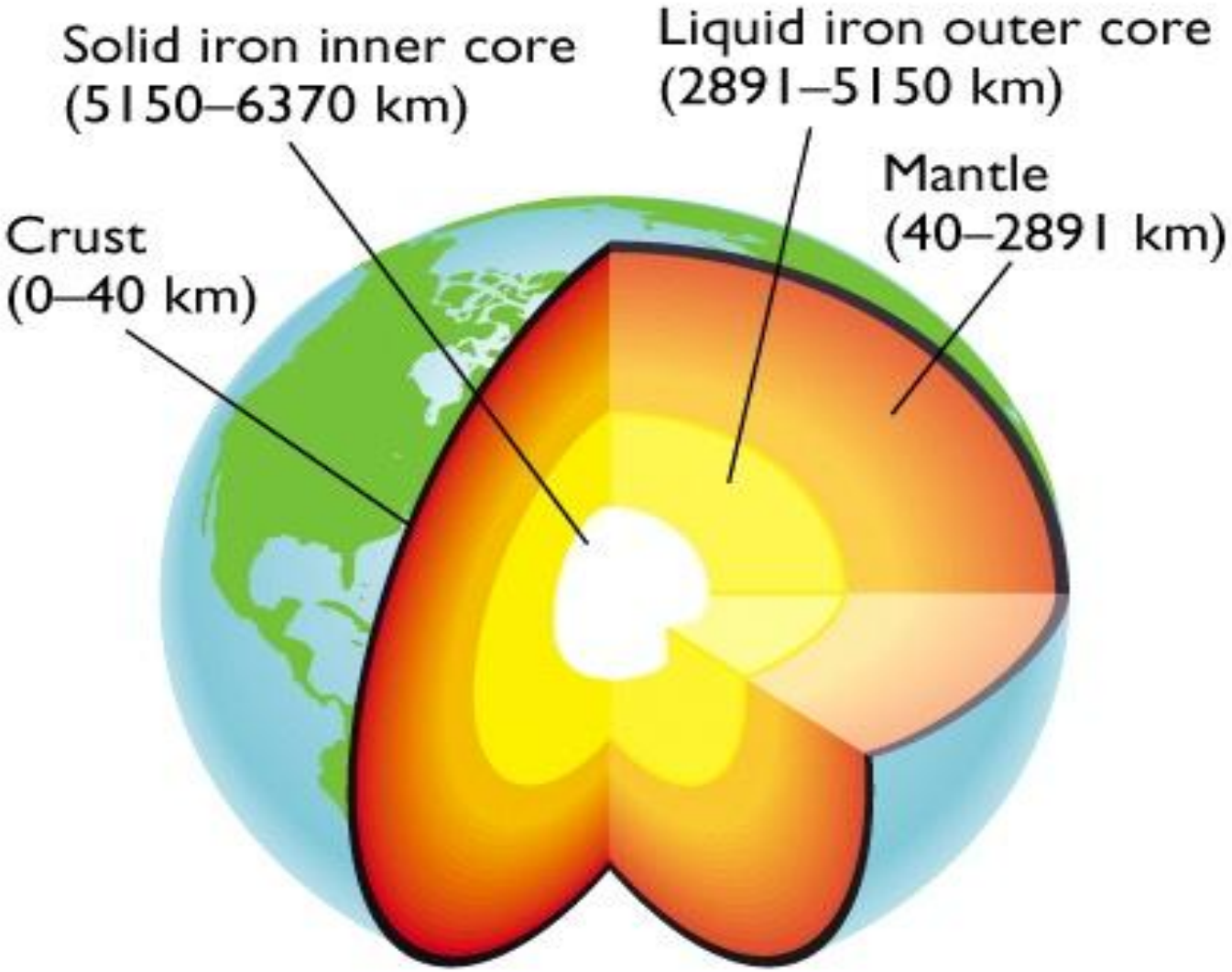
GEOLOGY OF EAST AFRICA

PHYSICAL GEOGRAPHY

Geology:

Is the study of minerals and materials that make up the solid earth's structure, composition and the processes of the earth's formation.

