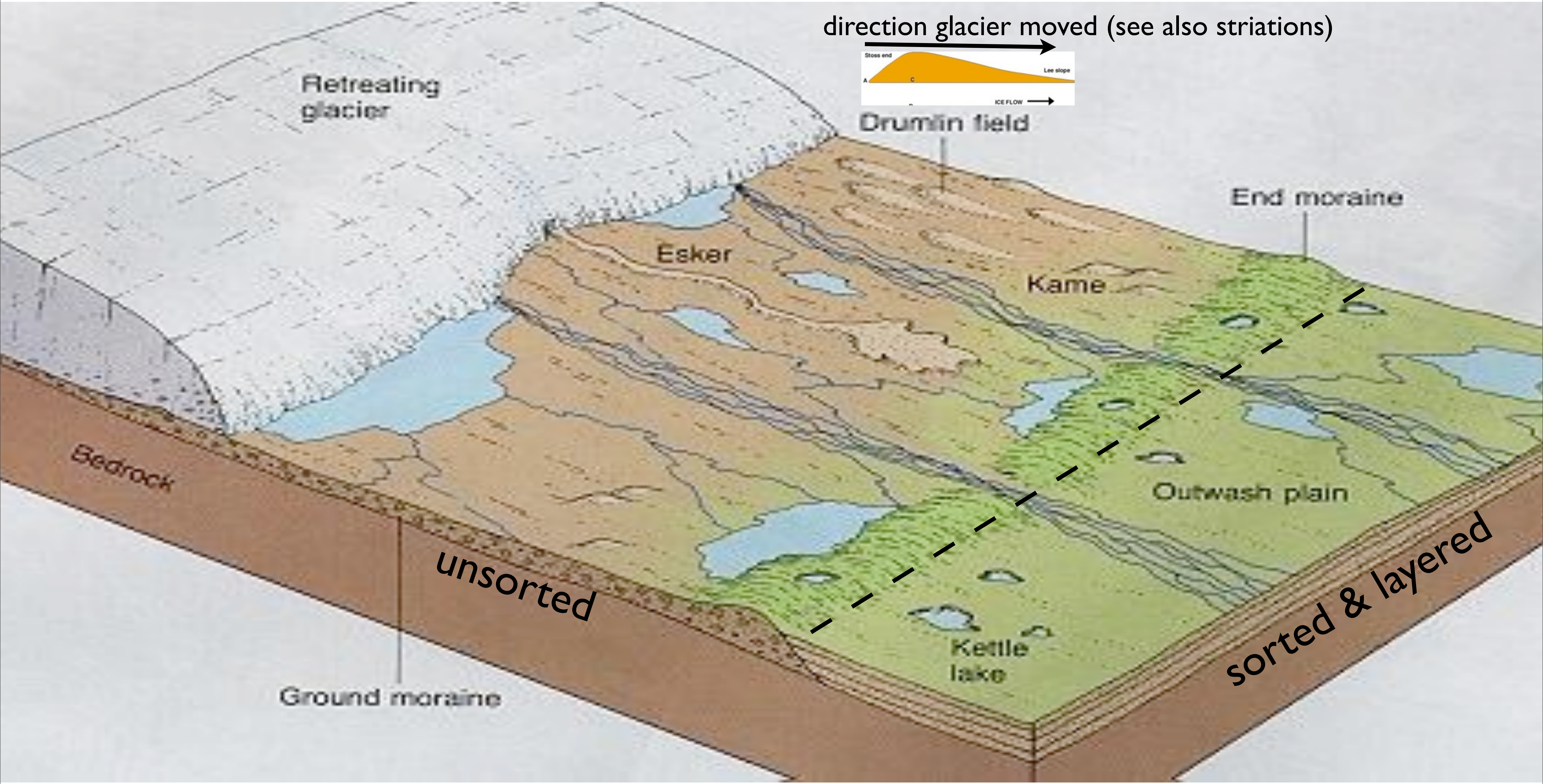
NYS Glacial Features



