

Branches of geology

- 1: **stratigraphy** → the study of layered and interrelationships { sedimentary rocks }
- 2: **paleontology** → the systematic study of past life forms
- 3: **mineralogy** → the study of the chemical composition and structure of minerals
- 4: **crystallography** → the study of crystal
- 5: **petrology** → the study of origin of the rocks
- 6: **geomorphology** → the study origin of landforms and modification
- 7: **physical geology** → the nature of the earth development chemical and physical
- 8: **sedimentology** → the science of the erosion and deposition of rock by wind, water, ice
- 9: **geochemistry** → the study of the chemical composition and ratio of elements
- 10: **engineering geology** → the study of the tunnels, mines, dams and bridges
- 11: **geophysics** → the study of the behavior of rock and exploration
- 12: **historical geology** → the study of the historical development of the earth

The Earth System

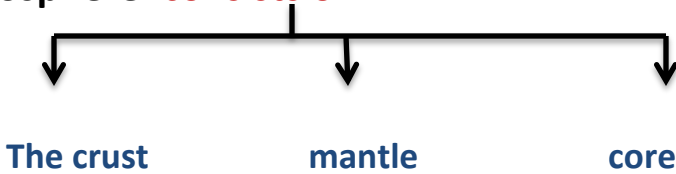
- 1: The atmosphere
- 2: The biosphere
- 3: The hydrosphere
- 4: The geosphere

The atmosphere : **is a mixture of gases ,mostly nitrogen and oxygen /it consist of 80:20 oxygen:nitrogen**

The biosphere : **is the thin zone near the earh in hahbited by life it includes the The uppermost solid ,the hydrosphere and lower parts of the atmosphere**

The hydrosphere : **contains all water in earth**

The geosphere: **consists of**



The crust : **القشرة الارضية**

Consist of two parts , The continental and oceanic crust

The continental crust : **average about 35km thick to 60 km / Granitic composition (a light colored- less dense)**

The oceanic crust : **5-12 km thic / Basaltic composition**

The mantle : **الوشاح** is the largest layer of the earth

The upper mantle is rigid and is part of the lithosphere / composed of silicon, Oxygen, magnesium, iron, aluminum

The asthenosphere: **is a part of mantle that exhibits plastic properties**

The lower mantle :**is semi-rigid to rigid**

The core : **اللب**

The core is a dense ball of the elementes iron and nickel and divided into two Layers (outer and inner core)

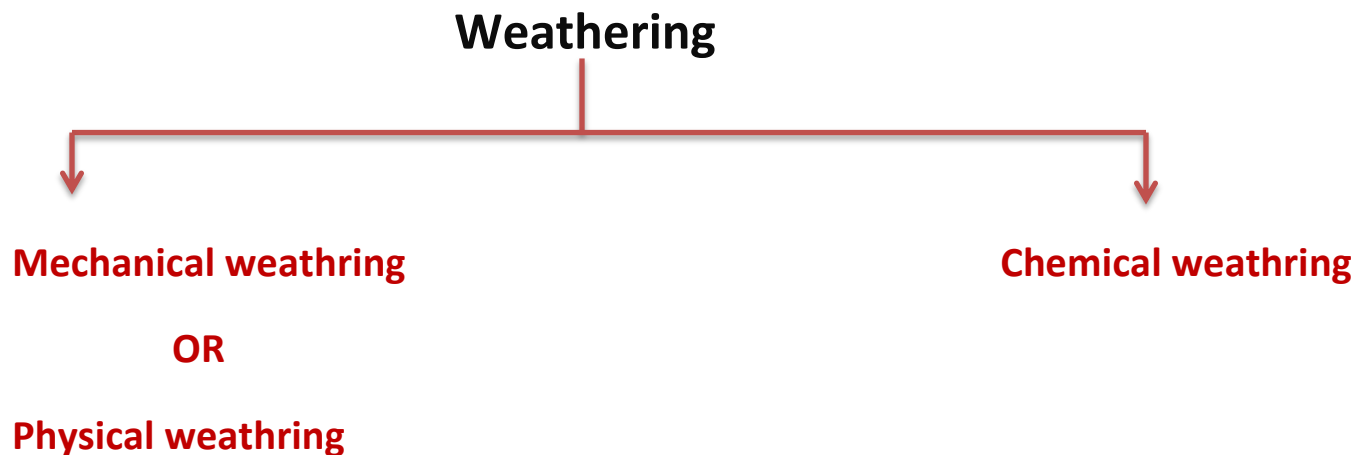
The outer core: it is at **2.890-5.150 km** / liquid to semiliquid and consist of iron
Some nickel, and about 10% sulphur and oxygen/temp:4000-5000 C / density
Between 10g/cm³ and 12,3g/cm³

The inner core: it is **5,150-6,370 km** / consist of iron,nickel,carbon,oxygen/temp
5000-6000 C/ density about 15g/cm³

Weathering and soil

Weathering: It is the decomposition and disintegration of rocks /no movement of
decomposed

Erosion:is the removal of weathered rocks/moving by water,wind and gravity



Mechenical weathering:breaks large rocks into smaller ones but not alter the
Rock chemical nature

