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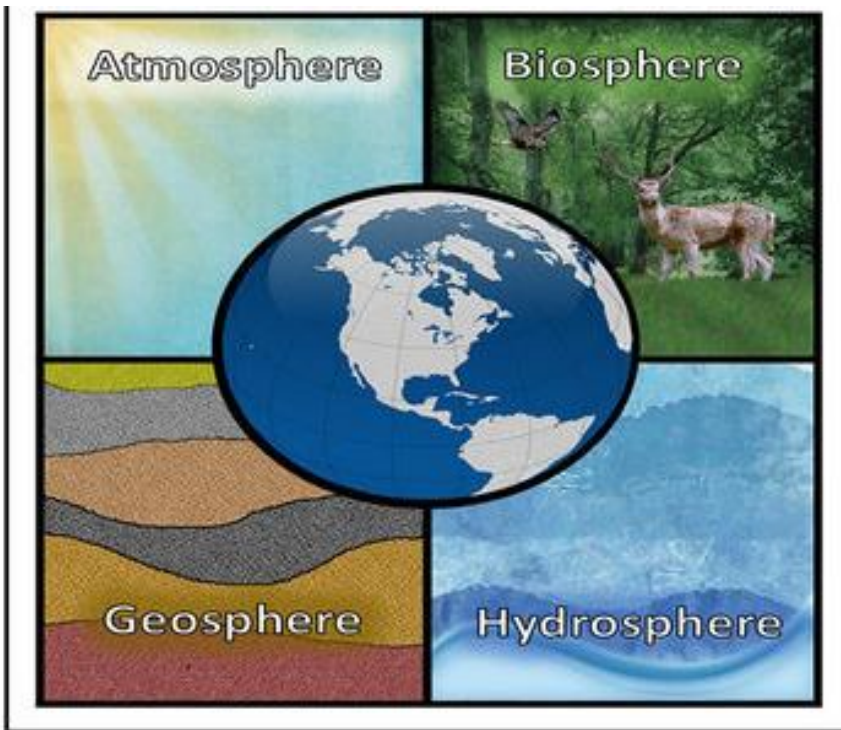
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## Chapter 9 Our Planet Earth Summary Notes

### 9.1 Earth Systems

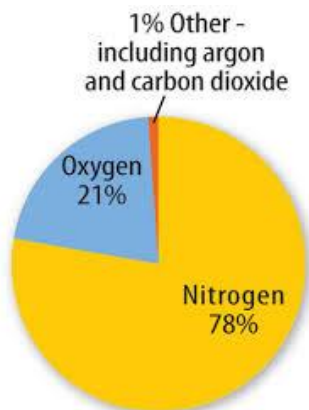
Earth is made up of smaller parts called Systems. There are 4 systems: The biosphere, the atmosphere, the hydrosphere and the geosphere. Each system is made of different materials and interact differently with one another.



#### The biosphere

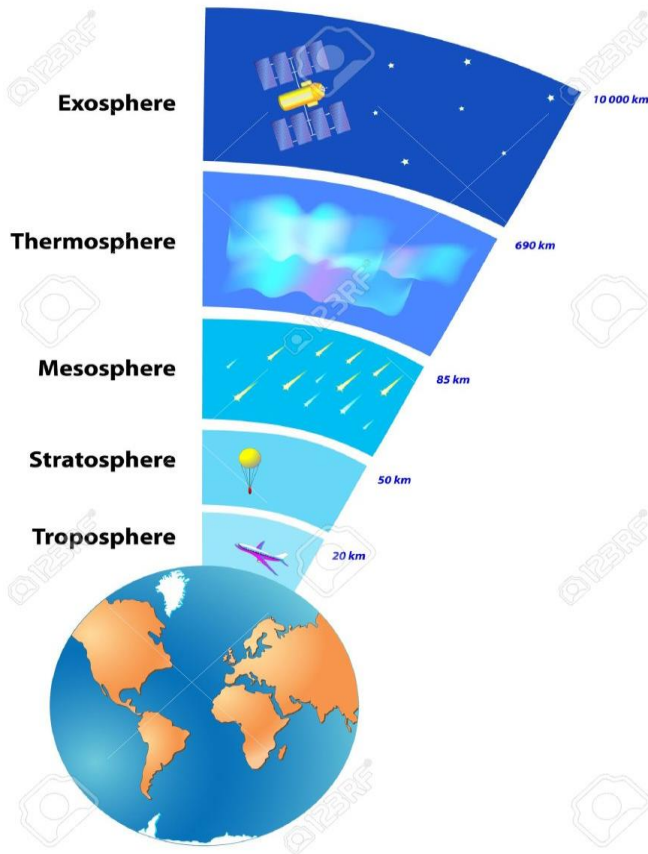
The earth system that contains all living things is the **Biosphere**. Living things are found in the water, air and soil and therefore have no **Distinct boundaries**. حدود مميزة

#### The Atmosphere



The mixture of gases forms a layer around Earth called the **Atmosphere**. The gases are denser **كثيف** closer to Earth's surface and become less dense as you travel up into the atmosphere.

