

Temperate Cyclones - their nature & life cycle

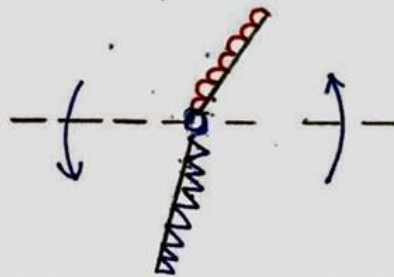
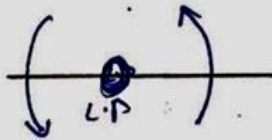
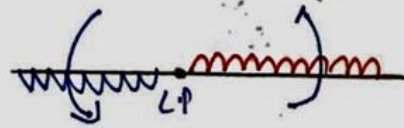
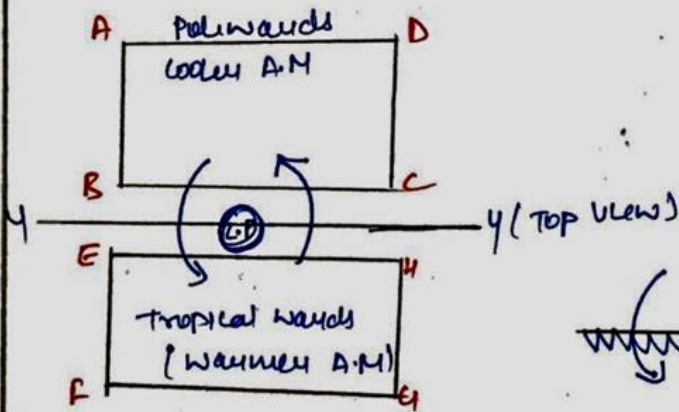
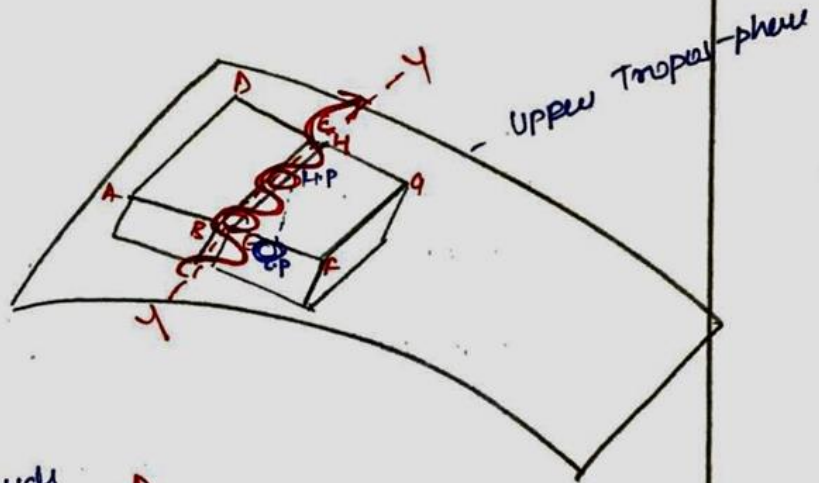
- They are in Mid Latitude (beyond $50-55^\circ$)
- They are in westerly wind belts
- They are large systems with diameters as much as 500/600 km - 1000 km
- Winds however are not powerful winds.
Wind velocities = 40/50 km/hour & it rarely exceeds 80 km/hour
- They are not as destructive & fears both on land & water

Theories -

- Not accepted
- 1] Temperate cyclones because of Air mass
F by FITZROY
 - 2] Abercromby = Mathematical model
- Accepted
- 3] Wave model - by Bjerknes & Bjerknes
Temperate cyclones are consequence of A-M interaction

• wave model - modified by baroclinic theory

Wave Theory of cyclones by Bjerknes

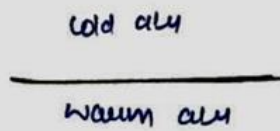


• Temperate cyclones are actually warm fronts
 & cold front rotating about dynamically induced
 L.P with cold front behind warm front.

