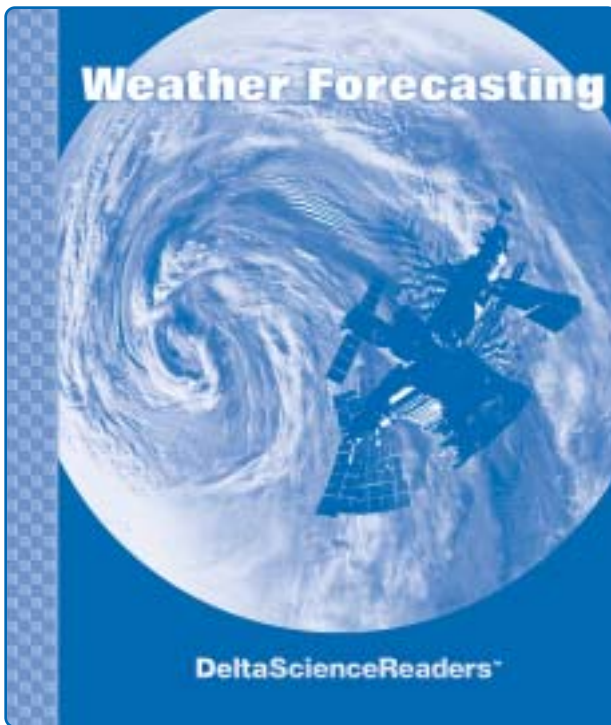


Weather Forecasting



Delta Science Readers are nonfiction student books that provide science background and support the experiences of hands-on activities. Every **Delta Science Reader** has three main sections: *Think About . . .*, *People in Science*, and *Did You Know?*

Be sure to preview the reader Overview Chart on page 4, the reader itself, and the teaching suggestions on the following pages. This information will help you determine how to plan your schedule for reader selections and activity sessions.

Reading for information is a key literacy skill. Use the following ideas as appropriate for your teaching style and the needs of your students. The *After Reading* section includes an assessment and writing links.

OVERVIEW

The Delta Science Reader *Weather Forecasting* introduces students to the world of weather forecasting and to the data, instruments, and science that make forecasting accurate. Students will explore the six main weather factors—temperature, air pressure, wind, humidity, precipitation, and cloudiness—as well as discover the difference between weather and climate. The book also contains a biographical sketch of tornado expert Tetsuya Theodore Fujita and information about two other kinds of weather scientists: climatologists and hurricane hunters. Students will find out how a weather satellite works and how different types of winds get their names.

Students will

- ▶ understand the main factors that cause weather and produce weather changes
- ▶ learn about the various instruments for measuring weather
- ▶ identify some of the elements of severe weather, and distinguish between weather and climate
- ▶ discuss the function of nonfiction text elements such as the table of contents, headings, tables, captions, and glossary
- ▶ interpret photographs and graphics—diagrams, illustrations, weather maps—to answer questions
- ▶ complete a KWL chart to track new knowledge

READING IN THE CONTENT AREA SKILLS

- Compare and contrast a variety of weather instruments
- Classify weather data
- Understand cause and effect relationships in weather conditions
- Think critically about why and how weather forecasting affects daily life
- Preview and predict what the text will be about
- Make predictions about outcomes
- Skim and scan text
- Set a purpose for reading
- Draw conclusions about how something will work based on prior knowledge
- Interpret graphic devices
- Summarize and restate information

NONFICTION TEXT ELEMENTS

Weather Forecasting contains a table of contents, headings, photographs, illustrations, diagrams, labels, captions, maps, map keys, tables, boldfaced terms, and a glossary.