Earth's structure



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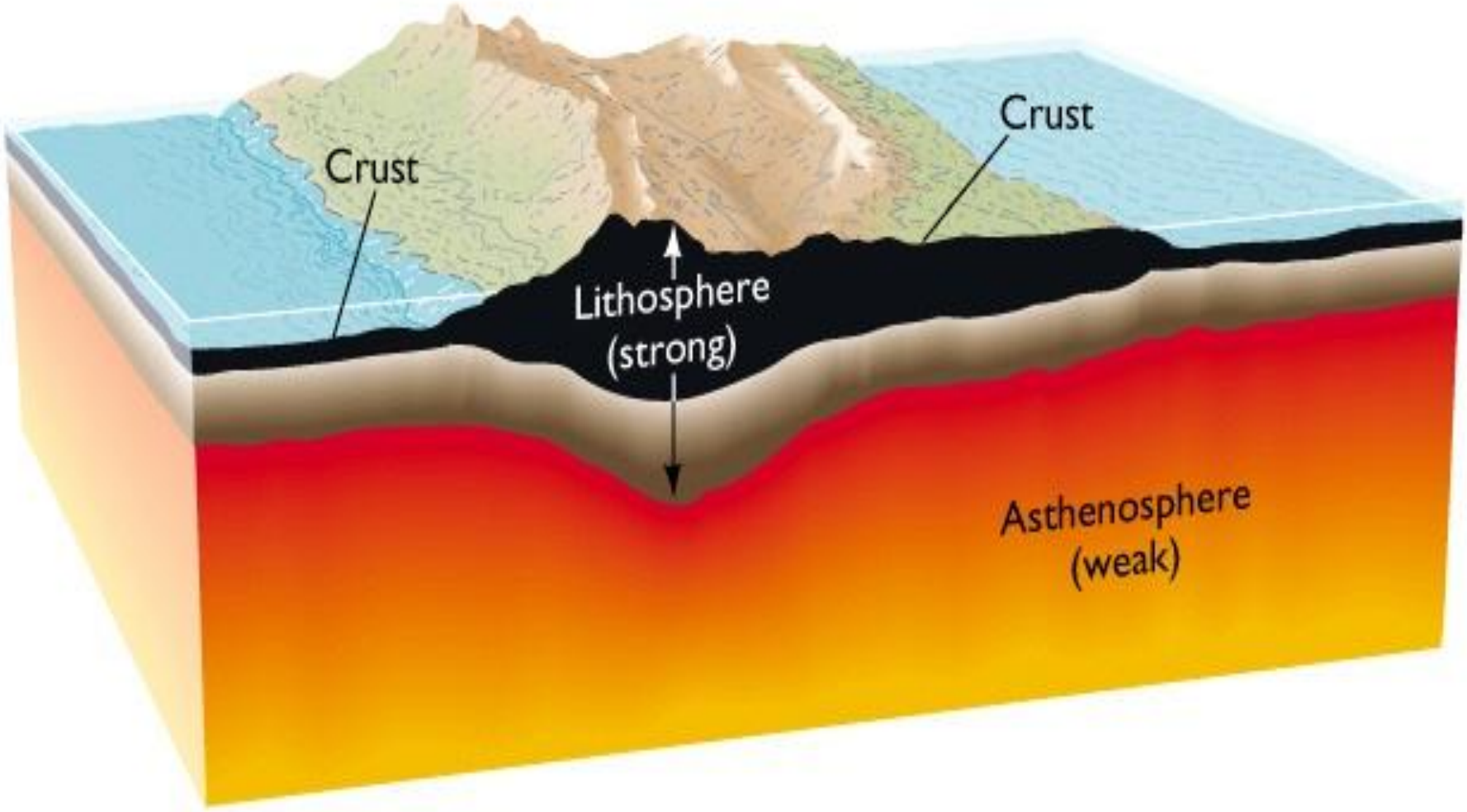
Earth's composition



Geology

- **Rock: Is an aggregate of mineral particles forming part of the lithosphere (earth's crust) in a solid form.**
- **Minerals: Any natural element occurring in inorganic substance with specific chemical composition and atomic structure obtained by mining.**

Types of rocks

There are three types of rocks.

