# Lesson 1: Ice Rings Like Tree Rings

## Objective:

Students will be able to understand that ice rings, like tree rings, can reveal environmental conditions about the year each layer was formed.

Students will learn that like tree rings, the thickness of the ice ring formed is determined by the environmental conditions during the year it was formed. As a new layer of snow falls each year in the Arctic and Antarctica, the weight of the added snow each year eventually changes to ice. These ice layers reveal the environmental conditions for the year it was formed.

## NGSS:

3-LS4-1. Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.

## Essential Questions:

1. What information can you learn by examining an ice core?
2. Why is it important to observe ice core samples?

## Materials:

* Tactile graphic of tree rings—can be a print of a tree rings printed on capsulated paper
* 1 tube-shaped, waterproof container that can be torn apart, such as a Pringles can, rinsed and dried
* Liquid measuring cup
* 1 quart of refrigerated water
* 1 quart of refrigerated water with instant coffee added
* Small amounts of gravel, dirt, sand, or dust
* Plastic insect or leaf
* Rimmed cookie sheet or paint tray
* Writing device of the students’ chosen medium
* Tactile or large-print ruler

## Lesson Sequence:

1. Hand out the tactile graphic of tree rings. Explain to the students that they are looking at a flat piece of wood that has been cut. Have students examine the tree rings. What do they notice? Be sure to point out that the lines are not perfectly round and that they vary in spacing size between lines if the students have not observed this prior.
2. Discuss with students why it is important for ecologists to study tree rings. (Tree rings can tell us not only the age of the tree but what the climate was like when the tree was growing. Thicker tree rings tell us that the tree was growing in warm and wet weather. Thinner tree rings tell us it was a cold and dry year. If the rings are close together, the tree might not have grown much at all.) (NASA, n.d.).
3. Tell students that similar to tree rings, ice core samples from both the Arctic and Antarctic can provide us with similar information.
4. Next, make a core ice sample. Please note that this activity takes place over several days due to the time needed to freeze each layer. You can decide to make them ahead of time or involve your students in the creation, depending on time.
5. Pour the layers into the container one at a time, following the layer descriptions found below. The sample will be 8 years old with 8 layers. The oldest layer is listed first.

* ½ cup water
* ¼ cup water with dissolved instant coffee
* ¼ cup water with dissolved instant coffee and a teaspoon of gravel, dirt, sand, or dust
* ½ cup water and a teaspoon of gravel, dirt, sand, or dust
* ⅓ cup water
* ⅓ cup water
* ¼ cup water with dissolved instant coffee and a plastic insect or leaf
* ½ cup water

1. Allow each layer to completely freeze before adding the next one. This can take between 12 and 24 hours. You may want to keep a written table of each layer and the date you poured it to help keep track.
2. After the last layer is frozen and you are ready to observe the layers, remove the container by cutting the top with scissors and tearing the cardboard away from the ice. Lay your unwrapped ice core on its side on the cookie sheet or paint tray.
3. Mark each layer with tactile markings. You may want to wrap a pipe cleaner around each layer and twist the metal to be sure that it is tight around each layer and not able to be moved upon observation. Yarn will also work as long as it is tied tightly.
4. Ask students to closely observe the layers of the ice. Tell them that each layer represents a year’s worth of snow.
5. Ask students to measure each layer. Be sure to number each layer with the top layer noted as Layer 1. What do the different measurements for each layer tell us? [How much snow fell that year—the levels of moisture in the area as well as temperature.]
6. Tell students to explore the ice texture, and, if able, the color. What is noticed about the color and or textures of the ice? [The color indicates the level of dust or debris in the air and indicates a dry climate.] What about the differences in heights of each of the brown and rough layers? [A thin layer of ice that is brown and rough indicates a drought.]
7. Ask students whether they notice a particularly rough layer. [Layers 5 and 6.] What does that indicate? [A possible volcanic eruption.]
8. Ask students to continue to make observations of the core ice samples. What do they hear, feel, or smell?
9. Ask students why it is important to study ice core samples? [It us more about the environmental conditions of Antarctica and the Arctic. It tells us more about the temperature of the Earth and how humans may be impacting the environment as well.]

## Further Exploration:

To learn more about polar ice core samples and to explore more polar science, visit https://virtualice.byrd.osu.edu. *Note.* You can put the tours on the whiteboard to enlarge them for those with low vision. However, voiceover will need to be provided for those that are unable to fully view the tours online.

To learn more about how the ice core samples are studied and stored for future research, visit: <https://byrd.osu.edu/research/facilities/cold-storage-ice-core>.

*Note*. Lesson plan adapted from “Exploring Polar Ice,” CFAES Ohio State University Extension, 2021.

Reference:

NASA. (n.d.). “What can trees tell us about climate change?” <https://climatekids.nasa.gov/tree-rings>