

*The hydrosphere

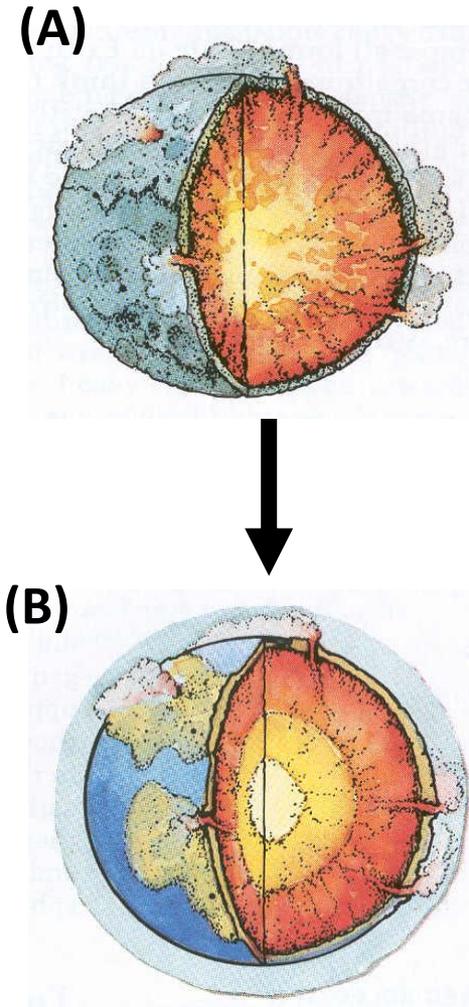
The hydrosphere is the sphere of water that surrounds our planet. In Latin, “*hydro*” means water.

