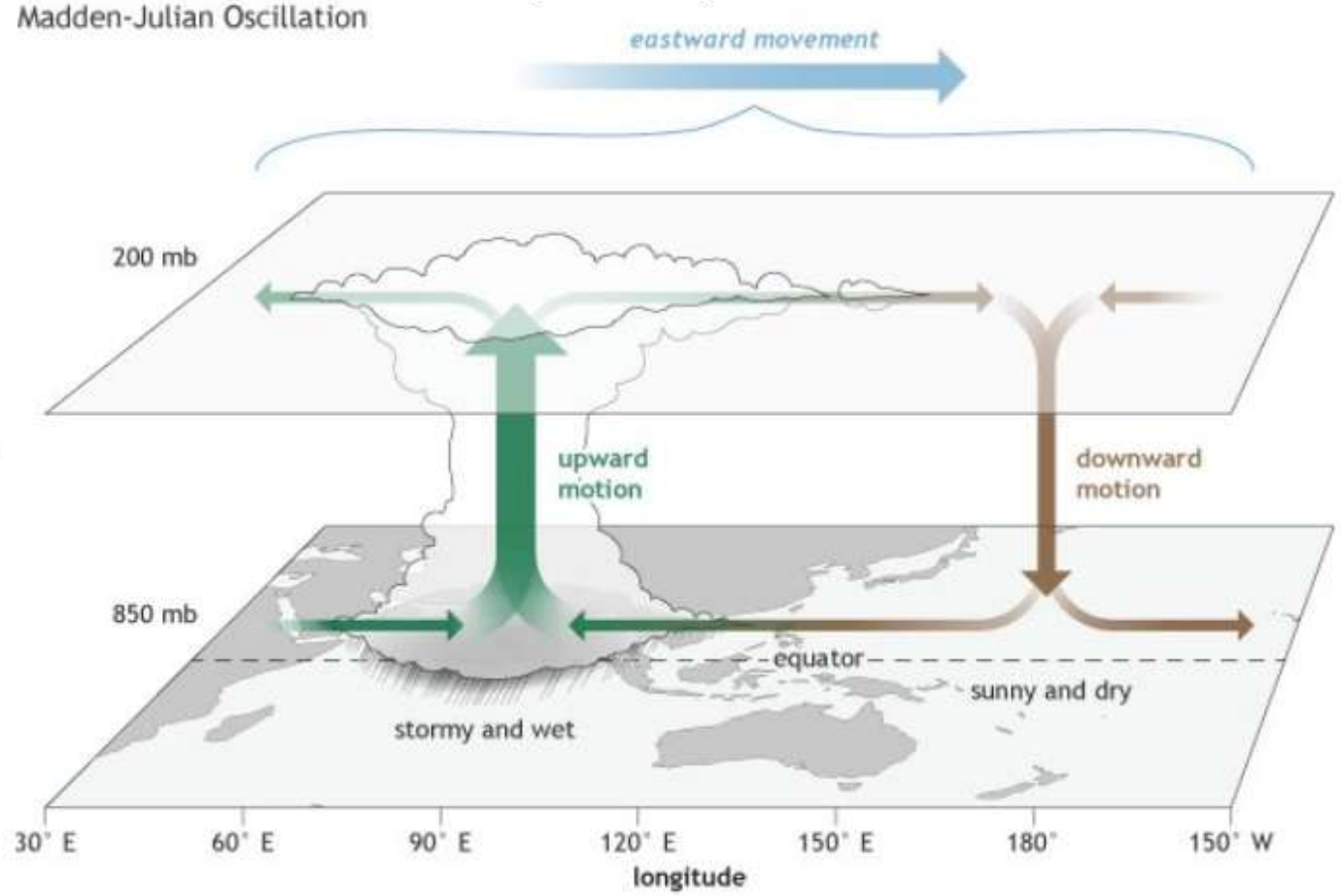
Geography Class 33

A BRIEF REVIEW OF THE PREVIOUS CLASS (09:11 AM)

- Thermohaline circulation
- El Nino and related concepts
- El Nino Modoki

MADDEN JULIAN OSCILLATION (09:27 AM)

- Madden-Julian Oscillation



MJO is like moving Walker Circulation which reaches its initial position in 30 to 60 days. It impacts El-Nino and La-Nina also.

