

Jet streams -

- Jet streams are very fast upper Tropospheric winds. They are embedded within upper Tropospheric wind

- These core wind velocity exceeds 300-400 km/hour

- Geostrophic winds, they are westerly winds.

If they are within Rossby wave, they also have meandering paths & will follow Index

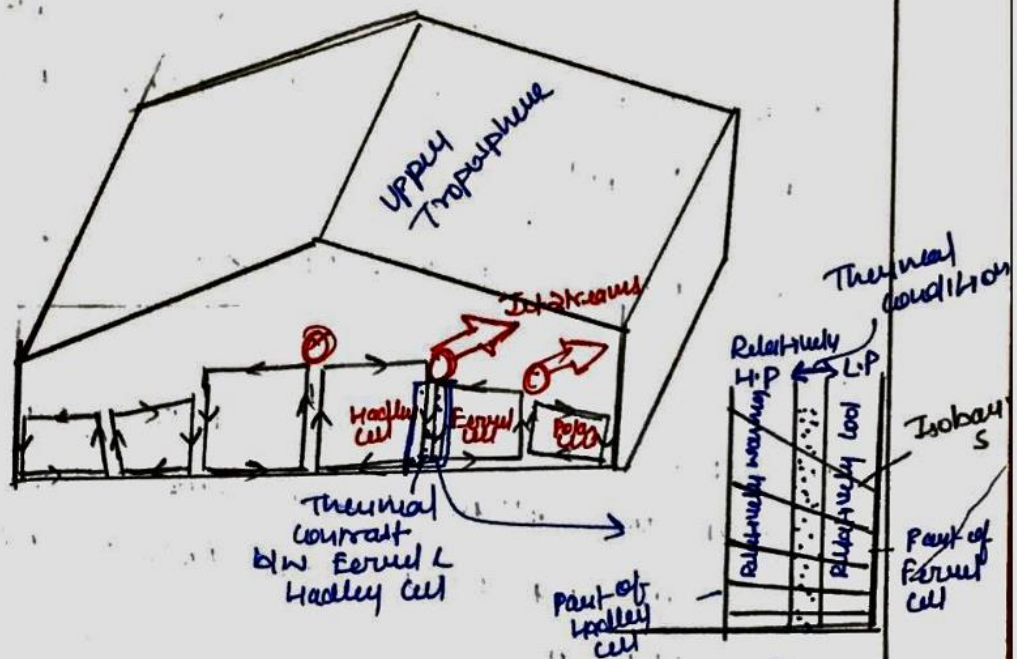
Cycle of oscillations

Special condition

Cycle of oscillation

◦ Jet streams are consequence of special condition called as Thermal wind conditions. The thermal wind conditions develop at margins of vertical meridional cells at lower parts of upper Troposphere.

◦ This condition is because of difference of thermal conditions b/w the two vertical meridional cells.



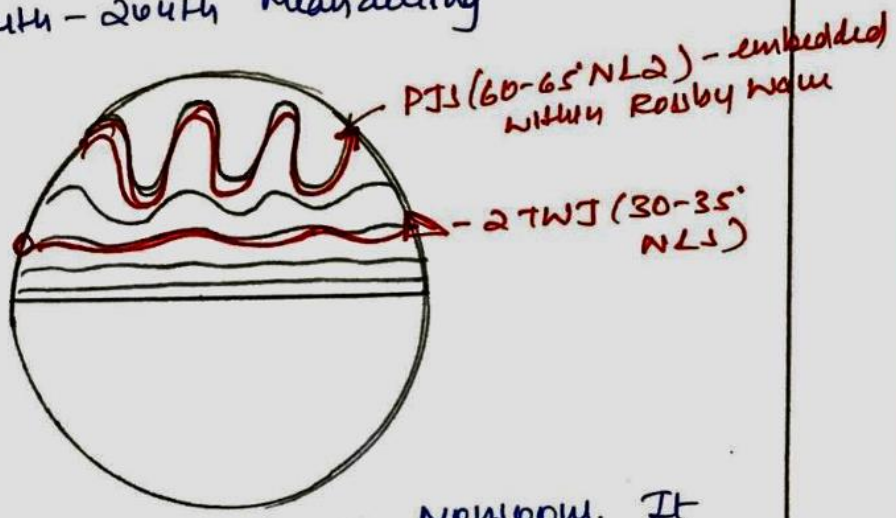
Thermal wind condition creates additional pressure gradient because of which upper troposphere winds become very very fast & forms Jet streams