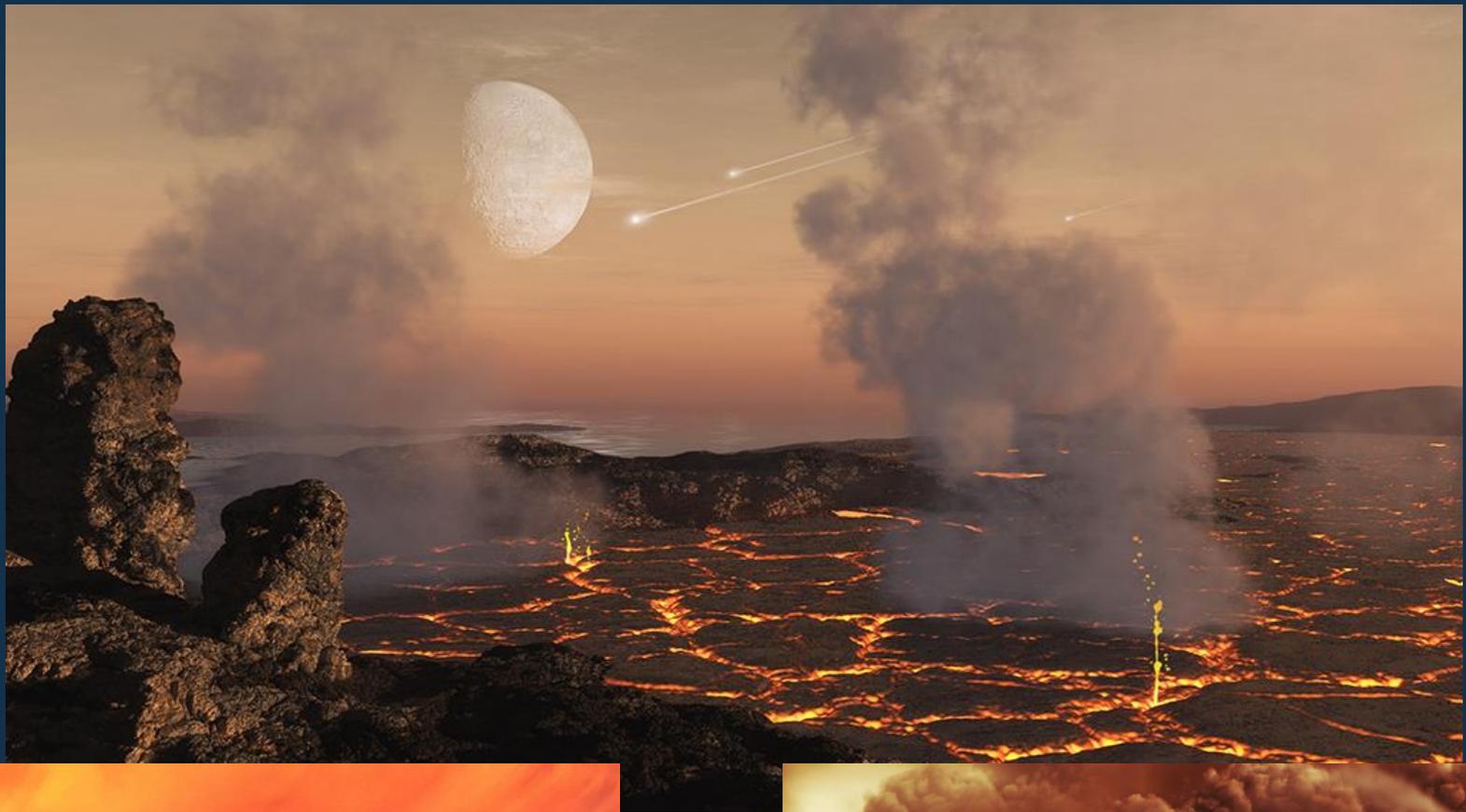


Origin of the Atmosphere

- ❖ During the early stages of segregation within Earth **(A)**, gaseous materials escaped from Earth's interior. A process called **volcanic outgassing**
- ❖ An atmosphere gradually evolved, composed mainly of gases released from within the planet **(B)**.
- ❖ Earth's original atmosphere consisted of; **water vapor, carbon dioxide, nitrogen and several trace gases.**

Note: No **free oxygen** at this point!!!





Origin of the Atmosphere

❖ Earth's original atmosphere had a different composition than Earth's present atmosphere.

Note: the following comparison

Original Atmosphere

- mainly water vapor
- NO free oxygen
- High percentage of CO₂



Present Atmosphere

- mainly nitrogen (79%)
- contains free oxygen (20%)
- less than 1% CO₂



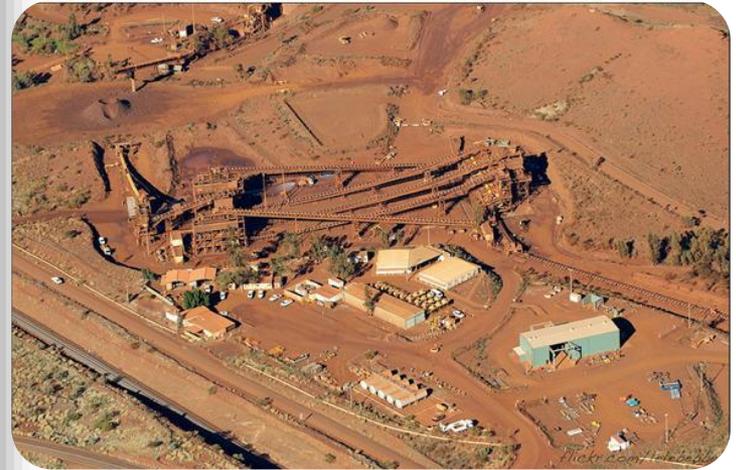
Evolution of the Atmosphere

If Earth's atmosphere formed from volcanic outgassing (no free oxygen), where did the high percentage of oxygen (20%) in the present atmosphere come from?

❖ the main source of oxygen is from green plants. Plants carry out **photosynthesis** where they consume carbon dioxide and release oxygen.



first oxygen released by plant life (algae) in the oceans did not make it to the atmosphere, instead, combined with particles in the water (iron) and formed chemical sedimentary deposits (iron ore).



❖ later in time the oxygen reached the atmosphere and accumulated to its present day percentages.

Origin of the Hydrosphere

How did the first oceans on Earth evolve from the original atmosphere?



- ❖ as Earth continued to cool, water vapor in atmosphere condensed to form clouds and great rains commenced.
- ❖ heat from surface caused water (rain) to evaporate before reaching surface or upon contact with Earth.



- ❖ once Earth's surface temperature cooled below 100 degrees celsius, rains slowly accumulated on Earth forming the oceans.

Origin of the Hydrosphere

How did the first oceans on Earth evolve from the original atmosphere?



- ❖ amount of water vapor in atmosphere was reduced as oceans formed
- ❖ high percentage of CO_2 in the atmosphere was also reduced because it dissolved in the rain and fell to the oceans.



