



Complete geography presentation

-by AMIT SIR



GEOGRAPHY

SYLLABUS FOR UPSC

FOR PRELIMS

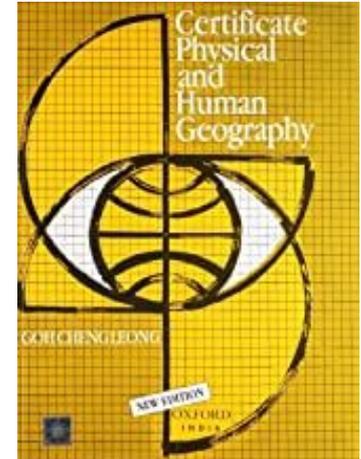
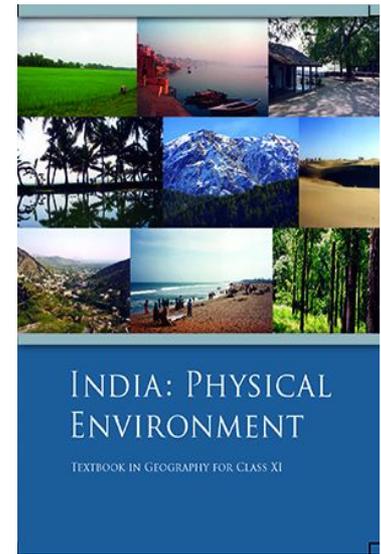
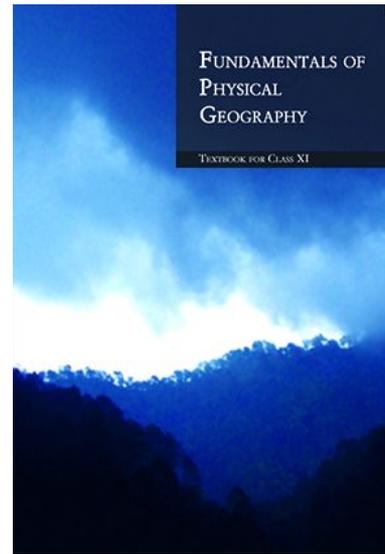
Indian and World Geography-Physical, Social, Economic Geography of India and the World.

FOR MAINS

- Salient features of world's physical geography.
- Distribution of key natural resources across the world (including South Asia and the Indian sub-continent); factors responsible for the location of primary, secondary, and tertiary sector industries in various parts of the world (including India).
- Important Geophysical phenomena such as earthquakes, Tsunami, Volcanic activity, cyclone etc., geographical features and their location-changes in critical geographical features (including water-bodies and ice-caps) and in flora and fauna and the effects of such changes.
- AGRICULTURE PART OF GS III

SOURCES

1. NCERT XI
 - a. **FUNDAMENTAL OF PHYSICAL GEOGRAPHY**
 - b. INDIA : PHYSICAL ENVIRONMENT
2. NCERT XII
 - a. FUNDAMENTALS OF HUMAN GEOGRAPHY
 - b. INDIA : PEOPLE AND ECONOMY
3. **GOH CHENG LEONG**
4. MAJID HUSSAIN- INDIAN AND WORLD GEOGRAPHY
5. SCHOOL ATLAS
6. CURRENT AFFAIRS



TREND ANALYSIS

NUMBER OF QUESTIONS FROM GEOGRAPHY

2013- 14

2014- 10

2015- 11

2016- 4

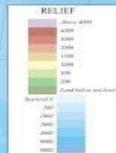
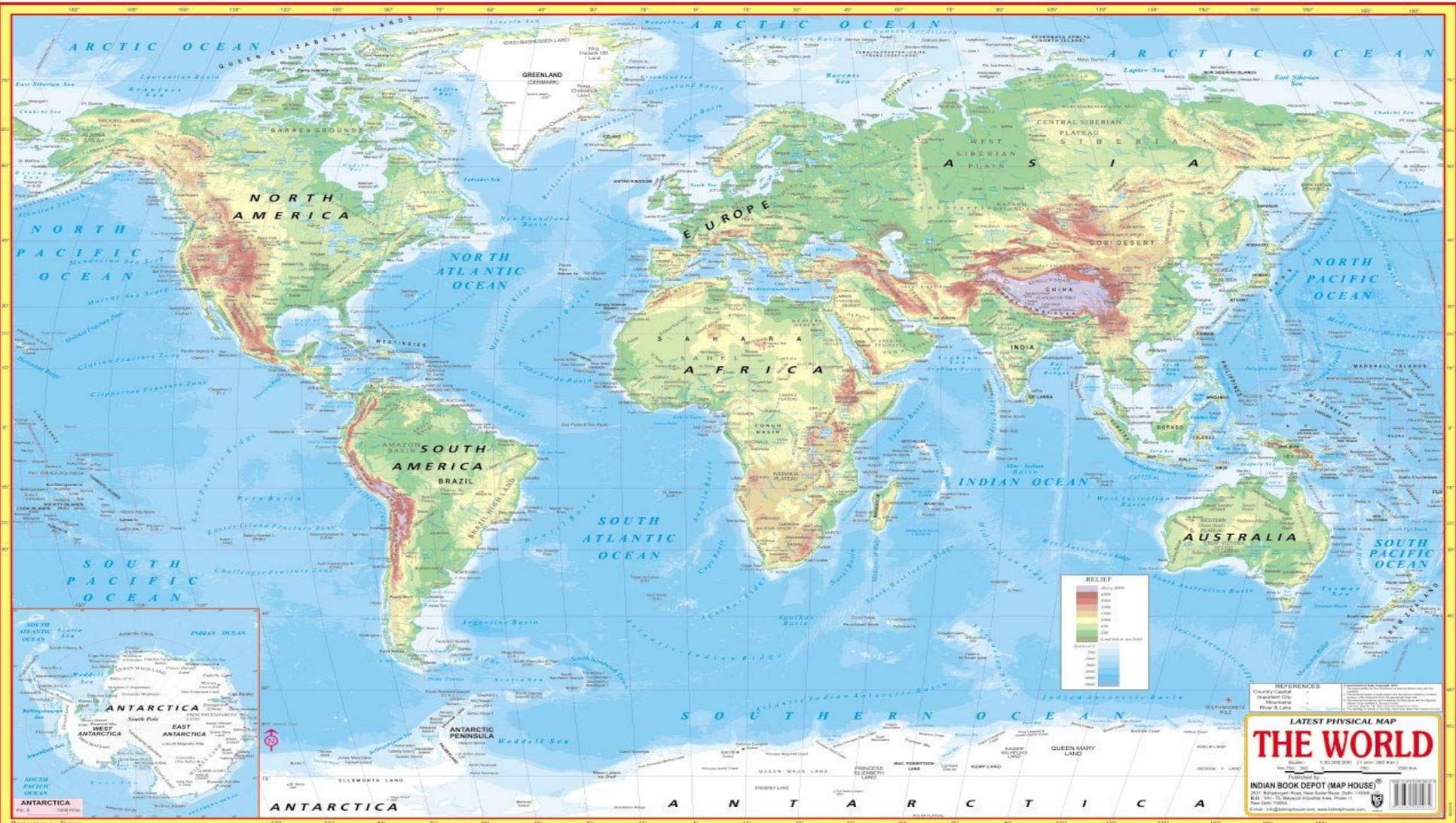
2017- 7

2018- 4

2019- 7

Topics in focus

- Map of India and the world
- Conventional conceptual part
- Physical geography
- Topics like rivers and climate are in focus



REFERENCES

LATEST PHYSICAL MAP

THE WORLD

Scale: 1:100,000,000 (1:150,000,000)

ANTARCTICA

INDIAN BOOK DEPOT (MAP HOUSE)[®]
 2017 Robinson Road, Near Singapore Zoo, Singapore
 P.O. Box 11, Republic of India, Chennai
 New Delhi 110002
 Email: info@indianbookdepot.com, info@maphouse.com



ANTARCTICA

SOUTH ANTARCTIC OCEAN

INDIAN OCEAN

ANTARCTIC PENINSULA

EAST ANTARCTICA

WEST ANTARCTICA

ANTARCTIC SEA

ANTARCTIC OCEAN

ANTARCTIC

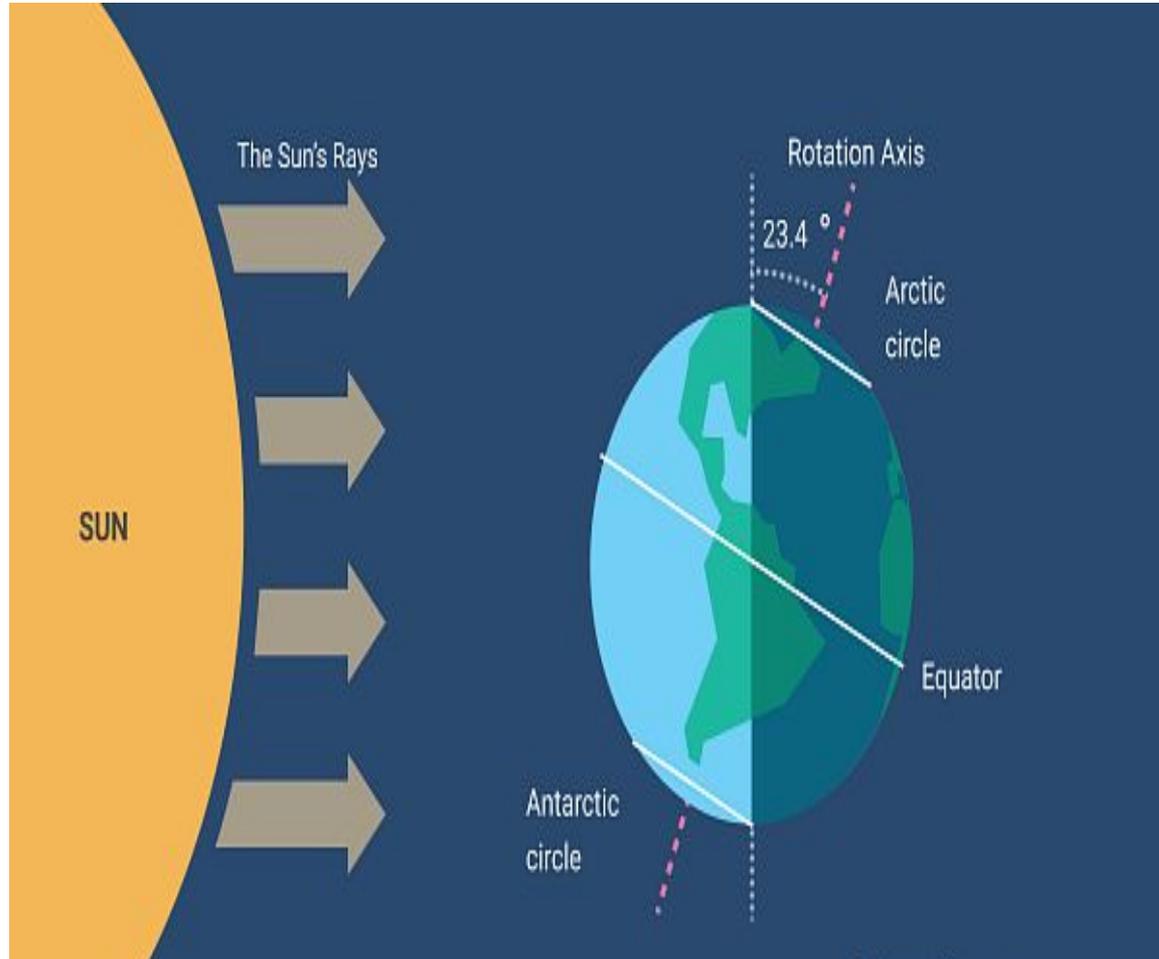
A N T A R C T I C A

Questions in 2019

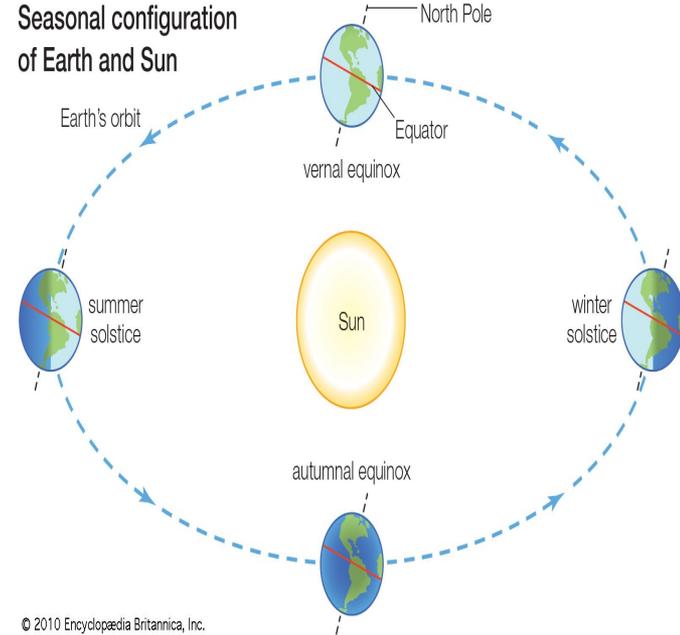
PRELIMS

Q. On 21st June the sun

- (a) Does not set below the horizon at the Arctic circle
- (b) Does not set below the horizon at Antarctic circle
- (c) Shines vertically overhead at noon on the Equator
- (d) Shines vertically overhead at the tropic of Capricorn



Seasonal configuration of Earth and Sun



© 2010 Encyclopædia Britannica, Inc.

Q. Why are dewdrops not formed on a cloudy night?

(a) Clouds absorb the radiation released from the Earth's surface.

(b) Clouds reflect back the Earth's radiation.

(c) The Earth's surface would have low temperature on cloudy nights.

(d) Clouds deflect the blowing wind to ground level.

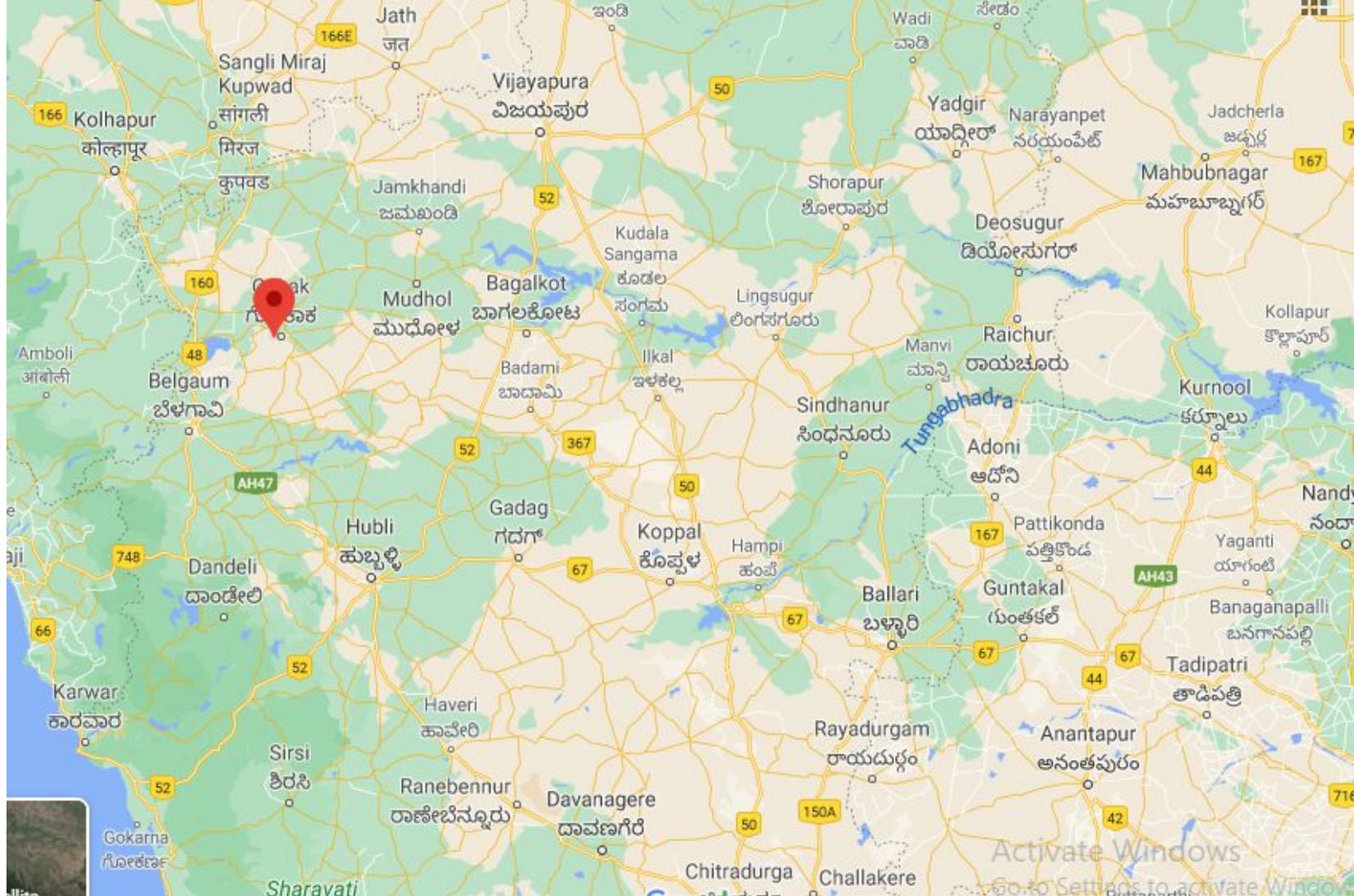
Q. Consider the following pairs :

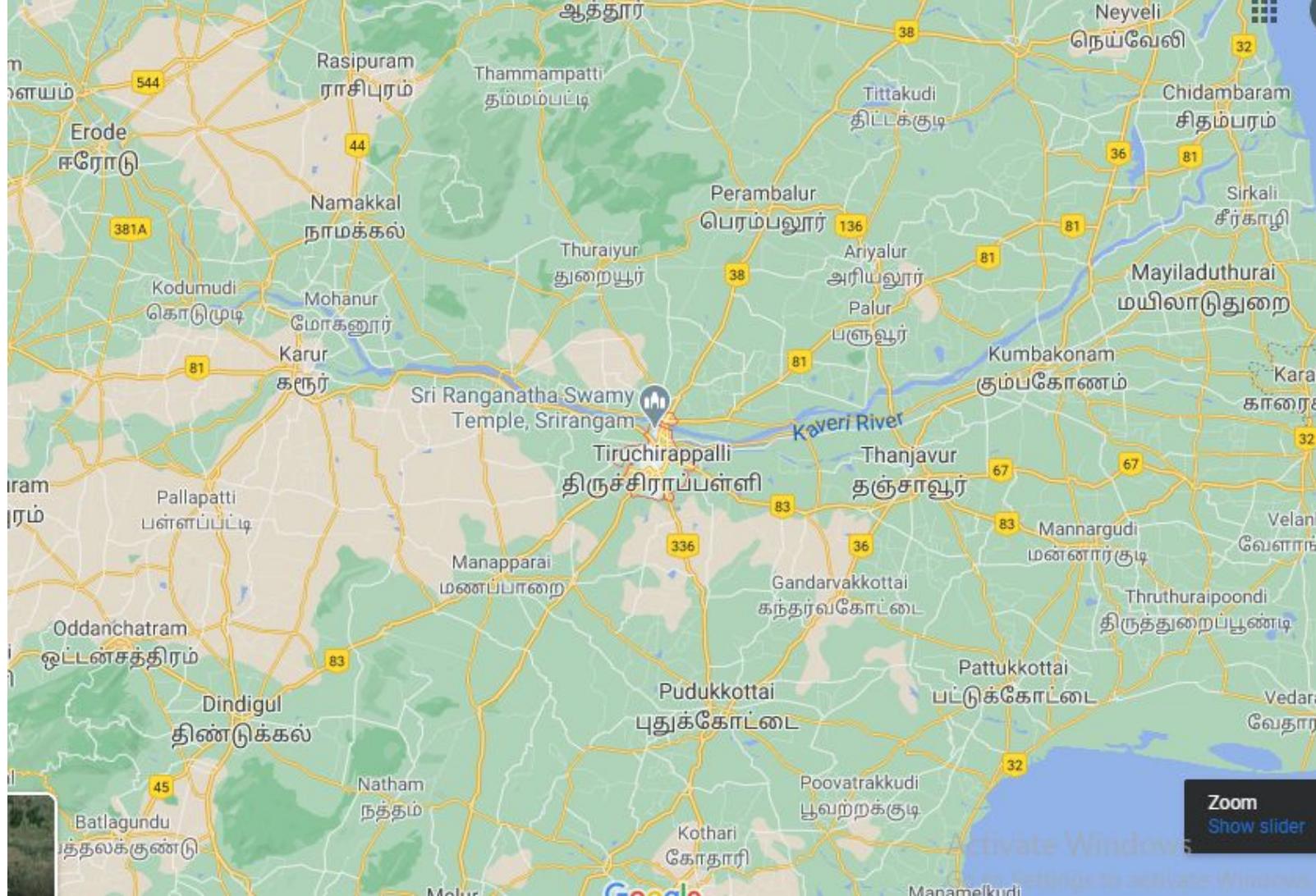
Famous place: River

- 1. Pandharpur : Chandrabhaga**
- 2. Tiruchirapalli : Cauvery**
- 3. Hampi : Malaprabha**

Which of the pair given above are correctly matched?

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3





ம
ளயம்

544

Erode
ஈரோடு

381A

Kodumudi
கொடுமுடி

81

Karur
கரூர்

Pallapatti
பள்ளப்பட்டி

Oddanchatram
ஓட்டன்சத்திரம்

Dindigul
திண்டுக்கல்

45

Batlagundu
த்தலக்குண்டு

Rasipuram
ராசிபுரம்

44

Namakkal
நாமக்கல்

Mohanur
மோகனூர்

Sri Ranganatha Swamy
Temple, Srirangam

Tiruchirappalli
திருச்சிராப்பள்ளி

Manapparai
மணப்பாறை

Pudukkottai
புதுக்கோட்டை

Natham
நத்தம்

ஆத்தூர்

Thammampatti
தம்மம்பட்டி

Thuraiyur
துறையூர்

Perambalur
பெரம்பலூர்

Ariyalur
அரியலூர்

Palur
பளுவூர்

Thanjavur
தஞ்சாவூர்

Gandavakkottai
கந்தர்வகோட்டை

Pattukkottai
பட்டுக்கோட்டை

Poovatrakkudi
பூவற்றக்குடி

Kothari
கோதாரி

Google

38

Tittakudi
திட்டக்குடி

38

81

83

336

36

Kumbakonam
கும்பகோணம்

Mannargudi
மன்னார்குடி

Pattukkottai
பட்டுக்கோட்டை

32

Manamalkudi

Neyveli
நெய்வேலி

32

Chidambaram
சிதம்பரம்

36

Sirkali
சீர்காழி

Mayiladuthurai
மயிலாடுதுறை

Karai
காரை

32

Velank
வேளாந்

Thruthuraiipoondi
திருத்துறைப்பூண்டி

Vedara
வேதார

Zoom
Show slider

Activate Windows
Go to Settings to activate Windows

Q. Consider the following pairs :

Sea: Bordering country

- 1. Adriatic Sea: Albania**
- 2. Black Sea: Croatia**
- 3. Caspian Sea: Kazakhstan**
- 4. Mediterranean Sea: Morocco**
- 5. Red Sea: Syria**

Which of the pairs given above are correctly matched?

(a) 1,2 and 4 only

(b) 1,3 and 4 only

(c) 2 and 5 only

(d) 1,2,3,4 and 5 only



MAINS QUESTIONS

Q. Assess the impact of global warming on coralife system with examples.
(Answer in 150 words)

Q. Discuss the causes of depletion of mangroves and explain their importance in maintaining coastal ecology. (Answer in 150 words)

Q. Can the strategy of regional-resource based manufacturing help in promoting employment in India? (Answer in 150 words)

Q. Discuss the factors for localization of agro-based food processing industries of North West India. (Answer in 150 words)

Q. What is water stress? How and why does it differ regionally in India? (Answer in 250 words)

Q. How can the mountain ecosystem be restored from the negative impact of development initiatives and tourism? (Answer in 250 words)

Q. How is efficient and affordable urban mass transport key to the rapid economic development of India? (Answer in 250 words)

Q. How do ocean currents and water masses differ in their impacts on marine life and coastal environment? Give suitable examples? (Answer in 250 words)



GEOGRAPHY

DEFINITION- “description of Earth”

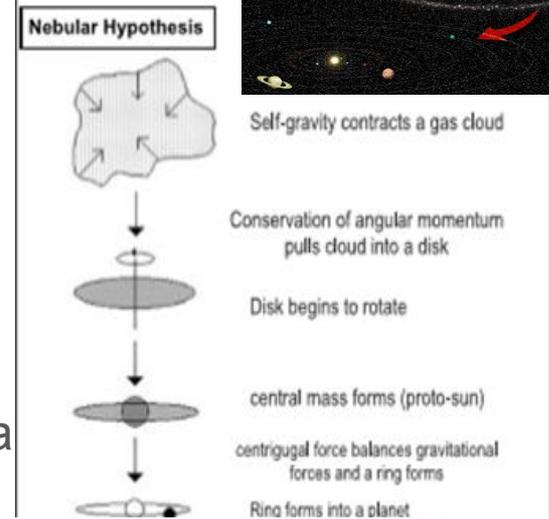
- The term ‘GEOGRAPHY’ was coined first by **Eratosthenes**, a greek scholar. It is made up of two greek words “**GEO**” means “**Earth**” and “**GRAPHOS**” means “**description**”.

- *‘Geography studies difference of phenomenon usually related in different parts of the earth surface’- says Hettner.*

Origin of Earth

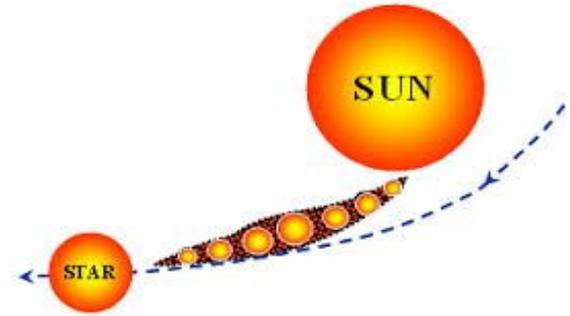
1. NEBULAR HYPOTHESIS

- It was given by Immanuel Kant, and later revised by Laplace in 1796.
- According to it, the cloud of gases and dust around the sun- led to formation of clumps of materials rotating around the Sun. this finally culminated into the Solar system.



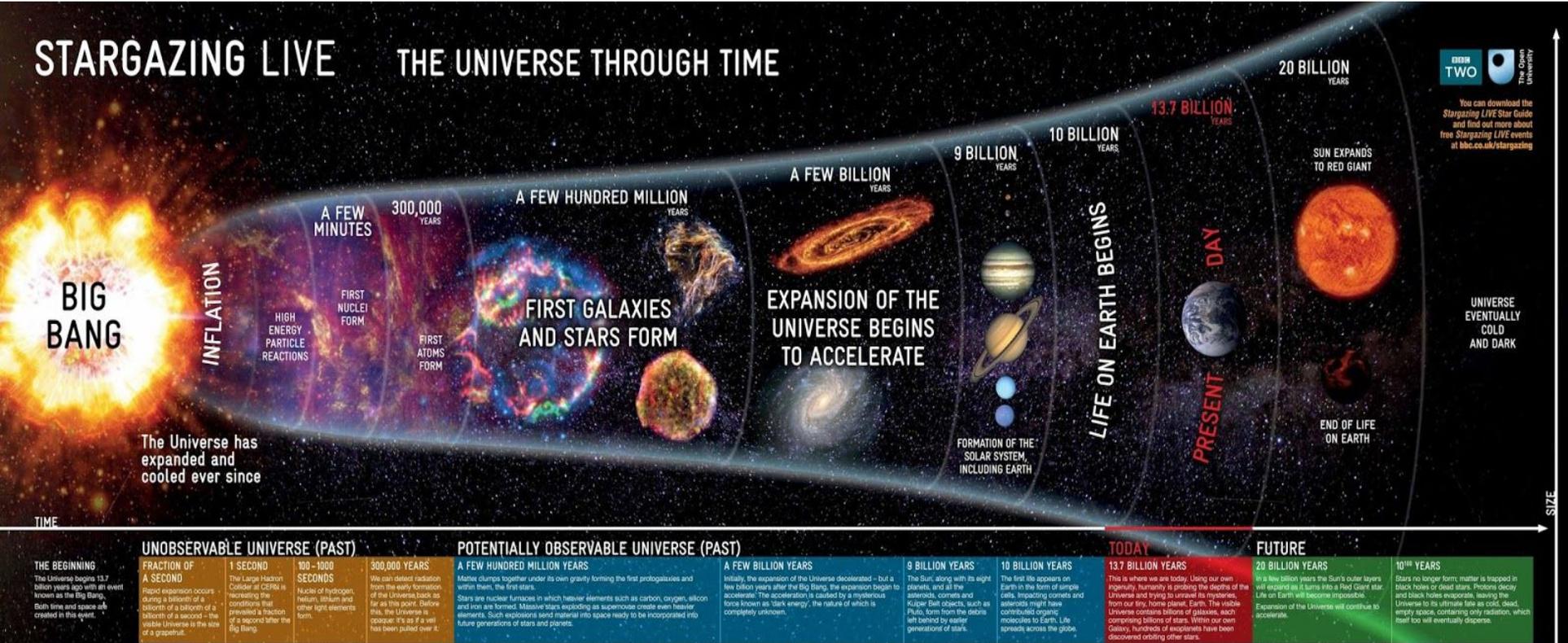
2. PLANETESIMAL HYPOTHESIS

- Given by **Chamberlin–Moulton**, theory says that a star passed close enough to Sun to close tidal bulges (due to gravitational pull) and eject material out repeatedly from Sun. This ejected material started orbiting Sun and later condensed to form small bodies called planetesimals.



BIG BANG THEORY OR EXPANDING UNIVERSE HYPOTHESIS

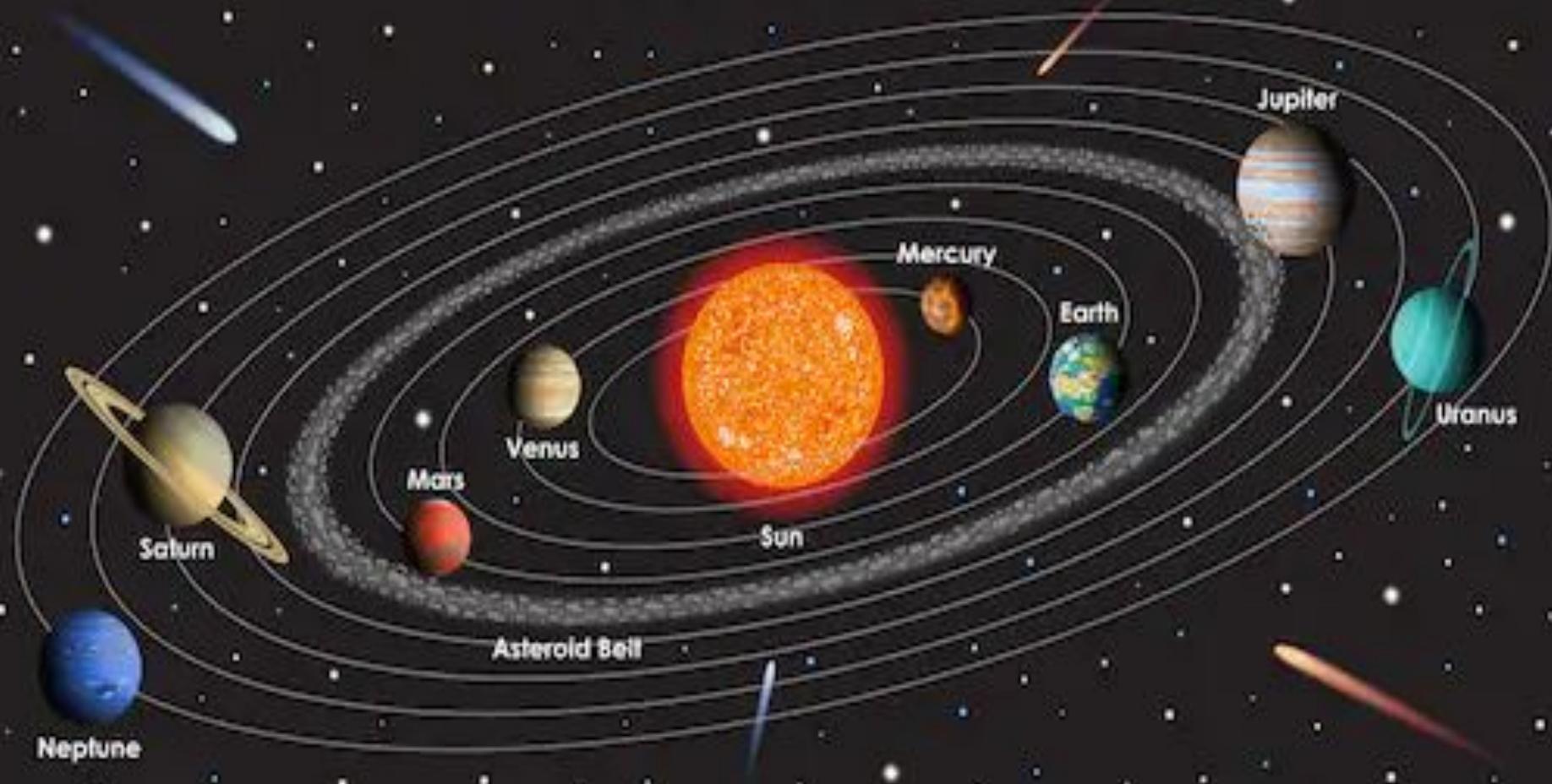
STARGAZING LIVE THE UNIVERSE THROUGH TIME



You can download the Stargazing LIVE Star Guide and find out more about free Stargazing LIVE events at bbc.co.uk/stargazing

SIZE

SOLAR SYSTEM



SOLAR SYSTEM

- It comprises the Sun and its 8 planets, orbiting around in their elliptical orbit, along with asteroids, gases, stars and other lesser bodies.
- **SUN** - the star present in the centre of solar system and is made up of hot plasma, with surface temperature of around 6000 degree centigrade. It is almost spherical and very massive in size, producing gravitational pull which binds the whole system.
- **PLANETS-**
 - MERCURY- smallest and closest to the Sun, without any atmosphere
 - VENUS - second closest with heavy carbon and sulphur clouds and called as 'Earth's twin'

- **EARTH**- most significant feature is the life sustainability. It has appropriate atmosphere and temperature- suitable for life to exist. And presence of ample amount amount of water in liquid form - ensures sustainability of life.
 - It has one natural satellite, calle as moon.
- **MARS** - or '**Red planet**' is believed to be the next Earth, by many astronomers. It has two moons- Deimos and phobos.
- **JUPITER**- being the largest planet, it has very high gravitational pull. Its surface is made up of gases like hydrogen, helium, etc.
- **SATURN**- has got rings (of dust and gases) and nine satellite around it, with Tian being the largest moon.
- **URANUS**- another giant planet which orbits around the sun, and rotates in clockwise direction, i.e., from east to west (along with Venus).
- **NEPTUNE**- farthest and fourth largest planet, also being densest



PLUTO : NOT A PLANET

- Pluto meets only two of these criteria, losing out on the third. In all the billions of years it has lived there, it has not managed to clear its neighborhood. What that means, “not clearing its neighboring region of other objects?” This means that the planet has become gravitationally dominant — there are no other bodies of comparable size other than its own satellites or those otherwise under its gravitational influence, in its vicinity in space.
- So any large body that does not meet these criteria is now classed as a “dwarf planet,” and that includes Pluto, which shares its orbital neighborhood with Kuiper belt objects such as the plutinos.

Why is Pluto no longer a planet?

Answer

The International Astronomical Union (IAU) downgraded the status of Pluto to that of a dwarf planet because it did not meet the three criteria the IAU uses to define a full-sized planet. Essentially Pluto meets all the criteria except one—it *“has not cleared its neighboring region of other objects.”*



Other celestial bodies

- **MOON** : Earth has got only one natural satellite called as moon. Its diameter is one-fourth of Earth and is only 3.84 lakh km away. The moon moves around the sun in 27 days and has one-sixth of Earth's gravity.
- **ASTEROIDS** : Small tiny bodies moving around the Sun, apart from stars, planet and satellites. Usually, they are found between orbits of mars and Jupiter.
- **GALAXY** : Cluster of million of stars. Our galaxy is milky way or Akash Ganga.

And millions of such galaxies together form **UNIVERSE.**

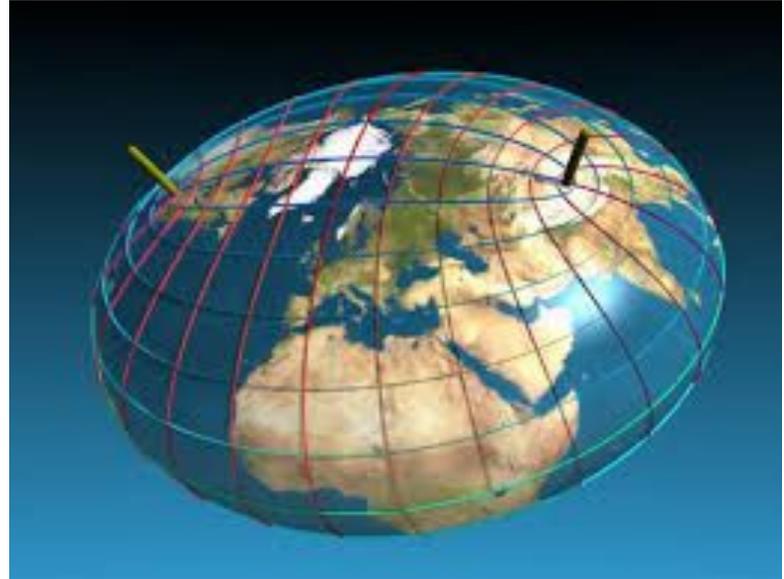


EARTH



SHAPE OF EARTH

- Earth is almost spherical in shape, or approximately an **oblate spheroid**.
- This is known by name **"geoid"**.
- It is bulging out near equator and flat at poles, which is due to rotation of earth.

