

Ice Cores: Unlocking Past Climates

Module 4: Stories in Ice

Overview

This lesson introduces students to the concept of a proxy as a substitute for actual observations. Students participate in a simulation in which they use proxies to determine what their science teacher had to eat for three days before becoming ill with food poisoning.

Content Objectives

Students will

- Define proxy.

Process Objectives

Students will

- Collect data and make inferences.

Grade Level: 5-8

Suggested Time: 1-2 class periods

Multimedia Resources

[link to video]

Materials

Bag of trash that includes food wrappers and other evidence of meals
Plastic gloves

Procedures

Advance Preparation: Gather a variety of food wrappers or other evidence of meals that can be safely handled by students. Toss the items into a trash bag in the order they would have been consumed beginning with breakfast 3 days before the illness and ending with the snack that was eaten the evening before the illness struck. Include additional items that will serve as clues as to when the items were eaten, e.g. dated receipts, newspapers. Consider including a salad dressing bottle (empty and clean) or another item that is well past its expiration date.

1. Engage students by showing the Stories in Ice video
 - a. Before showing the video present the students with this scenario: Your neighbors took a short weekend trip. You knew they were taking the trip, but you weren't sure where they were going. When they returned they all had sunburns. What conclusions would you draw about the weather they experience while on their trip? After students respond tell them that they just used sunburn as a proxy to tell you what the weather was like at a distant location.
 - b. Instruct students to listen carefully for the ice core proxies scientists use to determine what past climates were like.

- c. After the video ask students to explain how the neighbors’ sunburns were a proxy. The expected response is that the sunburns substituted for actually observing sunny conditions.

1. Proxy Simulation

- a. Introduce the activity as a chance for students to test their skill at using proxies. Read the following scenario to the class:

You walk into science class to discover that a substitute teacher will be in charge for the third day in a row! Where is the science teacher? Rumor has it that she has food poisoning from an unknown source. Your task is to discover what the ailing science teacher had to eat for the three days prior to her illness. You must also figure out the order in which she ate the food. The only way you can figure out what she had to eat is to analyze the items in her trash can. Good Luck!

- b. Set the bag of trash in clear view of all students. Ask students to carefully sort the trash, listing all items and noting where in the bag the items were located (near the bottom, middle, or top). This can be done as a whole class activity if only one bag of trash is available.
- a. Organize the students into teams after the trash has been sorted and recorded. Each team should then examine the list and the vertical location of the items in the bag to determine what the teacher had to eat and when she ate it. Each team member should record decisions in a table similar to the one below. Teams should be able to explain how they arrived at their decisions and tell the story of what the teacher ate for the three days before she became ill.

	3 days before illness	2 days before illness	1 day before illness
Breakfast			
Lunch			
Dinner			
Snack			

- a. Each team should present their findings and explain their reasoning to the class. After all presentations have been made, discuss any differences that exist. Review the evidence and reasoning for each decision. It is not necessary that all students reach agreement for all of the items in the bag. Scientists often interpret data differently. It is important that students consider all viable explanations.
- b. Ask students to hypothesize about what may have caused the teacher’s illness.
- c. Wrap up by relating this proxy simulation to how scientists use proxies to determine what the past climates were like. Include the role of inference in scientific investigations.

Additional content support for teachers:

Paleo Proxy Data http://www.ncdc.noaa.gov/paleo/primer_proxy.html

Ice Core Proxy Methods for Tracking Climate Change,
<http://www.csa.com/discoveryguides/icecore/review.php>