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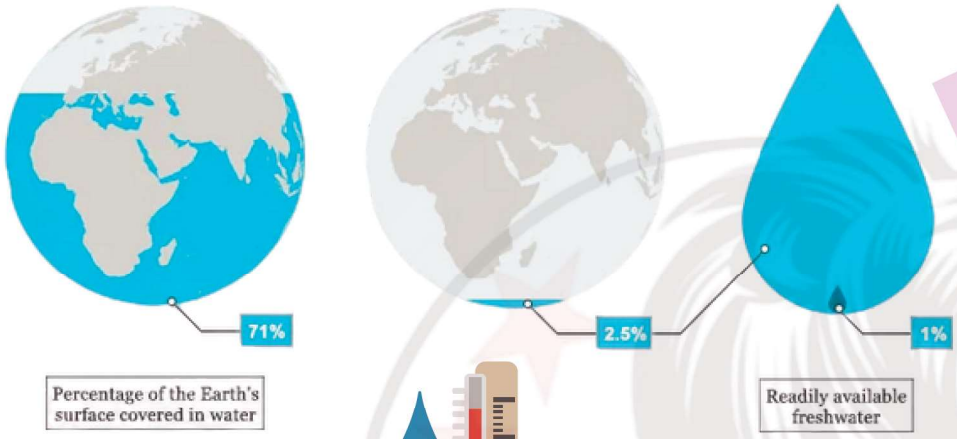
Condensation and Precipitation



Water on earth

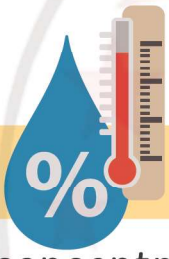
- 97.2 % of Earth's water is saline; only 2.8% is fresh water.
- Out of 2.8% freshwater : Ice caps / glacier (2%), Groundwater (0.68%), Lakes (0.4%), Atmosphere, River.
- As a whole (Freshwater): Ice caps / glacier (68.7%), groundwater (30.1%)





- 71% of Earth's surface covered with water.
- 29% of Earth's surface is covered with land

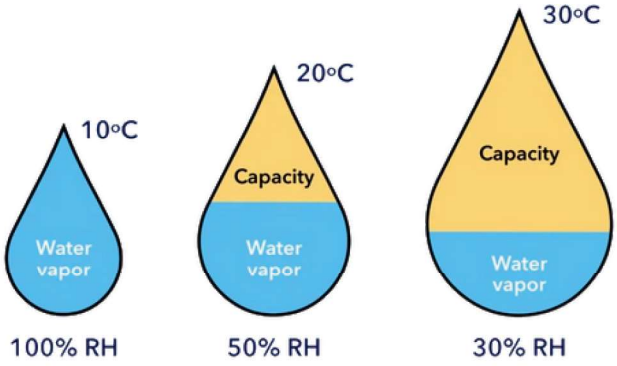
Humidity



Humidity is the concentration of water vapour present in the air.

Types of Humidity

1. **Absolute Humidity:** It is the total mass of water vapour present in a unit volume of air at a given temperature.
2. **Relative Humidity:** Actual moisture percentage compared to maximum capacity.

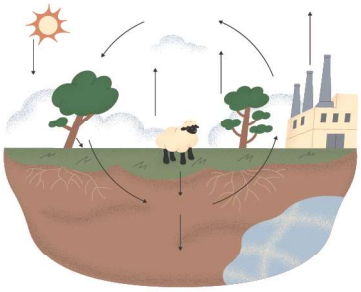


$$RH = \frac{\text{Absolute Humidity}}{\text{Capacity}} \times 100$$

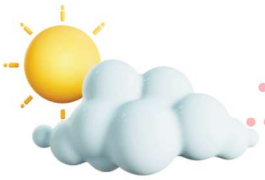
DON'T FORGET

- Absolute humidity is higher in warm air compared to cold air Because warm air can hold more water vapour due to its higher energy level.
- Humidity is measured by Hygrometer

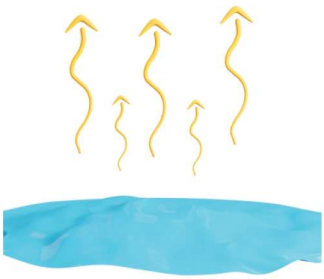
Water Cycle



Water cycle is the continuous movement of water between the Earth's atmosphere and surface.



Evaporation



Evaporation is a process in the water cycle that changes liquid water into water vapour.

Latent Heat of Vaporization

The amount of heat energy required to change a unit mass of a liquid into a gas at a constant temperature is called **Latent Heat of Vaporization**

Precipitation

Precipitation is any liquid or frozen water that forms in the atmosphere and falls back to the earth in the form of rain, snow or hail.

