CHAPTER 35

# Antarctica: Researching Global Warming at the Coldest Place on Earth

## 35.1 Introduction

Antarctica is the coldest continent on Earth. The average temperature at the South Pole is −74°F. At this temperature, spilled coffee can turn to ice before it hits the ground. No one lives on this cold continent. Each summer, though, Antarctica warms up a bit. During these few warmer months, researchers from around the world travel to Antarctica to work.

Researchers come to Antarctica to study many things. One of the most important, however, is **global warming**. This is a slow increase in the temperature of Earth's surface. **Climate** records for the past 25 years show a worldwide surface temperature rise of about 0.4°F. However, this warming is not uniform. Some places are warmer. Some are cooler.

Many scientists believe that this warming relates to a process called the **greenhouse effect**. This occurs when gases in the **atmosphere** prevent heat from Earth's surface from escaping into space. The trapped heat, the scientists believe, makes the Earth warmer. Studies of ice bubbles trapped in polar ice show that amounts of **greenhouse gases** in the atmosphere are increasing. Still, not all scientists think this increase explains Earth's warming. In fact, some aren't sure whether Earth is warming at all.

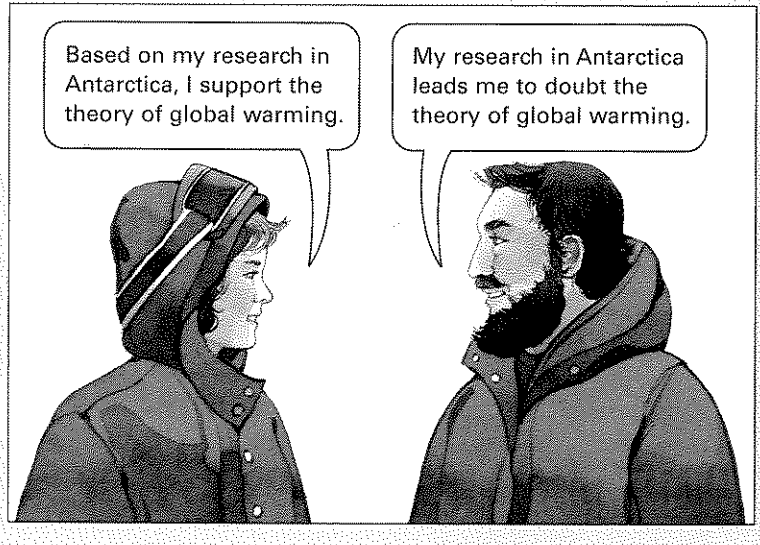
In this chapter, you will look at ideas about global warming and how it may be affecting Antarctica. You will also look at possible effects of global warming on the rest of the world.

### Essential Question

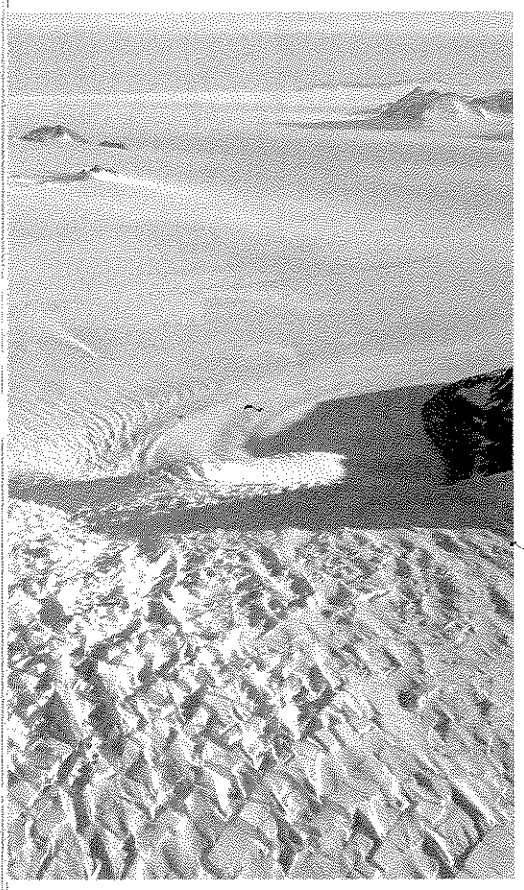
**How might global warming affect the environment in the world's coldest places?**

These two researchers are debating the theory of global warming. One believes that her research in Antarctica supports the theory. The other has doubts based on his research. Think about this debate as you try to answer the Essential Question.