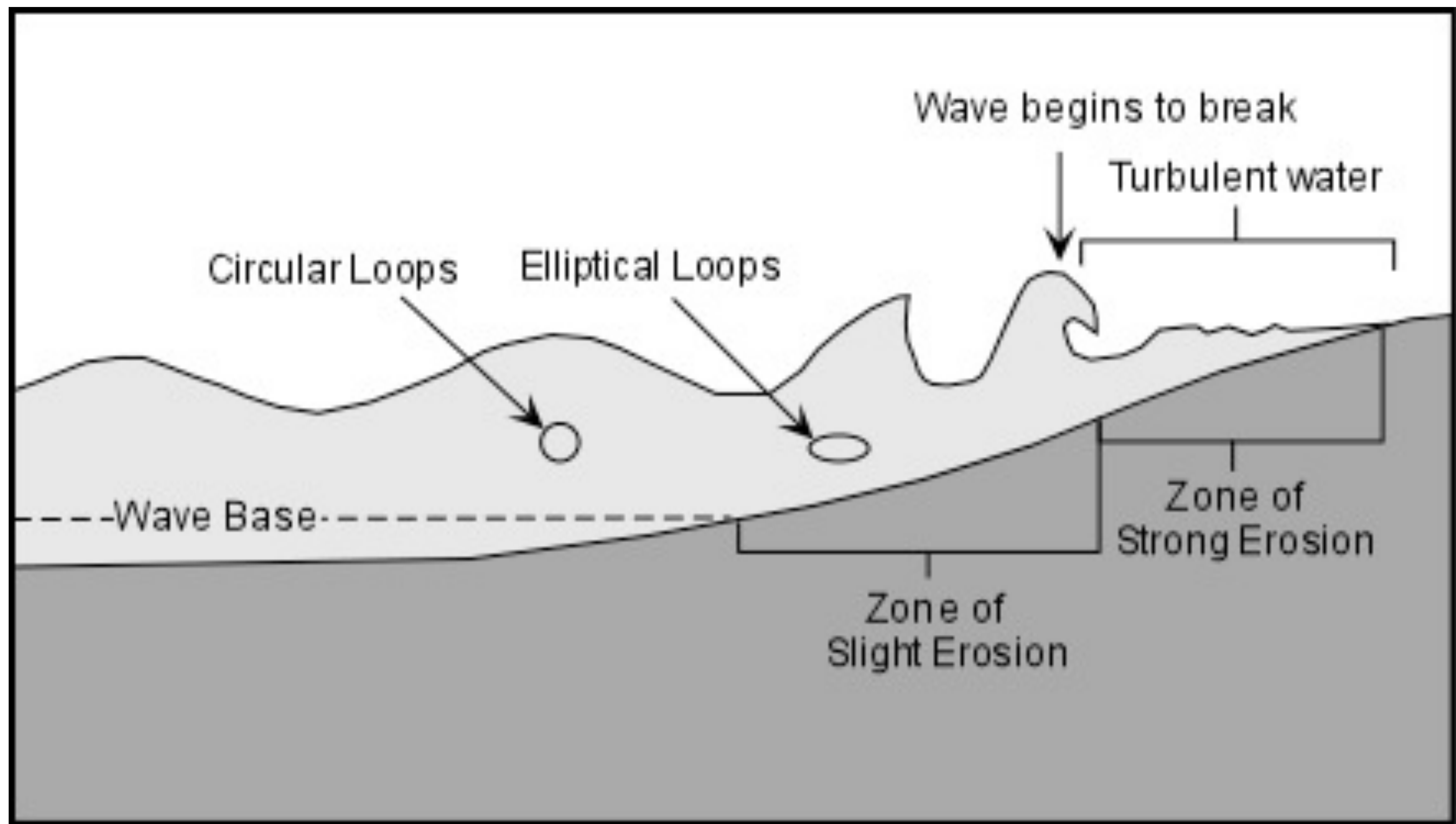


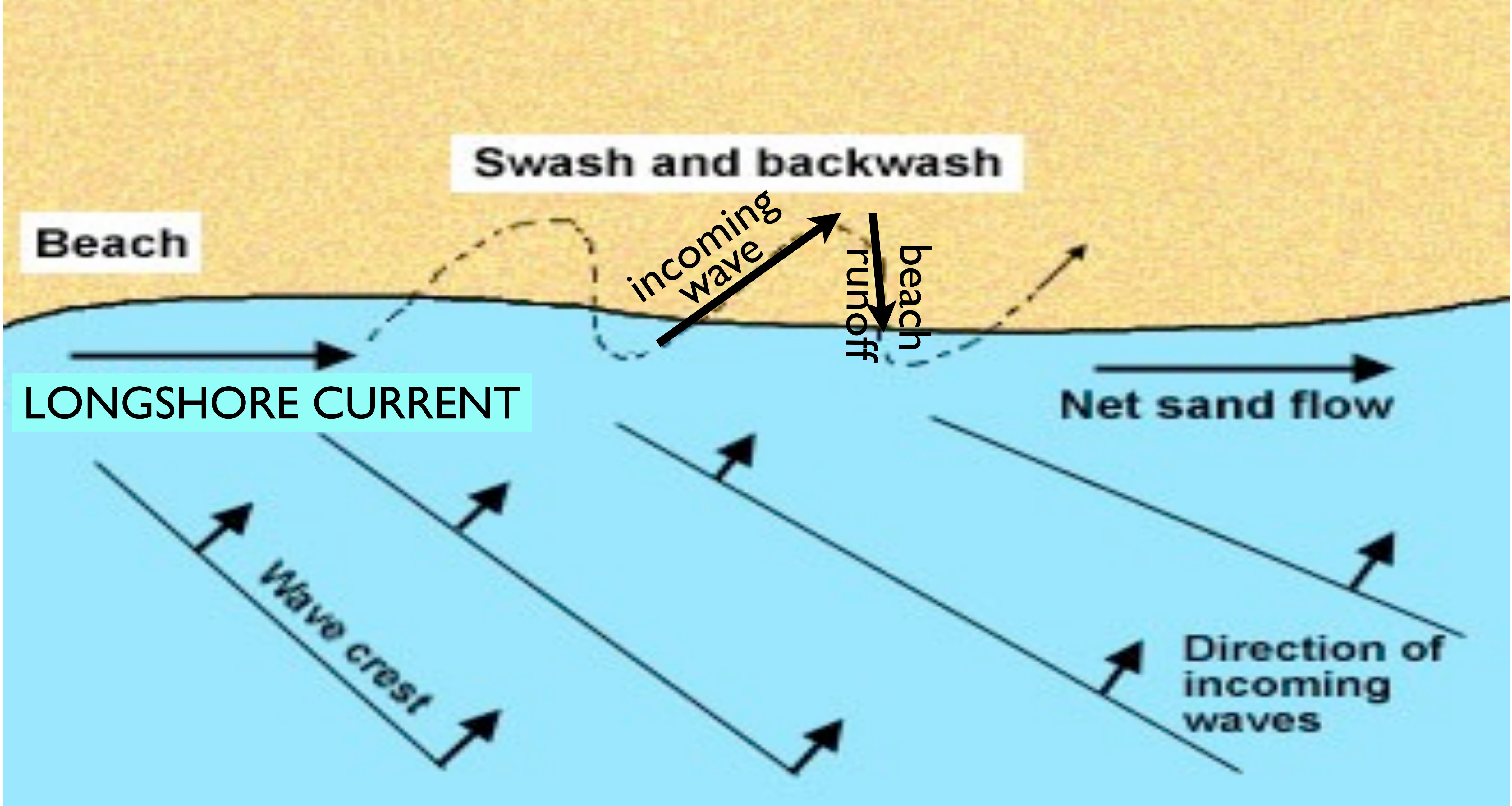


