edukemy
SUCCESS MEETS YOU

Atmospheric Stability & Instability –

- Stability or Instability condition is more imp for convectional upliftment or subsidence associated with packets of air rising through atmosphere because of packet being relatively warmer than air outside.

- To understand this process, the atmosphere is visualised as two components –

(a) Static Atmosphere that cools with height but cooling is because of distance of atmosphere layers from the surface below that warms it.

- The rate of cooling of static air is called as Environmental Lapse Rate [ELR]

which is variable & depends on seasons, time of the day, nature of surface & latitude [It is not NLR. NLR is a hypothetical concept for the atmosphere assumed to be at steady state

b] The Atmosphere in terms of moving air packets. These air packets can become warm & will rise through the atmosphere.

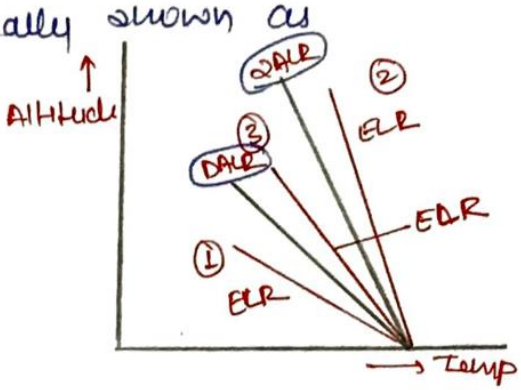
- While the packet rise, they operate in Adiabatic condition (Adiabatic because air is a bad conductor of heat) ∴ as air packet rise they expand & they cool - The mechani sm being different from cooling of static atmosphere

... referred to as

atmosphere

- The rate of cooling is referred to as Adiabatic Lapse Rate which depends on moisture content of Air packet
- Dry Adiabatic Lapse Rate (DALR) is 10°C/Km whereas SALR [Saturated Adiabatic Lapse Rate] is 4°C/Km

- The relationship b/w DALR & SALR is graphically shown as



• ELR in comparison is variable. There are 3 possi

① ELR > DALR

② ELR < SALR

③ ELR b/w SALR & DALR

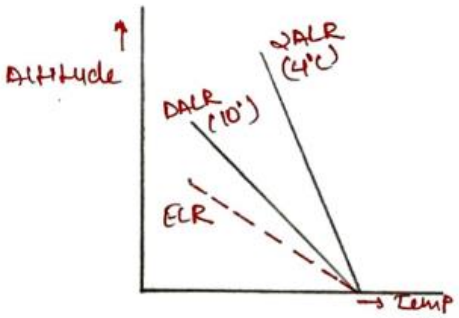


Fig - Absolute Instability

Case A - Absolute Instability

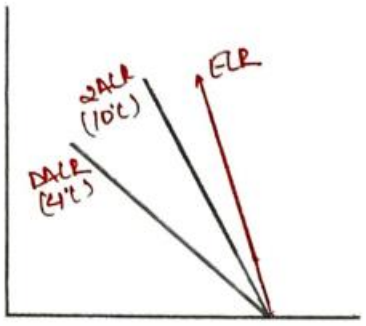
- ELR > DALR > SALR

- Air packet irrespective of its saturation is always warmer than air outside, packets of air rise very rapidly.
- ELR in this condition can be as high as 15|20°|25° c/km. These conditions can create Tornadoes & super cyclones & very violent extreme events.

Case B – ELR < SALR < DALR

– Absolute stability

-



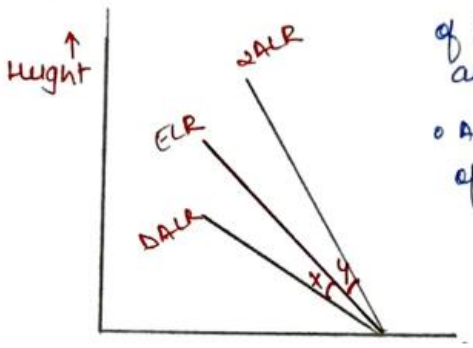
- Irrespective of degree of saturat° of air packet, Air packet is wolen than air outside ∴ packet of air will not rise & called as Absolute stability

edukemy
SUCCESS MEETS YOU

Case C - Conditional stability

- DALR > ELR > SALR (or)
- SALR < ELR < DALR (same)

- Instability depends on degree of saturation. For certain range of saturation, air packet will be stable but beyond that range air packet is unstable



- Air with x range of Temp = stable air packet
- Air with y range of Temp = unstable Air packet

* Donot refer book for this - It has some errors

- The relationship b/w ELR & ALR is very complex. There are many factors that influences, some of which includes the nature of surface, type of winds, type

of "Heat" that feed moisture into atmosphere. Presence of Mountain, Highlands can also impact the stability condition. This is called as **Potential Instability**