### Graphic Organizer




◀ Conducting research in Antarctica during the short summer season



**A Polar Desert**
People think that an ice-capped land must get a lot of rainfall. But Antarctica is a desert. It gets less than three inches of precipitation per year. This polar desert has fewer plants and animals than most desert biomes because it is so cold as well as dry.

## 35.2 The Geographic Setting

The South Pole is the southernmost point on Earth. Antarctica surrounds this point. This icy continent is larger than Australia or Europe. Almost all of its land is buried under **glaciers**. A majority of Earth's fresh water is frozen here as ice.

**The Coldest Place on Earth** Antarctica can be unimaginably cold. On July 21, 1983, instruments in Antarctica registered a temperature of −128°F. This temperature is the coldest ever recorded on Earth.

Why does Antarctica get so cold? It is the most distant continent from the equator. As a result, it receives less sunshine than other parts of the world. On some winter days, the sun never rises above the horizon. The small amount of **solar energy** that Antarctica does receive is mostly reflected by ice back into space.

Antarctica is also the driest continent. It receives less than two inches of **precipitation** per year. Few living things can survive in such a cold, dry **biome**, or large **ecosystem**. Only two flowering plants grow here. But a variety of animals thrive in the surrounding waters. They include seals, whales, penguins, and many other kinds of birds.

Glaciers cover about 98 percent of Antarctica. Much of this ice is well over a mile thick. Moving flows of ice called **ice streams** slide across the surface of this **ice cap**. These streams carry ice from the center of the continent to the sea. Upon reaching the coast, an ice stream flows outward into the ocean. There it forms an **ice shelf**, or floating sheet of ice, that remains attached to the continent. The Ross Ice Shelf, the largest of these ice shelves, is about the size of France. In some places, it is up to 3,000 feet thick.

**A Continent Reserved for International Research** In 1978, a pregnant woman boarded a plane in Argentina and flew to a research station in Antarctica. While there, she gave birth to a baby boy. He was the first human to be born on the continent. Yet he could not be a citizen of Antarctica. That's because Antarctica has no country or government.

In the past, seven countries claimed parts of Antarctica. In 1959, those countries joined with others to sign the Antarctic Treaty. As part of this treaty, the seven countries agreed to set aside their claims. The treaty stated that Antarctica should be reserved for peaceful activities such as scientific investigation.

More than 4,000 people travel to Antarctica every year to take part in scientific studies. Scientists find Antarctica a good place to do research for many reasons. One reason is that it is the least populated continent on Earth. This helps researchers see how Earth has changed over time without the influence of human activity.

Also, Antarctica's glaciers serve as records of climate change. Researchers drill deep into the thick ice and pull up samples called *ice cores*. They study the cores to learn what the climate was like as far back as 420,000 years ago. Researchers use this information to help understand the warming and cooling of Earth over time.

## ▶ Geoterms

**biome** a very large ecosystem such as a desert, forest, wetland, or grassland. Each biome is home to its own community of plants and animals.