Types: 1/pressure release fracturing

2/Frost weding

3/abrasion

4/organic activity

5/thermal expansion and contraction

Chemical weathering

1/Dissolution → in water to increase hydrogen

→ Leaching: The removal of minerals by dissolution

2/Hydrolysis → Water react with a mineral to form a new mineral

3/Oxidation → Elements react with O₂

Chemical and Mechanical Weathering

1/ Salt cracking

2/Exfoliation

Geological Structure

Primary structure : Forming during sediment deposition

1/Layering(Bedding) : layered structure

2/Graded Bedding: display progressive/grain size from the base to the top

3/Cross Bedding: beds are inclined to one another

Surface Features :

1/Ripple Marks : shallow water deposition /waves/type(Asymmetrical And Symmetrical)

2/Mud Cracks: From the drying out of wet sediment

Secondary structures: These imposed in rock by tectonic events after Their original formation

اللهم صلي علي النبي محمد صلي الله عليه وسلم

Tensional stress: The rock is stretched apart

Compressional stress: The rock pressed together

Shear stress: The rock slide in a horizontal direction

Ductile deformation: change in shape / permanent / flows or bends

Brittle deformation: Fracture in rock / permanent / breaks

Brittle:

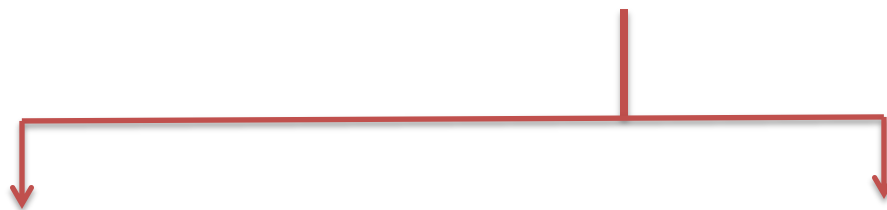
1/Fractures: separation / with no movement

2/Fault : break/ with movement/ types (normal-reverse-thrust-strike.slip)

Ductile:

Folds: are wave like structure.

Types



Synform=Syncline

= Concave up



Layering dips inward toward

Basin

Antiform=Anticline

=Concave down=Convex



Layering dibs outward

Dome

Groundwater

subsurface(Groundwater):

All water beneath the land surface is referred to as under groundwater.

Contain two different zones



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graph LR; A[Contain two different zones] --> B[Unsaturated]; A --> C[Saturated];
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Unsaturated



Soil zone: Extends from the land surface to maximum depth of 1m to 2m

***supports the plant**

Intermediate zone: Underlain the soil zone/depending on the thick and depth

Capillary fringe: is the supzone between unsaturated and saturated zone.

***Saturated zone=phreatic.**

Only the water to which the name groundwater/ available to supply wells.

Water Table: top of the zone of saturation/hydraulic pressure is higher than the Atmospheric pressure.

Aquifer: A porous and permeable, rock unit contains water.

Porosity: % is the ratio of voids to the total volume of a soil

Primary porosity: is the initial void space present when the rock

Sec porosity: it the result of fracturing, faulting or dissolution

Permeability: is the capability of a rock to allow the passage of fluids.

Aquifers can be confined or unconfined.

Aquitards or Aquicludes: The non-porous layers.

1: Confined aquifer: non porous layers above and below the aquifer zone

2: Unconfined: below non-porous and above free water table

3: Perched aquifer: Water intercepted by this lense.

4: Springs: occurs where the water table intersects the surface

Plutons and volcanoes

Plutons: Granitic magma it forms near the base of continental crust.

Batholith: is a pluton exposed over more than 100 km² / thick as 20 km to 10 km

Stock: is a pluton exposed over less than 100 km²

Dike: is a tabular, or sheet like / cut across sedimentary layers / thick as cm to more km

Sill: parallel to the layering. / thick as cm to more km

Volcanoes

If lava is too viscous to spread out as a flood, it builds a hill or mountain.

The volcano opening is called: vent

A bowl-like depression: crater

1: An active volcano: expected to erupt.

2: A dormant volcano: not now erupting and well probably do so again.

3: A extinct volcano: never to erupt again.

صلي علي النبي عليه افضل الصلاه والسلام

Types of volcanoes

1/Shield volcanoes: gently sloping/ angles between 6 to 12 from horizontal.

2/Cinder cones: small volcano/ large amount of gas/angles about 30 /most are less than 300 m although a large one can be up to 700 m.

Tectonic plates

Alfred Wenger proposed the theory that the crustal plates are moving over mantle.

He argued that today's continents once formed a single landmass called Pangaea.

