Hot lightning

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In news– According to a new study, Climate change might lead to more wildfire-inducing 'hot lightning' strikes.

Key findings of the study-

- The the study titled, **'Variation of lightning-ignited wildfire patterns under climate change'**, has been done by researchers from Spain and Germany.
- According to the researchers, lightning is a major cause of triggering wildfires and is responsible for producing the largest wildfires in some regions, including the Western United States.
- Lightning-caused wildfires are dangerous as they spread rapidly before a strong response can be implemented and release substantial amounts of carbon, nitrogen oxides and other trace gases into the atmosphere.
- Although previous studies have demonstrated that climate change might lead to an increase in lightning strike incidents, the **latest research is the first time that scientists have focused on the relationship between "hot lightning" strikes and rising global temperatures.**
- Moreover, they have also examined how this form of lightning might affect the incidents of wildfires across the world.
- The researchers analysed 5,858 selected lightning-ignited fires based on satellite images of US wildfires between 1992 and 2018 and **found that approximately 90 per cent of them might have started by "hot lightning" strikes.**
- **Also known as long continuing current (LCC), this type of lightning strike can last from around 40 milliseconds to nearly a third of a second.**
- Explaining why "hot lighting" has more potential of triggering a wildfire than typical lightning, the new study, told that lightning with continuing currents can

transport more energy from cloud to ground than typical lightning.

- **When lightning with continuing currents attach to ground or vegetation, they produce more Joule heating and higher temperature than typical lightning**, increasing the probability of ignition.
- With the help of computer simulations, the researchers also looked at the frequency of "hot lightning" strikes and observed that as the atmosphere warms, there might be an increase of 41 per cent in the incidents of LCC strikes by 2090. This means that the rate of such lightning flashes could jump from three strikes per second globally to four strikes per second.
- Meanwhile, **the frequency of all cloud-to-ground strikes might increase to nearly eight flashes per second, a 28 per cent jump.**
- According to the study, the **areas that might witness a significant increase in wildfires triggered by the LCC strikes are Southeast Asia, South America, Africa, Australia, North America and Europe**.
- The researchers predicted this after accounting for changes in precipitation, humidity and temperature.
- However, many northern polar regions might see a decrease in wildfires as rainfall is projected to increase while "hot lighting" rates remain constant.

What is lightning and how does it occur?

- **Lightning is a rapid and massive electrical discharge that takes place between storm clouds and the ground, or** within the clouds themselves.
- Scientists believe that for lightning to occur, positive and negative charges must separate within a cloud. This happens when the water droplets in the bottom part of the cloud are moved upwards, where the much colder atmosphere freezes them into small ice crystals.
- As these small ice crystals continue to go up, they gain

more mass and eventually become so heavy that they start to fall down to Earth.

- This causes a system in which ice crystals going down collides with the water vapours coming up, leading to the accumulation of positive charges on the top of the cloud and negative changes gathering at the base, while the atmosphere between them in the cloud acts as an insulator.
- When the positive and negative charges grow large enough, their strength overpowers the insulating properties of the properties.
- As a result, the two kinds of charges meet with each other and produce lightning.
- Although most of the lightning takes place within the clouds, sometimes it is directed towards Earth also.
- With the base of the cloud becoming negatively charged, positive charges start accumulating on tall objects, like trees, poles and buildings.