CONTENT VOCABULARY

The following terms are introduced in context and defined in the glossary: *air mass, air pressure, anemometer, atmosphere, barometer, cirrus cloud, climate, cold front, convection, cumulus cloud, evaporate, forecast, front, global warming, humidity, hurricane, hygrometer, isobar, local winds, meteorologist, nimbus cloud, occluded front, precipitation, prevailing winds, rain gauge, relative humidity, stationary front, station model, stratus cloud, surface map, tornado, troposphere, warm front, water cycle, weather, weather balloon, weather map, weather station, wind vane.*

BEFORE READING

Build Background

Access students' prior knowledge of weather forecasting by displaying the book and inviting students to share what they know about the topic from their personal experiences and hands-on science explorations.

Most students have probably seen weather forecasters on television or heard weather reports on the radio. Discuss how they think weather forecasters gather the information they need to accurately predict the weather. Many students may suggest that weather reporters use computers to help them. Ask: *What types of information do the computers tell weather reporters?* (Students may mention wind speed and direction, temperature, precipitation, cloudiness, or humidity.) Let students know that all of these things—and more—are part of weather forecasting. Explain that they will be learning much more about the weather.

Begin a KWL chart by recording any facts or ideas that students have about weather forecasting in the K column. Ask students to maintain their own charts as they read.

K What I Know	W What I Want to Know	L What I Learned	+ What I Want to Explore Further

Preview the Book

Invite students to scan the pages of *Weather Forecasting*. Explain that scanning is a way of looking ahead at the important parts of a book before reading it. When they scan, they should check the table of contents and the headings, look briefly at the graphics, quickly read the captions, notice the boldfaced terms, and see what types of questions might be asked. Remind students that scanning is an important way to preview what they are going to read. It introduces them to the ideas they will be reading about.

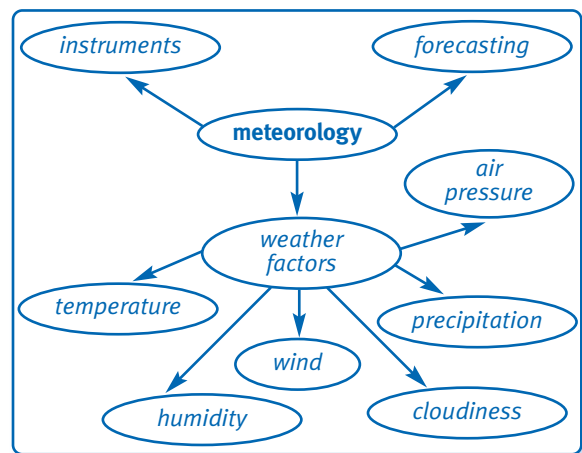
Call attention to the various nonfiction text elements and discuss how they can help students organize and understand what they read. For example, ask: *How do the headings in the table of contents help you know what you will learn about? What predictions can you make about what you are going to read based on the photographs and illustrations?* Explain that the words in boldface type are important words related to weather forecasting. Point out that these words are defined in the glossary. Choose one word and have students find its definition in the glossary.

After the preview, ask: *What questions do you have about weather forecasting that you hope this book will answer?* Have them write these questions in their KWL charts. They may also wish to include the headings that are in the form of questions. Remind them that they will be completing their charts after they finish their reading.

Preview the Vocabulary

You may wish to preview some of the vocabulary words before reading, rather than waiting to introduce them in the context of the book. Possibilities include a word wall, vocabulary cards, sentence strips, or a concept web.

For example, let students work in small groups to develop webs for weather forecasting terms, like the one shown here for **meteorology**.



▲ A concept web for **meteorology**.

Set a Purpose

Discuss with students what they might expect to find out when they read the book, based on their preview. Encourage them to use the questions on their KWL charts to set an overall purpose for reading.

GUIDE THE READING

Preview the book yourself to determine the amount of guidance you will need to give for each section. Depending on your schedule and the needs of your class, you may wish to consider the following options:

- **Whole Group Reading** Read the book aloud with a group or the whole class. Encourage students to ask questions and make comments. Pause as necessary to clarify and assess understanding.
- **Shared Reading** Have students form pairs or small groups and read the book together. Pause students after each text section to clarify as needed and to discuss any questions that arise or have been answered. New questions can be added to the KWL chart.
- **Independent Reading** Some students may be ready to read independently. Have them rejoin the class for discussion of the book. Check understanding by asking students to explain in their words what they read.

