

ATMOSPHERIC PRESSURE

Pressure

Technically pressure is defined as “Force per unit area”.

Atmospheric pressure : Atmospheric pressure is defined as “the pressure exerted by a column of air with a cross sectional area of a given unit i.e., a square inch or a square centimeter extending from the earth surface to the upper most boundary of the atmosphere”.

Standard atmospheric pressure : The atmospheric pressure varies continuously over a relatively small range and the average of these fluctuations is very close to a value adopted for certain standard conditions defined as “Standard atmosphere”. At a temperature of 15°C and at 45° latitude the standard normal pressure is *1013.2 millibars which is equivalent to 29.92 inches (or) 760 mm of mercury at the sea level, which is considered as standard atmospheric pressure.

- **Basic atmospheric pressure patterns**

These are various smaller pressure systems closely identified with daily weather changes. These are seen on daily weather maps.

1. **Low pressure systems or cyclones**

- ◆ When the isobars are circular or elliptical in shape, and the pressure is lowest at the centre, such a pressure system is called “low” or “depression” or “cyclone”.
- ◆ A line of low pressure is called a “Trough” when the isobars are not joined at the ends.
- ◆ The word “cyclone” is derived from a Greek word “cyclos” meaning the coils of a snake.
- ◆ In India cyclones occur during the monsoon seasons especially in north-east monsoon.
- ◆ The gales accompanying a cyclone give rise to confused seas, torrential rains and usually approach the coast at 300 to 500 kilometers per hour. A single severe cyclone can perish hundreds of human lives, animal populations, and submerge thousands of hectares of standing crop.

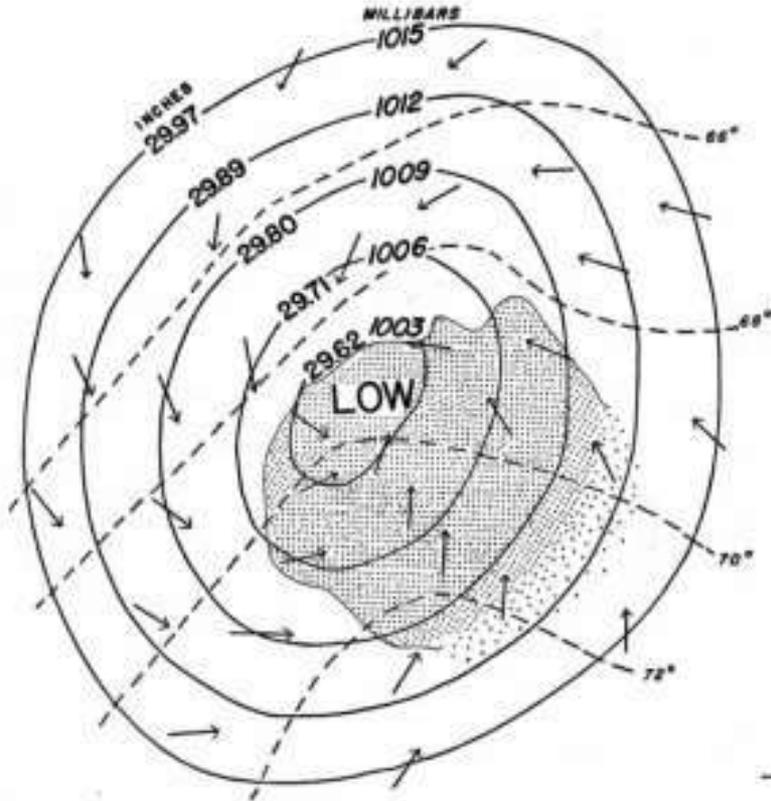
- ◆ The diameter of a cyclone ranges from a few hundreds to 2000 kilometers.
- ◆ Floods are the results of the cyclones.
- ◆ The devastation could be attributed to the absence of – Timely warning – Lack of awareness among the people – Inadequate preparedness – Poor response and participation.
- ◆ Cyclones are recurring feature in India.

2. High pressure systems or anticyclones

- When isobars are circular, elliptical in shape and the pressure is highest at the centre such a pressure system is called “High” or “Anticyclone”. When the isobars are elliptical rather than circular the system is called as a “Ridge” or “Wedge”.

