
Rain or
Shine?
Harcourt

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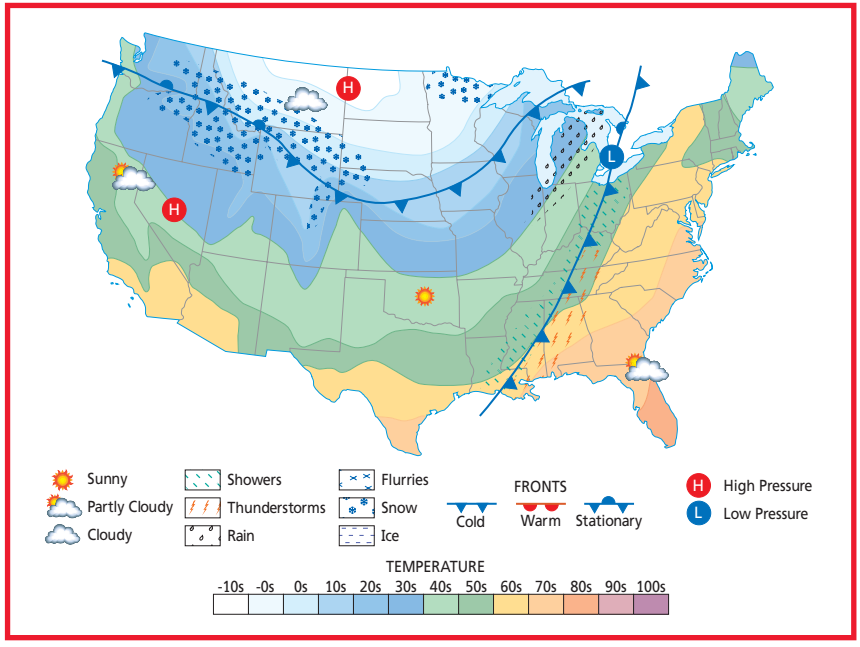
Introduction

Weather can change from minute to minute, hour to hour, day to day, or season to season.

Meteorologists are scientists who study Earth's atmosphere in order to predict these changes. Meteorologists use many kinds of instruments to gather data. Some of these instruments are on land. Others are at sea. Still others are high above Earth. The data gathered with these tools is often used to make weather maps, like the one shown here.



Thermometers

A thermometer is a tool that measures air temperature. Most thermometers are glass tubes that are about half full of liquid. The liquid in the tube rises when air warms. The liquid falls when air cools. A thermometer measures temperature in degrees.

Rain Gauges

A rain gauge is a container that measures the amount of rain that falls within a given time. A scale on the container shows the amount of rain in inches.

Barometers

A barometer measures air pressure in inches of mercury or millibars. Changes in air pressure are clues to future weather conditions. A drop in air pressure can mean bad weather. A rise in pressure can mean that good weather lies ahead.

Anemometers and Wind Vanes

An anemometer uses spinning cups to measure wind speed in miles per hour.

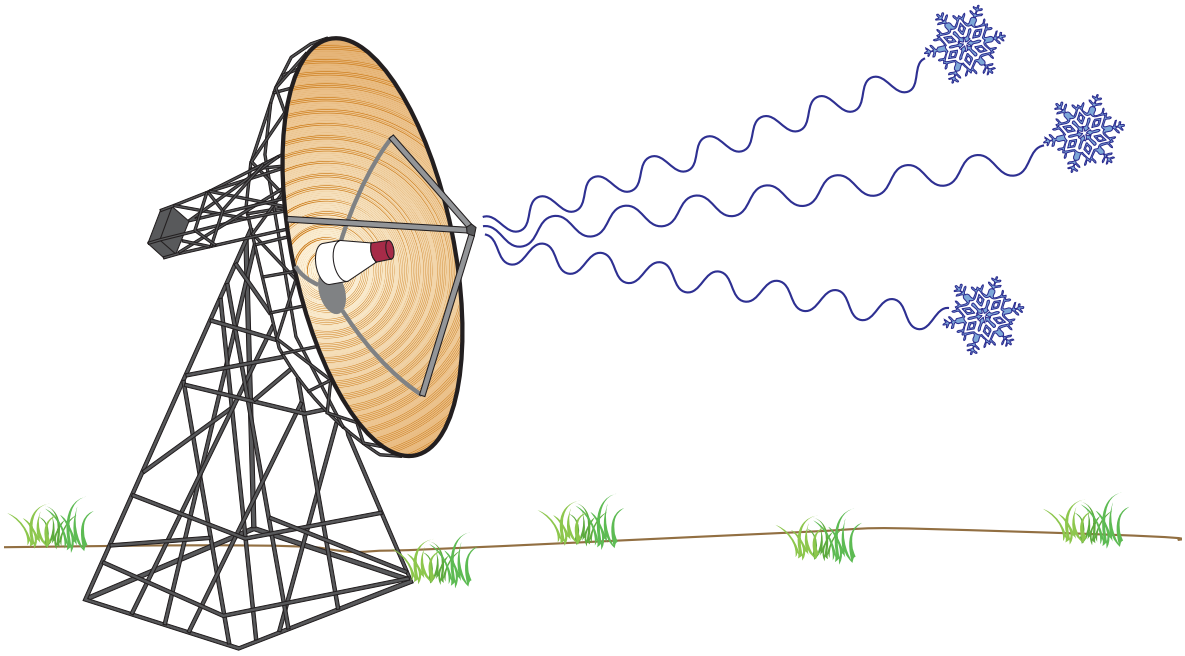
A wind vane shows wind direction. If a wind vane points north, the wind is moving from the north to the south.