direction glacier moved (see also striations)

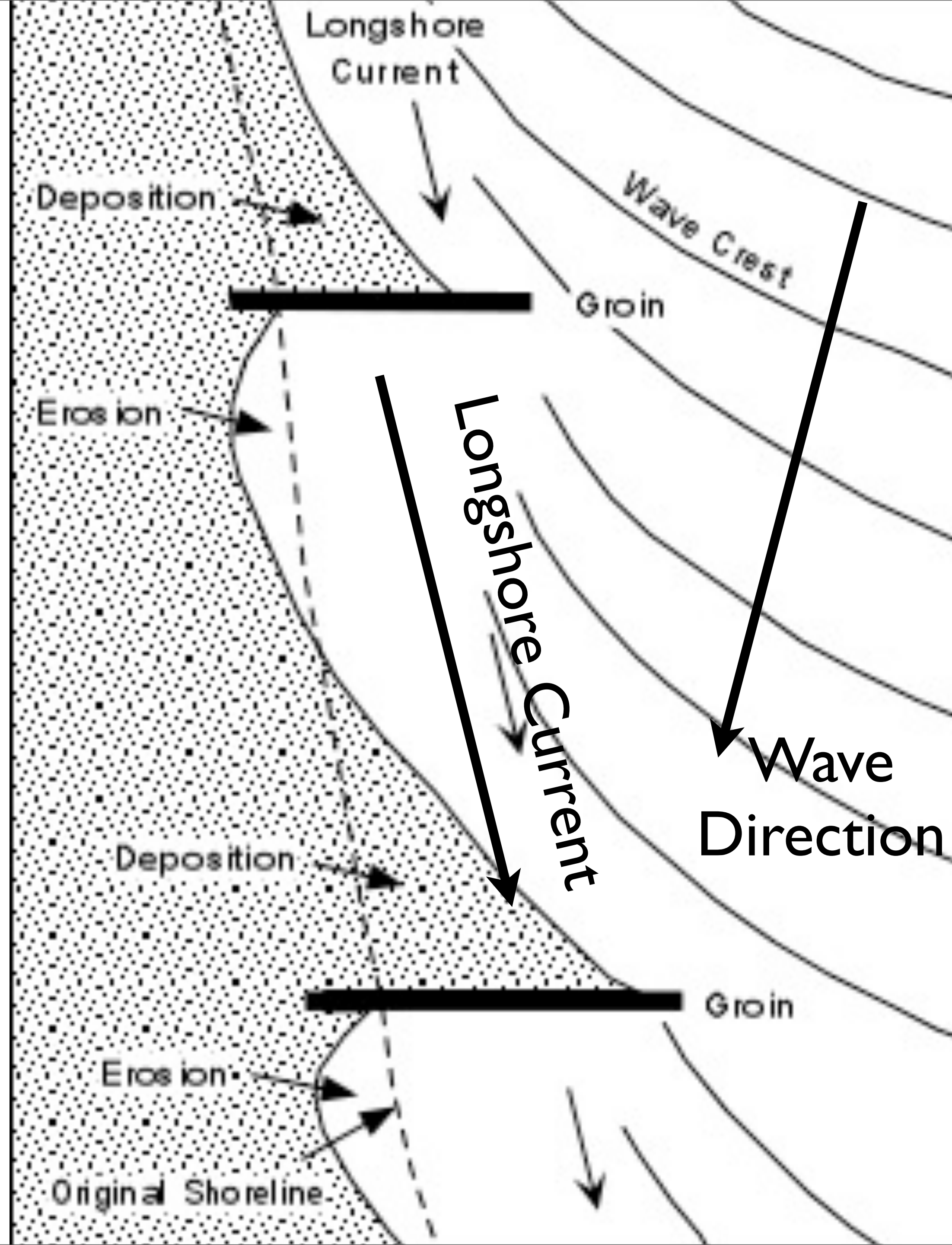