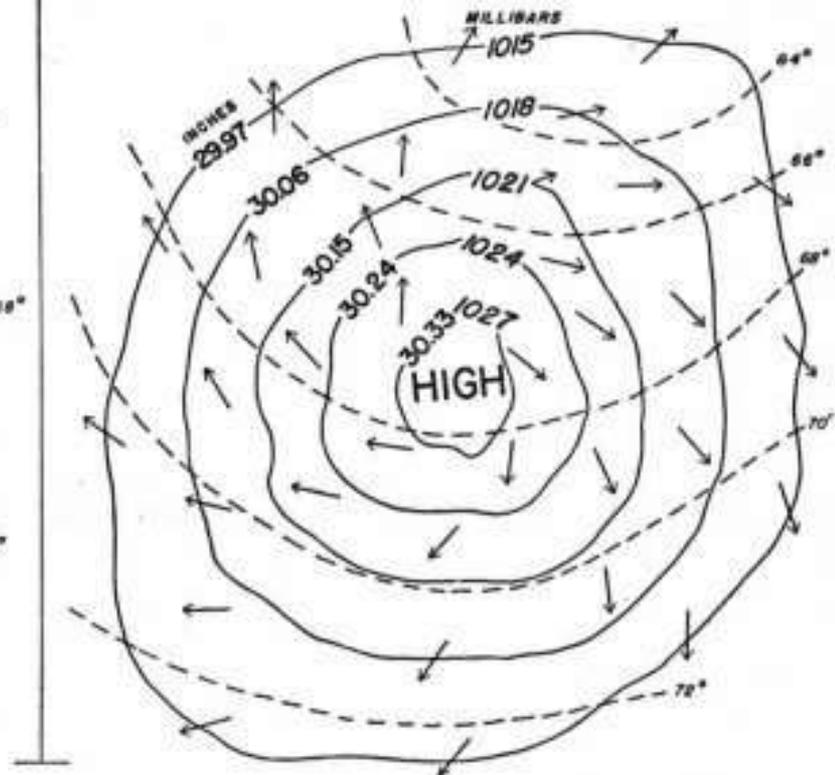
CYCLONE

LOW PRESSURE AREA



ANTICYCLONE

HIGH PRESSURE AREA



29.97_{in} — 1015_{mb} ISOBARS
 PRESSURE IN INCHES
 AND MILLIBARS

70° — — — — ISOTHERMS
 FAHRENHEIT DEGREES

▨ PROBABLE AREA
 OF RAINFALL

↗ WIND ARROWS FLY
 WITH THE WIND

Cyclones

Lowest pressure at the centre and it increases towards the outer rim gradually.

Relative humidity increases towards centre and bring cloudy weather.

Variety of clouds lies at different heights.

Highest rainfall occurs at the front side.

Wind velocity increases from outer rim to the centre.

Move in anticlock wise in northern hemisphere and clock wise in southern hemisphere

Anticyclones

Highest pressure at the centre and it decreases towards the outer rim gradually.

Relative humidity decreases and clouds are dissipated giving fair weather.

Little clouds with cool dry air are usually associated.

Rainfall is almost negligible.

Wind spirally rushes outward from the centre to periphery.

Move in clock wise in northern hemisphere and anti clock wise in southern hemisphere.

WIND

- **WIND** : Air in horizontal motion is known as “Wind”. Winds are named by the direction they come from. Windward refers to the direction a wind comes from and leeward is the direction towards which it flows. The wind which flows more frequently from one direction than any other is called as “Prevailing wind”.