- ❖ high percentage of nitrogen was left in the atmosphere

The Structure of Hydrosphere

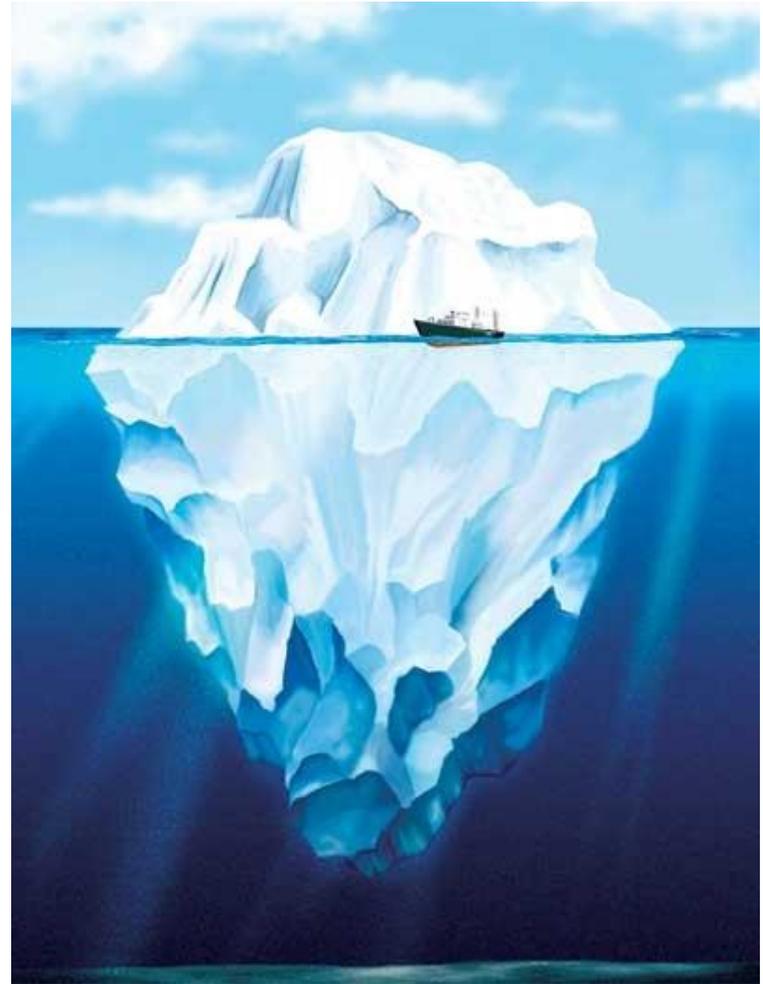
- Oceans—96.5% of water is salt water and it found in the oceans.
- Fresh water—the remaining 3 percent is freshwater.



- Fresh water distribution:
 - Ice: 1.762%
 - Groundwater: 1.7%
 - Surface Fresh Water: 0.014%
 - Atmosphere and soil: 0.002%

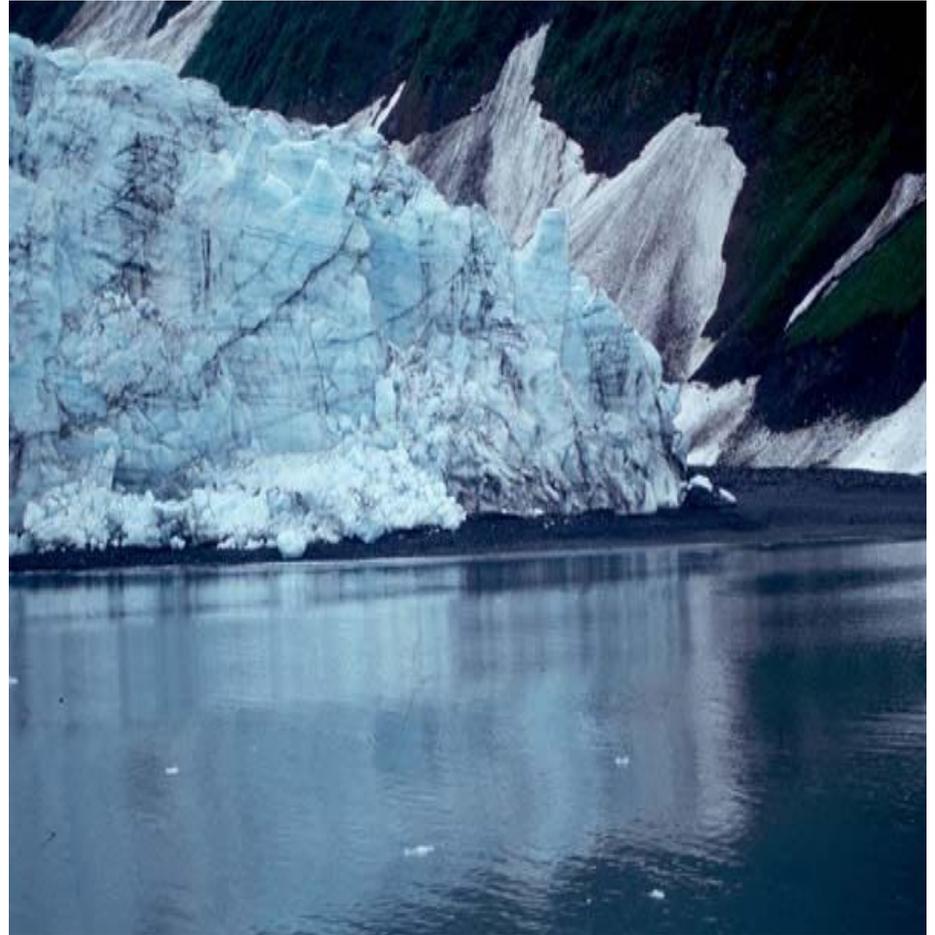
Understanding Where Your Water Is Located—Oceans and Ice

- What features house water as ice?
 - **Icebergs:** a large piece of freshwater ice floating in open waters.



