PARMAR SSC

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Topic :

Monsoon



Climate and Weather

Climate

The average weather of a place over a long period (30 years or more). It includes the average temperature, humidity, rainfall, and other weather conditions.



Weather

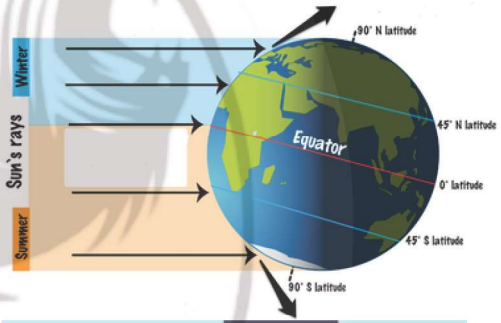
The day-to-day short-term atmospheric conditions like temperature, wind, and precipitation.



Factors Affecting Climate of Any Place

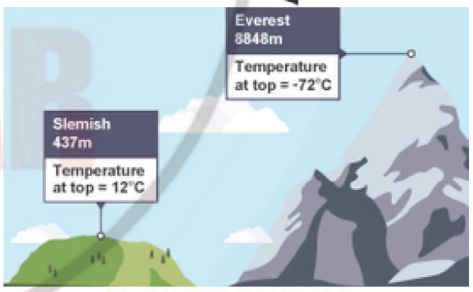
1 Latitude

The Tropic of Cancer divides India into tropical and subtropical zones.



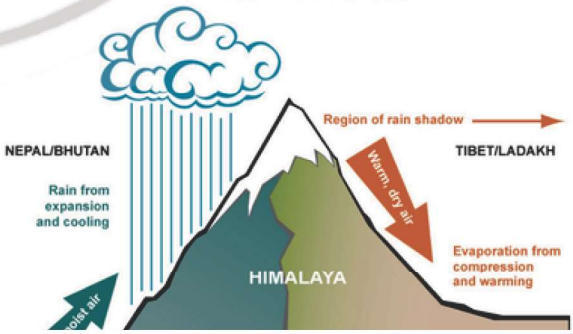
2 Altitude

As the altitude (height) increases, the atmosphere becomes thinner leading to low temperature and air pressure.



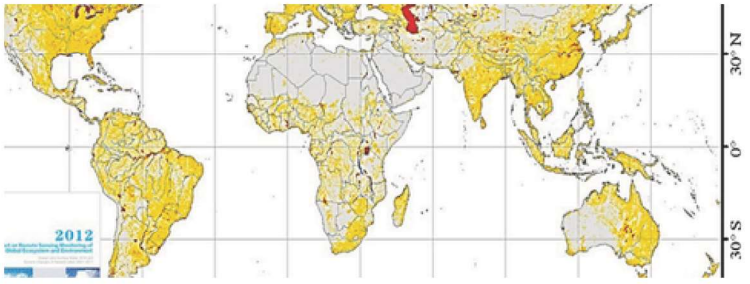
3 Himalaya

They act as a barrier to cold winds and influence monsoonal flow.



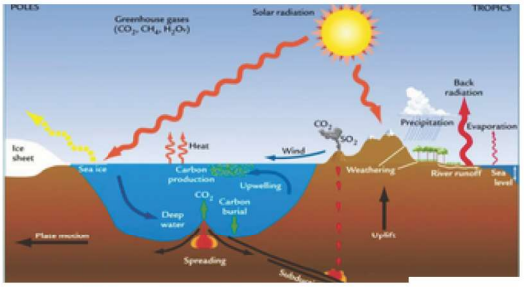
4 Distribution of Land and Water

Differential heating of land and sea creates pressure differences.



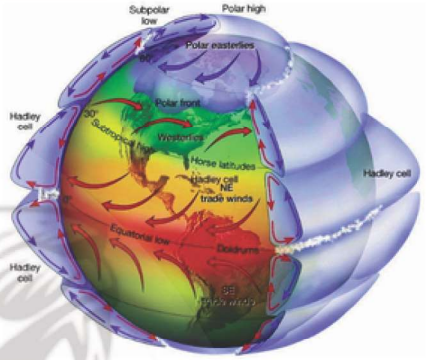
5 Distance from the Sea

Coastal regions have moderate climates, while inland regions experience extreme temperatures.



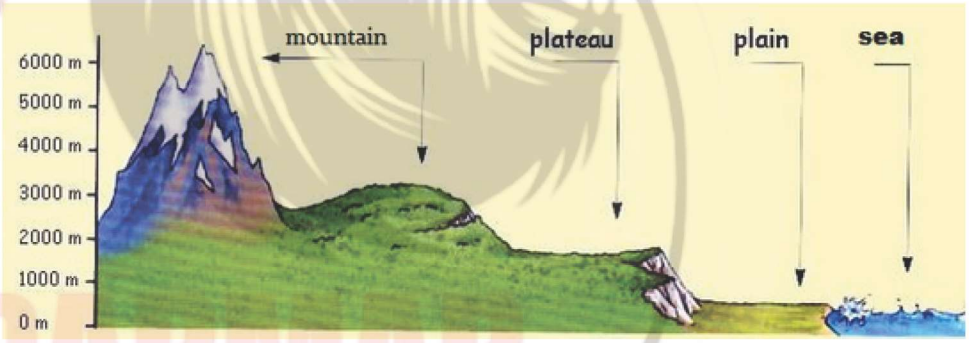
6 Pressure and Wind System

Influence monsoon winds and seasonal variations.



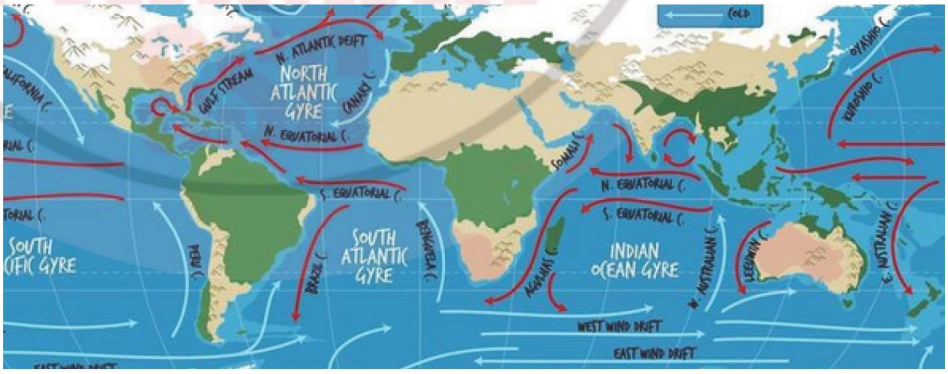
7 Relief Features

Mountains cause orographic rainfall, and plateaus influence wind movement.



