The Mini Page®
Betty Debnam, Founding Editor and Editor at Large

Our Electric Skies

Lightning!

Lightning is both glorious and terrible. It kills or injures hundreds of people each year in the United States. But people often ignore this powerful force, staying outside to play or work even when lightning is nearby. The top time for lightning storms is in the summer, when we want to be outside.

To learn more about the safety and science of this awesome part of nature, The Mini Page talked with a scientist at the National Oceanic and Atmospheric Administration (NOAA).

Electric world

Lightning flashes about 50 times every second around the world. About 2,000 thunderstorms are occurring at any one time.

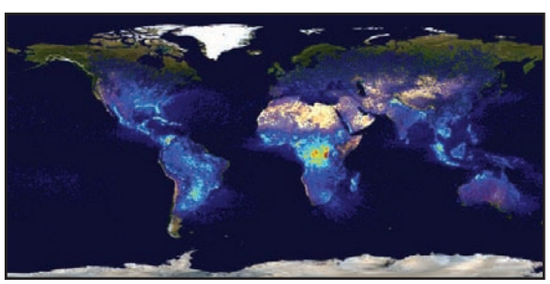


photo by Jeff De La Beaujardiere, Scientific Visualization Studio, courtesy NASA

More than 1.2 billion thunderstorms hit every year around the world. Central Africa gets the most lightning flashes per square mile. The polar regions get the least.

This map of lightning flashes was made with information from NASA spacecraft.

photo by J Schmidt, courtesy NPS

When you hear a crackling in the skies, you're hearing lightning within the clouds. When you hear loud, booming thunder, you're hearing lightning jumping from a cloud to the ground.

Super sparks

Lightning is a giant spark of electricity caused by the buildup of static charges. This is the same kind of electricity that can give you a little shock when you rub your feet on the carpet and touch a person, a pet or a metal object.

"**Static**" means something is not moving. **Electricity** is created when static charges start to move. A huge amount of electric charge has to build up before lightning can strike.

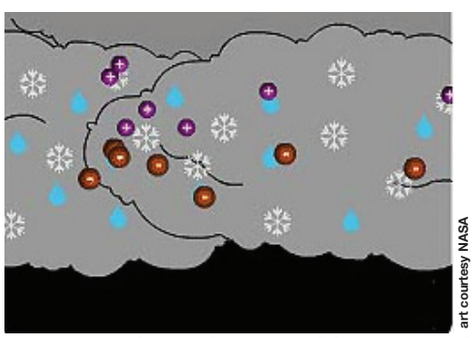
Lightning can strike within a cloud, between clouds, or between a cloud and the ground.

Electrical charge

During a thunderstorm, moist, warm air rises quickly into the atmosphere. As it rises, it cools and forms a cloud. Tiny flakes of ice crystals and a kind of soft hail called **graupel** (GRAU-puhl) form in the cloud.

The ice crystals and graupel collide and bounce apart in the clouds. When they rub against each other, the ice and graupel become electrically charged. This is similar to how static electricity builds up when your feet rub against the carpet in winter.

The ice crystals become positively charged. The graupel becomes negatively charged. This means they have opposite electrical charges. Opposite charges attract each other. Like charges push each other away, or **repel**, each other.



art courtesy NASA

Ice crystals and graupel bump each other and move apart to cause electrical charges.

A Lightning Assortment

Moving charges

In a storm cloud, the ice flakes are small and light, so they float to the top of the cloud. The top of the storm cloud becomes positively charged.

The heavier graupel stays lower in the cloud. It gives the bottom part of the cloud a negative charge.

The negative charge low in the cloud pushes the negative charge in the ground away. The top of the ground under the cloud is left with a positive charge.

Charged!

Once a lot of negative charge builds up low in the cloud, some of that charge starts moving toward the ground. It is met by positive charge rising up from the ground. When they connect, we see the bright flash of light.

Sometimes the positive and negative charges meet in the middle of the cloud or move between clouds. Lightning flickers across the sky.

photo by Oliver Spalt, courtesy Wikipedia

Volcanic lightning strikes during an eruption of Mount Rinjani in Lombok, Indonesia. Although most lightning occurs during thunderstorms, it also strikes in volcano eruptions, strong forest fires, nuclear explosions, heavy snowstorms and large hurricanes.

Fire and ice

Scientists believe lightning forms in volcano eruptions when pieces of rock, ash and ice collide in the air. These collisions create electrical charges just as collisions of ice flakes and graupel do in storm clouds.