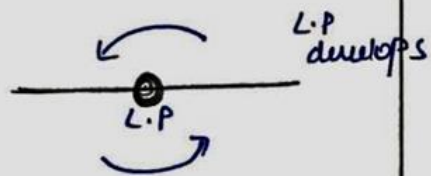
Life Cycle of Temperate Cyclone according to

Wave Model -

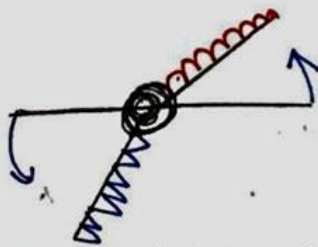
I Stationary front



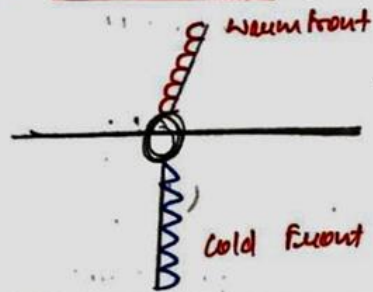
II Incubation/ Embryo stage



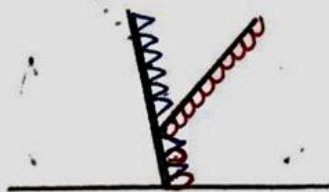
III Frontogenesis stage



IV Mature stage



V Stage of occlusion



VI Frontolysis

VI Frontolysis



fronts - dead, Inversion,
 Temp cyclone dead

Stage I - stage of stationary front.

- contrasting A.M. in face to face with no weather dynamics associated
- Quasi stationary front stage

Stage II - Incipient stage / Embryo stage

- L.P. is induced
- ✦ Original wave model does not explain the precise mechanism of how L.P. systems develop
- In more modern baroclinic theory L.P. genesis is better explained
- L.P. formation is associated with meandering loops of Rossby waves.

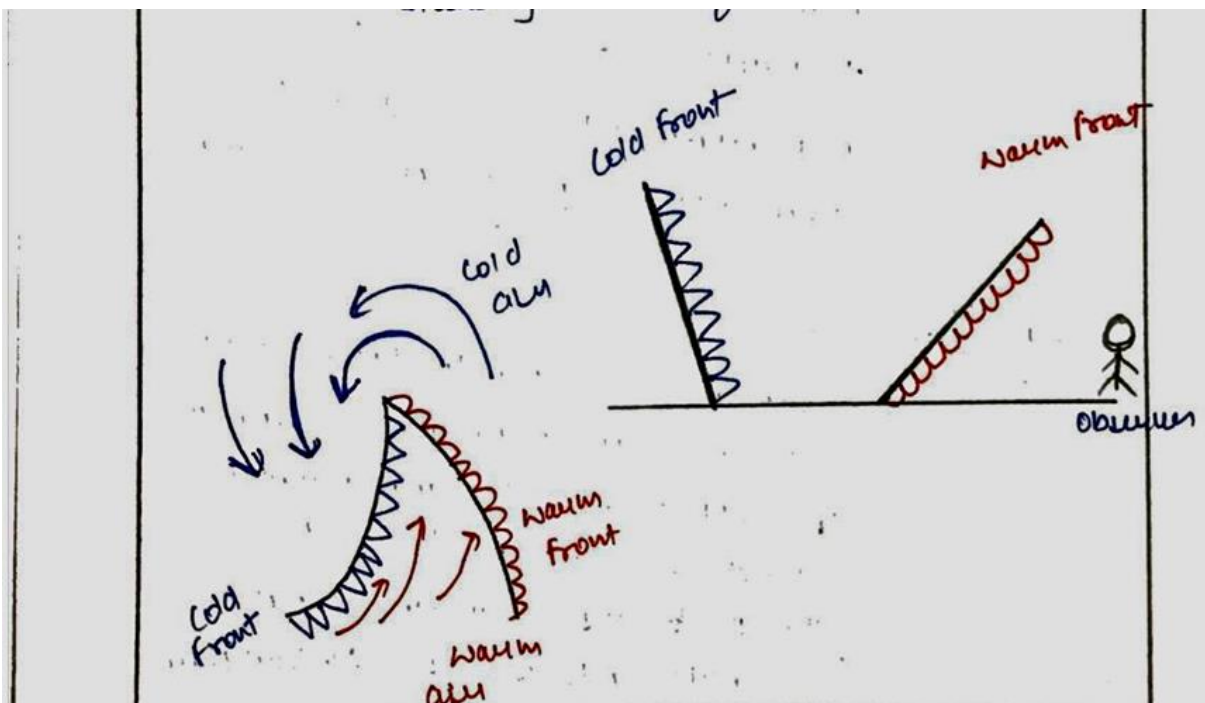
Stage III - Fronto genesis.

