

Weather Station



Keywords

- Science;
- Engineering;
- Weather.

The science behind

But how is wind, rain, sun, or storms formed? Behind all the meteorological events, there is a bit of science that we will see throughout this experiment and that you can easily do at home. Let's see.

Scientifically we use the term 'air mass' to describe a large body in which all the air inside that body has the same temperature, pressure, and humidity.

When the sun shines, or not, on specific air masses, it causes the temperature to rise or fall, creating differences in temperature so that we can have warmer and colder air masses somewhere in the atmosphere. When the temperature of an air mass changes, its density also changes. Warm air masses rise due to their lower density; consequently, cold air masses drop down to their higher density. Warm air is pushed upwards by its low density, creating low-pressure areas.

It is the movement of these masses which heat or cool in the sun, increasing and decreasing the temperature and creating the wind, which is nothing more than the movement of these enormous masses of air.



The wind, in turn, will depend on the way the sun heats or not unevenly different zones, causing the distinct masses to move around the atmosphere.

This significant movement of air masses creates what is comprehended as a weather front, which is nothing more than the boundary between two air masses of different temperatures/densities.

We can reasonably apprehend these concepts in the following image:

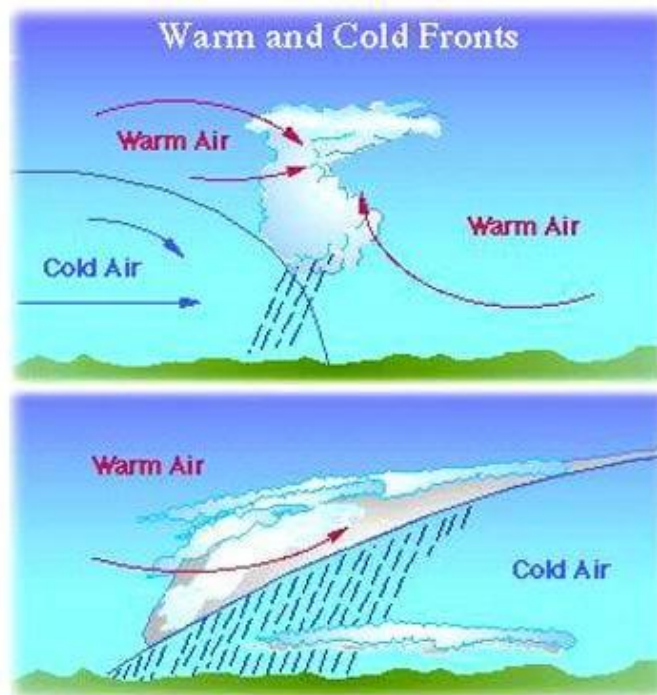


Figure 1 - Air Masses - Image retrieved from https://www.teachengineering.org/activities/view/cub_weather_lesson04_activity1 on July 28th of 2022

During these movements, two very similar phenomena are created. These are called the cold fronts and the warm fronts.

A cold front is a hot and cold air boundary where the existing hot air is replaced by cold air. In this movement, the colder and heavier air pushes the warm air, forcing it to rise.



The warm air (with more humidity) becomes colder as it rises. If this air is sufficiently humid, the water vapour it contains condenses into clouds, which can cause rain and as well, as lower air pressure.

In turn, a warm front is a boundary of warm and cold air, where existing cold air is replaced by warm air.

A warm front is a boundary between warm and cold air, where warm air replaces cold air. The warm air on the surface of a front pushes above the cold air mass, creating clouds and thunderstorms. When a warm front first approaches, some rain or snow precipitation may occur. When the front passes, the sky clears, and the air pressure increases. The temperature also rises as warm air replaces cold air.

Everyday life

Every day, in our daily life, these phenomena happen. They occur at any time of the day, and they never stop.

Although they sometimes pass unnoticed, we depend on them for practically everything. Let's see.

Much of what we eat comes from agriculture. However, farming is only successful if food is planted at the right time on a particular day under certain conditions. And even to grow, it needs specific amounts of rain or sun.

If meteorologists and farmers did not consider these factors, probably nothing they would plant would be born and grow.

And if that happened, could you imagine yourself without food?

Another situation where this knowledge most affects our daily lives is what we wear. Has it ever happened to you to leave home



without a coat, and it begins to rain or, worse, gets cold? It has happened to all of us!

If we knew how to interpret the weather's signs, we could predict whether we would need an umbrella or even a warm jacket.