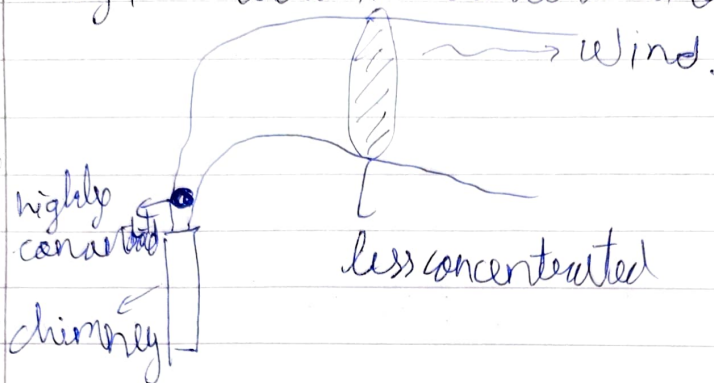


# Meteorology

→ Source of pollutant → chimney

Pollution comes out concentrated, it is permissible by law, you have done all you could.

As the pollutant rises and is carried forward by the wind the concentration level decreases.



Height of the chimney is decided based on the wind conditions.

When  $Cl_2$  cylinders are built the weather is studied such that the tanks are located such that ~~the~~ even if it leaks the gas is carried downstream (away from the civilization).

The geography must be studied properly.

## Mixing / Dispersion

→ Meteorology

- Horizontal

• Wind

- Speed

- Direction

- Vertical

• Temperature

- Lapse rate

Wind graph  $\begin{cases} \nearrow \text{wind direction} \\ \rightarrow \text{wind speed} \\ \searrow \text{frequency} \end{cases}$  } determines spread of pollutant.

The radial angle  $\rightarrow$  where the wind is coming from

The colour  $\rightarrow$  speed of the wind

The length of radius  $\rightarrow$  Percentage of time the wind is blowing in same direction with that speed.

All the percentages ~~to~~ should add to 100 %.

Wind roses are divided into 16 wind directions

As the percent of time the wind blows from a particular direction gets larger, the portion of the bar representing the wind speed gets larger both in length and width.

## Lec 5.

Mixing vertically  $\rightarrow$  Good thing

Atmosphere cools with height

$\rightarrow$  lapse rates

- Dry (Adiabatic)  $10^\circ\text{C}/\text{km}$   $\rightarrow$  Drops by this amount
- Wet (Adiabatic)  $6^\circ\text{C}/\text{km}$

If we were to raise a parcel and ~~cool~~ is of pollutants then due to not having ~~be~~ enough time for heat transfer it would cool adiabatically and be ~~less~~ warmer than the air surrounding it and hence continue to rise  $\rightarrow$  [Figure ①]

## → Figure ②

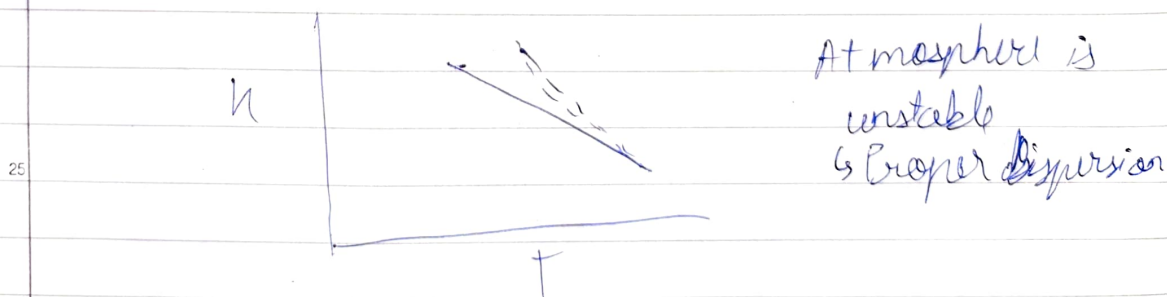
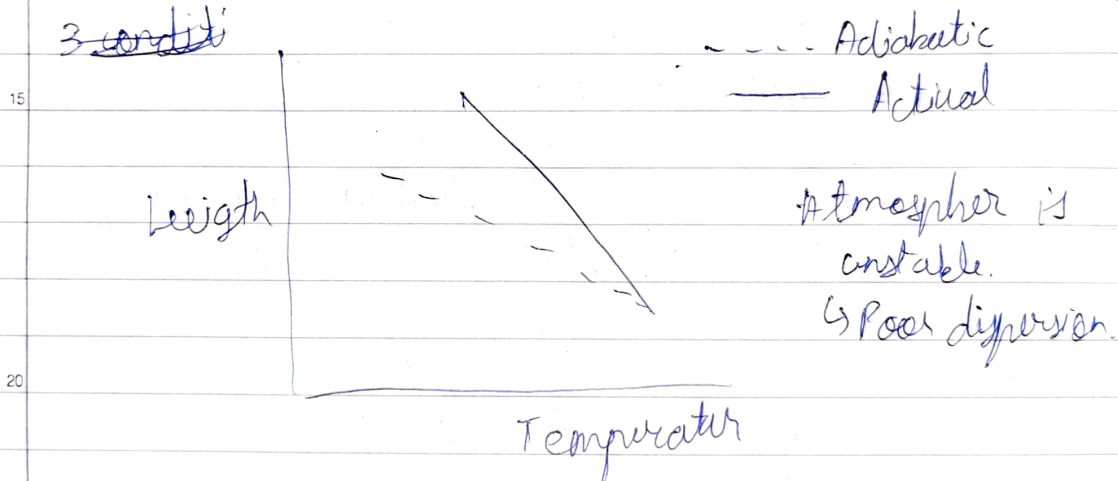
If we push air up it will continue to go up but if we push the air down then it will continue to go down.

