*Not all thunderstorms produce rain that reaches the ground. These are referred to as* ***dry*** thunderstorms. They often form at great height above the *ground. As rain falls from the cloud into the surrounding dry air it evaporates without getting to the ground.*

***How do thunderstorms affect us?***

Thunderstorms may produce heavy rains which could trigger flash flooding. Persons who live in low-lying and flood prone areas are at greatest risk.
Flooded streets and roadways should be avoided as attempts to cross them could result in the loss of lives.

Another dangerous component accompanying all thunderstorms is lightning. A person struck by lightning could receive serious injuries or even death.

In Jamaica strong damaging winds and to a lesser extent hail are also products of this phenomenon.

Suggested Reading:


- Meteorology Today- C. D. Ahrens (1994)
- The Atmosphere – F.Lutgens/ E Tarbuck (1992)
- International Meteorological Vocabulary – WM0 No. 180
- Tropical Meteorology – Selvin Burton (1999).
- http: www.usatoday.com/weather


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**Meteorological Service, Jamaica**

# An Introduction to

# THUNDERSTORMS

# AN INTRODUCTION TO THUNDERSTORMS

***What is a thunderstorm?***

A thunderstorm is an electrical discharge accompanied by a flash of lightning and thunder. The thunderstorm is usually associated with large, dark Cumulonimbus clouds, which under the right conditions develop from Cumulus clouds. These storms may occur at any time of the day or year. In Jamaica however, most thunderstorms occur in the afternoons during the summer months. Thunderstorms may occur singly, in clusters or one after the other.

***Formation***

Three factors are necessary for thunderstorms to form. These are:

- Unstable air
- Uplift
- Moisture

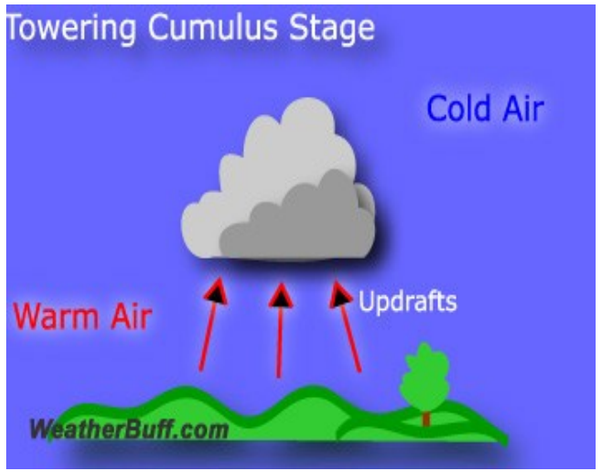
Thunderstorms originate in unstable environments where warm humid air can rise rapidly. Topographical effects, daytime heating, sea breezes or the lifting of warm air along a frontal boundary may trigger the rising of the air. Available moisture helps in the formation and transformation of clouds from small Cumulus to the Cumulonimbus, which may reach great vertical extents. All thunderstorms have a similar lifecycle that is comprised of three stages:

*Development*

## Cumulus Stage

During this stage strong updrafts work to build the storm. Warm air rises rapidly, cools and some of its water vapour condenses to produce small cumulus clouds. As the moist air associated with the cloud mixes with cool dry air aloft, evaporation occurs. Though precipitation is produced, none reaches the ground but the air aloft is even more moist than before. With more moisture available, rising air can now condense at increasingly higher levels, allowing the cumulus clouds to grow taller. As the top of the cloud grows beyond the freezing level the particles of the cloud gets larger and heavier and begin to fall. The falling precipitation sets off a downdraft. This signals the start of the next stage.

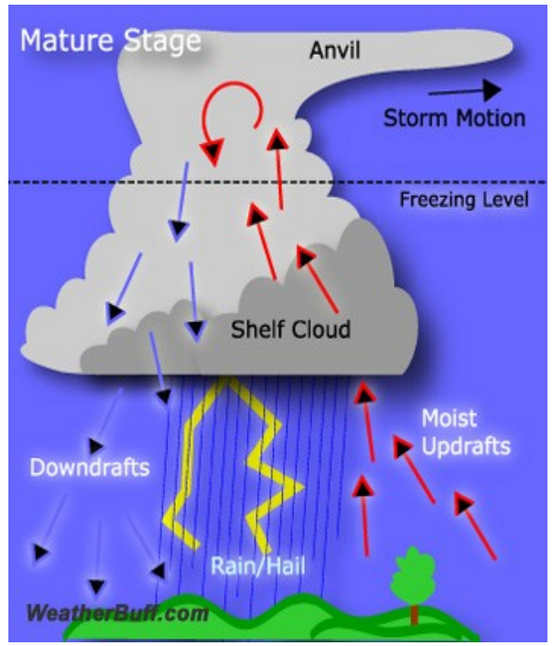
**Figure 1- Cumulus Stage**




## Mature Stage

**Figure 2 – Mature Stage**

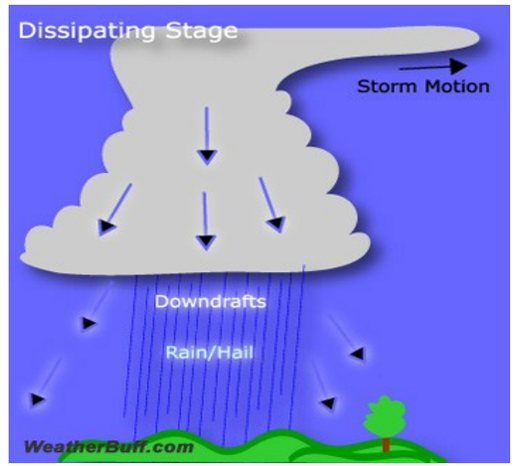
During the mature stage there is the presence of both updrafts and downdrafts. The downdraft and updraft within the cloud creates a cell. The cloud by this time may extend upwards to over 12 km. Strong winds in the upper levels then spread the cloud's ice crystals laterally. This is the most active period in the thunderstorm's life and is usually accompanied by heavy rain, gusty winds, and even hail. Within half an hour of entering the mature stage, downdrafts dominate the cloud and the dissipating stage begins.




## Dissipating Stage

With the downdrafts occurring throughout the cloud, its supply of warm moist air is cut off and cloud droplets no longer form. Rainfall becomes light and low-level cloud particles evaporate quickly and the storm dies.

**Figure 3 – Dissipating Stage**




## Types

Though most thunderstorms may last for less than 30 minutes, there are some that can go on for a few hours. These are referred to as ***severe*** thunderstorms and may be accompanied by lightning, strong winds or hail. Severe thunderstorms are usually produced as a result of forceful lifting along a cold front.

***Air-mass*** thunderstorms are sometimes referred to as ***ordinary*** thunderstorms and occur mainly during the afternoons when daytime heating leaves surface temperatures at their highest. Some may also occur after sundown when cooling takes place at