Understanding Where Your Water Is Located—Oceans and Ice

- What features house water as ice?
 - **Glaciers:** any large mass of ice that moves slowly over land
 - *permanent snow areas also “house” water as ice



Fresh Water Locations—Surface Water

- What is the difference between a watershed and a river basin?
 - Both terms describe land that drains into a river, stream or lake.
 - **River Basin**: the term used to describe an area that drains into a large river
 - **Watershed**: the term used to describe an area that drains into a smaller river or stream.

Fresh Water Locations—Rivers, Streams, and Lakes

- What is a **river**?
 - A large channel along which water is continually flowing down a slope—made of many streams that come together.



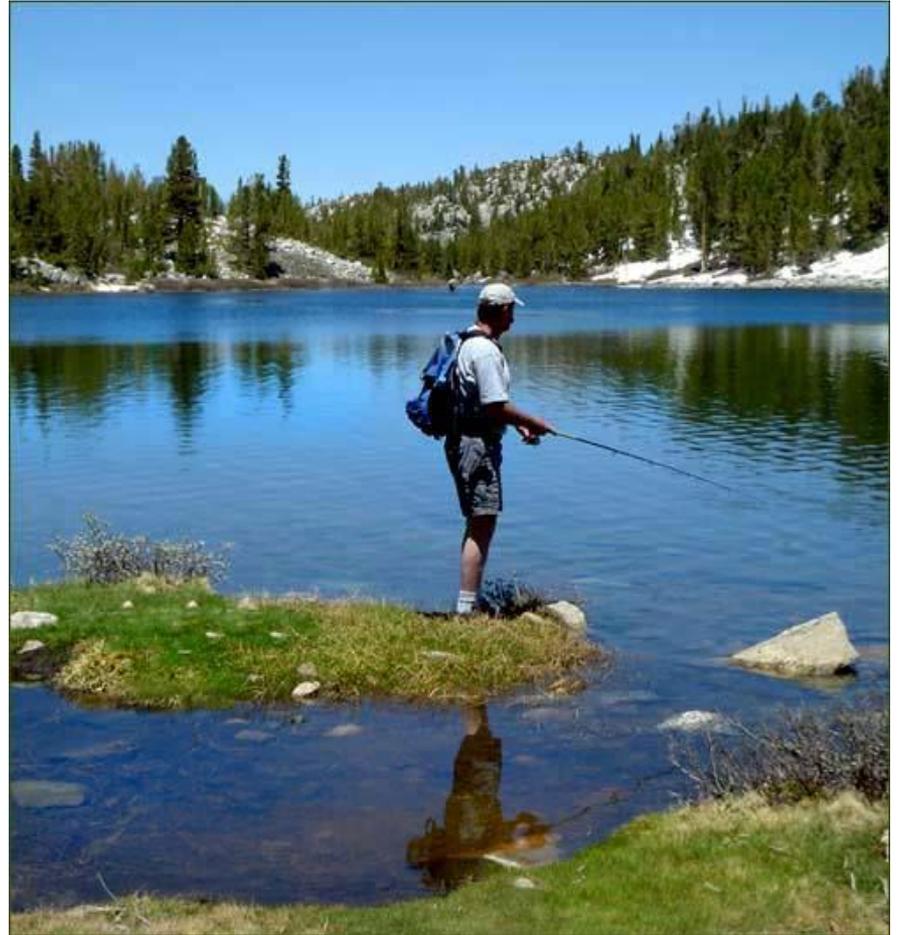
Fresh Water Locations—Rivers, Streams, and Lakes

- What is a **stream**?
 - A small channel along which water is continually flowing down a slope—made of small gullies.



