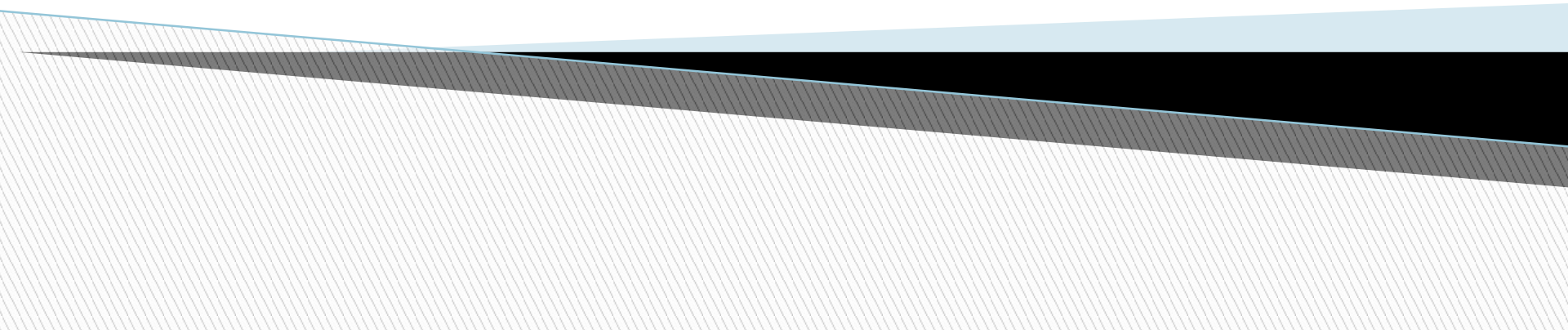


Lapse Rate

Dr Indranil Ghosh

Associate Professor

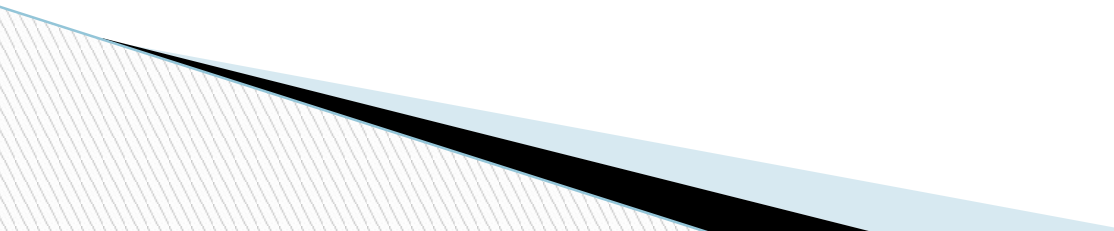


Definition

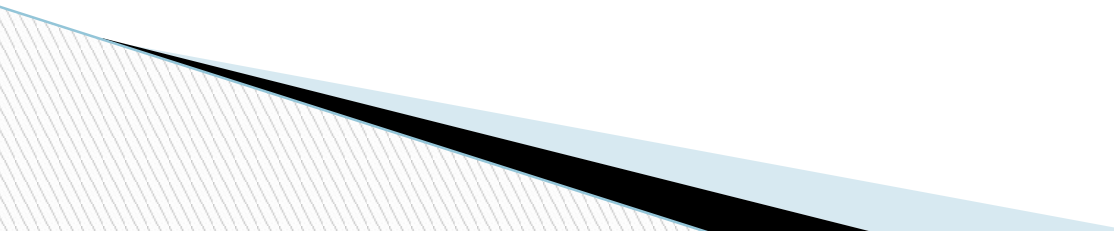
- The change of temperature of air with respect to height or altitude is called **Lapse Rate**.
- Environmental Lapse Rate (ELR)
- Adiabatic Lapse Rate (ALR)

Environmental Lapse Rate (ELR)

In atmosphere, the temperature of the ambient (surrounding) air changes with increase in altitude (height). This is called **ambient lapse rate of Environmental Lapse Rate (ELR)**. This rate will differ from place to place and from time to time even at same place. Generally this is about $6.5^{\circ}\text{C}/1000\text{m}$.

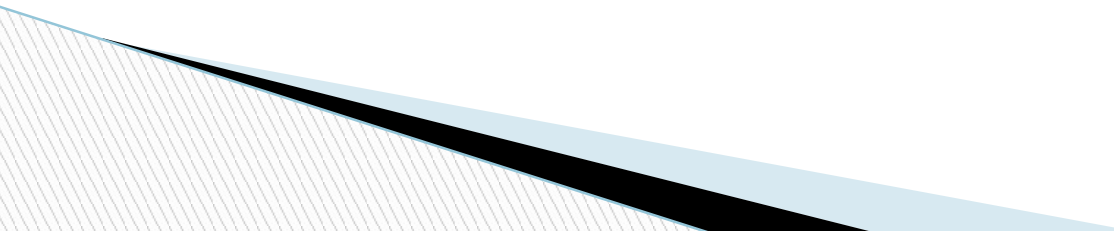


Influencing factors of Lapse Rate

- Height
 - Season: Environmental lapse rate is lower in winter or during a rainy season.
 - Surface: Environmental lapse rate is lower over land than sea.
 - Air mass: Different properties of air masses mean different lapse rate.
- 

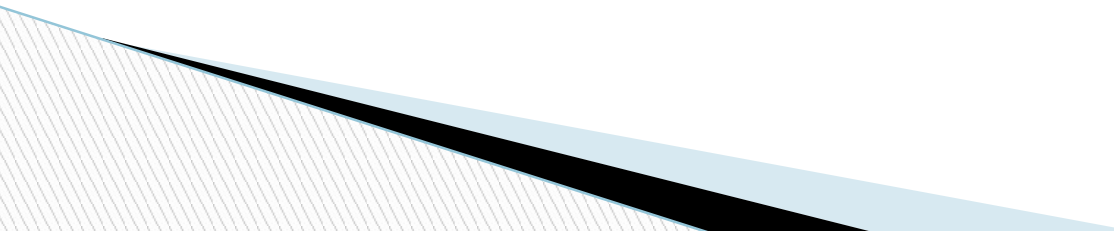
Adiabatic Lapse Rate (ALR)

This is a theoretical rate and can be calculated. Under the prevailing environmental conditions, when a parcel of air (e.g., automobile exhaust, smoke from factories etc.), which is hotter and lighter than the surrounding air is released, then naturally it tends to move in upward direction. It will move, until it reaches to a level or height where its own temperature and density become equal to that of the air surrounding it. This rate of change of temperature is called **Adiabatic Lapse Rate (ALR)**.



Dry Adiabatic Lapse Rate (DALR)

When the artificially heated air is dry and the temperature is more than the dew point temperature (the temperature at which dew is formed), the adiabatic lapse rate is called Dry Adiabatic Lapse Rate (DALR). The Dry Adiabatic Lapse Rate (DALR) is constant at -10°C/Km .



Saturated adiabatic Lapse Rate (SALR)

When the artificially heated air is saturated by moisture and temperature is less than the dew point temperature, the adiabatic lapse rate is called Saturated Adiabatic Lapse Rate or Wet Adiabatic Lapse Rate (SALR). The average SALR is $-5.4^{\circ}\text{C}/\text{Km}$

The artificially heated air normally neither fully dry nor fully saturated and so actual ALR is in between DALR and SALR i.e., in between $-5.4^{\circ}\text{C}/\text{Km}$ and $-10.4^{\circ}\text{C}/\text{Km}$