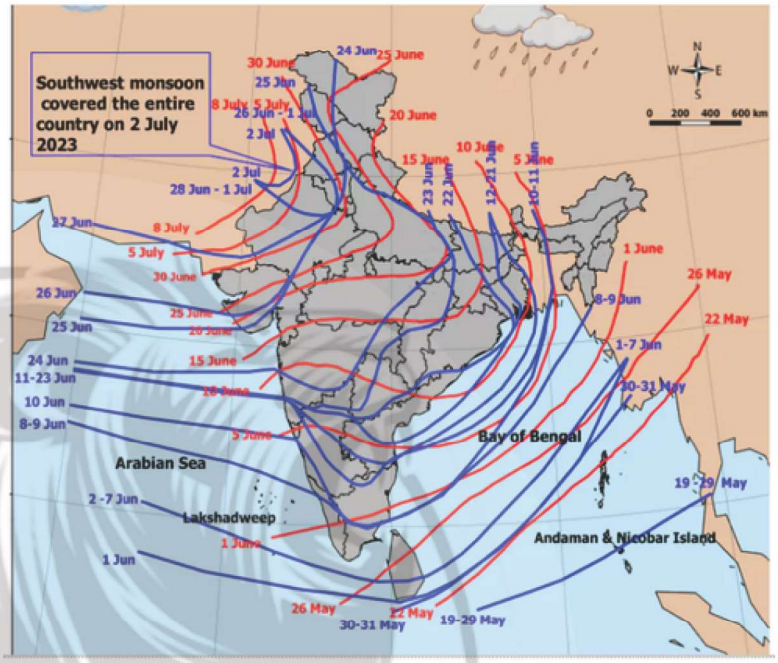
8 Ocean Currents

They influence temperature and rainfall patterns.

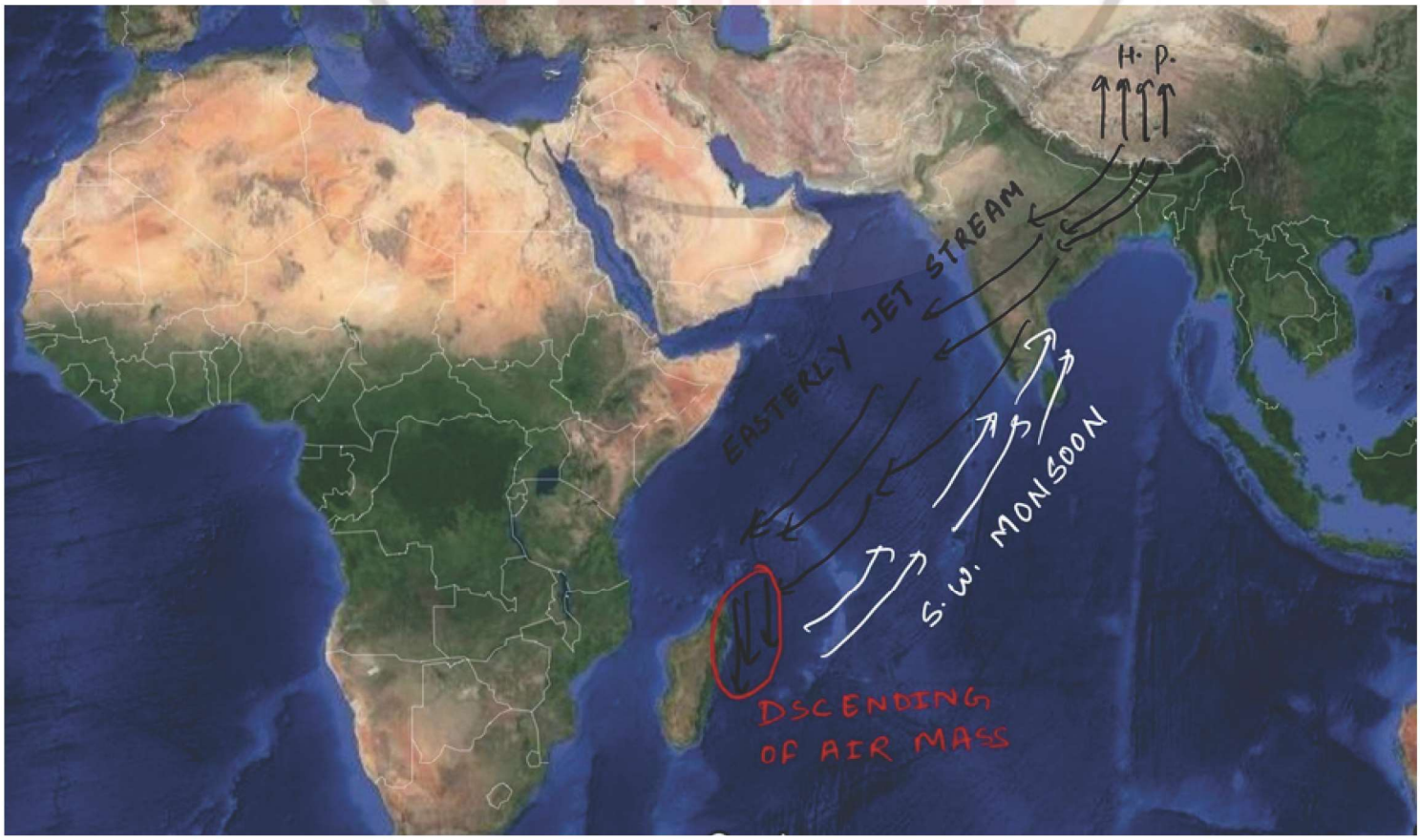


Summer Season (March-May)

- The Inter-Tropical Convergence Zone (ITCZ) is a low-pressure zone located near to equator where trade winds converge and air tends to ascend.
- It is shifted around 20°N-25°N latitudes (over the Gangetic plain) in July month and is sometimes called the monsoon trough.
- This monsoon trough leads to the formation of thermal low over north and northwest regions in India.
- Intense heating of the Tibetan Plateau creates low pressure, attracting winds.



- Intertropical Convergence Zone (ITCZ) shifts northward, leading to the onset of the southwest monsoon over the Indian subcontinent.
- Easterly jet streams blowing at 13-14°N latitude on the India subcontinent also help in the arrival of monsoon.
- High pressure on East of Madagascar also facilitates monsoon.