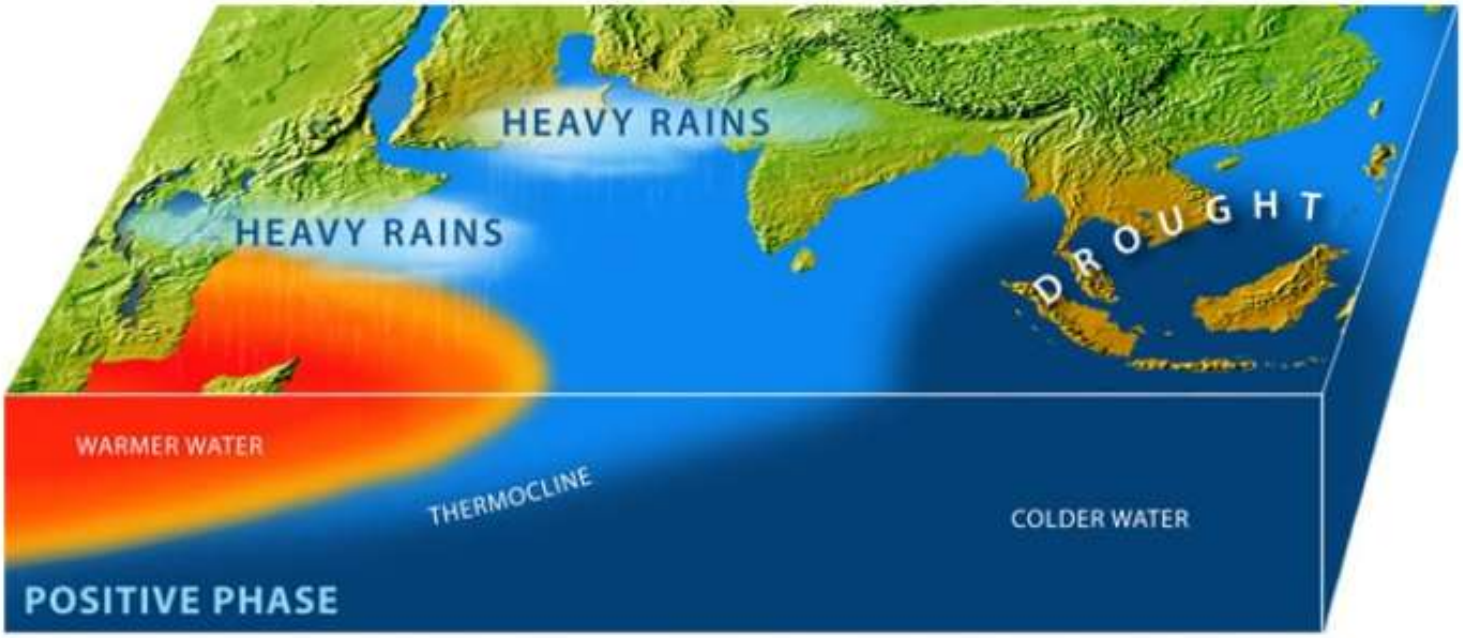
- It is an eastward-moving disturbance of clouds, rainfall, winds and pressure that traverses the planet in the tropics and returns to its initial starting point in 30 to 60 days on average.
- Unlike ~~Unline~~ El Nino, which is stationary, MJO is a moving circulation.
- MJO has two parts-
- 1) Enhanced rainfall
- 2) Supressed Rainfall
- MJO can influence the timing and strength of the Indian Monsoon as well as the impact of El Nino.
- If there is convective MJO, along with El Nino, it results in normal or above normal rainfall in India.
- Subsiding MJO along with El Nino results in drought conditions.

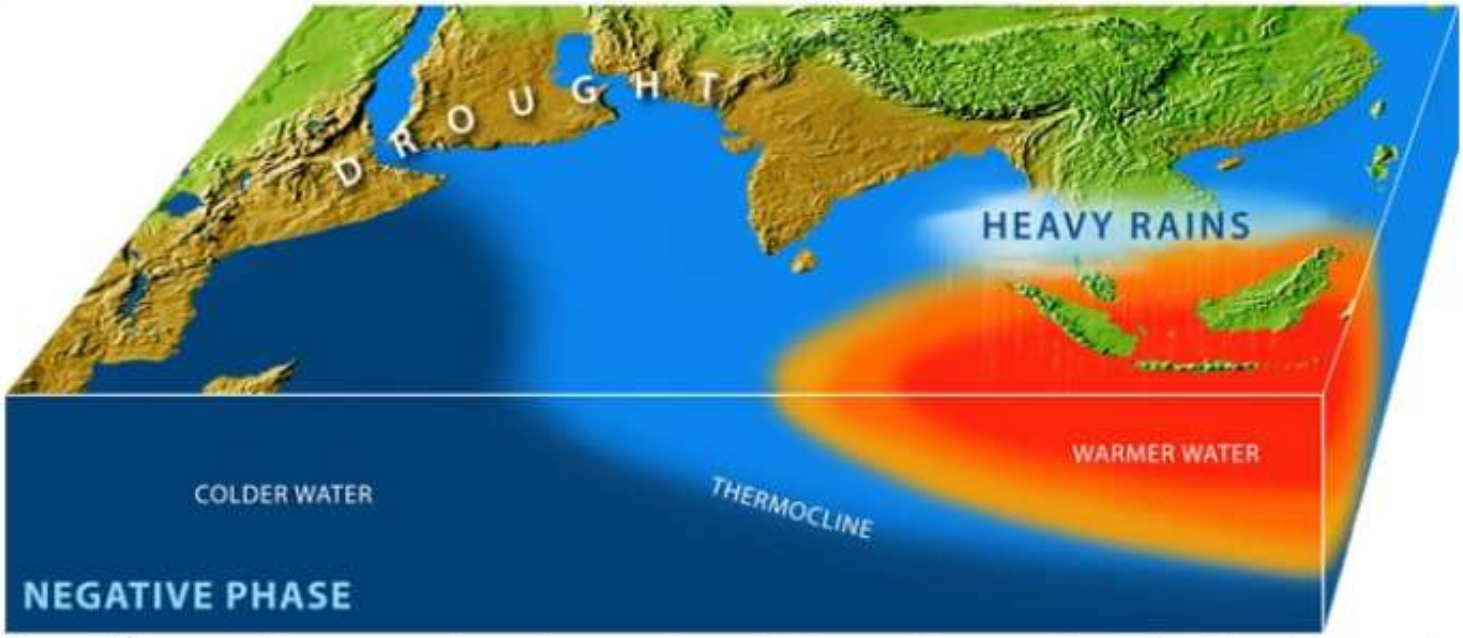
During an El Niño year, the general expectation is for reduced monsoon rainfall in India due to weakened monsoon winds.
However, if the MJO is in its convective (wet) phase over the Indian Ocean during the monsoon season, it can temporarily boost convection and rain-bearing clouds over India, counteracting the suppressive effect of El Niño.
This means that even if El Niño is present, the convective phase of the MJO can lead to normal or even above-normal rainfall in India during that period because it encourages increased monsoon activity and enhanced rainfall.

