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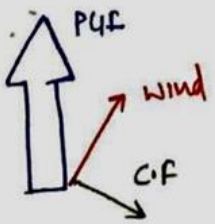
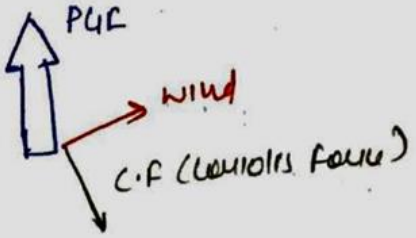
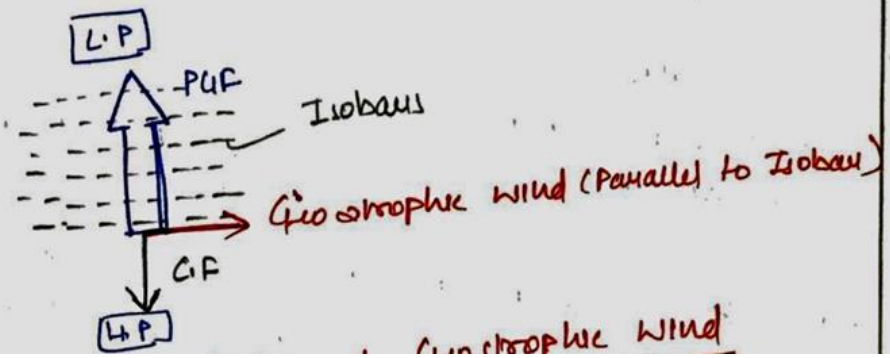
Upper Tropospheric Winds -







H.P

Geostrophic balance & Geostrophic Wind

- It is a unique condition where very fast moving winds deflect perfectly because of Coriolis force & winds move at 90° to PGF (Pressure Gradient force. In this condition, the PGF is balanced by Coriolis force that acts in exact opposite direction.
- If wind speed increases beyond Geostrophic balance condition, the deflection won't be more than 90° to the PGF

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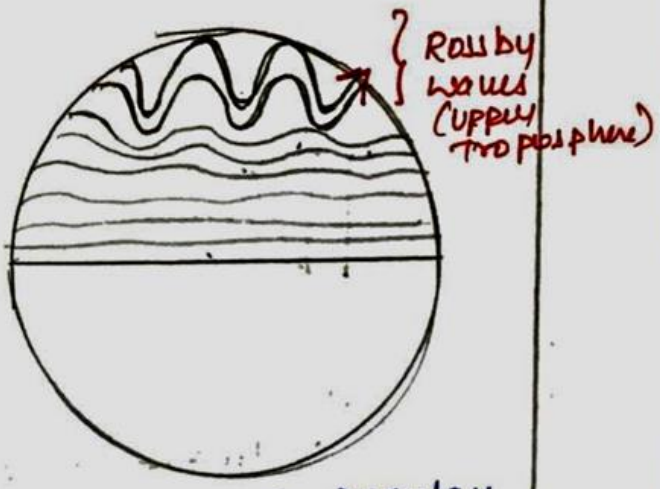
Winds (Upper Tropospheric Winds)

1] Deflect

2] Geostrophic Balance

3] Westerlies

4] High Latitude Westerlies taking zig zag path due to conservation of Angular Momentum



Some 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 become more pronounced

the winds to take zig zag meandering path become more pronounced beyond 50-60° N Lat.

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

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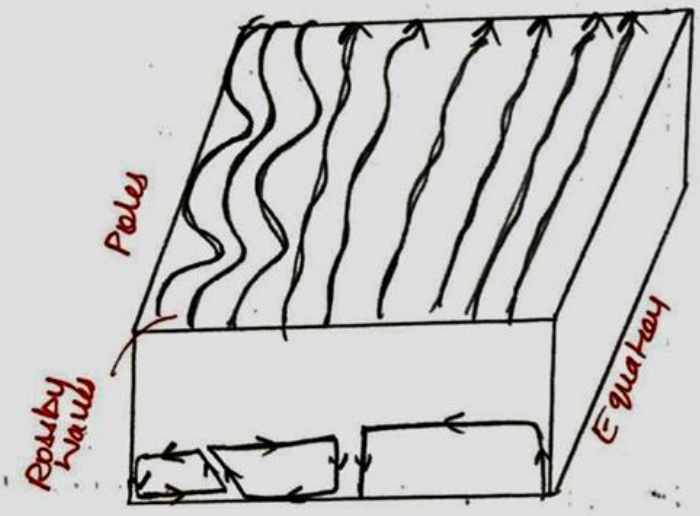
- Rossby wave go through 10-15 days Oscillation cycle called as Index cycle where from being North-South meandering wave, they switch to East-West straight wind & again back to North-South meandering. This is an infinite cycle of continuous oscillation