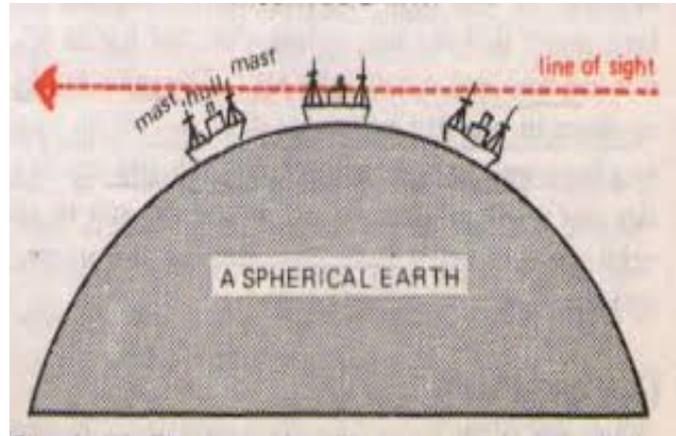
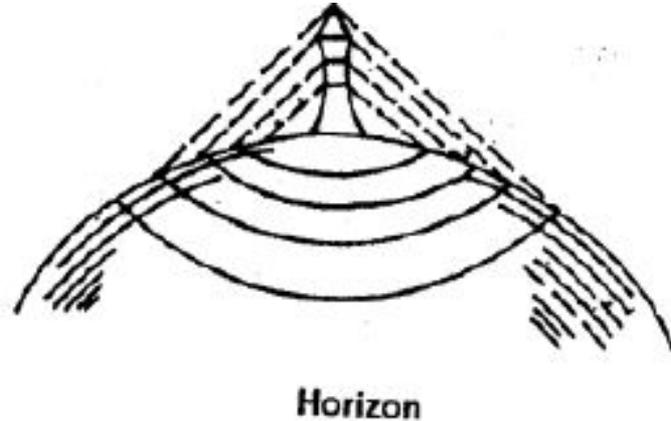
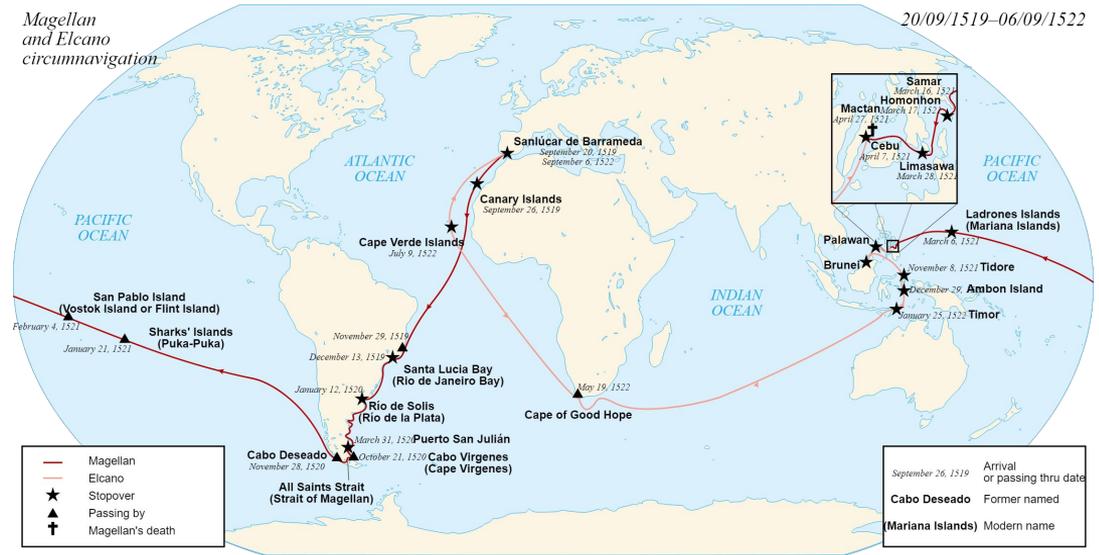


EVIDENCES

1. Circum-navigation of Earth
2. Circular Horizon
3. Ship's Visibility
4. Sunrise and sunset
5. The lunar eclipse

Magellan and Elcano circumnavigation

20/09/1519–06/09/1522



CARTOGRAPHIC PRESENTATION

GLOBE

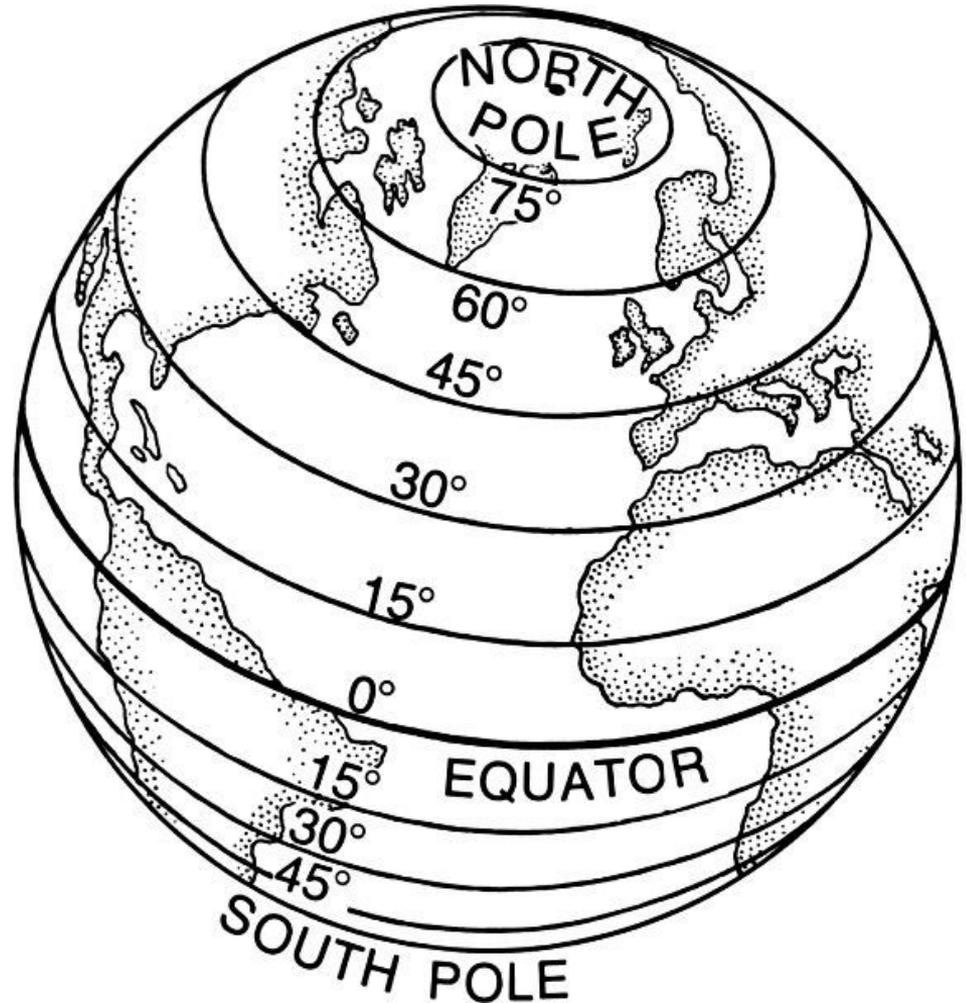
- Its miniature model of Earth, on which continents, oceans and countries are shown in proportional manner.
- Needles on tops and bottom are aligned with the axis of Earth, which is tilted with vertical in same manner as actual Earth.

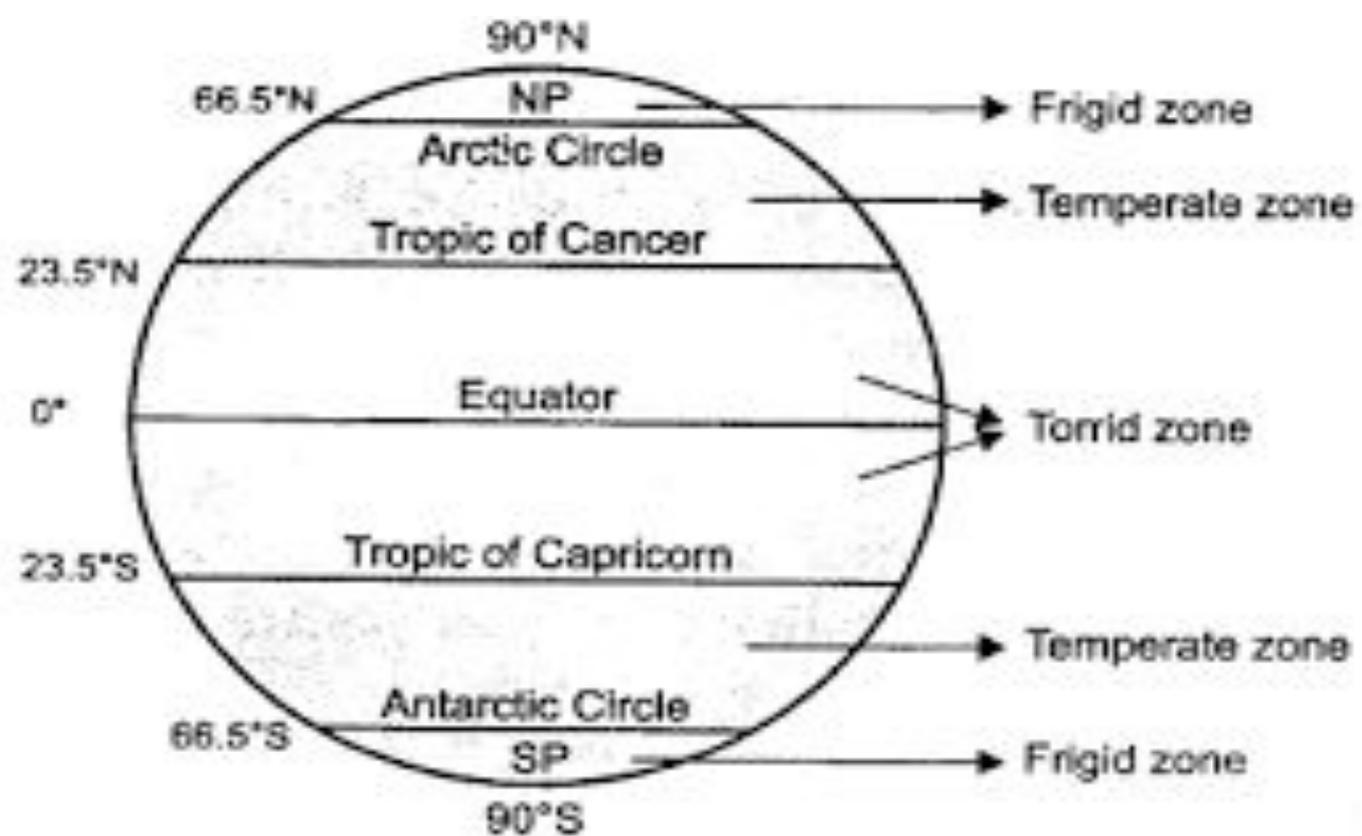




LATITUDE

- These are horizontal imaginary lines drawn on Earth. They measure **the angular distance of a point from the centre of the Earth.**
- Biggest one of them is **EQUATOR**, which passes through the centre of the Earth, dividing it into two equal halves.
- Equator represents 0 degree latitude and other latitudinal circles are parallel to it, upto poles at 90 degree.
- Size of these circle goes on decreasing towards poles.

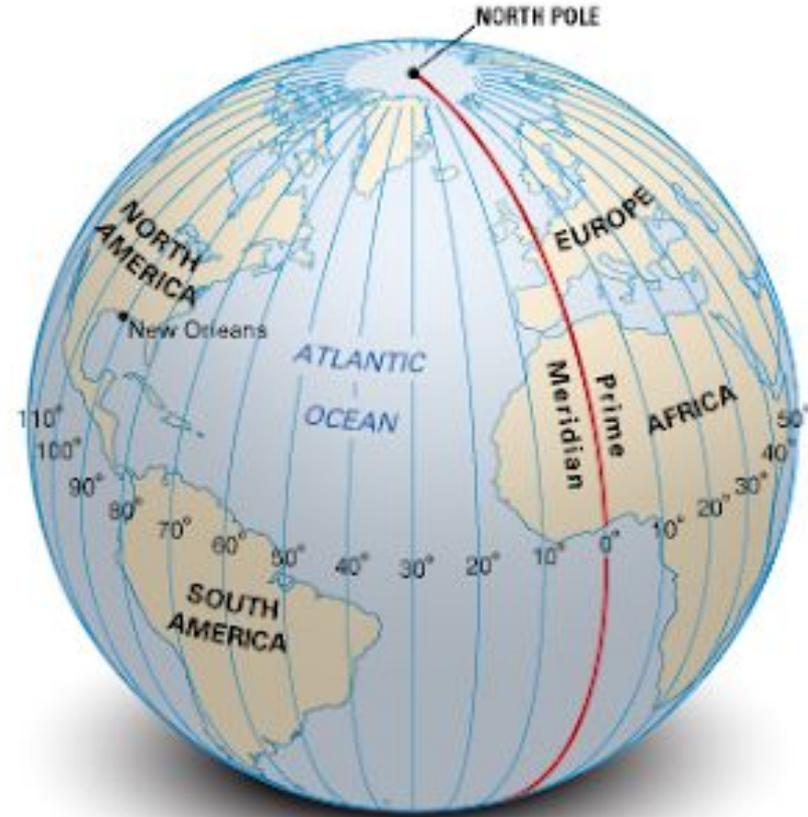




Important Parallels of Latitudes

LONGITUDE

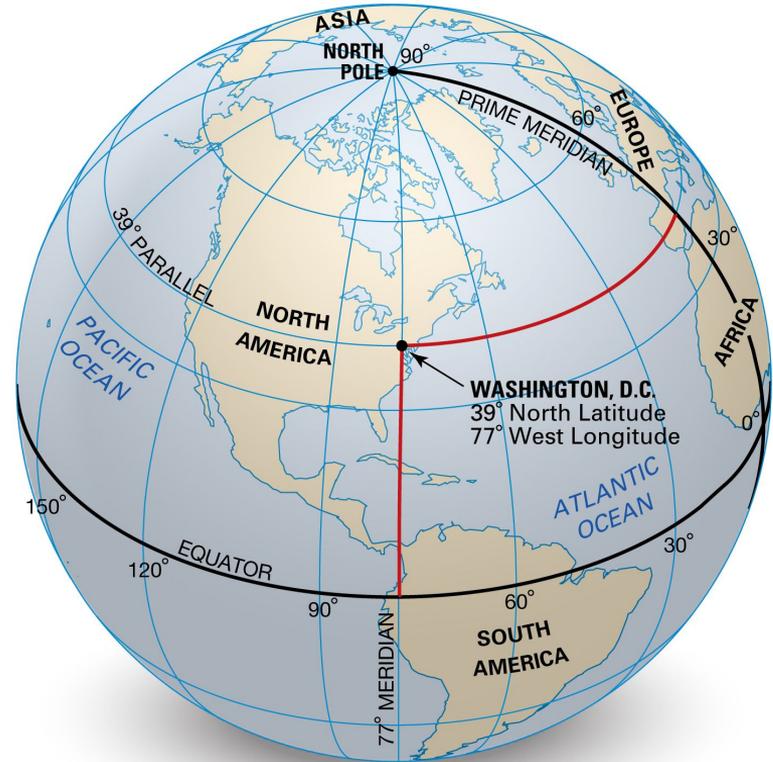
- These are vertical lines on globe, and every circle is a great circle.
- They are geographic coordinates used to give location, in east-west direction of prime meridian.
- The **prime meridian**, which passes near the Royal Observatory, Greenwich, England, is defined as 0° longitude by convention.
- Each degree represents 4 minutes of time and thus 15 degrees is one hour.
- It is used to allot relative time. For eg. India is 82.5 degree east of London, thus 5:30 hours ahead.



LOCATION

- Intersection of latitude and longitude helps in determining the location of a place on Earth.
- It is done with the help of N-S and E-W coordinates of a place which can be located on map or globe to get the location.
- For eg. coordinates of Delhi are

28.7041° N, 77.1025° E

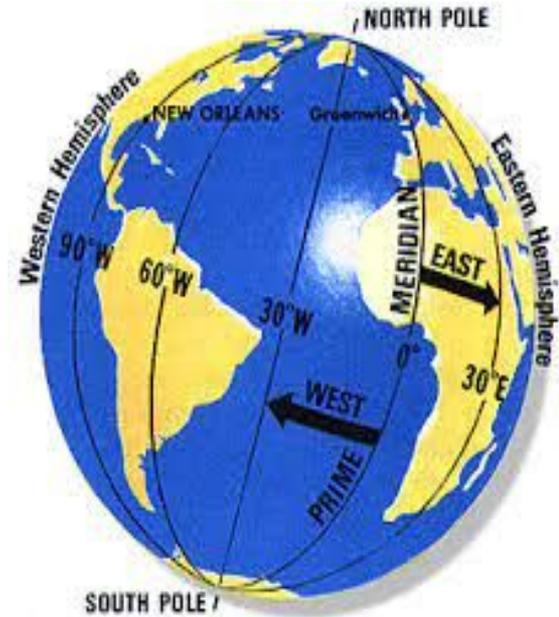


TIME

- Longitudes help in determination of local time of a place.
- As **15 degrees amounts to one hour**, degree of eastward or westward location of a place from Prime Meridian would let us determine number of hours ahead or back, a particular place is of Greenwich meridian time.

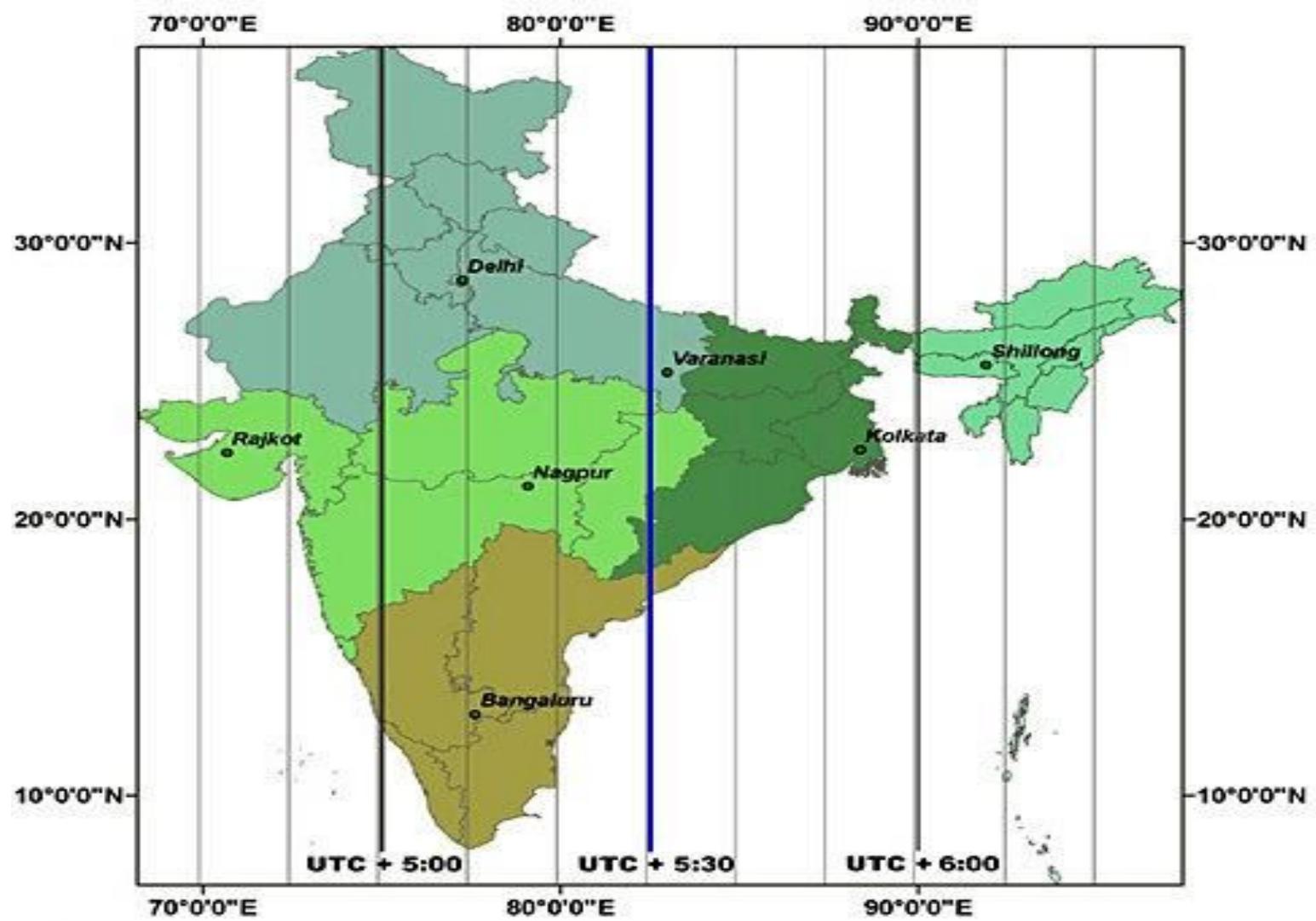
STANDARD TIME AND ZONES

- Countries wide enough to cover many longitudes, suffer from problem of many local times, which can disrupt administrative working.
- Thus, they need to standardise their time in order to avoid confusion. For eg. India has chosen $82 \frac{1}{2}$ degree longitude as its standard timeline.



WORLD TIME ZONES





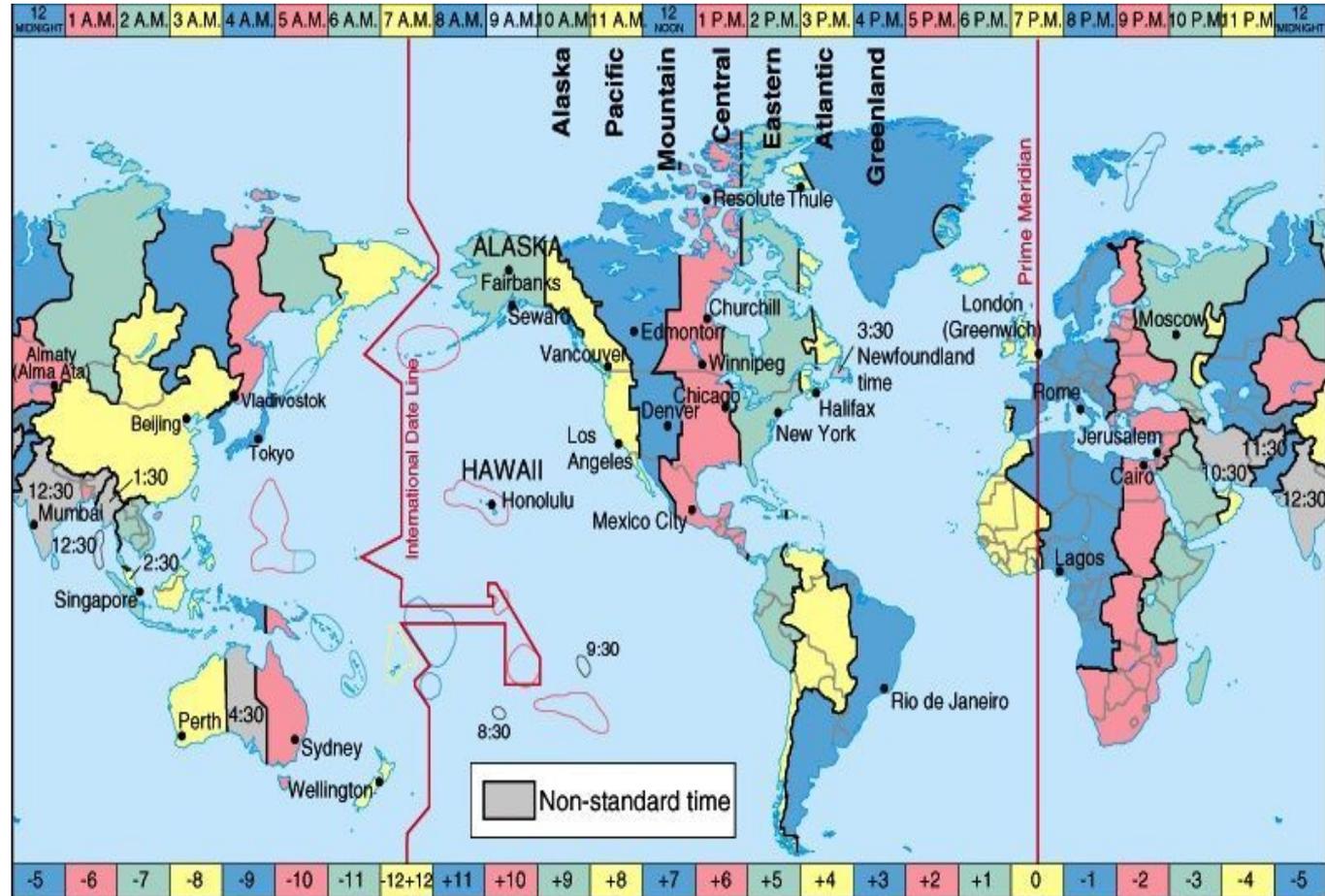
DAYLIGHT TIME SAVING

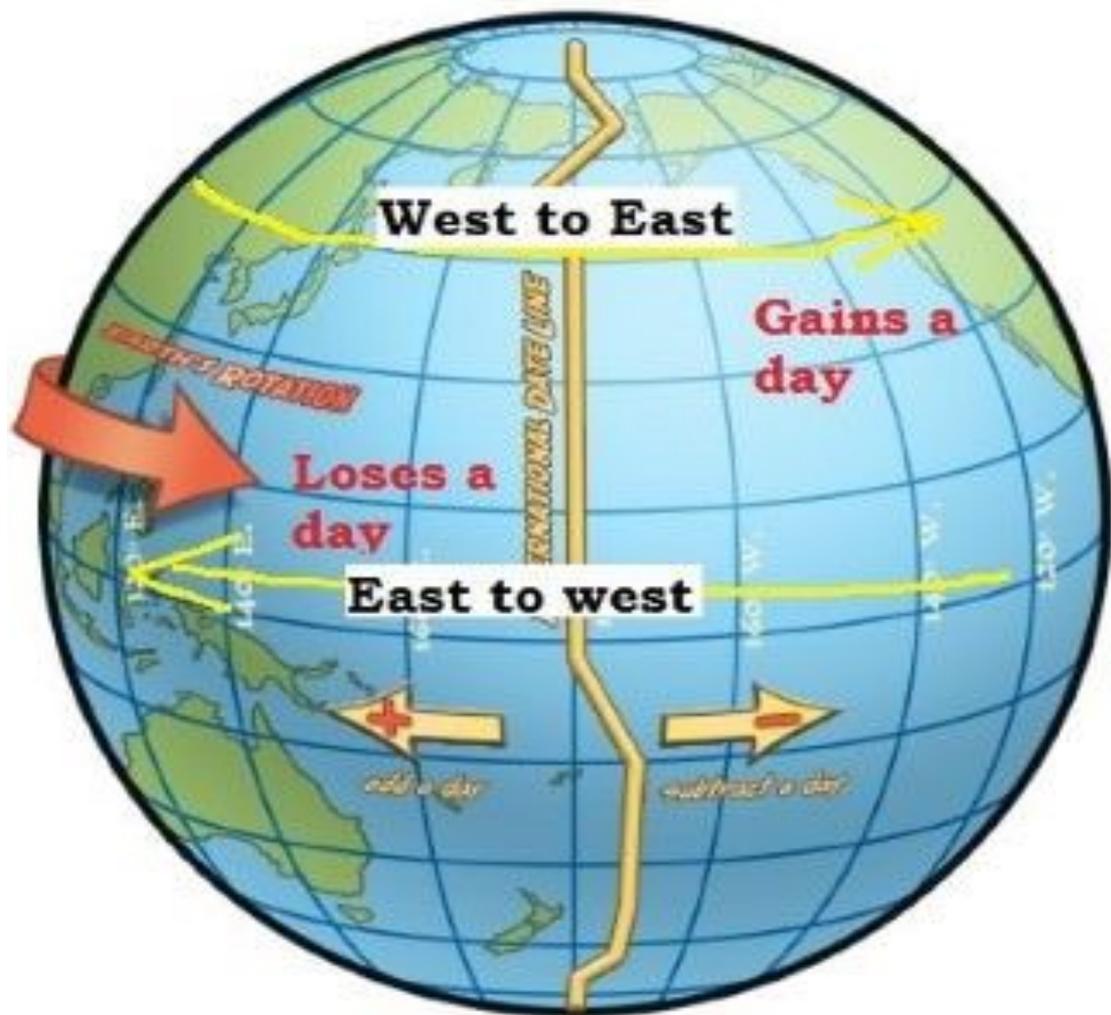
- It is the practice of advancing clocks during warmer months so that darkness falls later each day according to the clock.
- Its implementation is done by advancing clock by one hour in spring and moving it back to return to standard time, during autumn (before winter).



INTERNATIONAL DATE LINE

- It is an imaginary line passing through mid-pacific ocean, from North pole to South pole, roughly following 180 degree longitude of Earth.
- It is line of demarcation, separating two calendar dates.





SAMOA'S NEW TIME ZONE



Old
International
Date Line

U.S.A.

International
Date Line

Pacific
Ocean

Australia

New
Zealand



70 km

SATURDAY

FRIDAY

Apia

PAGO
PAGO

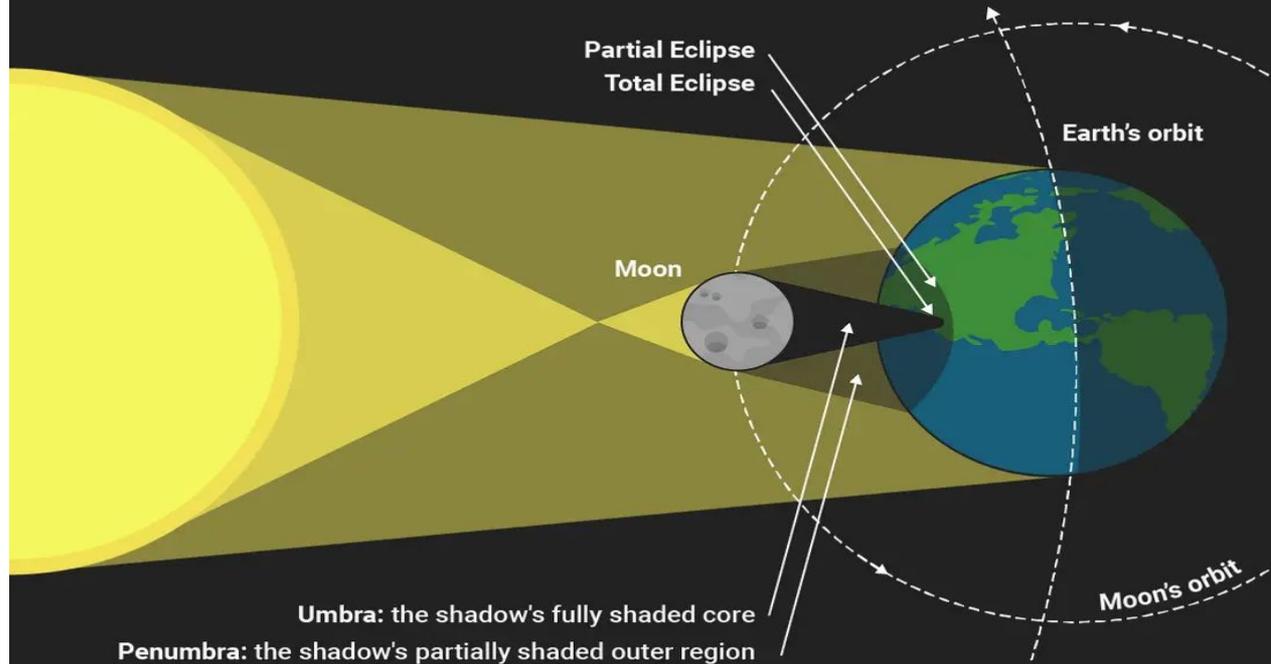
AMERICAN
SAMOA

New International Date Line

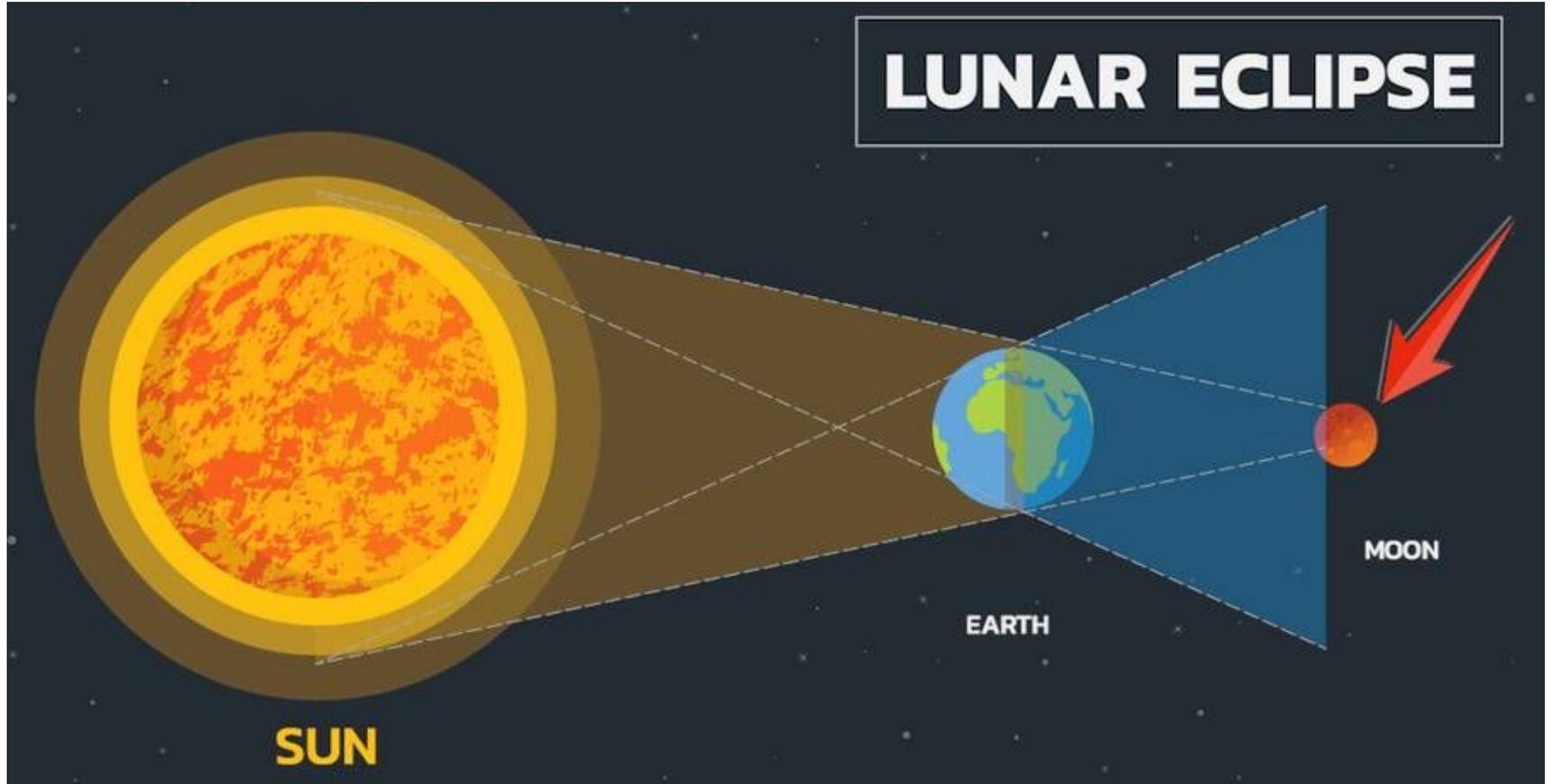
- Employers must still pay workers for the missing Friday, Dec. 30, although banks will not be allowed to charge interest for the lost day
- Samoa used to be the same time zone as New Zealand and Australia but went back a day in 1892, aligning itself with the U.S.