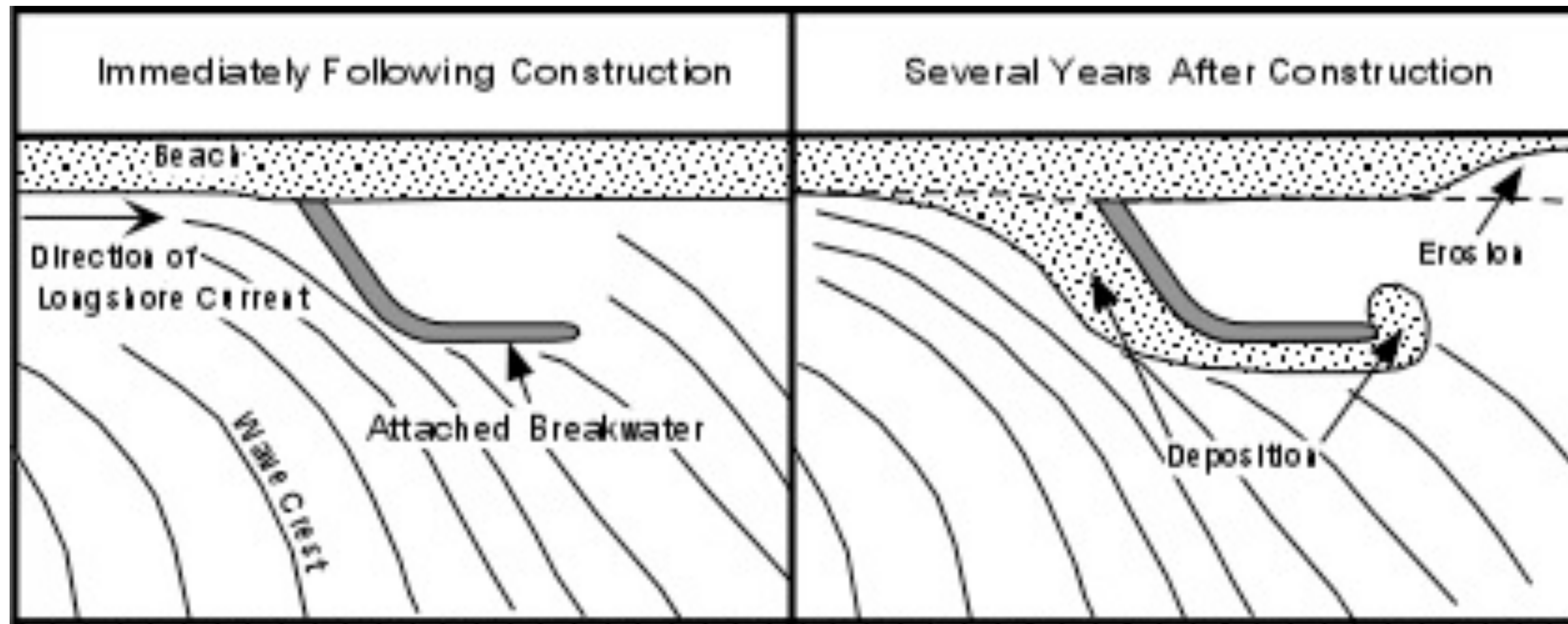
Beach Erosion