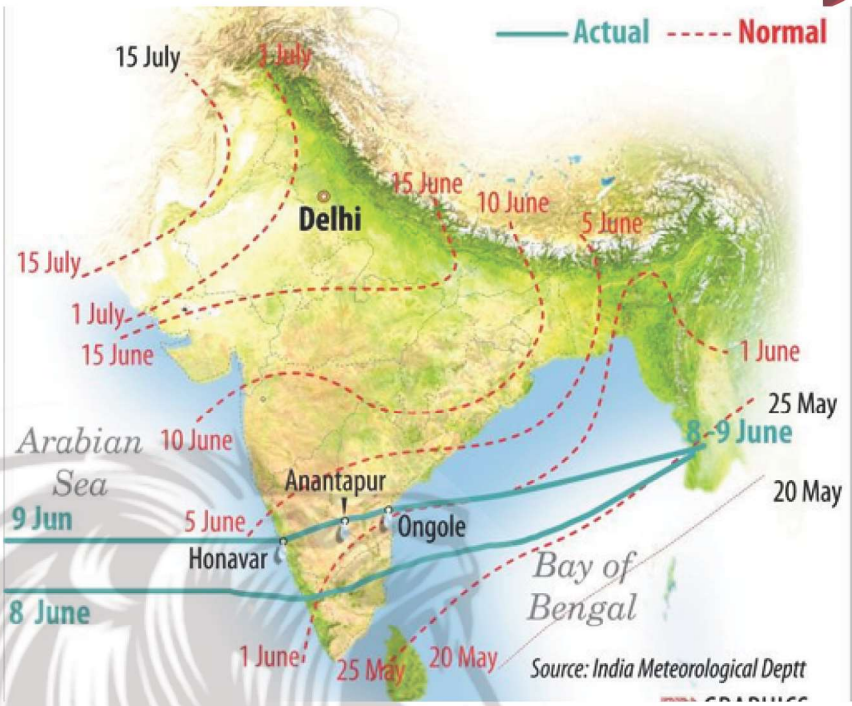
Pre-Monsoon Showers

Pre Monsoon is the period of rainfall that occurs in the summer before the rainy season

Nor westers: They are known as Kal Baisakhi (calamity in the month of Baisakh) in West Bengal (they help in growth of jute and tea crops) and Bardoli Chheerah/Bordoisila in Assam.

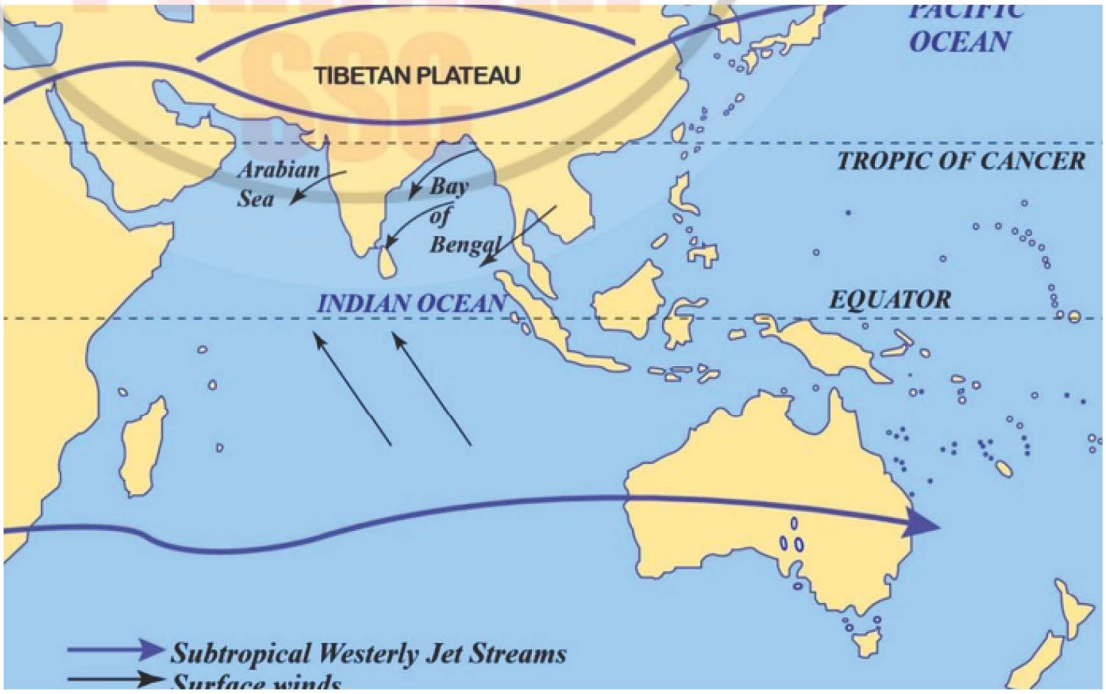
Blossom Showers in Kerala and nearby areas: They help in growth and cultivation of coffee crops.

Mango Showers in coastal Karnataka and Kerala: They help in early ripening of mangoes.



Monsoon Season (June-September)

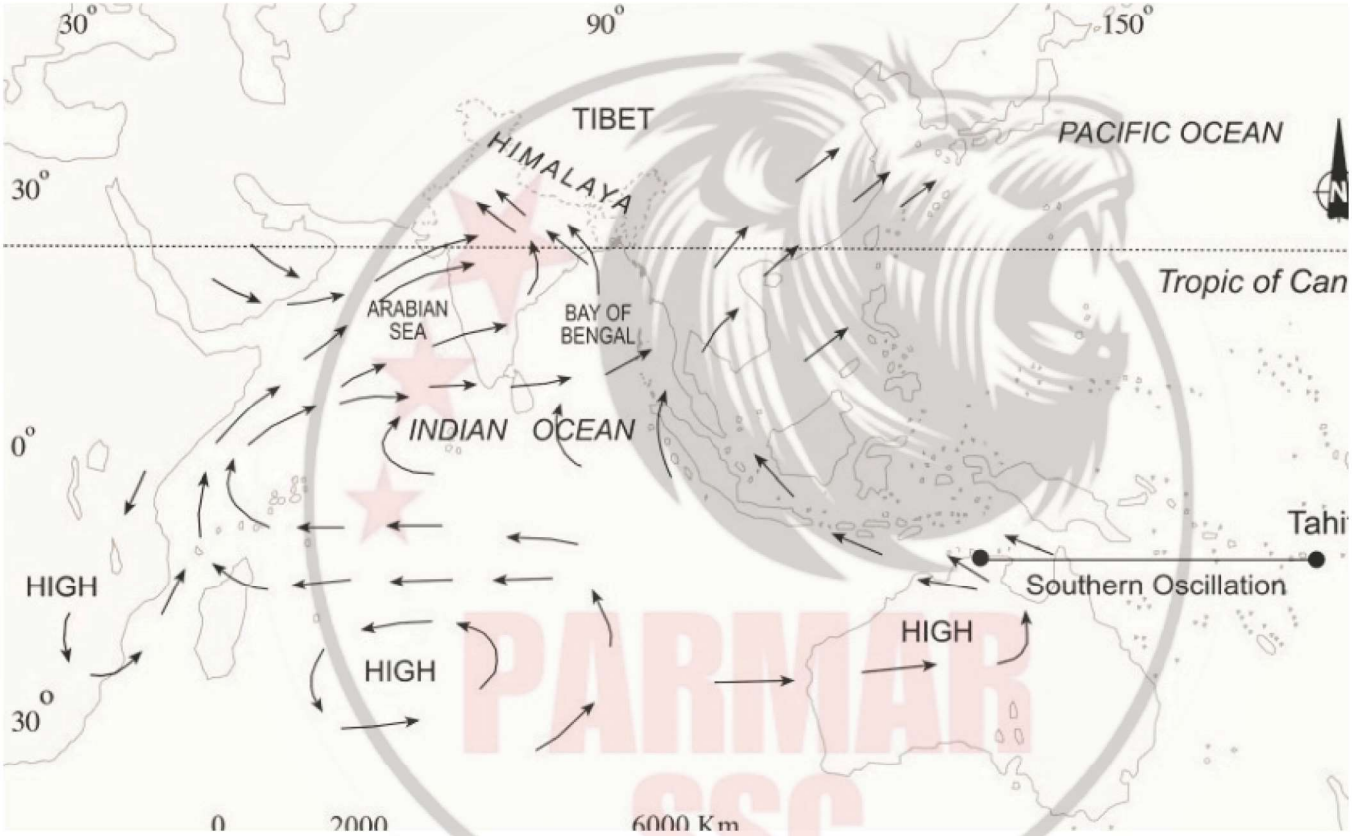
- The term "Monsoon" is derived from an Arabic word "Mausim" meaning seasonal reversal of winds.
- Onset of monsoon: It begins in Kerala (first week of June) in the Western ghats (orographic rainfall).
- Rain Shadow Zone: Areas like Leeward side of Western Ghats receive less rain.