Tips for Reading

- If you spread the reading out over several days, begin each session by reviewing the previous day's reading and previewing what will be read in the upcoming session.
- Check and assess understanding after each section by having students paraphrase in their own words what they have read. Encourage students to take turns in this process.
- Begin each text section by reading or having a volunteer read aloud the heading. Discuss what students expect to learn, based on the heading. Have students examine any illustrations or graphics and read accompanying captions or labels.
- Help students locate context clues to the meanings of words in boldfaced type. Remind them that these words are defined in the glossary.
- As appropriate, model reading strategies students may find helpful for nonfiction: adjust reading rate, ask questions, paraphrase, reread, visualize.

Think About . . . (pages 2–9)

Page 2 *Why Do We Predict the Weather?*

- Before students read, ask them to brainstorm answers to the question: *Why do you care about what the weather will be tomorrow?* (Students may suggest that they care because they want to know what to wear the next day; they want to know if their sports will be in rain or shine; they want to know whether to leave windows open or shut in their rooms.)

Then have them look at the heading at the top of page 2. Ask them what reasons other people might have for predicting the weather. (Students may suggest to determine if people will

have to work inside or outside; to decide whether to wear a coat or not; to make travel plans; to predict whether there will be a drought; to prepare for a storm.)

- After reading page 2, be sure that students understand all of the science concepts. To assess comprehension, ask, *In what layer of the atmosphere does weather occur?* (troposphere) *What causes change in the weather?* (movement of air masses) *What is the study of weather called?* (meteorology)
- Have students make inferences based on their reading. Ask, *How would a scientist know if another planet, such as Venus, had weather?* (Scientists could find out whether the planet was surrounded by an atmosphere. A planet that has no atmosphere would have no weather.)
- As students look at the atmospheric labels in the illustration, ask, *What do each of the words have in common?* (The words all end in *-sphere*.) Ask if anyone knows what the word *sphere* means. (round) If necessary, explain that the atmosphere is like a multi-layered blanket of air *around* the earth.
- As students read the caption under the graphic, ask, *How do you think the layers of the atmosphere change as they get farther from the earth's surface?* (Accept reasonable ideas, and ask students to give their reasons for their suggestions. As needed, point out that generally the air gets thinner and colder the higher you go.) Some may suggest that the upper layers of the atmosphere are hotter because they are closer to the sun. Parts of the thermosphere, heated by ultraviolet rays and X-rays, can become very hot. In the lower atmosphere, however, the sun warms the earth, and the earth in turn warms the air around it. So in the troposphere, the farther from Earth, the colder the atmosphere.

- If necessary, provide help with the pronunciation of *precipitation* (pri-sip-uh-TAY-shuhn) and *meteorologist* (mee-tee-ur-OL-uh-jist). Reinforce the idea that the weather “reporters” on television and radio are often *meteorologists*—scientists who study the weather.
- Remind students to expand their word webs as they read each section.

