



# The Mini Page

Betty Debnam, Founding Editor and Editor at Large



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## Fantastic Light Show

# The Northern Lights

Imagine looking up and seeing bright, colorful streamers of light waving in the night sky. These waves of colored light in the north are called the **aurora borealis** (uh-ROAR-uh bore-ee-AH-lus), or the northern lights.

If you live in or have visited the far north of America, in Alaska or Canada, you have probably seen the aurora borealis during the dark winter nights. In the summer, the night sky is usually too light for the colors to stand out.

People in northern countries such as Norway often see the northern lights.

The farther south you are, the less likely you are to see them. But every once in a while, when conditions are right, people as far south as Los Angeles can see the glow of the aurora.

The Mini Page talked with a scientist of space weather to learn more about these beautiful displays.



photo courtesy National Geophysical Data Center, NOAA

The aurora australis glows in the south, near the South Pole, looking like a bright dawn.



photo by Dr. Yohsuke Kamide, collection of Dr. Herbert Knehl, NGDC, courtesy NOAA

The aurora borealis lights the sky near Anchorage, Alaska. The auroras are usually made of blue-green light, although sometimes the light is pink, purple or red.

The more common green color is made when a charged particle hits an oxygen particle. Other colors come when charged particles hit bits of other materials.

## Polar aurora

The closer you are to the North or South Pole, the more auroras you will be able to see. The light shows appear near both poles.

Aurora borealis is Latin for “northern dawn.” In the south it is called aurora australis, or “southern dawn.”

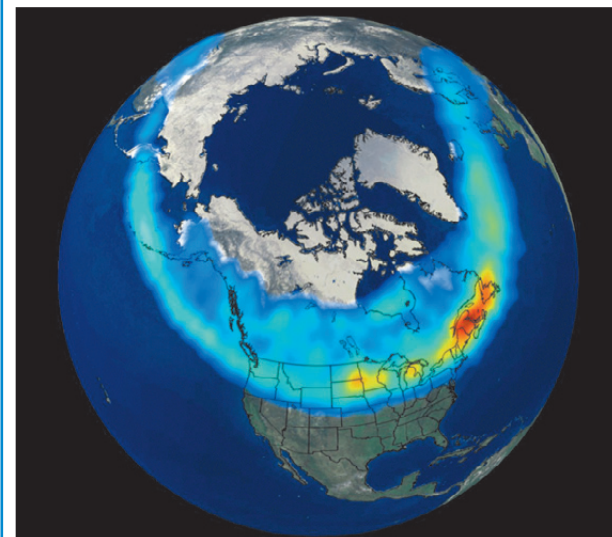
Few people get to see the aurora australis, however, because it usually shines away from the continents.



Auroras can be giant light shows stretching for thousands of miles up and down the sky. The light usually appears near the horizon. The polar auroras may shine anywhere from 60 to 600 miles above the Earth.

## The view from above

When an aurora is seen from space, it often looks like a circle around one of the poles.



The aurora borealis can be seen at the North Pole from space.

photo courtesy NASA/Goddard Space Flight Center Scientific Visualization Studio

# More About the Aurora

## Setting the stage

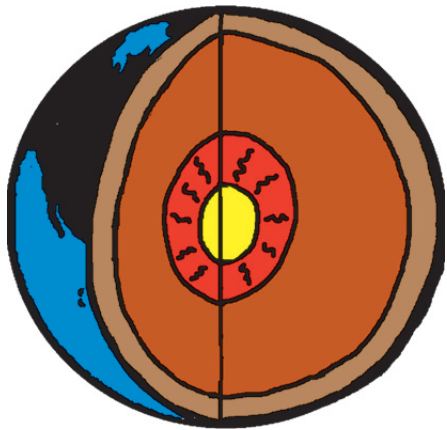
There are two main ingredients needed to make polar auroras:

1. the magnetic field around the Earth, and
2. the magnetic field around the sun.

When something is **magnetic**, it is attracted to something else.

A **magnetic field** is like an invisible force field surrounding a body such as a planet or the sun.