- Southwest Monsoon is divided into two branches: Bay of Bengal and Arabian Sea Branch
- Both branches meet Northwest of Ganga Valley and Punjab Plains.
- Highest rainfall recorded in: Mawsynram and Cherrapunji (Khasi Hills of Meghalaya).

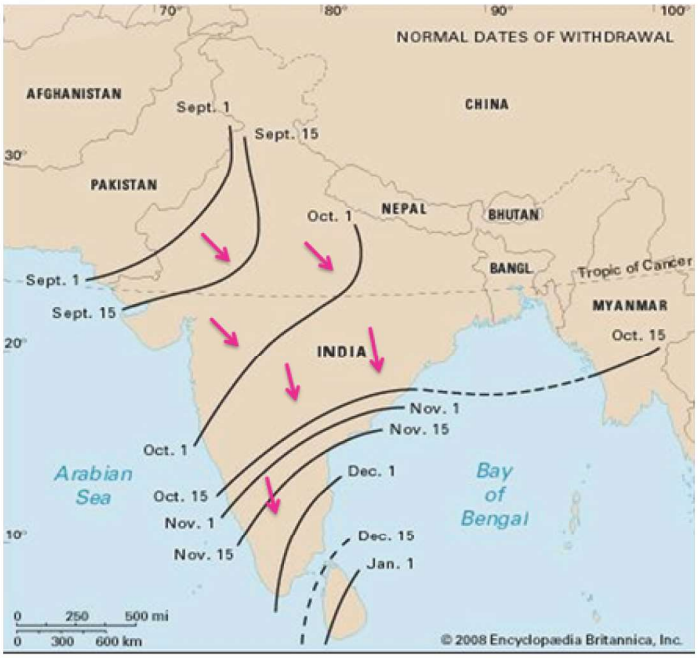
Break in Monsoon:

A temporary period during the monsoon season, when there is a significant decrease or complete absence of rainfall.



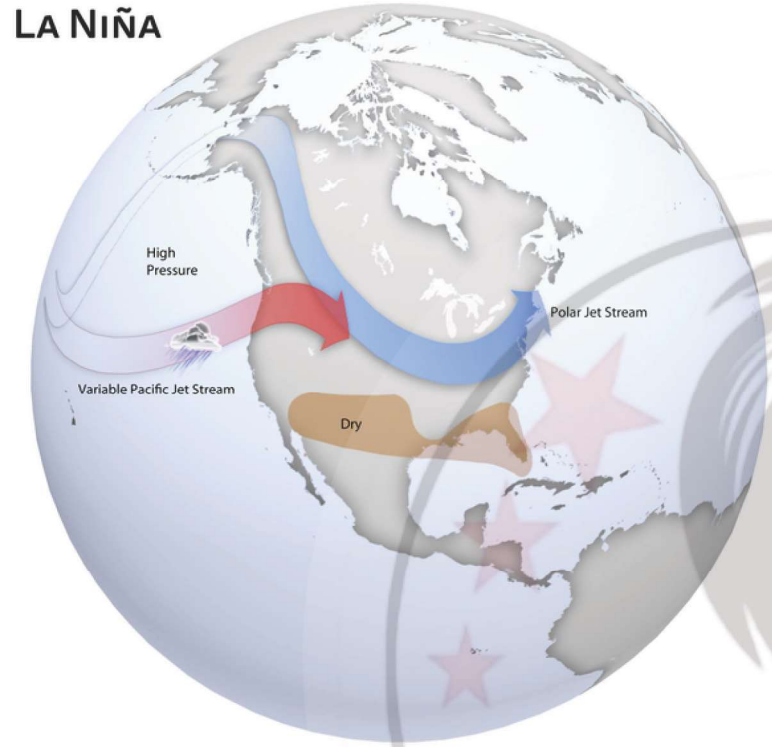
Retreating Monsoon (October-November)

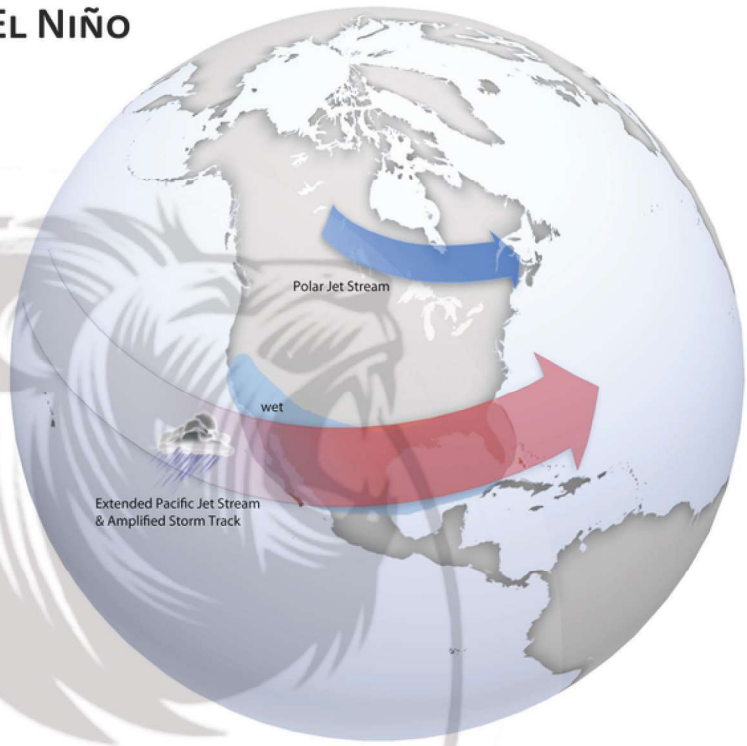
- Monsoon starts its retrieval from northwest part. When it passes from Bay of Bengal it causes cyclonic disturbances and also causes heavy rainfall in Coromandel Coast (Tamil Nadu). This is called North-East monsoon or Retreating monsoon.
- "October heat" refers to the rising temperature and humidity in India during October due to retreating monsoons and clear skies, leading to oppressive weather conditions