SOLAR ECLIPSE

HOW A TOTAL SOLAR ECLIPSE WORKS



LUNAR ECLIPSE



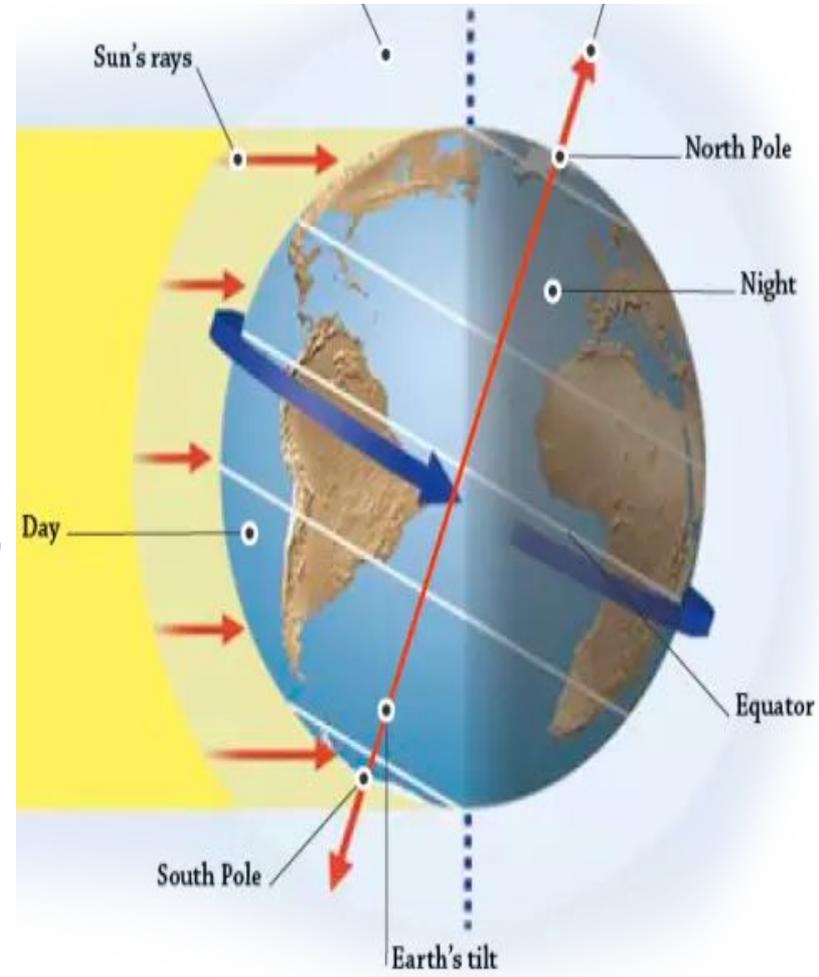
MOTIONS OF THE EARTH

EARTH HAS TWO MAJOR TYPES OF MOTION :

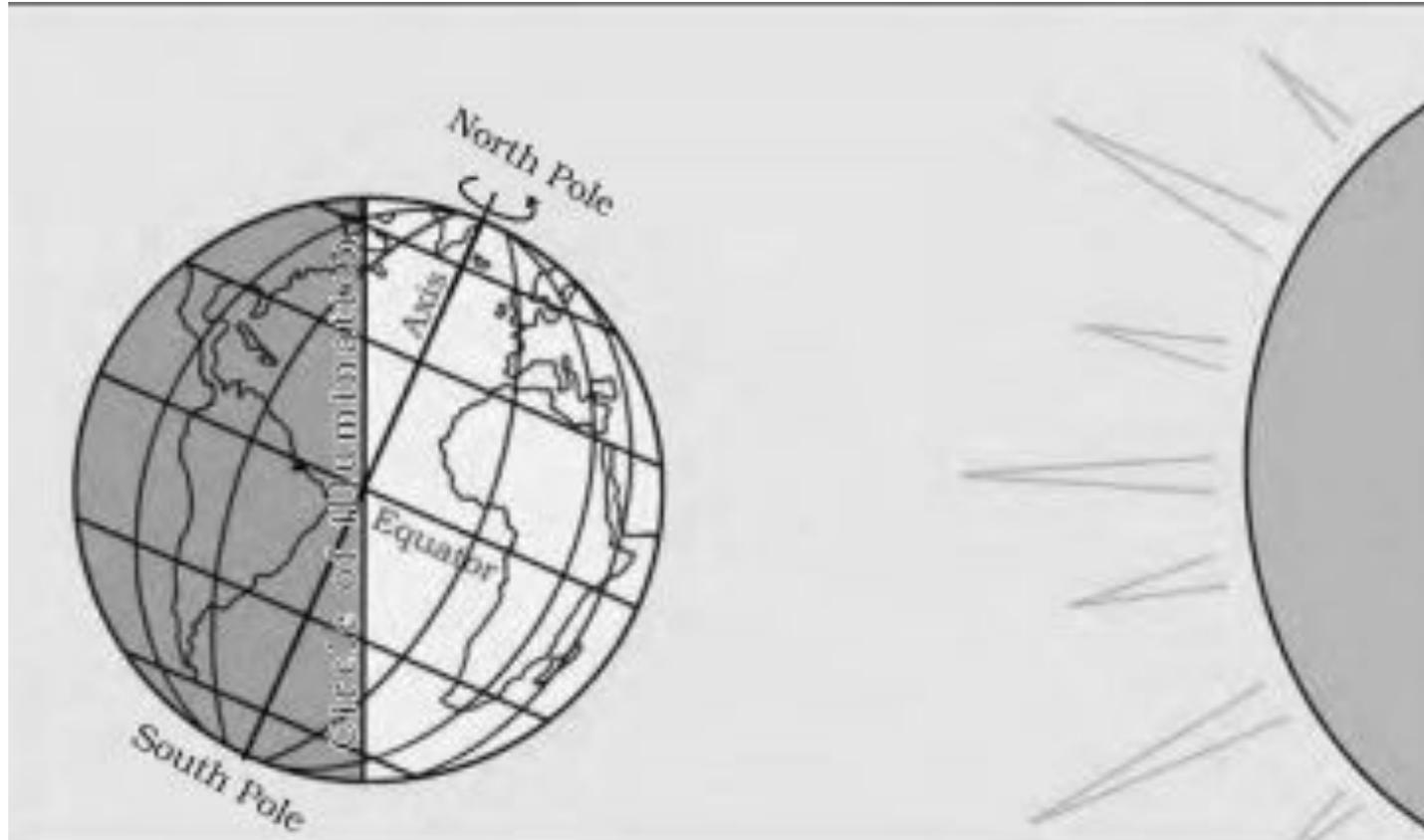
1. **ROTATION**- where Earth rotates around its own axis from west to east, once in every 23 hours 56 minutes 4,09 seconds.
 - **Solar day** - the average time of spinning of earth around the Sun, which is 24 hours
 - **Sidereal day**- which is of 23 hours 56 minutes, that is actual time to complete rotation.

CONSEQUENCES OF ROTATION:

- Distortion of Earth's shape
- Coriolis force
- Occurrence of day and night

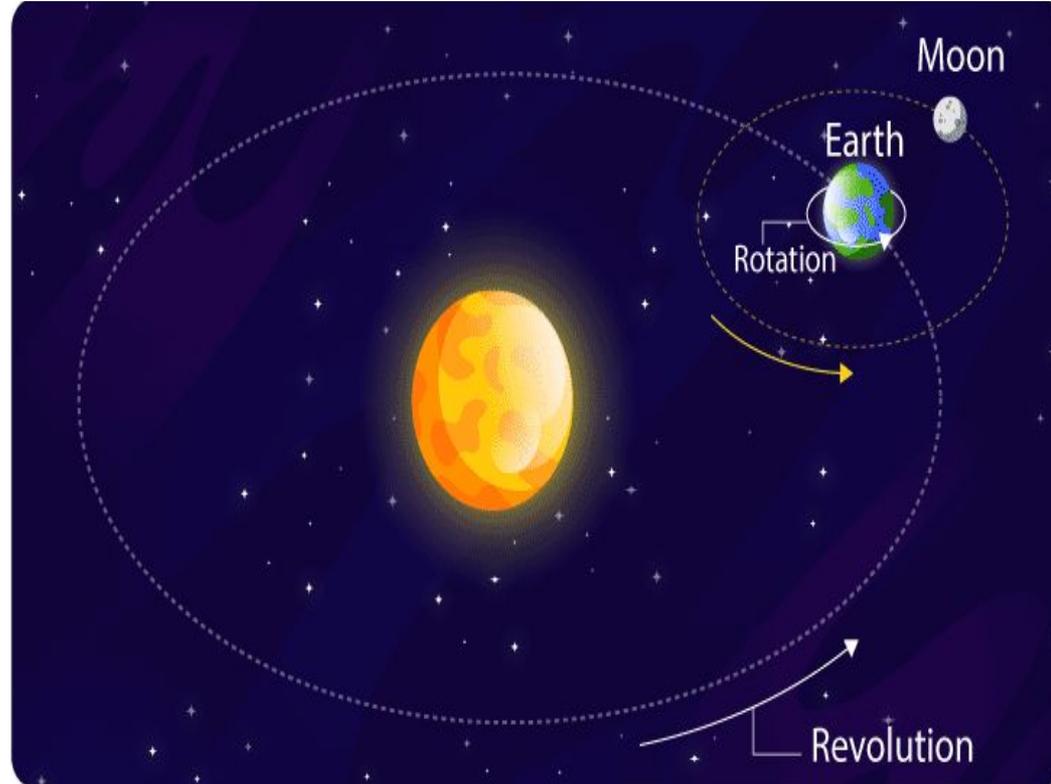


DAY & NIGHT



2. REVOLUTION

- where Earth moves in an elliptical orbit around the Sun, once in every 365.25 days
- Earth's revolution speed is approx 30 km/s.
- The closest Earth gets to the Sun each year is at perihelion (147 million km) on about January 3rd and the furthest is at aphelion (152 million km) on July 4th.

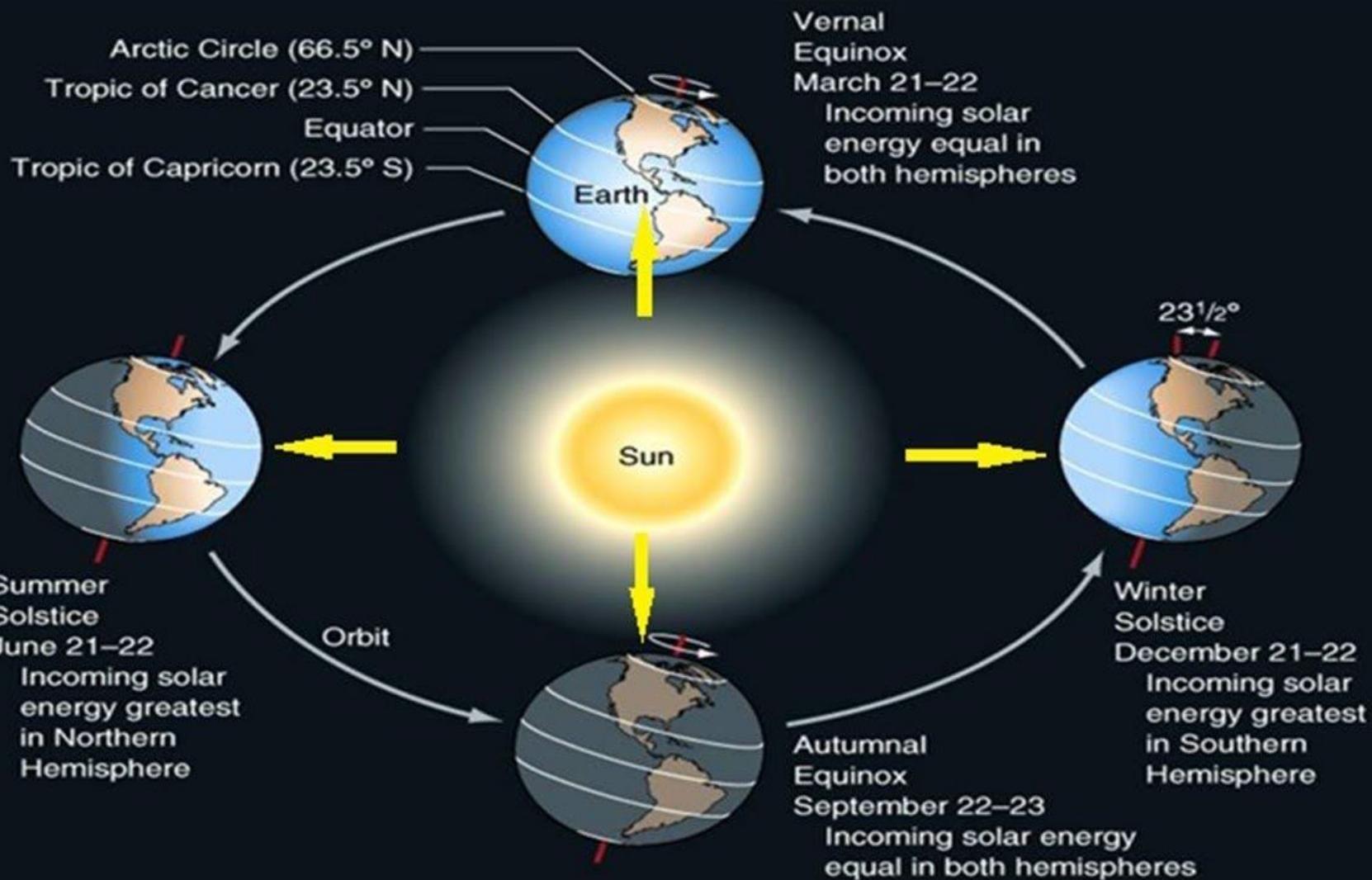


Solstice and Equinox

- **Summer solstice**
 - Occurs on 21st June
 - Longest day and shortest night in Northern hemisphere
 - Sun shines directly over tropic of Cancer
- **Winter Solstice**
 - Occurs on 22nd December
 - Shortest day and longest night
 - Sun shines directly over Tropic of Capricorn

Equinox- when days and night are of equal length. Here, Sun shines directly over the Equator.

- **Vernal equinox**
 - Or spring equinox
 - Occurs on 21st March
- **Autumn equinox**
 - Occurs on 23rd September



Thank you

2.GEOMORPHOLOGY

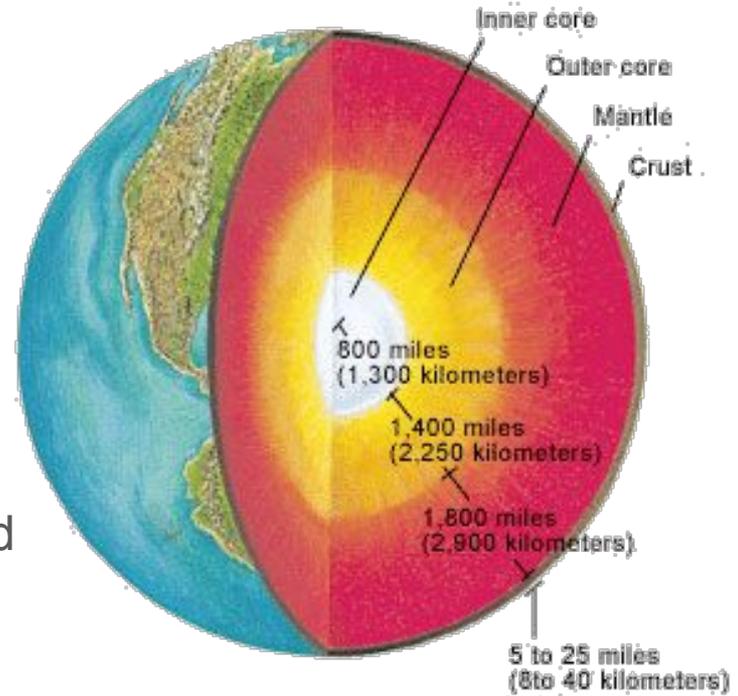


Geological Time Scale

<i>Eons</i>	<i>Era</i>	<i>Period</i>	<i>Epoch</i>	<i>Age / Years Before Present</i>	<i>Life / Major Events</i>
	Cainozoic (From 65 million years to the present times)	Quaternary	Holocene Pleistocene	0 - 10,000 10,000 - 2 million	Modern Man Homo Sapiens
		Tertiary	Pliocene Miocene Oligocene Eocene Palaeocene	2 - 5 million 5 - 24 million 24 - 37 Ma 37 - 58 Million 57 - 65 Million	Early Human Ancestor Ape: Flowering Plants and Trees Anthropoid Ape Rabbits and Hare Small Mammals : Rats – Mice
	Mesozoic 65 - 245 Million Mammals	Cretaceous Jurassic Triassic		65 - 144 Million 144 - 208 Million 208 - 245 Million	Extinction of Dinosaurs Age of Dinosaurs Frogs and turtles
	Palaeozoic 245 - 570 Million	Permian Carboniferous Devonian Silurian Ordovician Cambrian		245 - 286 Million 286 - 360 Million 360 - 408 Million 408 - 438 Million 438 - 505 Million 505 - 570 Million	Reptile dominate-replace amphibians First Reptiles: Vertebrates: Coal beds Amphibians First trace of life on land: Plants First Fish No terrestrial Life : Marine Invertebrate
Proterozoic Archean Hadean	Pre-Cambrian 570 Million - 4,800 Million			570 - 2,500 Million 2,500 - 3,800 Million 3,800 - 4,800 Million	Soft bodied arthropods Blue green Algae: Unicellular bacteria Oceans and Continents form – Ocean and Atmosphere are rich in Carbon dioxide
Origin of Stars Supernova Big Bang	5,000 - 13,700 Million			5,000 Million 12,000 Million 13,700 Million	Origin of the sun Origin of the universe

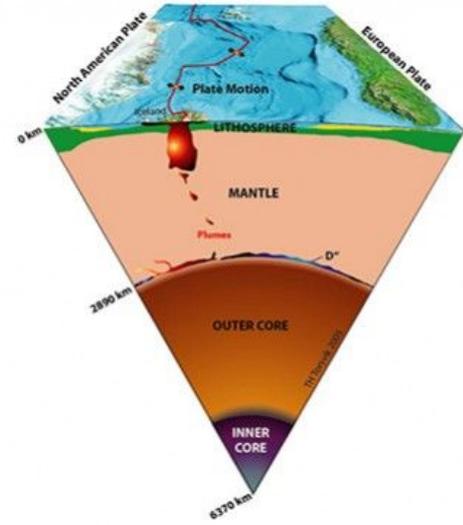
INTERIOR OF EARTH

- Earth's interior is quite complicated and very little knowledge is available about it.
- Earth's radius is 6370 km and we have hardly reached to depth of 10-12 km.
- Most of the information available is based on estimates and inferences, which can be attributed to two kind of sources :
 - Direct sources
 - Indirect sources



DIRECT SOURCES

- Includes material from mines and drilling projects
- Volcanic eruption



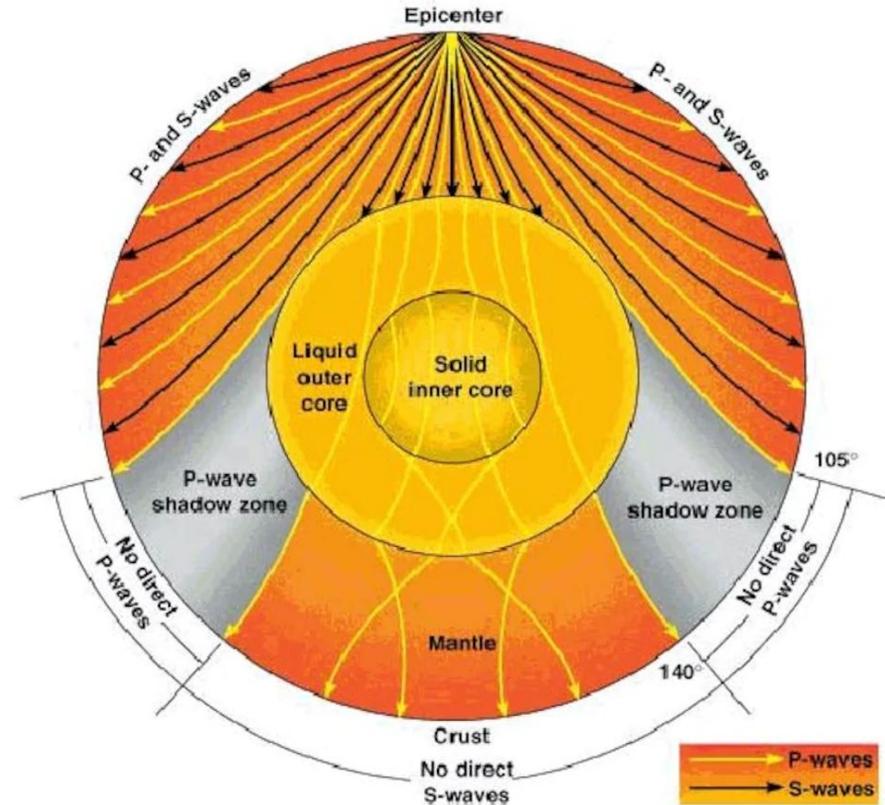
INDIRECT SOURCES

- Rising temperature, pressure and density with increasing depth
- Meteorites
- Also from gravitational, magnetic and seismic waves



SEISMIC WAVES

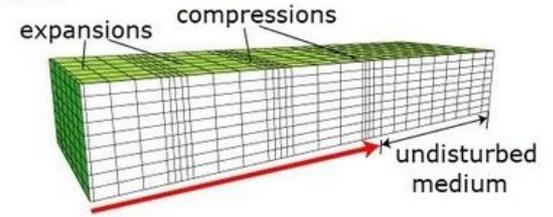
- Earthquake occurs due to **shaking of earth** and this may be due to release of energy by stressed rocks or crustal movements caused by other forces.
- This seismic activity can be recorded using an instrument called '**seismograph**'.
- These seismic waves can be classified as body waves or surface waves.
- Body waves include :
 - P waves
 - S waves



P WAVES

- Primary or pressure waves
- They reach the surface first, as travels faster.
- They are similar to sound waves (longitudinal waves)

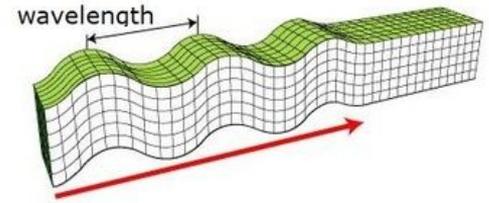
P wave



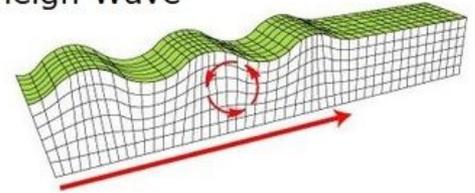
S WAVES

- Secondary waves or shear waves
- Are transverse in nature like light waves
- Cannot travel through liquid (only in solid)

S Wave



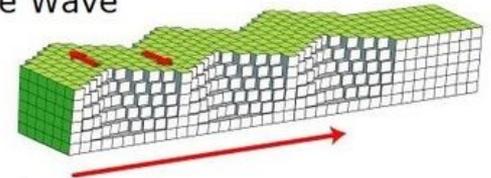
Rayleigh Wave



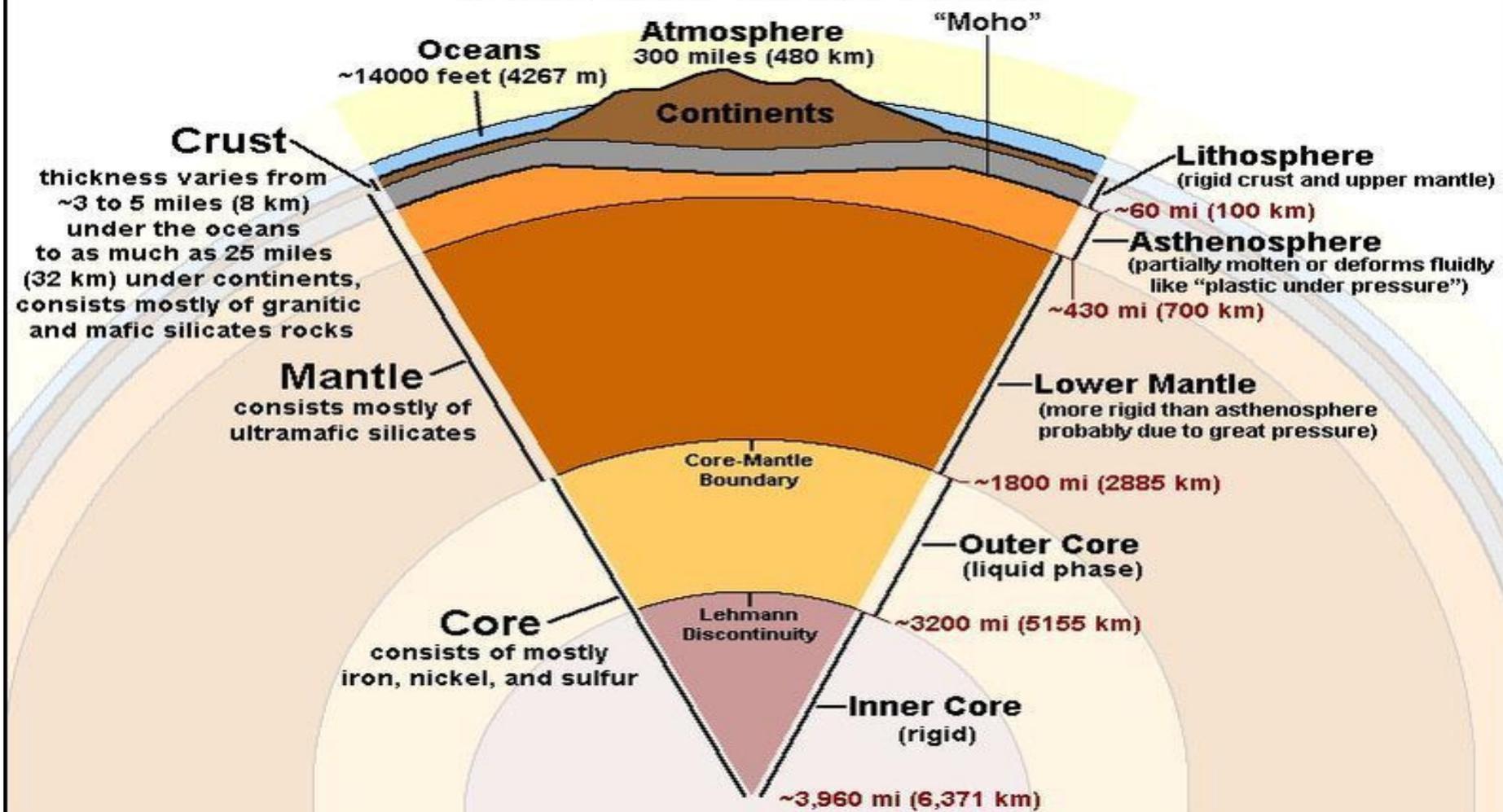
SURFACE WAVES

- Have lower frequency and are more dangerous
- Travels just beneath the surface
- Can travel through all medium but with low velocity

Love Wave



Structure of the Earth

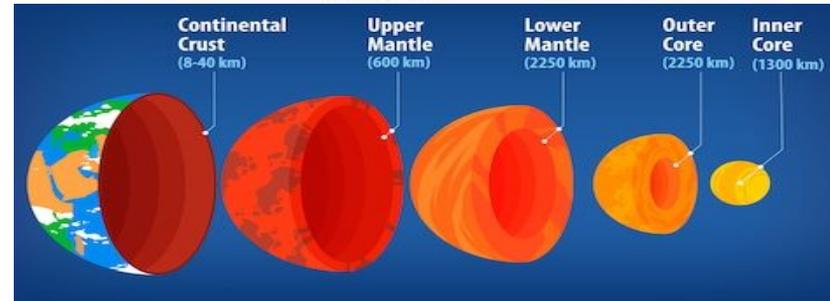
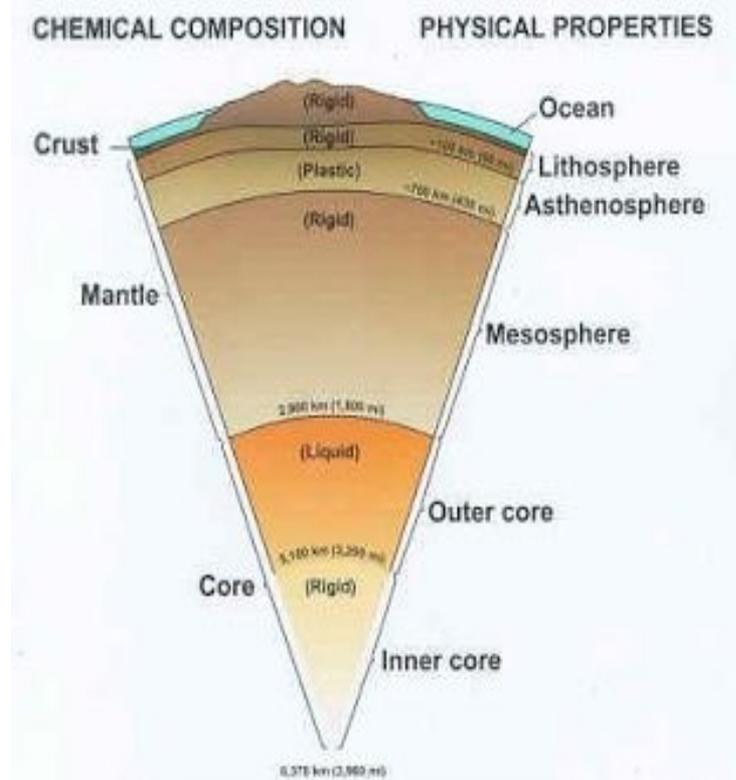


- **CRUST- THE OUTERMOST PART**

- Topmost part of lithosphere, made up of
 - **SIAL** (silicate + Aluminium- forms continental crust) and
 - lower denser layer of **SIMA** (silicate + magnesium- forming oceanic crust)

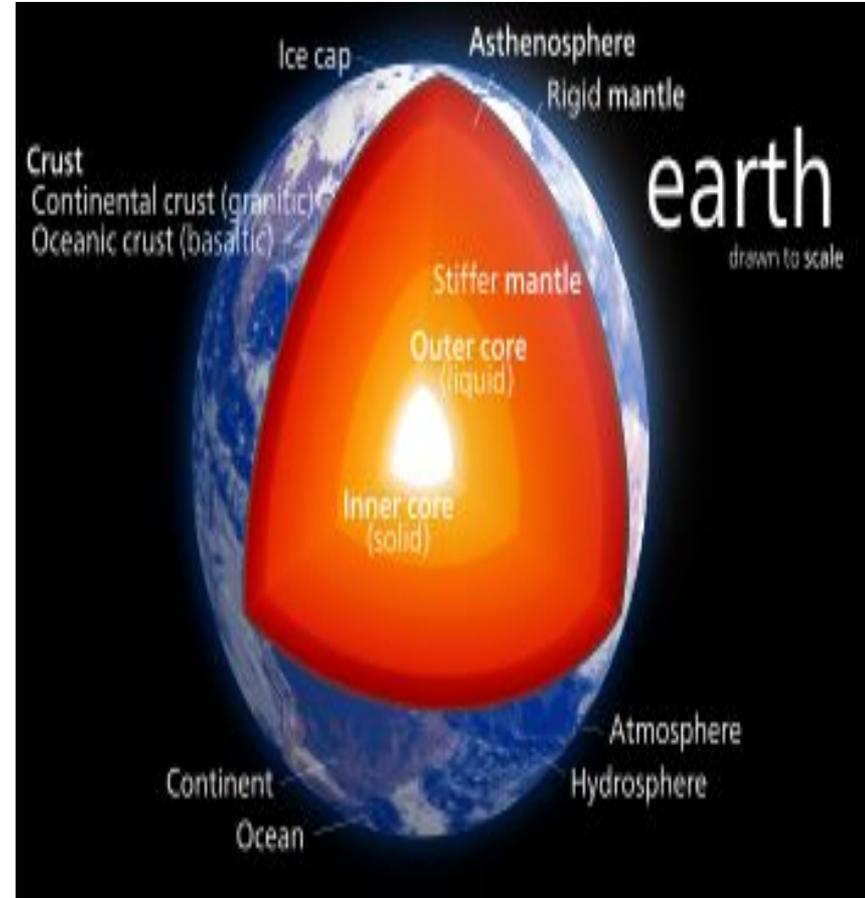
- **MANTLE**

- Almost 2900 km thick and comprise 83% of Earth's volume.
- Top layer of upper mantle within 100-200 km below surface, is called as asthenosphere.
- Separated from crust by Moho discontinuity and from core by Gutenberg discontinuity.



CORE

- This layer is formed of NiFe (iron and nickel).
- It has two layers :
 - outer core : which is in molten state
 - Inner core : which is solid and very dense
- Density reaches upto 13 g/cm^3 .
- Temperature is estimated at inner core - around 5700 K - which is same as Sun.
- Very less information available - and largely gathered from :
 - Seismic waves and
 - Earth's magnetic field.



CONTINENTAL DRIFT & PLATE TECTONICS

- This theory was given by Alfred Wegener, a German meteorologist, in his book “Origin of Continents and Ocean Basin”.
- This idea refers to movement of continent over large scale.
- Earlier all the sialic layer was concentrated as one landmass, called Pangea and it was surrounded by mega Ocean called Panthalassa.
- Movements over period of time led to formation of present global map, and this theory was subsumed by plate tectonics theory.

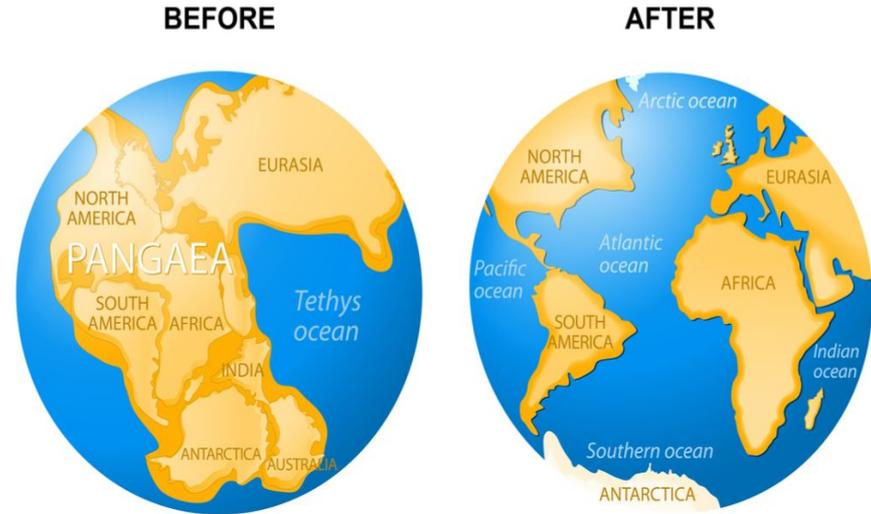
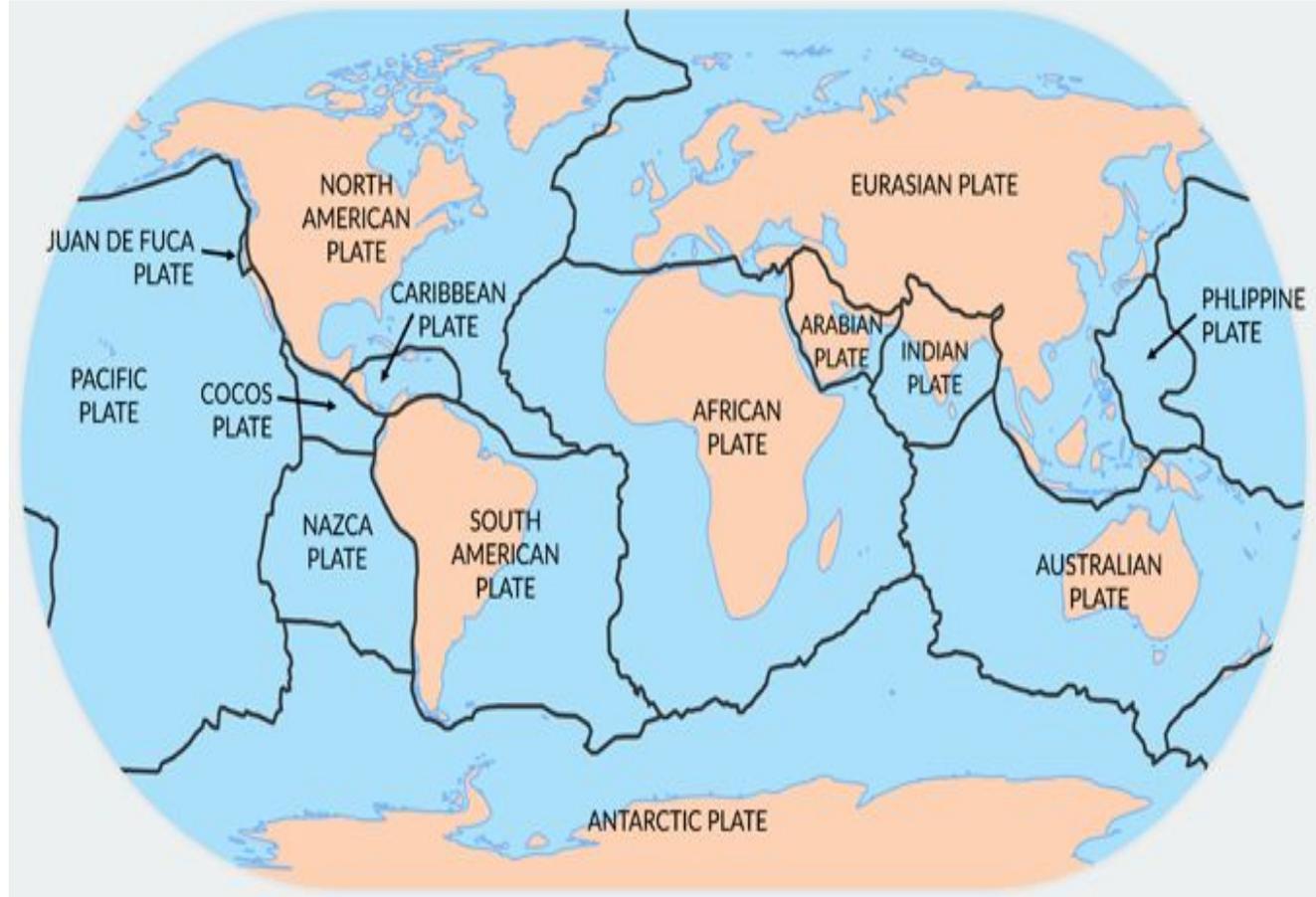


Plate tectonics theory

- It is a scientific theory based on idea that Earth's crust is made of number of plates, which have tendency to move over weak Asthenosphere.
- It has seven very large size plates and number of small plates, moving and colliding against each other.