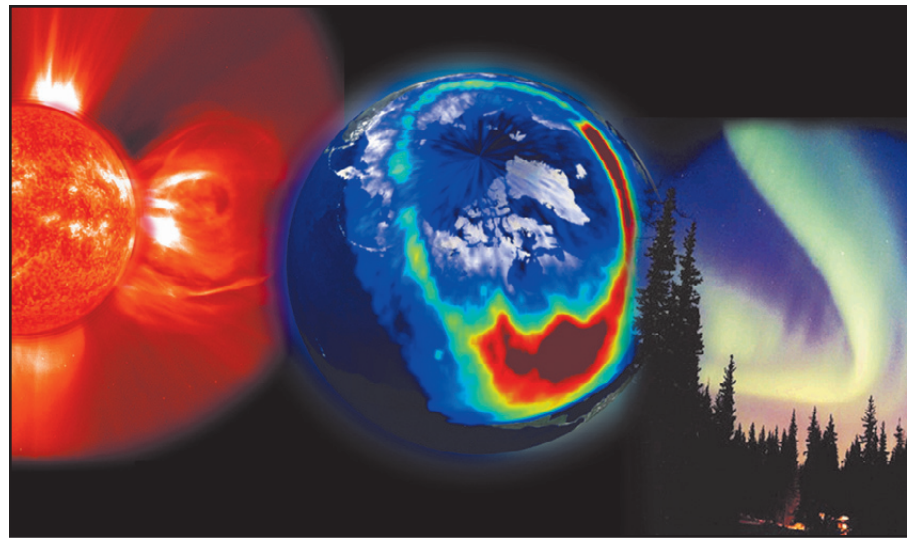
Experts believe the Earth's magnetic force field is created this way:



- In the middle of the Earth there is iron rock. It is so hot that it is liquid.
- The Earth rotates,

moving the liquid iron around.

- When the liquid iron moves, it creates electrical currents.
- When the electrical current moves, it produces the magnetic field.

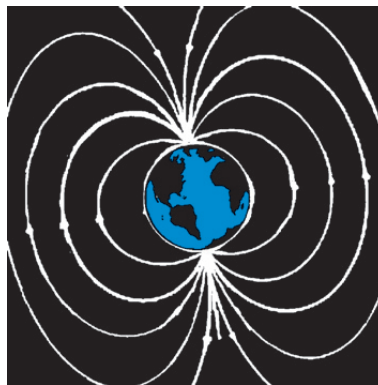


This image is made from photos of heavenly elements making up an aurora: a disturbance, or storm, on the sun that causes the aurora; an aurora as seen from space; and an aurora as seen from Earth.

photo courtesy NASA

## Magnetic field

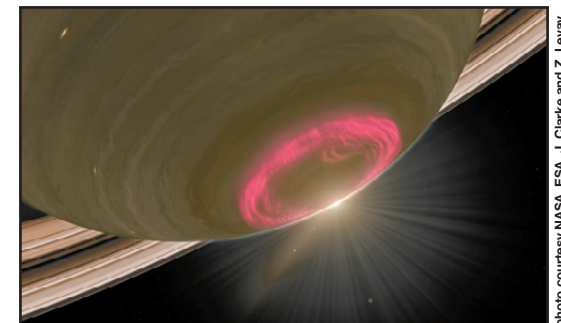
The magnetic field is like a bubble surrounding the Earth. It turns the Earth into a giant magnet.



The magnetic field has magnetic lines leading to the North and South Poles. If we could see it, this magnetic field would look like a Slinky wrapped around the Earth.

## Planetary auroras

Earth is not the only planet that has aurora light shows. Many other planets have similar displays.



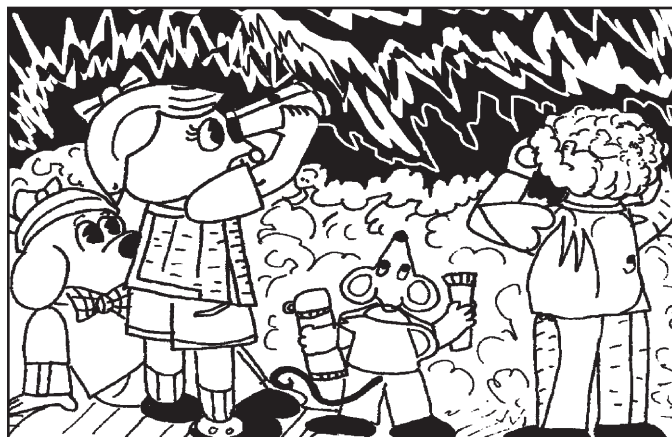
This ultraviolet image of the aurora circling Saturn's pole was taken by the Hubble Space Telescope.

photo courtesy NASA, ESA, J. Clarke and Z. Leovy

## Mini Spy ...



Mini Spy and her friends are enjoying the northern lights. See if you can find: • elephant's head • mushroom