Types of Precipitation

01 **Rain** Liquid water droplet that fall when the air temperature is above freezing point.



02 **Snow** Frozen water crystals that are formed when temperature is below freezing point.



03 **Sleet** Small pallets of ice that forms when a layer of warm air lies above a subfreezing layer resulting raindrops freeze before reaching the surface.



04 **Hail** It is a type of precipitation that falls to the ground in the form of ice balls or lumps.

- Concentric Rings are seen in Hailstone



Condensation



It is the process where water vapour (gas) becomes water (liquid).

Forms of Condensation



01 Dew

It is the moisture that form as a result of condensation.

02 Fog

It is the thick clouds that forms close to the ground and reduce visibility. In fog the size of water droplets tend to be larger compared to those in mist. Fog contain less moisture than mist and has visibility less than 1 km.



03 Mist

Mist is a phenomenon caused by small droplets of water suspended in the cold air, usually by condensation. Mist contains more moisture than fog and has visibility of more than 1 km.



04 Frost

It forms when water vapor (gas) directly turns into solid ice crystals without becoming liquid first.



05 Clouds

A mass of very small drops of water that floats in the sky and is usually white or grey



Note: Dew, Fog and Mist are formed when Dew point is greater than Freezing point, while Frost is formed when Freezing point is greater than Dew point.

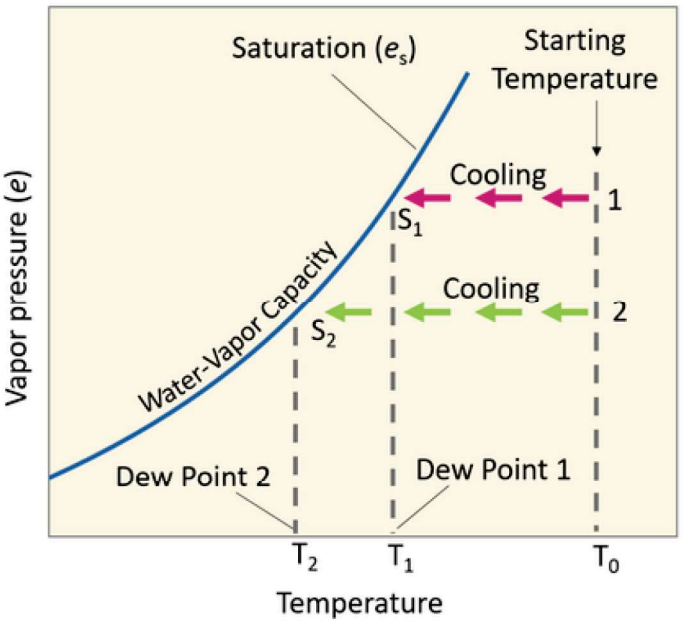
Smog

Smog is a type of air pollution that results from the combination of smoke and fog



Dew Point

- The dew point is the temperature at which air becomes fully saturated with moisture, causing water vapour to condense into liquid droplets.
- In winter air cools down due to which dew point reduces, water vapour condenses into water.

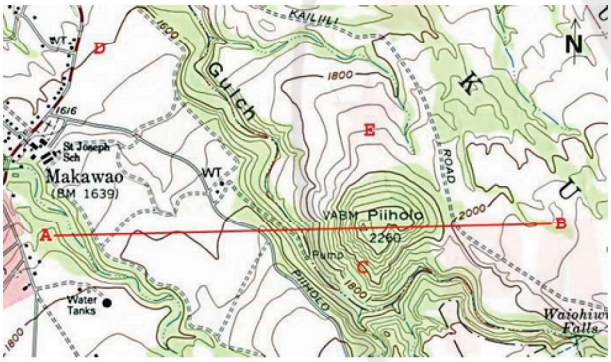


Clouds

Clouds are visible masses of tiny water droplets or ice crystals suspended in the Earth's atmosphere

Isoneph

- Line drawn on map, connecting the points containing same amount of clouds.