Sedimentary rocks,

Igneous rocks (fire-rocks)

and

Metamorphic rocks (changed rocks)

IGNEOUS ROCKS (FIRE FORMED ROCKS)

They were formed by volcanic activities and they are fire formed rock. They are characterized by:

- **Crystalline in nature when formed underground.**
- **They are hard/resistant rocks.**
- **They have fine grains when formed on the surface.**

CHARACTERISTICS CON'T

- **some are acidic, others basic and some are inter mediate**
- **Some are spongy due to presence of gases at the time of formation.**
- **Some are glassy in appearance**

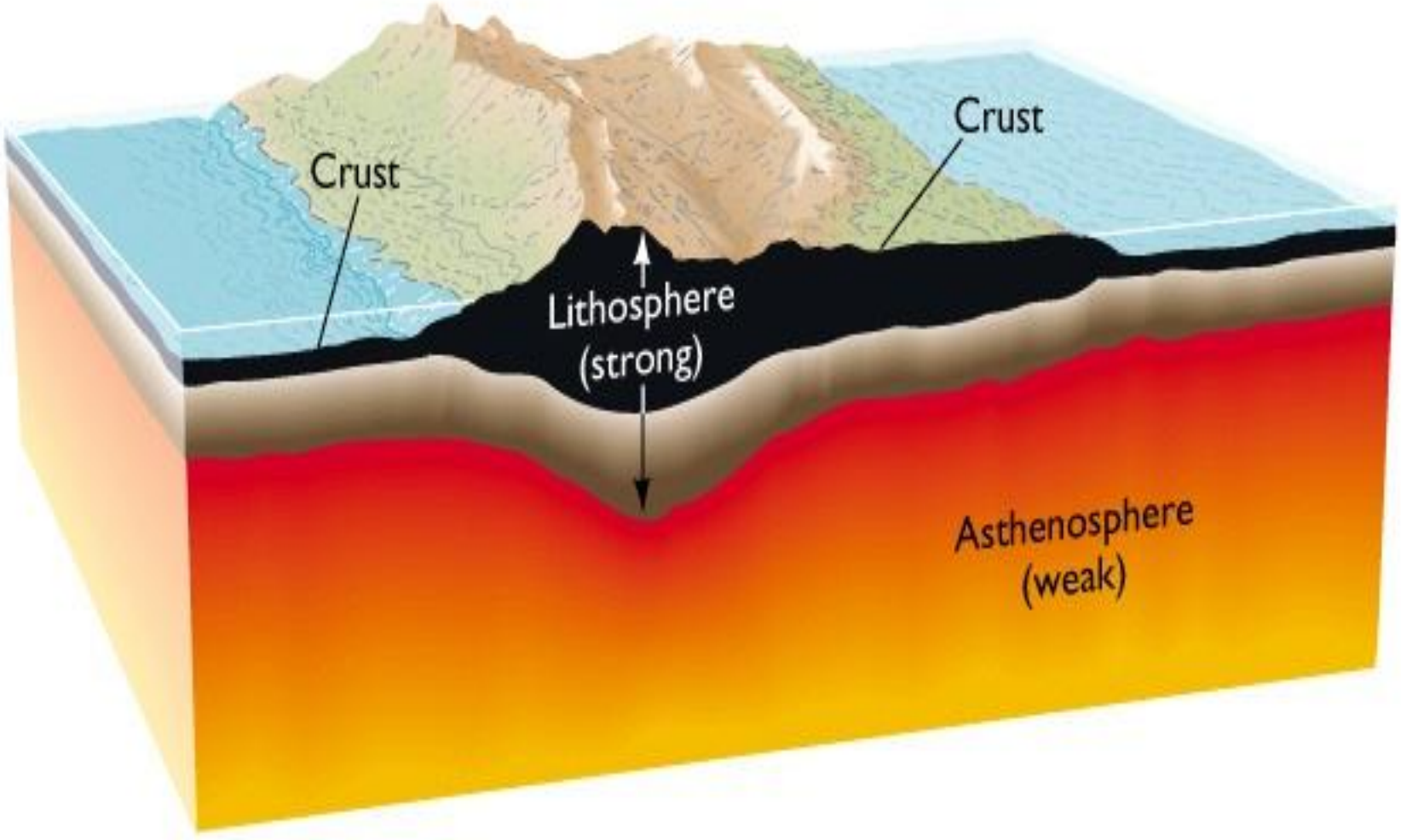
The character of igneous rocks depends on two main features: - a) chemical composition and (b) the cooling of magma.