MJO runs throughout the year but it is not so powerful as compared to Walker Circulation and El-Nino.

INDIAN OCEAN DIPOLE (09:49 AM)

Indian Ocean Dipole

- 



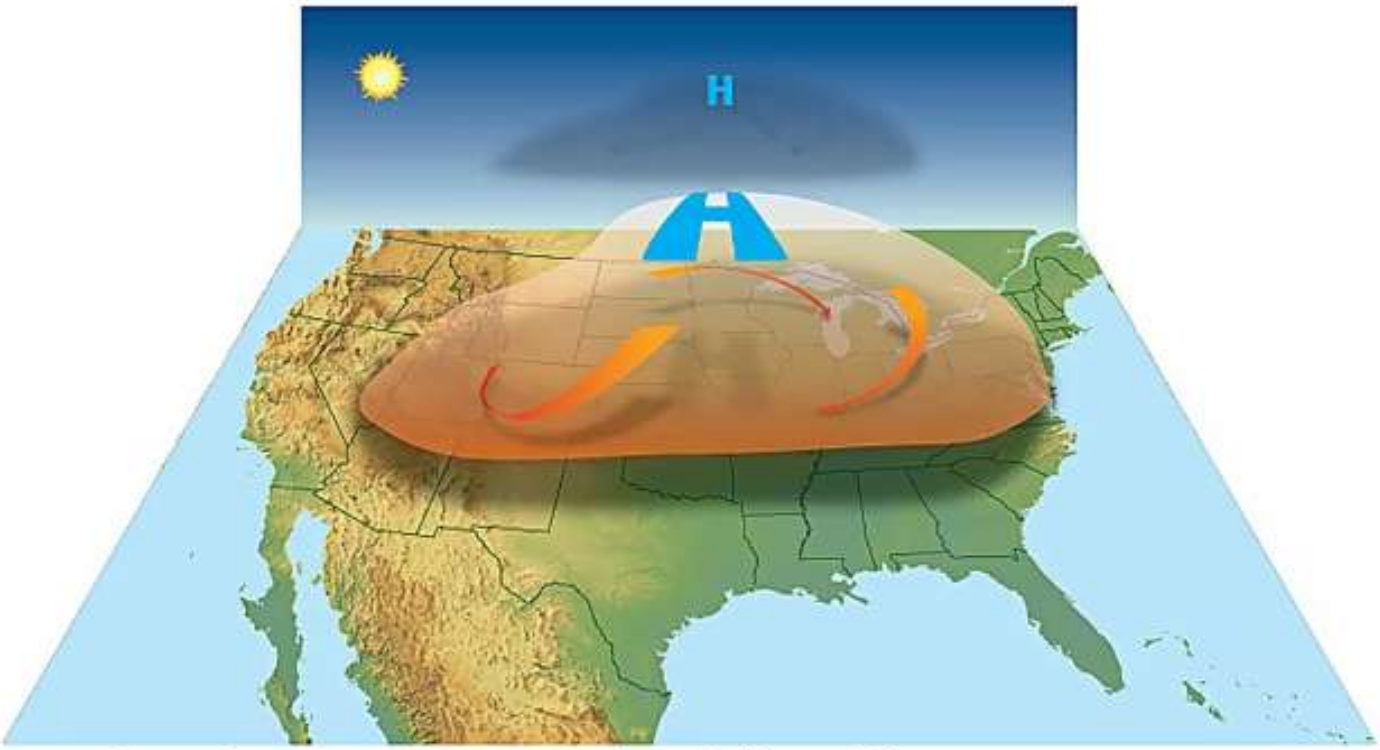
- The difference in sea surface temperature between the western Arabian Sea and the eastern Indian Ocean of Indonesia and Australia is called as Indian Ocean Dipole.
- Similar to MJO, it is a coupled ocean and atmospheric phenomenon.

- **Positive IOD**
- Warm sea surface along the western part relative to the east.
- Good precipitation near India.
- Less rainfall in Indonesia and Australia.
- Reduces the impact of El Nino over India.
- Higher chance of cyclone formation in the Arabian Sea than Bay of Bengal.
- **Negative IOD**
- Warm Sea surface along the eastern Indian Ocean than west.
- Bad for Indian Monsoon due to dryness and drought conditions.
- More precipitation over Indonesia and Australia.
- Increases the impact of El Nino over India.

Since S-W monsoon comes in India so when there is +ve Indian Ocean Dipole it will bring good rainfall in India and if there is -ve Indian Ocean Dipole it will bring drought in India but good rainfall in Australia.

Now we can combine IOD, MJO and El-Nino.

HEAT DOME (10:05 AM)

- 

- It occurs when the atmosphere traps hot air like a lid.
- It is due to the combined impact of La Nina and weakened Jet streams.
- La Nina results in strong subsidence of hot air along the eastern Pacific.
- Jet streams when weakened start to meander in its path.
- These meandering jet streams trap the hot air descending due to La Nina for a longer period of time resulting in the formation of a heat dome.

Since Cannada is at higher latitude but due to meandering of jet stream hot subsiding air of La-Nina get trapped and causes formation of Heat Dome over Cannada which causes increase in temperature.

Both high and low tide can be experience in all the point on surface of earth in one day due to rotation of earth.