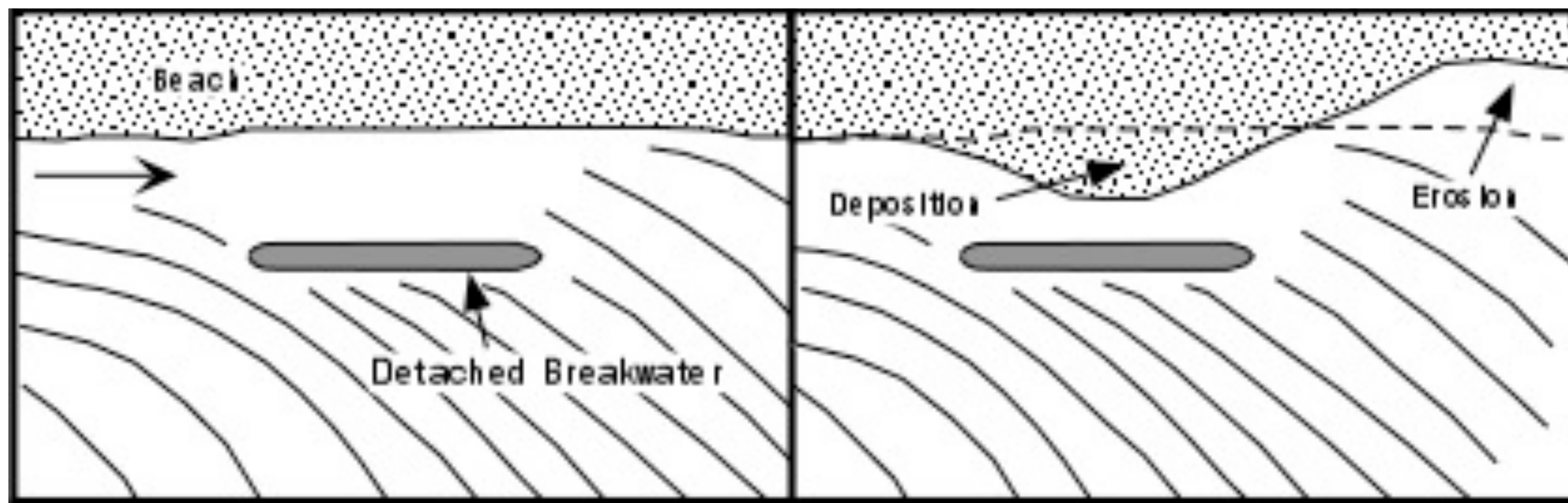


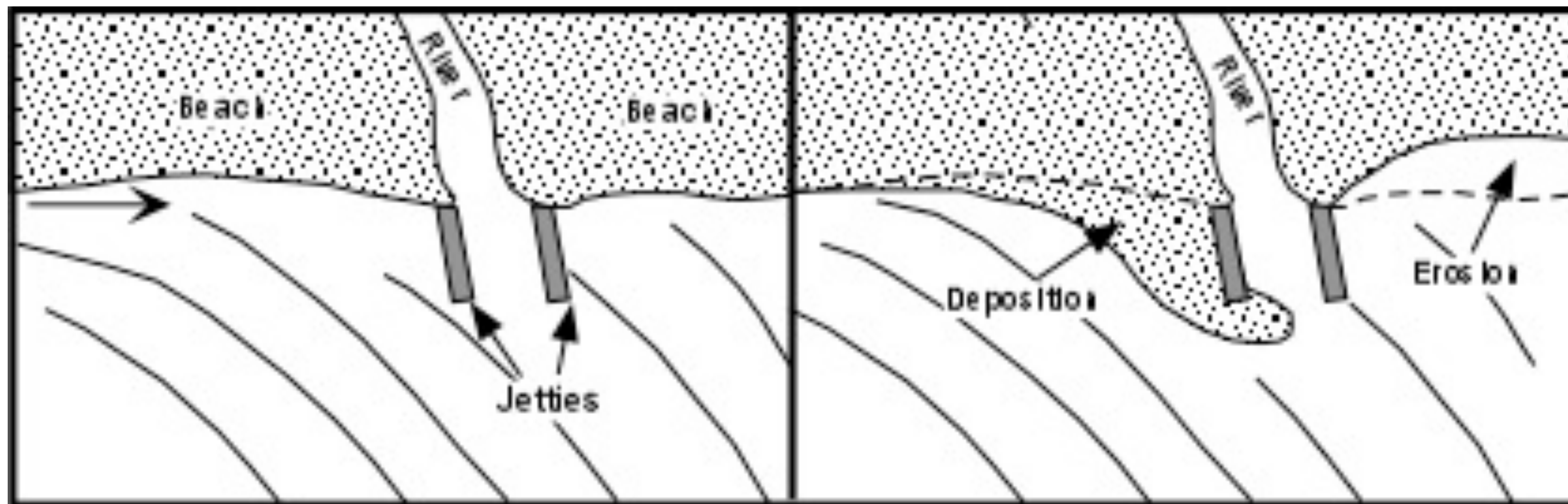