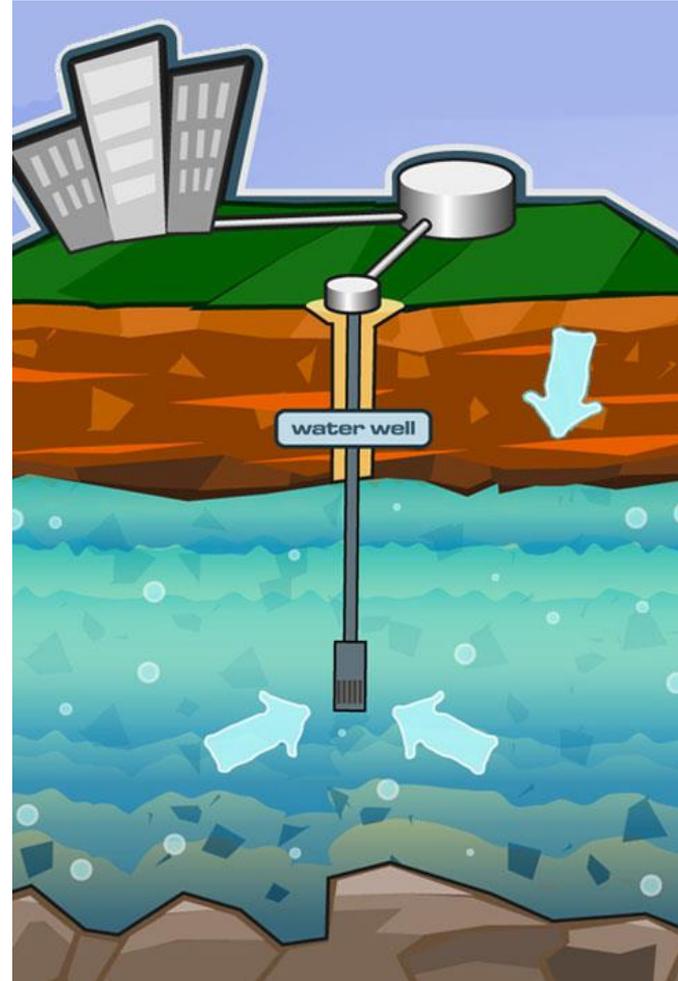
Fresh Water Locations—Rivers, Streams, and Lakes

- What is a **lake**?
 - A body of water of considerable size contained on a body of land.



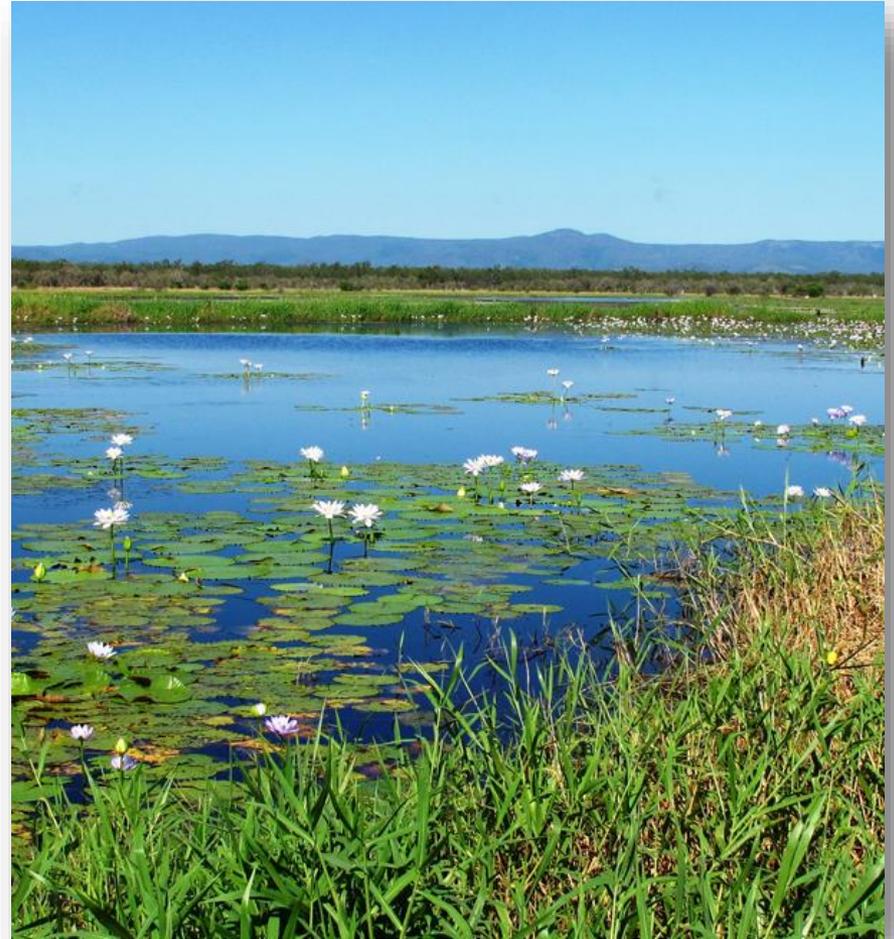
Fresh Water Locations--Groundwater

- What is **groundwater**?
 - The water found in cracks and pores in sand, gravel and rocks below the earth's surface.



Other Surface Waters

- What is a **wetland**?
 - An area where the water table is at, near or above the land surface long enough during the year to support adapted plant growth.