TIDES (10:18 AM)

- The regular rise and fall of water level in the world's oceans resulting from the gravitational pull of the sun and moon are called as tides.
- The combined gravitational pull of the sun and moon pulls the ocean water in a bulge.
- The centrifugal force of the earth's revolution pulls another bulge in the opposite direction.
- A bulge in one direction creates low water in another.
- As the earth rotates, the position of high and low waters change across the surface.
- **Factors affecting tides**
- Gravitational pull of the Sun and Moon
- Relative position of sun and moon.
- The centrifugal force of earth's revolution.
- Uneven distribution of water. (as somewhere continents are present and somewhere ocean present)
- Ocean bottom topography.

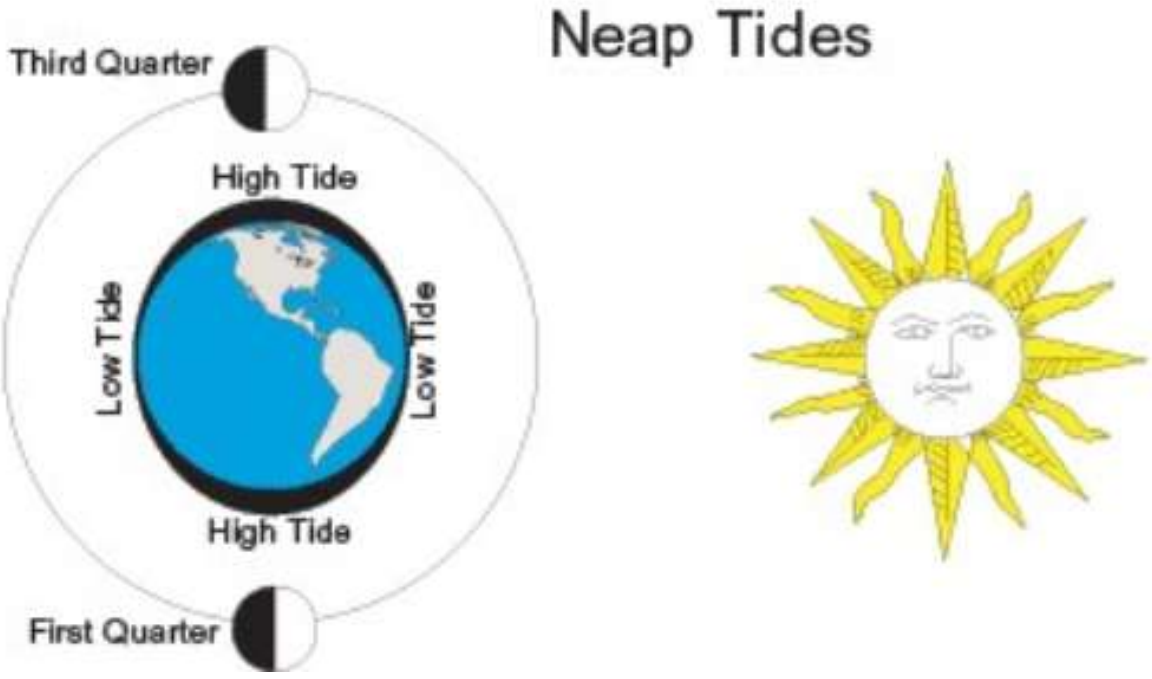
The depth and shape of the ocean floor can either amplify or diminish the tidal range (the difference between high and low tide). In shallow areas, the tidal range can increase because the water is constrained and forced to rise higher. In contrast, deep areas may experience smaller tidal ranges.

In India Chandipur coast has highest range of 5km of low and high tide.

Generation of energy depends on ki pani kitna upr niche ho rha h na ki pani kitna aage piche ja rha h.

- Types of Tides

-



Same point experience low and high tide for two times in a day.

- **Spring tide-**
- These are very high high tides and very low low tides.
- The position is the sun, moon and earth aligned in a straight line called syzygy.
- Syzygy involves two types-
- Conjunction (when Moon and Sun are in same side of Earth.)
- Opposition (when Moon and Earth are in opposite side of Earth.)
- **Neap tide-**
- These are smaller high tides and low tides.
- They occur during quadrature i.e. the sun and the moon are in perpendicular location.
- **Significance of tides**
- Generation of energy (By making dams near coast)
- Navigation of tidal ports. Eg.- Kolkata Port
- Helpful for the shipbuilding industry.(because during low tide companies make ships on land and release them during high tide.)
- Growth of Mangrove forest
- Natural cleaning of coasts.
- Restricts delta formations.
- Causes coastal erosion.
- Helps in maintaining higher biodiversity. (Ex:- Hynsa fish comes to river during high tides to lay eggs and goes back to ocean.)