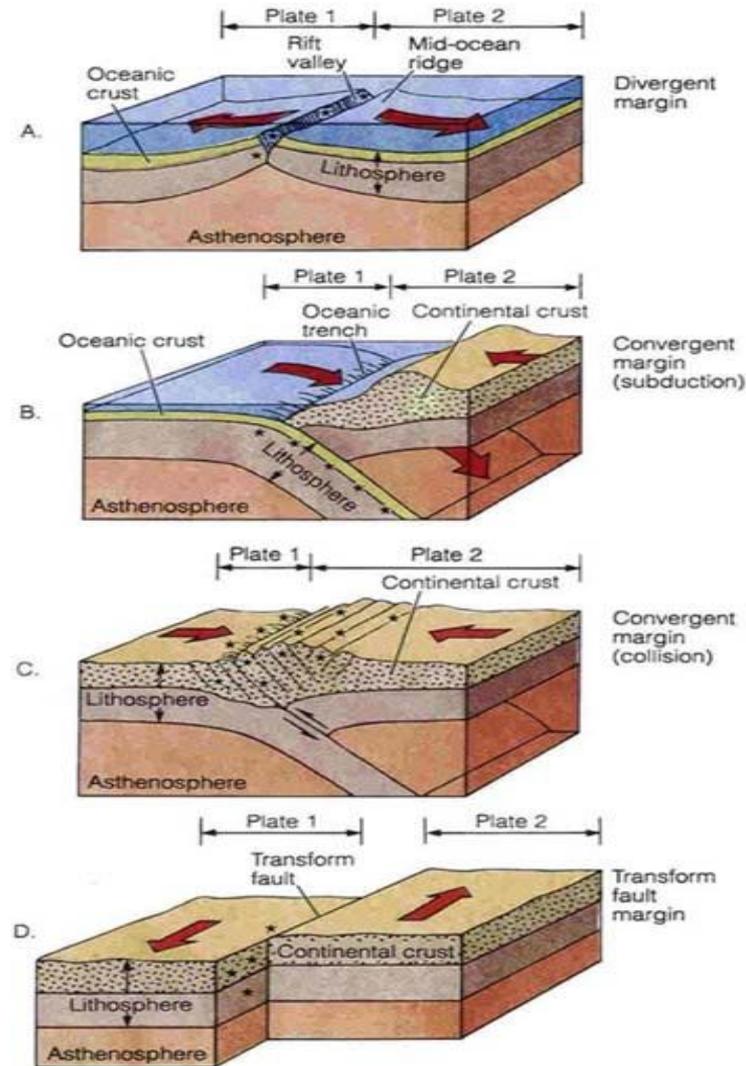


- Plate tectonics theory was one of great scientific achievements of 1960s, based on :
 - Concept of continental drift
 - The concept of seafloor spreading

Types of plate movements

- **CONSTRUCTIVE PLATE MARGIN OR DIVERGING MOVEMENT**

- Represents zones of plate diversion, leading to continuous upwelling of molten lava and thus forming new crust.
- When oceanic plates split apart in opposite directions, mid-oceanic ridges are formed.

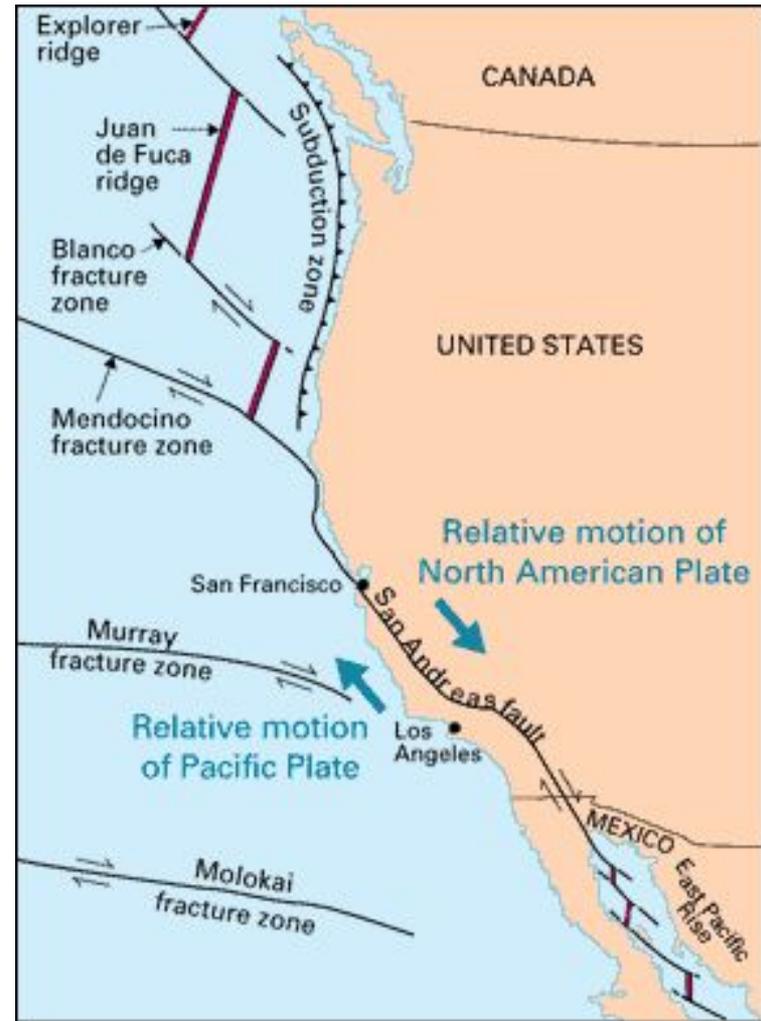


- **CONVERGENT OR DESTRUCTIVE PLATE MARGINS**

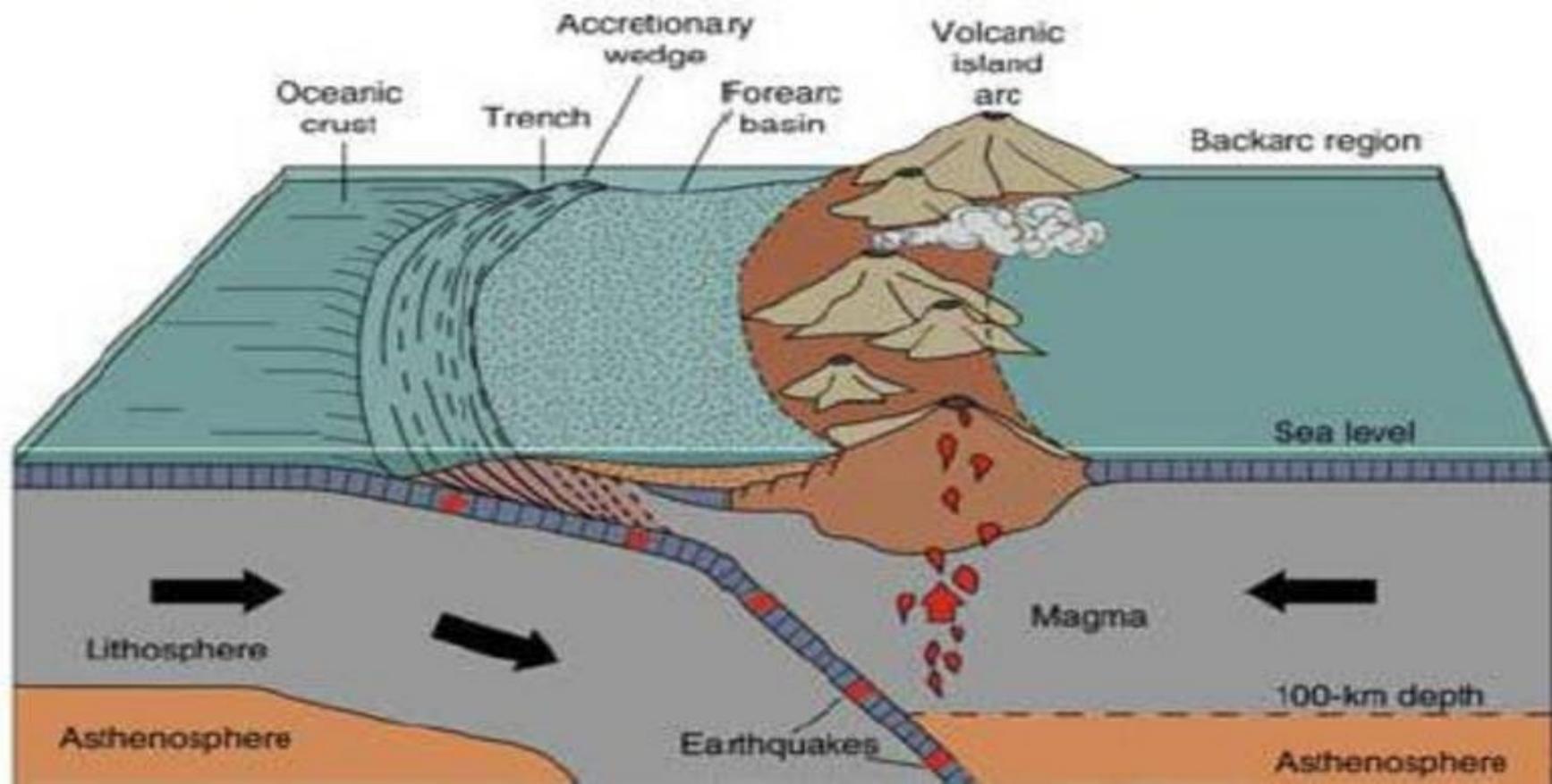
- Two plates move towards each other and converge along a line. Here, one plate overrides the other and the latter gets subducted or thrust into mantle.
- We witness loss of crust to mantle here, and thus called destructive boundary.

- **TRANSFORM BOUNDARY**

- Also called as conservative or shear plate margins.
- Here, two plates pass or slide past each other along the transform fault line.

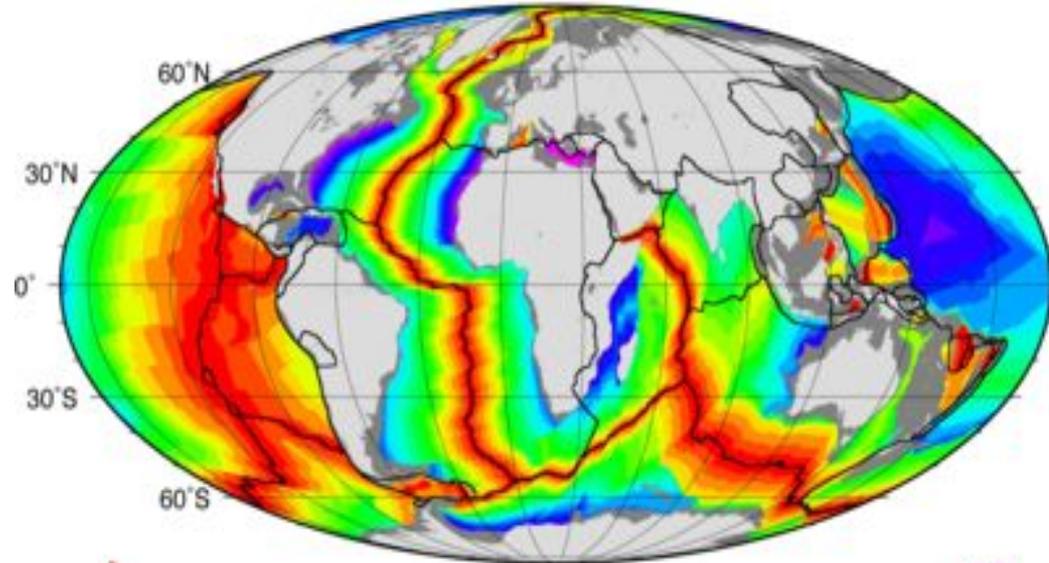
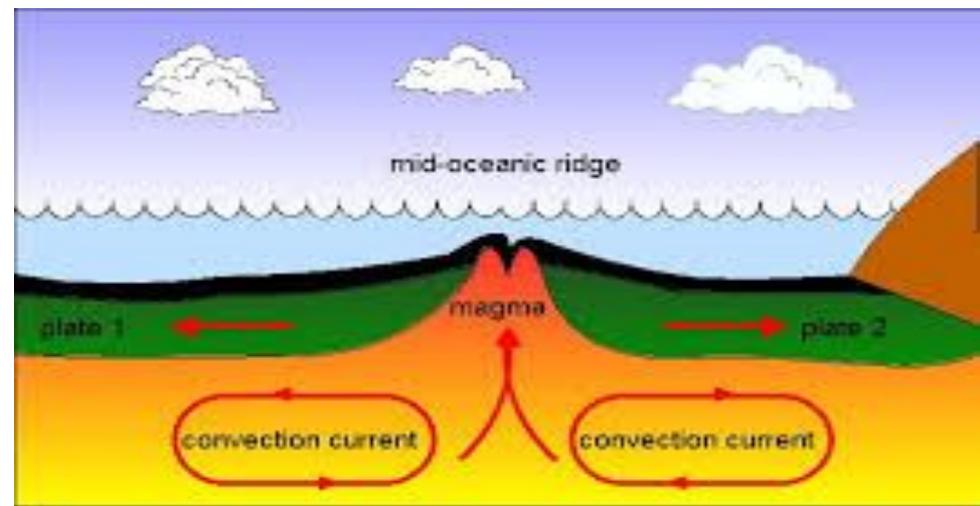


Cooler oceanic plate subducts underneath island arcs (also oceanic crust), creating a deep sea trench



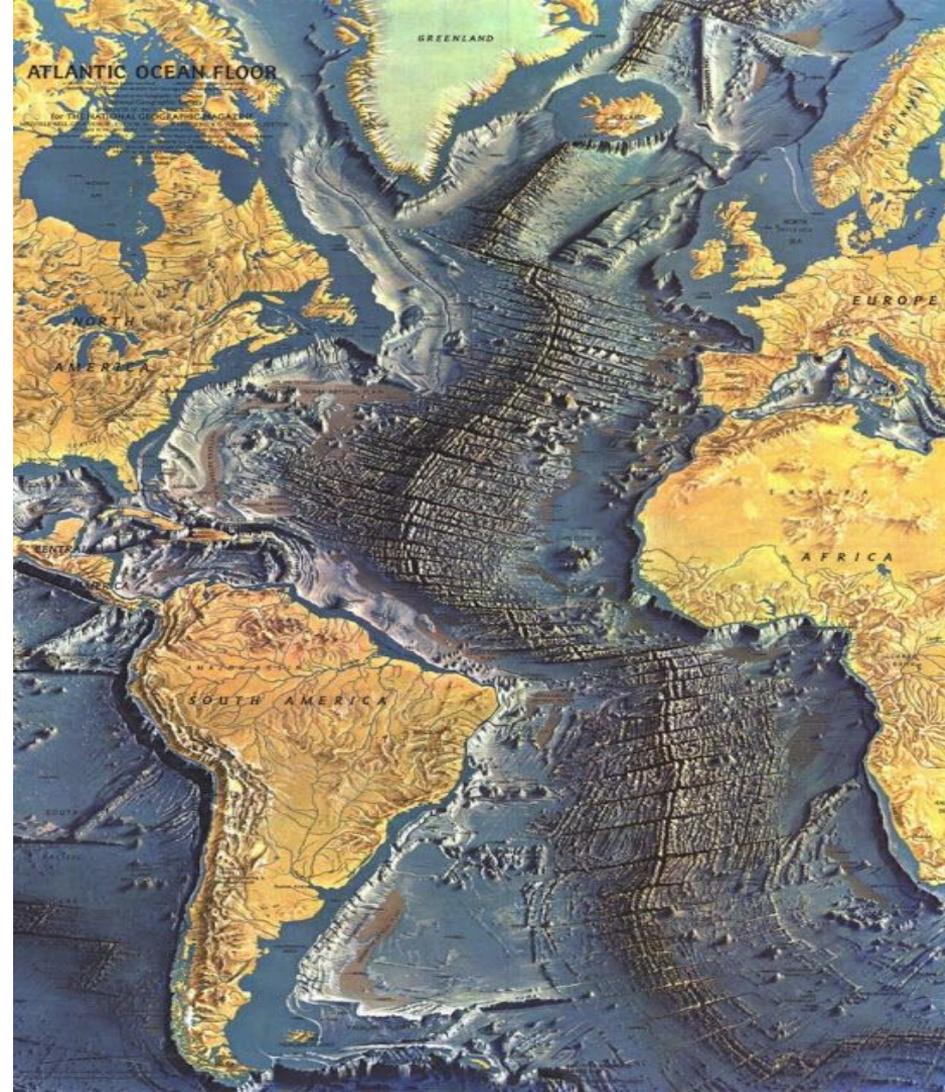
Sea floor spreading

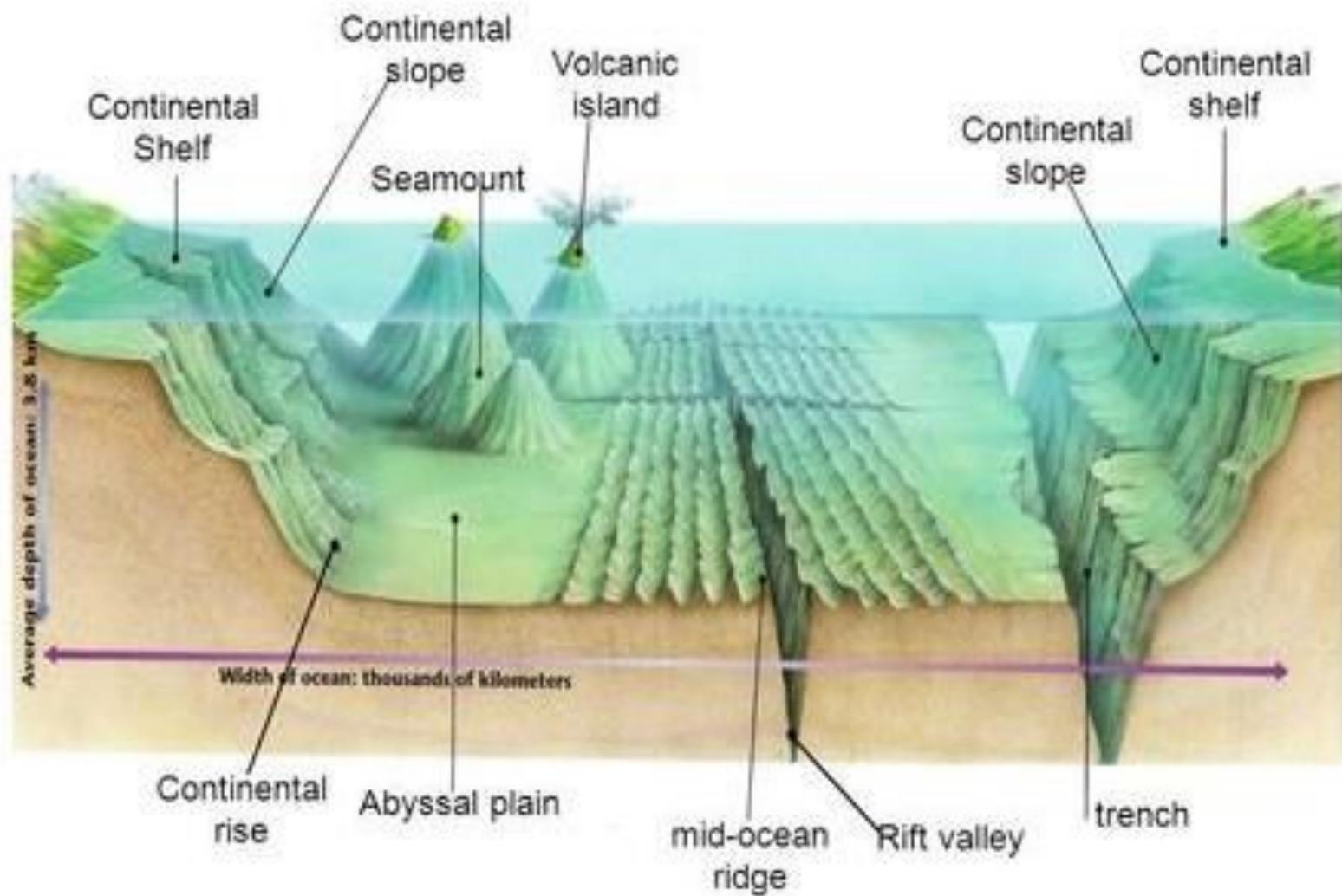
- Idea was proposed by Harold Hess.
- It is about moving apart of oceanic plates which results in upwelling of hot magma to the surface of earth.
- This magma solidifies over the period of time and leads to formation of new crust.

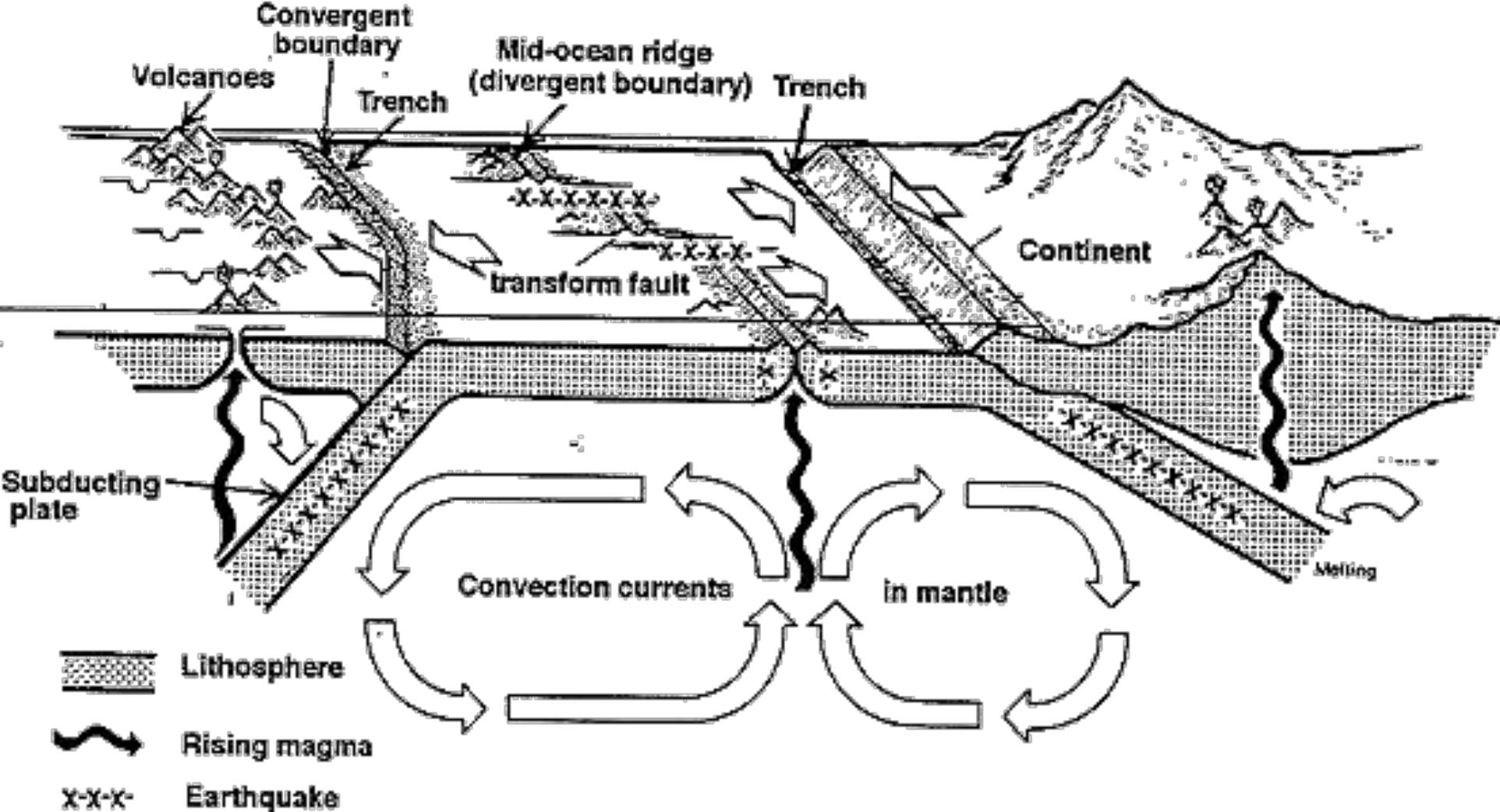


MID-OCEANIC RIDGES

- It is a sea-floor mountain system formed by plate tectonics.
- It covers thousands of kilometres (approx. 70,000 km length worldwide).
- 2-5 km deep and covers hills, rifts, along with active volcanism and seismicity.
- Well developed example of MOR is Mid-Atlantic ridge.



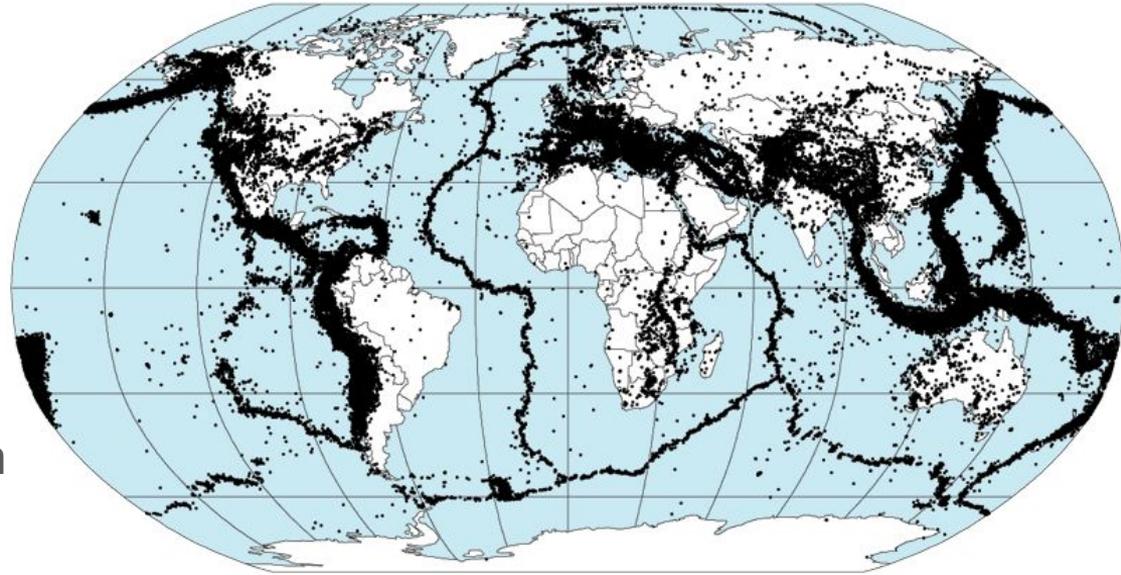




EARTHQUAKE

- Earthquake is shaking of ground surface due to endogenetic forces, which can occur in the form of faint tremors or wild motion of Earth and can turn into a disaster.
- Energy released is measured on Richter Scale, which is a logarithmic scale.

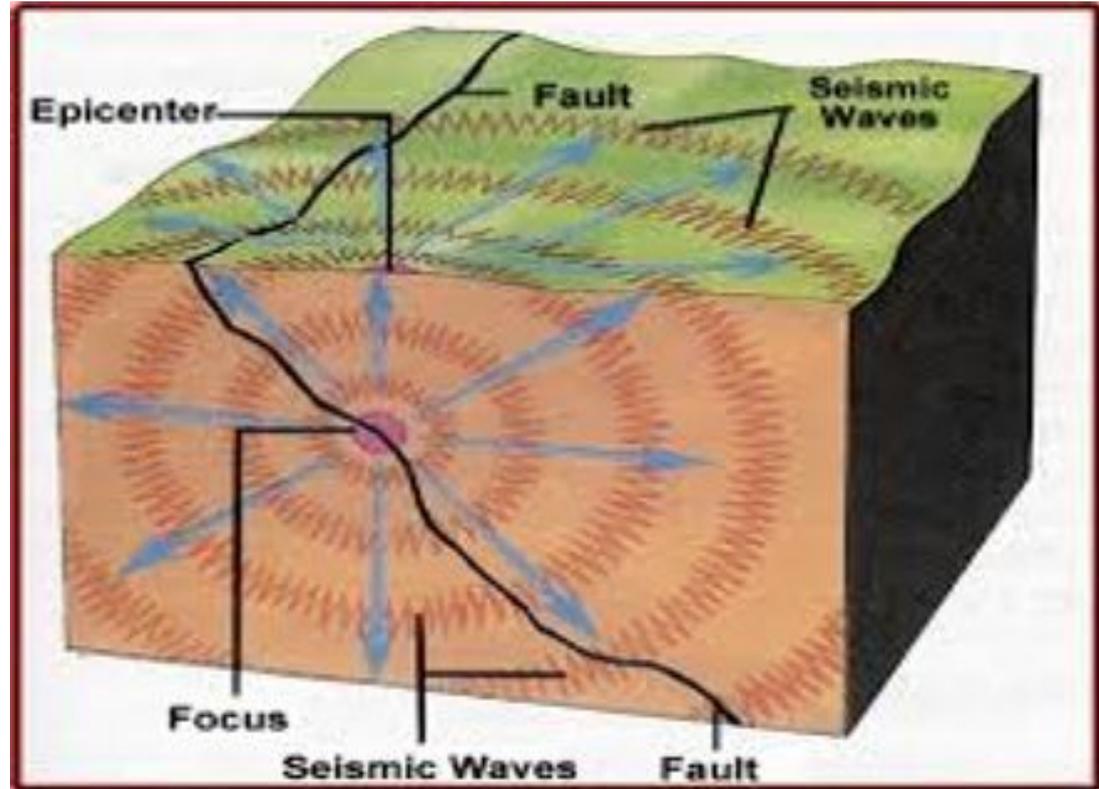
Preliminary Determination of Epicenters
358,214 Events, 1963 - 1998



CAUSES OF EARTHQUAKE

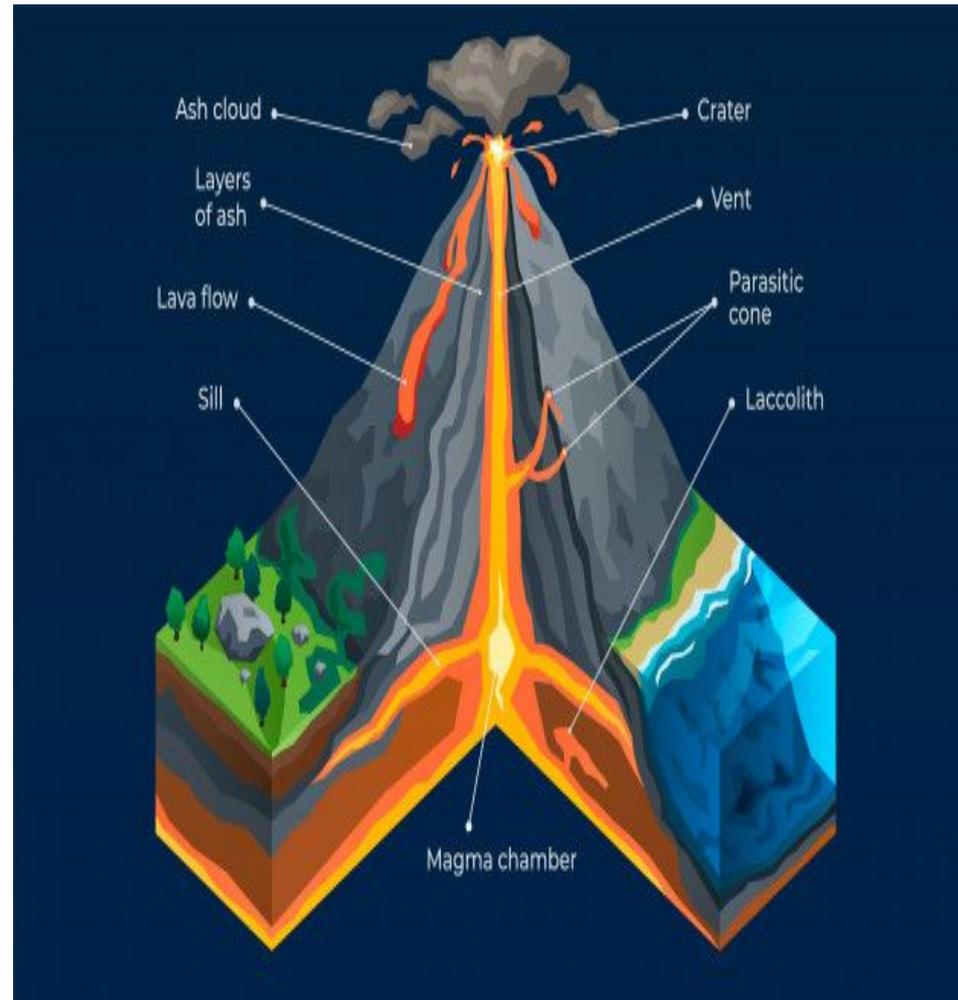
- **Vulcanicity**
- **Faulting and Elastic Rebound theory**
- **Hydrostatic Pressure & Anthropogenic causes**
- **Plate tectonic theory**

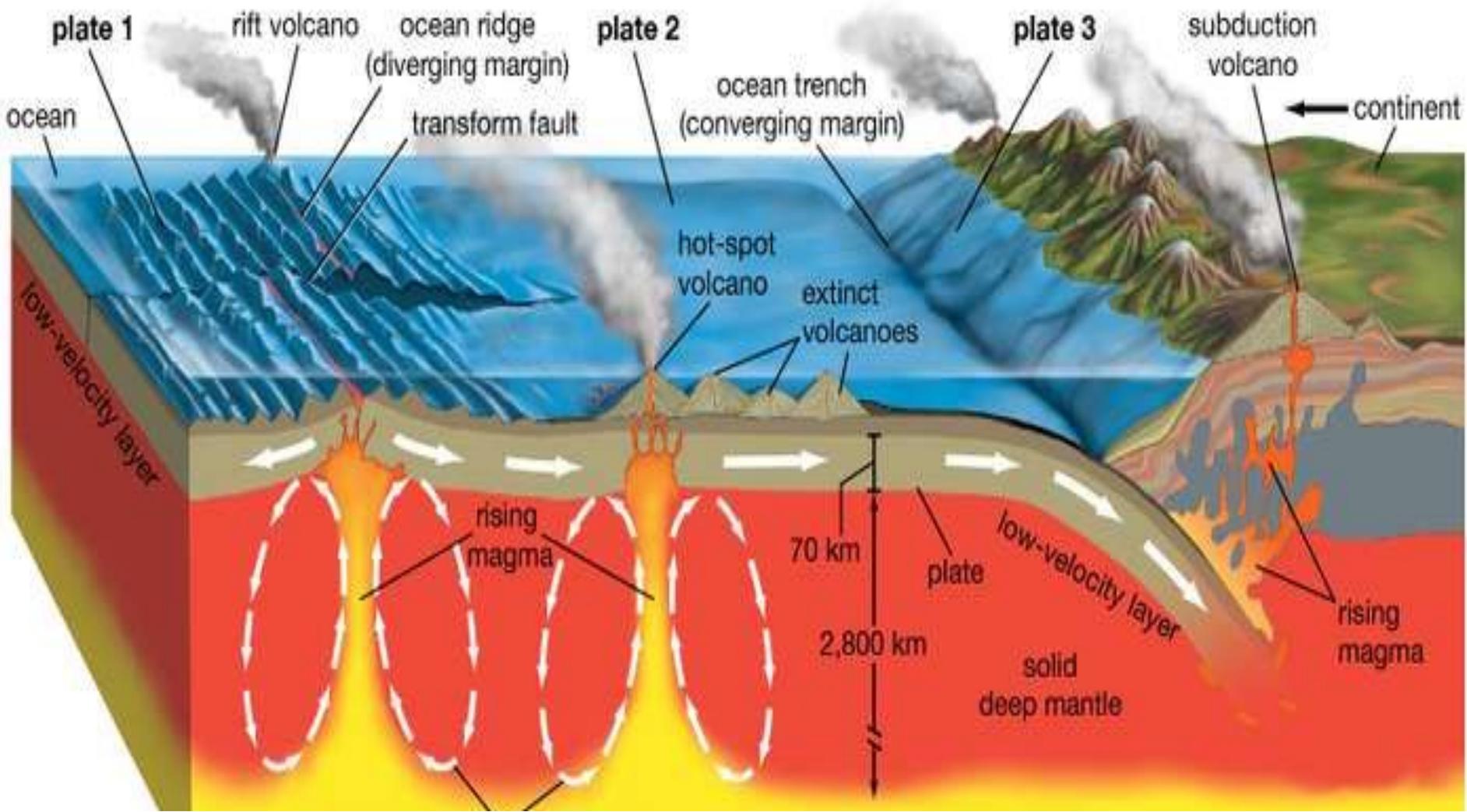
As per the plate tectonics theory, Earth's crust is made up of number of plates which are constantly moving with respect to each other due to thermal convective currents originating deep within the earth.