Heat lightning

What people call **heat lightning** is actually lightning from a storm far away. People see light from the lightning reflected off the clouds. It is so far away from the viewer that it is not dangerous.

Sprites and elves

Recently, scientists discovered that lightning bolts don't just strike from the bottoms of clouds. They also shoot from the tops of clouds. These types of lightning are known as **red sprites** and **blue elves**.

photo by D. Sentman and G. Wescott, courtesy Geophysical Institute, U. Alaska Fairbanks, NASA

When flying above a storm in 1989, an airplane pilot was one of the first to notice sprites and elves.

Ready Resources

The Mini Page provides ideas for websites, books or other resources that will help you learn more about this week's topics.

On the Web:

- www.lightningsafety.noaa.gov/kids.shtml
- weather.gov/Owlie's
- nws.noaa.gov/pa/forkids.php
- scijinks.jpl.nasa.gov

At the library:

- "Lightning" by Seymour Simon
- "National Geographic Kids: Storms!" by Miriam Busch Goin

Basset Brown's Try 'n' Find

Lightning

F	E	R	I	F	S	U	O	R	E	G	N	A	D	G
L	C	R	I	A	G	N	I	N	T	H	G	I	L	R
A	H	M	R	O	T	S	R	E	D	N	U	H	T	A
S	A	H	I	E	F	A	S	D	N	U	O	R	G	U
H	R	S	O	C	T	I	H	E	K	I	R	T	S	P
S	G	U	K	T	E	V	S	R	O	O	D	N	I	E
K	E	N	S	R	A	O	R	S	D	U	O	L	C	L
Y	L	R	E	D	N	U	H	T	S	E	K	A	L	F
T	A	E	H	Y	T	I	C	I	R	T	C	E	L	E

Words that remind us of lightning are hidden in the block below. Some words are hidden backward or diagonally. See if you can find: AIR, CHARGE, CLOUDS, DANGEROUS, ELECTRICITY, FIRE, FLAKES, FLASH, GRAUPEL, GROUND, HEAT, HIT, HOT, ICE, INDOORS, LIGHTNING, ROARS, SAFE, SKY, STRIKE, SUN, THUNDER, THUNDERSTORM.

Mini Spy

Mini Spy reports the weather, and she predicts lightning storms! See if you can find:

- ❑ toothbrush
- ❑ letter E
- ❑ peanut
- ❑ boomerang
- ❑ muffin
- ❑ number 3
- ❑ word MINI
- ❑ dolphin
- ❑ olive
- ❑ letter A
- ❑ ladder
- ❑ safety pin
- ❑ basket
- ❑ umbrella
- ❑ number 7
- ❑ sailboat
- ❑ flower
- ❑ pencil
- ❑ kite
- ❑ leaf
- ❑ ruler

Rookie Cookie's Recipe
Sweet Potato Fries With Maple-Dijon Dip

You'll need:

- Cooking spray
- 2 large sweet potatoes, peeled and cut into 1/2-inch-thick slices
- Salt and pepper
- 1 teaspoon ground cumin
- 1/2 cup light sour cream
- 2 tablespoons pure maple syrup
- 1 teaspoon Dijon mustard

What to do:

1. Preheat oven to 400 degrees. Coat a large baking sheet with cooking spray.
2. Arrange sweet potato slices on baking sheet and spray them with cooking spray. Season with salt, pepper and cumin.
3. Bake for 25 minutes until potatoes are golden brown and tender.
4. Whisk together sour cream, maple syrup and mustard. Serve fries with dip on the side. Serves 4.

You will need an adult's help with this recipe.

Adapted from "The Robin Takes 5 Cookbook for Busy Families" with permission from Andrews McMeel Publishing (andrewsmcmeel.com).

Meet Adam Goddard and Warren Brown

photo by Robert Ciolfi

Warren (left) and Adam

Adam Goddard and Warren Brown are the creators of the Disney Junior Channel TV series "Big Block Singsong." The program runs in several other countries on different networks.

Adam is a composer, music producer and musician. Warren is a creative director, designer and animator. They both grew up in Grimsby, Ontario, Canada, and now live in Toronto.

Warren studied anthropology and illustration in college. Adam studied piano, musical composition and orchestration.

They began working together on music videos for Nickelodeon about 10 years ago. They have worked on programs such as "Bruno" and "Tigga and Togga."

