

Aurora Borealis



POLAR LIGHTS COMMEMORATIVE STAMPS 2007

P O L A R L I G H T S

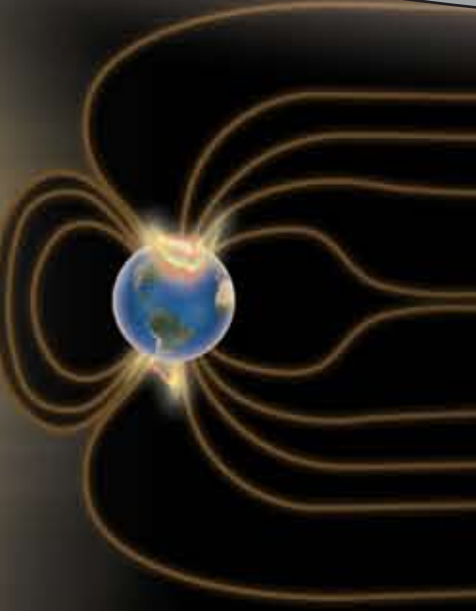
REMEMBER! OCTOBER IS NATIONAL STAMP COLLECTING MONTH!



Aurora Australis

# P O L A R L I G H T S

Energy constantly flows from the sun in the form of solar wind, which brings electrons and ions in contact with Earth's magnetic field.



Solar wind is deflected around Earth's magnetic field, called the magnetosphere, in a phenomenon known as bow shock.

Polar lights are created when streams of electrons from outer space concentrate along Earth's magnetic poles and excite gases in the upper atmosphere.

Following the lines of Earth's magnetic field (as depicted by the orange lines in this diagram), incoming electrons are forced to the polar regions, where they emit green and sometimes red light.

The appearance of these elements has been graphically rendered and exaggerated for the purposes of this illustration.

In ancient Roman mythology, Aurora was goddess of the dawn. Every morning she flew across the sky in her chariot to announce the arrival of the sun.



Exploring and mapping the polar regions presented great challenges. The 1872 map on the left was compiled from information provided by many Arctic voyagers. The tall-masted ship and pontoon plane were used to explore the Antarctic by Richard Byrd, who is pictured below with fellow explorer and pilot Floyd Bennett during the 1920s.



## FIRE 'N ICE

**MATERIALS:** USPS Polar Lights poster, globe, flashlight, reference materials, computer with Internet, selected literature, construction paper, pencils, crayons, chart paper, Arctic bulletin board, pastels, paint, ink, plastic knives, white soap, shoeboxes, miscellaneous art supplies

**OPENING:** What is the most incredible sky you've seen? Have you ever heard of the polar lights? Show photographs from <http://www.spaceweather.com/aurora/gallery.html>. Read The Ballad of the Northern Lights by Robert Service (<http://www.geocities.com/Heartland/Bluffs/8336/robertservice/northernlights.html>). Polar lights are created when streams of electrons from outer space concentrate along the Earth's magnetic poles and excite gases in the atmosphere. At the North Pole, the lights are called aurora borealis, named after the Roman goddess of dawn, Aurora, and the Greek north wind, Boreas. At the South Pole they are called aurora australis (Latin for "of the South"). During National Stamp Collecting Month, the United States Postal Service is featuring the Polar Lights (show poster). In the next few days we're going on a polar expedition to learn more about the polar lights, lands, animals, and explorers.

### Mini-lesson

Identify the North and South Poles and circles of latitude on a globe. The amount of sunlight polar regions receive depends upon the time of the year and the path of Earth's rotation around the sun. Demonstrate the equinoxes and solstices by pretending a flashlight is the sun. Have a child rotate the earth around the sun. Polar springs and falls are two months long, summers last for three months, and the rest of the year is winter. During the summer and winter solstices, polar regions have 24 hours of sunlight or 24 hours of moonlight. Polar lights are especially bright during the long winter months. The North Pole is located in the Arctic Ocean, which is covered by a thin layer of year-round ice and bordered by Eurasia, North America, and Greenland. The Arctic Circle marks the southern boundary of the Arctic region. Arctic land masses are covered with tundra and glaciers. Although the environment is harsh, many people live in the Arctic region. The South Pole is located on the continent of Antarctica, surrounded by the Southern Ocean. The Antarctic Circle defines the northern boundary of the Antarctic region. Although there are some dry valleys and ice-free lakes in Antarctica, most of Antarctica is covered by a one-mile-thick layer of ice. When glaciers reach the ocean, they "calve off" huge icebergs. Antarctica also has some subglacial lakes and rivers and active volcanoes! Although there are no permanent residents, approximately 4,000 scientists from all over the world conduct research there.