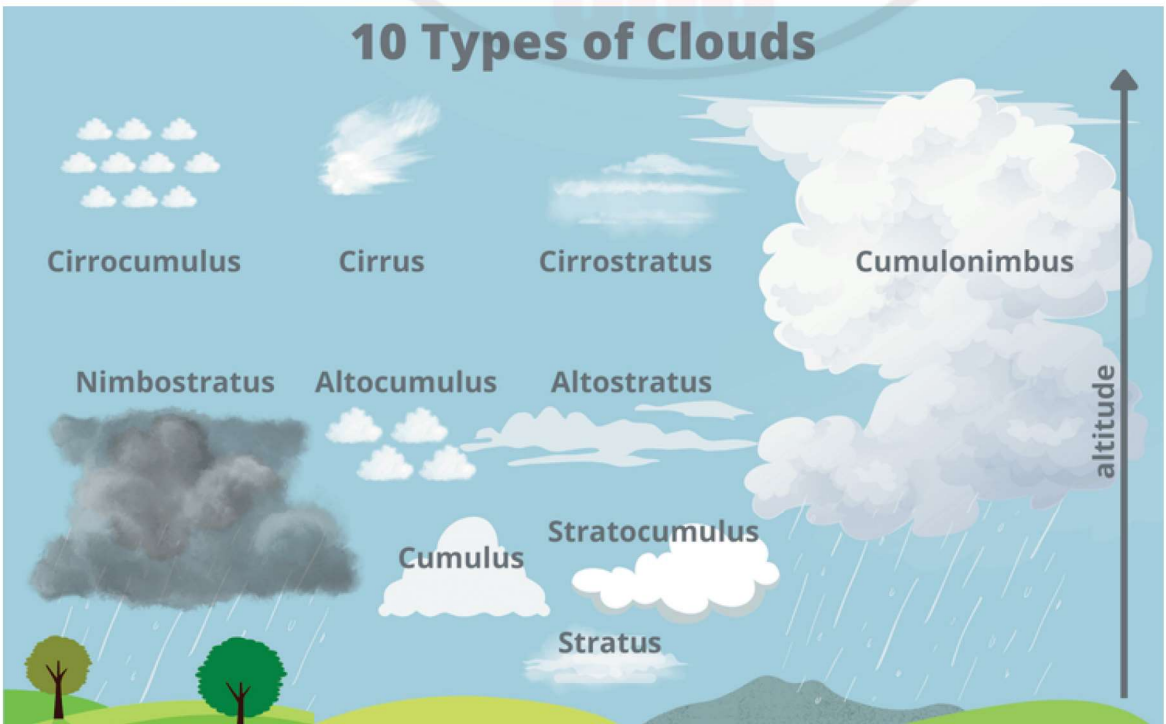
Hygroscopic Nuclei

- Microscopic particles in the atmosphere, like dust, salt, and smoke, that attract and absorb water vapor, acting as surfaces for clouds to form

Collision-coalescence process

- It is a weather mechanism where cloud droplets grow by colliding and merging into larger droplets that eventually fall as precipitation