VULCANISM

- A volcano is a vent or a opening through which heated material (magma, fragments of rocks & gases) comes out to the surface of Earth.
- While vulcanicity is about all activities involving rising of magma to surface of earth.
- Largely they occur at plate boundaries as vents are formed there, allowing hot magma inside earth to come up.
- Most of global volcanoes or volcanic activity is found around fault boundaries. Eg. pacific Ring of Fire





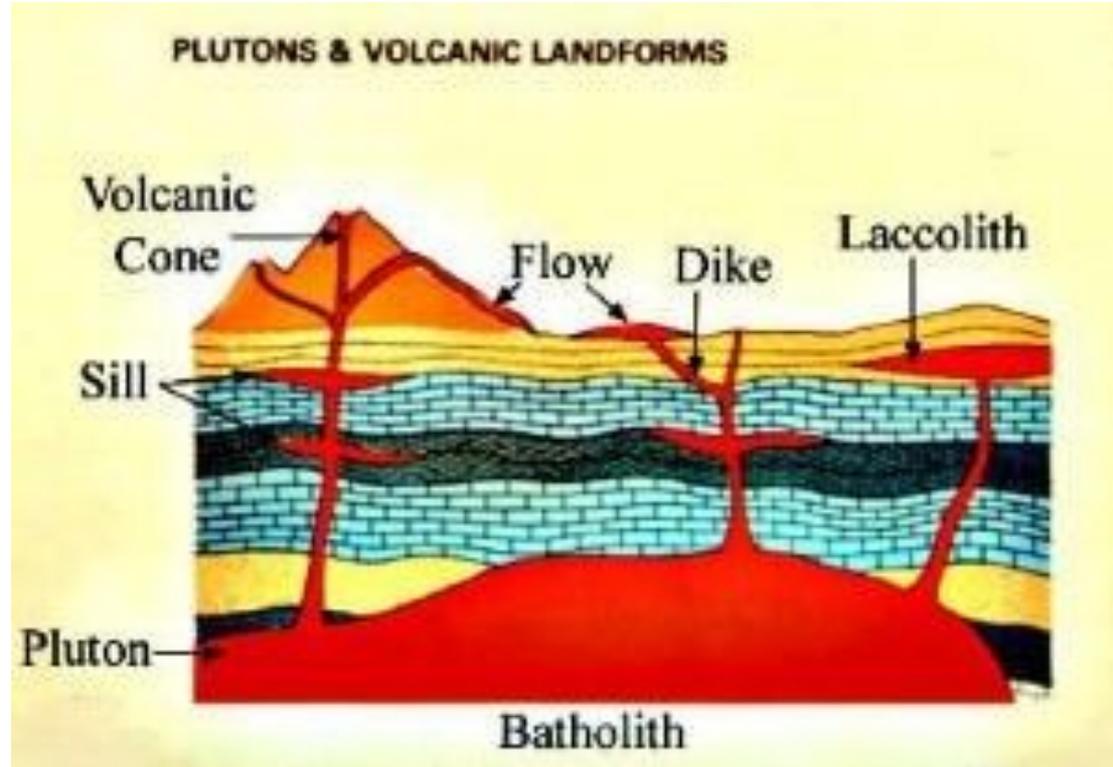
Landforms due to volcanism

- Extrusive landforms -

It involves volcanic cone, fissures, hot springs, geysers, fumaroles, solfatara, mud volcanoes, etc.

- Intrusive landforms- plutonic rocks (cooling in the crust)

These include batholiths, laccoliths, sills, dykes, lopoliths and phacoliths.



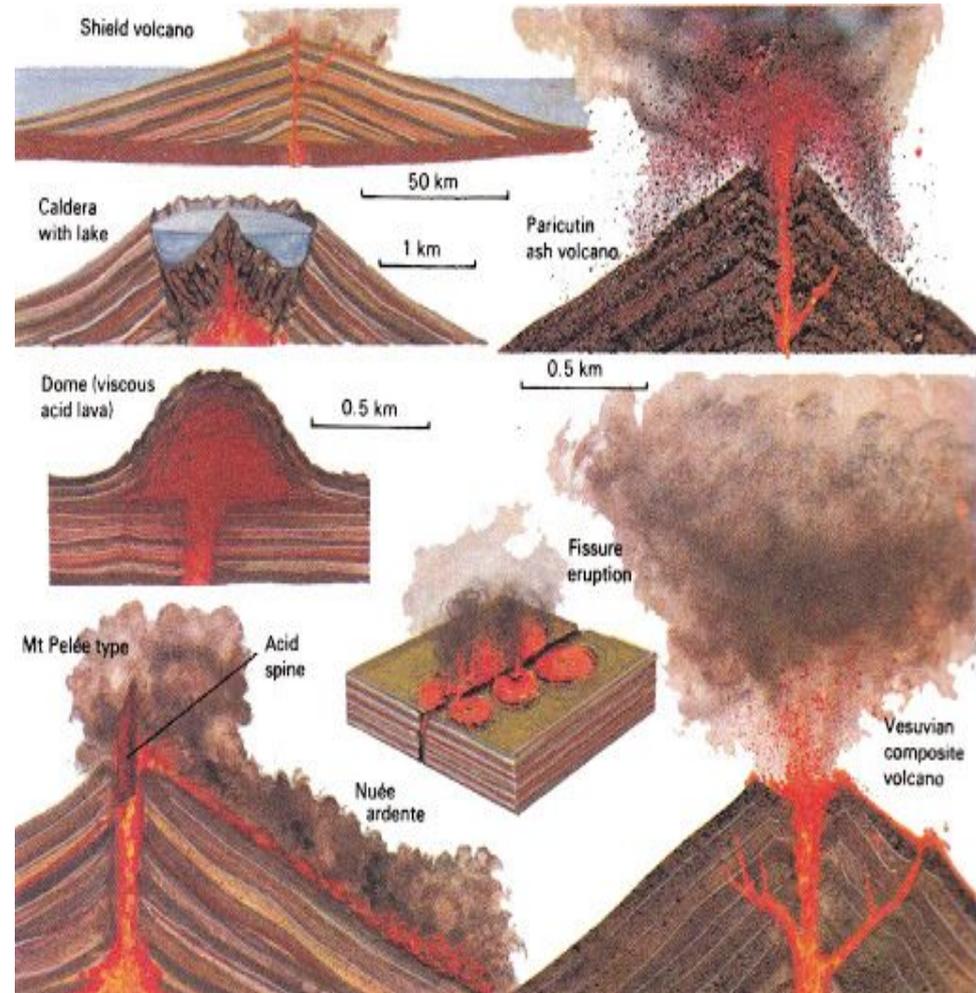
Types of Volcanoes

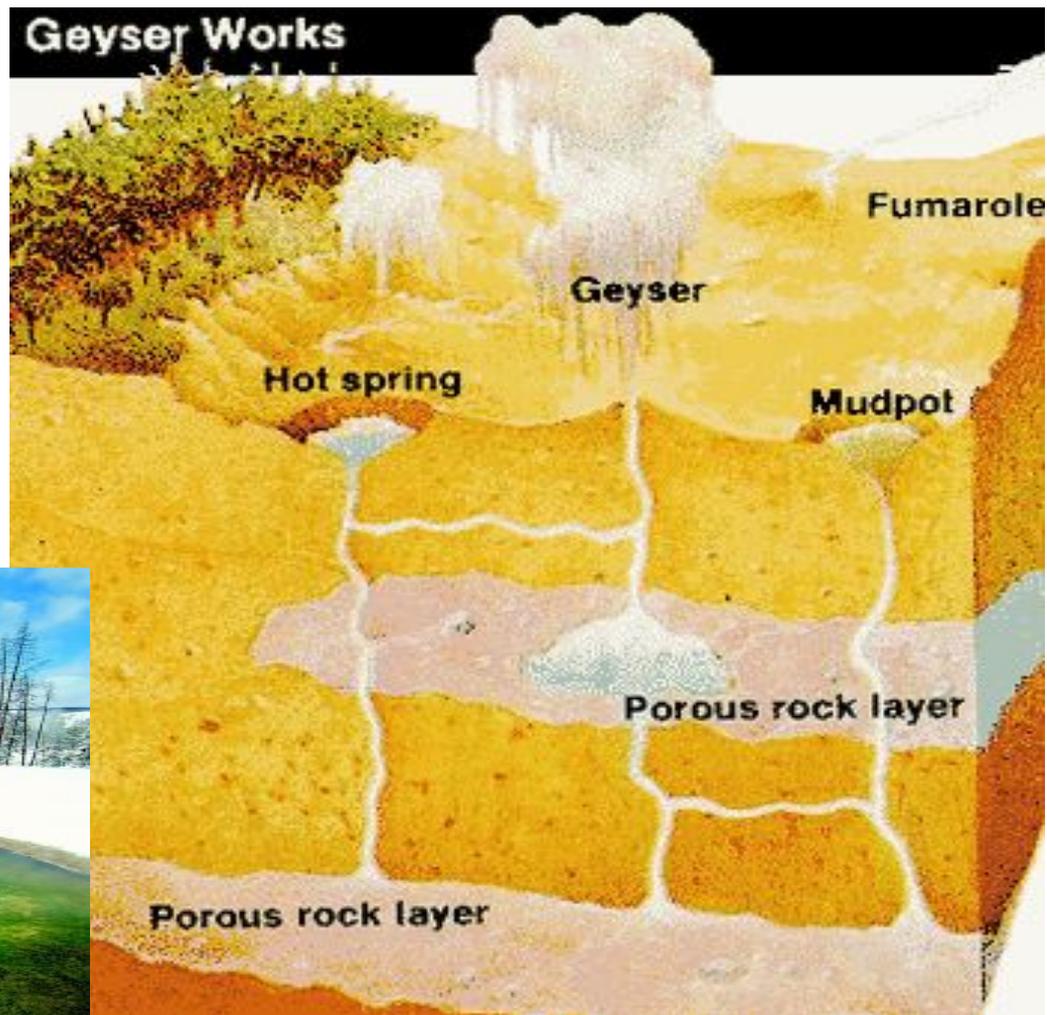
- BASED ON DORMANCY

- EXTINCT VOLCANOES
- DORMANT VOLCANOES
- ACTIVE VOLCANOES

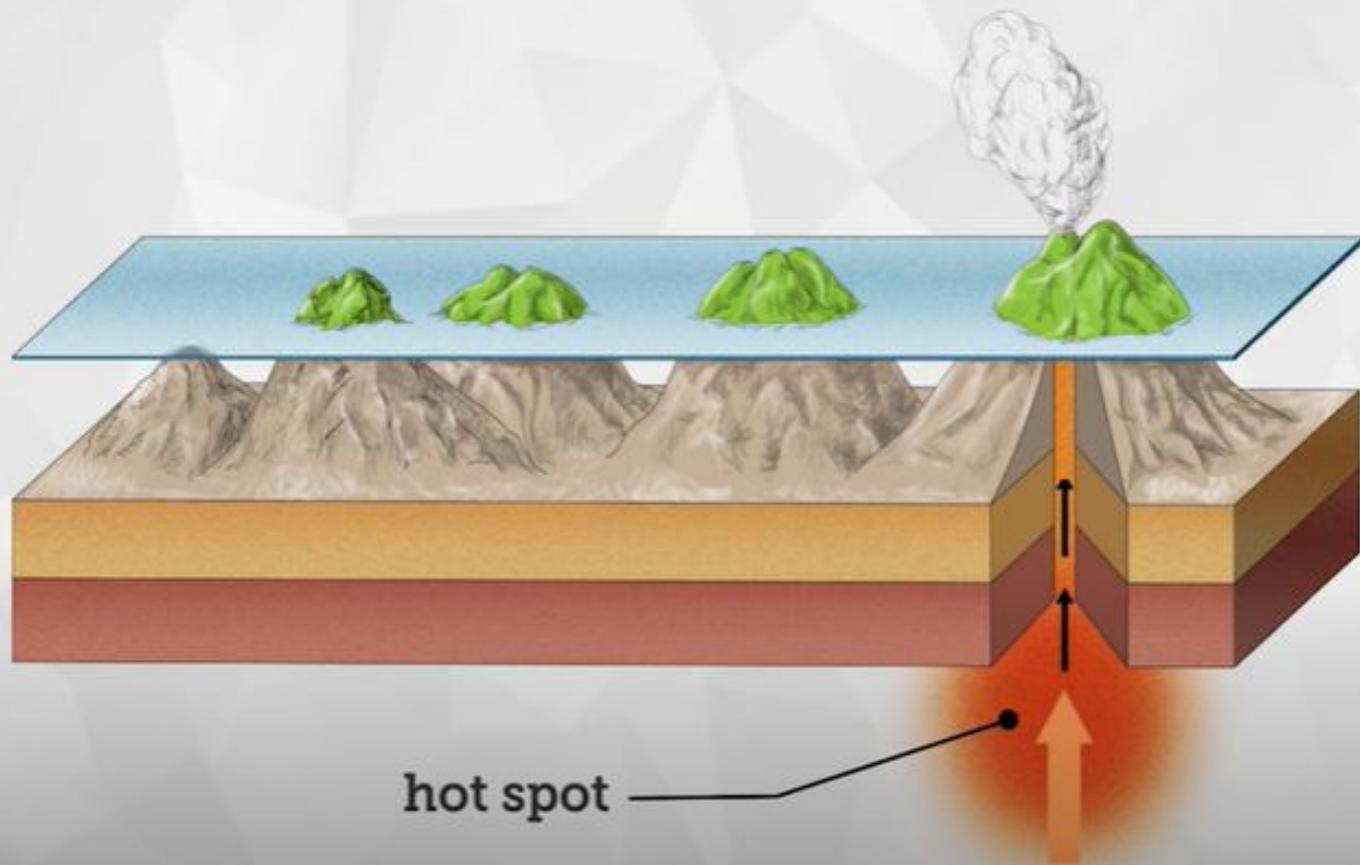
- BASED ON FORM DEVELOPED AT SURFACE (it depends on nature and composition of lava and other ejected materials)

- CINDER OR ASH CONES
- SHIELD VOLCANO
- COMPOSITE VOLCANO
- CALDERA
- MID-OCEANIC RIDGES & GEYDERS AND HOT SPRINGS



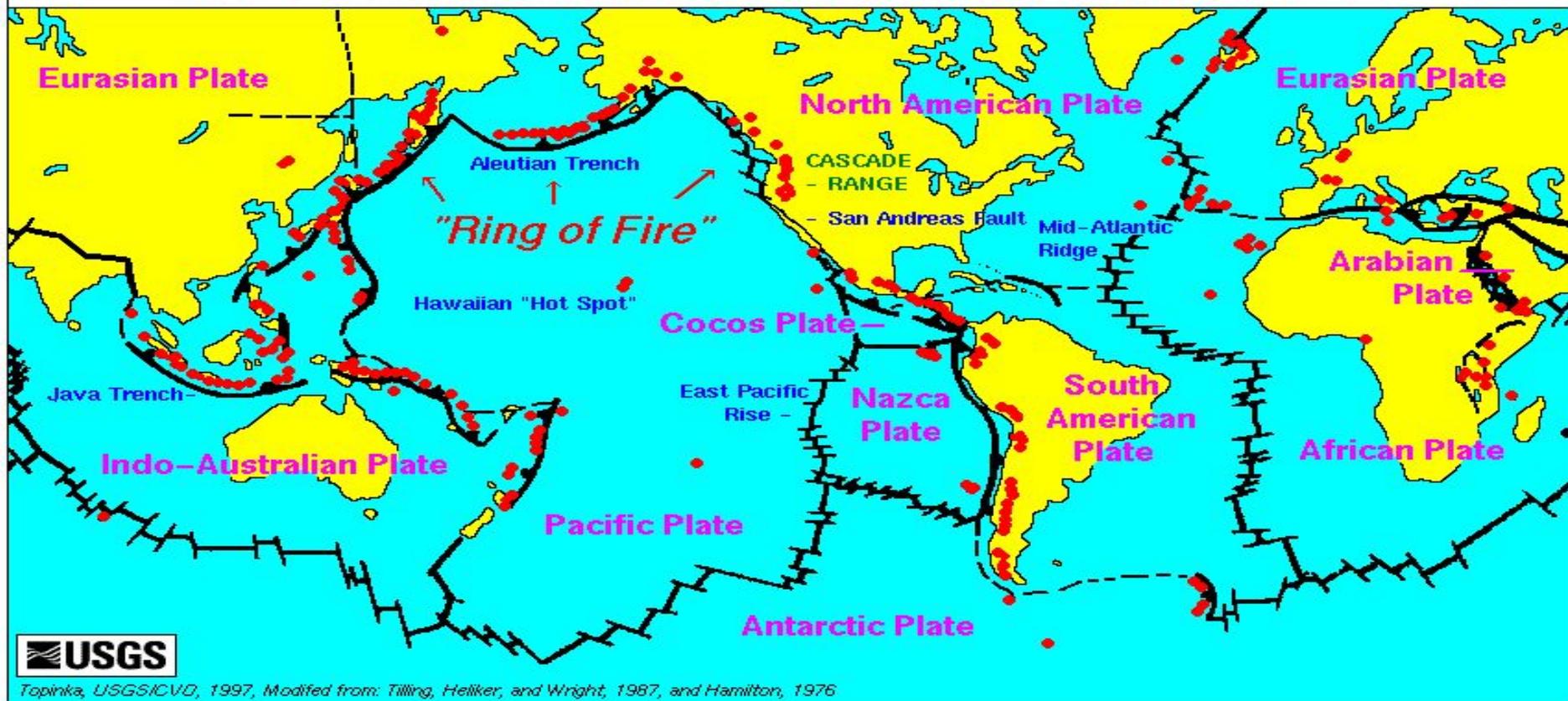


hot spot

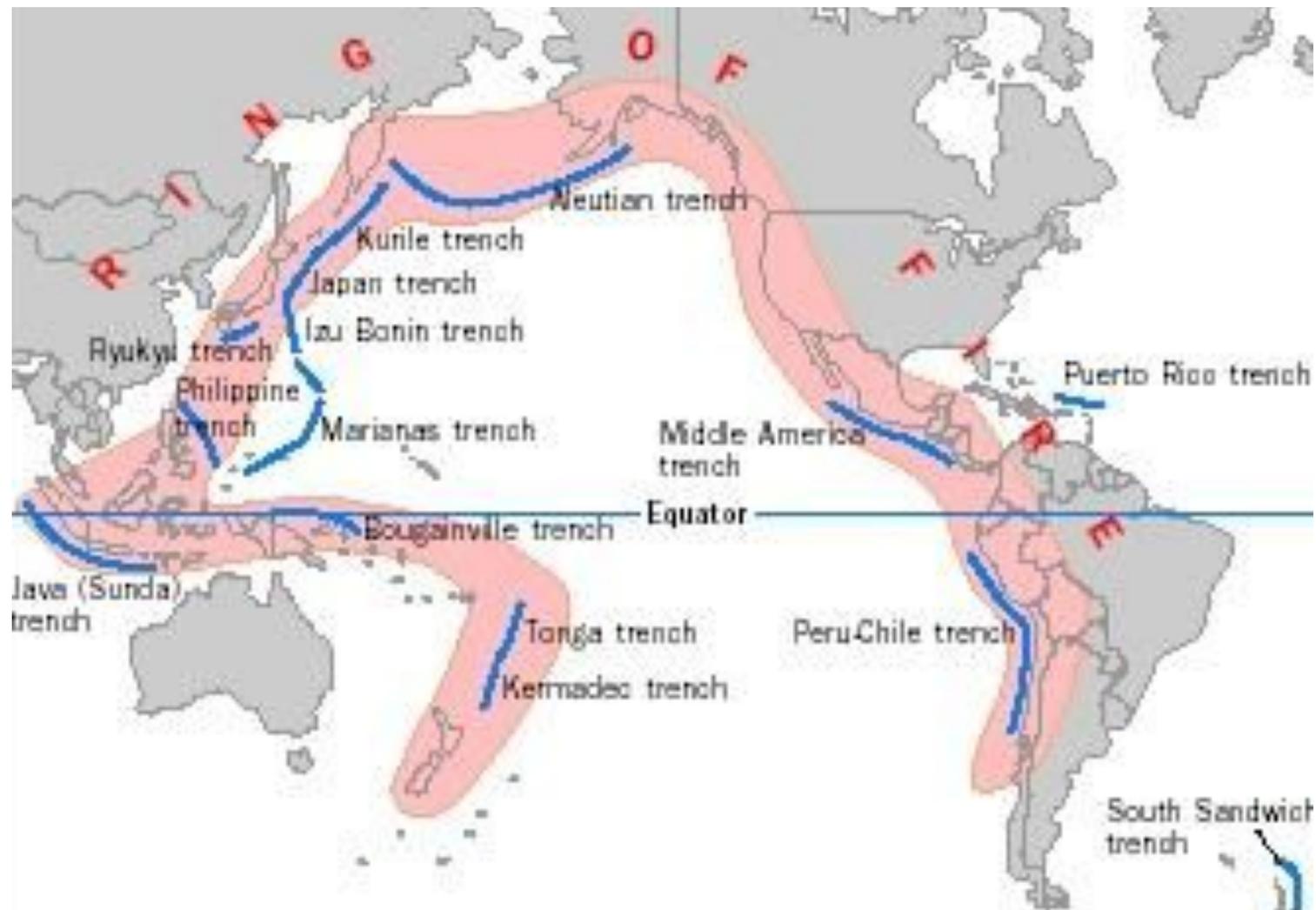


PACIFIC RING OF FIRE

Active Volcanoes, Plate Tectonics, and the "Ring of Fire"

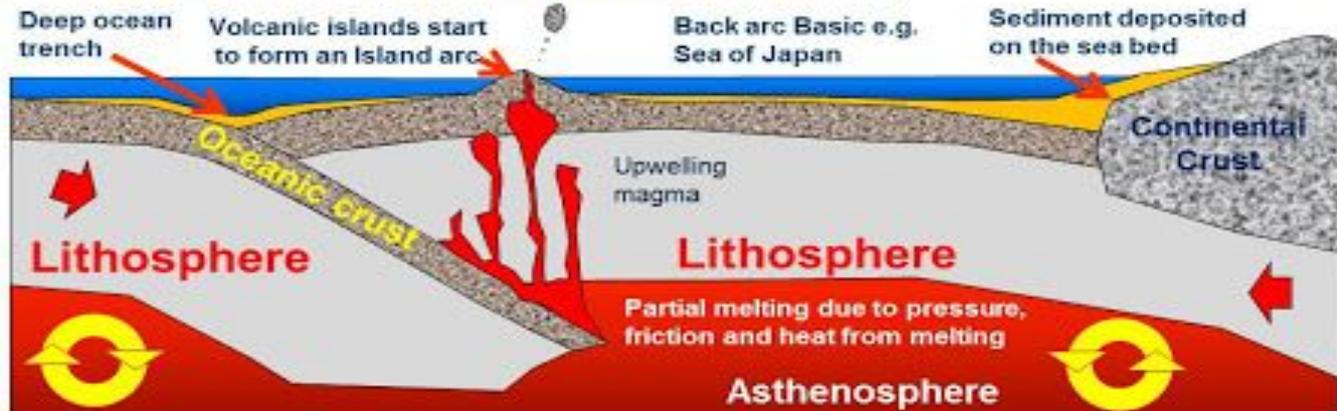


TRENCH



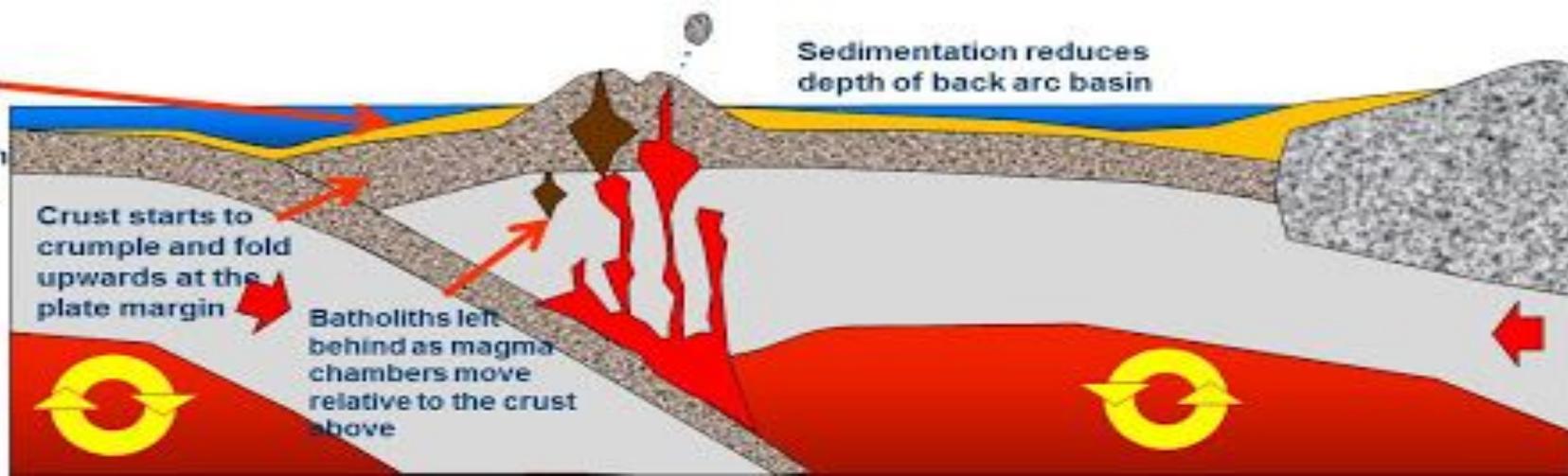
Islands Arcs and Festoons

EARLY ISLAND ARC FORMATION



ISLAND ARC DEVELOPMENT

Sedimentation continues to decrease ocean depth close to island arc creating an accretionary prism



ROCKS

The Earth's crust is made up of three types of rocks:

1. **Igneous rocks**

formed by solidification of magma

2. **Sedimentary rocks**

formed by deposition of eroded material in layers

3. **Metamorphic rocks**

changed rocks formed under high temperature & pressure conditions.



Gneiss



Slate



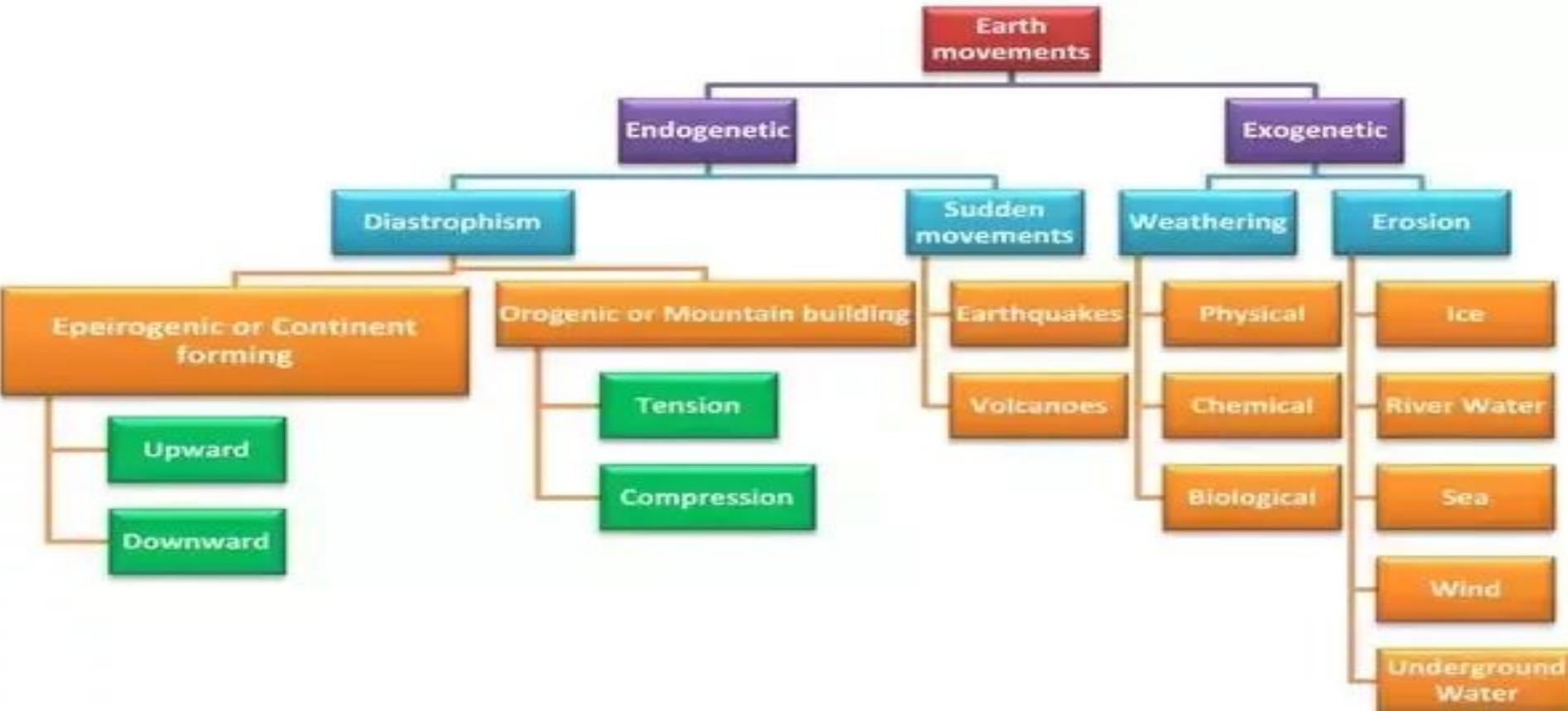
Schist



Marble

MOUNTAIN BUILDING & EARTH'S MOVEMENTS

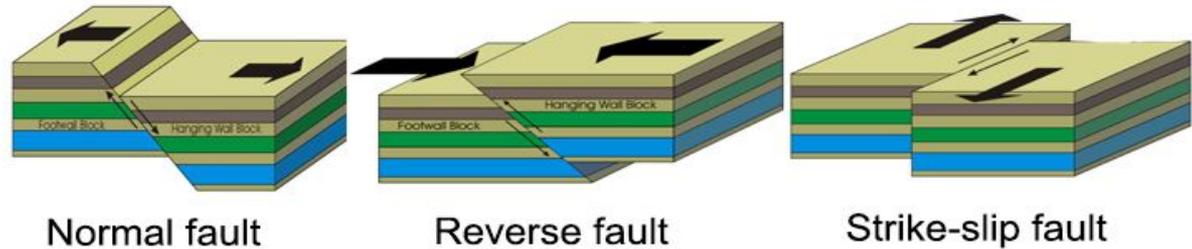
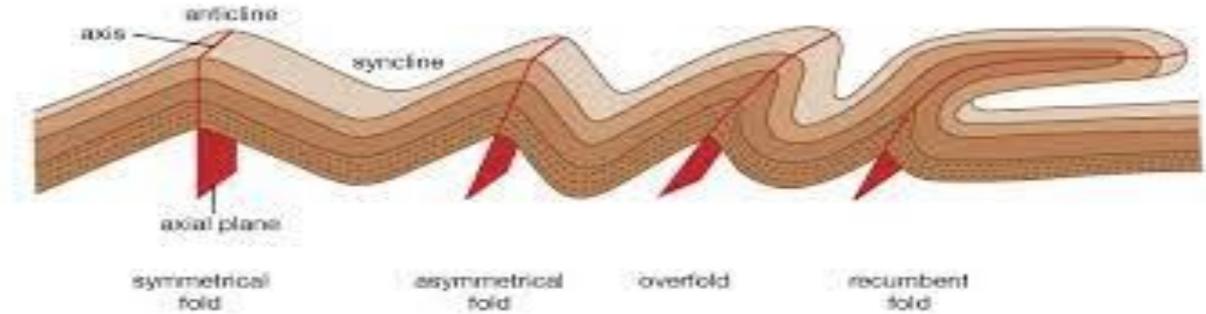
- Forces often affect and change the face of earth.



ENDOGENETIC FORCES

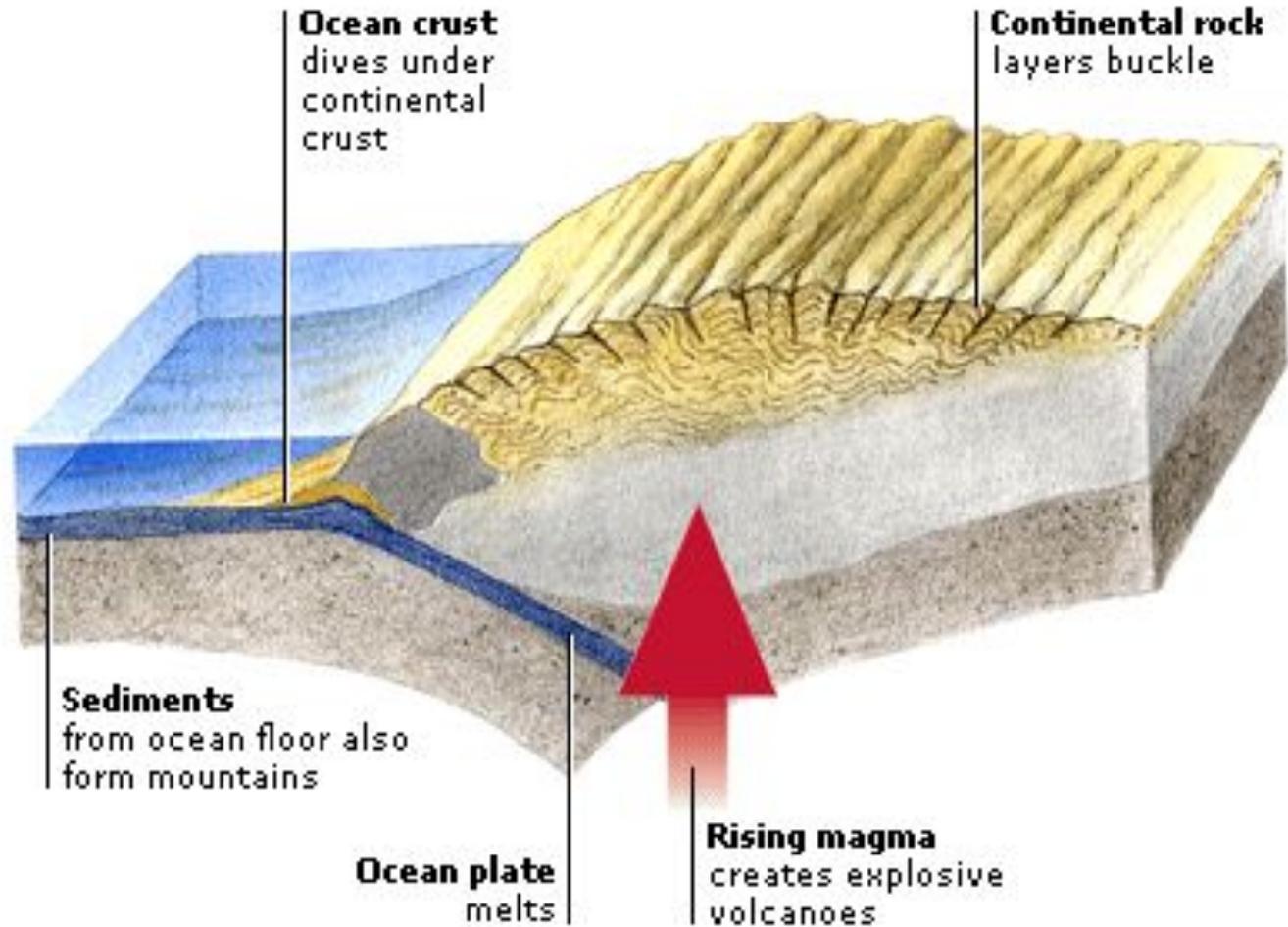
They lead to formation of :

- Folds
- Faults
- Rift valley or graben



Process of mountain building involves three processes :

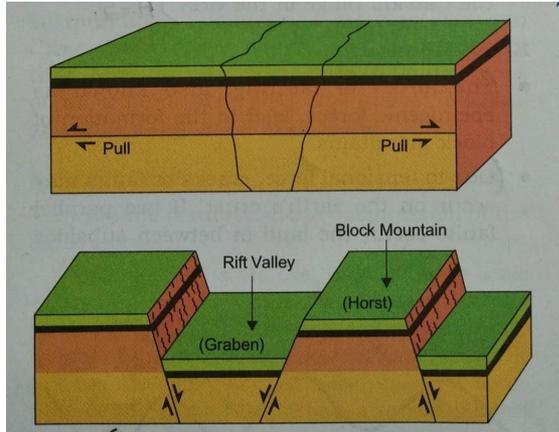
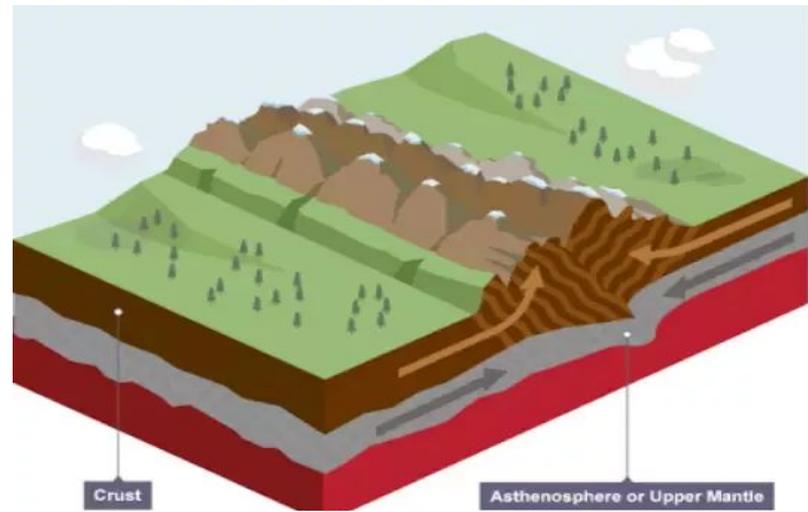
1. Lithogenesis
2. Orogenesis
3. Gliptogenesis



TYPES OF MOUNTAINS

BASED ON MODE OF FORMATION :

1. FOLD MOUNTAIN
2. BLOCK MOUNTAIN
3. VOLCANIC MOUNTAIN
4. RESIDUAL MOUNTAIN

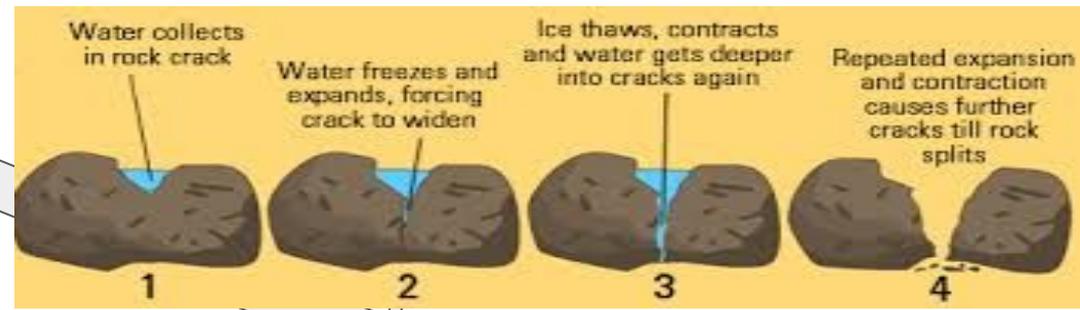


WEATHERING

- Weathering, mass wasting, erosion and deposition are exogenic processes.
- **Weathering** - is process of in situ disintegration and decomposition of rocks.
- While **mass wasting or mass movement** is detachment and downslope transportation of soil & rock material.
- Natural elements that has capability of acquiring and transporting earth materials are called as **geomorphic agents**, and erosional, transportational and depositional processes performed by these are called as **geomorphic processes**.