There are 5 layers in the atmosphere because of the difference in temperature for each as the altitude ارتفاع increases.



✚ In the **Troposphere** the temperature decreases as you climb higher (Think of climbing a mountain or being in an airplane, the weather will be cooler).

In this layer gases swirl causing weather.

✚ In the **Stratosphere** the gases do not swirl. This is where the Ozone layer of gas is which protects the Earth from harmful Sun radiation. Ozone absorbs solar radiation. Temperature increases in this layer becoming hotter.

✚ In the next 3 **upper layers** the gases become less dense and temperature increases.

Changes in the atmosphere:

**Weather** is the state of the atmosphere at a certain time and place. Scientists use different factors مؤشرات to describe changing in weather:

**Air temperature** is the measure of average amount of energy produced by the motion حركة of air molecules. When air molecules cause movement in different direction we call this **Air pressure** which causes wind رياح. Weather is affected by the atmosphere, hydrosphere and the geosphere.

**Climate** is the average weather pattern for a region منطقة over a long period of time.

## The Hydrosphere

The system which contains all of Earth's water is called the **Hydrosphere**. It contains more than 1.3 billion km<sup>3</sup> of water. Water amounts just like gases in the hydrosphere does not change over time instead, it continually flows from one place to another also changing states to Solid, Liquid and Gas.

**Ocean:** largest reservoir of Earth's water is in the ocean, about 97%. Many minerals dissolve easily in water on its way to the ocean which is why it is salty.

**Lakes and Rivers:** are made up of fresh water. Rain and snow supply these places.

**Groundwater:** 20% of freshwater is deep below the Earth's surface.

**Cryosphere:** 79% of Earth's freshwater is frozen. This is where the snow, glaciers and icebergs are. This frozen water can be stored for thousand of years.

## The Geosphere

All solid parts on Earth including thin layer of soil and broken rock material is the *Geosphere*.

The geosphere has materials composed of smaller particles; **Minerals** and **Rocks**.

**Minerals** are:

1. Naturally occurring
2. inorganic (not made of living things).
3. Solids only
4. Have crystal structures
5. Definite chemical composition (التركيب الكيميائي المحدد)



**Rocks** are:

1. Naturally occurring
2. Solid
3. Made of minerals
4. Sometimes made of other materials such as organic matter

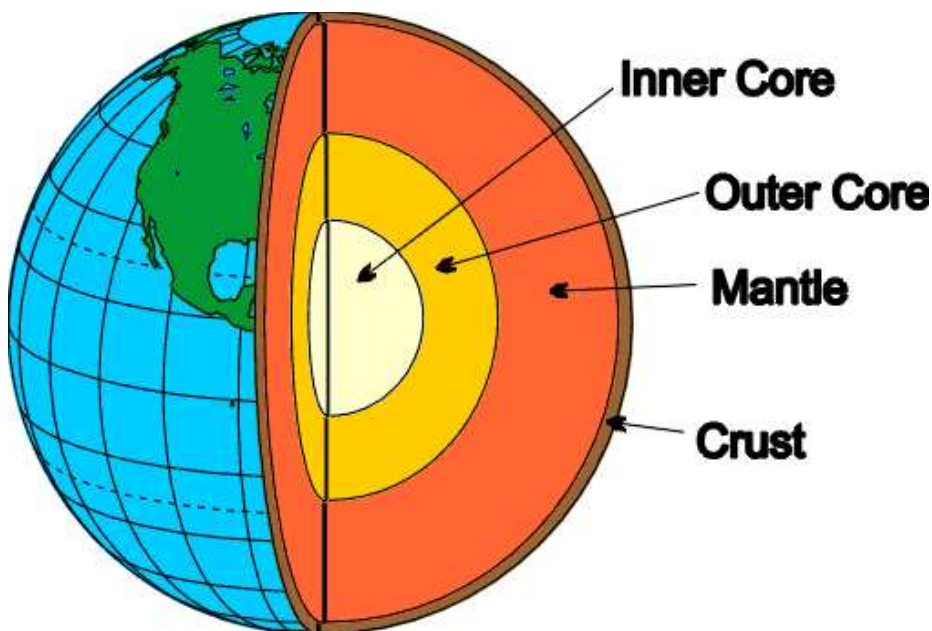
Scientists classify مؤلف the rocks by how they are formed صنف

## 3 Major Rock Types

- **Igneous**
  - Formed from the solidification of molten rock (magma or lava).
- **Sedimentary**
  - Formed at the Earth's surface from the accumulation and cementation of fragmented pieces of older rock produced by weathering.
- **Metamorphic**
  - Rocks that have undergone physical changes as a result of exposure to extreme pressure, temperature and fluids.



### The structure of the Earth:



Think of Earth like a boiled egg. Each layer of the geosphere has a different composition **تكوين**.