Measuring Humidity

Humidity is the amount of water vapor in the air. Water vapor is the gaseous form of water. The amount of this invisible gas in the air can vary. Dry air, for example, has little water vapor in it. Very humid air can hold up to about 4 percent water vapor.

- A hygrometer measures humidity. Some hygrometers use either mirrors or a piece of hair to measure humidity. A psychrometer is a hygrometer that uses two thermometers to measure water vapor.

- One thermometer is dry. The other is wet. The two temperatures are compared to find humidity.



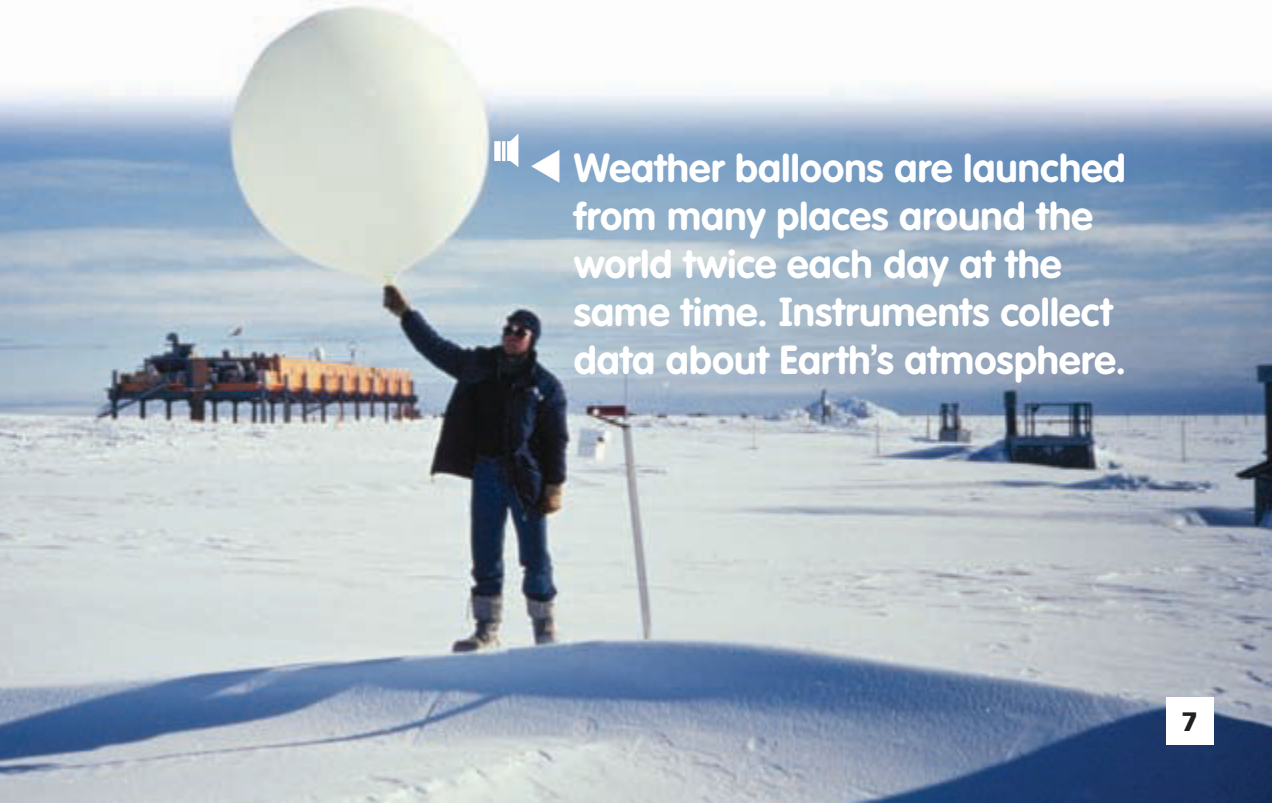
Radar

Meteorologists use radar to find and measure precipitation. A radar dish sends out energy as waves. When the waves hit an object such as a raindrop or a snowflake, they scatter. Some of the energy bounces back to the radar dish. Then computers analyze the strength of the energy and the time it took it to return. These data help meteorologists locate storms and tell how quickly they are moving. Then meteorologists can warn people to prepare for the storms.