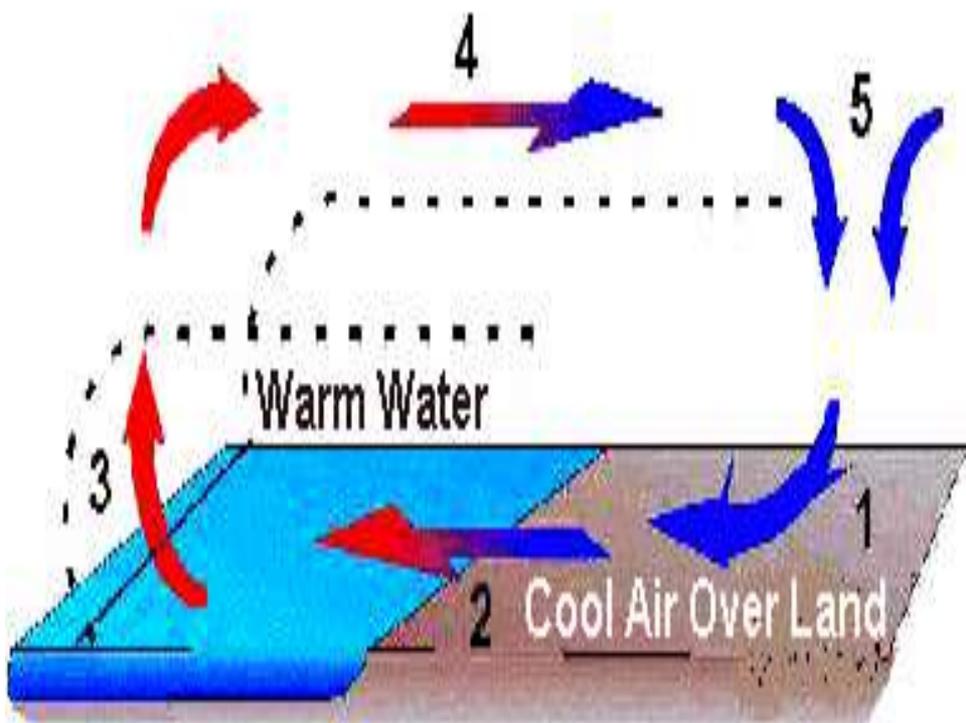
Importance of wind on plants

- Transports heat in either sensible or latent form, from lower to higher latitudes,
- Provides the moisture (to the land masses) which is necessary for precipitation
- Moderate turbulence promotes the consumption of carbon – dioxide by photosynthesis.
- Wind prevents frost by disrupting a temperature inversion
- Wind dispersal of pollen and seeds is natural and necessary for certain agricultural crops, natural vegetation, etc.

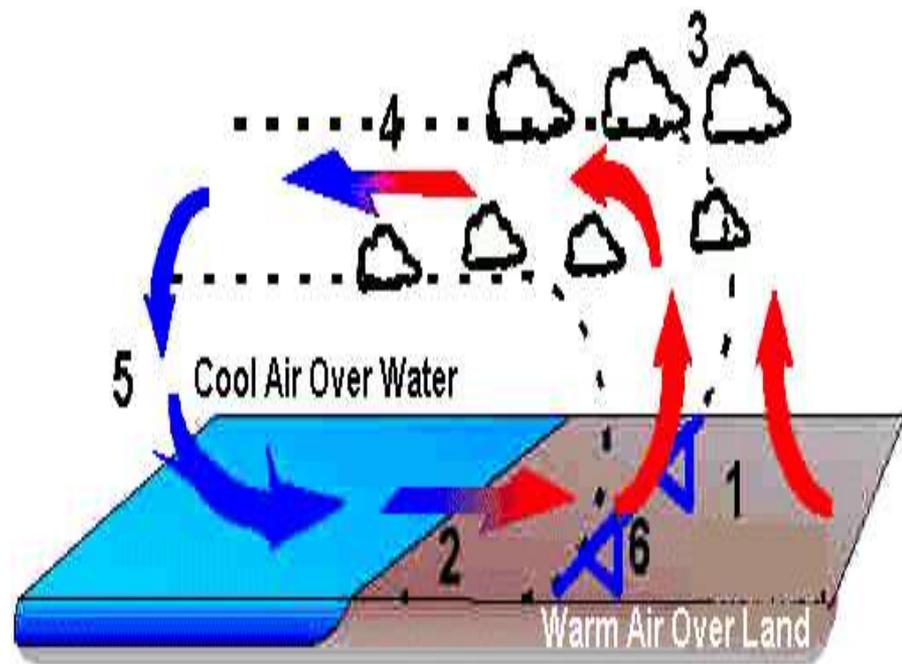
Land and sea breezes

- These winds are defined as “The complete cycle of diurnal local winds occurring on sea coasts due to differences in surface temperature of land and sea”.
- There is a complete diurnal reversal of wind direction of these coastal winds.
- That is why they are also referred to as diurnal monsoon, since these wind systems are caused by unequal heating of land and water surfaces.
- Land and sea breezes are caused by diurnal variation of pressure (monsoon by seasonal variation).
- During the day time, more so in summer land is heated more than the adjacent body of water.
- As a result, warmed air over the land expands producing an area of low pressure.
- The cooler air over the water starts moving across the coast line from sea to land. This is the “Sea breeze” or “On shore breeze”.
- However, at night because of nocturnal radiation, land is colder than adjacent sea and the pressure gradient is directed from land to sea. There is a gentle flow from land to sea. This “Off-shore” wind is called “Land breeze”.

Land Breeze Circulation



Sea Breeze Circulation



Land breeze	Sea breeze
Occurs in night time.	Occurs in day time.
Flows from land.	Flows from sea.
Do not have more moisture than sea breeze.	Have more moisture than land breeze.
Produces cooler winters and warmer summers.	Modifies weather on hot summer afternoons.
Weaker than the sea breeze.	Stronger than land breeze.

Mountain winds

Valley winds

Blows from mountain up slope to base.

Blows from valley base to up slope.

Occur during night time.

Occur during day time.

Cooling of air close to slope takes place.

Over heating of air adjacent to slope takes place.

Also known as “Katabalic winds”.

Also known as “Anabatic winds”.