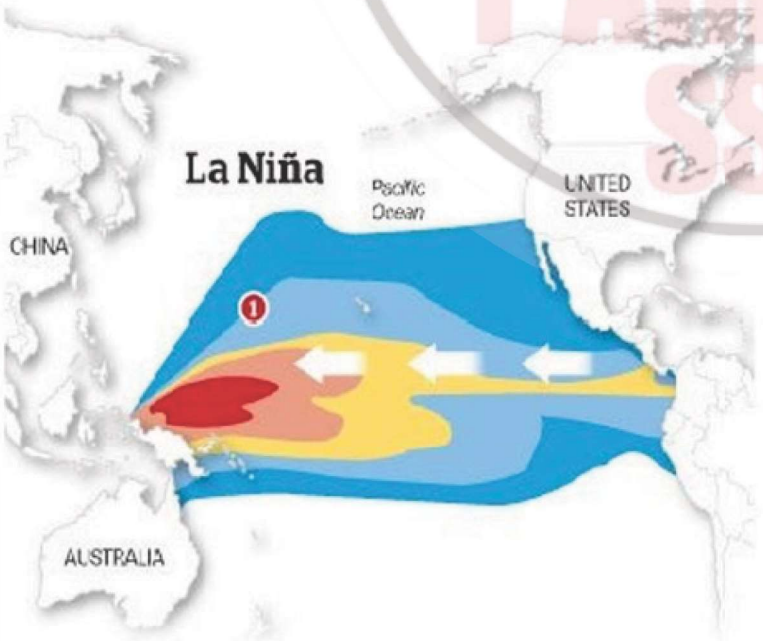


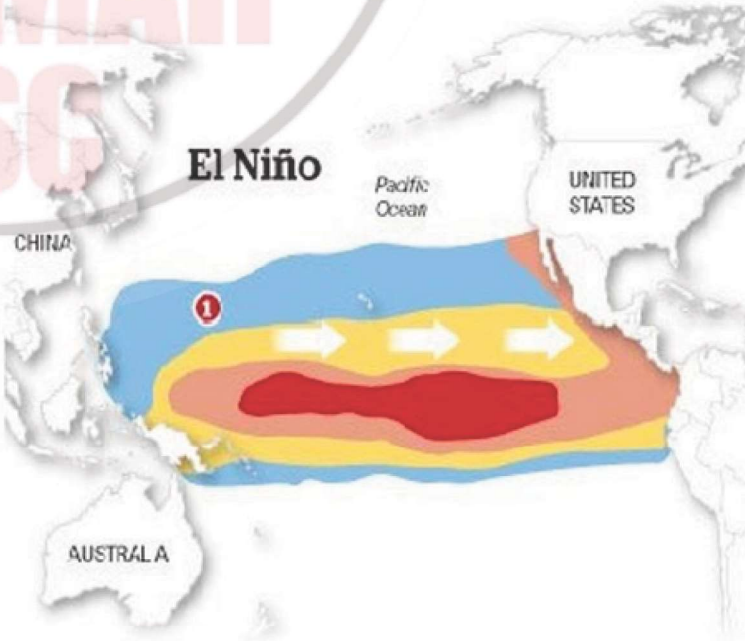
La Niña and El Niño

- In relation to El Niño and La Niña, Darwin (Australia) experiences higher air pressure than Tahiti during an El Niño, while during a La Niña, the pressure is higher in Tahiti compared to Darwin.









La Niña and El Niño

La Niña

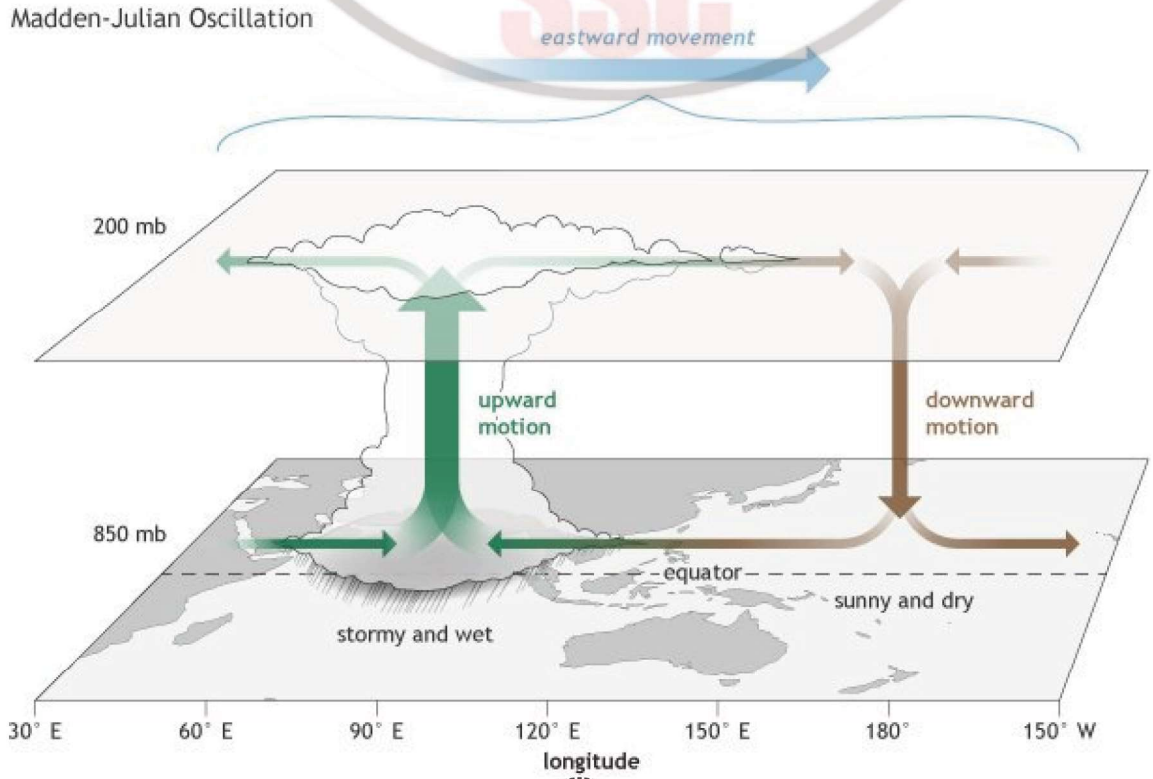
- Meaning : Small Girl
- Below average sea surface temperature in east-central equatorial Pacific (Cold phase of ENSO cycle)
- Trade winds strengthen, pushing warm water western Pacific
- It is seen in every 2-7 yrs.
- Pressure difference between Tahiti and Darwin is positive
- It can cause intense rainfall in Australia and India along with heavy floods; drier conditions in South America
- Fishing industries in South America coast will flourish.

