



Mission: Arctic

A Scientific Adventure to A Changing North Pole

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NGSS Standard Connections:

Ecosystems, Interactions, Energy, and Dynamics

Interdependence in Ecosystems

Weather and Climate

This scientific research of the Arctic lends itself to many different areas of study for classrooms. The ideas presented are a few ways to incorporate this book into a study of the Arctic ecosystem. There are many different directions to go with this book. The focus of these ideas will be on Part 2 of the book, Climate Research on the ice.

1. The Greenhouse Effect: The good and the bad

Before you read the Greenhouse Effect from the book, have your students brainstorm what they think it might be. Divide the class into groups of 4 and ask them to research the Greenhouse Effect. Each group should record what they found out about the Greenhouse Effect in the unit journal. Have a class discussion using the information the students uncovered about the Greenhouse Effect. Make a class chart from the discussion.

Read pages 42-45. Identify both the good and the bad of the Greenhouse Effect. Make a classroom chart of the good and bad effects.

Investigation: What is the Greenhouse Effect

Materials:

Two glass bowls of the same size

Twelve ice cubes

Cold tap water

Clear plastic bag.

A warm spot - this can be a sunny windowsill or use a heat lamp/light bulb as a heat source

Thermometer -digital if possible

What to do:

1. Place the same measurement of water in each bowl.
2. Place 6 ice cubes in each bowl.
3. Cover one bowl with the plastic bag. This represents the atmosphere around the Earth. Leave the other one uncovered.
4. Put both in a warm spot. Watch them to see what happens.
5. Using the thermometer, measure the temperature of the water in each bowl at the beginning of the investigation and each half-hour. Record the temperature of each bowl of water.
6. Record observations of each bowl every half-hour in the unit journal along with the temperature readings.

What happens:

The ice cubes in the covered bowl will melt first, because the water inside will get hotter than the uncovered glass. This is because the plastic bag traps the heat inside, acting like the atmosphere around the earth.

Our Earth's poles are covered in ice. In the Arctic, the ice is mainly sea ice, which means it is floating on top of the ocean. In Antarctica, the ice is mainly resting on top of land.

Sea Levels

Investigate what happens to sea levels when the ice at the poles begins to melt with this investigation.

You will need:

Two large plastic tubs half full of cold water

Large pebbles

Ice cubes

A waterproof pen

What to do:

1. Use the pebbles to form a mound in the water so the top is above the water line.
2. Add 4 ice cubes to the top of the pebble mound. Explain that this is representing the land ice in Antarctica.
3. Add 4 ice cubes into the other tub of water so they float on the water. This is the sea ice in the Arctic.
4. Use the pen to mark the level of the water in each tub.
5. Talk about what they think will happen to the ice cubes and the water level in each tub.

What happens:

The ice cubes will melt. In the land-ice tub, the water level will rise, but in the sea-ice tub, it will stay the same.

This doesn't mean that rising sea levels are only a problem in the southern hemisphere though as all the world's oceans are joined together!

Each team should discuss their findings and create a poster of their findings/understandings. Each group will present their findings/understanding to the whole group. The class may ask clarifying questions of the group. After each group has presented a class discussion should be held. (This is a great opportunity for teachers to uncover misconceptions. Teachers should have some "back-pocket" questions that can be used to help groups or the class if misconceptions come up.)

Ice Camp—pages 48-49

This part of the book lends itself to the class creating a model of the ice camp to share with others in the school. This could be an interactive bulletin board or a table model. Another idea maybe a museum exhibit. Each group in the class should pick a different part of the Ice Camp to research and design. Each team should create a descriptor of each part of the Ice Camp detailing what information that will be collected at each station.

Have a variety of materials available for students to create with and give each team the ability to "special order" items within reason. If you would like, teams may purchase the materials. If you do this, give each team a budget and price your materials. Each team should keep a bookkeeping record of purchases and stay with the budget.

Ice Investigations

Ice is a natural curiosity to kids. It is easily investigated in the class but remember it does melt and can be a bit messy but oh so worth it!

Research the difference between Sea Ice and Land Ice

Sea Ice forms from sea water. Sea Ice grows and changes and has many different forms, each having its own name. Land ice forms from precipitation and is fresh water, not salt water. Find out the different types of ice on pages 52-53 of the book.

Icebergs-

For each group:

Tub of water

Ice chunks of various sizes and shapes from large to ice cubes- (freeze different sizes and shape containers for the icebergs)

Have a class discussion of how the ice will float or sink in the tub of water. As the teams place the Ice chunks in the water have them observe how it floats. Ask them to look carefully at the ice above the water and the ice below the water. Where is the biggest part of the ice? Above the water or under the water? (The largest part of an iceberg in the ocean is under the water.)

Start with the ice cube first. As they place it in the water, ask them to record in their unit journal by drawing and labeling what they observe. Ask them to push the ice cube down in the water and watch what happens. Record their observations. Continue to add the ice chunks from smallest to largest repeating the recordings each time.

After each chunk has been investigated have a class discussion about their observations.

Ice Cores—don't miss

Byrd Polar and Climate Research Center

[Create Classroom Ice Cores | Byrd Polar and Climate Research Center \(osu.edu\)](#)

NSTA Science Teacher: Ice Core Investigations: By Michael Brody and Jessica Krim

NSTA Science Scope: January/February 2021: Getting to the Core of Climate Change; by Bob Riddle

These activities will help get you started using this great resource in your classroom. Look at each part of the book and choose the standards applicable to your grade level to focus on. You may want to use the whole book or just parts of the book. Feel free to contact me for additional ideas using this book.

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