

A beaker of water with a clear, closed top is an example of a **closed** system.

Residence time is the **average length of time material spends in a reservoir**.

The situation where materials have an exceptionally long residence time in a reservoir is called: **sequestration**.

Two important implications of Earth being a **closed system** are:

1. the amount of matter in a closed system is fixed and finite;
2. if changes are made in one part of a closed system, the results of those changes eventually will affect other parts of the system

The Earth is essentially a closed system. As a result which of the following statements is most accurate:

The mineral resources on this planet are all we have and – for the foreseeable future – all we will ever have.

The following places are in the life (habitable) zone of the Earth:

In the Midst of the Sahara desert;
The tops of the highest mountains;
The deepest reaches of the ocean;
On the frozen glaciers of Antarctica.

The place where Earth's four reservoirs interact most intensively is a narrow zone called the **life zone**. Conditions favourable for life are created by interactions between the **lithosphere, hydrosphere and atmosphere**, and **modified by the biosphere**.

The **geosphere** is the solid Earth, composed principally of rock (by which we mean any naturally formed, non-living, firm coherent aggregate mass of solid matter that constitutes part of a planet) and regolith (the irregular blanket of loose, uncemented rock particles that covers the solid Earth).

The **atmosphere** is the mixture of gases – predominately nitrogen, oxygen, argon, carbon dioxide, and water vapour – that surrounds the Earth.

Earth systems tend toward **self-regulation** and a state of **equilibrium**.

All of science – including Earth system science – advances by application of the scientific method. The steps of the scientific method are to systematically observe phenomena and gather data; formulate a hypothesis; test the hypothesis, numerous times and in various ways; formulate a theory; and finally formulate a law or principle.

The following methods are useful for testing a hypothesis:

controlled experiments in a laboratory;
further observations and measurements;
development of a mathematical model;
taking measurements in the field.

If there are uncertainties in aspects of an Earth system, the following statement is most true: It is normal for uncertainty to exist in our knowledge of a highly complex and changing system.

The following are some types of potential energy:
chemical energy;

nuclear energy;
gravitational energy;
store mechanical energy.

The following are some types of kinetic energy:

radiant energy;
electrical energy;
thermal energy;
motion of objects.

Earth's energy cycle: Energy is received from the Sun, some is reflected back to space, and some is absorbed, degraded and eventually reradiated back to space.

The energy cycle encompasses the inputs and outputs, pathways and reservoirs for the energy that drives all of the other cycles of the Earth system.

Geothermal energy is drawn from the Earth's internal heat source.

A glass of water with ice cubes would contain different **phases** and different **phases**.

Water is a **compound** containing oxygen and hydrogen while air is a **mixture** of oxygen and nitrogen.

Diamonds and carbon dioxide are **inorganic**.

The compositional layering of the Earth, from interior to surface:
core, mantle, crust.

The two most abundant elements of the Earth's continental crust: oxygen and silicon.

A mineral:
naturally formed;
inorganic;
solid;
specific chemical composition;
characteristic crystal structure.

A rock formed from completely molten magma is an **igneous** rock, while a rock formed by high temperatures and pressures without complete melting is a **metamorphic** rock.

On the surface of the Earth, **sedimentary** rocks are most common, while for the crust as a whole, **igneous** rocks are most common.

Regolith refers to **the decomposition and disintegration of rock by weathering**.

When regolith contains organic matter, it is **soil**.

A subduction zone is where one plate undergoes subduction into the mantle beneath the other plate;
where one lithospheric plate is dragged or pushed below another lithospheric plate.

The Himalaya Mountains are created by **convergent** plate boundary.

Hot spots and plate tectonics account for the islands of the Hawaiian Island chain varying in age: As molten material continually seeped from the hot spot, an island(s) would form. As

the Pacific Plate continued to move, the island locked to the Pacific Plate would move as well. A new island would then form above the hot spot.

The Earth's oldest rocks are found in the cores of continents (areas called **Cratons**).

The first evidence that led Alfred Wegener to suspect the continents were once connected was that the continents simply looked like they fit together, especially Africa and South America.

The contact zone where one slab of lithosphere subducts beneath another slab of lithosphere is called the Benioff Zone.

Rocks only have enough strength to store a finite amount of elastic energy before they reach their breaking point. As a result, **no earthquakes of a magnitudes of around 10 have ever been observed.**

Minimum **three** seismic stations is needed in order to triangulate location of the epicentre of an earthquake.

Epicenter: the point on Earth's surface directly above the focus.

Focus: the point or region where energy is first released during an earthquake.

The distance to an earthquake epicentre can be determined by measuring the **time difference of arrival of the first P-wave to S-wave.**

Other than water vapour, the most abundant gas in a volcano is **carbon dioxide.**

When molten rock reaches the surface, it's called **Lava.**

The type of igneous rock that is a result of solidification of lava is **extrusive igneous rock.**

Pahoehoe type of lava flow has a smooth, ropy-looking texture.

The **composition of the magma, amount of dissolved gas in the magma, and the temperature of the magma** determines whether a volcanic eruption is violent or passive.

The plate boundary caused 1556 Shaanxi central China earthquake was continental collision boundary.

The primary effects of earthquake damage (those that cause direct damage to buildings, infrastructure, and the landscape) are **ground motion and surface rupture.**

The geologic time scale is generally based upon major geological and/or biological events.

? Sedimentary rocks provide clues about
geologic activity at the time of deposition;
past climates;
surface conditions at the time of deposition;
environmental conditions at the location of deposition;
all of these.

Chemical sedimentary rocks are formed **from various solutions.**

Mass wasting is material moved primarily due to **gravity.**

Clastic sedimentary rocks are classified based upon **grain size.**

Intrusive igneous rocks are generally **coarse-grained**.

The largest reservoir for water in the hydrologic cycle is **the oceans**.

Most of the fresh water on Earth is found in **the ice caps**.

Karst terrain is formed as a result of the dissolution of limestone over long periods of time.

The primary force that dictates the downward migration of groundwater is **gravity**.

The factors that control **stream** behaviour:

the sediment load;

the average width and depth of the channel;

the channel gradient;

the average velocity of the water.

For a meandering stream, the coarsest sediment is associated with the zone of highest velocity, which is on the outside of the bend.

If there is excessive pumping of groundwater, it is likely to happen:

lower the water table;

salt water will be sucked into coastal wells;

subsidence.

The release of water vapour to the atmosphere by plants is called **transpiration**.

With regards to a meandering stream or river, the majority of erosion occurs **on the outside of the bend**.

? Deforestation affects the hydrologic cycle:

the lack of vegetation alters the porosity of the soil thereby affecting infiltration;

the lack of vegetation alters the permeability of the soil thereby affecting infiltration;

the removal of plants lessens transpiration thereby effecting water source.

All of these;

None of these.