El Niño

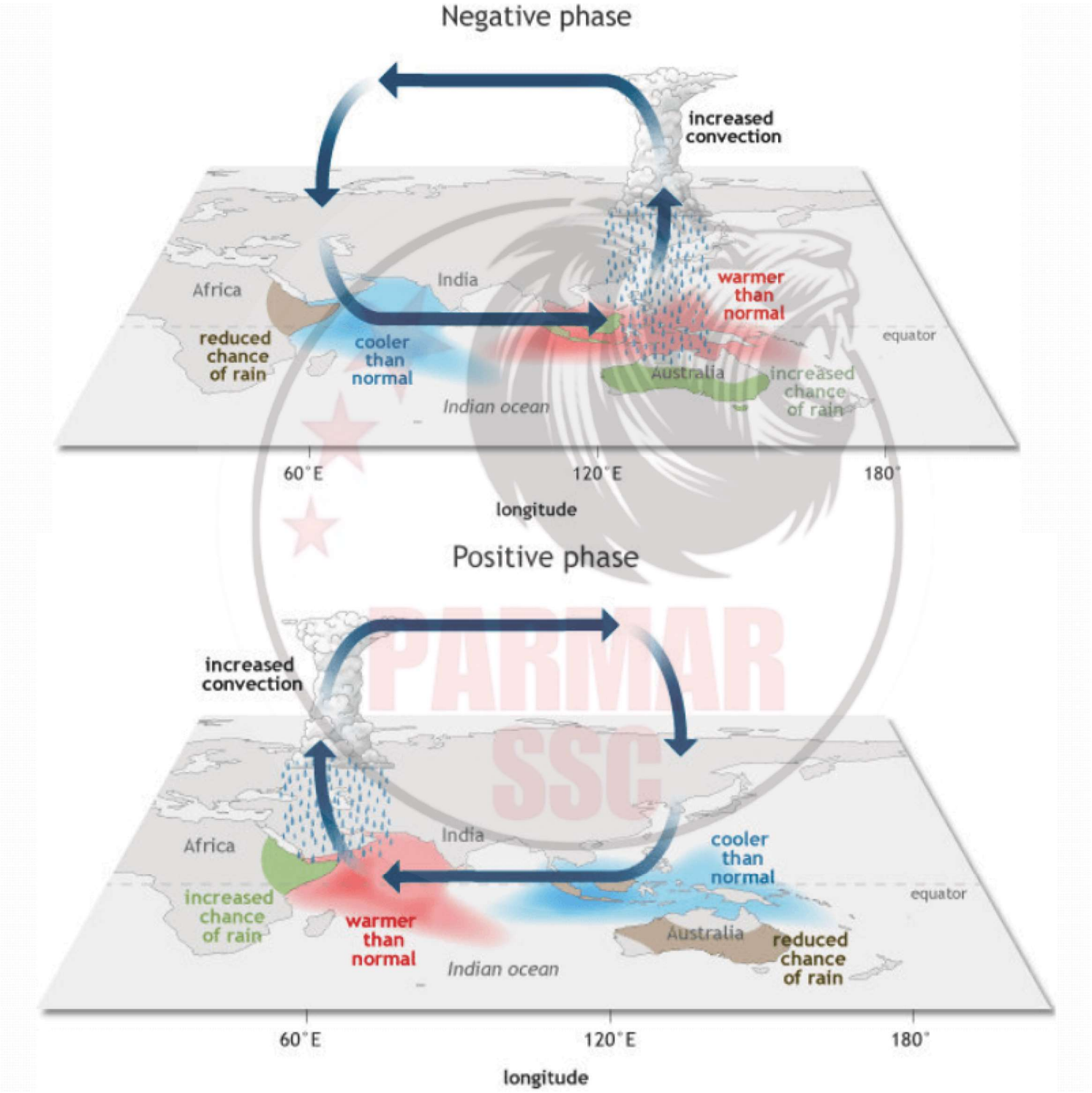
- Meaning : Child Christ / Small Boy
- Above average sea surface temperature in east-central equatorial Pacific (Warm phase of ENSO cycle)
- Trade winds Weaken, allowing warm water eastward.
- It is seen in every 3-7 yrs.
- Pressure difference between Tahiti and Darwin is negative
- It can cause drought in Asia and Australia and in the US. India experiences below average and late monsoon
- Fishing industries won't flourish.

Madden-Julian Oscillation

The Madden-Julian Oscillation (MJO) is a planetary-scale, eastward-moving wave of clouds and rainfall that circles the equator every 30-60 days