Pages 3, 4, 5 *How Is Weather Data Gathered?*

- As students read page 3, be sure that they understand the science concepts. Ask, *How do meteorologists record air pressure?* (by using a barometer) *How can a barometer show if the weather will be rainy?* (Low air pressure is a sign of rain.) Point out that in low pressure air masses, air rises and cools, forming clouds and precipitation.
- Point out the boldfaced term **convection**. Help students locate context clues to the meaning of the word.
- Ask, *How are a wind vane and an anemometer different?* (One measures wind direction, and the other measures wind speed.)
- As students continue reading about collecting weather data, be sure that they understand the science concepts. Ask, *What is humidity?* (water vapor in the air) Remind students that water vapor is the gas form of water. Then ask, *How do clouds form?* (When warm air rises and cools in the upper atmosphere, water vapor condenses back into liquid water droplets.) *What does relative humidity measure?* (the amount of water vapor in the air compared with the greatest amount that could be in the air at that temperature and pressure)
- Have students look at the diagram on page 4. Ask, *What part does the sun play in the water cycle?* (The sun heats the water on Earth, causing it to evaporate, or change from liquid to gas in the air.)
- Continue tracing the water cycle with the diagram as a guide. Ask, *What is condensation?* (water vapor changing back to small droplets of water) Have students think of an example of condensation. (dew on the grass in the mornings; drops of water on the window after a pot of water has been boiling; water on the walls of the bathroom after a shower; cloud formation)
- Look again at the heading on page 3. Can students answer the question? Have them try to summarize the different ways to collect weather data described on pages 3 and 4. Ask volunteers to restate the main ideas from these two pages. (Weather data collecting involves recording wind speed, air pressure, temperature, humidity, precipitation, and cloudiness.)
- Before students begin to read page 5, have them look first at the photograph and read the caption. Discuss the purpose of the structure pictured. Then read the first paragraph. Ask, *What is a Cotton Region Shelter?* (It is a box located at weather stations that contains weather instruments. The instruments can be “outside” but not harmed by the weather. It is also called a Stevenson screen.)
- Ask, *Why do you think there are so many weather stations across the United States?* (The more stations there are, the more data can be collected and the more accurate weather information will be.)
- Students may be fascinated by the idea of weather balloons. Explain further that weather balloons are launched from almost 1,000 sites all over the world twice a day. Ask, *What do the instruments on weather balloons measure?* (temperature, humidity, air pressure, and wind speed) Then ask students to think critically: *Why do you think a balloon is an effective way to measure these weather data?* (It can send signals back from a variety of altitudes. It can get higher than a tower or weather station.)
- Point out that the word *radar* is an acronym for *radio detecting and ranging*.

Ask, *What can radar locate?* (precipitation)

- Students have learned about several instruments that measure or collect weather data, such as the barometer, the anemometer, the thermometer, and the hygrometer. Ask them what all these words have in common. (the root word *meter*) Ask, *What do you think meter means?* (to measure)

Page 6 *What Do Weather Maps Show?*

- If possible, make available some newspaper weather maps of your local area. Let students try to identify symbols on the local map and interpret their meanings based on the body text and the map and key.
- Ask students as they read: *What is a station model?* (a cluster of numbers and symbols that explain weather data from weather stations) *What are isobars?* (lines on the maps connecting stations with similar air pressure) *What is a weather front?* (a boundary between two unlike air masses, such as a cold air mass and a warm air mass) *Why does weather from a warm air mass last longer than weather from a cold air mass?* (because warm air masses travel slower than cold air masses)
- Draw students' attention to the boldfaced word **isobars**. Let them know that the prefix *iso-* comes from the Greek word that means "same." Then point out that the root word *bar* in *isobar* (and *barometer*) means "heavy" or "weight." *What do you think isobar means?* ("same weight"; isobars connect stations with the same weight of air, or air pressure)
- Give students time to examine the weather map and the key of weather symbols. Go over the symbols to be sure students understand how they represent different weather conditions. Invite students to choose a city on the

map and interpret the weather data for that location. Ask a volunteer to point out high- and low-pressure areas and warm and cold fronts. *Where is there a high-pressure area?* (far north of Minneapolis, at the top of the map) *Who can remember what the weather is like in high-pressure areas?* (fair) *Where is there a low-pressure area?* (just north of Detroit, over the Great Lakes) *What does the low pressure tell you about what the weather is likely to be?* (probably rainy or stormy.)

- Ask students to draw conclusions about their reading by asking, *Why do you think meteorologists use a map instead of a chart or list to view weather data?* (Students may suggest that a map helps them to see weather patterns. A map will help them see what has been happening in areas around their location and help them predict what might happen where they are. A map can use symbols to give a lot of information.)