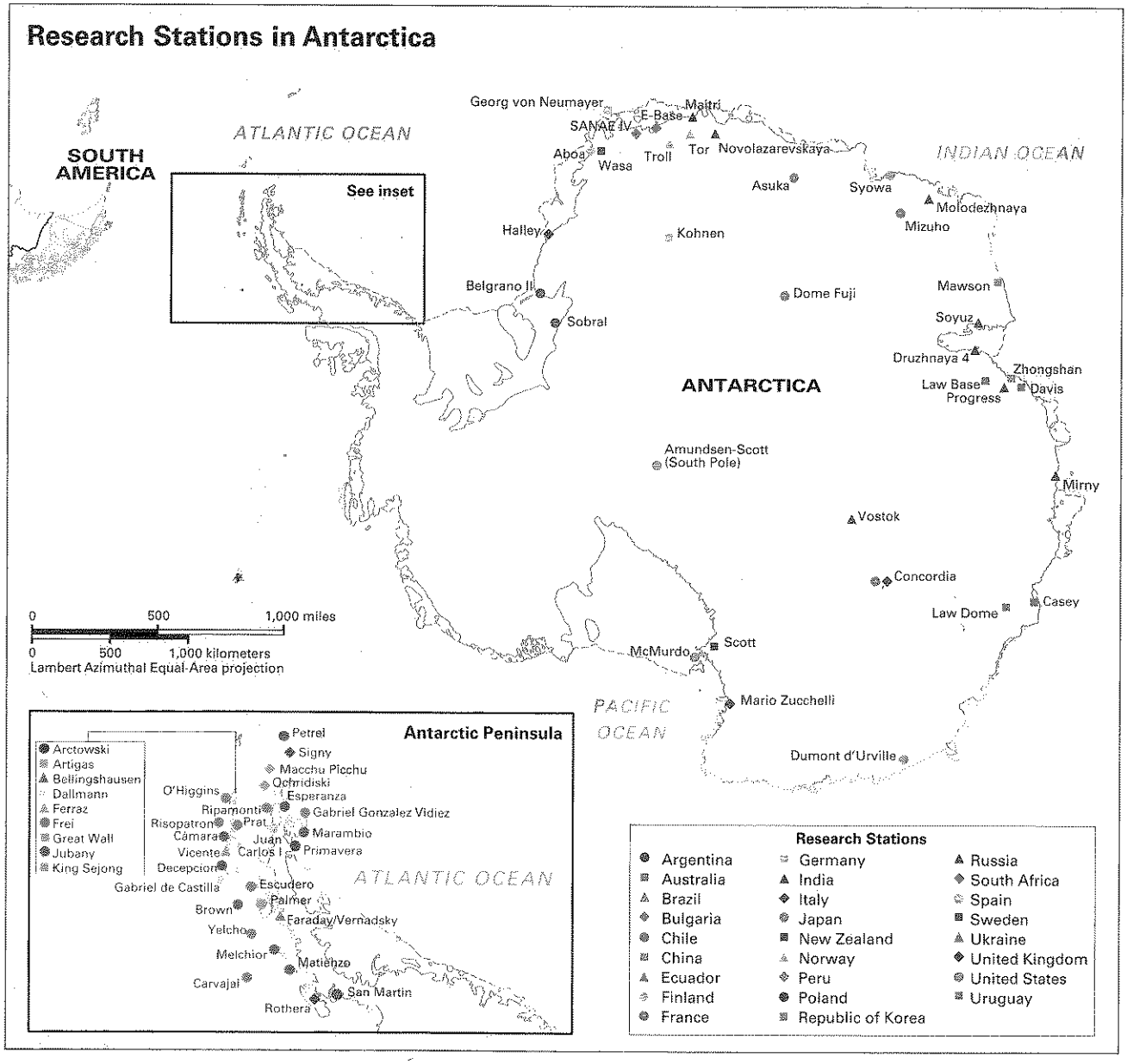
**global warming** the gradual increase in the temperature of Earth's surface over time. This warming may be the result of natural causes. It may also be caused by human activity.

**greenhouse effect** the process by which gases in the atmosphere trap heat from the sun and keep it close to Earth's surface. This trapped heat may contribute to global warming.

**ice shelf** a large, floating sheet of ice that is attached to the coast. Ice shelves can extend out to sea for hundreds of miles.

### A Cool Place for Research

No one owns Antarctica. The Antarctic Treaty makes it a natural reserve. It can be used only for such peaceful purposes as scientific research. Many countries have research stations in Antarctica.



# GEOTERMS 35

Read Sections 35.1 and 35.2. Then create an illustrated dictionary of the Geoterms by completing these tasks:

- Create a symbol or an illustration to represent each term.
- Write a definition of each term in your own words.
- Write a sentence that includes the term and the word *Antarctica*.

| Geoterm and Symbol | Definition | Sentence |
|---|---|---|
| biome | | |
| global warming | | |
| greenhouse effect | | |
| ice shelf | | |