

Lightning is a natural phenomenon of disruptive electrostatic discharge of great intensity that occurs in the atmosphere, between electrically charged regions, and can occur either inside a cloud (intra-cloud discharge), or between several clouds (inter-cloudy), either between a cloud and the ground (cloud-ground or ground-cloud)

Lightning is always accompanied by lightning (intense emission of electromagnetic radiation, the components of which are in the visible part of the spectrum), and thunder (emission of sound waves), in addition to other associated phenomena.

Although intra-cloud and inter-cloud discharges are more common, cloud-to-ground discharges pose a greater danger to humans.

Most of the lightning occurs in the tropical zone of the planet and mainly on the continents.

They are associated with convective phenomena: thunderstorms.

Lightning probably appeared on Earth long before life, over three billion years ago. In addition, lightning was probably fundamental for the formation of the first organic molecules, essential for the appearance of the first forms of life.

From the formation of the Earth, the high temperatures of the Earth's crust are responsible for the formation of large, violent and permanent storms, giving rise to the oceans.

Water, during its cycle, carries with it chemical elements, such as carbon and nitrogen, which accumulate in the primitive seas.

Ultraviolet rays and lightning may have greatly aided the process of combining these inorganic compounds as well as their transformation into amino acids, essential components for the emergence of life.

Electric shocks are the main source of nitrites and nitrates, essential for plant life.

Plants are not able to use atmospheric nitrogen directly, so they must be transformed into other nitrogen compounds.

Lightning is responsible for these chemical reactions, which maintains the nitrogen cycle.

Forest fires triggered by lightning play a fundamental role in the evolution of plants, because the consumption of dry matter and the elimination of possible pests by fire are beneficial for the environment.

The process of evolution of plant life seems to be closely linked to the appearance of fires, which promote the emergence of new genes.

It is possible that fires caused by lightning were the first source of fire used by primitive men, which would have been one of the important stages that led to the evolution and domination of it over its environment.

In addition to the diversity of patterns associated with lightning, they also present particular colors: mauve, reddish or white and sometimes yellow or bluish.

Lightning is the luminous part of lightning, thunder is the acoustic part.

The light associated with a flash can display different colors.

Some landfills light up the landscape with a vivid pink, while others are more characterized by a crisp white.

There are three essential factors which, together, will determine the color that a lightning will have for an observer: the proximity of the latter in relation to the discharge, the intensity and the characteristic of the atmospheric diffusion and the temperature therefore the power. love at first sight.

The diffusion of light through the atmosphere.

Disregarding any interference effect, a lightning bolt has a white to slightly indigo color; the channel temperature is that of an ionized plasma at about 30,000 ° C, or 5 times the surface temperature of the Sun.

However, the material between an observer and the light source will cause an alteration of the latter as it travels. In particular, nitrogen air, oxygen, argon, water vapor and small cloud particles will tend to preferentially diffuse short wavelengths (purple, blue, etc.)

The discharge channel will thus change from bright white to yellow / orange or even red as the shorter wavelengths are gradually removed from the spectrum along the way.

The distance factor will influence the diffusion parameter indirectly.

The closer the impact, the less atmospheric thickness light has to travel through to reach the observer.

The diffusion will therefore be weak and the lightning channel will appear rather bright white.

It is those discharges that occur at a distance that are most likely to display a singular coloration.

However, at a great distance, a flash may appear white if the atmosphere is very pure (low particle content, no rain, high cloud base indicating dry air, etc.), in which case the diffusion is also low.

Finally, the intensity of the thunderbolt will add an extra touch to what has been said so far.

Very powerful lightning, warmer and with an intense electrical density, will have a greater amount of blue light contained in the spectrum.

On the contrary, weak lightning will tend to be impoverished.

An observer located near a very powerful impact could then witness a so-called bluish discharge, due to the large scattering of short wavelengths by the atmosphere.

On the contrary, a weak lightning bolt falling close enough will appear yellow to orange, because the small proportion of short wavelengths will have been quickly eliminated.

The color that lightning takes on photographs is sometimes quite different from their real color, and the presence of certain materials in the air is also capable of influencing the latter: an atmosphere rich in carbon as in the case of fireworks. forest will favor yellow for example.

In part, these colors will tend to reach the observer indirectly: a bit like the blue of the sky that reaches us indirectly after the diffusion of direct solar radiation.

This explains the mauve or indigo appearance that the sky or the curtain of precipitation tends to take on during a discharge.

When the impact is not too far away, this indirect radiation can combine with the whiteness of the flash and give a bright pink flash (sometimes referred to as a lilac effect)

A thunderstorm of rare intensity crossed the sky this morning, accompanied by torrential rains around 7:30 am.

In less than a quarter of an hour, when the day had risen, It fell ten days of rain in fifteen minutes.

Most lightning occurs inside clouds.

A precursor channel of the discharge appears in the negative core of the lower part of the cloud and continues upwards, where the positive charges are usually concentrated.

Typically lasting 0.2 seconds, these discharges have an almost continuous brightness, marked by pulses possibly attributed to the return discharges that occur between the charge pockets.

The total charge transferred in such a discharge is of the same order as that of cloud-to-ground lightning.

The discharge begins with the movement of negative charges that form a precursor channel in the vertical direction, which develops in 10 to 20 milliseconds and can reach a few kilometers in length.

When it reaches the top of the cloud, this channel is divided into horizontal branches, from which the transfer of electrons from the base of the cloud occurs.

