



Ice Caps and Climate Change



Raccoon Creek Explorers Activity #17

Supplies:

- **4 clear bowls or containers of the same size (like Tupperware or mason jars)**
- **Clay, playdough or rocks to use as 'earth'**
- **ice cubes (at least 4)**
- **water**
- **ruler**
- **plastic wrap**

Time: about 30 minutes

Vocabulary:

albedo: the amount of light radiation reflected by a surface

climate: the long-term pattern of weather in an area

climate change: a change in global or regional climate patterns

displacement: liquid is moved out of the way when an object is placed in it; the volume of the liquid displaced is equal to the volume of the object.

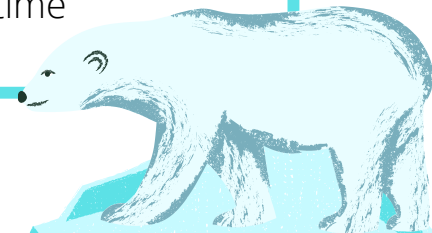
fossil fuels: non-renewable fuels made from ancient, decomposing plants and animals found in the earth. They contain carbon and hydrogen and can be burned for energy, but are limited in supply. They include Natural Gas, Coal and oil.

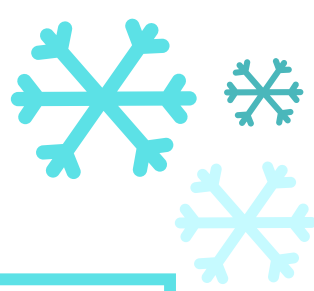
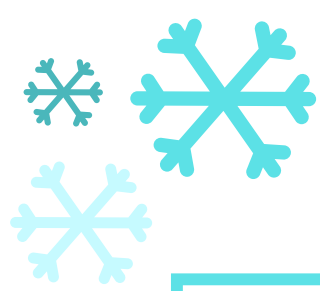
greenhouse effect: a process where energy from the sun is partially trapped in the earth's atmosphere by certain gasses, warming the planet.

greenhouse gas: a gas that contributes to the greenhouse effect, including water vapor, carbon monoxide and methane.

ice cap: a covering of ice over a large area, especially in polar regions

weather: the state of the atmosphere at a specific place and time





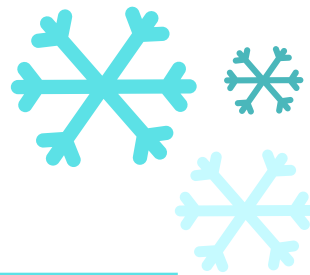
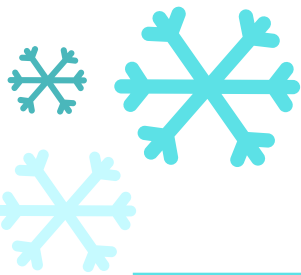
Background

You have probably heard people talk about climate change at some point, either on TV or the adults in your family or at school, but what is climate, how does it change, and why is it important?

Sometimes people confuse climate and weather, but they're not quite the same! Weather is what's happening outside at a specific time, like today or maybe last week.: is it cold or hot today? Did it rain a lot last week? etc.

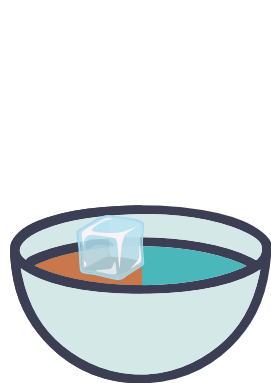
Climate is the average of weather in an area over a long period of time, To determine climate, scientists look at average temperatures, rainfall, sunshine and extremes in weather in an area over a 30 year period. That way, they can account for variation in weather through the years to get an idea of what things are typically like. Climate change is a change in that average long-term picture of weather. It tells us that things are actually changing and we aren't just looking at unusual weather.