Kaleena Mosqueda-Lewis

Goldie Goodsport's Supersport

Height: 5-11
Age: 21
Hometown: Anaheim Hills, California

Kaleena Mosqueda-Lewis began taking jump shots in elementary school. As she got older, a practice session would include 500 shots — later on, it became 1,000. She was a two-time California basketball state champion in high school and was also named the 2011 Gatorade National Player of the Year. After years of hard work, Kaleena's determination has continued to pay off — big time.

In April, Kaleena, a senior forward, helped lead the University of Connecticut women's basketball team to a third straight NCAA title. The Huskies rolled to their eighth consecutive Final Four appearance before downing Notre Dame 63-53 in the finals. Along the way, Kaleena set the Division I record for most career 3-pointers with 398.

The 2015 championship was the 10th in UConn history, and tied head coach Geno Auriemma with legendary UCLA coach John Wooden as the only coaches to claim 10 NCAA titles in the sport of basketball.

Mighty Funny's Mini Jokes

All the following jokes have something in common. Can you guess the common theme or category?

Larry: What is a tornado's favorite game show?
Leslie: "Wind, Lose or Draw"!

Lauren: What did they call the heavy snowstorm that hit the Emerald City?
Lilly: The Blizzard of Oz!

Lisa: In what wars do hurricanes fight?
Lester: Whirl wars!

Don't Wait: Go Indoors

Roaring thunder

When gases are heated, they **expand**, or grow bigger. The faster they are heated, the faster they expand.

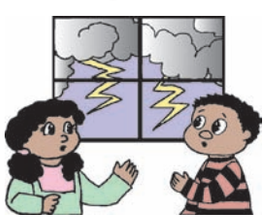
A lightning bolt can be as hot as 50,000 degrees Fahrenheit. This is five times hotter than the surface of the sun. When lightning strikes, it heats the air around it in a fraction of a second.

The air expands faster than the speed of sound, which is 750 miles per hour. Then it cools rapidly, causing the air to shrink, or **contract**.

The rapid expansion and contraction forms a shock wave that makes a loud boom. This is the thunder.

Millions of booms are created along the path of the lightning bolt. This makes the sound we hear as a rumble. When the lightning strikes near us, the thunder makes a sharp crack or a loud bang. Distant lightning strikes have a long rumble.

Warnings



NOAA's important safety slogan is: **When thunder roars, go indoors.** If you can hear thunder when you're outside, you're in danger of being struck by lightning. Run to a safe place right away.

photo by Dave Powell, courtesy USDA Forest Service, Bugwood.org

Lightning started this forest fire that burned in Oregon and Washington in 2001. Lightning causes about 24,600 fires every year.

A serious force

In 2014, lightning struck about 250 people in the United States, killing 26 of them and seriously injuring most of the rest.

No place outdoors is safe. If you hear thunder, get indoors fast. Lightning can strike more than 10 miles away from where it is raining.

Safe places

Even if the skies are clear overhead, there may be clouds off to the side. If you are hearing thunder, it's not safe to stay outside.

Two places are safe in a lightning storm. The best place to be is inside a building such as a house, church, store or office. The second place is inside a hard-topped vehicle with the windows closed. Cloth-topped vehicles don't provide safety.

Stay safely inside for 30 minutes after the last thunder has passed.

Safe inside

Once inside a building, stay away from anything that plugs into the wall. For example, stay off corded phones or a plugged-in computer. (Cellphones are OK because they are not connected by wiring.)

Keep away from the plumbing. Metal pipes could conduct the lightning's electricity. Don't take a shower or do dishes during a thunderstorm.

Car protection

Once you're in the car, roll up the windows. Don't touch anything metal such as the ignition or the radio.

People are safe inside a vehicle (or an airplane) because lightning follows the vehicle's outer metal shell, passing safely around the people inside. Tires do not have anything to do with the protection.

Most dangerous areas

When lightning strikes, it usually hits the tallest object. This includes people if they're out in the open. Never stand under trees.

The most dangerous place of all is on or in the water. Water is a strong conductor of electricity. The highest number of lightning deaths happen to people fishing.

If you hear thunder, get out of the pool and away from any water. Even indoor pools can be dangerous.

The Mini Page thanks John Jensenius, NOAA, for help with this issue.

Next week, The Mini Page is about American cemeteries overseas.

Look on the weather page of your newspaper to help plan a safe day.

The Mini Page Staff

Betty Debnam - Founding Editor and Editor at Large Lisa Tarry - Managing Editor Lucy Lien - Associate Editor Wendy Daley - Artist