### Fantastic Frigid Facts

What do students think they know about the polar regions from watching these movies: *Happy Feet*, *Ice Age*, and *March of the Penguins*? Students create large iceberg shapes. Color the top one-eighth white and the bottom seven-eighths blue (representing the icebergs' immersion in the ocean). Students write two polar facts in the white section. Volunteers share. Record responses in the "K" (what they think they know) column of a class-size KWHL chart. This information is just the tip of the iceberg;

Only about one-eighth of most icebergs appear above water – most of the iceberg is below the surface.

there is so much more to learn about the polar regions! Students write questions about what they would like to learn more about in the blue sections. Share. Record students' questions in the "W" (what students Want to learn) column. Brainstorm ways students can find answers to these questions in the "H" (How will they find information) column of the class KWHL chart. Post the chart in the room for reference.

Divide students into research teams. Students study reference materials, websites, and books to answer their "W" questions. As students discover answers, they create "snow blocks"—folded pieces of white construction paper with the research questions on the outside and answers on the inside. As students' knowledge grows throughout the mini-unit, build a "snow palace" out of the blocks of information. After they're finished, record their favorite frigid facts in the "L" (what students have Learned) column of the class KWHL chart.

Suggested children's books include: *Arctic Son* by Jean Craighead George; *Nessa's Fish* by Nancy Luenn; *Arctic Memories* by Normee Ekomoniak; *Benny's Flag* by Phyllis Krasilovsky; *Building an Igloo* by Ulli Steltzer; *Arctic Lights*, *Arctic Nights* by Debbie S. Miller; *Arctic Tundra* by Donald M. Silver and Patricia Wynne; *Arctic Alphabet: Exploring the North from A to Z* by Wayne Lynch; and *Antarctica: The Blue Continent* by David McGonigal and Lynn Woodworth. Informational websites include:

- <http://www.wordplay.com/tourism/icebergs/>; <http://coastalsafari.com/ICEBERGS.htm>
- <http://amrc.ssec.wisc.edu/iceberg.html>; <http://www.solcomhouse.com/iceberg.htm>
- [http://www.galenfrysinger.com/american\\_inuits.htm](http://www.galenfrysinger.com/american_inuits.htm); <http://www.mnh.si.edu/arctic/features/croads/eskimo.html>; <http://www.britannica.com/eb/article-9033011/Eskimo>
- <http://www.thewe.cc/veplanet/poles/antarctic/mastvolcano.html>
- [http://volcan.wr.usgs.gov/Volcanoes/Antarctic/description\\_antarctica\\_volcanoes.html](http://volcan.wr.usgs.gov/Volcanoes/Antarctic/description_antarctica_volcanoes.html)
- <http://www.vb-tech.co.za/Antarctic/>

### Extension Activities

- In *Benny's Flag*, a young boy designs the Alaskan state flag. The illustrator of *Nessa's Fish*, Neil Waldman, has created postage stamps for 13 countries. Students demonstrate what they have learned by designing either a flag or a stamp representing the Arctic or Antarctic regions.
- Create dioramas, or polar-scapes, of a polar setting. Use black construction paper and pastels to make polar light backdrops. Add animals after the lesson.
- Inuits are renowned for creating scrimshaw art. Students create scrimshaw art of polar images using white bars of soap and plastic knives. Highlight carved lines with ink or paint. Please be sure to talk about safety concerns and gain permission from the principal and parents before doing this project!

An Inuit man in Arctic Canada begins to build an igloo.



## SHIPS, SLEDS, 'N SNOWMOBILES

**MATERIALS:** computer with Internet access and Power Point program, reference materials

**OPENING:** What's the biggest trip you've ever taken? How did you plan for the trip? How did you get there? Did anything unexpected happen? One of the many things people need for a big trip is a good map. Piri Reis, a 16th-century Turkish naval admiral, used maps called portolans to create an amazing map that included a representation of the coastline of Antarctica 300 years before it was officially discovered! Many men and women, representing multiple countries, have explored the Arctic and Antarctica. Why do you think they wanted to venture to these cold regions? How do you think they traveled? Let's find out!

**LITERATURE CONNECTION:** Expeditions, or major trips, to the polar regions require careful planning to be sure everyone comes home safely. Read Winnie-the-Pooh's adventure in *An Expedition to the North Pole* by A. A. Milne. Because he is a bear of "very little brain", what are some misperceptions Pooh had about the region? Read a true story of Ernest H. Shackleton's dramatic expedition (<http://www.vb-tech.co.za/Antarctica/hist1.htm>).