Volcanic activities

GEOLOGY

The igneous rocks solidified from the molten magma either intruded/within the crust or poured out/ extruded on the earth's surface. The rocks are formed to the cooling and solidification of molten materials/magma to lava to form rocks. These two processes are known as vulcanicty. These are two types of rocks resulting from the cooling of molten magma: - (i) plutonic rocks (intrusive rocks) and ii) volcanic rocks (extrusive rocks).

Intrusive&extrusive

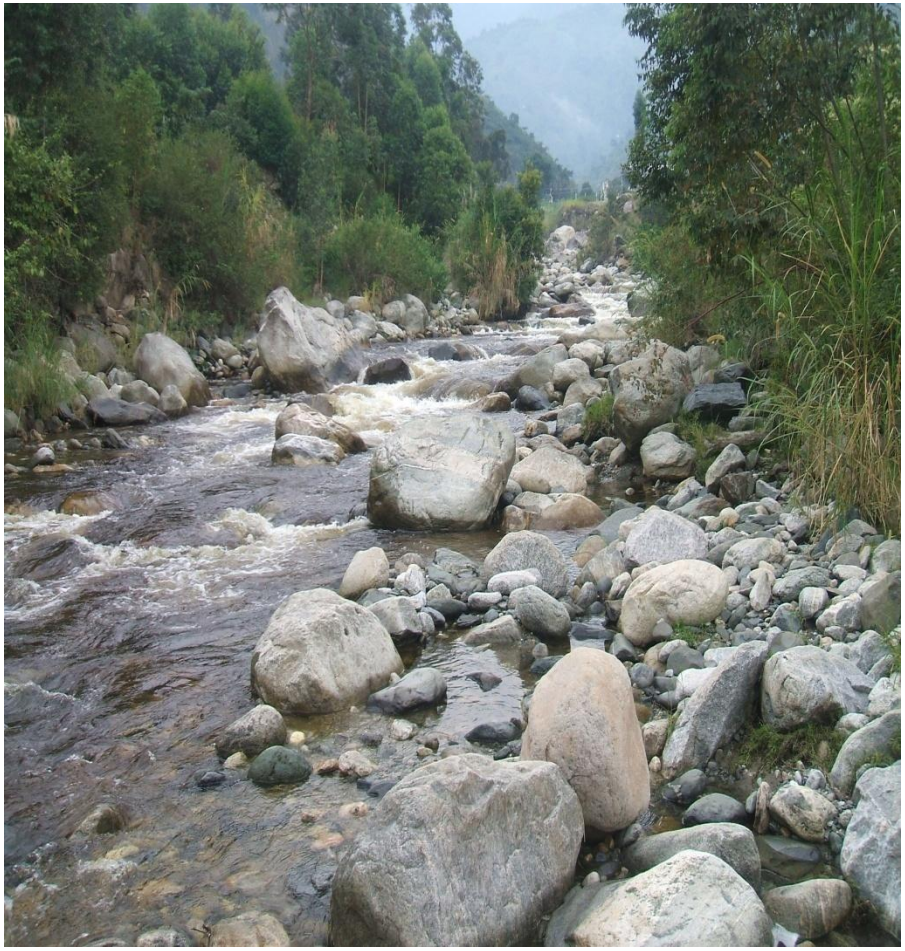


Plutonic rocks were formed by volcanic activating beneath the earth's crust. The magma cooled slowly at considerable depth in the earth's crust for example granite, gabbro, diorite and peridolite. Some of these plutonic rocks have been exposed to the earth's surface by the denudation processes for example; volcanic plug/volcanic neck (Tororo rock in Eastern Uganda), Batholiths in Kikandwa village- Mubende district.

INTRUSIVE ROCKS EXPOSED

VOLCANIC PLUG IN KASESE

ROCKS ALONG RIVER NYAMWAMBA



Volcanic rocks **(extrusive rock)**

were formed by basic magma which was exposed to the earth's surface through the lines of weakness (fault lines) and later cooled down slowly and solidified on the earth's surface to form extrusive rocks for example Basalt, obsidian, Dolerite, Quartz, Andesite, Rhyolite, Pumice.