Continental Drift Evidences

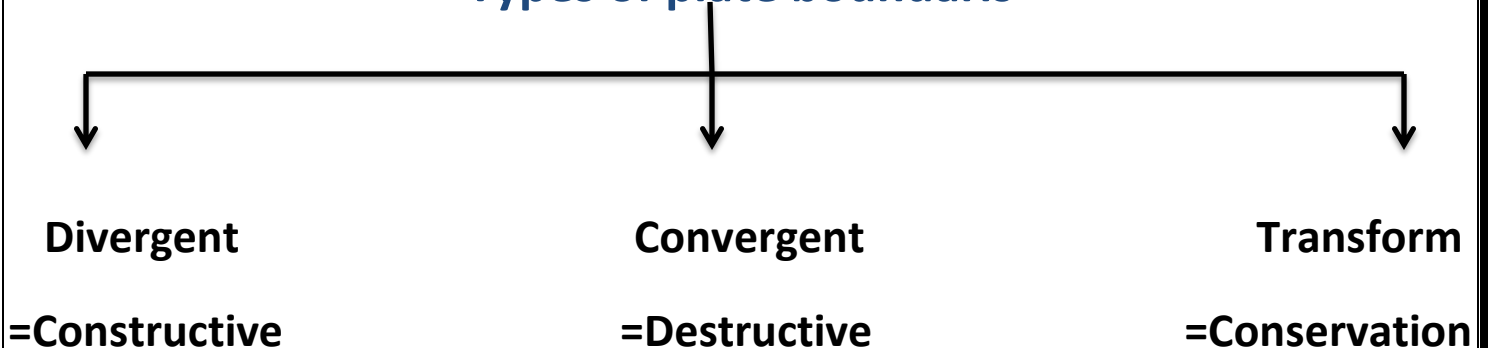
(The continental puzzle/Fossil/Rock type/Climates)

Fossil Evidence: fossil of the same species were found on separate continents and nowhere else.

Paleo climatic evidence : indicates that now tropical region on same continents had polar climates in the past.

ثم بدأ يتكلم علي الليثوسفير ان هو اقل كثافة من الاسينوسفير فيطفو فوقه و hence فدلوقتي انواع اللوح التكتونية

Types of plate boundaries



1:Divergent: occur where two plates slide apart from each other.

2:Convergent: occur where two plates slide towards each other.

3:Transform: occur where plates slide grind past each other along transform.

Divergent plate boundaries

Mid-Oceanic Ridge is formed

الخلاصة: يحصل حركة تباعدية فيحصل انفصال وتتكون الماجما في الفراغ مكونة حيد وسط المحيط

***Convergent plate boundaries* يوجد منها 3 انواع وهنعرفهم دلوقتي**

1:Between Oceanic crust and Contintal crust: Andes Mountain

2:Between Oceanic and Oceanic crust: island arc e.g.Japan

3:Between Contintal and Contintal crust: The Hymalayas and the Alps

Transform plate boundaries

Californias San Andreas fault formed.

Earthquakes

Is the shaking of the earth when the stored energy in the rocks are sudden released

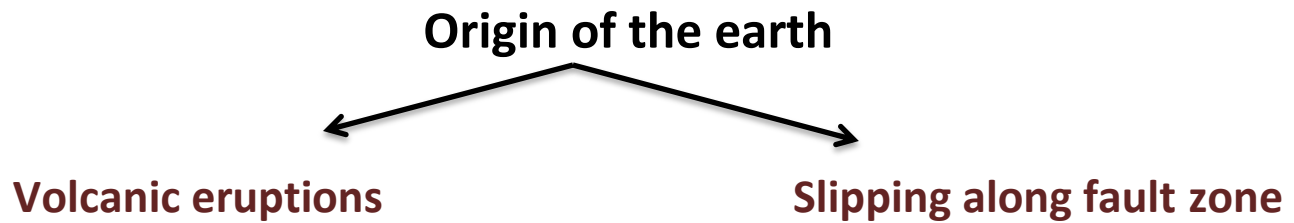
Seismic waves

Are vibration travel through the rocks.

seismology

The study of how sesmic waves behave in the earth.

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Earthquake focus: it is the source of the earthquakes

Epicenter: is a point on the earth surface above the focus.

Types of the seismic waves

1:body waves

2:surface waves

Body Waves: travel in all direction

1: P-Waves=Primary Waves

***Like-sound waves ,move by compressing and expanding**

***Has the highest velocity**

***Firstly to the seismograph/depends on the elastic properties**

2: S-Waves=Shear Waves=Secondary Waves

***Travel slower than P-Waves**

***Reach a seismograph after P-Waves**

***Depends only on rigidity and density**

3:Surface Waves.

***Travel along paths nearly parallel to the surface**

***Travel slower than S-Waves**

Earthquake Record.

The record of an earthquake is recorded by a **seismometer**.

Location of the Earthquakes

Recorded from at least three seismographic stations at different distances

From the epicenter.

Richter scale

Measure the amplitude of the largest recorded wave at a specific distance

From the earthquake.

الحمد لله عدد ما خلق

الحمد لله ملء ما خلق

الحمد لله عدد ما في السماوات والارض

الحمد لله ملء ما في السماوات والارض

الحمد لله عدد ما احصي كتابه

الحمد لله ملء ما احصي كتابه

الحمد لله عدد كل شيء

الحمد لله ملء كل شيء

الحمد لله والشكر لله

عدد خلقه ورضا نفسه وزنه عرشه ومداد كلماته