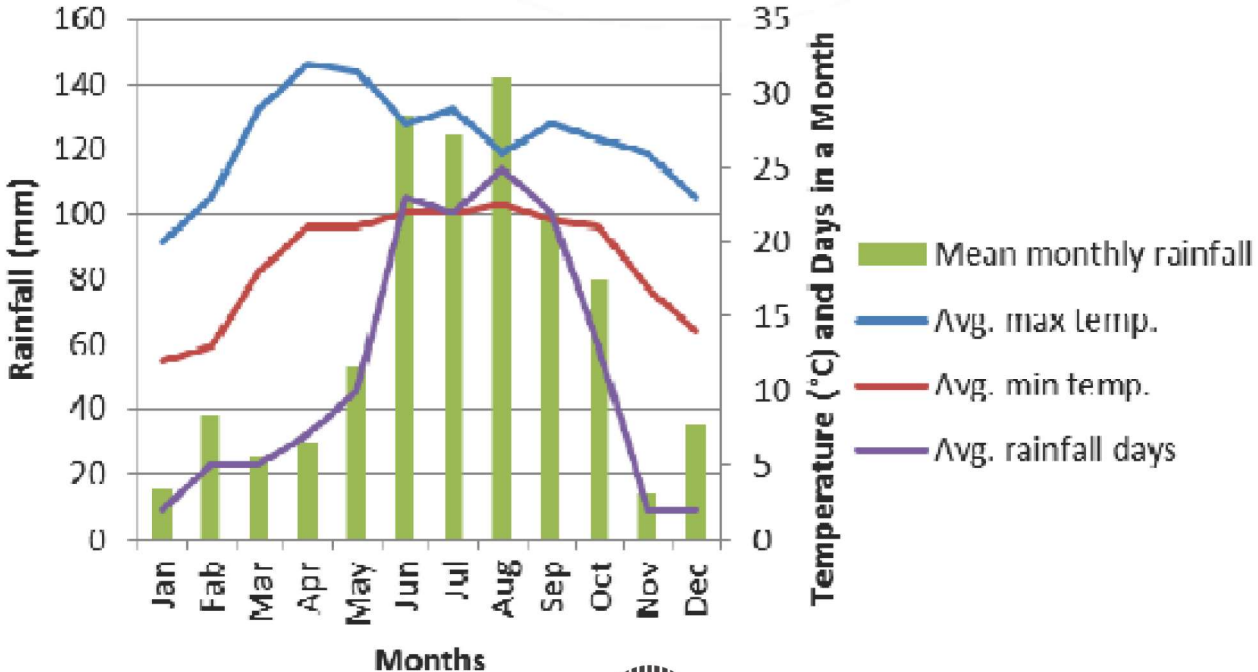
"Indian dipole" refers to the Indian Ocean Dipole (IOD), a climate phenomenon in the Indian Ocean characterized by a difference in sea surface temperatures between its western and eastern poles



Seasons	Months (Indian Calendar)	Months (Gregorian Calendar)
Vasant	Chaitra-Vaishaka	March-April
Grishma	Jyaishta-Asadha	May-June
Varsha	Shravana-Bhadra	July-August
Sharada	Asvina-Kartika	September-October
Hemanta	Margashira-Pausa	November-December
Shishira	Magha-Phalguna	January-February

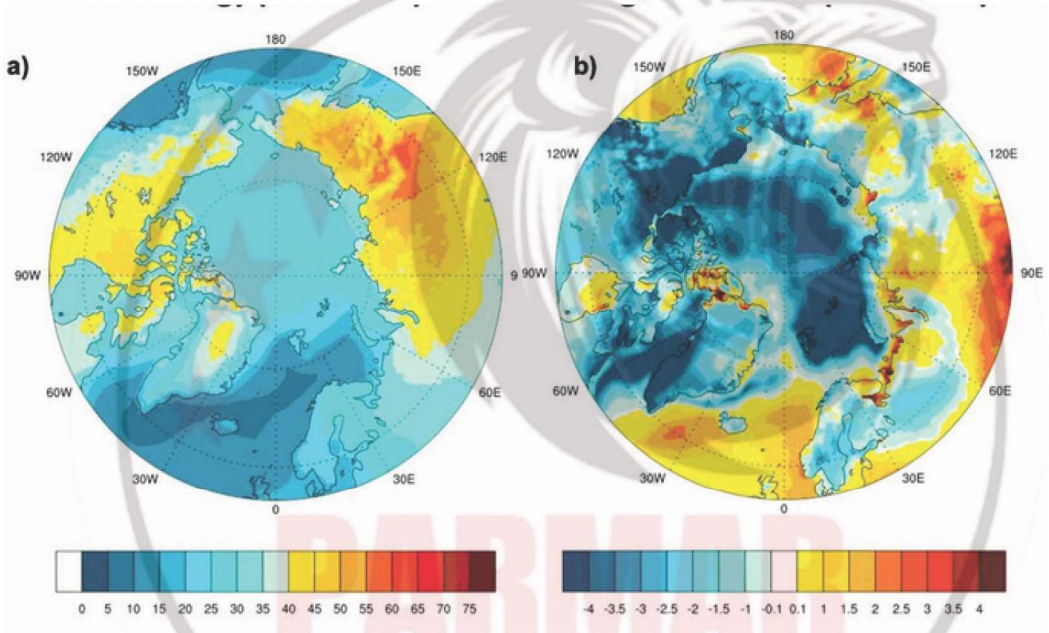
Variation in Temperature & Rainfall

- Diurnal Temperature Range: It is the difference between the highest and lowest temperatures in a 24-hour period.
- Annual Temperature Range: It is the difference between the average temperature of the hottest month and the average temperature of the coldest month.
- Annual Rainfall Variation: It is the difference in the amount of rainfall received over a year, either across different regions or within the same region over multiple years.



Continentality Effect

- It is the experience of extreme weather conditions due to distance from the sea.
- The far we go from the ocean into the continent, the moderating influence of sea decreases and the climate becomes more extreme this is called as continentality effect.
- Coastal cities do not experience extreme climate due to "moderating influence of sea". E.g. Mumbai, Chennai, Bangalore, etc.
- Whereas cities like Kanpur, Delhi, Jalandhar experiences extreme climate due to continentality effect.



Area of High Rainfall

- Western side of Western Ghats
- North East : Meghalaya
- Brahmaputra Valley

Inadequate Rainfall

- Western Rajasthan
- Ladakh

Area of Medium Rainfall

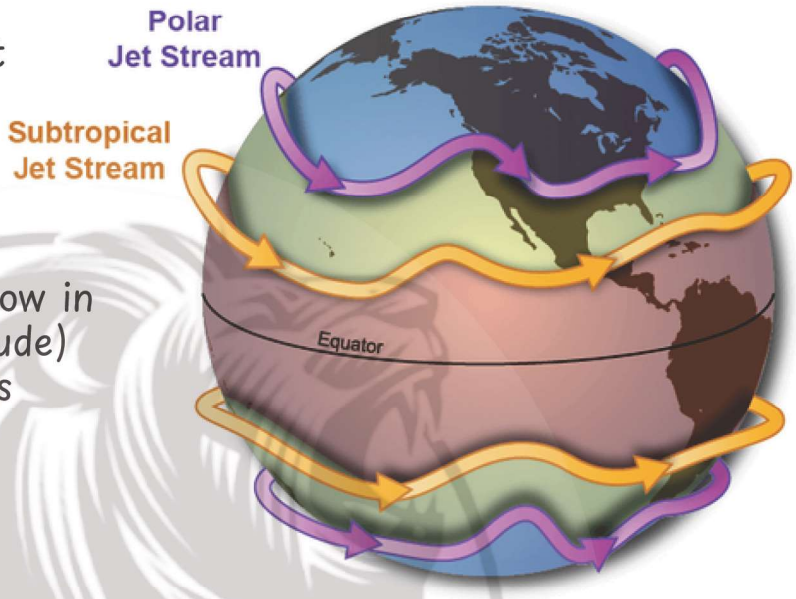
- Eastern part of Tamil Nadu
- North-East Peninsula
- Parts of Madhya Pradesh
- Cachar Valley (Assam)

Area of Low Rainfall

- Western UP, Delhi, Haryana, Punjab, J&K, Eastern Rajasthan

Winter Season (December-February)

Winter season is affected by Cold, dry, chilling winds from Arctic/Central Asia, but they are blocked to a certain extent by the Himalayas.