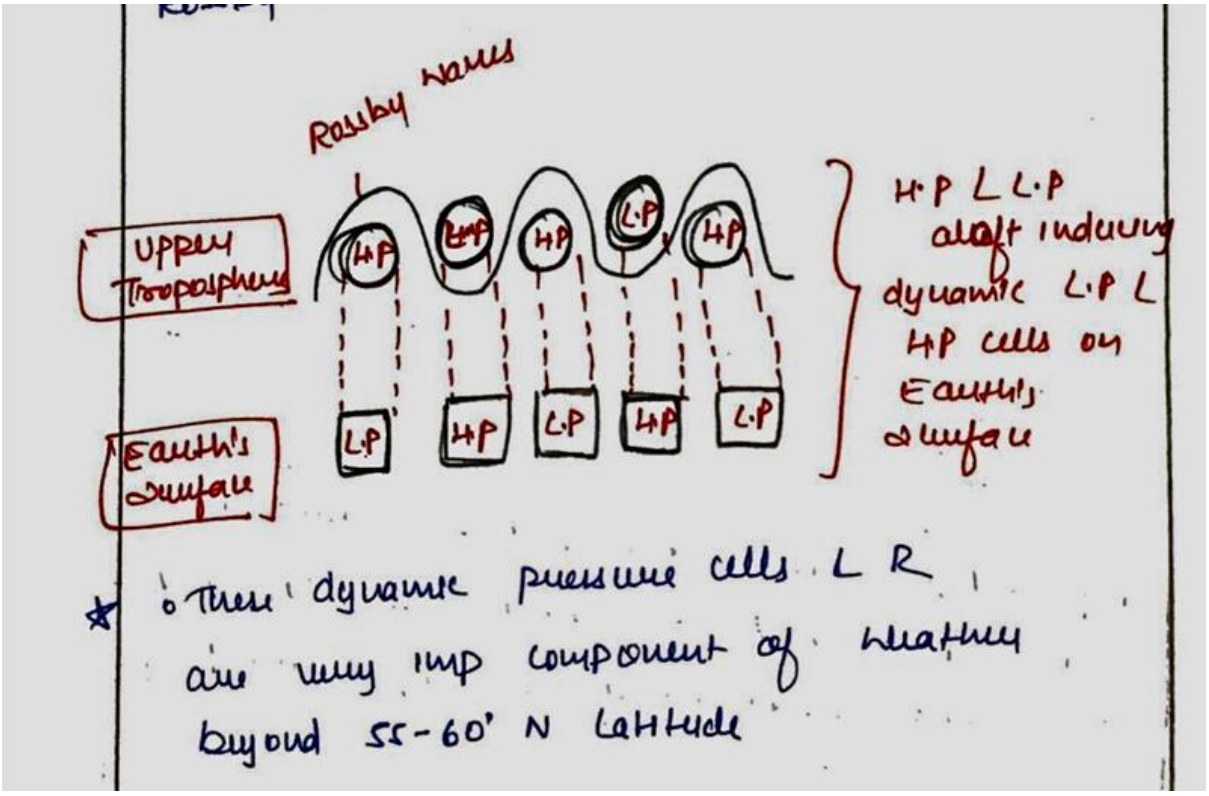


Modified Pressure Patterns because of Rossby waves -

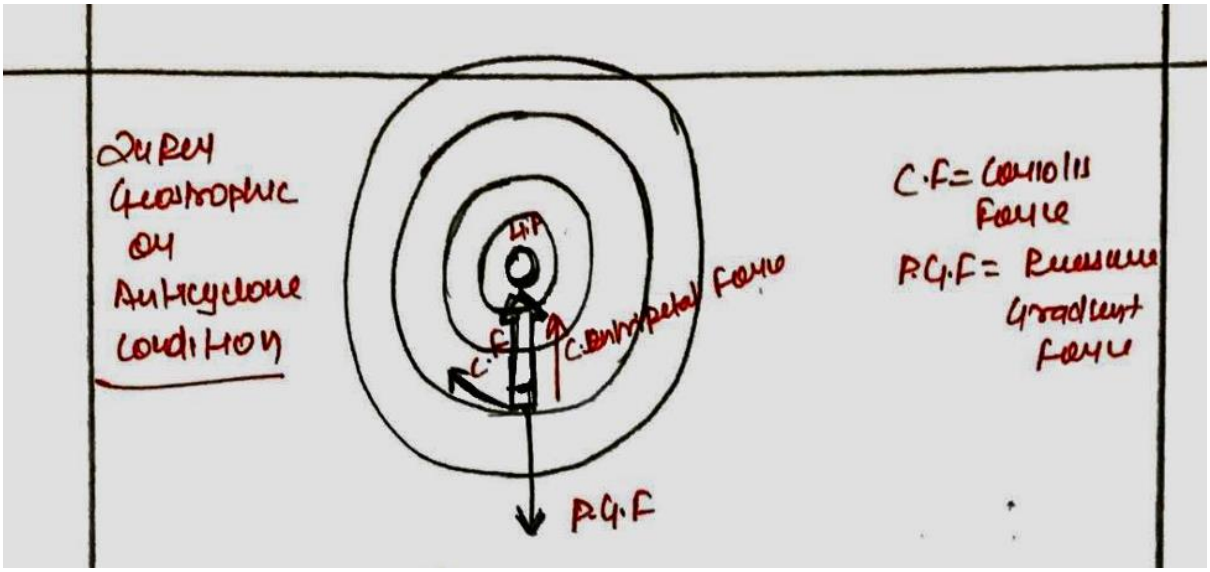
- PGF - from equator towards pole → very very high speed winds - creating Geostrophic winds - due to Ang Conservation of Angular momentum -

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

- Meandering Rossby waves creates Pressure cells within their loops & HP on the right & LP on the left in N. Hemisphere. This pattern forces Pressure cells on the surface.
- 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



Gradient Winds -

- Gradient winds are category of local planetary currents that are rotatory & cyclonic
- They are always the consequence of localised H.P or L.P (the linear pressure belt patterns are gradients of closed Isobars).

- In. Gradient winds, there is an additional component of centripetal force that forces the rotatory motions & genesis of centripetal force is localised L.P pattern.
- Genesis of additional Centripetal force is because L.P or H.P is localised and Isobars is near circular