Wind and Types of Wind Cyclones, Hurricane and Typhoons, Tornadoes

Wind

We have all experienced the feeling of wind blowing against our bodies. Winds can range from a light breeze on a hot summer day to tornadoes and hurricanes with speeds of hundreds of kilometers per hour. Have you ever wondered what causes this phenomenon? How is wind formed?

Let us start with first defining what wind is. On Earth, we have an atmosphere composed of air molecules. The air is free to move in every which way unless something is blocking it. For the purpose of our discussion, we define wind as the movement of air molecules in the atmosphere. However, it's important to note that more generally wind can be defined as the flow of any gases, not only air.

Let us now proceed to discuss what causes wind.

Cyclone

The terms related to tropical cyclones may be perplexing. It is so because people have given these dangerous storms diverse names in several areas of the world.

Hurricanes

They are called 'hurricane' in the North Atlantic and the Caribbean as well as the north-eastern Pacific. On the other hand, people refer to them as tropical cyclones or cyclones in the Indian Ocean and South Pacific.

Typhoons

Further, they are referred to as 'typhoons' in the Northwest Pacific which are the most active tropical-cyclone basin in the whole world.

Tornadoes

Other than that, there are tornadoes which are relatively small and also more localized. However, they are also capable of producing higher wind speeds. Sometimes, people also refer to them as cyclones but they are completely different from each other.

Cyclone

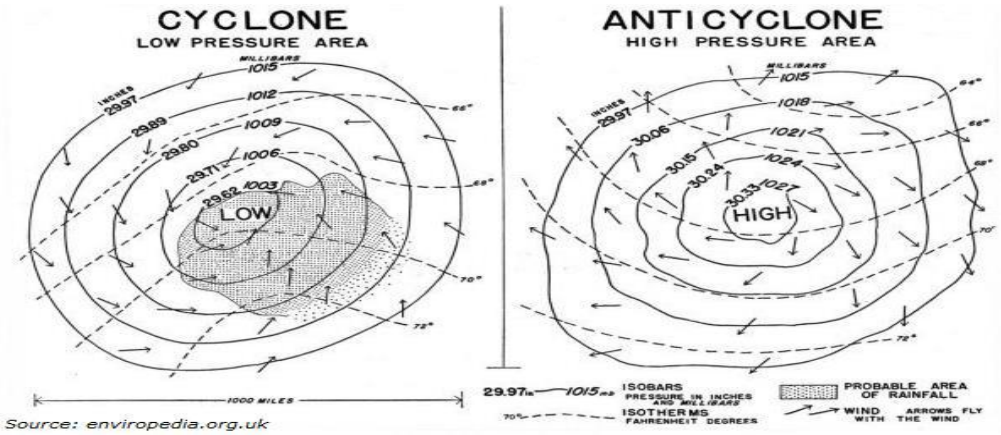
- **Cyclone** is a large-scale air mass that keeps rotating around a strong center of low pressure. It rotates counterclockwise in the Northern Hemisphere and clockwise in the Southern Hemisphere.
- In the northeastern Pacific oceans and the Atlantic Ocean, the tropical cyclone is known as "***Hurricane***."

- In the Indian and south Pacific Oceans, the tropical cyclone is called as "**Cyclone**," and in the northwestern Pacific Ocean it is known as "**Typhoon**."
- In the South Indian Ocean (specifically South-west of Australia), a tropical cyclone is known as "**Willy-Willy**."

Anti Cyclones, Humidity, Fog, Dev Point, Smog

Anticyclone

- **Anticyclone** is a large-scale wind system that circulates around a central region of high atmospheric pressure. It rotates clockwise in the Northern Hemisphere and anti-clockwise in the Southern Hemisphere (the following image illustrates the comparative structure of cyclone and anti-cyclone).



Humidity

Humidity is the amount of moisture or water vapour or water molecules present in the atmospheric gas. The more is the water in the vapour, the more will be the humidity. Humidity arises from water evaporating from places like lakes and oceans. Warm water evaporates quickly. That's why, you may find the most humid regions near to warm water bodies in the places like the Red Sea, the Persian Gulf, and Miami.

Here, we will learn about the humidity and its types viz: specific, relative, and absolute humidity.