**The crust:** is the outside layer of the geosphere. It is much thinner than all the other layers on Earth. It is made of rocks. There is also oceanic crust which is found underneath the ocean's water.

**The mantle:** is the middle layer of Earth and the largest. It is also made from denser rocks but much hotter in temperature.

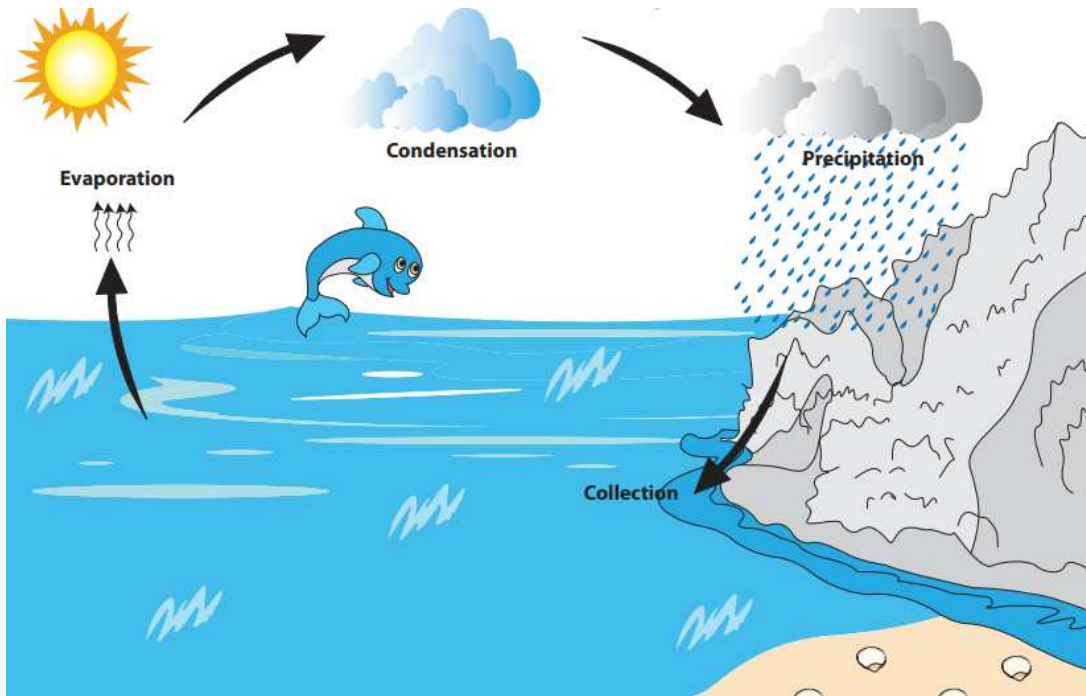
**Outer core:** think of this as the yolk of the egg. It is not made from rock but made from molten liquid **ذائب** metal iron and small amounts of nickel.

**Inner core:** is made of dense solid iron.

## 9.2 Interaction of Earth Systems

The amount of water on Earth does not change it only moves from one place to another with no start or end. We call this process the **Water Cycle**. We need the SUN's thermal energy to drive this process. Water will move through the hydrosphere to the atmosphere, the geosphere and the biosphere.

Water first enters the Earth's atmosphere through **Evaporation**.



- A. **Evaporation** is when liquid changes to gas (water vapor) because the heat from the sun causes the water particles to vibrate fast and break away from the other water molecules.

B. Water vapor can also come from plants when they release water vapor from their leaves. This is called **Transpiration**.

C. Some water vapor also comes from organisms (living things) through cellular **Respiration** التنفس الخلوي. Water and carbon dioxide are produced when we breathe. This water vapor also enters the atmosphere
- Condensation** is when gas changes back to liquid. When water vapor rises to the atmosphere the cool temperature in the troposphere will make the water vapor lose thermal energy. When many water droplets join, they form clouds.
- Precipitation** when the cloud becomes heavy and large the water drops. Rain and snow are types of precipitation.

The **Rock Cycle** is another natural cycle. It is a process that continually **بـاسـتـمـرـار** change rocks into different forms. Scientists classify rocks according to how they are formed **مؤلف**. As rocks move through the rock cycle they can become sedimentary rocks, igneous rocks or metamorphic rocks.

1. **Cooling and crystallisation** is when magma flow out of volcanos as lava. Mineral crystals form when the lava cools down which makes molten material into Igneous rock.
2. **Uplift** is when rocks form deep within Earth. Uplift causes rocks at the bottom to come to the surface at the top (think of mountains).
3. **Weathering and Erosion** when rock is broken down into sediments **الرواسب** because of coming into contact **لمس** with water and air. Erosion happens when these sediments are carried to new locations **مواقع**.
4. When many layers of sediment are layered together pressure turns them into Sedimentary rocks.
5. When rocks are exposed to high temperature and pressure Metamorphic rocks form.