So what affects climate? It turns out, climate is affected by a lot of natural phenomenon and its study can be quite complicated! It also turns out that humans can affect these natural phenomena and thereby affect the climate! Green house gasses are a common subject in climate change discussions. These are gasses in our atmosphere like, carbon dioxide and methane, which help trap energy from the sun. They aren't necessarily a bad thing, as they occur naturally and help keep our planet at a warm and livable temperature. However, humans can add extra greenhouse gasses by doing things like burning fossil fuels, and then things start to get too hot! This change in temperature affects climate differently all over the world but one big problem is that it can cause the ice on our polar ice caps to melt, which destroys valuable habitat and can cause sea levels to rise! Another problem with losing ice caps is that they actually help maintain a normal climate by reflecting sunlight. This reflection is called albedo.

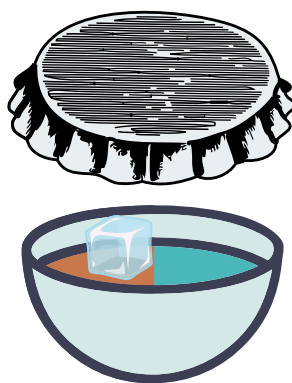


Lets Start!

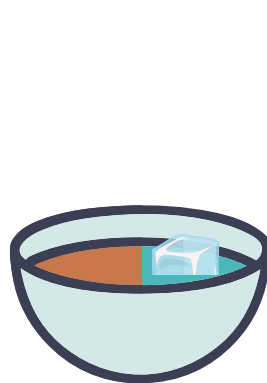
- 1) Place equal amounts of clay or rocks in each container. This will be the 'earth' or dry land for our experiment.
- 2) Place an equal number of ice cubes on top of the land in 2 containers. This will represent ice on land.
- 3) Place the same number of ice cubes in the last 2 containers, in the empty space next to the land. This is our sea ice. It is important to add the ice before the water.
- 4) Add water to the empty space in each container so the water levels are equal in all of them and do not cover the land.
- 5) If you have a marker and can mark the containers, draw a line at the starting water level. Use a ruler to measure the water levels.
- 6) Use plastic wrap to cover one of the containers with 'land ice', and one of the containers with 'sea ice'. You should end up with 4 containers as shown bellow.
- 7) Place the containers on a windowsill or another sunny place and observe what happens to the water levels as the ice melts. You may want to label your containers with a piece of tape or paper to help keep them straight!



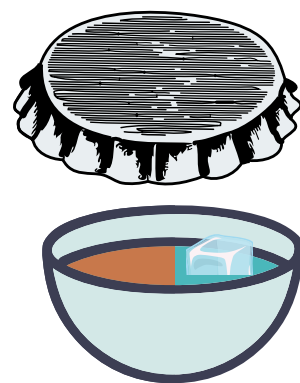
Ice on land,
uncovered



Ice on land,
covered



Ice in water,
uncovered



Ice in water,
covered



Apply:

- Did the ice melt faster in some containers than others? Which ones melted the fastest and why do you think that happened?
- Did any of the containers have higher water levels after the ice melted? Which ones?
- What did the plastic wrap represent in this experiment?
- What things can you think of that might affect climate?
- What kind of affects do you think climate change might have on the place you live? Would it change things for you or the plants and animals that live near you? What might it change in other parts of the world like islands, coastlines and deserts?

Wrap Up

Sometimes people have a hard time understanding how melting ice caps can cause sea levels to rise. Think about the ice in a glass of water on a hot day. Even after the ice melts, the cup doesn't overflow. This is because the ice cubes already take up space in the water. This is displacement. When they melt, that water will actually take up roughly the same amount of space and displace the same amount of water. If sea ice melts, why are scientists worried the sea level will rise? That's because not all the ice on the ice caps is in the sea; a lot of it is on land. Adding water from melted ice on land would be like adding water to an already full glass.

There are a lot of factors that affect climate and scientist aren't exactly sure what will happen as our climate changes. Some things are easier to predict than others, like changes in sea level, but some things are harder. Will changes in climate lead to more server weather like hurricanes? Will adding cold ice water change the way the ocean's currents flow? How will changing climate affect wildlife? What can we do to slow climate change? How can we better take care of our planet? There are a lot of questions and scientist are working hard to find the answers!