Types of Weathering



PHYSICAL WEATHERING

- Temperature changes
- Hydraulic action
- Frost action
- Pressure release or exfoliation

CHEMICAL WEATHERING

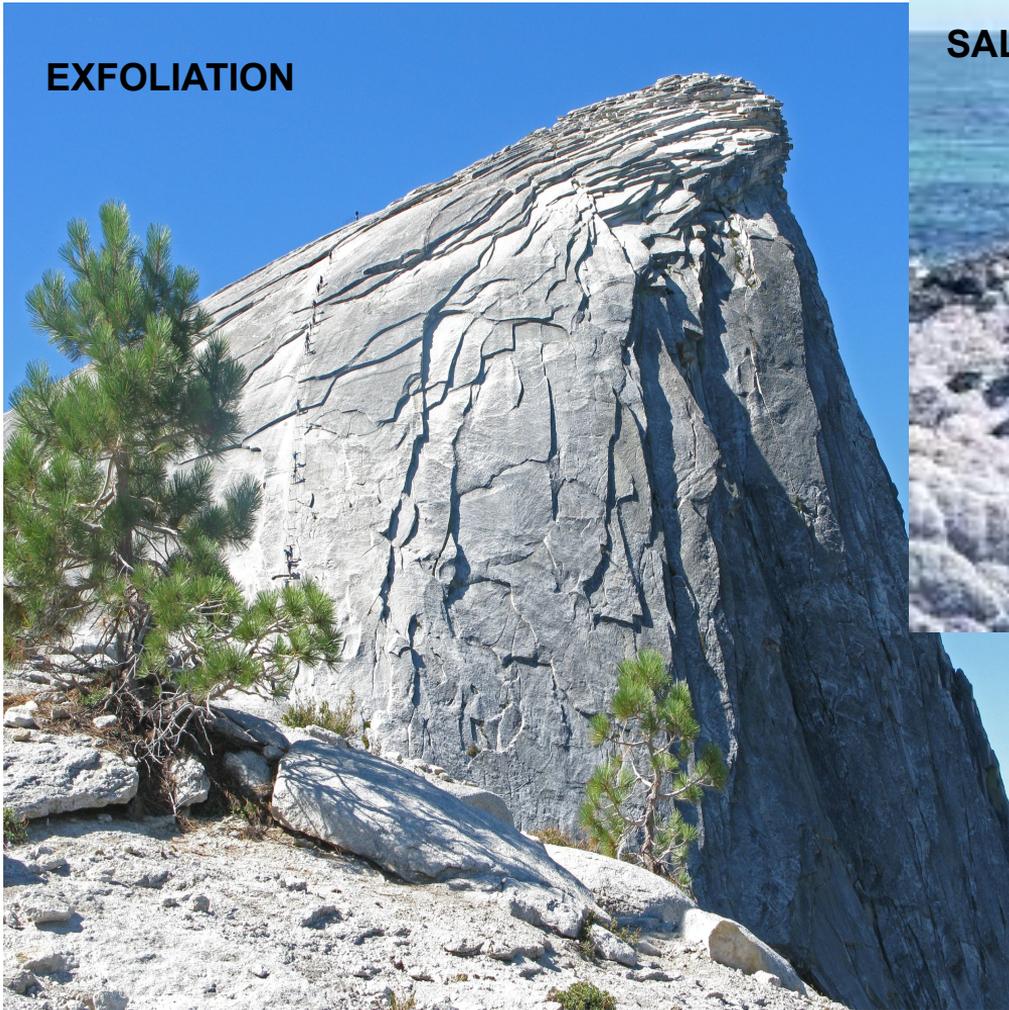
- Solution
- Oxidation
- Carbonation
- Hydration and hydrolysis
- chelation

BIOLOGICAL WEATHERING

- Faunal
- Floral
- Anthropogenic



EXFOLIATION

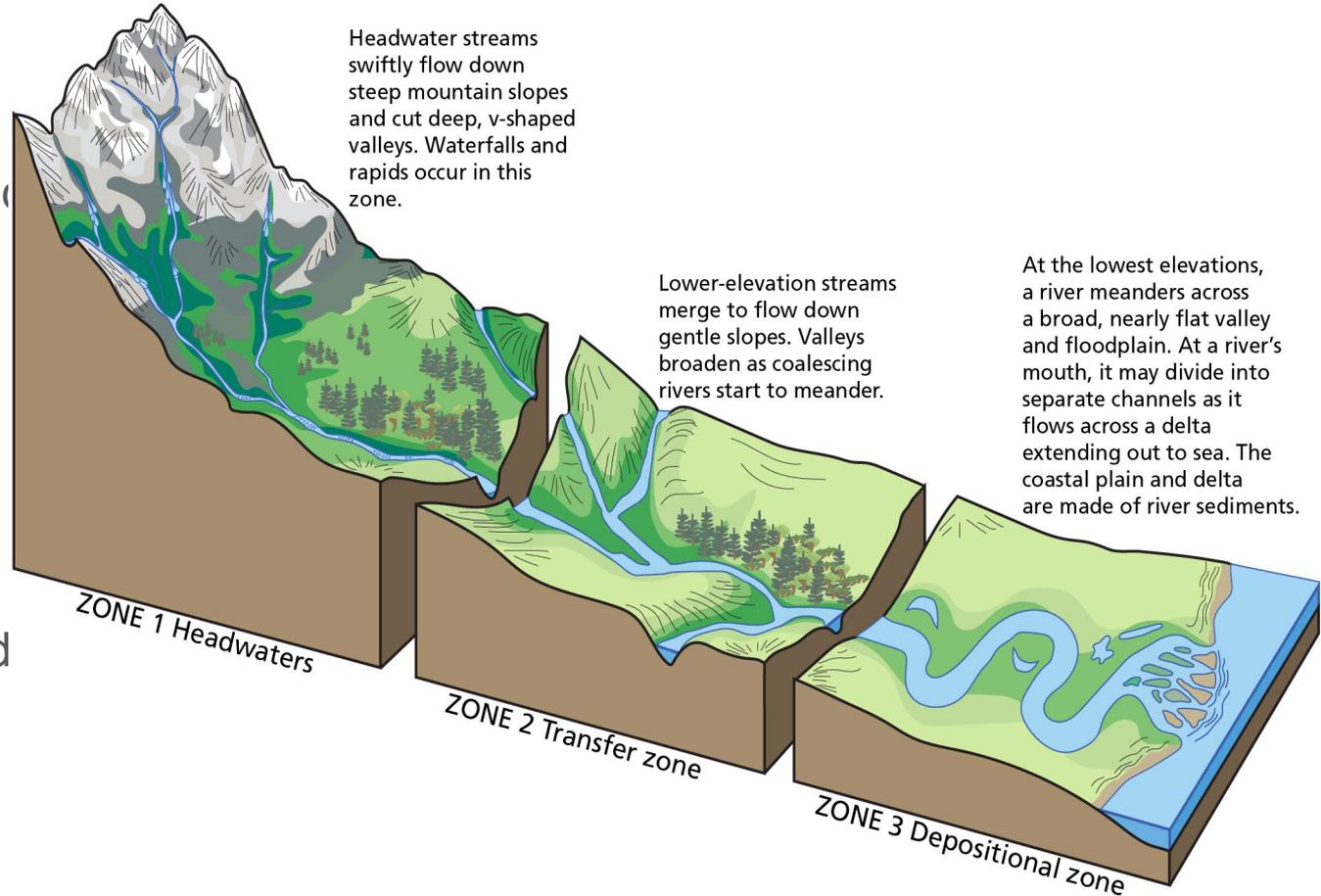


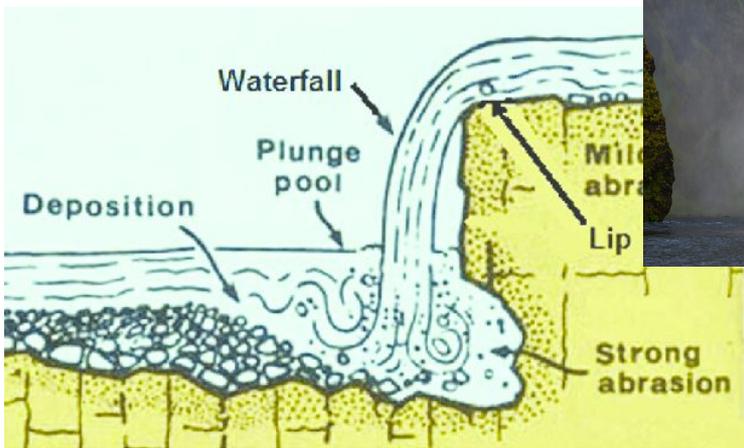
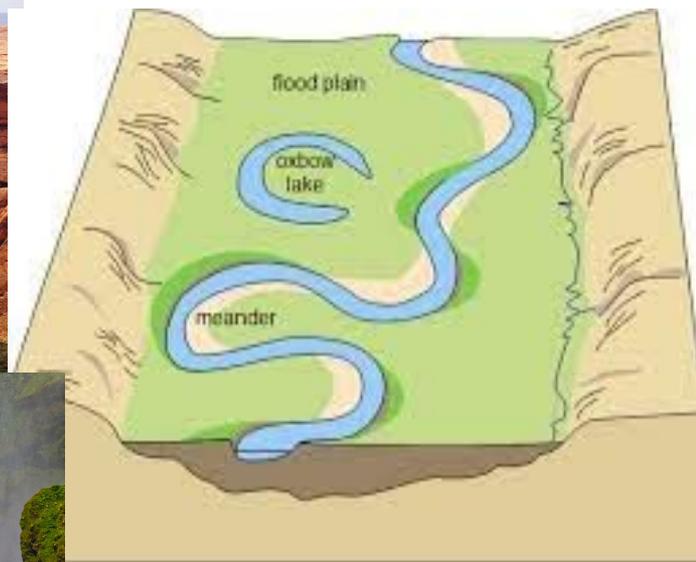
SALT WEATHERING



FLUVIAL LANDFORMS

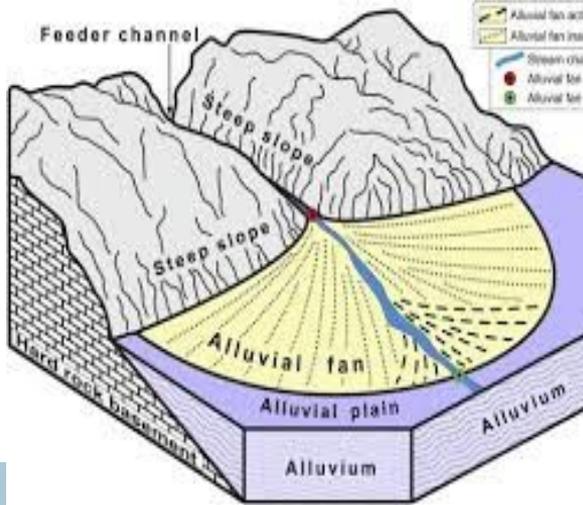
- They are the landforms generated by running waters, usually rivers.
- They can be erosional (by solution, abrasion and attrition), transportational and depositional landforms.



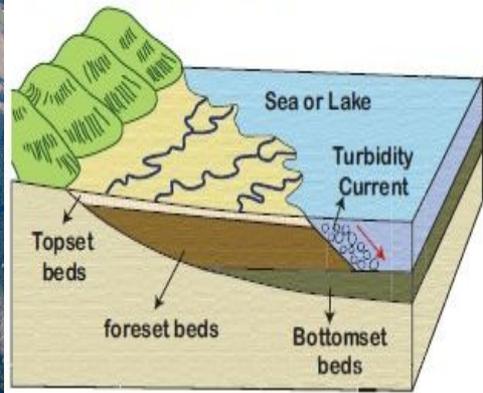


River and Glacial Valleys





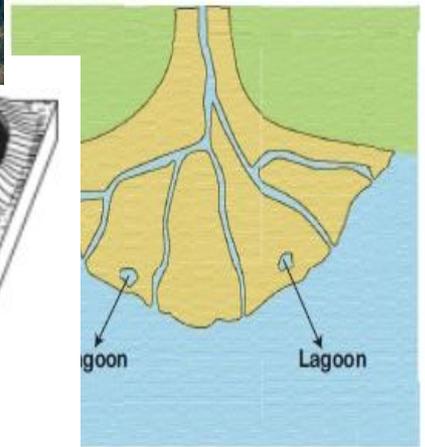
(a) Structure of a simple delta



(b) Cusate delta



(c) Arcuate delta



(d) Bird's foot delta

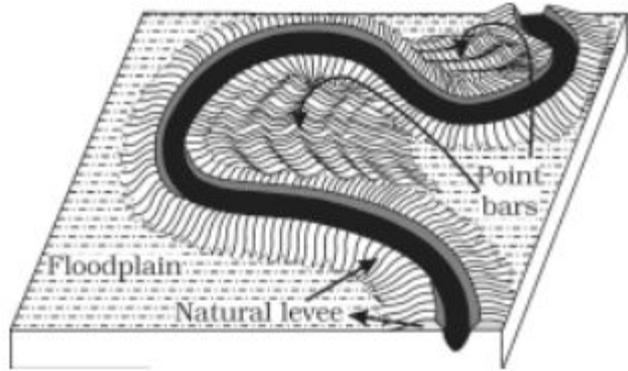
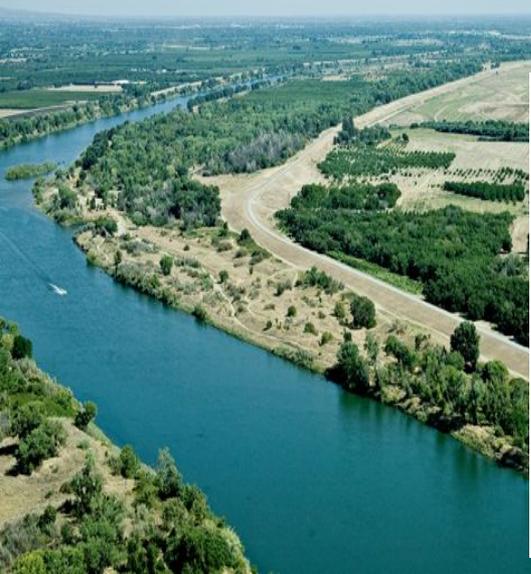


Figure 7.6 : Natural levee and point bars

Types of Delta

KARST LANDFORMS

- Action of groundwater through solution and deposition processes on limestone or dolomite region - results into rugged topography called karst topography.
- Limestone are more susceptible to dissolution under the process of carbonation.

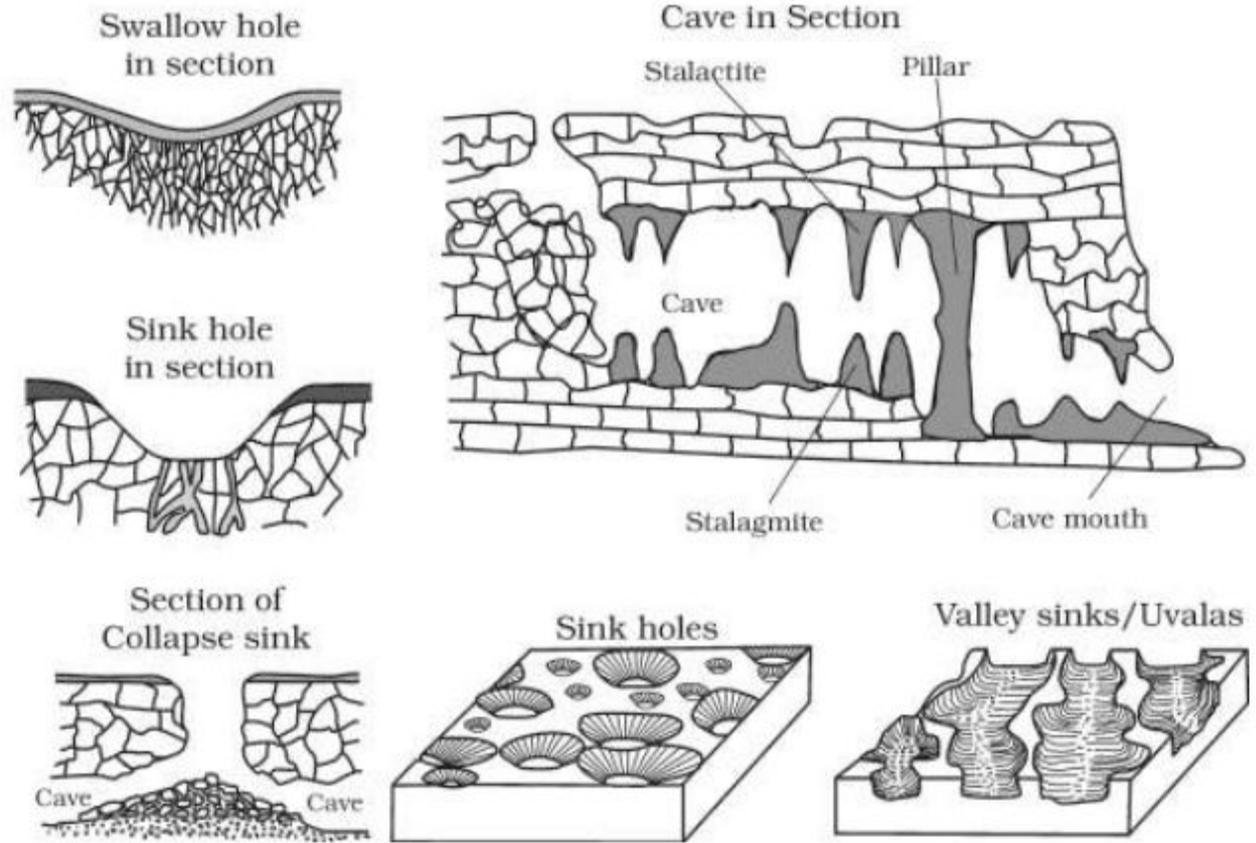
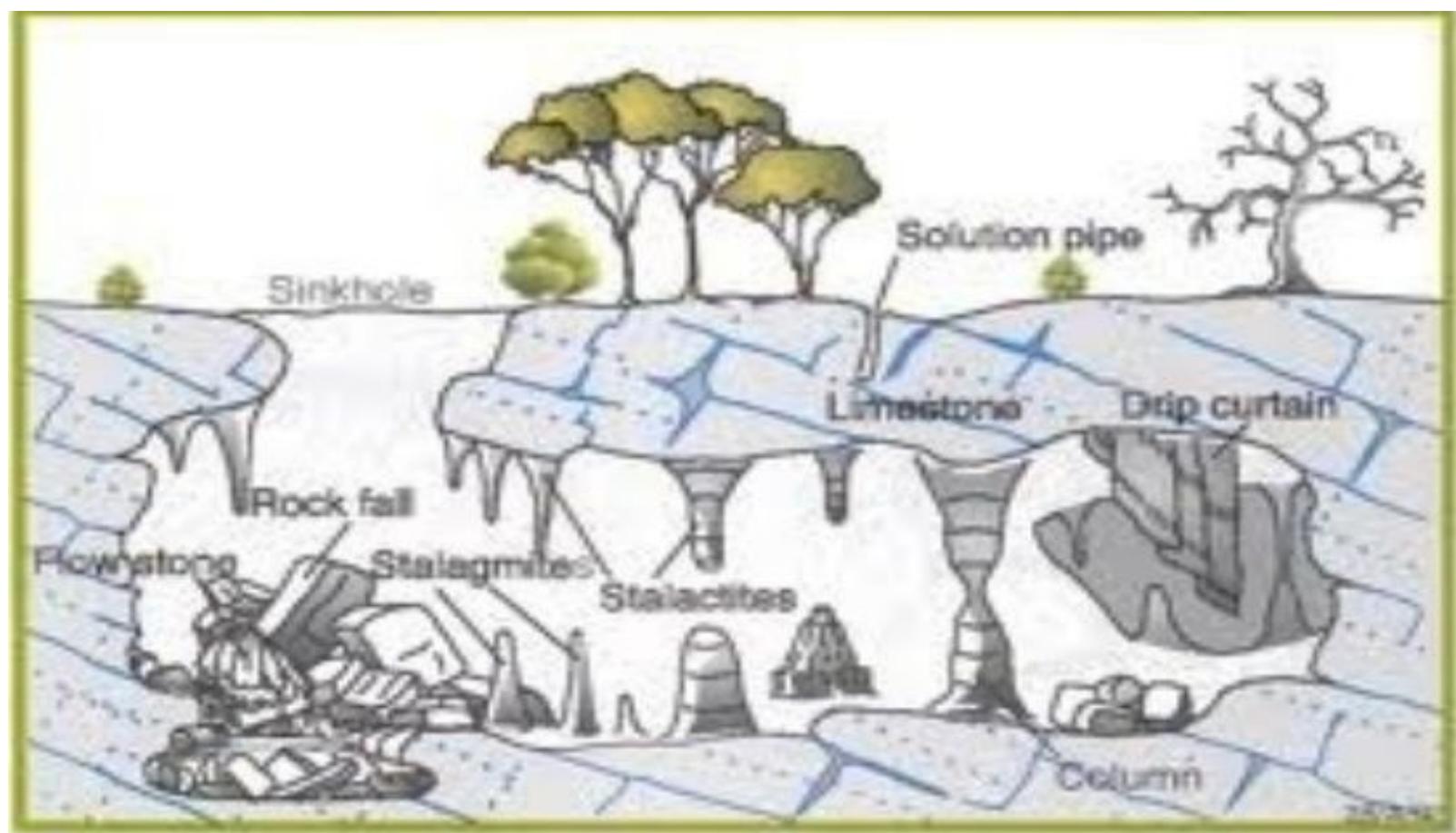
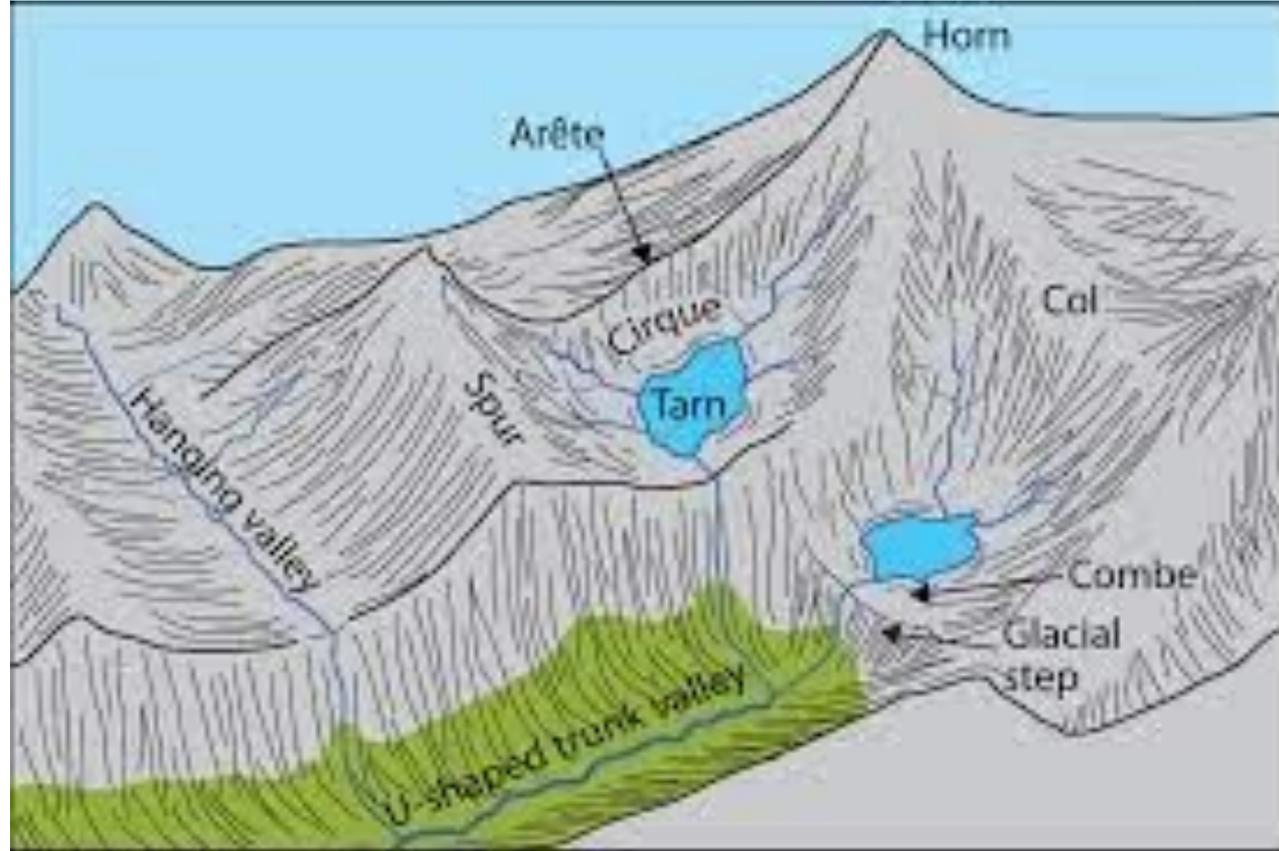


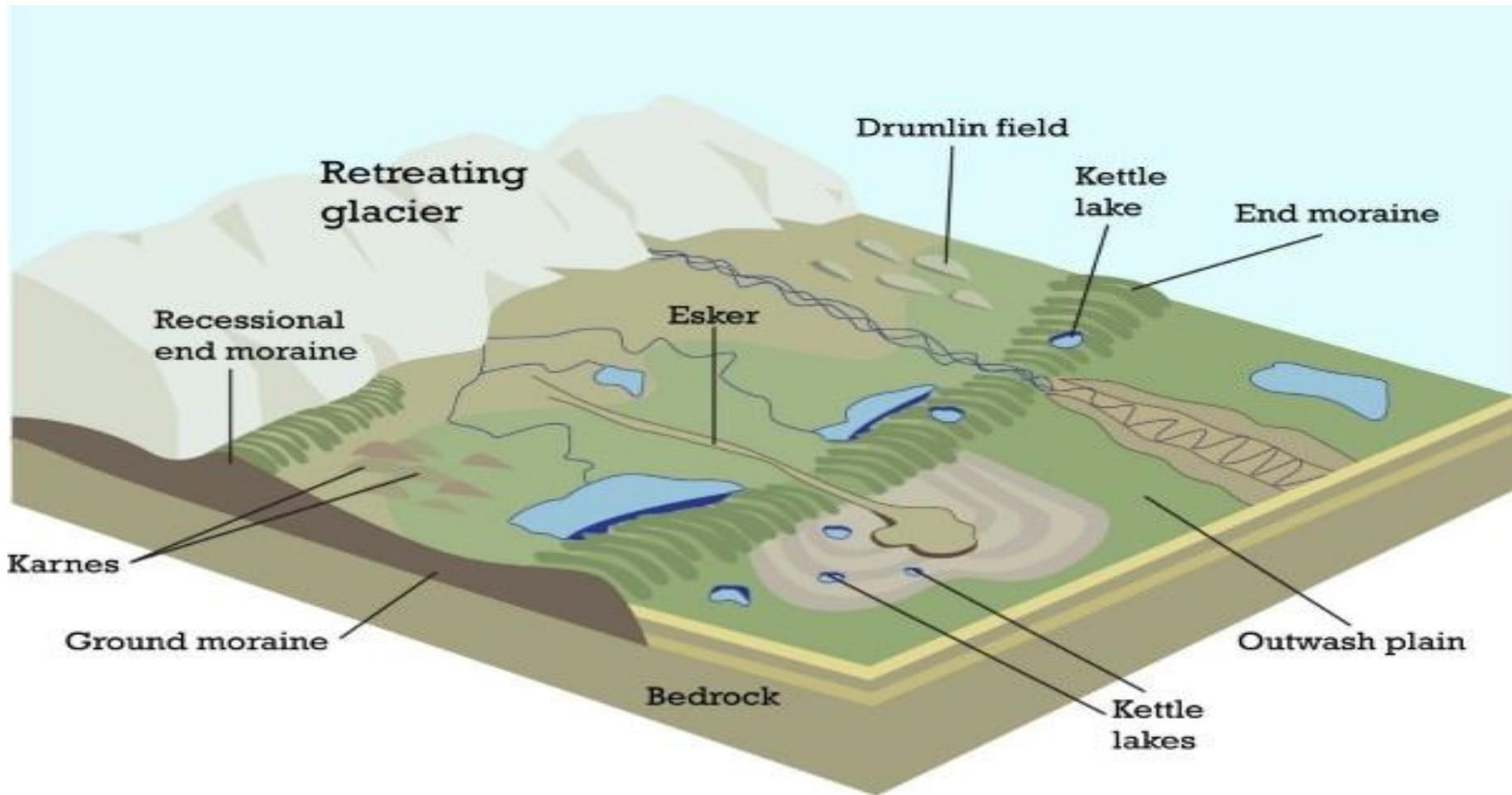
Figure 7.10 : Various karst features



Glacial landforms

- These landforms are created due to downslope movement of vast sheets of ice.
- They are predominantly created in temperate and arctic zones of earth.
- Movement of glaciers is quite slow, under the force of gravity.





AEOLIAN LANDFORMS

- Landforms formed due to erosion and deposition by winds, are called as Aeolian landforms.
- They are mostly found in arid and semi-arid region, as wind the dominating geomorphic agent there.
- Winds cause deflation, abrasion and impact erosion.





Zeugen



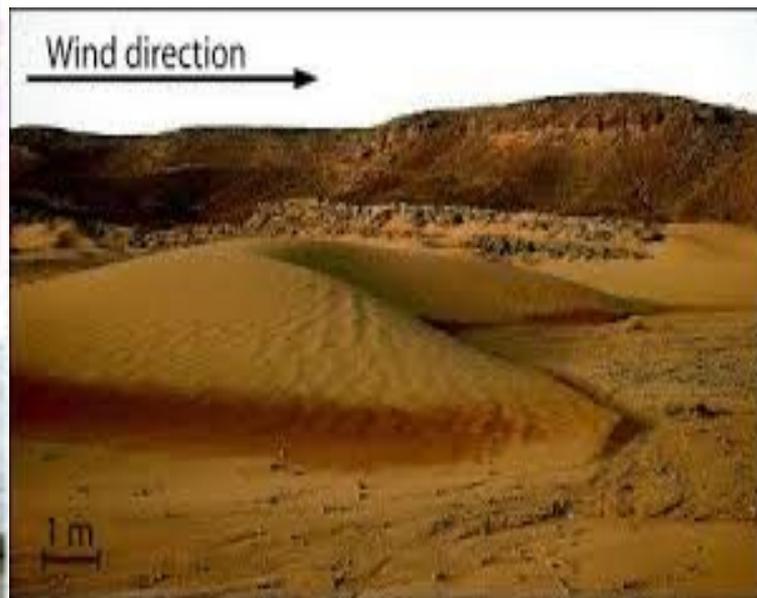
Yardangs



Blow Outs



Inselbergs



COASTAL LANDFORMS

- These are the landforms created by the agents like sea waves, oceanic currents, tidal waves and tsunamis.

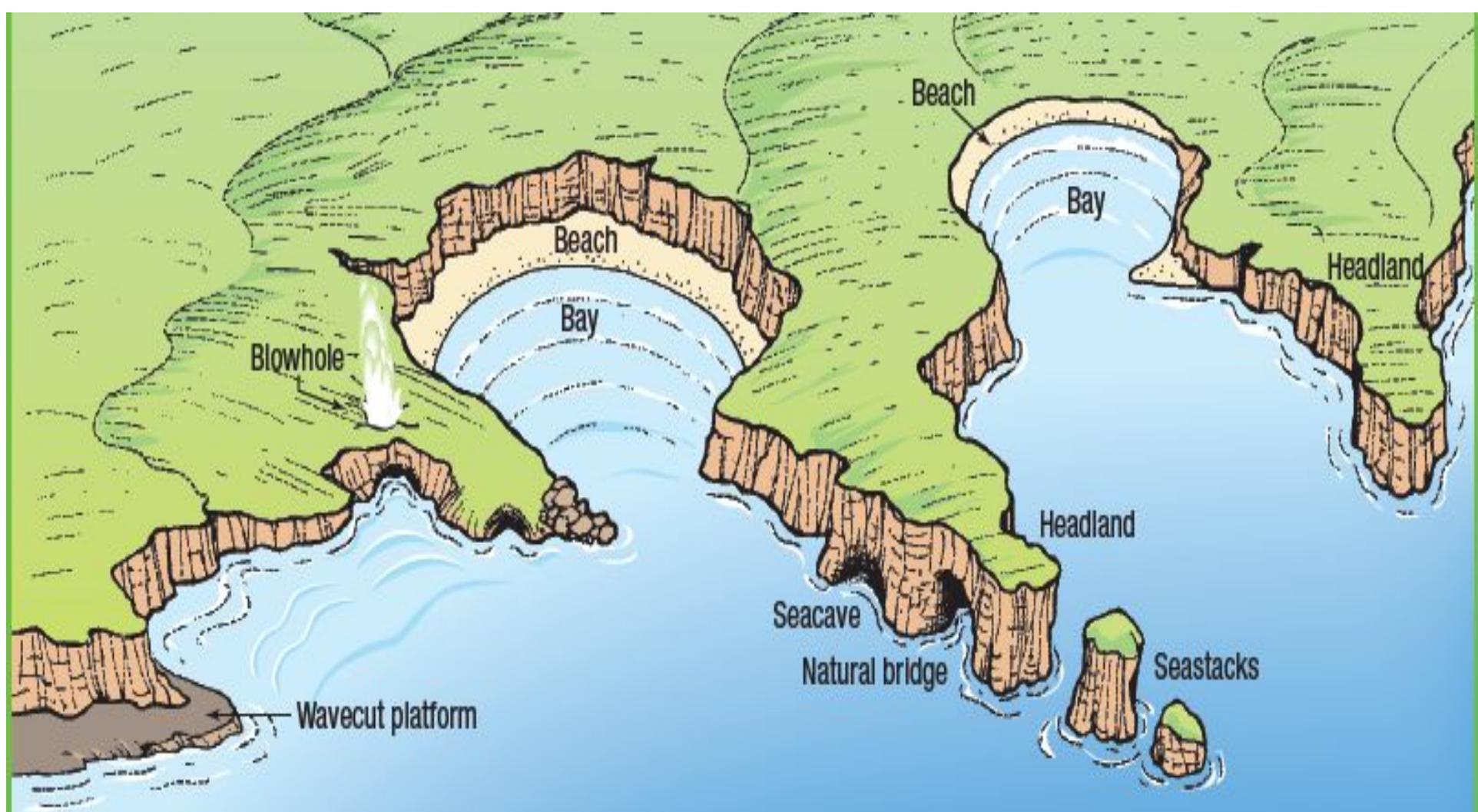
- Erosional features-

Capes and bays, cliffs & wave-cut platforms, cave, arch, stack and stump.

- Depositional features

Beaches, spits & bars, marine dunes





Q1. Consider the following statements:

1) The Earth's magnetic field has reversed every few hundred thousand years.

2) When the Earth was created more than 4000 million years ago, there was 54% oxygen and no carbon dioxide.