1 Jet Stream

They are high-speed winds that blow in Upper Troposphere (9-13 km altitude) that influence Northern Plains, this causes winter rainfall by bringing Western Disturbances (known as "Mahawat" in Rajasthan).

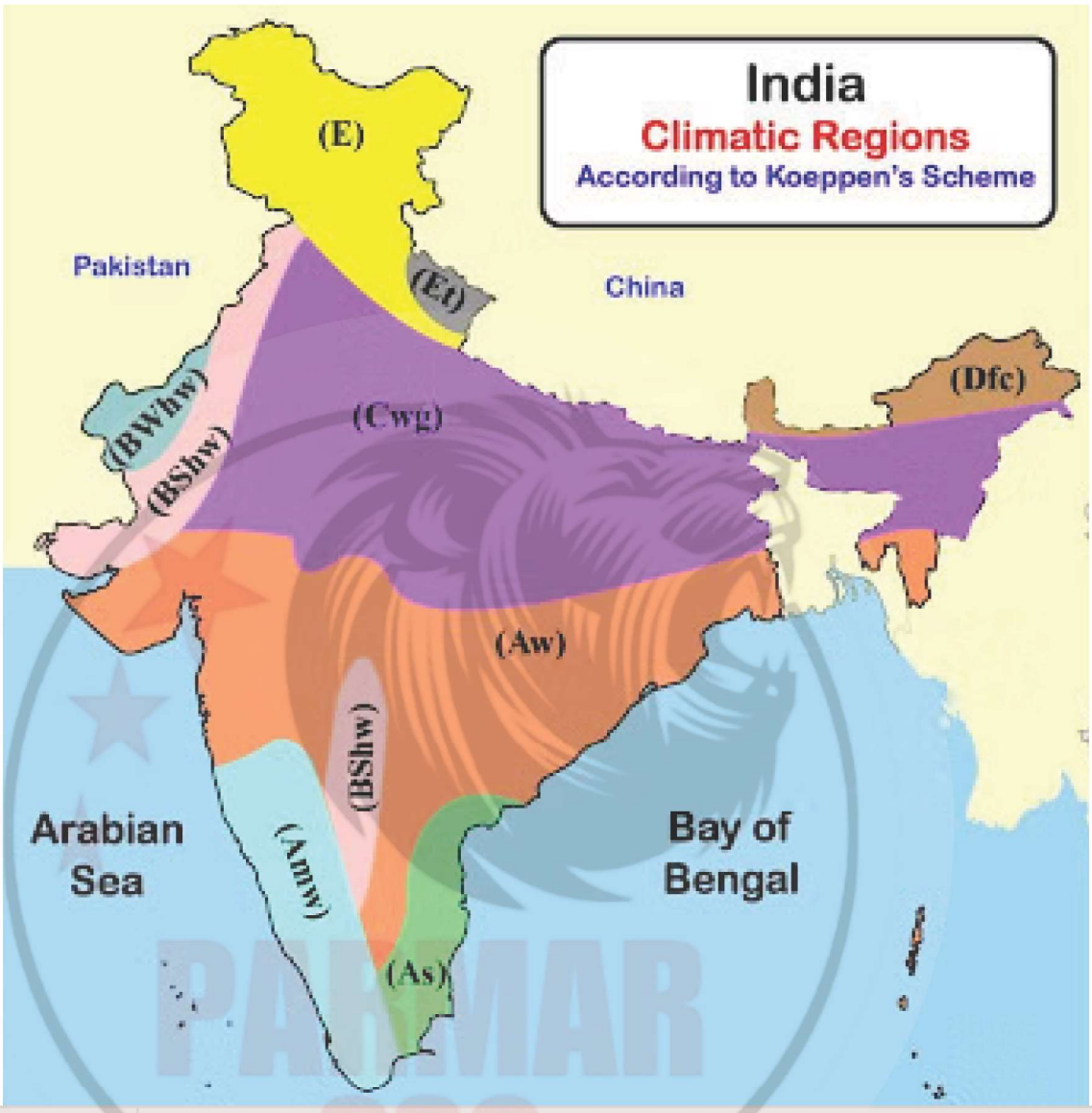
2 Western Cyclonic Disturbances

- Cyclonic storms from the Mediterranean Sea and Caspian Sea bring winter rainfall.
- Winter Rainfall is beneficial for cultivation of Rabi crops.
- An increase in the prevailing night temperature in winter months in Northern parts of India generally indicates the arrival of Western Disturbances in India.



Koeppen Climate Classification (1884)

- It is an empirical classification for categorising the world's climates into five main groups. It's based on average monthly and annual temperatures and precipitation.



Classification Groups	Characteristics
A : Tropical	Average temperature of the coldest month is 18°C or higher
B : Dry Climate	Potential evaporation exceeds precipitation
C : Warm Temperate	The average temperature of the coldest month of the (Mid-Latitude) climate years is higher than -3°C but below 18°C
D : Cold snow forest	The average temperature of the coldest month is -3°C or Below
E : Polar Type (Cold) / Tundra	Average temperature for all months is below 10°C.

- S : Steppe
- W: Desert
- m : Monsoon
- f : Full Rainfall
- w : Winter Dry
- s : Summer Dry

Group	Type	Letter Code	Characteristics
A-Tropical Humid Climate	Tropical wet	Af	No dry season
	Tropical monsoon	Am	Monsoonal, short dry season
	Tropical wet and dry	Aw	Winter dry season
B-Dry Climate	Subtropical steppe	BSh	Low-latitude semi arid or dry
	Subtropical desert	BWh	Low-latitude arid or dry
	Mid-latitude steppe	BSk	Mid-latitude semi arid or dry
	Mid-latitude desert	BWk	Mid-latitude arid or dry
C-Warm temperate (Mid-latitude) Climates	Humid subtropical	Cfa	No dry season, warm summer
	Mediterranean	Cs	Dry hot summer
	Marine west coast	Cfb	No dry season, warm and cool summer
D-Cold Snow-forest Climates	Humid continental	Df	No dry season, severe winter
	Subarctic	Dw	Winter dry and very severe
E-Cold Climates	Tundra	ET	No true summer
	Polar ice cap	EF	Perennial ice
H-Highland	Highland	H	Highland with snow cover