LONGSHORE CURRENT

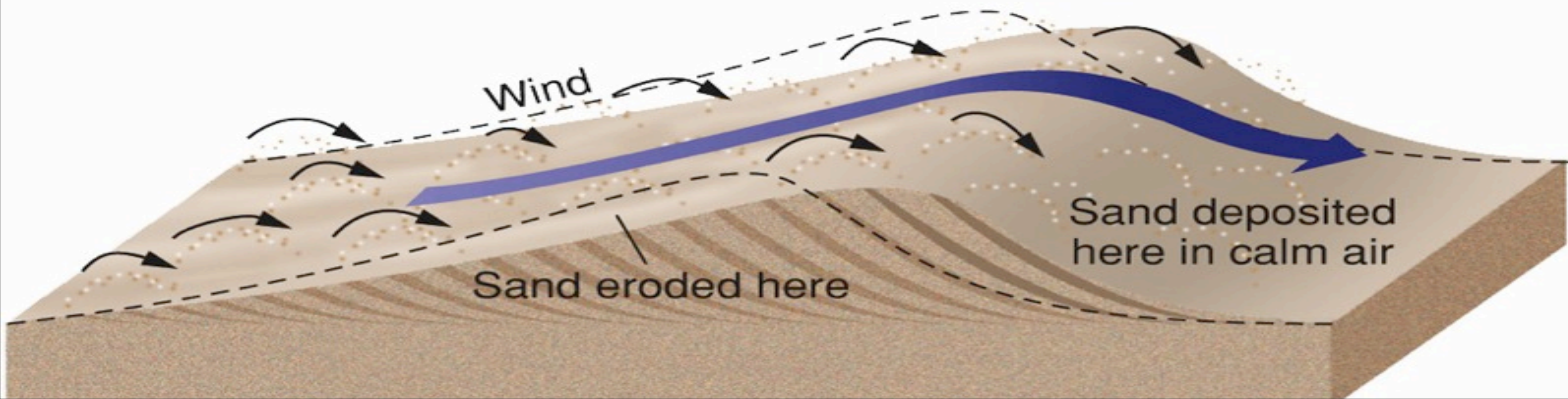