3) When living organisms originated, they modified the early atmosphere of the Earth.

Which of the statements given above is/are correct?

(a) 1 only

(b) 2 and 3 only

(c) 1 and 3 only

(d) 1,2 and 3

2. Which of the following phenomena might have influenced the evolution of organisms?

- 1) Continental drift
- 2) Glacial cycles

Select the correct answer using the code given below.

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) neither 1 nor 2

Q3. On the planet earth, most of the freshwater exists as ice caps and glaciers. Out of the remaining freshwater, the largest proportion

- (a) Is found in atmosphere as moisture and clouds
- (b) Is found in freshwater lakes and rivers
- (c) Exists as groundwater
- (d) Exists as soil moisture

4. Consider the following:

1. Electromagnetic radiation
2. Geothermal energy
3. Gravitational force
4. Plate movements
5. Rotation of the earth
6. Revolution of the earth

Which of the above are responsible for bringing dynamic changes on the surface of the earth?

- (a) 1, 2, 3 and 4 only
- (b) 1, 3, 5 and 6 only
- (c) 2, 4, 5 and 6 only
- (d) 1, 2, 3, 4, 5 and 6 only

5. The Brahmaputra, Irrawaddy and Mekong rivers originate in Tibet and flow through narrow and parallel mountain ranges in their upper reaches. Of these rivers, Brahmaputra makes a "U" turn in its course to flow into India. This "U" turn is due to :

(a) Uplift of folded Himalayan series

(b) Syntaxial bending of geologically young Himalayas

(c) Geo-tectonic disturbance in the tertiary folded mountain chains

(d) Both (a) and (b) above

8. Match List I with List II and select the correct answer using the code given below the lists:

List-I (Geographic List-II (Country) feature)

- | | |
|--------------------------|----------------|
| A. Great Victoria Desert | 1. Australia |
| B. Grand Canyon | 2. Canada |
| C. Lake Winnipeg | 3. New Zealand |
| D. Southern Alps | 4. USA |

Codes:

- (a) A-1; B-2; C-4; D-3
- (b) A-1; B-4; C-2; D-3
- (c) A-3; B-2; C-4; D-1
- (d) A-3; B-4; C-2; D-1

10. Consider the following geological phenomena:

- 1) Development of a fault
- 2) Movement along a fault
- 3) Impact produced by a volcanic eruption
- 4) Folding/unfolding of rocks

Which of the above cause earthquakes?

- (a) 1, 2 and 3
- (b) 2 and 4
- (c) 1, 3 and 4
- (d) 1, 2, 3 and 4

11. Consider the following statements:

- 1) Most magmas are a combination of liquid, solid and gas
- 2) Water vapour and carbon dioxide are the principal gases dissolved in a magma.
- 3) Basaltic magma is hotter than the silicic magma.
- 4) The magma solidified between sedimentary rocks in a horizontal position is known as dyke.

Which of these statements are correct?

- (a) 1, 2 and 3
- (b) 1 and 4
- (c) 2, 3 and 4
- (d) 1, 2 and 4

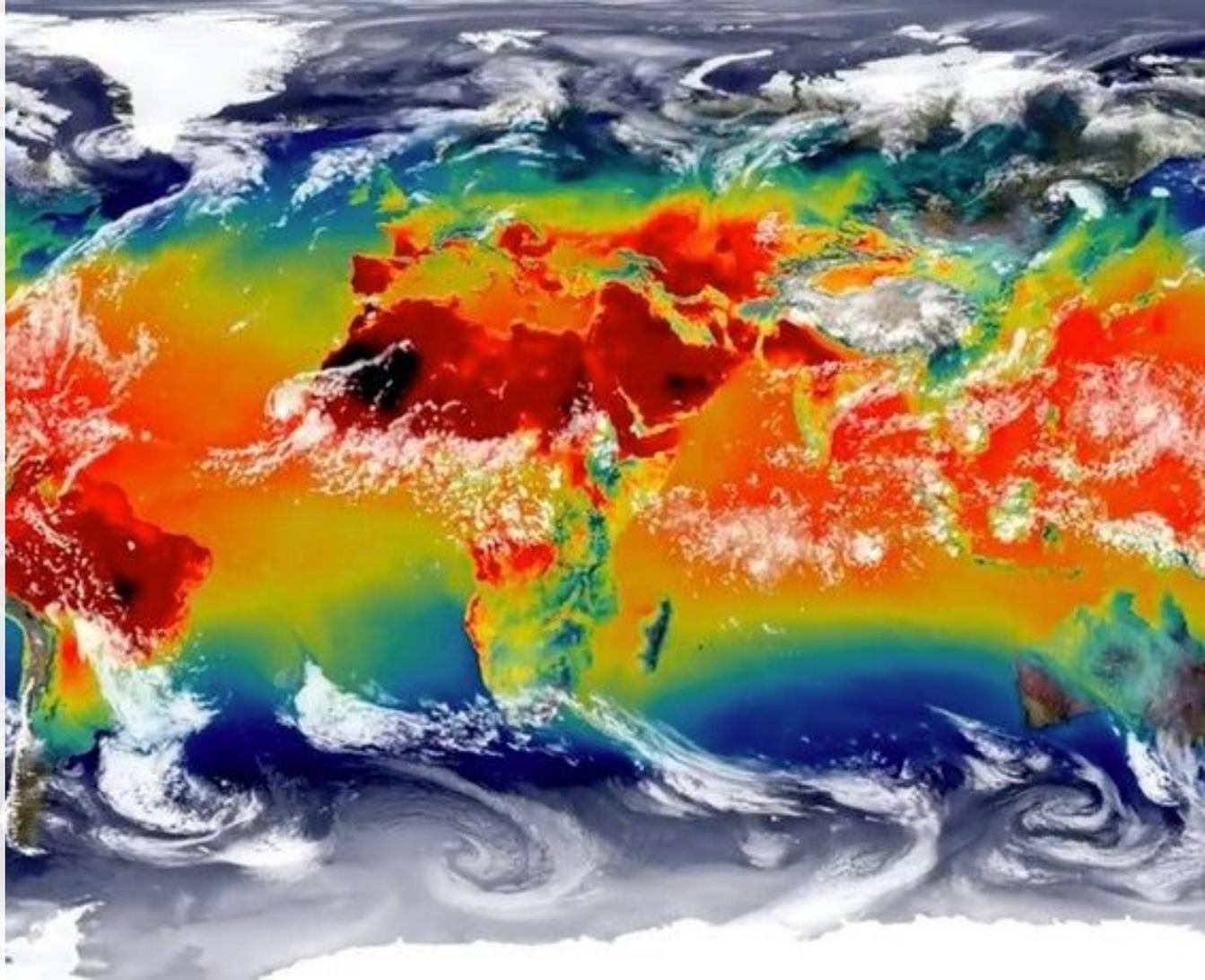


CLIMATOLOGY

CLIMATE

Long term average of weather of a place is called as climate. It is about mean of meteorological variables, taken over temporal and spatial scale.

While weather is about short term atmospheric conditions.

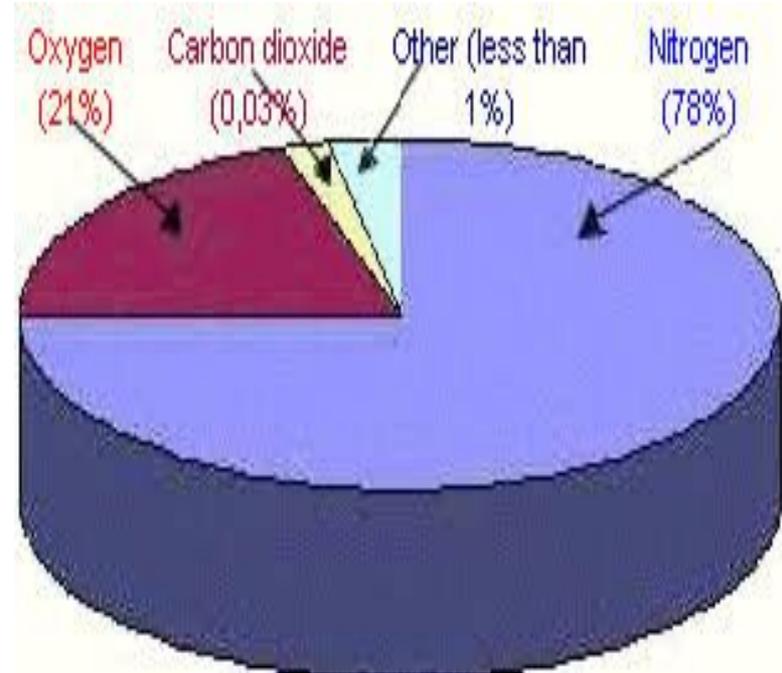


ATMOSPHERE & ITS COMPOSITION

- Atmosphere is an envelope of gases and vapours all around the earth, hanging there because of the gravitational force of earth.

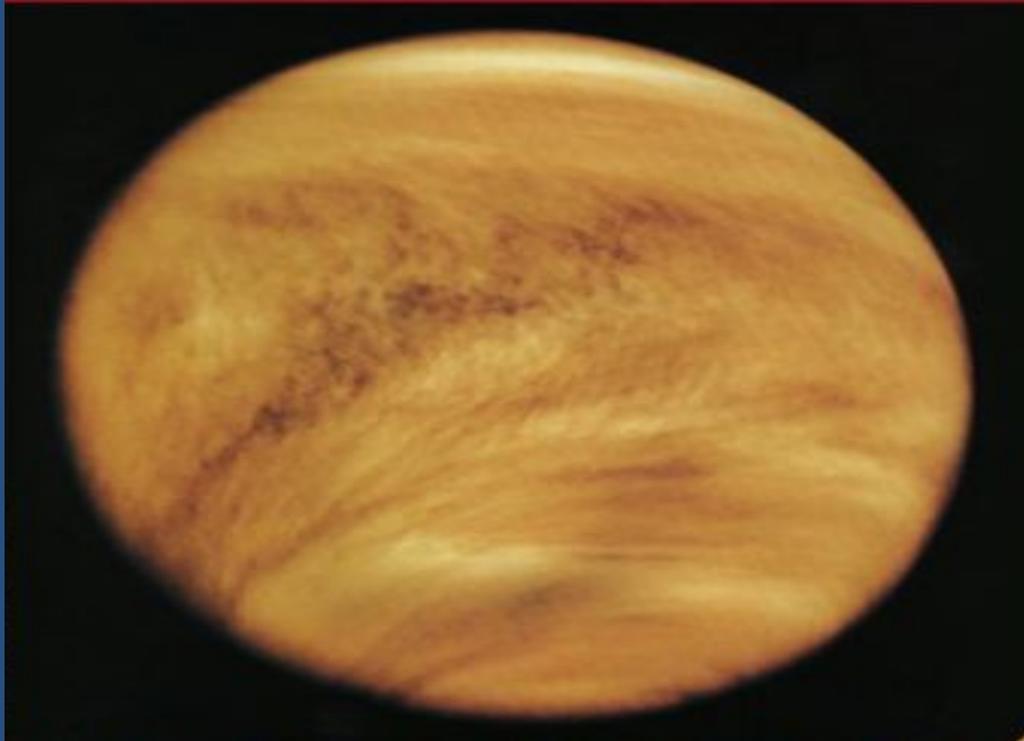
- **Composition of Atmosphere :**

- Nitrogen- 78%
- Oxygen - 21%
- Argon - 0.93%
- Carbon dioxide- 0.03%
- Neon - 0.0018%
- and so on..
- Water vapour is also present and its content ranges from 0 to 5 % by volume. 90% of the total water vapour is found upto 5 km.
- Particulate Matter and pollutants have also become part of atmosphere, over the period of time.





▼ Venus is like Earth in that it has the same mass and water has been detected in its **atmosphere**. But there's never a clear day on Venus. Earth's twin planet is always shrouded in thick clouds of sulfuric acid.



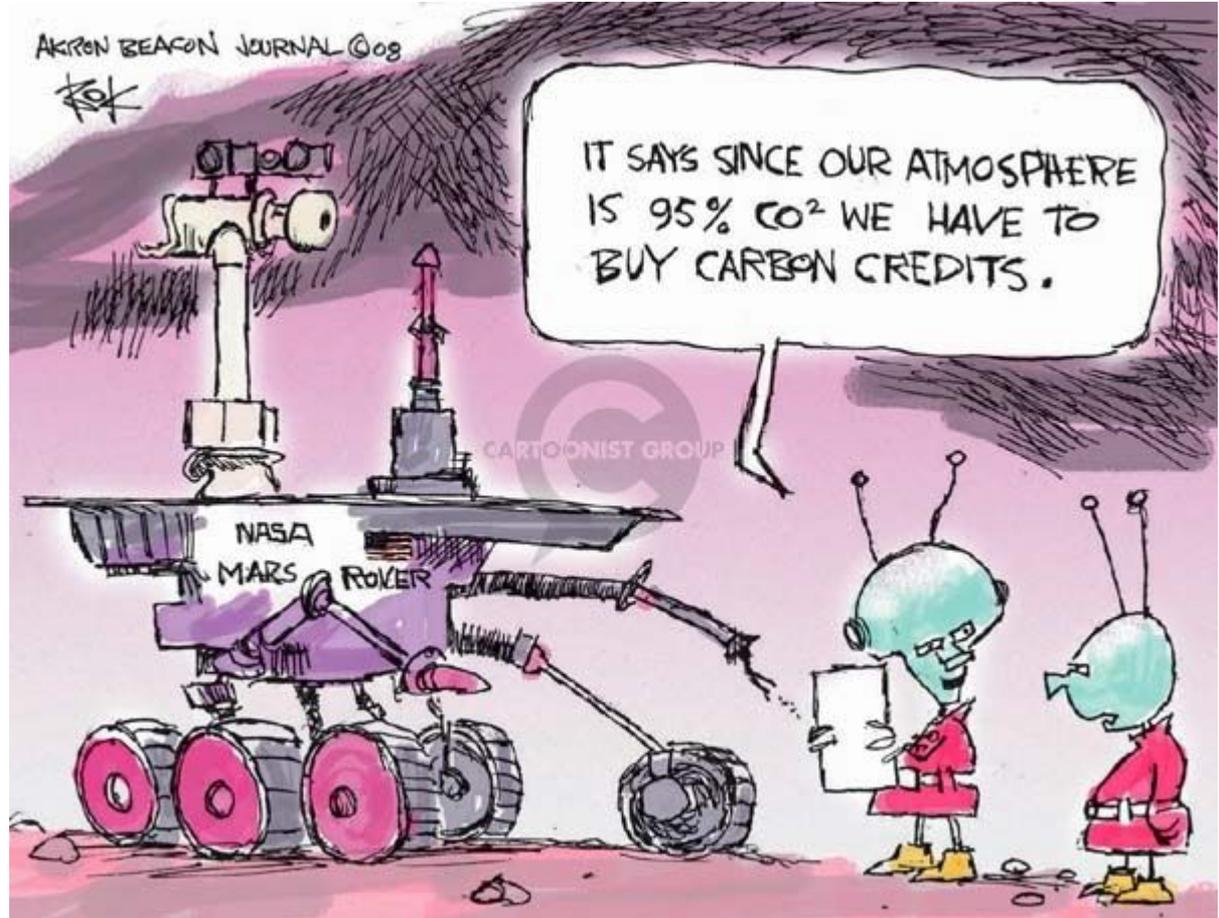
THE EARTH'S ATMOSPHERE
CONSISTS OF 10% OXYGEN
..... 15% NITROGEN
..... AND
75% WI-FI!



ZOLK

Atmosphere of Mars has :

- 95 % - CO₂
- 2.6%- Nitrogen
- 1.9% - Argon





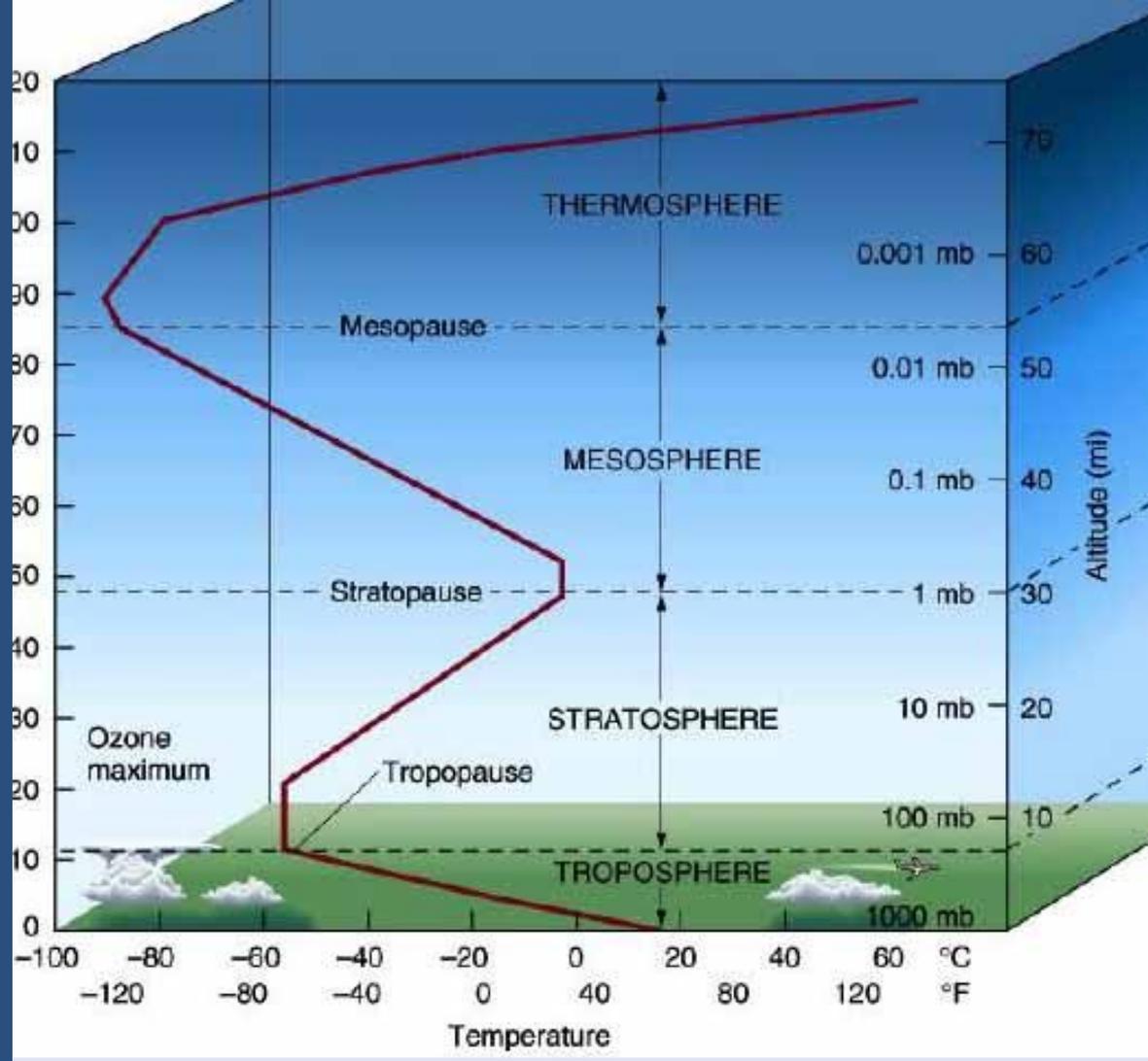
STRUCTURE OF ATMOSPHERE.

ON THE BASIS OF TEMPERATURE AND PRESSURE CHARACTERISTICS

1. TROPOSPHERE
2. STRATOSPHERE
3. MESOSPHERE
4. THERMOSPHERE
5. EXOSPHERE

ON CHEMICAL COMPOSITION BASIS

1. HOMOSPHERE
2. HETEROSPHERE



Exosphere

400

300

200

100

0

Altitude (km)

Thermosphere

Mesosphere

Stratosphere

Troposphere

Satellite

Sounding rocket

Aurora

Air Glow

Noctilucent Clouds
(Polar Mesospheric Clouds)

Nacreous Clouds
(Polar Stratospheric Clouds)

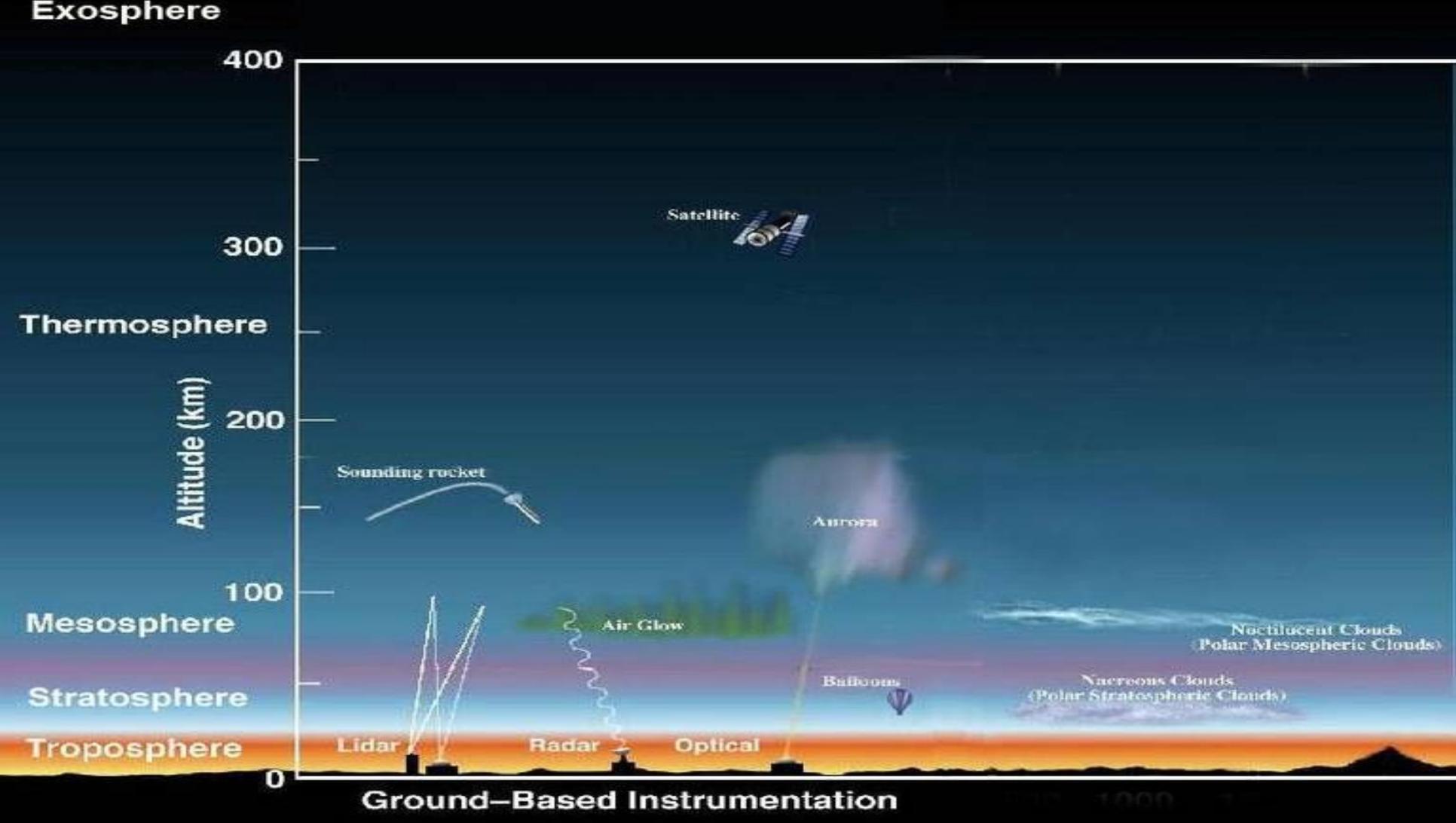
Balloon

Lidar

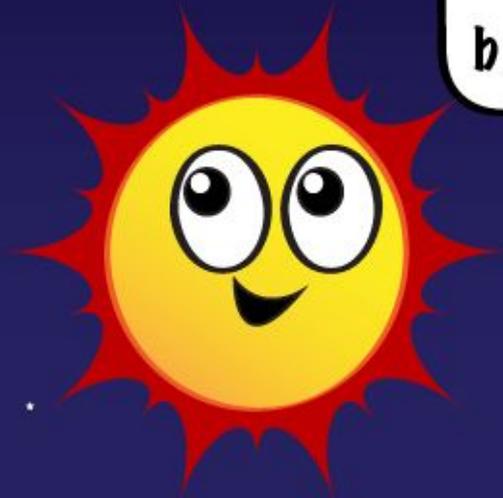
Radar

Optical

Ground-Based Instrumentation



aurora



Yup, it's all
because of me.



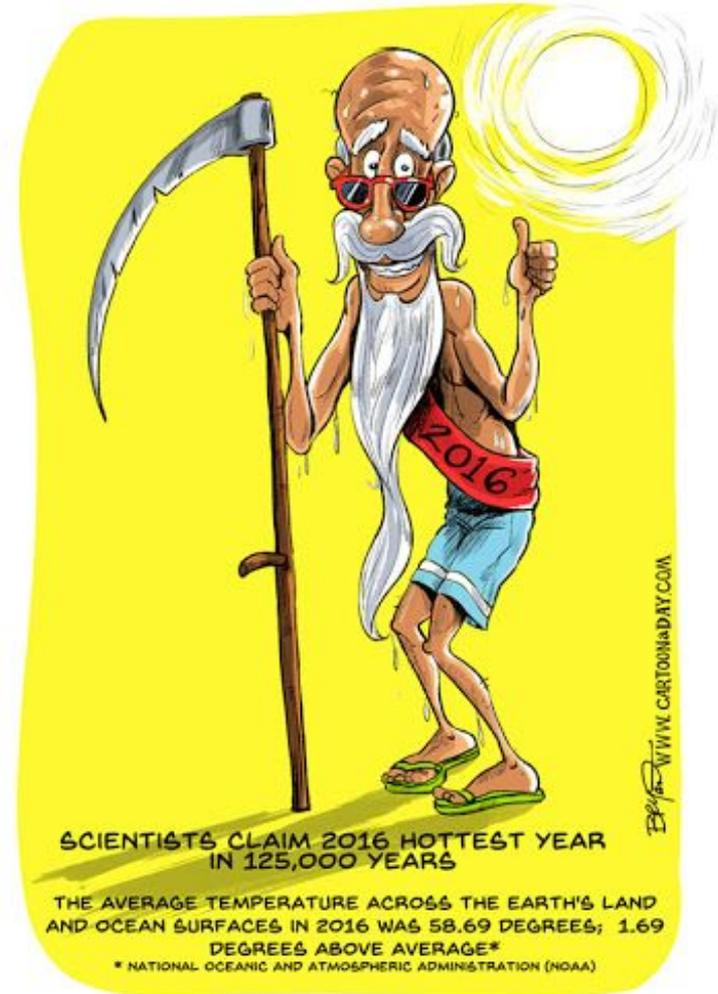


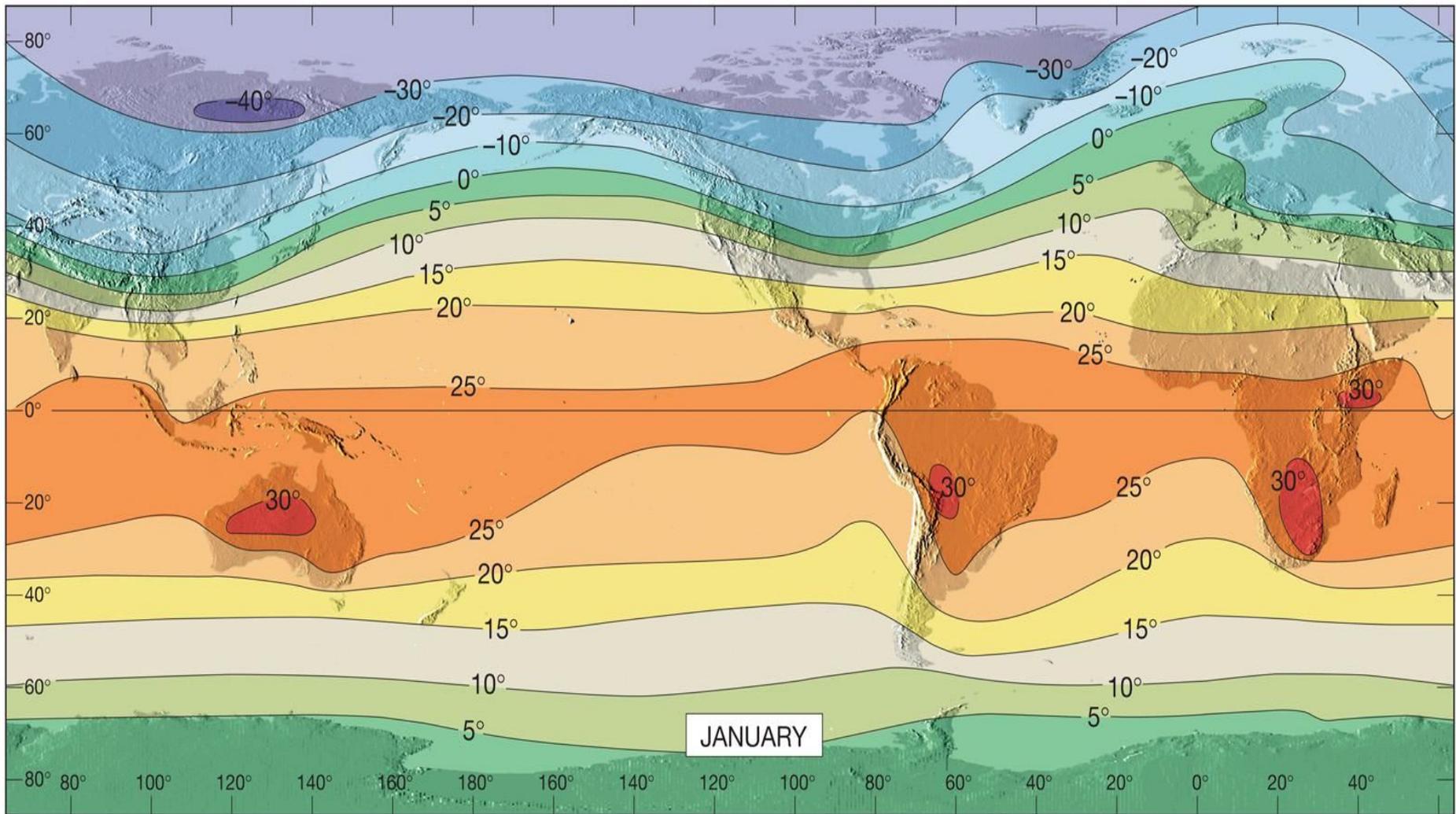
METEOROLOGICAL VARIABLES

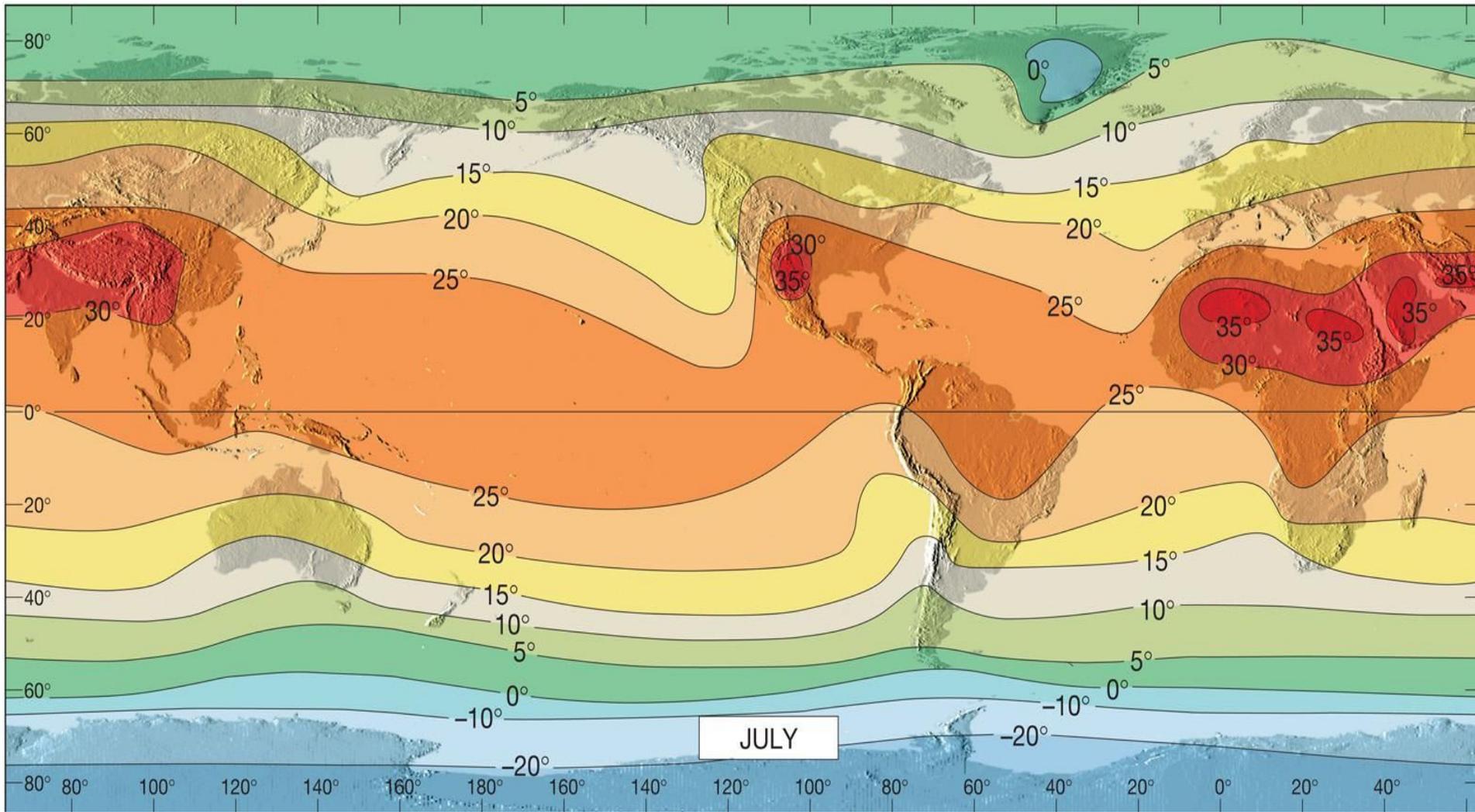
1. TEMPERATURE
2. PRESSURE
3. PRECIPITATION
4. HUMIDITY
5. WIND
6. INSOLATION
7. CLOUDS

Temperature

- Degree of hotness or coldness measured using an instrument called thermometer.
- Measuring units are
 - Degree Fahrenheit
 - Degree Celsius
 - Kelvin
- Sun is the ultimate source of heat on Earth.