Dew

Dew, on the other hand, is the condensation that occurs due to temperature drops to the dew point. It often appears on grass, twigs, leaves, and metal surfaces as fine water droplets. Despite being composed of fine water droplets, dew can be measured using the dew gauge.

Unlike fog, dew does not affect visibility. Like fog, it also forms at night when moisture condenses to the earth's surface. The temperature above the ground is cooler than the air at ground level. Radiation cooling causes the air at the surface to eventually cool to a point of condensation. As a result, water drops will appear on objects on the surface with grass and leaves being the common targets. When the air above the ground cools, then fog formation comes into place.

If the temperature drops further, dew freezes and leads to frost formation. This is characterized by ice crystals often observed in the mornings. Rapid conversion of water vapor to ice also cause frost. That is the process termed sublimation.

Fog

Fog is an atmospheric condition characterized by the cloud appearing close or at the earth's surface. It is a thick cloud that can reduce visibility greatly. It is hard for motorists during fog because they struggle to see even in the presence of vehicle lights. Strong winds and the sun can make the frog disappear gradually and clear the way.

Fog normally forms at night when air cools to a point where condensation is reached. The formation of fog may be affected by the slopes. In flat surfaces, for

instance, air cools evenly and condensation forms under light wind speeds so fog eventually forms. In sloppy areas, the wind speeds increases while wind flows down the sloppy areas. This prevents fog formation.

Fog is not necessarily consistent in thickness. In other areas it may appear thinner or even have some patches. It is predominant in areas near the streams and in valleys. Mist, in contrast, is prevalent in mountains. In winter months, fog is most common and may last the entire day.

Clear skies lead to a quick formation of fog because they cool air quicker than the cloudy skies. Basically, fog and dew are formed the same way by the cooling of air temperature to dew point. The wind speed as the effect to determine that which conditions is the remainder. Calm winds lead to dew formation whereas light wind speeds lead to fog formation. The definition of dew is highlighted below.

Cloud, Monsoon

Clouds occur in the lower two atmospheric layers that comprise the troposphere extending from the surface to about 12 km altitude. The uppermost atmospheric layer extends from about 12 – 100 km and is comprised, going upward, of the stratosphere (containing the ozone layer), the mesosphere and the thermosphere.

Stratifrom clouds

Stratifrom clouds are, by definition, stably stratified, and stratiform precipitation results from such clouds. Hydrometeors (snow or rain) in stratiform clouds grow primarily by descent through a widespread updraft whose magnitude is less than 1 m/s. The growth occurs primarily by continued condensation/deposition (i.e. the diffusion of water vapour onto droplets or ice crystals, respectively). Purely stratiform rain results from mid-latitude frontal systems, convergence into lows, or upslope flow, all situations in which the lower troposphere is stably stratified.

Mid-level clouds: The bases of clouds in the middle level of the troposphere, given the prefix "alto," appear between 6,500 and 20,000 feet. Depending on the altitude, time of year, and vertical temperature structure of the troposphere, these clouds may be composed of liquid water droplets, ice crystals, or a combination of the two, including super cooled droplets (i.e., liquid droplets whose temperatures are below freezing). The two main type of mid-level clouds are altostratus and altocumulus.

Cumulus clouds are puffy clouds that sometimes look like pieces of floating cotton. The base of each cloud is often flat and may be only 1000 meters (3300 feet) above the ground. The top of the cloud has rounded towers. When the top of the cumulus resembles the head of a cauliflower, it is called cumulus congestus or towering cumulus. These clouds grow upward, and they can develop into a giant cumulonimbus, which is a thunderstorm cloud.

Precipitation

Precipitation is water that falls back to the surface of the earth upon condensing in the atmosphere. In other words, any form of water which falls, whether it is in liquid or frozen form, falls as precipitation only. Now that we are clear on what is precipitation, let us move on to the different types. You can consider heavy or light rain as precipitation and even snow, drizzle and hail.

However, we will see that fog and dew do not fall into the category of precipitation. It is so because both of these are examples of water condensing. When we look at dew, it condenses on objects and fog condenses in the air.

Moreover, there are particular types of precipitation which associate with summer and others are winters. The ones which are associated with winter are snow and graupel. On the other hand, the one with summer is rain and hail. Moreover, the other forms like drizzle, sleet and fog drip do not limit to a particular season.