- banana
- carrot
- letter L
- teapot
- heart
- cat
- bird
- ice pop
- ruler
- caterpillar
- bell



## Northern Lights TRY 'N FIND

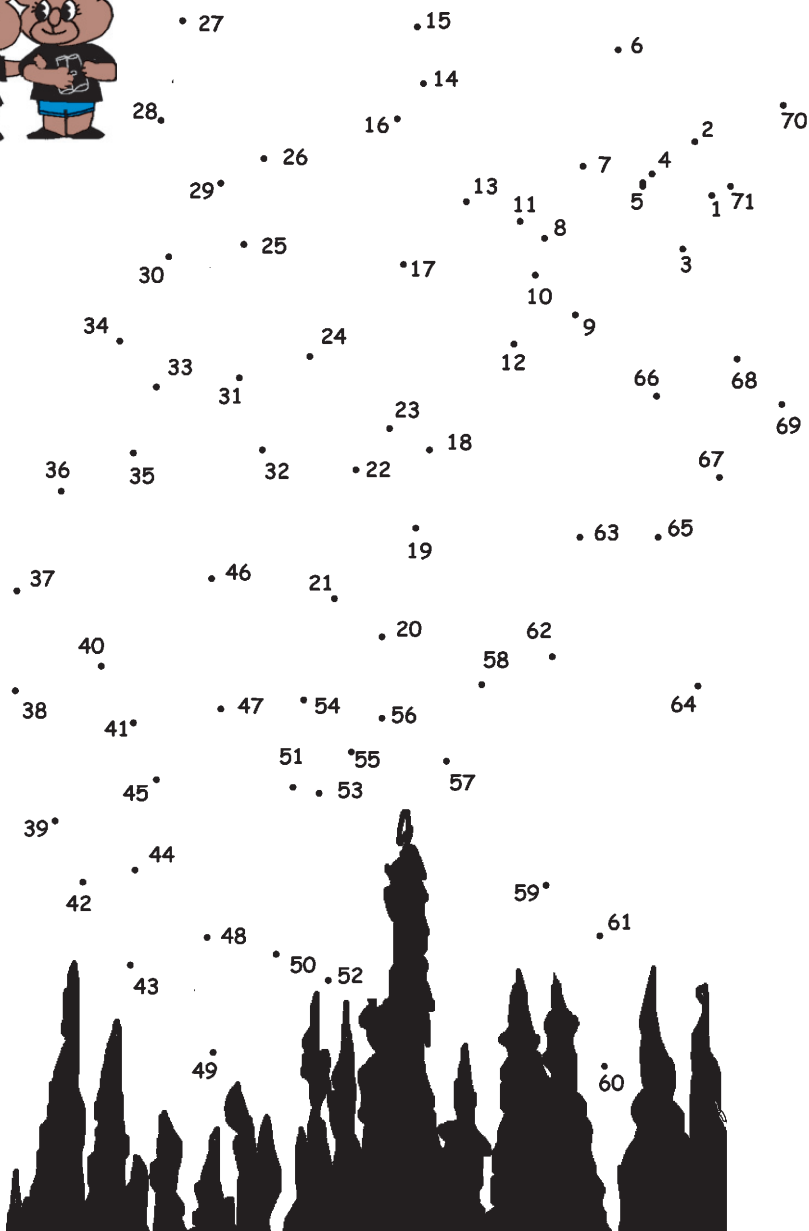
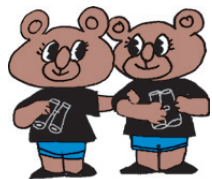
Words that remind us of the northern lights are hidden in the block below. Some words are hidden backward or diagonally. See if you can find: AURORA, BOREALIS, AUSTRALIS, DAWN, SUN, CHARGED, PARTICLES, MAGNETIC, FIELD, EARTH, POLES, SKY, GREEN, RED, GLOW, PLANET, IRON, ELECTRICAL, SOLAR, WIND, WAVES, ATMOSPHERE.

WHAT A LIGHT SHOW!



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

Go dot to dot and color.



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## Rookie Cookie's Recipe Easy Vegetable Dip

*This makes a tasty and nutritious after-school treat!*

### You'll need:

- 1 (8-ounce) container reduced-fat sour cream
- 1/2 cup finely chopped raw broccoli
- 1/4 cup finely chopped carrots
- 1/4 cup finely chopped celery
- 1/4 cup light ranch dressing



### What to do:

1. Mix all ingredients in a medium-sized bowl.
2. Chill for 2 hours to blend flavors.
3. Serve with cut-up vegetables or crackers.