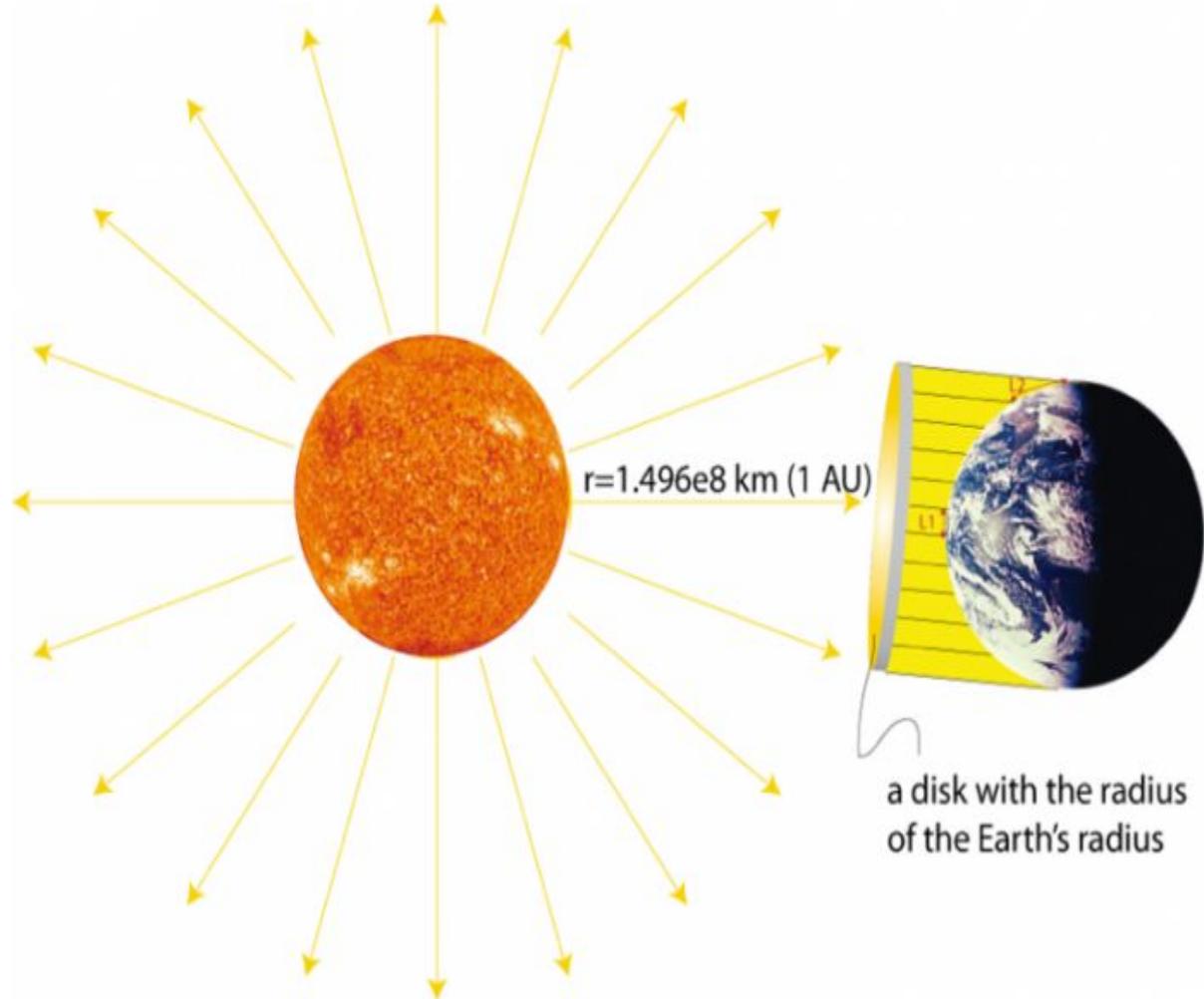






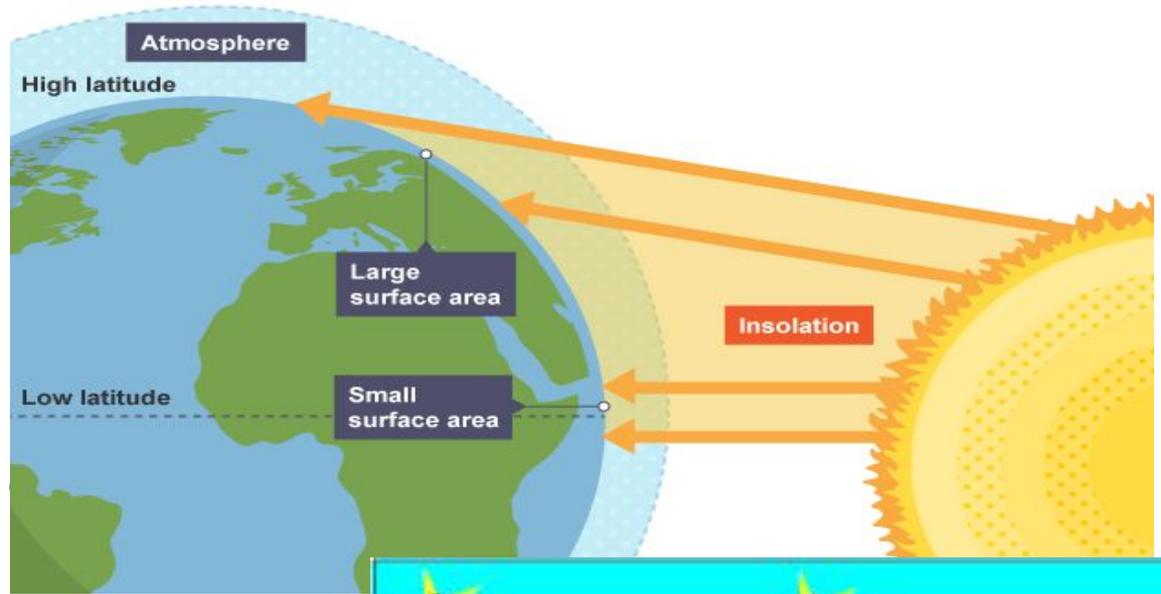
INSOLATION

- It is about “incoming solar radiation” on earth’s surface per unit area per unit time.
- It is given in W/m^2 .
- **Solar constant** - amount of solar radiation received per unit area (at avg. dist.) is more or less constant.
- Sun is the ultimate source of energy for various processes on earth like weathering, biogeochemical cycles, photosynthesis, etc.



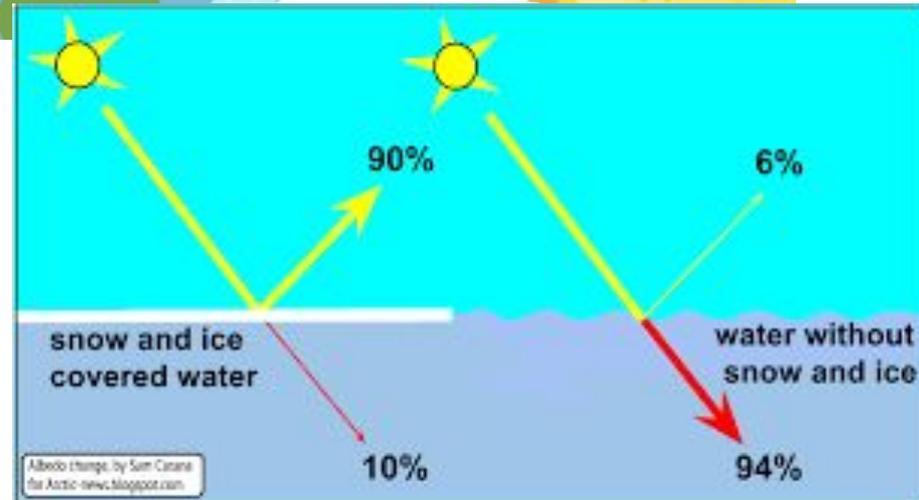
FACTORS AFFECTING INSOLATION

- Angle of Sun's rays or Latitude
- Length of day
- Distance between Earth Sun
- Atmospheric effect



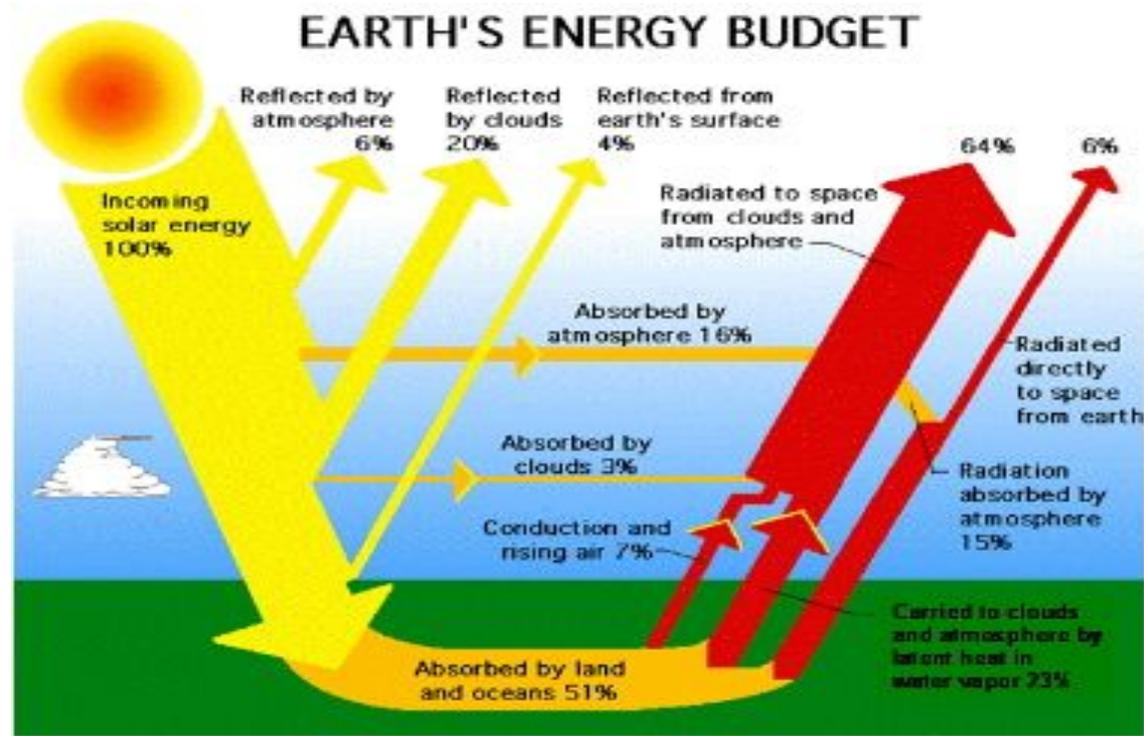
ALBEDO

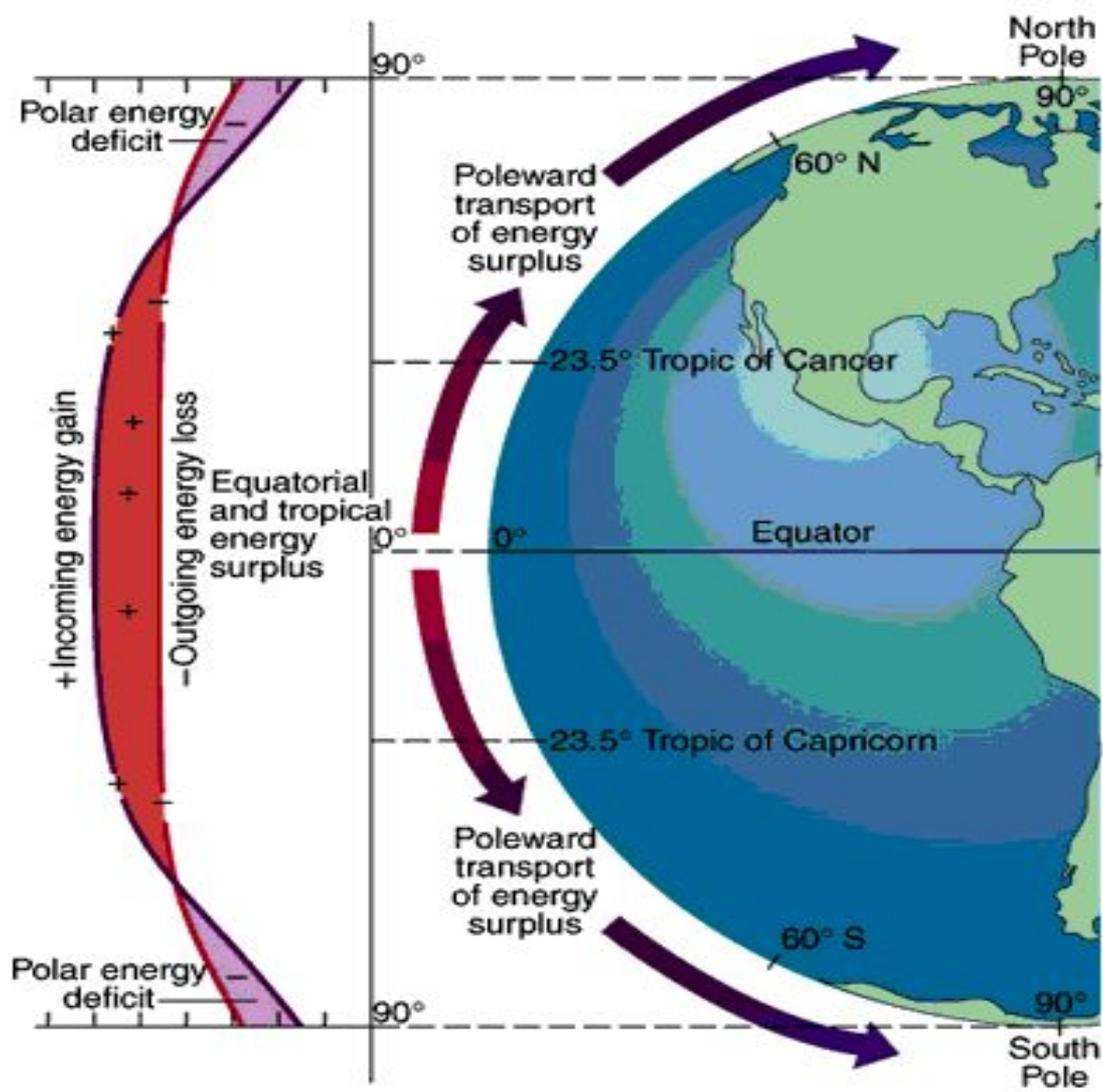
- It is the part of incident radiation getting reflected back from a surface, without getting absorbed.



HEAT BUDGET OF EARTH

- Energy received by Earth is equal to energy lost by it.
- Sun heats Earth unevenly and to even out solar heating imbalances processes like -evaporation of surface water, convection, rainfall, winds, and ocean circulation- occurs. There is “meridional heat transportation”, driven by heat engine of Earth.
- Coupled atmosphere and ocean circulation is known as Earth’s heat engine.



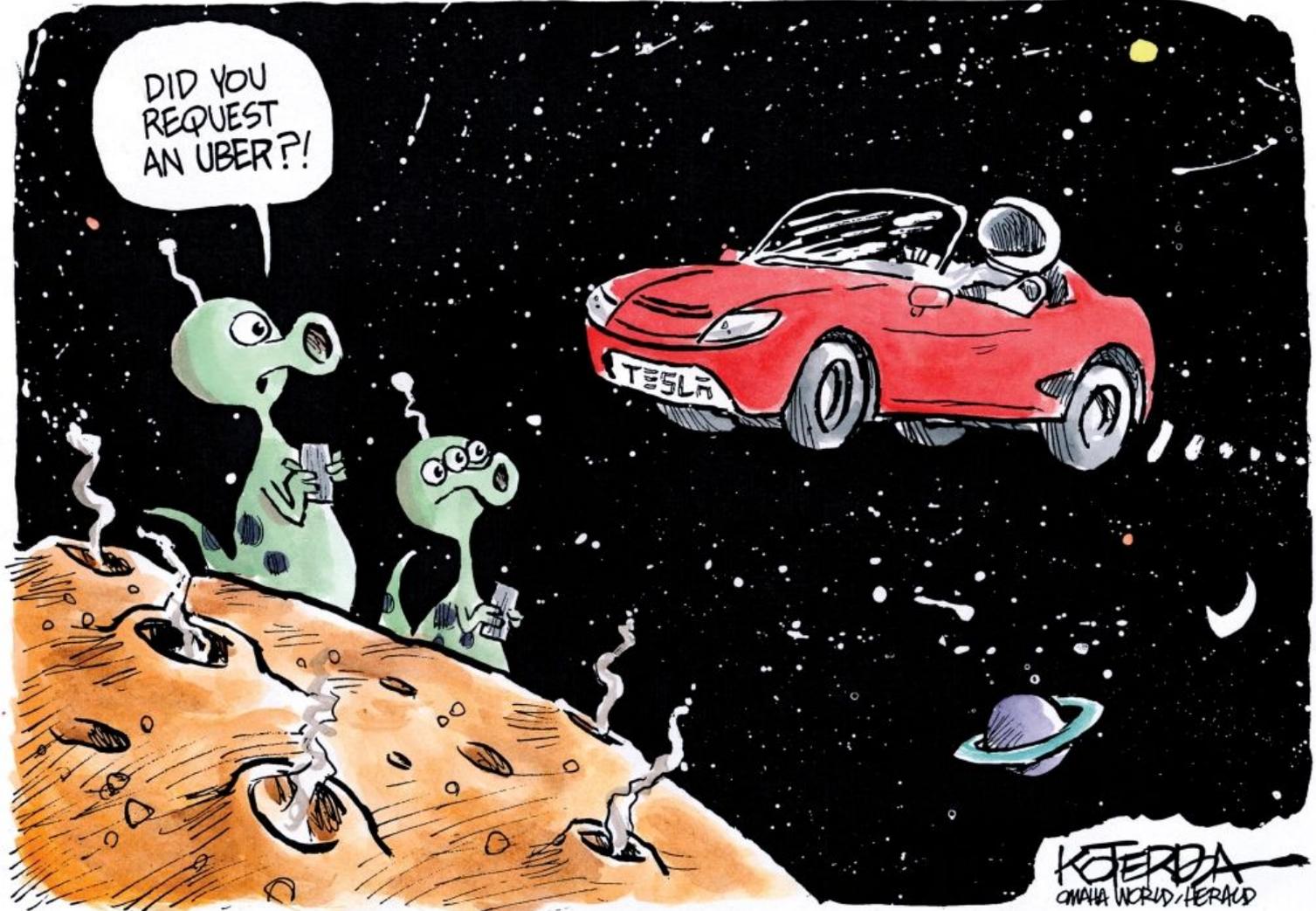




SATELLITE
COLLISIONS.
SPACE JUNK.
IT'S BEGINNING
TO BLOCK OUT
THE SUN!

WHO
SAYS WE
CAN'T
REVERSE
GLOBAL
WARMING?

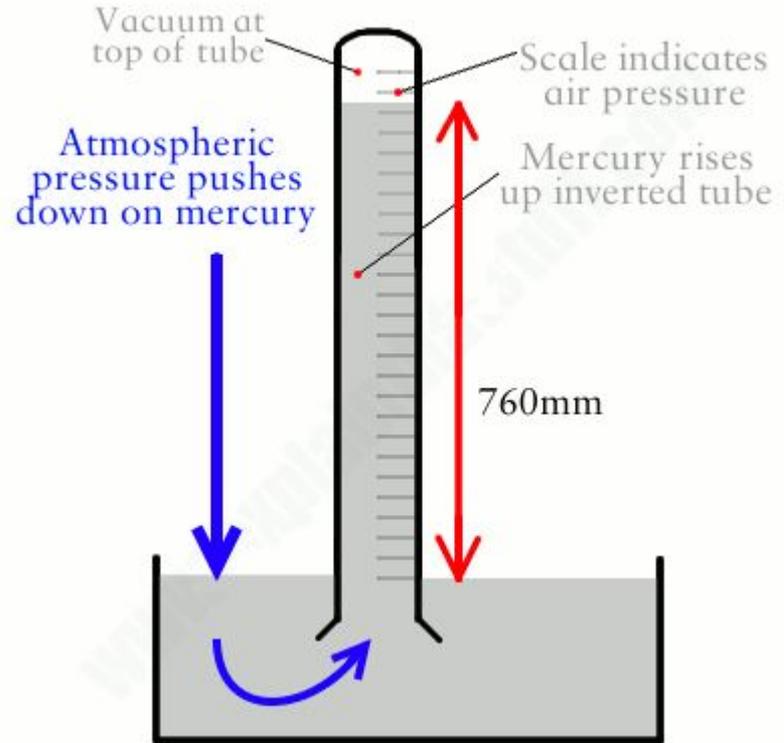
Mike Keefe THE DENVER POST 2.18.09



KETERBA
OMAHA WORLD HERALD

Pressure

- The weight of a column of air contained in a unit area from mean sea level to the top of the atmosphere is called as pressure.
- It is measured by using instrument called barometer and its unit is Bar or N/m^2 . While atmospheric pressure is expressed in mb and Pascals.
- At sea level, atmospheric pressure is 1013.25 mb.
- Isobar is the line joining places of equal pressure, usually drawn at sea level.



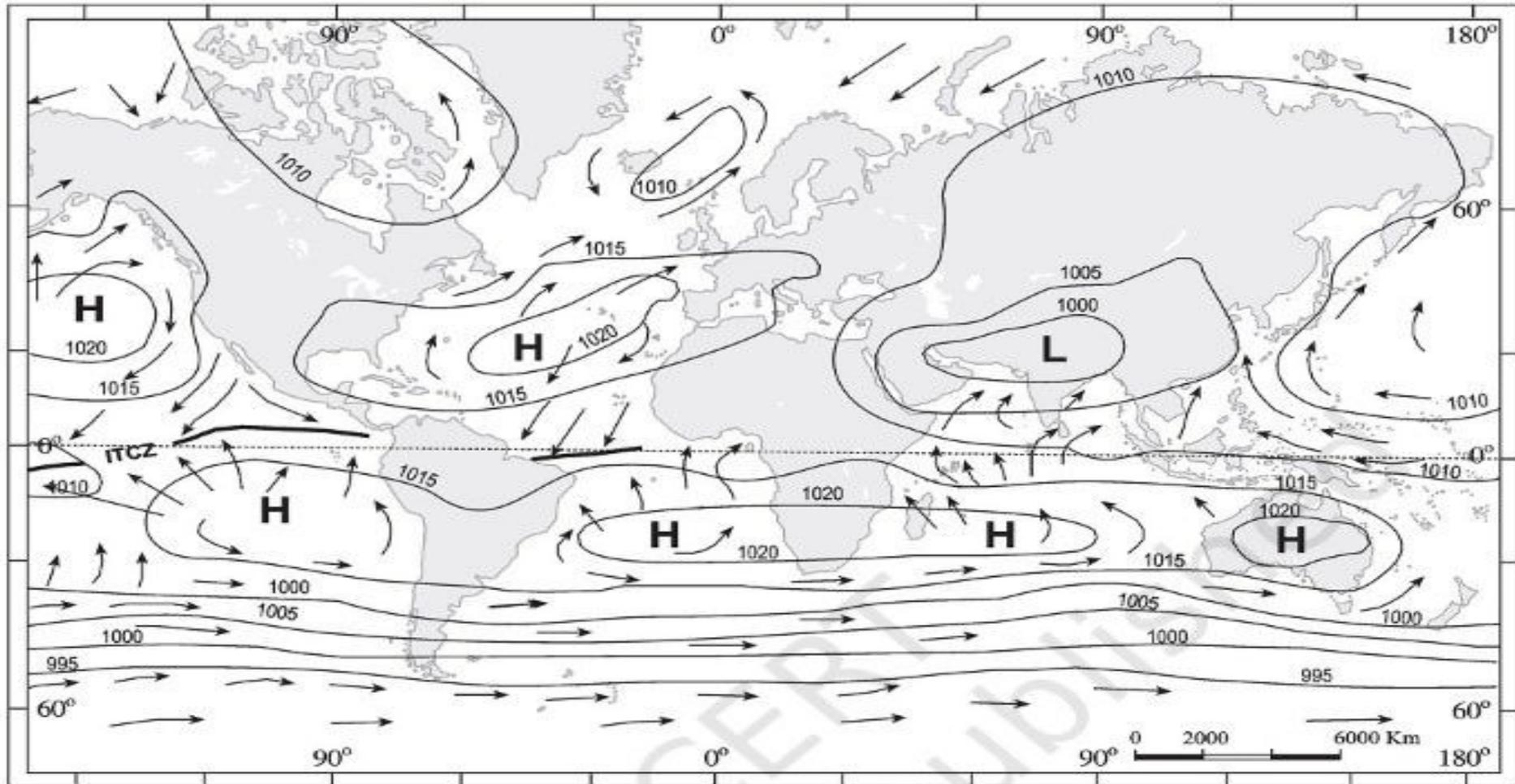
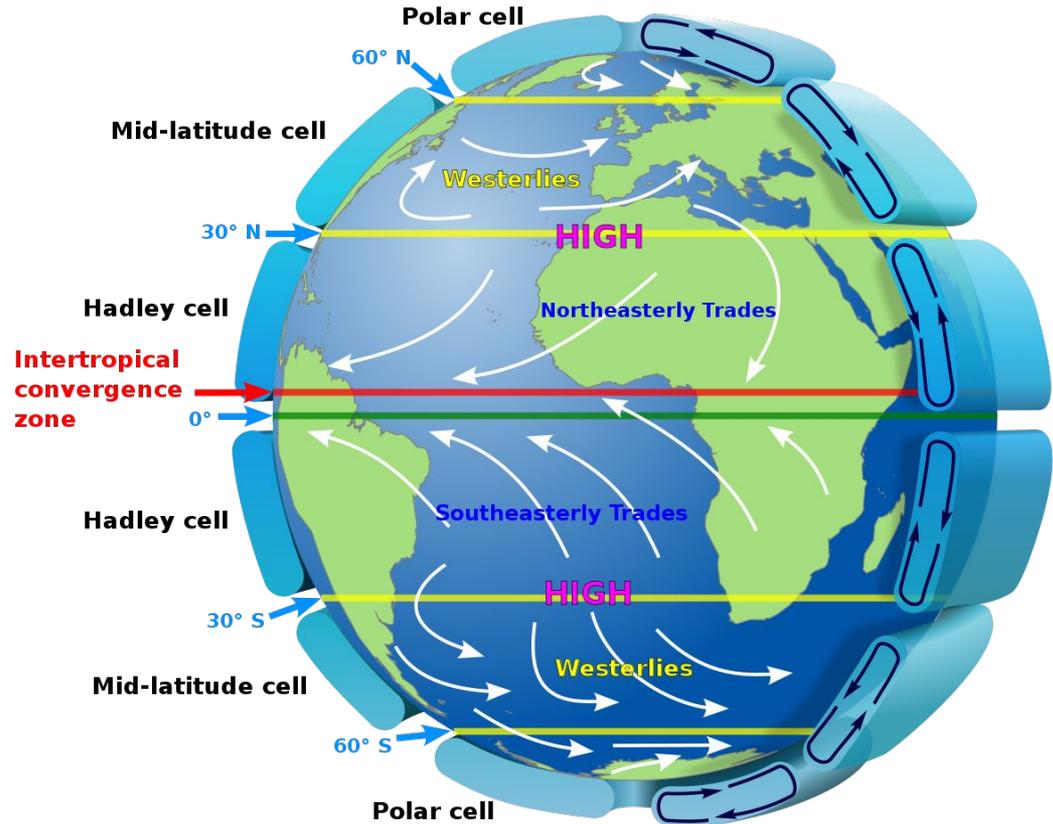
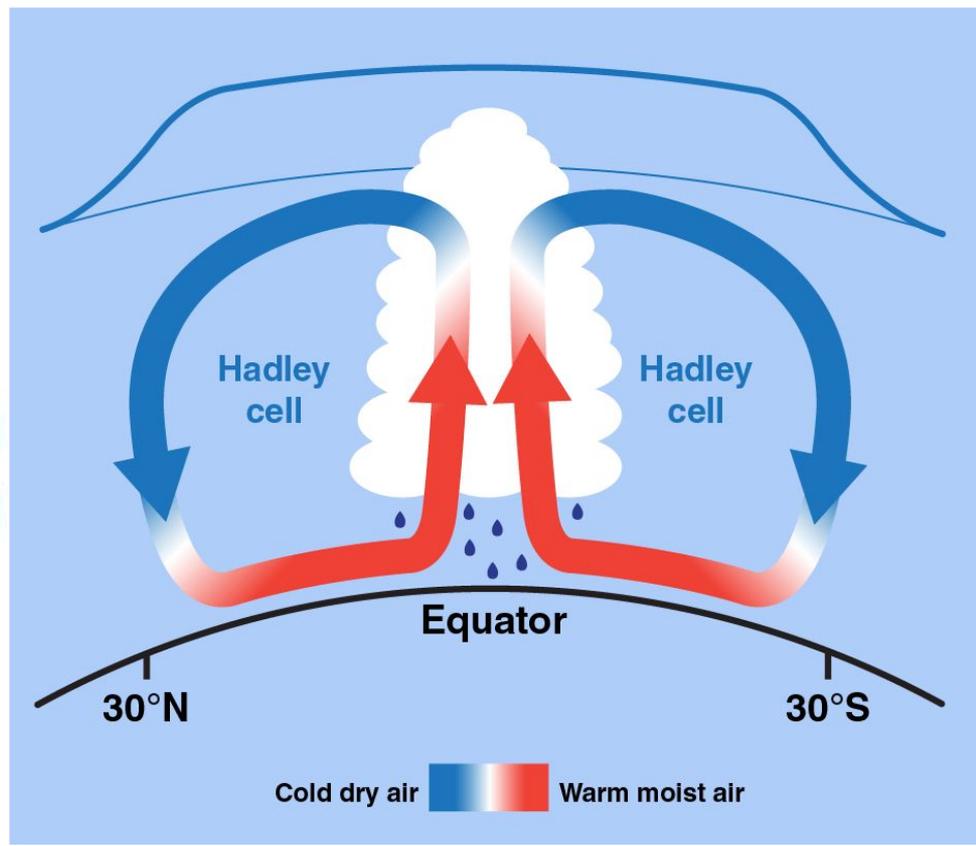
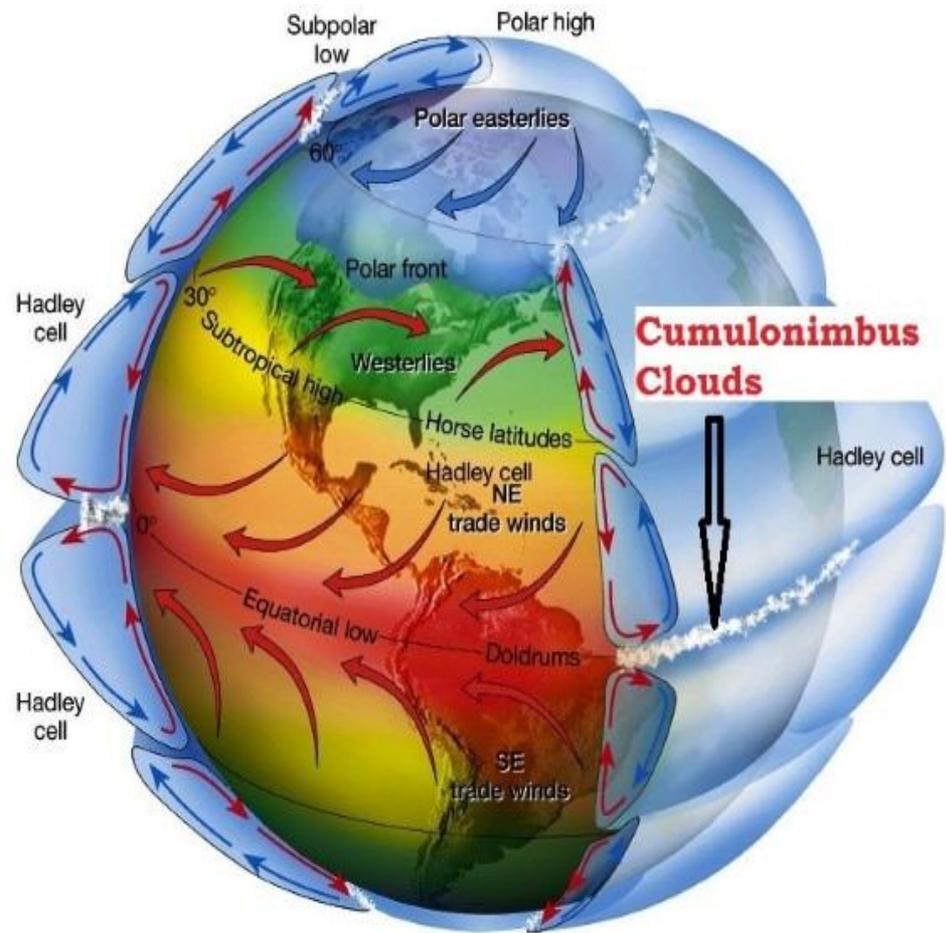


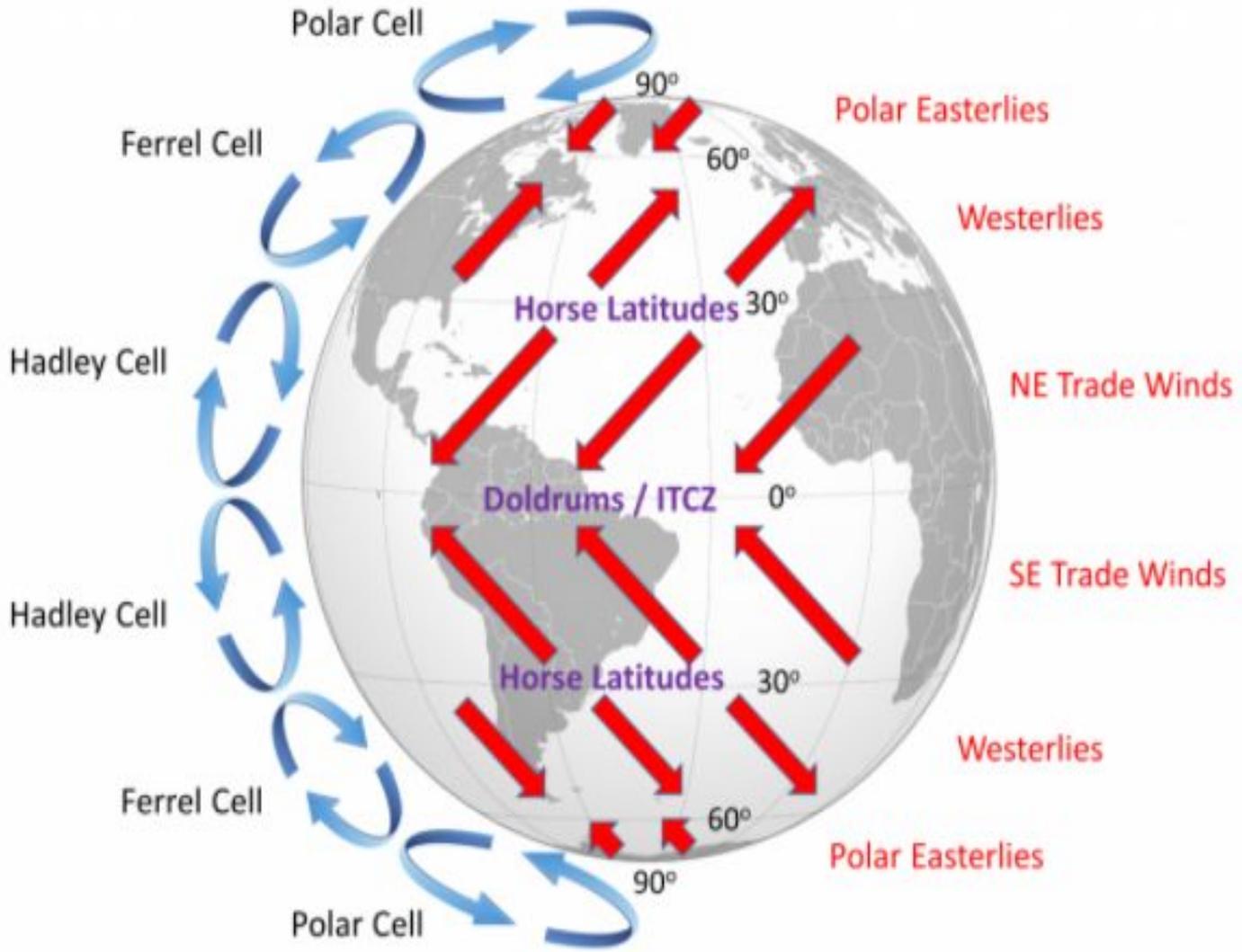
Figure 10.3 : Distribution of pressure (in millibars) — July

ATMOSPHERIC CIRCULATION

- The horizontal distribution of air pressure across latitudes is characterised by pressure belts.
- There are 4 such pressure belts :
 - EQUATORIAL LOW PRESSURE BELT OR DOLDRUMS
 - SUBTROPICAL HIGH PRESSURE BELT
 - SUB-POLAR LOW PRESSURE BELT
 - POLAR HIGH PRESSURE BELT







WINDS

- In an attempt to balance uneven pressure distribution, air moves from regions of high pressure to low pressure regions.
- This horizontal movement of air due to pressure difference, is called as winds.





FORCES CAUSING MOVEMENT OF WINDS

1. **PRESSURE
GRADIENT FORCE**

2. **CORIOLIS FORCE**

3. **FRICTION FORCE**

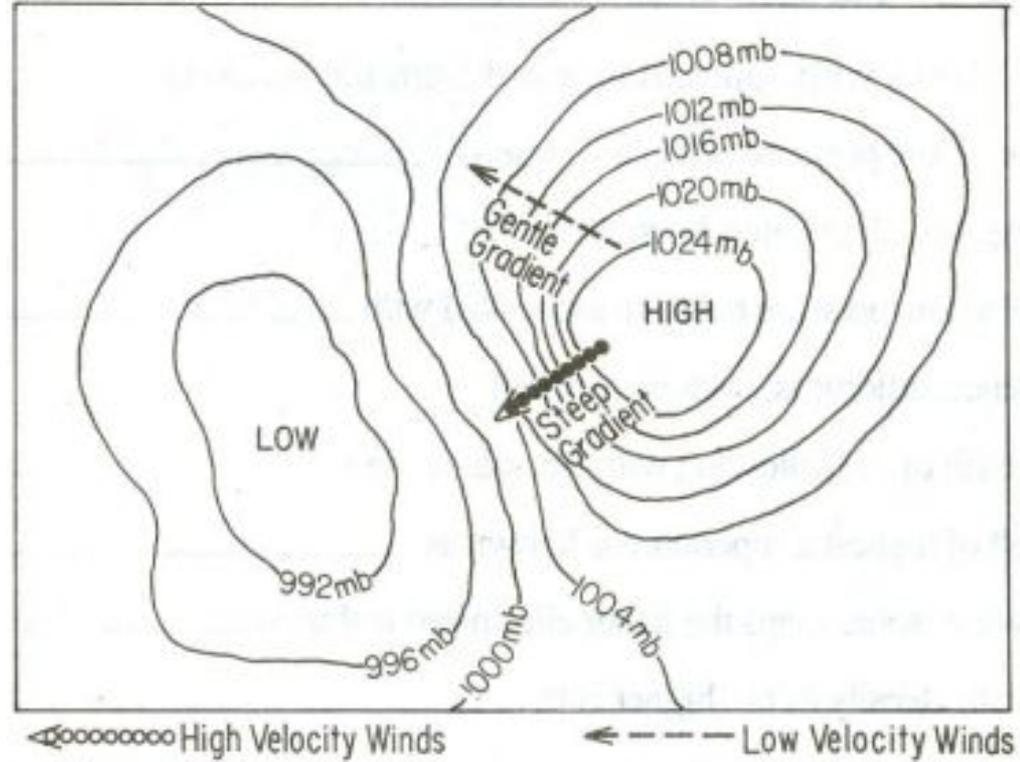


Fig. 11.5 Relationship between Pressure Gradient and Winds