Page 7 *How Are Weather Forecasts Made?*

- As students read page 7, be sure that they can recall and comprehend what they read. Ask, *What causes weather systems to move?* (prevailing winds) Then ask, *What is the usual pattern of prevailing winds in the United States?* (The winds move from west to east.) Help students apply knowledge by asking where the weather in your local area usually comes from. (Answers will vary depending on location.)
- Help students draw conclusions by asking, *How do clouds help meteorologists make weather forecasts?* (Different kinds of clouds bring different kinds of weather. By observing the clouds in the sky, you can tell something about what the weather will be.) Review the four different kinds of clouds with students, and have them add the cloud names to their webs.

- Ask, *Why do you think weather forecasting is more accurate today than it was twenty years ago?* (Students may respond that today the instruments are more sophisticated and accurate. Today we have computers to help forecast and interpret the data.) Point out that weather forecasts can be wrong. Invite students to share their experiences with making plans based on a weather forecast that turned out to be wrong. Speculate about why weather forecasts may not be correct all the time.
- Ask students to look at the photograph on page 7 and to think about what information is being shown here. Ask, *Based on what you can see in this picture, what types of information do you think the meteorologist is giving in this report?* (Have students support their answers with evidence from the graphic.)
- Ask students to think about the job of a meteorologist. *What types of background, education, and training do you think a person would need to become a meteorologist?* (Students may suggest college education, science education, some math ability, the ability to analyze data and draw conclusions about what they see. Television meteorologists would also have to learn how to communicate well in front of the camera or an audience.)

Page 8 How Is Severe Weather Predicted?

- Before they read page 8, have students brainstorm a list of severe weather types. They may come up with a list including tornadoes, hurricanes, thunderstorms, blizzards, typhoons, and windstorms.
- To check comprehension, ask, *What causes a thunderstorm?* (warm, moist air rising quickly along a cold front) *What type of air pressure do you find in a tornado?* (very low) *How fast can a tornado move?* (70 mph) *How can you tell if a thunderstorm may be approaching?* (If you can see an anvil-shaped cloud with a dark bottom, it can signal a storm.)

- Ask students to make inferences about what they read. For example, ask: *Why do you think it is harder to predict a thunderstorm that forms within an air mass? Why do most thunderstorms occur during the summer?*
- Ask students what they know about tornadoes. Perhaps they live or have lived in an area where tornadoes occur. Explain that there is a “tornado season,” a time of year when they are more likely to occur. This season usually lasts from March through July.
- Ask students to compare and contrast tornadoes and thunderstorms. Invite them to create a chart that outlines the similarities and differences. Under similarities students might note high winds, severe weather, detected by radar. Under differences they might list that tornadoes have a funnel-shaped cloud, spinning winds, higher winds, and extremely low pressure. A thunderstorm has an anvil-shaped cloud, thunder and lightning, heavy rain, and it can form within an air mass, not just along a front.

Page 9 How Do Weather and Climate Differ?

- Have students look at the heading on page 9. Ask them to think about the question.
- After they read page 9, ask, *What is the main difference between climate and weather?* (Weather changes from day to day and place to place, but climate is the average weather conditions over a large region for a long period of time.) *What are Earth’s six types of climate?* (tropical, dry, temperate, cold, polar, and highland) *What did you learn about Earth’s climate?*
- Students may have heard of global warming. Ask them to speculate about what might happen to the earth if the planet’s overall climate were to get very much warmer. Encourage interested students to research global warming on

the Internet and share their findings with the class.

- Give students time to examine the map. Discuss what it shows about Earth's climates. Ask students to think about what life might be like for someone who lives in another climate. Have them brainstorm ways everyday life would be different. (Accept all reasonable answers and ideas.)