MARITIME ZONES (11:24 AM)

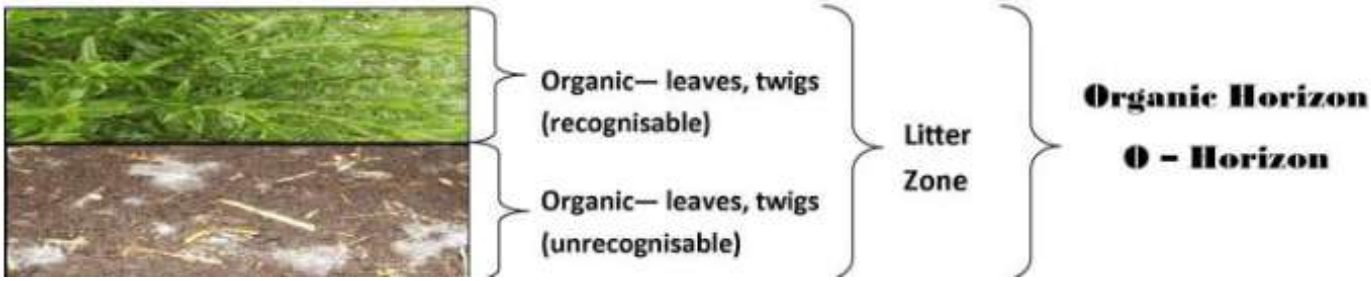
- The baseline is the average coastal line marked at low waters.
- Internal waters are the landward side of the baseline.
- It includes lagoons, deltas, Estuaries and other water bodies.
- The territorial sea is up to 12 nautical miles from the baseline. A country exercises a sovereign jurisdiction over the bottom, surface and air.
- However, innocent passage with restrictions is allowed.
- The contiguous zone is 24 nautical miles from the baseline.
- A country can exercise sovereign jurisdiction over the bottom and surface but not in the air.
- **Exclusive Economic Zone**
- Up to 200 nautical miles from the baseline or the edge of the continental shelf whichever is farther.
- Exclusive rights over resources.
- High Seas beyond EEZ also called as international waters a common heritage of mankind come under the jurisdiction of the International Seabed Authority established by UNCLOS.

United Nation Convention on Law of Seas.

BIOGEOGRAPHY

SOIL (11:45 AM)

- Loose surface material consists of inorganic and organic matter and is the source of water and nutrients for vegetation.
- True soil is characterized by its capacity to support vegetation and the presence of distinct horizons.
- **Horizon** ← means different-different layer
- A distinguishable layer in the soil that has certain chemicals and a distinct colour is called a horizon.
- **Regolith**
- A layer of unconsolidated material derived from weathering of parent rock.
- **Soil profile**
- The vertical arrangement of horizons down to the parent rock material is called a Soil profile.



Most of mineral, nutrients and water are found in top soil.

Mineral/Humus Mix

Dark colouration

Eluviation: minerals in water move through layers as rainwater moves through the soil

Maximum leaching of minerals and presence of clays

Illuviation: leaching of colloids and salts into the lower layers of the soil

Top Soil

A - Horizon

Redisposition of clay and minerals

Sub Soil

B – Horizon

Relatively unweathered with the accumulation of calcium - & magnesium carbonates. This layer lacks organic material

Rock Frag-ments

C – Horizon

(Regolith)

Solid Rock

Unweathered

Bed Rock

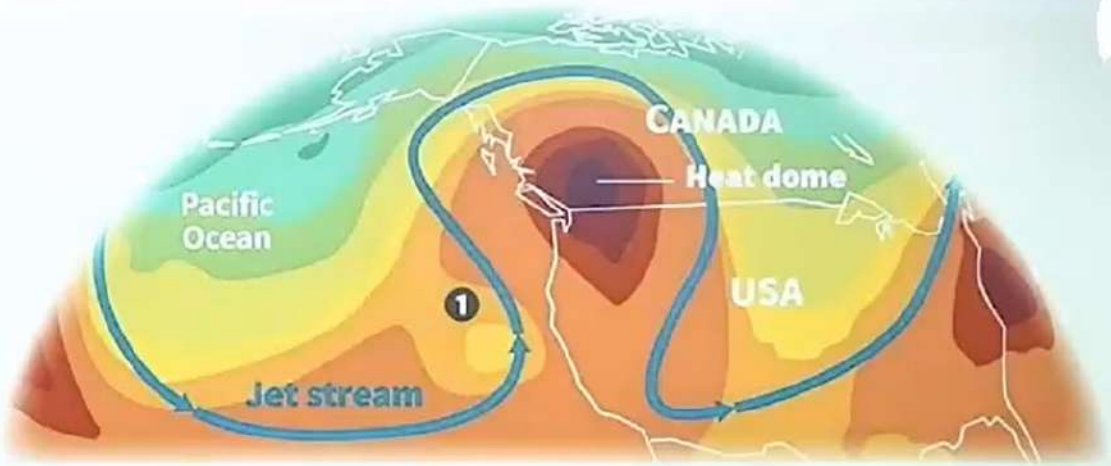
D – Horizon

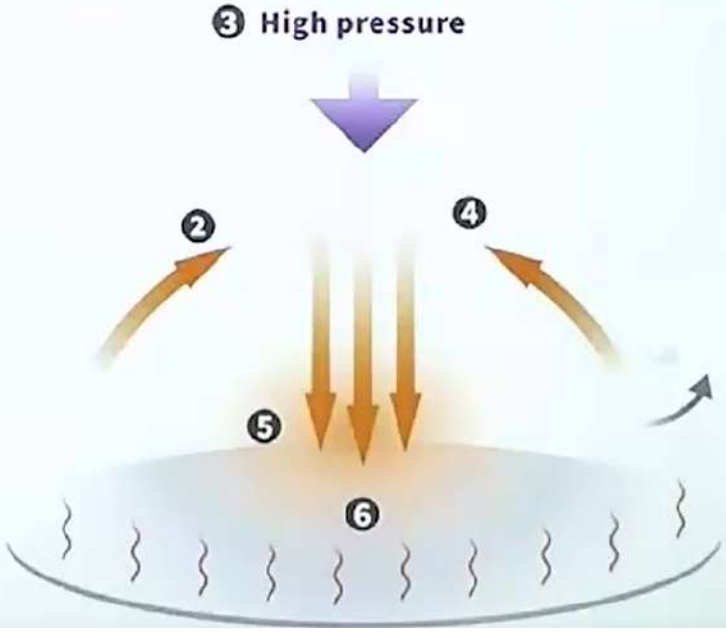
(Parent rock)