Other Surface Waters

- What are the types of **wetlands**?
 - Swamps, bogs, and marshes
 - Swamp: a wetland dominated by trees



Bogs: a wetland dominated by peat moss





Tollund Man, Denmark
Died about 2300 years ago.
Had a rope tied around his
neck, evidence suggests he
was hanged.

Preserved by the peat in the bog.
Discovered in 1950.



Marshes: a wetland dominated by grasses



Tom Blagden, Jr.

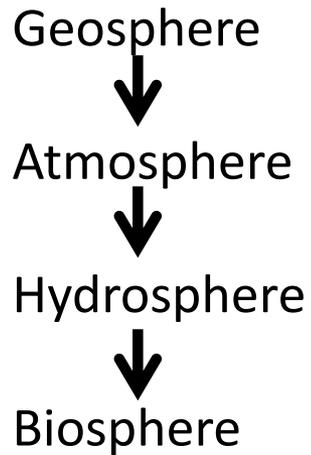
Additional Vocabulary

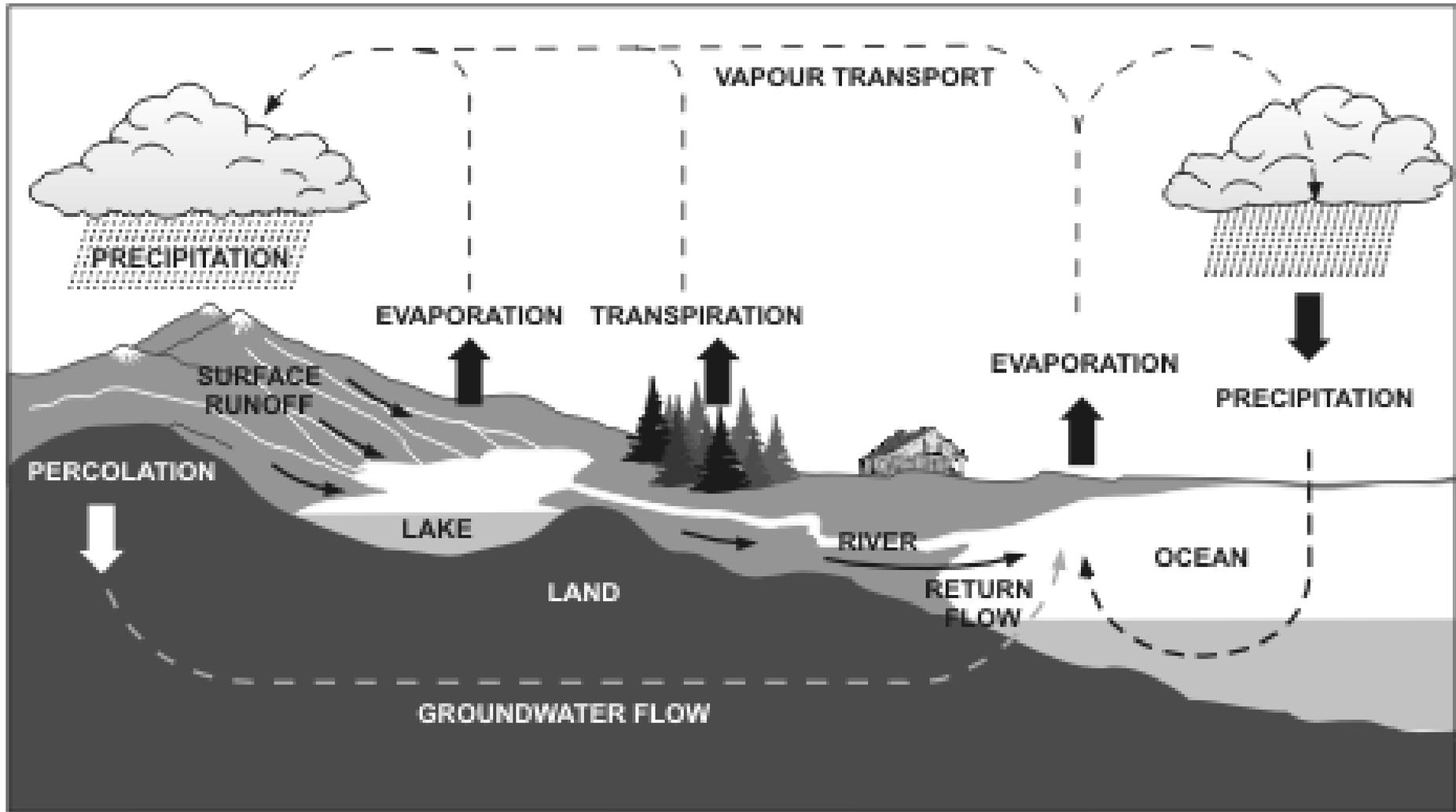
- **Reservoir** – a lake that stores water for human use.
- **Tributary**-a stream feeding a larger stream or a lake