### Educational Expeditions

- Each student researches one or more of these historic or modern explorers: Captain James Cook, Fabian Gottlieb von Bellingshausen, Edward Bransfield, Nathaniel Palmer, Mikhail Petrovich Lazarev, John Davis, James Clark Ross, Mercator Cooper, T.W. Edgeworth, David Roald Amundsen, Richard Evelyn Byrd, Rear Admiral George Dufek, Nobu Shirase, Adrien de Gerlache, Fridtjof Nansen, Robert F. Scott, Douglas Mawson, Apsley Cherry-Garrard, Louise A. Boyd, Ranulph Fiennes, John Franklin, Matthew A. Henson, Robert E. Peary, John Rae, Henry Hudson, Alexander Mackenzie, Vilhjalmur Stefansson, Edmund Hillary, Douglas Mawson, James Weddell, Alan Hubert, Dixie Dansercoer, Lonnie Dupre, Eric Larsen, Richard Weber, Mikhail Malakhov, David Hempleman-Adams, Rune Gjeldnes, Hyoichi Kohno, Nobu Natta, Akchan Miyagawa, Sir John and Lady Jane Franklin, Paul Landry, Paul Crowley, Naomi Uemura, Charles Calvert, Robert Swan, Will Steger, Helen Thayer, Marek Kaminski, Wojciech Koska, Marc Fafard, Yvan Desllets, or Gus McLeod.
- Gather information about each explorer's name, expedition date, home country, targeted destination, mode of transportation, and adventures. Suggested websites include: <http://www.atropolis.com/map6.htm>; <http://www.smithsonian.com/arctic.html>; <http://www.enchantedlearning.com/explorers/arctic.shtml>; <http://www.universetoday.com/2007/06/12/arctic-explorers-are-getting-some-help-from-above/>; <http://www.explorearctic.com/exp-modern.html>; and <http://www.arctic.org/explore.htm>
- Cooperatively create a chronological PowerPoint slideshow depicting the explorers and their accomplishments.

### Extension Activities

- Students pretend they are going on expeditions to a polar region. Write about their adventures as ballads, blogs, or simulated journal entries. Share their creative efforts (ballads may be sung).
- Generate lists of terms associated with polar expeditions. Students create word find puzzles or riddles to challenge their classmates.



This Inuit hunter travels by dogsled through the polar night in northwest Greenland.

On a modern mission to gather seismic data, an icebreaker crosses freezing Arctic waters.



## CIRCLES 'N STORIES

Celebrate the Arctic and Antarctic Circles with literature circles, a student-centered approach that builds a community of learners, emphasizes interaction and active student involvement, and ignites students' interest in reading more about the polar regions.

- Select quality children's literature representing a spectrum of reading abilities. You can use multiple copies of one title such as *Mr. Popper's Penguins* by Richard and Florence Atwater. Another option is creating text sets of multiple fiction/nonfiction titles: *Polar Legends Text Set: Ka-Ha-Si and the Loon* by Colihue; *The Polar Bear Son: An Inuit Tale* by Lydia Dabovich; *The Eye of the Needle* retold and illustrated by Teri Sloat; and *Aurora: A Tale of the Northern Lights* by Mindy Dwyer. *Iditarod Tales: Balto and the Great Race* by Elizabeth Cody Kimmel; *Akiak: A Tale from the Iditarod* by Robert J. Blake; *Dogteam* by Gary Paulsen; *Dogs of the Iditarod* by Jeff Schultz; and *Storm Run: The Story of the First Woman to Win the Iditarod Sled Dog Race* by Libby Riddles. Give 3-minute "informercials" promoting each book.
- After students have had a chance to browse the books, form literature circles, or reading groups. These can be student- or teacher-selected groups of similar or mixed reading abilities. Assist struggling readers through buddy reading, reading at home or with an aide, or listening to taped versions of the book.
- Assign student group roles. Discussion directors create questions and ensure equitable participation. Harmonizers encourage respectful interactions. Word wizards identify important vocabulary. Capable connectors make real-life connections to the story. Artful artists draw pictures of important story events. Investigators seek additional background information related to the text.
- Allot time for students to read and respond to the book, conduct group discussions, and create team presentations. Students respond to the readings through dialogue journals (conversation on paper with a circle buddy) or double-entry journals (two-column chart reflecting upon quotes/reactions, predictions/events, or cause/effect). They can also draw symbolic representations of the story's meaning (sketch-to-stretch). To focus on the author's craft, students can participate in "Save the Last Word." Write key phrases on one side of an index card and a personal reaction on the other side of the card. During group meetings, pass around the cards, reacting to the key phrase. The student who created the card shares his/her reactions as the "final word."
- After students have read and responded to the book, they are ready to hold student-led discussions about the text. Encourage them to begin by sharing their response activities. Some groups might like to work cooperatively to complete graphic organizers such as story webs, plot maps, character webs, graffiti boards, and Venn diagrams while they are talking.
- Student teams create mini-presentations to celebrate the literature through murals, story boxes, posters, board games, displays, story innovations, sequels, storytelling, or dramatizations.



Seated on her sled, this Alaskan Eskimo woman is ice fishing for pike.