Around the start of the discharge channel, negative charges move in its direction, extending the branches at the base of the cloud and increasing the duration of the discharge.

Lightning ends when the main connection between the lower and upper parts of the cloud is broken.

Lightning usually appears bright and intense, sometimes producing a strobe effect.

The brightness of a lightning bolt can be seen several tens of kilometers away.

If there is no precipitation at the observation site, it is often referred to as "lightning or heat flash" as this phenomenon is usually associated with high-peak summer thunderstorms away from the observer.

When a lightning strike occurs inside a cloud, the lightning is able to completely illuminate it, also lighting up the sky.

Eventually, intra-cloud discharges can manifest as extremely branched channels that extend horizontally into the higher regions of the cloud, over much of it.

Lightning bolts that are distributed horizontally generally appear to move slower than average.

In cloud-to-ground discharges, it is possible that lightning bolts similar in shape to a ribbon may occur.

This is due to strong winds which are able to move the ionized channel. With each discharge, the lightning then seems to move sideways, forming segments parallel to each other.

Positive discharges, because they originate from the highest part of the cumulus cloud, can extend beyond the storm region, into an area where the weather is stable, miles away.

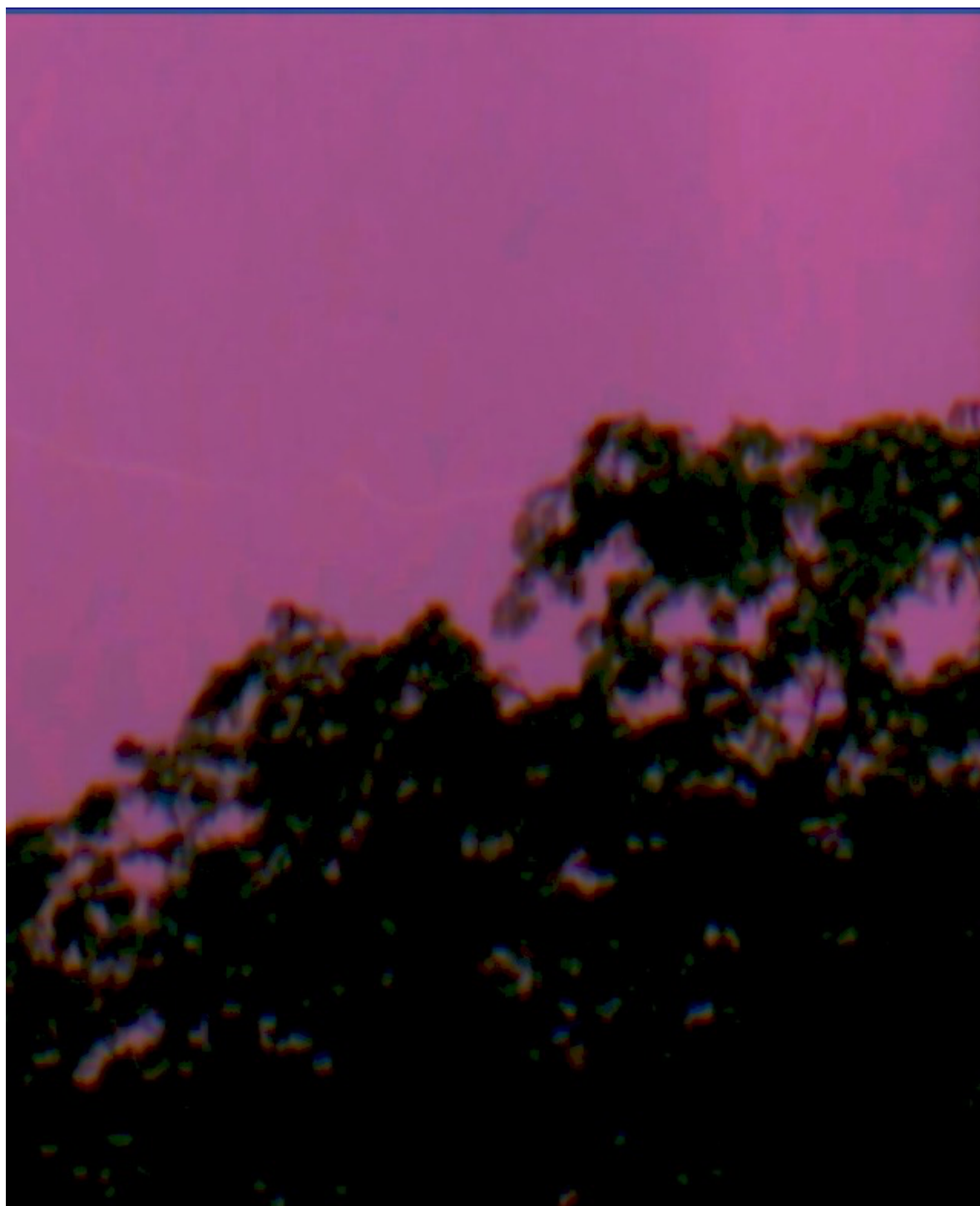
The channel of this type of lightning can move horizontally for a few kilometers before suddenly heading towards the ground.

Discharges of all kinds leave a channel of extremely hot ionized air through which they pass.

By cutting off the flow of electrical charges, the remaining channel quickly cools and breaks down into several smaller parts, creating a sequence of light spots that quickly vanish.

Segments form because the channel does not have a constant thickness throughout its length, and thicker parts take longer to cool.

This phenomenon is extremely difficult to observe, since the whole process takes only a small fraction of a second.





(Same image)

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