People in Science (pages 10–13)

Page 10 *Tetsuya Theodore Fujita*

- Students will be reading about a scientist who studied tornadoes and thunderstorms. After they read the biographical sketch, check comprehension with questions such as: *Where does a tornado come from?* (It is a violent spinning of air that hits the earth from the bottom of a thunderstorm cloud.) *On what did Fujita base his system of classifying tornadoes?* (on the amount of damage they could produce) *What new discoveries did Fujita make?* (He discovered that one thunderstorm could produce more than one tornado and that some tornadoes have more than one vortex, or funnel.)
- Ask students what they think about Fujita's work. *Why do you think it is important to classify tornadoes according to type of damage?* (Accept all reasonable answers. Students may suggest that it is important to classify them so that people will know what to expect when the tornado comes; scientists need to keep track of how many tornadoes of what force are occurring in a certain area so they can track the climate and forecast future storms.)
- Ask students to look at the Fujita scale chart. Ask them to imagine that they are listening to a news report of a tornado. Here's what they hear: *Last night several homes in the Shady Lanes Mobile*

Home park were turned over and many shingles were torn off roofs when a tornado hit Alantown. Ask, Based on the Fujita scale, what type of tornado swept through Alantown? (F1) Several families were left homeless and carless after a tornado swept through Jake's Landing. Ask, What type of tornado twisted through Jake's Landing? (F4)

Further Facts

Tetsuya Theodore Fujita

- Began his study of meteorology when he heard thunder approaching in his hometown in Japan and measured the distance between the lightning and the thunder.
- Discovered a book in the trash by American meteorologist Horace Byers and began corresponding with him.
- In 1956 became research professor and senior meteorologist at the University of Chicago alongside Horace Byers.
- Established Severe Local Storms Project (SLSP).
- Created the Fujita scale in 1971.
- Began his study of downbursts and microbursts following a plane crash in 1975.
- In later life studied typhoons and the El Niño phenomenon.

Page 11 *Climatologists*

- Look at the heading on page 11. If necessary, provide help with the pronunciation of *climatologists* (klye-muh-TOL-uh-jists). Ask students to predict what they think a climatologist might do. (They study Earth's climate to find out how it is changing.) After reading, ask students how a climatologist is like an historian. (They both study pieces of the past to get a sense of what

happened. This helps them to analyze what is happening today and to predict what might happen in the future.)

- Ask, *Why do climatologists go to glaciers to find out about Earth's past?* (The thick ice in glaciers preserves trapped gas bubbles and materials that tell the story of the earth's past climate.)
- Ask students to think about a climatologist's career. Ask, *What do you think might be the most exciting part of being a climatologist?* (Students can speculate that it might be very exciting to find a new clue to the history of climate or make a discovery that would help protect Earth's climate from changing.) *Why do you think it is important to learn about climate of the past?* (to be able to detect patterns; to predict how human activity affects climate and what might happen to Earth's climate years from now; to help people make decisions about use of energy resources)

Pages 12, 13 *Hurricane Hunters*

- Tell students that now they will read about a career choice they may never have considered before: hurricane hunting. Before they read, ask students what they think a hurricane hunter might do and why. (Students may speculate that hurricane hunters follow hurricanes with instruments to see when and where they might hit land.)
- Be sure students understand what makes a storm a hurricane. Ask, *At what wind speed does a storm become a hurricane?* (119 kph, or 74 mph) *What kind of damage can a hurricane do?* (It can wreck buildings and flood streets.) *How do hurricane hunters track hurricanes?* (by flying an airplane directly through the eye of the hurricane and taking instrument readings)
- Ask students to look at the picture of the hurricane hunter airplane on page 13. Ask, *What type of personality do you think you would have to have to be a hurricane hunter?* (You would have to be

able to think and react quickly; you would have to be committed to discovering more about hurricanes.)