Different Types of Clouds

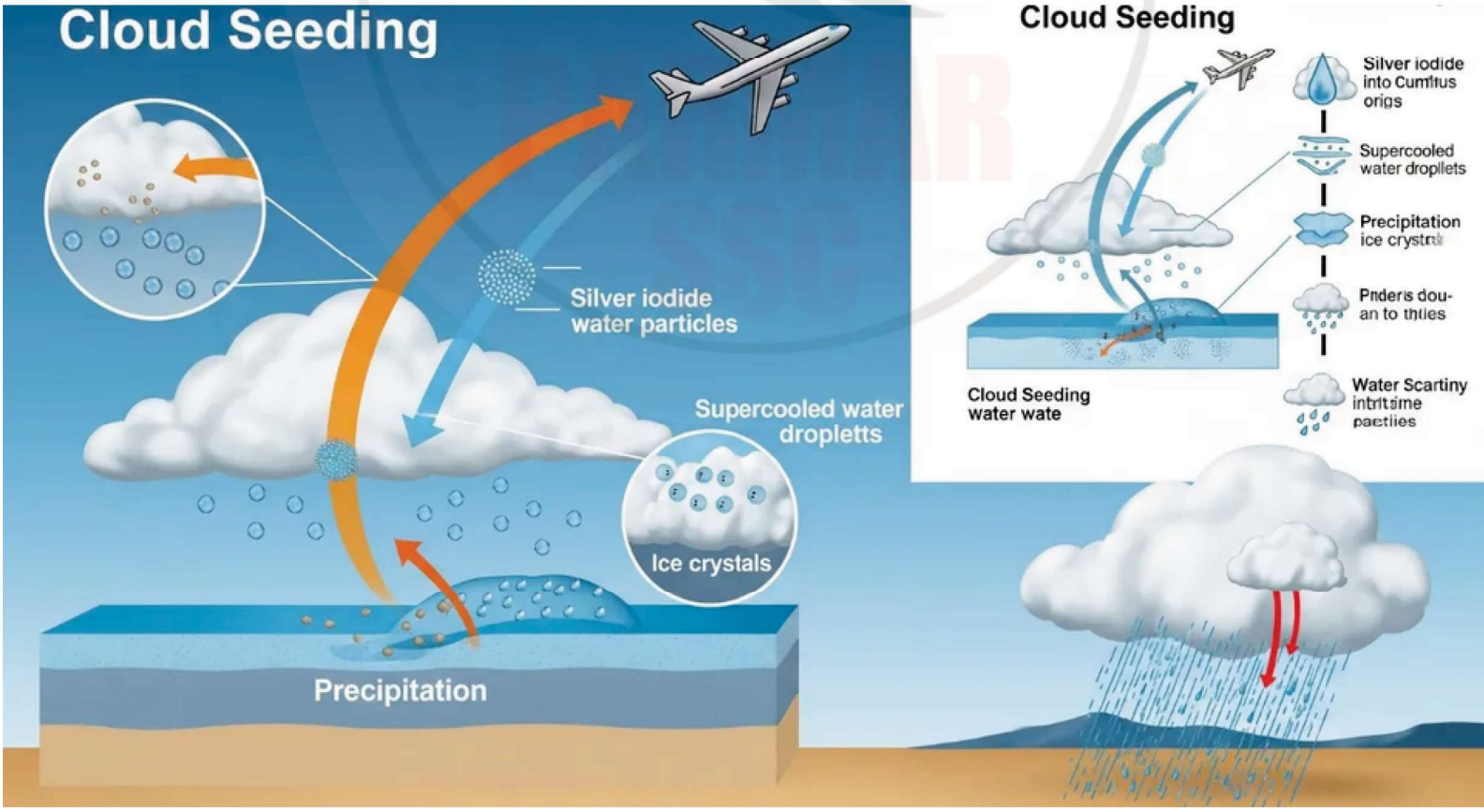


Different Types of Clouds

Clouds	Height	Features
Nimbus	Low Level (<4km)	Rain Bearing, Opaque, Grey
Stratus	Low Level (<4 Km)	Layered Clouds
Cumulus	Middle level 4-7 Km	Wool / Cauliflower shaped, flat base
Cirrus	High Altitude 8-12 Km	Feather shaped clouds, Do not cause Rain
Cumulonimbus	Extensive Vertical Development	Produce severe weather that contributes to cyclone & has Anvil top.

Cloud Seeding

Cloud seeding is a weather modification technique that involves dispersing substances like silver iodide, dry ice, or salts into clouds to increase the amount of precipitation that falls, such as rain or snow



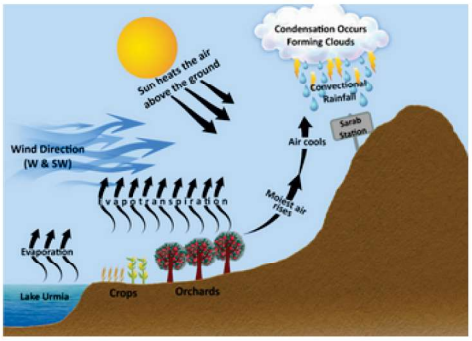
Rainfall

Rainfall is the amount of water that falls from the atmosphere as precipitation over a specific period and area.

Types of Rainfall

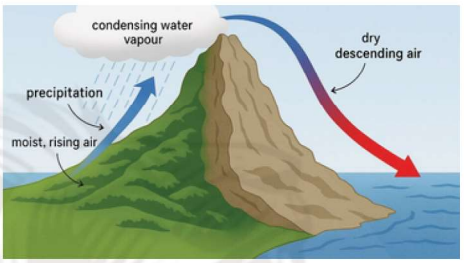
1 Convectional Rainfall

It occurs when the surface of earth is heated up by the sun.



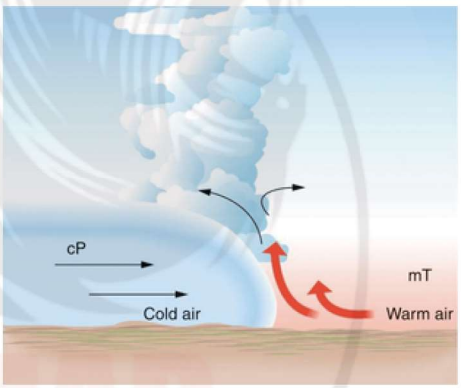
2 Orographic Rainfall

Precipitation that occurs when moist air is forced to rise over a mountain.



3 Frontal / Cyclonic Rainfall

It is type of precipitation that occurs when warm, moist air meets cold, dry air mass.



Leeward Side (Dryside)

This side of mountain faces away from the wind (mostly affected by Katabatic wind) receives the Less rainfall as the air loses it's moisture on the windward side before descending dry. It is also a rain shadow region.
Eg. : Leeward side of Western Ghats

Windward Side (Wet side)

This side of mountain facing the wind (mostly affected by Anabatic wind) receives the heavy rainfall as the air rises and cools there.
Eg. : Windward side of Western ghats

Mumbai (Maharashtra) and Manglore (Karnataka) are in windward side of Western Ghats unlike Vidarbh (Maharashtra) and Banglore (Karnataka), hence experience more Rainfall.