



# Incidents of Lightning

## Why in News

Recently, thirty people were killed in separate **incidents of lightning** in various parts of the country.

- Lightning is the **biggest contributor to accidental deaths due to natural causes.**

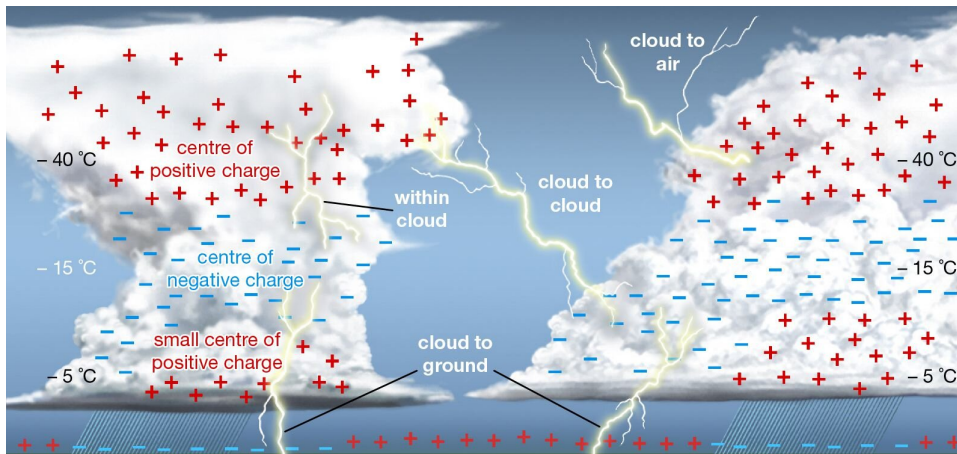
## Key Points

### ▪ About:

- It is a very **rapid and massive discharge of electricity in the atmosphere.** It is the process of **occurrence of a natural 'electrical discharge of very short duration and high voltage** between a cloud and the ground or within a cloud', accompanied by a bright flash and sound, and sometimes thunderstorms.
  - **Inter cloud or intra cloud (IC)** lightning are **visible and harmless.**
  - **Cloud to ground (CG)** lightning is **harmful as the 'high electric voltage and electric current'** leads to electrocution.

### ▪ Process:

- It is a result of the **difference in electrical charge between the top and bottom of a cloud.**
  - The lightning-generating clouds are typically about **10-12 km in height, with their base about 1-2 km from the Earth's surface.** The temperatures at the top range from  $-35^{\circ}\text{C}$  to  $-45^{\circ}\text{C}$ .
- As **water vapour moves upwards in the cloud**, it condenses into water due to decreasing temperatures. A huge amount of **heat is generated** in the process, **pushing the water molecules further up.**
- As they move to **temperatures below zero**, droplets change into small ice crystals. As they continue upwards, they gather mass, until they **become so heavy that they start descending.**
- It leads to a system where smaller ice crystals move upwards while larger ones come down. The **resulting collisions trigger release of electrons**, in a process very **similar to the generation of electric sparks.** The moving free electrons cause more collisions and more electrons leading to a chain reaction.
- The process results in a situation in which the **top layer of the cloud gets positively charged** while the **middle layer is negatively charged.**



- In little time, a huge current, of the order of lakhs to millions of amperes, starts to flow between the layers.
  - It **produces heat**, leading to the heating of the air column between the two layers of cloud.
  - It is because of this heat that the **air column looks red during lightning**.
  - The heated air column expands and produces shock waves that result in **thunder sounds**.
- **Strikes Earth's Surface:**
  - The **Earth is a good conductor of electricity**. While electrically neutral, it is relatively positively charged compared to the middle layer of the cloud. As a result, an estimated **20-25% of the current flow is directed towards the Earth**.
    - It is this current flow that results in damage to life and property.
  - Lightning has a **greater probability of striking raised objects on the ground**, such as trees or buildings.
    - **Lightning Conductor** is a device used to protect buildings from the effect of lightning. A metallic rod, taller than the building, is installed in the walls of the building during its construction.
  - The most lightning activity on Earth is seen on the shore of **Lake Maracaibo in Venezuela**.
    - At the place where the Catatumbo river falls into Lake Maracaibo, an average 260 storm days occur **every year, and October sees 28 lightning flashes every minute** - a phenomenon referred to as the **Beacon of Maracaibo or the Everlasting Storm**.
- **Climate Change & Lightning:**
  - An **increase of one degree Celsius would increase the frequency of lightning strikes by 12%**, warned California University in a study published 2015.
  - A study published in Geophysical Research Letters in March 2021, too, has **established links between climate change and rising incidences of lightning in the Arctic region**.
    - The number of lightning strikes recorded during the summer months between 2010 and 2020 shot up from around 18,000 at the start of the decade to more than 1,50,000 by 2020.
  - Therefore even the **Indian Institute of Tropical Management (IITM)** concludes that the **increase in lightning incidents may be directly related to the climate crisis**, and the **availability of more moisture over land** due to global warming.

- **IITM** in Pune is the only institution in India that works full-time on thunderstorms and lightning.

▪ **Increased Lightning Strikes in India:**

- As many as **18.5 million lightning strikes were recorded in India between April 2020 and March 2021**, according to India's second annual report on lightning released by **Lightning Resilient India Campaign (LRIC)** recently.
  - **LRIC** is a joint initiative of [Climate Resilient Observing-Systems Promotion Council \(CROPC\)](#), [National Disaster Management Authority](#), [India Meteorological Department \(IMD\)](#), Union Ministry of Earth Science, World Vision India, **UNICEF** among others.
  - The campaign aims to reduce the number of deaths to less than 1,200 a year by 2022.
- This is an **increase of 34% compared to previous year**; at least **13.8 million strikes were recorded between April 2019 and March 2020**.

[Source: IE](#)

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