- Ask, *In what ways do hurricane hunters save lives?* (They save lives by recording the information about wind speed and path of the hurricane so that residents in its path can be warned and evacuated.) Ask students to imagine that a hurricane warning has been posted for your city or town. They will not have to be evacuated, but they will have to prepare quickly for the storm. *What are some things you might do to prepare?* (Take in any furniture or bicycles or plants that are not tied down around their home; fill up empty bottles with water; go to the store and get batteries and candles and extra water; be sure there is canned food available in case power for cooking goes out; tape up their windows so that the wind won't break them; power up cell phones; locate flashlights and battery-operated radios; unplug all electrical appliances.) Encourage students to make a list of all the things they might do to prepare for a hurricane.
- Ask students, *Which career would you prefer, being a climatologist or a hurricane hunter? Why?* Encourage students to give detailed answers about their choices.
- Have students look at the hurricane chart on page 13. Ask them to explain the chart and any conclusions they can make based on it.
- Ask students to apply what they know about weather to answer this question: *What do you think happens to the barometer just before a hurricane hits?* (It shows the air pressure falling rapidly and steadily.)
- Hurricane hunter aircraft are equipped with special tools and carry them into weather systems. Can students recall another weather instrument that performs a similar function? (a weather balloon)

Hurricane Hunters

- The idea for hurricane hunting came in 1969, after the devastation of hurricane Camille.
- Since 1978 names for hurricanes have alternated yearly between male and female names. Two alphabetical lists of names are repeated every six years. Names of especially destructive hurricanes are retired and not used again.
- Hurricane hunters gather tropical storm data from June through November and winter storm and blizzard data from November through April.
- Missions usually last around 11 hours and cover thousands of miles.
- The airplanes fly at around 300 mph and data are collected every 30 seconds.
- Key instrument is the dropsonde, which is dropped from the plane every 400 miles and when in the eye. It takes readings as it falls through the storm.
- Weather data collected from hurricane hunters have improved forecasting data by 25 percent.

Did You Know? (pages 14–15)

Page 14 *How Weather Satellites Work*

- Before they read the text, ask students to read the title. If necessary, provide help with the pronunciation of *satellite* (SAT-uh-lite). Ask, *What is a satellite?* (Accept reasonable responses; a satellite is a vehicle made to orbit Earth and take pictures of Earth's surface.)
- Check students' understanding of the concepts on page 14. Ask, *How does a satellite take pictures of the same spots on Earth day after day?* (It either

stays over one location by moving at the same speed Earth rotates, or it passes over the same locations at the same times each day.) *How is a satellite powered?* (It uses energy from the sun.) *How are satellite pictures sent back to Earth?* (via radio waves)

- If possible, direct students to two websites that show more about GOES weather satellites and their output: the National Oceanic and Atmospheric Administration (NOAA) site at www.noaa.gov/satellites.html and the National Aeronautics and Space Administration (NASA) site at <http://rsd.gsfc.nasa.gov/goes>.

Further Facts

GOES Weather Satellites

The first artificial satellite was launched by the Soviet Union in October 1957. It was called *Sputnik 1*. Now more than 3,500 satellites orbit the earth. Two are weather satellites called Geostationary Operational Environmental Satellites, or GOES, which together monitor two-thirds of the earth's surface. The first GOES mission was in 1975; the most recent GOES was launched in 1997. The GOES weather satellites are about 2 m (6–7 ft.) long and weigh 4,640 pounds. Images from GOES show

- day and night cloud cover and height
- land surface temperatures
- sea surface temperatures
- winds calculated by cloud motion
- locations of forest fires
- water vapor at various altitudes
- heat or energy leaving the earth
- estimates of precipitation amounts

GOES satellites are also sometimes used to locate survivors of airplane crashes or shipwrecks, or hikers lost on

a mountain. NASA launches and maintains the GOES satellites, and NOAA oversees their day-to-day operations.

Page 15 *Winds Have Names*

- Read together the heading on page 15 and make a class list of names of winds that students already know. After they have read page 15, compare the list with the names they discover in their reading.
- Draw students' attention to the wind type called the doldrums. Ask if anyone has ever heard this word before. Tell them about the expression "down in the doldrums." Explain that this expression means feeling depressed or sad. Make the connection to the wind name by explaining that the expression originated when sailors who were sailing in the area of the doldrums would get discouraged because their ships would not make very much headway sailing in the light winds. Sometimes they would be stalled or stuck in the same place for weeks.
- Remind students to list the types of winds on their KWL charts.
- Ask students which winds are most likely to affect them. (Answers will vary depending on location.)
- Have students look at the map of the global wind patterns and read the caption and labels. *Which winds are blowing closest to the equator? (trade winds) Speculate about where these winds got their name. Which winds are blowing in the Arctic and Antarctic area? (polar winds)*
- If necessary, provide help with the pronunciation of *chinook* (shih-NOOK) and *sirocco* (suh-ROK-oh). Ask: *What is the difference between these two types of wind?* (A chinook blows from the west down the Rocky Mountains. A sirocco blows from the south out of the Sahara Desert.)