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

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## Meet Emma Roberts and Jake T. Austin



photo by Jamie Trueblood, © 2008 Dreamworks LLC and Cold Spring Pictures. All Rights Reserved.

Emma Roberts stars as Andi and Jake T. Austin stars as Bruce in the movie "Hotel for Dogs."

Emma, 17, was born in Rhinebeck, N.Y. She has appeared in several movies, including "Nancy Drew" and "Aquamarine." She sang a song in the movie "Ice Princess." She played Addie Singer in the Nickelodeon series "Unfabulous."

Emma began acting when she was 9. She also plays the guitar. She is the niece of actress Julia Roberts. In 2007, she was a spokesperson for the "Drop Everything and Read" day.

Jake Austin, 14, was born in New York City. He likes to make short films with his friends and enjoys writing and watching TV. He goes snowboarding and surfing, and plays basketball and soccer. He can speak Spanish.

He acted in the movie "The Perfect Game."

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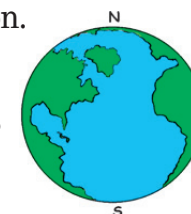
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MIGHTY  
FUNNY'S

## Mini Jokes

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

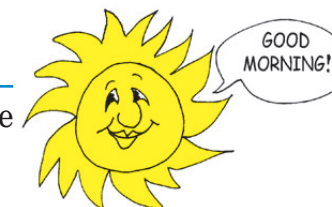


**Evan:** What does planet Earth use to go fishing?  
**Erin:** The North and South Poles!



**Ewan:** Where is the deepest part of the Earth's oceans?  
**Erica:** On the bottom!

**Eustace:** Why is the sun lighter than the Earth?  
**Esther:** Because it rises every morning!



# Sun Show

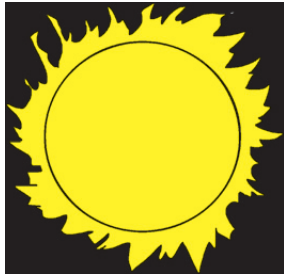
## Charging up

There are tiny bits of matter that have an electrical charge. Many of these electrically charged particles come from the sun. They are trapped in the Earth's magnetic field.

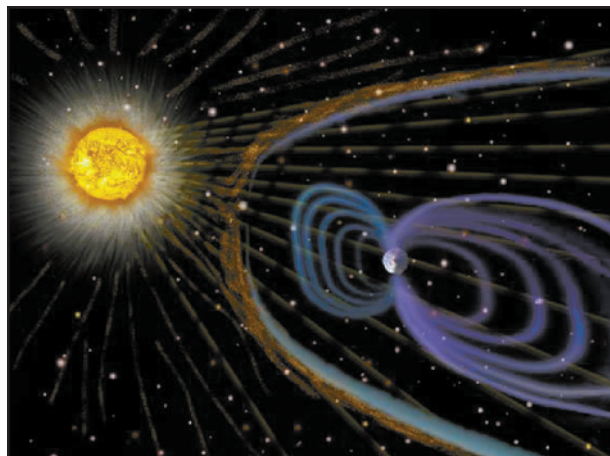
The sun has its own magnetic bubble surrounding it. When the sun's bubble is blown outward, it sends out a stream of electrically charged particles toward Earth. This blowing stream is called the **solar wind**.

The Earth's magnetic field bounces most solar particles back into space. But sometimes these charged particles are trapped in the magnetic field.

The charged particles follow the magnetic lines around the Earth, straight to the poles. Once the charged particles reach the Earth's atmosphere, they hit little bits of matter, such as oxygen.



Each time a charged particle hits another particle, there is a little burst of light. The many particles bursting into light create the auroras.



art courtesy NASA

This art shows the solar wind carrying charged particles toward Earth. The particles hit the Earth's magnetic field (shown as ovals on the right).



photo by Joshua Strang, USAF, Wikipedia, courtesy NASA

This aurora streams over Alaska. The solar wind carrying electrically charged particles from the sun to the Earth's atmosphere not only can create beautiful auroras, it can also disrupt electronic equipment such as satellites. If a satellite is damaged, it could affect communications or weather forecasting. The solar wind can also cause electricity blackouts.