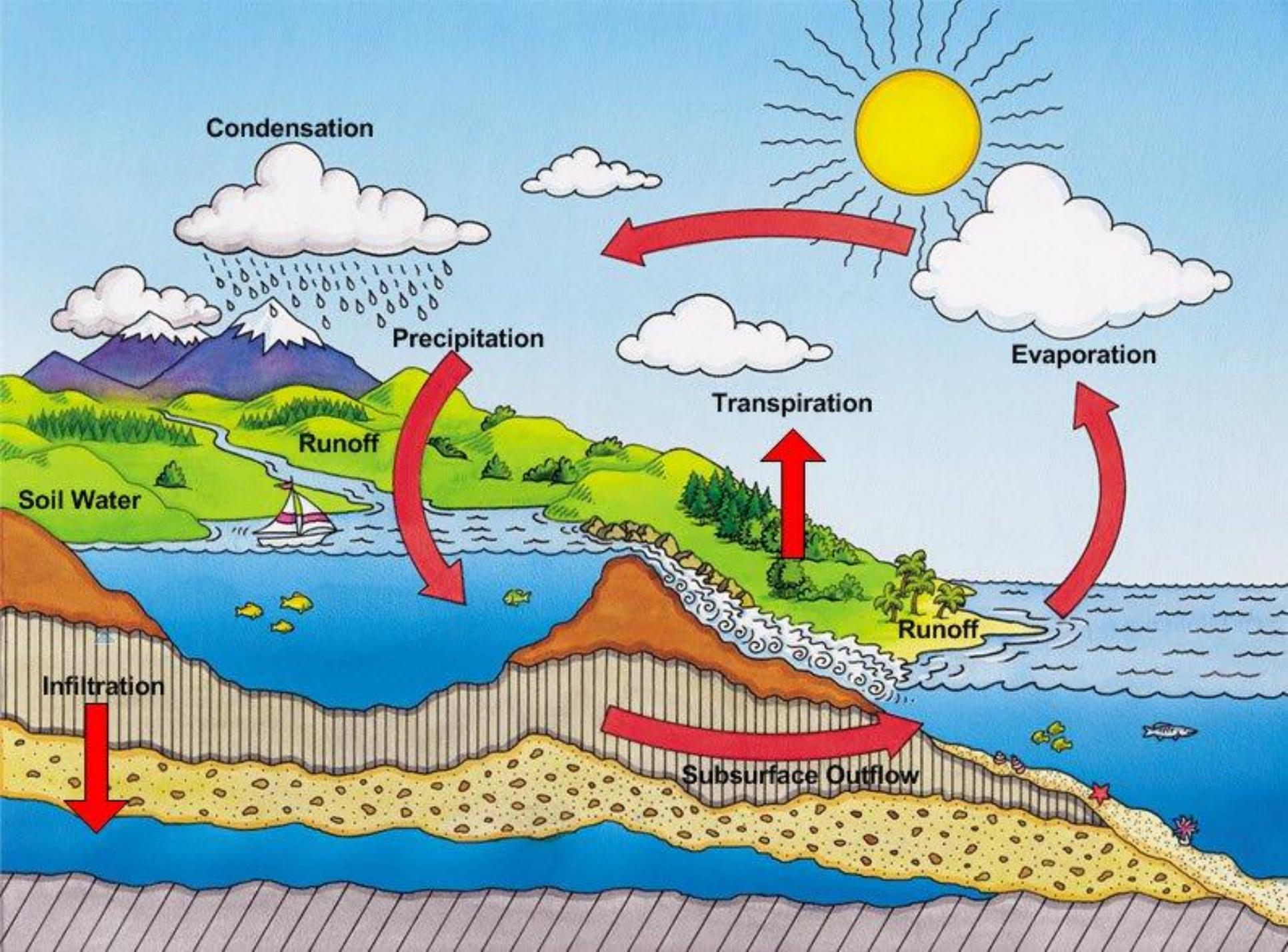


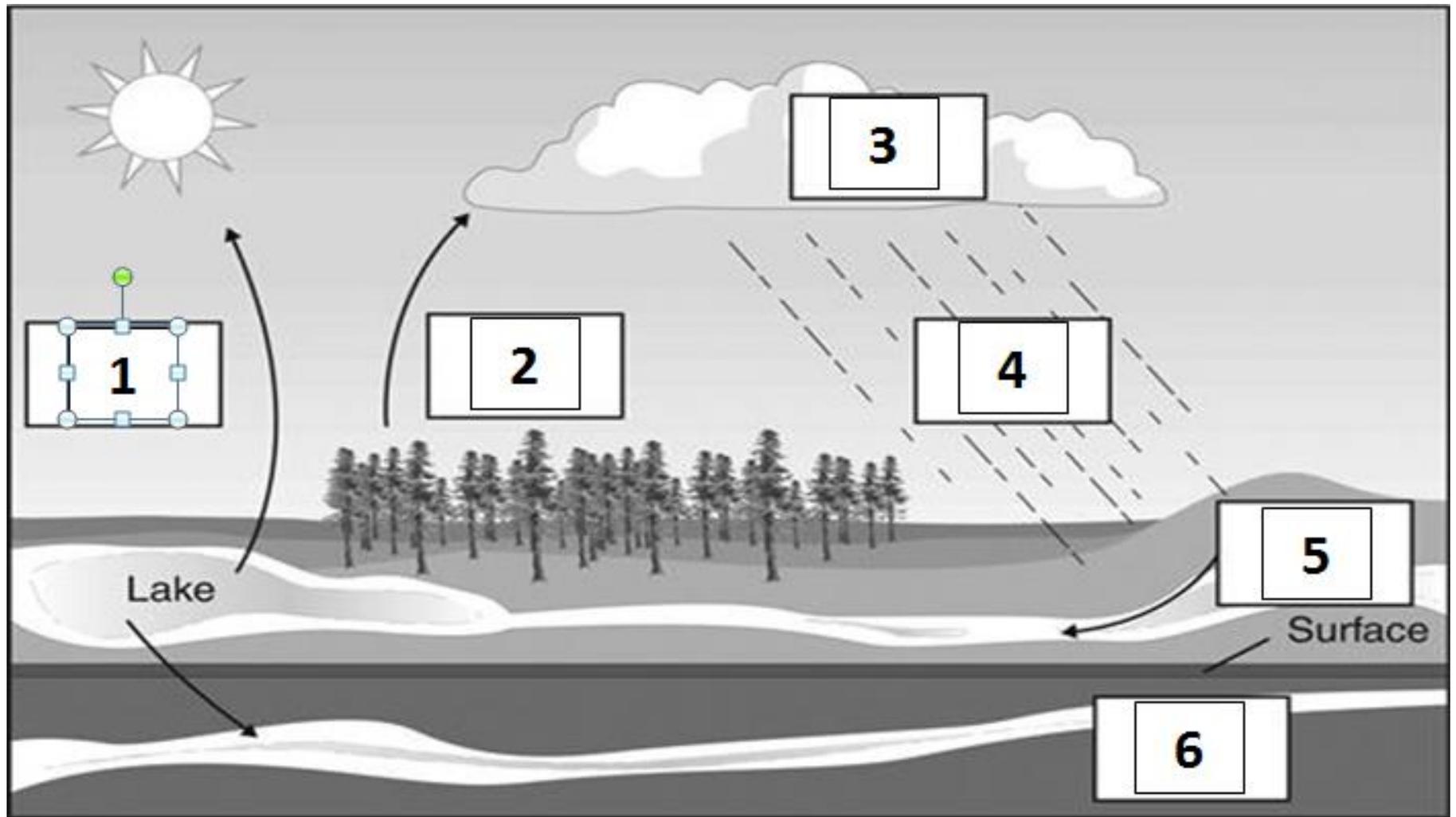
Formation of the spheres:

- ❖ Students should know that the spheres formed in the following order:









Example 1:

Which process explains the origin of the atmosphere and the hydrosphere?

- (A) gravitational forces
- (B) lithification
- (C) segregation
- (D) volcanic outgassing

Example 2:

Which gas was absent from the original atmosphere?

- (A) carbon dioxide
- (B) nitrogen
- (C) oxygen
- (D) water vapour

Example 3:

Which formed as a result of volcanic outgassing?

- (A) atmosphere and geosphere
- (B) atmosphere and hydrosphere
- (C) biosphere and geosphere
- (D) biosphere and hydrosphere

Your Turn . . .

Take the time and complete the following questions . . .

(Solutions to follow)

Question:

If volcanic activity had never taken place on Earth, explain what affect this would have had in relation to the origin of the atmosphere and hydrosphere.

Solutions . . .

Questions:

If volcanic activity had never taken place on Earth, explain what affect this would have had in relation to the origin of the atmosphere and hydrosphere.

- Scientists believe that the atmosphere and hydrosphere originated from gases released through volcanic activity billions of years ago as described by the nebular theory.
- As a result, if volcanic activity had never taken place on Earth, then neither the atmosphere or hydrosphere would have been formed and/or created.

Summary . . .

Overview of Points covered:

- ❖ Earth's atmosphere and hydrosphere formed as a result of volcanic outgassing.
- ❖ Atmosphere formed first and the hydrosphere formed later in time from high amounts of atmospheric water vapour.