Further Facts

Winds

Hundreds of winds have been named. Wind names sometimes come from ancient legends and sometimes reflect local culture. For example,

- *Barber*: a damp, icy, downhill wind in Canada and the northern U.S. that freezes on contact with hair and beards.
- *Kona*: a Hawaiian wind that blows from the southwest bringing heavy rains.
- *Sonora*: a warm wind that blows from Mexico into the southwestern U.S.
- *Williwaw*: a frigid, strong wind in Alaska.
- *Santa Ana winds*: very warm, dry, gusty winds in southern California, often responsible for the spread of forest fires.
- *Cat's Paw*: a breeze that is only strong enough to cause a ripple in water.
- *Diablo*: northern California version of the Santa Ana winds.
- *Jet stream*: high-altitude bands of air that travel up to 300 kph (190 mph).
- *Kohilo*: a gentle breeze in Hawaii.
- *Knik wind*: a strong southeast wind in the vicinity of Palmer, Alaska.
- *Nor'easter*: a strong wind that blows across New England from the northeast, usually bringing stormy weather.
- *Shawondasee*: means "lazy wind," from Algonquin language; a late summer wind from the south.

AFTER READING

Summarize

Complete the KWL chart you began with students before reading by asking them to share the answers to their questions in the W category. Call on volunteers to retell each of the sections in the text. Then have students use the information in the chart to write brief summary statements.

Discuss with students how using the KWL strategy helped them understand and appreciate the book. Encourage them to share any other reading strategies that helped them with their reading, such as making inferences, drawing conclusions, making generalizations, comparing and contrasting, predicting, and classifying.

Direct students' attention to the fourth column in the chart and ask, *What questions do you still have about forecasting weather? What would you like to explore further?* Record students' responses. Then ask, *Where might you be able to get this information?* (Students might mention an encyclopedia, science books, and the Internet.)

You may want to obtain a copy of *Watching Weather* (Accidental Scientist series, Owl Publishing). This book explains simple ways to forecast the weather using information gathered through everyday observation.

Review/Assess

Use the questions that follow as the basis for a discussion of the book or for a written or an oral assessment.

1. What are the weather factors and what do they tell about the weather? (The six factors are: temperature [tells how warm or cold it is], air pressure [helps predict changes in the weather], humidity [whether the weather will be wet or dry], wind [tells what direction the weather is moving; helps tell how fast the weather is moving], precipitation [tells what type of water will be falling from the clouds], and cloudiness [tells whether skies will be clear, rainy, or stormy].)
2. What are some of the instruments used to collect weather data? (The barometer measures air pressure; the anemometer measures wind speed; the hygrometer measures humidity; radar tracks precipitation; satellites take pictures of storms, cloud cover, and wind patterns from high above Earth; and computers track all of the information and help put it together in moving pictures for analysis.)

Writing Links/Critical Thinking

Present the following as writing assignments.

1. How do you think your life might be different if there were no meteorologists to forecast the weather? (Students may suggest that they wouldn't be able to plan their days as well; they wouldn't be able to plan for snow days or sports activities; they might not be able to work or plan their income if they work outdoors.)
2. Which of the instruments for measuring or forecasting weather do you think is the most important? Why? (Students can choose one of the instruments they read about and express their reasons for believing it is most important.)

Science Journals: You may wish to have students keep the writing activities related to the reader in their science journals.

References and Resources

For trade book suggestions and Internet sites, see the References and Resources section of this teacher's guide.