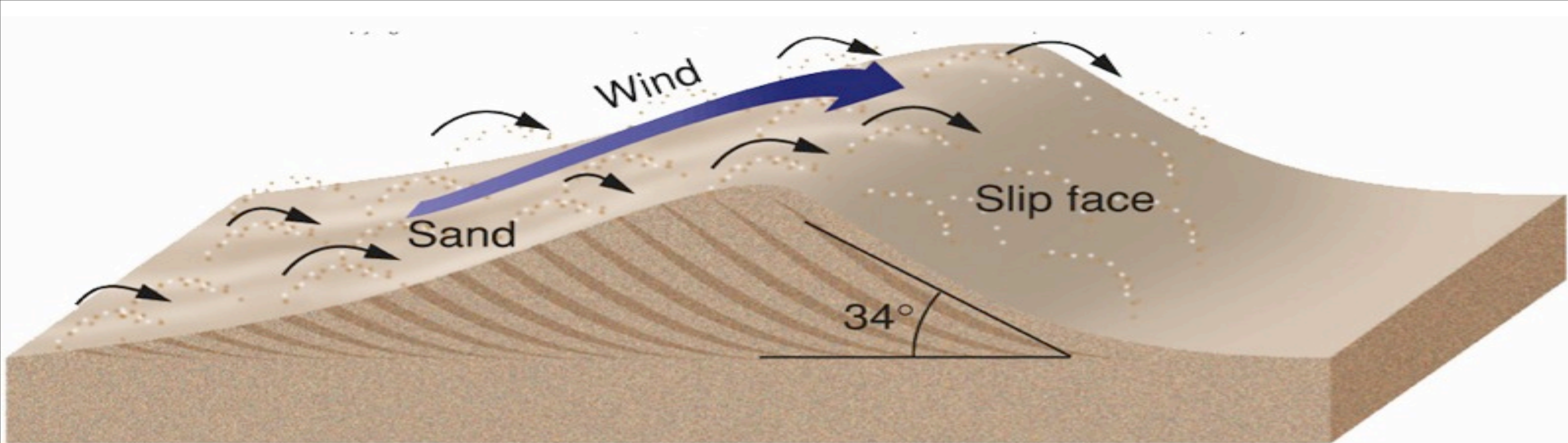




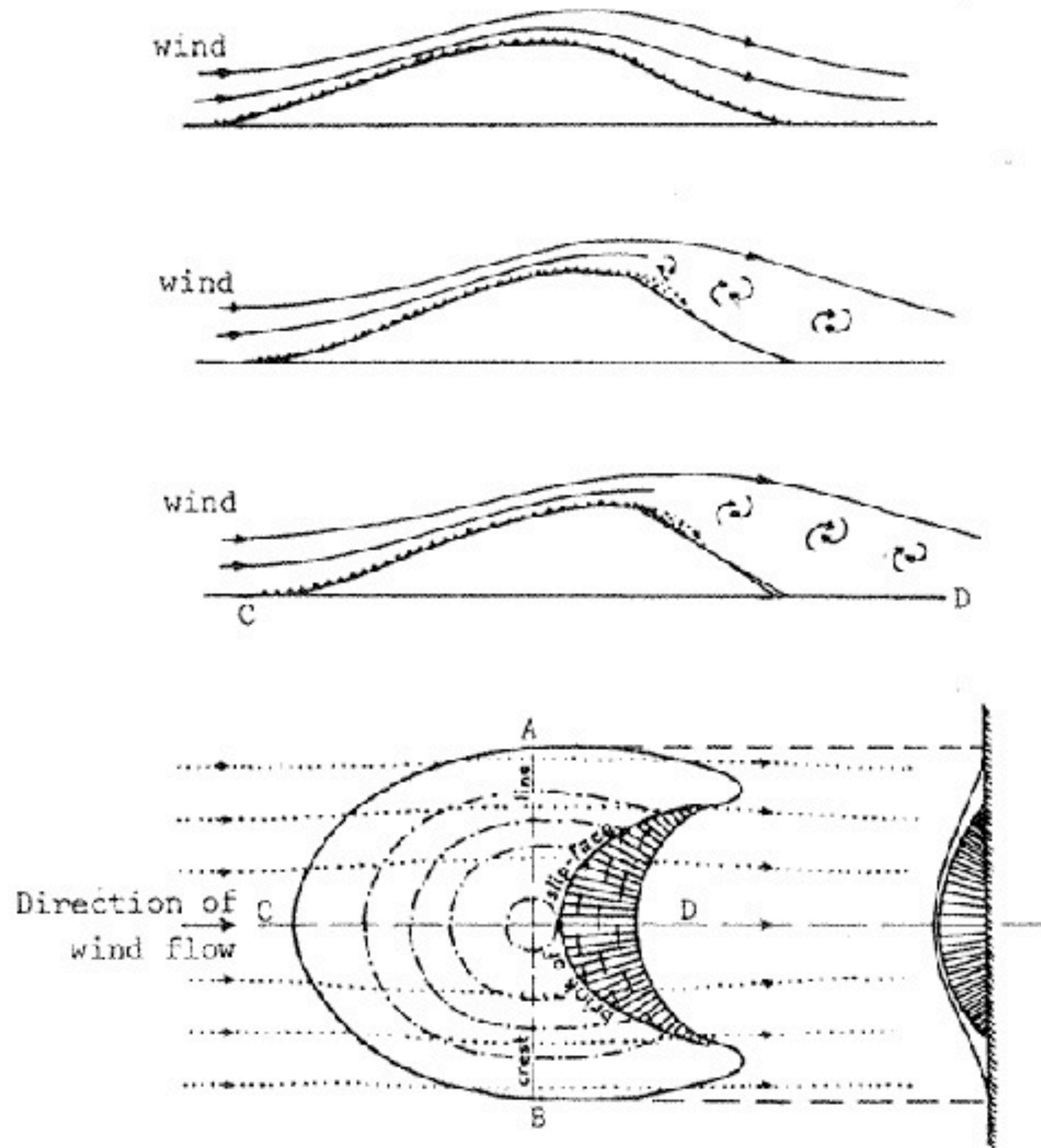




Sand Dunes



Sand Dune Formation





Have a Good Weekend!