

This incredible natural phenomena is both a curse and a blessing. A little common sense can go a long way to protecting life and property.

Lightning



Story By Stanley A. Changnon
Photos By Bruce Challgren, PhotoPixels.Com.

It is one of nature's most spectacular and beautiful phenomena, capable of creating deadly and damaging weather conditions and yet it's an essential feature in maintaining the electrical balance between the earth and atmosphere.

Lightning results from major differences in the electrical charge of the negatively charged atmosphere and the positively charged earth. These differences must constantly be relieved by an exchange of charges, creating the cloud-to-ground lightning which serves as the electrical discharge between these two opposites. Each day the earth experiences 1 million lightning discharges from 50,000 thunderstorms—an important effect in transferring the negative charge from the atmosphere to the earth.

A thunderstorm is a tall cumulus cloud that generates lightning—a short-lived high current electrical discharge (about 30 million volts per bolt) with a path several miles long. The lightning charge seeks the path of least resistance for its channel to earth, resulting in a path that is often forked, quite crooked and frequently produces strikes on tall buildings, rural barns and trees.

Although beautiful to watch and beneficial to our environment, a respect for lightning is essential to people who work and play in the outdoors.

Most lightning energy from the rapid expansion of the adjacent air goes into heat, and the resulting expansion of the air creates the strong noise we label as thunder. Essential components of a cloud-to-ground lightning stroke are its positive and negative leaders. When the cloud-generated leader reaches the ground, a return stroke occurs from the earth. About 20 percent of all lightning strokes are between clouds and the rest are cloud to ground strokes.

Lightning Impacts

Lightning is dangerous, producing injuries and death to humans and farm animals, setting fires to forests and buildings, and damaging power grids, electrical systems and communication systems.

(Photo By Paul Haefield, www.pawleewurx.)



On the other hand, lightning has benefits. It is an essential element in maintaining the earth-atmosphere electrical balance. Lightning converts gaseous nitrogen in the atmosphere into nitrogen compounds that are absorbed by rainfall and deposited on the ground, creating a fertilizer for our soils. The lightning-ignited fires that historically swept across the Midwest's rich prairie soils, destroyed encroaching trees and enhanced the growth of prairie grasses.

Damaging Lightning

On average, nine to 10 people are killed by lightning in Illinois each year—more deaths than caused by any other form of severe weather, including tornadoes and floods. Annually, an average of 18 lightning-related injuries to humans occur, and many farm animals are killed.

Studies have shown that only 3 percent of all Illinois thunderstorms produce damaging lightning, and damages from lightning occur, on average, 14 days each year. Damaging events are most common (80 percent) from June through August, usually occurring between 1 and 4 p.m., and least prevalent from 10 p.m. to 9 a.m.

The distribution of damaging lightning events is not even across the state. Although deep southern Illinois has

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more storms than anywhere else, it has had the fewest incidents of damages. Southwestern and northeastern Illinois have experienced the most damages, partly a result of high population density and from the added storms generated by the effect of St. Louis and Chicago on the atmosphere.

Protection Against Lightning

Statistics show that most deaths are to persons caught out-of-doors when a storm strikes. Persons working or relax-

June is
**Lightning
Awareness
Month.**



Cloud-to-ground lightning helps enrich our soils with nitrogen compounds necessary for plant growth.

ing outdoors during the storm season (March-October) need to be alert to, and continuously monitor, weather forecasts calling for thunderstorms.

Do not rely on hearing thunder before going inside. Thunder audibility has a maximum distance of 5 miles, and since storms travel at speeds of 20 to 30 mph, lightning can occur quickly after the first thunder is heard. Furthermore, thunder should not be a primary decision for leaving the outdoors as studies of Illinois storms show that 22 percent of all lightning strikes occur without thunder being heard within 5 miles of the stroke. In addition, one of the dangers of remaining outdoors is that a newly developing storm can occur overhead, and its initial lightning can occur with little or no warning.

Another reason for concern is that some thunderstorms have excessive cloud-to-ground lightning. Illinois State Water Survey studies show that 50 percent of all lightning strokes come with only 12 percent of the thunderstorms. These are truly lightning storms.

When a storm approaches, seek shelter. Farmers should get off tractors and other metal farm equipment. Children should be brought indoors. Do not stand near or beneath a tree.

The safest place to be during a lightning storm is inside a well-grounded structure but precautions should be taken there, also. Avoid using the telephone since lightning strikes can hit the wires and high voltage can move over

Lightning damages in Illinois:

- Rural areas experience the most damage: farm buildings, 82 percent; rural schools and churches, 9 percent.
- Damages in cities with a 100,000 population or more: residences, 40 percent; commercial structures, 23 percent; industrial buildings/facilities, 22 percent.

Annual financial losses resulting from lightning in Illinois:

- Fires to forests and uninsured property = \$2-3 million
- Repairs to power and communication systems = \$6-7 million
- Damage to in-house electrical fixtures = \$1-2 million
- Insurance payments for damages to property = \$38-40 million

Nationally, annual losses from lightning:

- Airline operating costs and delays = \$2 billion
- About 300,000 claims handled by one major insurance company = \$330 million
- Power outages = \$1 billion

the line into your home. Unplug expensive electrical equipment and turn off computers before an impending storm. Use of lightning arresters on power lines serving computers and other expensive electrical fixtures is highly recommended.

All structures should be equipped with lightning protection, usually lightning rods mounted on the highest points of the roof and attached by cabling to ground rod conductors buried to a level where moisture exists in the soil. These systems drain electrical charges that can develop on a structure.

Sometimes you cannot avoid being outdoors during a passing storm. If you feel your hair stand on end it is a signal

Thunderstorms travel at speeds of 20 to 30 mph. Monitoring weather conditions is essential when outdoors, such as these farmers harvesting a wheat field.

A common type of discharge, sheet or intracloud lightning occurs between oppositely charged centers within the same cloud.

that lightning may be about to strike you. Drop to your knees and bend forward, putting your hands on your knees. Do not lie flat on the ground.

Be alert to storm forecasts and developing storms, and get to safe locations during stormy conditions.



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Illinois Thunderstorm Facts

- Thunderstorms occur somewhere in the state 85 to 90 days each year.
- A given place in southern Illinois averages 60 storm days a year compared with 40 storm days a year at a given northern Illinois location.
- A typical thunderstorm path is 5 to 10 miles wide and 20 to 50 miles long.
- Storms typically last 1 to 3 hours.
- There are several hundred lightning strikes in each storm.
- The annual average number of lightning strokes hitting in a square mile in Illinois is 10 to 11 in the south, 8 to 9 in the central and 5 to 7 in the north.



(Photo courtesy Illinois State Water Survey.)