The 'heat dome'

Occurs when the atmosphere traps hot ocean air like a lid or cap

1. In summer, the **jet stream** (which moves the air) shifts northward
2. **Hot** and stagnant **air expands** upwards
3. Strong and **high-pressure** atmospheric conditions combine with influences from La Nina act like a dome or cap
4. In a process known as **convection,** hot air attempts to escape but high pressure pushes it back down
5. Under the dome, the air sinks and **compresses,** releasing more heat
6. As winds move the hot air east, the jet stream traps the air where it sinks, resulting in **heat waves**





Temperature forecasts (darker color = hotter)

Heat dome also blocks out clouds, which provide some relief from the sun's heat

The hotter the temperature is, the stronger the heat dome gets, and vice versa

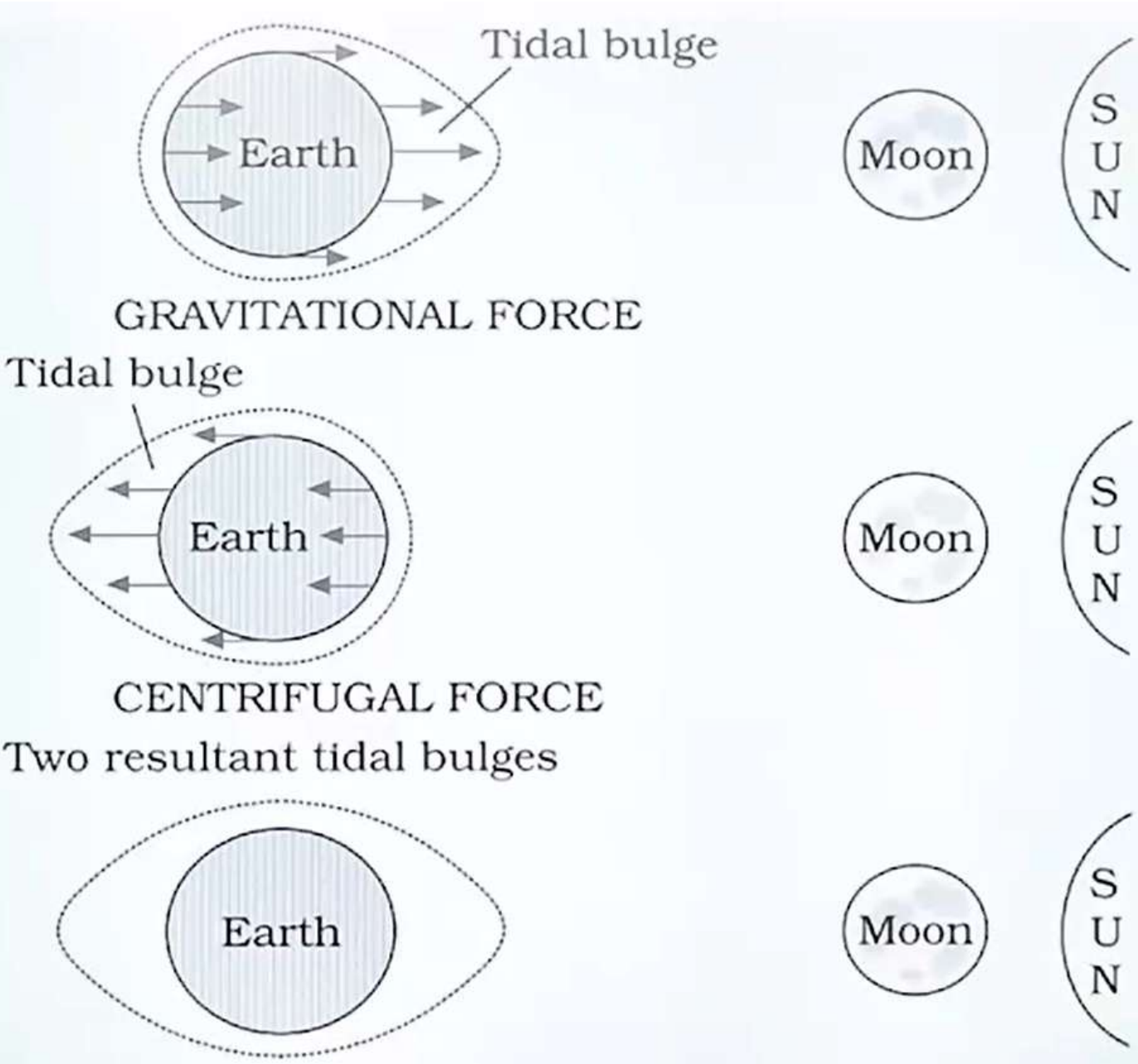
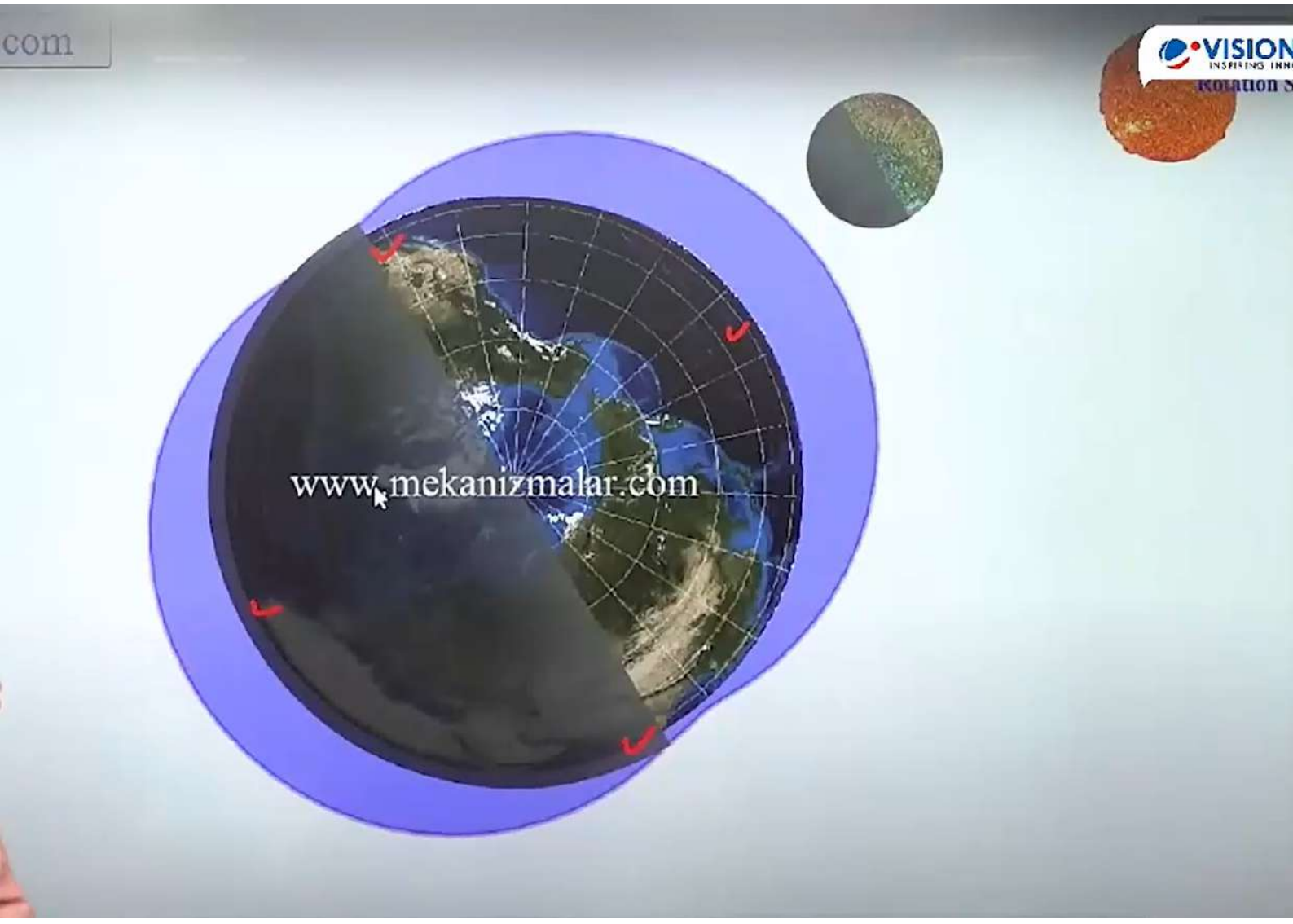