A modern Antarctic researcher makes adjustments to sled-drawn radar equipment.



These two stamps feature the beauty of the polar lights in the Arctic and Antarctica. Designed by Phil Jordan and featuring photographs by Fred Hirschmann and Per-Andre Hoffmann, they will be issued by the U.S. Postal Service on October 1, 2007.



## FUR, FLIPPERS 'N FEATHERS

**MATERIALS:** construction paper, string, drawing supplies, reference materials, computer with Internet access, paper lunch bags, miscellaneous art supplies, books (see below)

**OPENING:** Some of these creatures live in the arctic year-round; others are seasonal visitors. Try to guess these polar animals. This animal, called nanook by the Inuit, is the largest land carnivore. Its 12-inch, five-toed paws act like snowshoes on land and like paddles while swimming. What furry friend is this? (polar bear) This marine mammal uses its whiskers to skim the ocean floor when searching for food. Its scientific family name, *odobenidae*, means "those who walk with their teeth." What flippered friend is this? (walrus) This bird turns white in the winter and has feathered feet. What feathered friend is it? (ptarmigan)

### Extension Activities

- Community Connection:** The worldwide scientific community has designated March 2007 through March 2009 as International Polar Year to draw attention to the climatic change in the polar regions that is endangering the animals' existence. Some believe this "global warming" is caused by people burning too many fossil fuels. Discuss ways students can help save the polar animals' habitat by reducing their families' and communities' consumption of fossil fuels. With permission from the principal and parents, students write and publish editorials and/or put up flyers reminding people to conserve fossil fuel usage.
- Snowflake Poems:** Brainstorm a list of polar opposites (e.g., penguin-leopard seal, Arctic-Antarctic, penguin-ptarmigan, north pole-south pole). Write seven-line, diamond-style poems on snowflakes. Suspend from ceiling.  
LINE A: one polar term  
LINE B: two adjectives describing Line A term  
LINE C: three -ing words (participles) describing Line A term  
LINE D: two nouns related to Line A and two nouns related to Line G  
LINE E: three -ing words describing Line G term  
LINE F: two adjectives describing Line G term  
LINE G: one polar "opposite" term

### FURRY, FLIPPERED AND FEATHERED FRIENDS

- Each student selects one polar creature from the table below. Conduct research about the animal using traditional reference materials, the Internet, and books such as *Wildlife of the Polar Regions* by G. Carleton Ray and M.G. McCormick-Ray, *Amazing Arctic Animals* by Jackie Glassman, and *March of the Penguins* by Luc Jacquet.
- Write fantastic facts about the animal (habitat, description, adaptations, life cycle, etc.) on little colored pieces of paper.
- Cover all surfaces of paper lunch bags to represent the polar animals. Put the facts inside the sacks. Students visit classmates' desks to read the facts and talk about the polar animals.

### AMAZING POLAR ANIMALS

#### FUR



ermine (short-tailed weasel), lemming, musk ox, polar bear, Arctic wolf, Arctic hare, Arctic ground squirrel, caribou, reindeer, wolverine, moose, mouse, Arctic fox (pictured above), Dall sheep, grizzly bear

#### FLIPPERS



hair seal, sea lion, fur seal, walrus, ringed seal, bearded seal, ribbon seal, hump seal, hooded seal, leopard seal, Weddell seal, Ross seal, killer whale, beluga whale, bowhead whale, bottlenose whale, narwhal, gray whale, finback whale, southern right whale (pictured above), humpback whale, blue whale, sei, minke whale, Greenland shark

#### FEATHERS



eider, auk, brant, Arctic loon, finch, snowy owl, osprey, ivory gull, rock ptarmigan, gyrfalcon, peregrine falcon, Ross's gull, albatross, Cape pigeon, parakeet auklet, tern, Wilson's storm-petrel, skua, sheathbill, Antarctic petrel, emperor penguin, Adelin penguin, chinstrap penguin, King penguin, kelp gull, blue-eyed shag, puffin, fulmar, snow goose



Walrus's ivory tusks can grow to be four feet long!



Because polar bears are insulated by two layers of fur, they experience almost no heat loss in the cold of the circumpolar north.



The south polar skua is the most southerly bird in the world.

## PENGUIN 'N POLAR POWER

**DIRECTIONS:** Who can capture the most area in the penguin rookery? Find a partner. You will need one die, two crayons, and one copy of the rookery (gameboard or graph paper). The highest roller goes first. Roll one die. Capture that number of spaces by writing an X in each box. Spaces must share an endpoint or a side. You can bend around corners. For example, if you roll a 4, you need to mark off 4 squares that touch one another. You must use all 4 squares or sit out that turn. Then it's the next person's turn. Because penguin families include a mother, father, and chick, if you roll a 3 you get a free turn! Whoever captures the most squares wins.