There are 2 permanent Jet streams in each hemisphere

① **STWJ** (Sub Tropical Westerly Jet stream) (30°-35° N and S)

② Polay Jet stream ($60-65^{\circ}$ N and ω).

↓
embedded within Rossby waves & it has same index cycle of oscillation and north-south meandering



* ω STWJ has an impact on monsoon. It has a role in monsoon burst, monsoon breaks & western disturbances (winter rainfall in India)

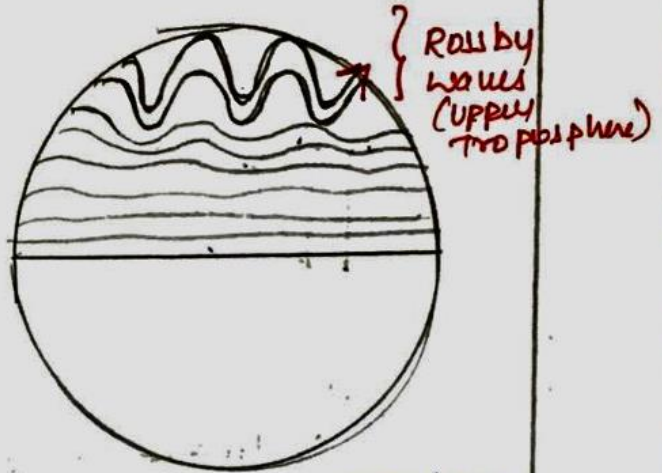
whereas as Polay Jet stream impacts weather of mid latitudes & plays a very imp role in formation of temperate cyclones

Winds (Upper Tropospheric Winds)

- 1] Deflect
- 2] Geostrophic Balance
- 3] Westerlies

4] High Latitude

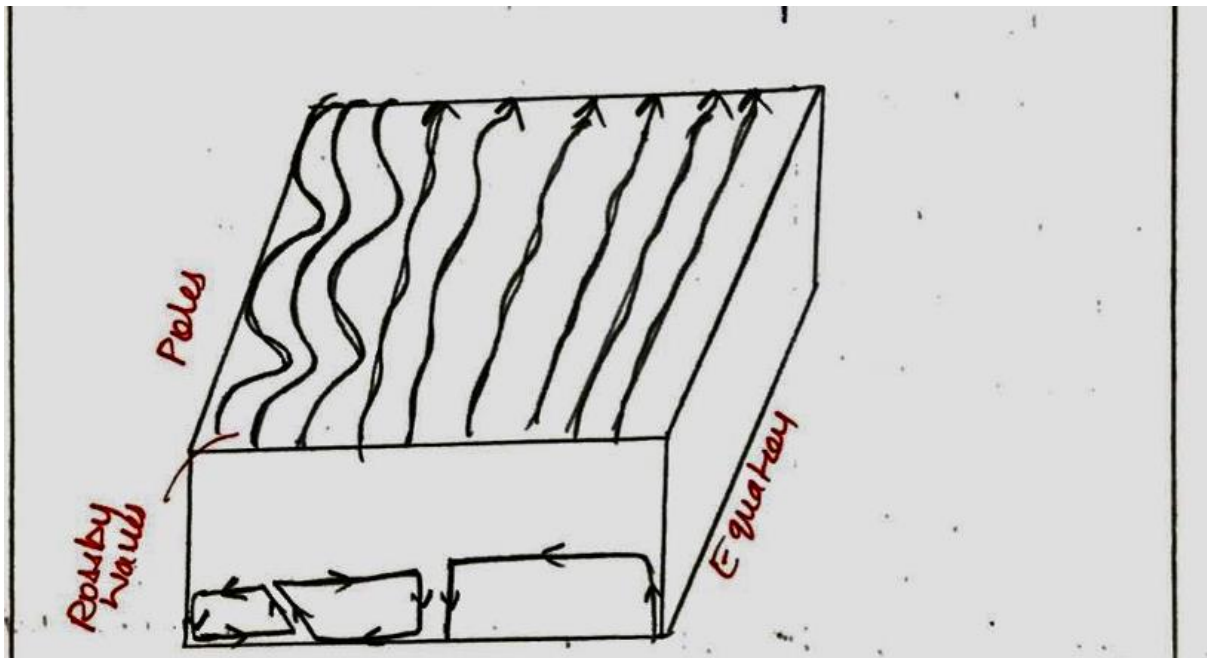
Westerlies taking zig zag path due to conservation of Angular Momentum