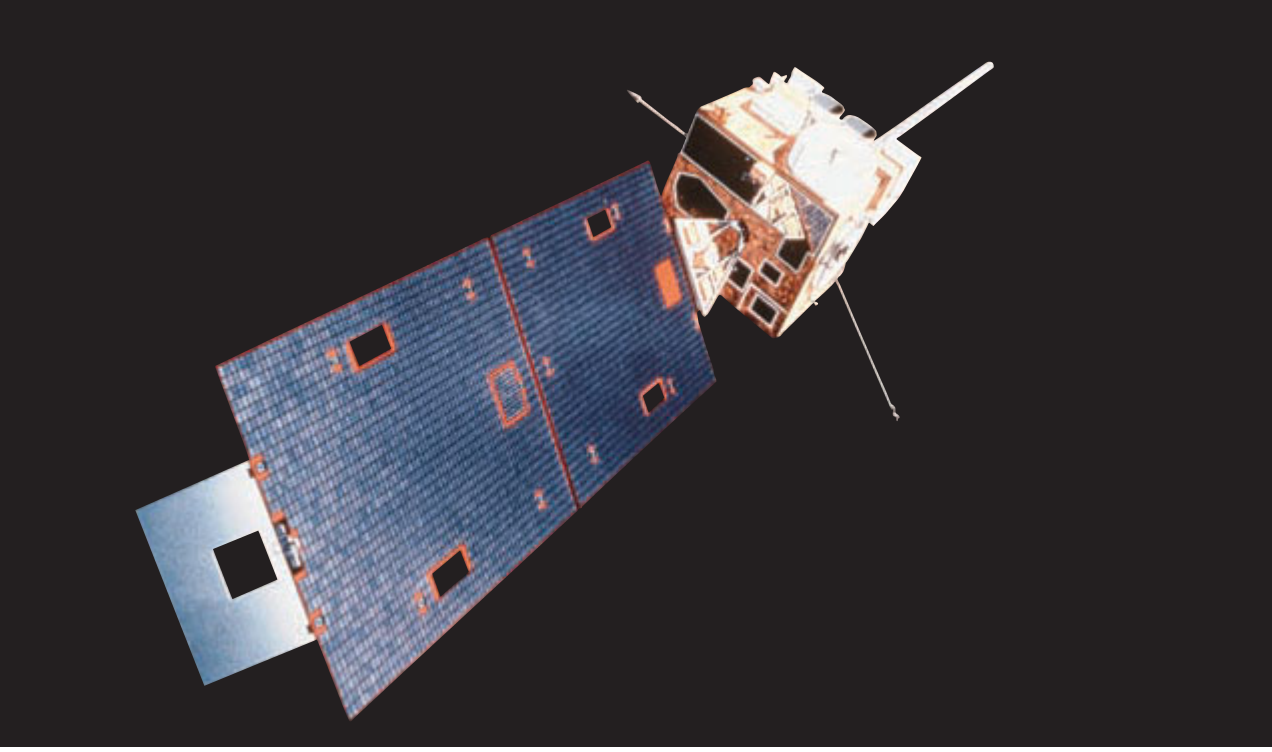
Weather Balloons

Weather balloons were first used in France in 1892. These balloons are still important tools that gather data in order to predict the weather. Weather balloons float high into the atmosphere. Some rise to heights of more than 20 miles above Earth!

Some weather balloons stay in one place as instruments on board gather data. Other balloons drift through the air to collect information. When a weather balloon bursts, a small parachute carries the balloon's instruments safely back to Earth.



Weather balloons are launched from many places around the world twice each day at the same time. Instruments collect data about Earth's atmosphere.



Other Important Tools

A satellite is an object that orbits Earth. Weather satellites gather data on clouds, wind, sunshine, and precipitation. The newest satellites gather more information and gather data much more quickly than older satellites.

Computers are important tools for studying and forecasting weather. They quickly gather and process data. Meteorologists from all across the world use computers to share weather data.

Think and Respond

1. What does a meteorologist do?
2. What is a barometer? What does it measure?
3. How is radar used to predict the weather?
4. **Expository** Write a paragraph telling how weather balloons and weather satellites are the same or different.

Hands-On Activity

Weather Changes Make a chart to record weather data for your city or town for one week. Tell how the weather changed.

School-Home Connection

Catch the Wind With a family member, use books or the Internet to find out how to make a simple anemometer. Use your instrument on a windy day to see how fast the wind is blowing.

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