

CLASSROOM ACTIVITY

Melting Ice, Rising Seas

The rising temperatures of global climate change are melting the world's ice. Most notable are the shrinking ice sheets of Greenland and west Antarctica, which have shown dramatic loss in recent years. Earth scientists are studying geologic records of past warming in the glaciers of Greenland and in the fossilized coral reefs of the Florida Keys to predict future ice loss and associated sea level rise.

CLASS DISCUSSION

Establish Prior Knowledge

Before watching the video discuss with students the various methods scientists use to formulate and test hypotheses: **observation**—collecting observational data in the field; **experimentation**—designing and conducting a controlled experiment, and then collecting data from the experiment; and **modeling**—constructing and running a computer model using known information and physical laws, and then collecting data from the running of the model.

Exploration

Ask students to take notes while they are watching the video about the methods scientists use to formulate and test a hypothesis.

Have students view the feature and read the synopsis. Use the following questions to guide the discussion.

- What observations have scientists made regarding the glaciers of Greenland and ice sheets in West Antarctica?
- Why are these ice sheets melting at a faster pace?
- What evidence do scientists have that the global temperatures are 2°C higher than they were 50 years ago?
- What evidence do scientists have that, in the past, seas were once higher than they are today?
- What do scientists hypothesize about what will happen if global temperatures continue to rise?

Wrap-Up

Use the following questions to wrap up your discussion.

- Are the scientists' predictions certain? As scientists continue to gather data and evaluate their findings, how might their hypotheses about rising seas change?

The Scientific Method

Research scientists use the Scientific Method (see page two) to investigate the natural world. You can use *Melting Ice, Rising Seas* to illustrate how scientists formulate and test hypotheses.

Scientific Process

The Scientific Method is a dynamic and open-ended process that scientists use when they investigate a question they have. It is not a series of prescribed steps that scientists follow to prove a hypothesis. Rather, it's a general plan that helps guide their investigation. And while all scientists use the Scientific Method, they might not use all the steps, or they may complete the steps in a different order. For example, a scientist might make observations and collect data about a subject that interests him or her for years before formulating a hypothesis.

DEFINING A QUESTION TO INVESTIGATE

As scientists conduct their research, they make observations and collect data. The observations and data often lead them to ask why something is the way it is. Scientists pursue answers to these questions in order to continue with their research. Once scientists have a good question to investigate, they begin to think of ways to answer it.

FORMING A HYPOTHESIS

A hypothesis is a possible answer to a question. It is based on: observations scientists make, existing theories, and information they gather from other sources. Once they have a hypothesis, scientists can begin to think about how to test it.

TESTING A HYPOTHESIS

Evidence is needed to support or disprove the hypothesis. There are several strategies for collecting evidence. Scientists can gather their data by observing the natural world, performing an experiment in a laboratory, or by running a model. Scientists decide what strategy to use, often combining strategies. Then they plan a procedure and gather their data. They make sure the procedure can be repeated, so that other scientists can evaluate their findings.

ANALYZING THE DATA

Scientists organize their data in tables, graphs, diagrams, and even photographs. If possible, they check the data by comparing it to data from other sources. They are looking for patterns that show connections between important variables in the hypothesis they are testing.

DRAWING CONCLUSIONS

Scientists must decide whether the data clearly support or do not support the hypothesis. If the results are not clear, they must rethink their procedure. If the results are clear, scientists write up their findings and results to share with others. The conclusions they draw usually present new questions for them to pursue.