Once Upper Tropospheric winds have become westerly winds because of Geostrophic balance, the winds are also affected by principle of Angular Momentum conservation. This forces the winds to take zig zag path and this meandering path become more pronounced beyond $50-60^{\circ}$ N Lat.

• In high latitude where zig zag path are more pronounced, Upper Tropospheric winds are called as Rossby waves.

• Rossby wave go through 10-15 days oscillation cycle called as Index Cycle where from being North-South meandering wave, they switch to East-West straight wind & again back to North-South meandering. This is an infinite cycle of continuous oscillation



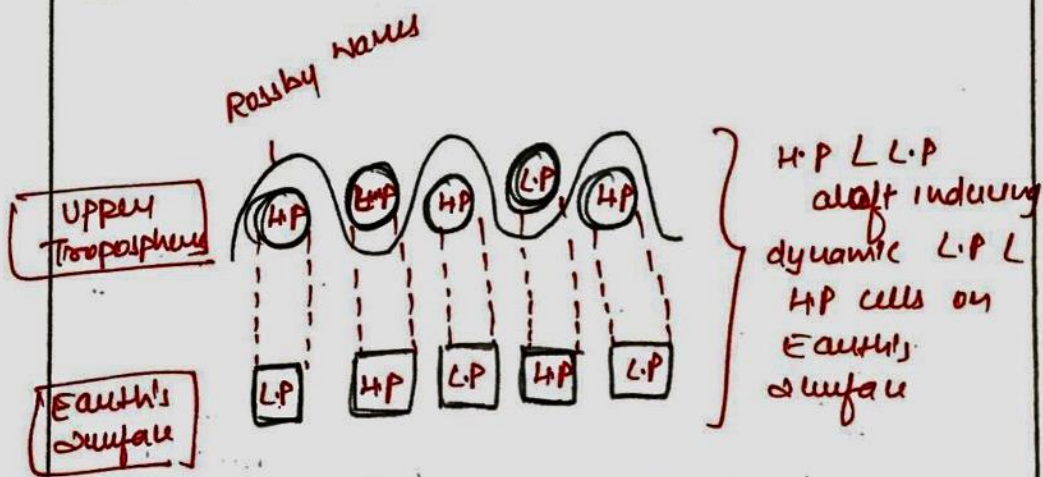
Modified Pressure Patterns because of Rossby waves -

• PWF - from equator towards pole \rightarrow very very high speed winds - creating geostrophic winds - due to the conservation of Angular Momentum -

Meandering paths are created - further creating Rossby waves - which have Index cycle - This Rossby waves & Index cycle creates Dynamic Pressure cells

o Meandering Rossby waves creates pressure cells within their loops & HOP on the right & LOP on the left in N Hemisphere. This pattern forces pressure cells on the surface.

o These pressure patterns are dynamically induced & have cycle of 10-15 days cycle of Rossby waves



* These dynamic pressure cells L R are very imp component of weather beyond 55-60° N latitude