If the actual ~~temp~~ temperature drop has a greater slope than adiabatic then as we push the parcel of air up, it will cool adiabatically ~~and~~ however it will be colder than the surroundings and hence move down.

## → Figure ③

→ Tendency of vertical movement is less → Atmosphere is stable.

3 ~~conditi~~

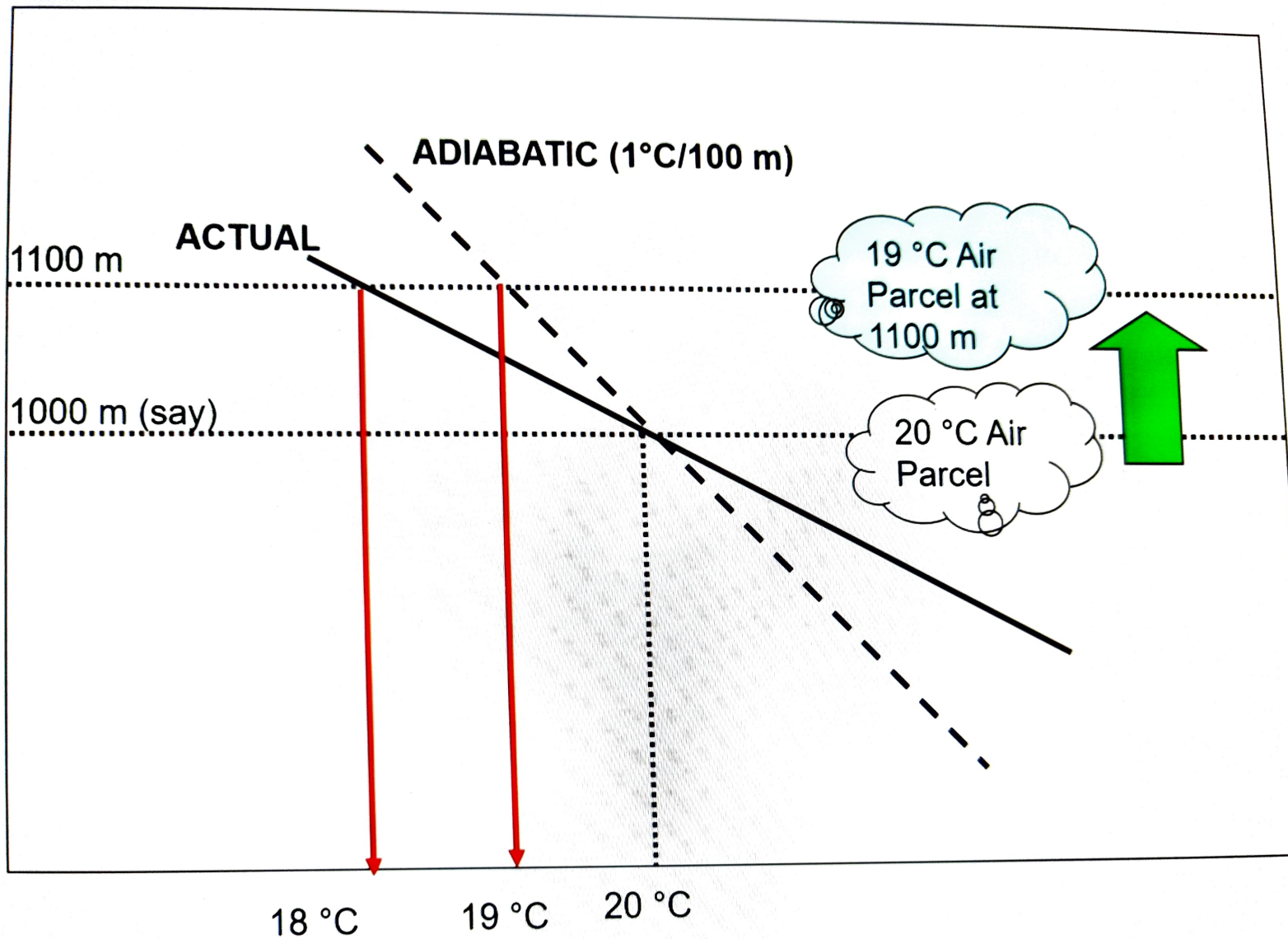


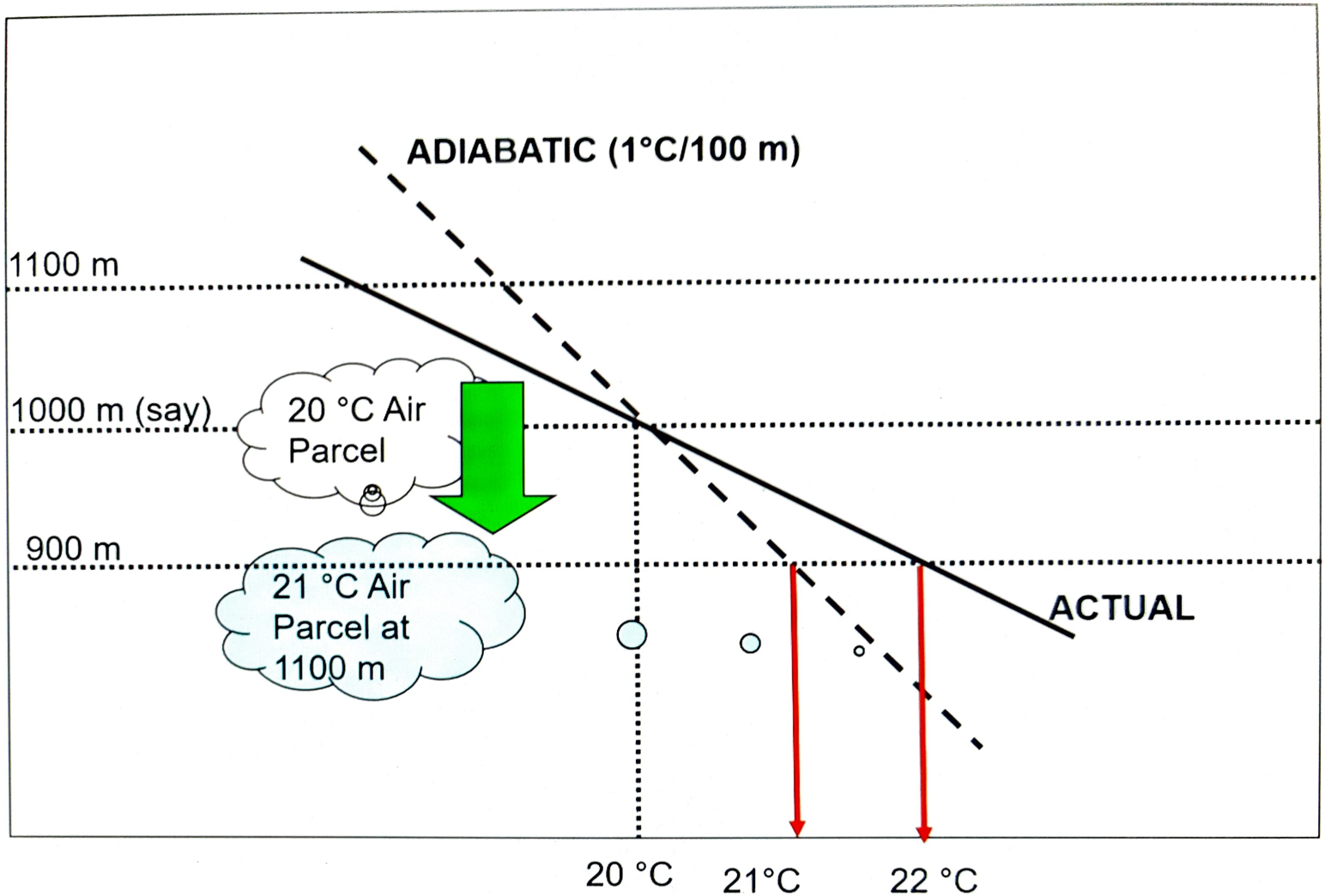
## lec 6

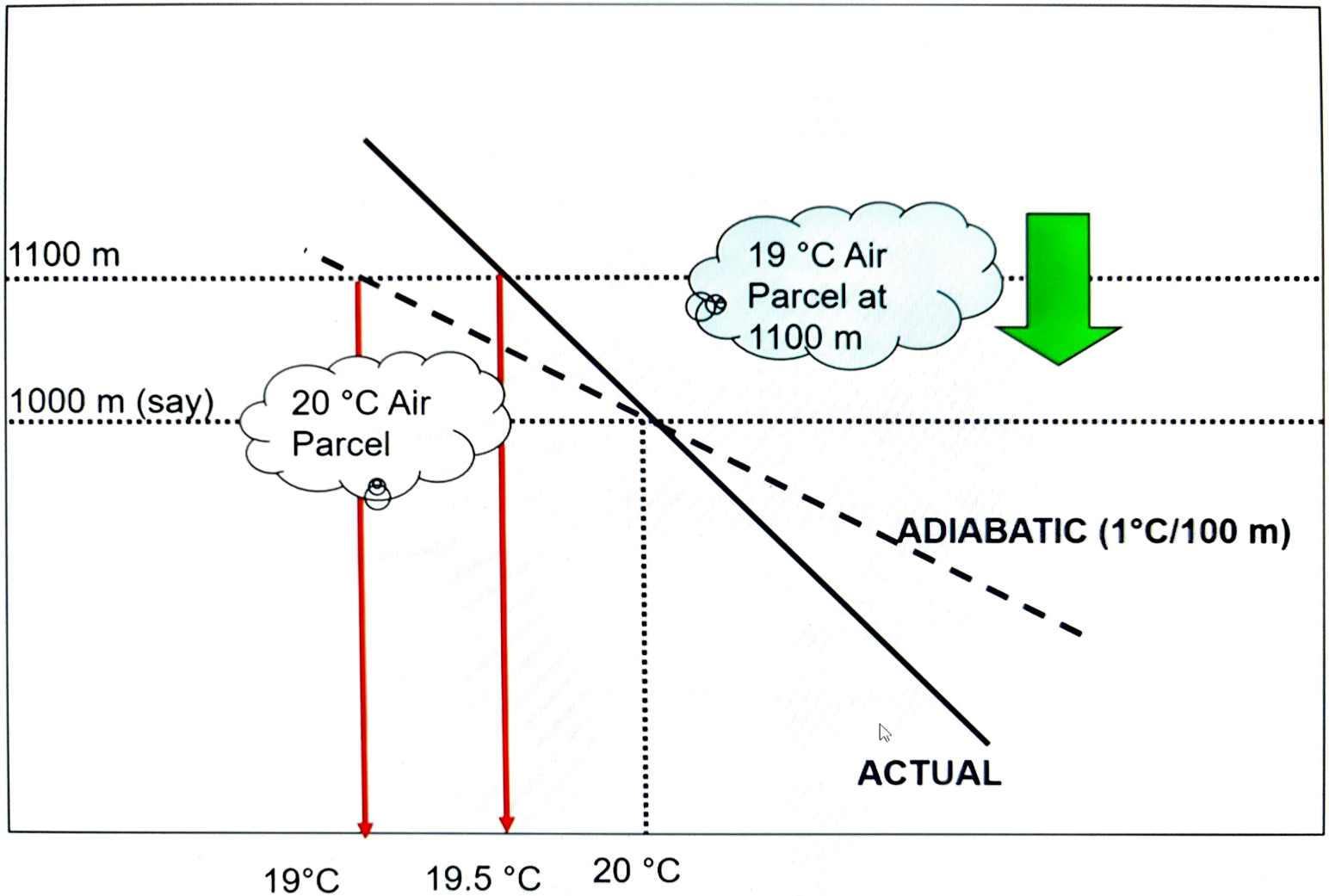
we're doing this to:

- 1) Know where to put a new industry.
- 2) Know pollution levels in worst case scenarios.
- 3) know what height the chimneys need to be.









# **Why are we doing all of this ?**

- **If you want to set up a new industry, it implies adding a new source of pollutant(s)**
- **This source is PERMITTED to emit after it has applied the Best Available Control Technology (BACT) on their processes**
- **AFTER leaving the chimney, the concentrations on ground is determined by the meteorology**



4) Quantify the horizontal movement and vertical mixing.

Gaussian Plume (Dispersion) Model

→ Used to estimate ground level concentrations

Inputs to GPM

- Height of Chimney and source strength
- Wind rose data
- Atmospheric stability of data → Adiabatic lapse rates.

IMD → Indian Meteorological department  
respected around world.

~~Study was done on data~~

Study was done on Jaodhpur, wind roses were studied on ~~IMD~~ stations, however wind roses did not match

Good data → Good model.