Figure 14.2 : Relation between gravitational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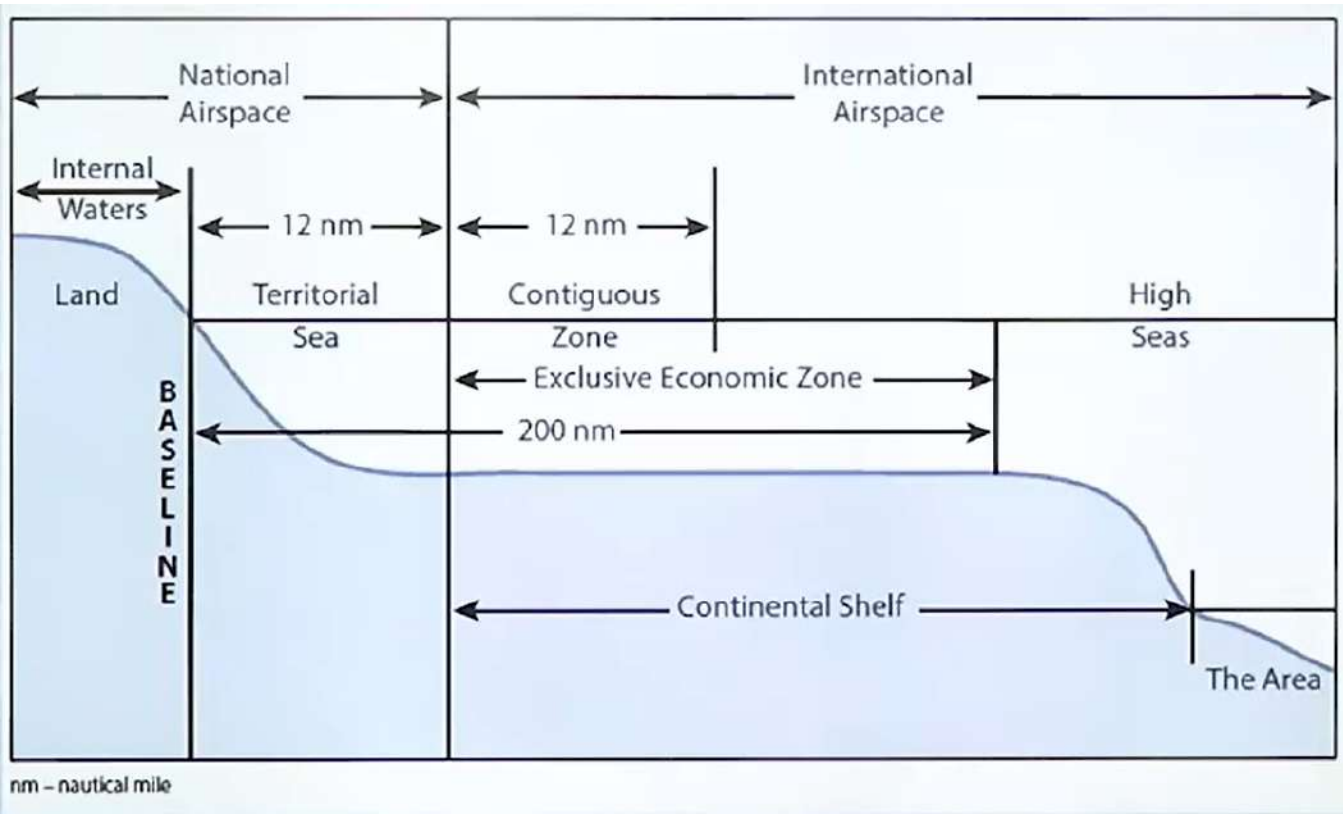
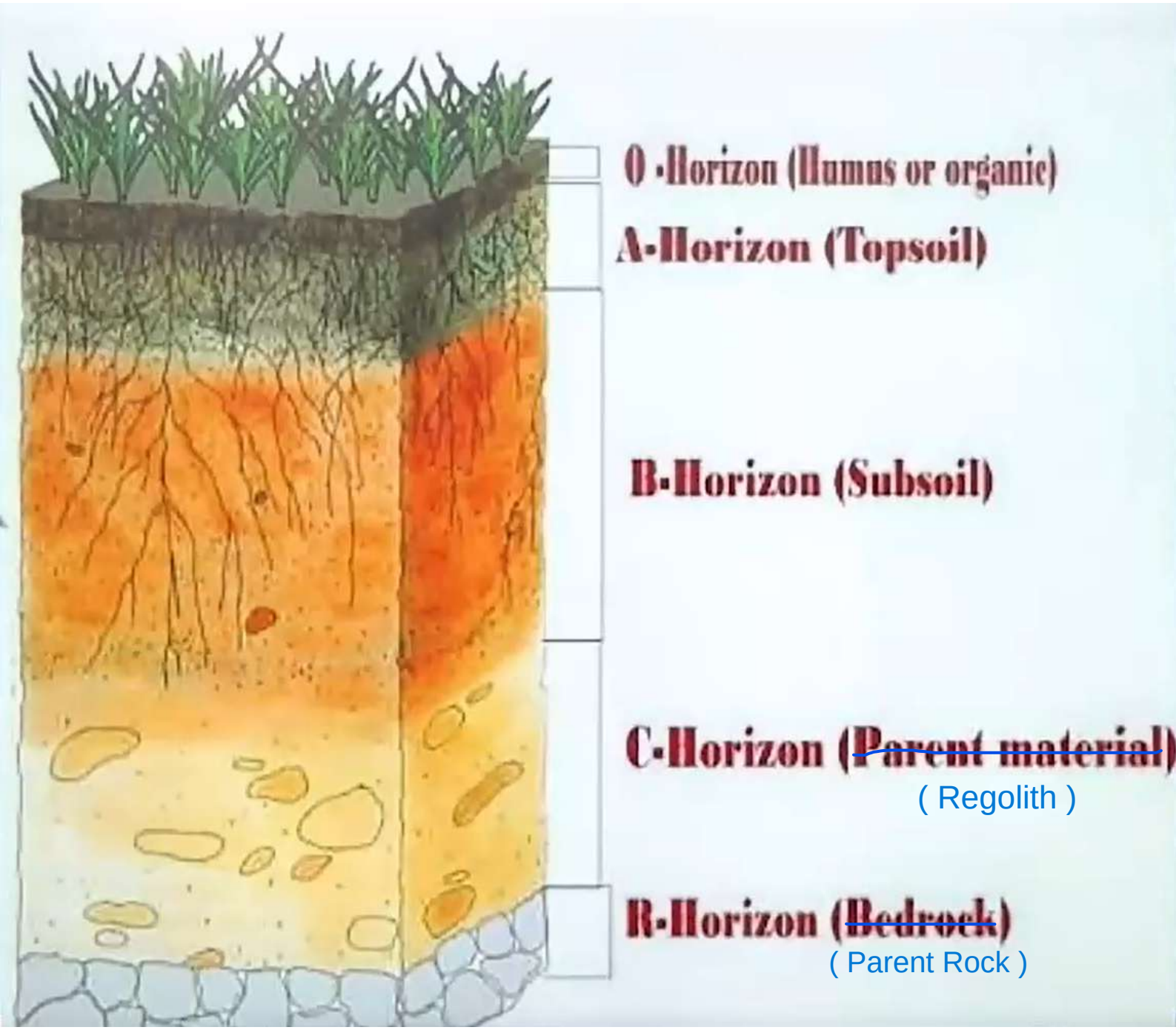


Legal Boundaries of the Oceans and Airspace

nm – nautical mile


O -Horizon (Humus or organic)
A-Horizon (Topsoil)
B-Horizon (Subsoil)
C-Horizon (Parent material)
(Regolith)
R-Horizon (Bedrock)
(Parent Rock)