## A solar production

Sometimes a big magnetic bubble is blown loose from the sun. The magnetic bubble can slam into the Earth's atmosphere at a million miles per hour.

When this hits the atmosphere, it creates waves in the Earth's magnetic field. These waves hit charged particles already trapped in our magnetic field.

These crashing particles create waves of light.

If there is a lot of activity in the sun, the incoming bubble can squash the Earth's magnetic field. Light from the aurora borealis can then be pushed south so the aurora is visible much farther from the North Pole.

The Mini Page thanks Janet Green, physicist, Space Weather Prediction Center, NOAA, for help with this issue.

Site to see:  
[www.exploratorium.edu/learning\\_studio/auroras](http://www.exploratorium.edu/learning_studio/auroras)  
<http://spaceplace.nasa.gov>

Next week The Mini Page is about dog guides for the blind.

Look on the weather page of your newspaper. What space weather events are listed there?

## Sun cycle

The sun is on a regular 22-year cycle. This means the sun's magnetic field flips directions every 11 years. Then, 11 years later, it flips back again.

It doesn't flip all at once. It starts changing direction throughout the cycle. In the middle of the cycle, the particles in the sun's magnetic field become the most disturbed.

When this happens, more charged particles stream toward Earth. The more particles that hit the Earth's atmosphere, the more light is produced. Then we see more and brighter auroras.

By knowing the sun's cycle, scientists can predict when the brightest auroras will appear in the Earth's skies.



photo courtesy National Geophysical Data Center, NOAA

A display of aurora australis flows over the South Pole Station in Antarctica.

## The Mini Page Staff

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

## Read all about the northern lights



photo by Joshua Strang, USAF,  
Wikipedia, courtesy NASA

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by Betty Debnam

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(Note to Editor: Above is camera-ready, one column-by-3<sup>1</sup>/<sub>2</sub>-inch ad promoting Issue 3.)

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3-5 (09)

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## The Mini Page<sup>®</sup> Standards Spotlight: The Northern Lights

Mini Page activities meet many state and national educational standards. Each week we identify standards that relate to The Mini Page's content and offer activities that will help your students reach them.

**This week's standards:**

- Students understand changes in the Earth and sky. (Earth and Space Science)

**Activities:**

1. Draw a picture of yourself watching the aurora borealis. Then cut out five newspaper words that describe the aurora borealis and paste them along the bottom of your picture.
2. Make a "rainbow line" on a piece of paper. Cut out sections of colors from newspaper photos and ads. Paste them in a straight line following this pattern: red, orange, yellow, green, blue and purple.
3. What is winter weather like where you live? Look at the weather page of your newspaper. Write down the high temperature for today. Find two places where the weather will be warmer and write down the cities and temperatures. Now find two places where the weather will be colder and write them down.
4. How are each of these important for the northern lights: (a) sun, (b) oxygen, (c) sun cycle, and (d) the Earth's liquid center?
5. Today's Mini Page gives you the scientific explanation for the northern lights, but people in earlier times may have different explanations. Write a story that uses myth or magic to explain how the northern lights came to be. You may want to Google images for the aurora borealis for inspiration.

(standards by Dr. Sherrye D. Garrett, Texas A&M University-Corpus Christi)

(Note to Editor: Above is the Standards for Issue 3.)

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**Goldie Goodsport's Report**

## Supersport: Casey Nogueira



**Height: 5-6 Birthdate: 2-23-89 Hometown: Raleigh, N.C.**

The pressure mounts. The title is on the line. It's make-or-break time. North Carolina women's soccer star Casey Nogueira thrives in those moments. In the recent College Cup, she scored the tying goal and made the winning shot to help lift the Tar Heels to a 2-1 win over Notre Dame and claim their 19th NCAA championship under legendary coach Anson Dorrance. Nogueira was the MVP of that College Cup.

When North Carolina won the title in 2006, Nogueira, then a freshman, also hit the game-winning goals in the semifinals and finals. She has the timing, talent and touch to produce in the clutch.

Nogueira, who scored 25 goals this season, rockets the ball with both her left and right foot. Poor goalies!

Nogueira, whose father, Victor, played pro soccer for 27 years, took up the game at age 5. Her goal is to play pro soccer after graduating with a degree in interpersonal communications.

Off the field, Casey likes music and fried rice, and lists Tiger Woods as her favorite athlete.

(Note to Editor: Above is copy block for Page 3, Issue 3, to be used in place of ad if desired.)

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