- fronts are starting to form with a warm air pushing cold air in the right & cold air pushing against warm on the left
- [This is because cyclone moves Anti clockwise in N. Hemisphere]

- Cold front ~~del~~ from behind moves faster than warm front ahead

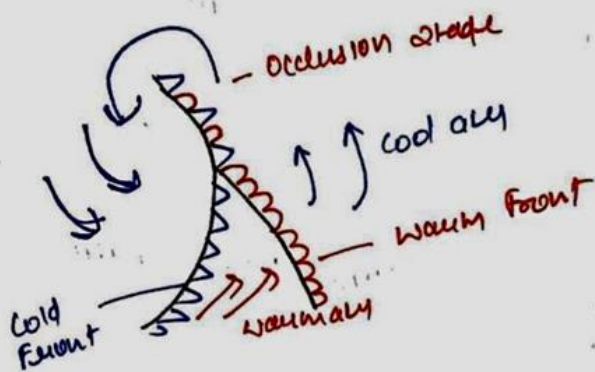
Stage IV - Mature stage -

- Fronts are well developed & cyclones are mature
- weather conditions in mature cyclone will typically follow warm front weather & then cold front weather sequence and some times change can be rapid through 24 hours (Observed standing ahead of warm front)



Stage V - Occlusion stage -

- Cold front from behind will overtake warm front ahead
- complex weather - heavy rainfall, light drizzle etc
- warm air has been forced above



Stage VI - Frontolysis

- Death
- warm air is completely above
- Frontal contrast disappears

• This cycle will last 10-15 days mentioning Index cycle of Rossby wave L Polar Jet stream.

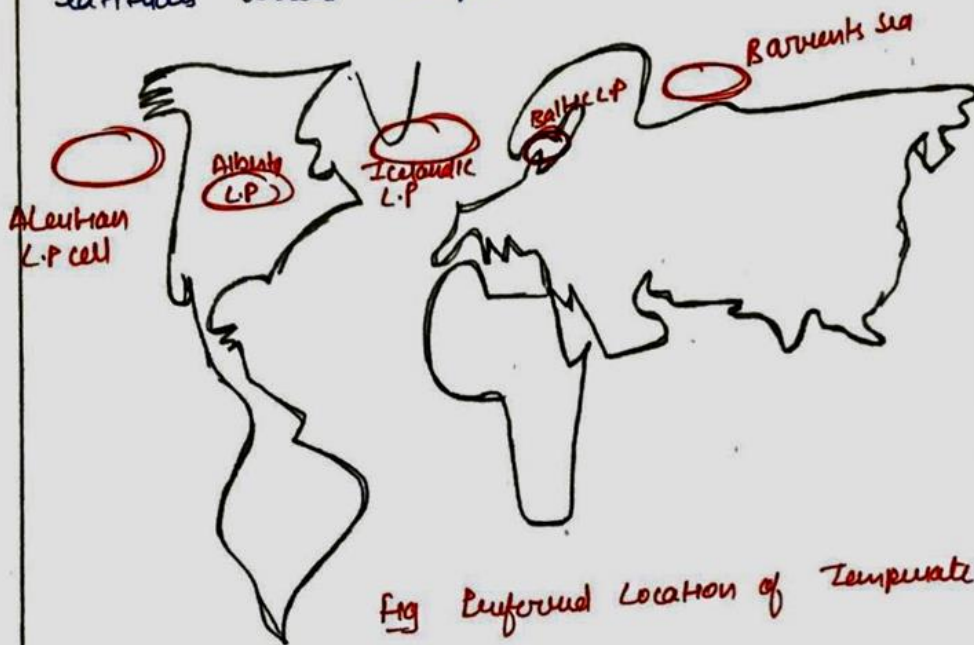
- o Temperate cyclones are year long phenomenon
They form & die with the Rossby waves.
- o The temperate cyclones are more frequent &
are more intensified in the winters.
- o Temperate cyclones are responsible for rain
-fall of Siberian region & also for weather
variability of British type of climate.

Movement & Tracking of Temperate Cyclone.

- o They are phenomenon of high-mid latitude
(beyond $50-55^\circ$)
- o They are in westerly wind belt so in
general they move from West towards
East
- o Because they are influenced by Rossby wave,
they also have north-south meandering
path.
- o Weak temperate depression can forced upto
sub tropics by meandering Rossby waves

where they can be captured by Sub Tropical westerly Jet stream & can cause frontal rains like Western Disturbances of South Asia

o In the mid-latitudes, there are certain preferred latitudes where Temperate cyclones can originate



o In recent times because of Global Warming & climate change leading to weakening of Polar Vortex & tropicward shift of Polar Vortex, Temperate cyclones in the winters are known to impact southern USA with heavy rains & snow -fall.

