

Chapter 1 Lesson 1: Earth Systems

Vocabulary

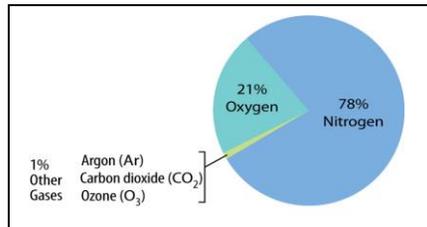
-biosphere	-cryosphere	-mineral
-atmosphere	-groundwater	-rock
-hydrosphere	-geosphere	

What is Earth?

- Scientists divide Earth into systems to help them better understand the planet.
- The outermost Earth system is an invisible layer of gases that surrounds the planet.
- Below the layer of gases are the systems that contain Earth's water.
- Next is a solid part of Earth, which contains a thin layer of soil covering a rocky center.
- The Earth system that contains all living things is the **biosphere**.

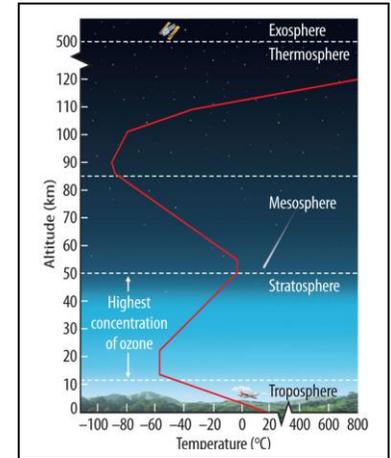
The Atmosphere

- Earth's gravity pulls gases into a layer surrounding the planet. This layer is called the **atmosphere**.
- The atmosphere contains a mixture of nitrogen, oxygen, and smaller amounts of other gases.



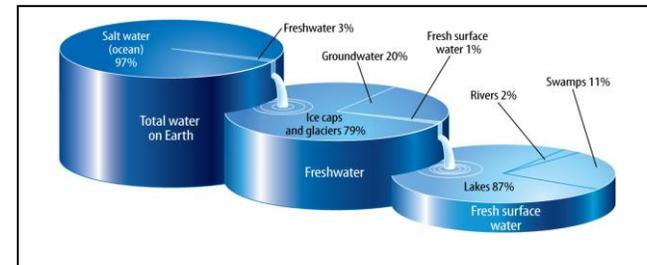
- Thermal energy from the Sun heats the atmosphere; however, different parts of the atmosphere absorb or reflect this heat in different ways.
- In the bottom layer, the **troposphere**, temperature decreases as you move upward from Earth's surface. Gases flow and swirl in the troposphere, causing weather.
- The **stratosphere** is above the troposphere. In the stratosphere, gases are more stable and form flat layers.

- The **mesosphere** is above the stratosphere. In the mesosphere, the air temperature decreases with increasing altitude.
- Temperatures increase again as you move further from Earth's surface through the next layer, the **thermosphere**.
- The outer layer of Earth's atmosphere is the **exosphere**.

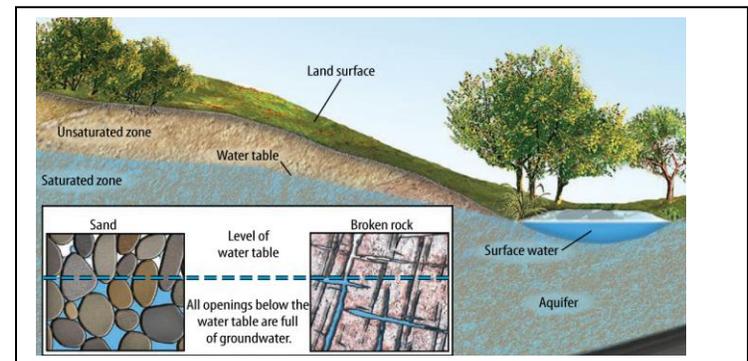


The Hydrosphere

- The system containing all of Earth's water is called the **hydrosphere**.
- The water in the hydrosphere changes state and is found as a liquid, a solid, and a gas on Earth.
- About 97% of Earth's water is in the ocean.



- **Groundwater** is water that is stored in cracks and pores beneath Earth's surface.

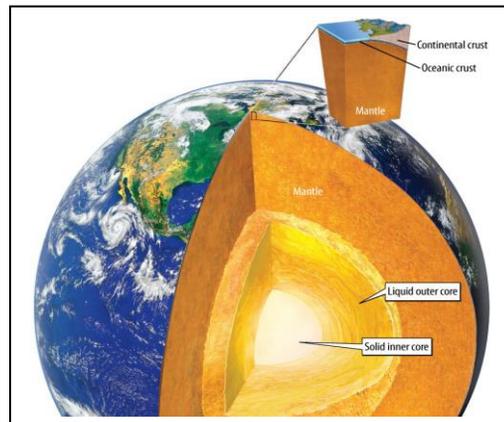


The Cryosphere

- The frozen portion of water on Earth's surface is called the cryosphere.
- The cryosphere consists of snow, glaciers, and icebergs.
- About 97% of the planet's freshwater is in the cryosphere.