SEDIMENTARY ROCKS (DERIVED ROCKS)

Are the youngest rocks consisting of sediments laid down in layers and/or cemented. They are formed by sedimentation (is a process where the small particles of broken/weathered/ eroded rocks (accumulated sediments) are transported by either water (rain water), glacier (snow/Ice), wind or water waves and deposited in layers.

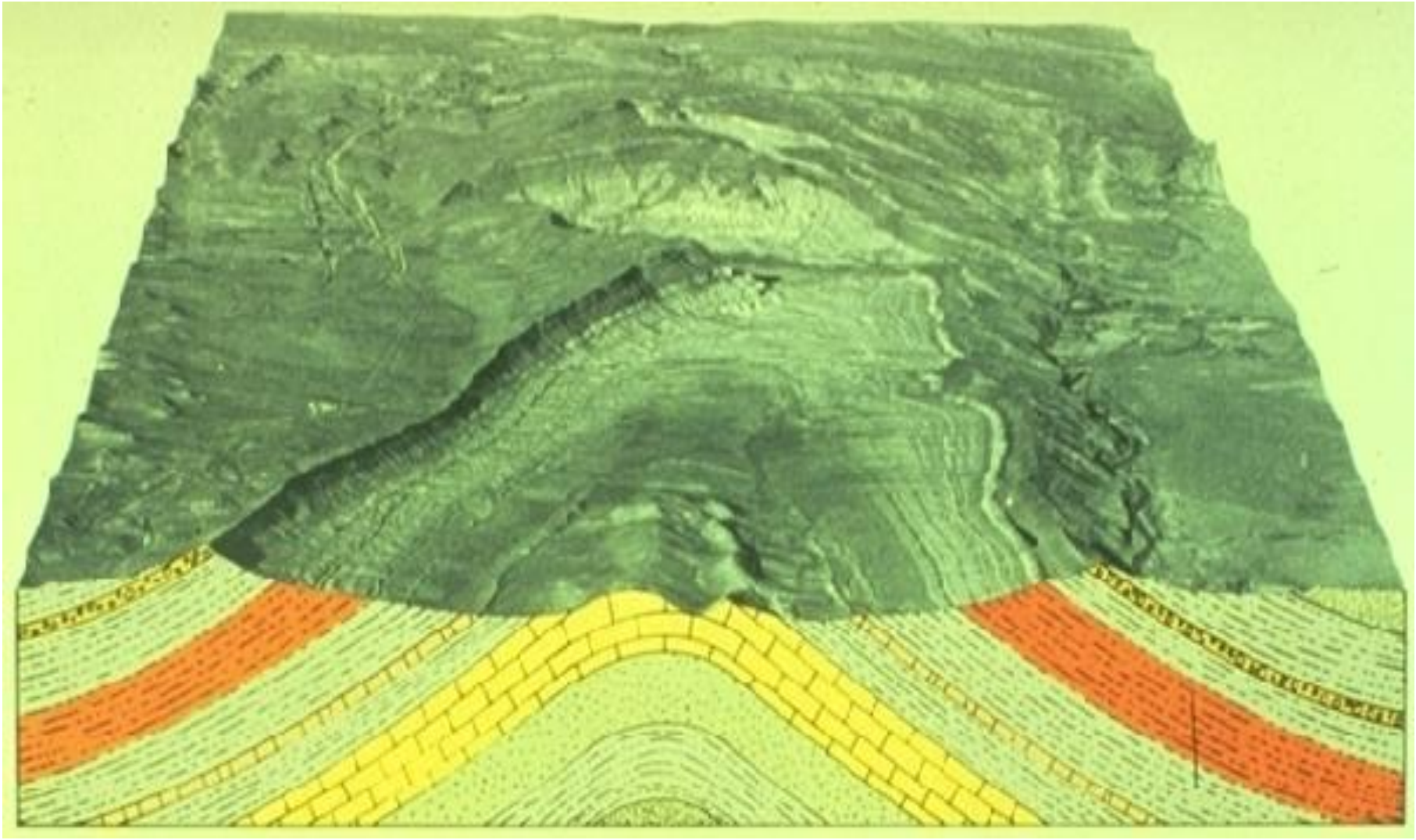
The layers are then cemented/compacted/ compressed/ hardened to form rocks. They are characterized by:

SEDIMENTARY ROCKS

- They have layers (strata) which are separated by bedding planes
- They contain fossils (remains of dead plants and animals)
- Have fine texture
- They are soft rock and are laid down rock wastes
- Some are porous (permeable)

ROCK LAYERS/STRATA

strata



Classification of rocks

Sedimentary rocks can be classified according to their mode of origin as listed below:-

- **Mechanically formed sedimentary rocks**
- **Organically formed sedimentary rocks**
- **Chemically formed sedimentary rocks**

Mechanically formed sedimentary rocks

This group include a variety of fine textured rocks formed from the result of erosion and are formed by compaction and cementation of the eroded/weathered materials that have been derived from many sources like the broken igneous rocks.

The weathered/eroded materials are transported and deposited in other parts in layers/strata which are later harden to form mechanically formed sedimentary rocks for example clay, mudstone, sand stone, shale, conglomerate, gravel, silt stone.

Organically formed sedimentary rocks

These rocks are composed of remains of once living organisms (fossils-remains of plants and animals). They are formed from the decomposition of organic matter (remains of plants and animals). Shells or skeletons of polyps, animals accumulated and cemented/sealed/compressed by solutions of the other marine creatures to form sedimentary rocks for example limestone, chalk, coal (peat, lignite, bituminous and anthracite).

Chemically formed Sedimentary rocks

They result from chemical reactions (Chemical weathering processes like carbonation, Oxidation) which lead to dissolution of some minerals like sodium chloride which are transported in solution form, when the water evaporates or precipitates the rocks remains behind in a hardened state for example: Dolomite, rock salt, gypsum, potash.

GHS STUDENTS AT LAKE KATWE

METAMORPHIC ROCKS

These are very hard compact and resistant rocks to erosion. They are formed from existing rocks, which are either igneous or sedimentary rocks. These are also rocks which have been subjected to intense heat (thermal metamorphism) and great pressure (dynamic metamorphism) brought about by earth movements. They have been changed in both character and appearance.

VOLCANIC ACTIVITY

They are formed when igneous and sedimentary rocks are subjected to intense heat and great pressure (the pressure is caused by compressional forces within the earth's crust).
They are rocks which have undergone physical and chemical alternations .

NB. **They are common in central Kenya, Central Tanzania and most parts of Uganda.**

In some parts of East Africa Metamorphic rocks have been exposed by denudation processes- (erosion and weathering) to form outcrop rocks. Examples of metamorphic rocks are:

Original rock	Metamorphic rock
Sandstone (sedimentary)	Quartzite
Limestone (sedimentary)	Marble
Clay (sedimentary)	Slate
Shale (sedimentary)	Schist
Granite (Igneous)	Gneiss
Organic matter	Graphite

IMPORTANCE OF ROCKS
Positive importance

- Source of mineral resources- limestone, phosphates, soda ash, rock salt,
- Raw materials for construction purposes.
- Source of fuel- coal and oil.
- Tourists attractions like the coral reefs.
- Soil formation after weathering processes hence promoting agricultural activities.
- Source of animal feeds e.g. rock salt for cattle.

Positive importance

- Research and study purposes
- Income generating activities-quarrying and extraction of rocks
- Decoration and beautifying of the environment.
- Industrial development for example graphite rocks are used in the making of pencil leads.
- Provide a firm foundation for the construction for the physical infrastructures

Positive importance

- When they form uplands they modify the local climate
- Provide employment opportunities to the miners
- Lime provide medicine
- Hold underground water
- Caves provide shelter
- Brick making from clay.
- Government revenue from taxing those who are selling aggregate
- Corals shelter harbours from strong water waves and wind.

Negative:

- Hindrance to the construction of roads, railways, airstrips.
- Lead to formation of poor soils like sand stones, which do not support agricultural activities.
- Porous rocks lead to loss of surface water.
- Rock mass wasting destroys property and life.
- Caves are hid out for criminals and wild animals.

Negative:

- Rain shadow on leeward side of the uplands.
- Too cold on top of highland rocks.
- They cause water logging in clay areas.
- Corals at the coastal areas hinder marine fishing.
- Corals are shipping hazards at the coastal areas
- Displacement of people where mining is taking place.