

Welcome students, in this session we will be doing paper title Earth dynamics and structural geology,

Unit 1 and this will be module 2:

General characteristics of the earth.

So through this session i will be discussing the following: General characteristic about the planet earth, the position of earth in the solar system, the earth's shape, the earth's mass, the internal layering

in the earth, the pressure and temperature inside the earth.

By the end of this lecture you will be able to explain the various attributes of the planet earth.

Geology is the study of planet earth and its interaction

of various subsystems. So to understand the dynamic nature

of the earth, we need to first understand its attributes and general characteristics.

To begin with the position of the earth in the solar system,

Earth is the third planet from the Sun after Venus

and Mercury and before Mars. The distance from the sun

is approximately 150 million kilometers.

This distance is also referred to as in one astronomical unit.(1 Au)

Therefore earth is at one astronomical Unit away

from the sun. Earth is a rocky body constantly moving around the sun along a orbit.

This orbit is slightly oval in nature.

The earth orbits the sun and one complete orbit

takes around 365.256

days during which time the earth travels around 940 million kilometers.

The earth's shape: The shape of the earth is oblate spheroid or ellipsoid which means

it is Sphere but it is not exactly round.
The earth because of its rotation got distorted because of the centrifugal force.

Centrifugal force is that force that causes the mass of a rotating body to move outward. Because this force is largest at the equator, there is more diameter along the equator than along the poles. As the earth rotates the centrifugal force is greater at the equator so this causes a slight outward bulge there giving the region a larger circumference and a diameter which is referred to as the 'equatorial bulge'.

At the equator the earth's circumference is around forty thousand and seventy five point one six kilometers.

This is slightly smaller between the north and south poles that is forty thousand and eight kilometers.

The earth's mass: Earth is the largest and most massive of the rocky inner planets.

Its mass is about 5.97×10^{24}

Kilograms. The earth is the densest of the terrestrial planets and this can be attributed to its core.

It is the only terrestrial planet that has a liquid outer core and a solid inner core.

The earth is the largest of the terrestrial planet based on its circumference and diameter as well.

Internal layers of the earth: The earth consists of three concentric layers the core, the mantle and the crust.

This orderly division has resulted from the density differences

between the layers as a function of its variation in composition, temperature and pressure. The core is the innermost layer.

The density of the core varies between 10 to 13

grams per cubic centimeters. This is the densest of the all three layers.

The next layer is the mantle.

The mantle can be divided into the upper mantle and the lower mantle.

The part of the upper mantle along with crust

forms the 'lithospheric plates'. This overrides a part of the mantle which is semi-solid in nature. This is referred to as the 'asthenosphere'

Below this, the mantle continues to be a hard rock

and more dense as it goes deeper.

The mantle is composed of a ultramafic rock termed as 'peridotite'. The crust

is the topmost layer. This layer is divided into two types the

continental crust,

that is seen along the continents and the oceanic crust, that lies beneath the ocean floor.

The oceanic crust is denser as compared to the continental crust.

The continental crust is thicker as compared to the oceanic crust.

Like i said, the part of the crust along with the part of the upper mantle is referred to as the lithospheric plates.

The pressure and temperature inside the earth:

The pressure increases with depth in the earth interior

due to the overlying weight of the rocks.

In the solid rock, the pressure at depth of one kilometer

is about 300 atmospheric pressure.

At the earth's center the pressure is estimated to reach about 3.6 million

Atmosphere. The temperature also

increases with depth.

This is the geothermal gradient

This is the rate of change in temperature

with depth. As you can see in the upper part

of the earth,

the temperature gradient is about 20 to 30 degree celsius per kilometer

which means it increases about 20 to 30 degree celsius

as you go deeper and deeper.

Thus around 35 kilometers below the earth.

The temperature is expected to reach

around 400 to 700 degree celsius

and around the core mantle boundary, it is expected to reach

around 3600 degree celsius.

In addition to these attributes the

earth also has its gravity

and magnetic nature. This will be

discussed in subsequent modules.

To summarize earth is the third planet

from the sun

and is at a distance of one

astronomical unit from the sun. The shape

of the earth is oblate spheroid or

ellipsoid.

Its mass is about 5.97×10^{24}

kilograms.

Earth is densest of the terrestrial

planets and this can be attributed to

its dense

liquid core. Earth's internal layers are

made up of the core,

the mantle and the crust and this has

resulted

from the density differences between the layers,

as a function of its variation in

composition temperature and pressure.

The pressure and temperature increases

inside the earth

with increasing depth. The rate of change

of temperature

with depth is referred to as the

'geothermal gradient'.

The earth has its magnetic field and
exerts

its gravitational pull.

These are the references that we used
for the session.

Thank you.