The Geosphere

- The geosphere is the solid part of the Earth, which includes a thin layer of soil and broken rock material along with underlying layers of rock.
- Minerals are naturally occurring, inorganic solids that have crystal structures and definite chemical compositions.
- A rock is a naturally occurring solid composed of minerals and sometimes other materials such as organic matter.
- There are three major rock types: igneous, sedimentary, and metamorphic.
 - Igneous rocks form when molten material, called magma, cools and then hardens.
 - Sedimentary rock forms when forces such as water, wind, and ice break down rocks into smaller pieces called sediment.
 - Metamorphic rocks form when extreme temperatures and pressure within Earth change existing rocks into new rocks.
- The three basic layers of the geosphere are the crust, mantle, and core. Each layer has a different composition.
- The crust is the brittle outer layer of the geosphere. It is much thinner than the inner layers and is made of rock.
- The middle and largest layer is the mantle, made of rocks that are hotter and denser than those in the crust.



- The center of Earth is the core, made mostly of metal iron and small amounts of nickel.

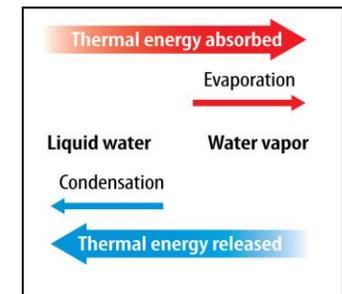
Chapter 1 Lesson 2: Interactions of Earth Systems

Vocabulary

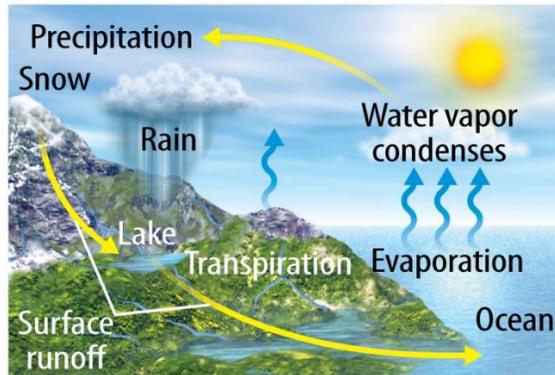
-water cycle	-condensation	-climate
-evaporation	-precipitation	-rock cycle
-transpiration	-condensation	-uplift

The Water Cycle

- The water cycle is the continuous movement of water on, above, and below Earth's surface.
- The Sun provides the energy that drives the water cycle and moves water from place to place.
- Water can change state back to a gas or a solid and then back again to a liquid.
- Thermal energy is released or absorbed when water changes state.
- Evaporation is the process by which a liquid, such as water, changes into a gas.
- Transpiration is the process by which plants release water vapor through their leaves.
- Some water vapor also comes from organisms through cellular respiration.
- The process by which a gas changes to a liquid is condensation.
- Moisture that falls from clouds to Earth's surface is precipitation.

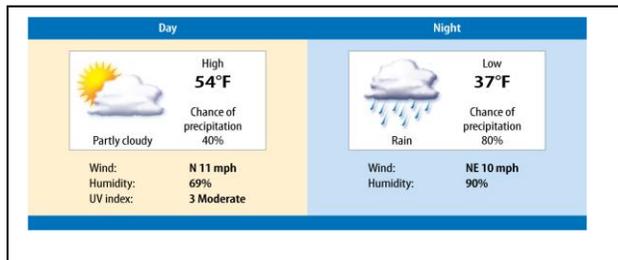


The Water Cycle



Changes in the Atmosphere

- **Weather** is the state of the atmosphere at a certain time and place.
- Weather is influenced by conditions in the geosphere and the hydrosphere.
- Scientists describe weather using air temperature and pressure, wind speed and direction, and humidity.



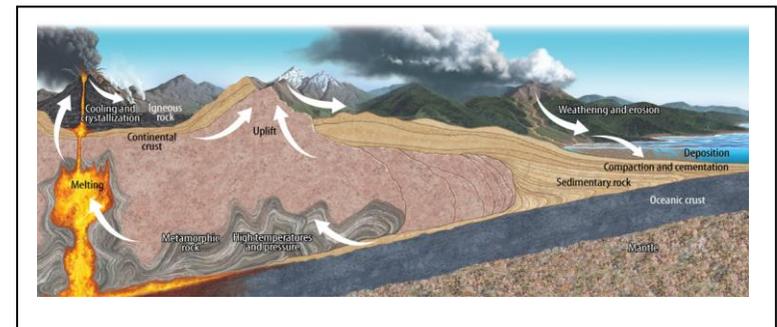
- **Climate** is the average weather pattern for a region over a long period of time.
- As wind blows over an ocean, it creates surface currents that transport the thermal energy in water from place to place.

- Mountains can affect the amount of precipitation an area receives – a phenomenon known as the rain-shadow effect.



The Rock Cycle

- The **rock cycle** is the series of processes that transport and continually change rocks into different forms.
- As rocks move through the rock cycle, they might become igneous rocks, sedimentary rocks, or metamorphic rocks.
- **Uplift** is the process that moves large bodies of earth materials to higher elevations.



- Rocks on Earth's surface are exposed to the atmosphere, the hydrosphere, the cryosphere, and the biosphere.
- Glaciers, wind, and rain break down rocks into sediment through a process called weathering.
- Eroded sediments are deposited, forming layers of sediment.
- As more layers of sediment are deposited, compaction and cementation produces sedimentary rocks.
- Metamorphic rocks form when rocks are subjected to high temperatures and pressure, usually far beneath Earth's surface.
- Earth's systems interact and function together as one unified system – planet Earth.