

Permafrost Brought to Light

Objective:

Participants will create a suncatcher to model Earth's layers, with a focus on permafrost and its role in shaping the Arctic landscape. Focus on demonstrating how surface observations can help us study changes that may be occurring below, such as permafrost thaw.

Materials (Pre-prepped for Participants):

- Tissue paper in a variety of colors: (to represent Earth's layers)
- Pre-cut black cardstock paper for the frame
- Pre-cut clear contact paper
- Scissors
- Printed photos and diagrams of Arctic soil layers (including the permafrost layer)
- Sample images showing surface features (like ponds, cracks, sinking or shifting ground) related to permafrost thawing
- Sharpie (for optional labeling)
- Velum sheet (for optional backing)

Overview:

Permafrost is a layer of permanently frozen ground found in cold regions like the Arctic. While this frozen layer is hidden below the surface, it plays a key role in forming the surface, supporting everything from ecosystems to human-built infrastructure. Through this activity, participants will learn how changes in permafrost can have observable effects on the surface.



Process:

Step 1: Review Sample Images and Earth's Layers

Note: This step can be kept simple or expanded depending on the participant's age, interest, and time available. The main takeaway is for participants to visually recognize the differences in the layers of the Arctic tundra and understand how permafrost serves as the foundational layer that shapes the surface features they observe.

Together as a group, review the following:

- A diagram of earth layers in the Arctic (with permafrost emphasized).
- Images of surface features such as cracks, shifting ground, ponds, or certain plants that can indicate changes in moisture below.
 - Encourage participants to observe how these surface features, which might seem unrelated, are actually signals of what is happening beneath the surface.

Discussion Questions:

- How might cracks, ponds, or shifting plants and soil be signs that the permafrost layer is affecting the surface?

Step 2: Receive Materials

Each participant will receive:

- A piece of black construction paper cut into a rectangular frame glued to a sheet of clear contact paper.
- Tissue paper sheets in various colors to represent the Earth's layers.

Step 3: Draw and Plan the Earth's Layers

For older groups: Participants will sketch their different layers onto the non-sticky side of the contact paper:

- Label the different layers based on the example diagrams: ground/surface, active layer, permafrost,
- Discuss how the permafrost layer supports the surface and shapes what the ground layer looks like.

For younger groups: It may be best to skip right to adding layers in step 4.

Step 4: Assemble the Stained Glass

Participants will then:

1. Form different layers showing surface and subsurface features with tissue paper.
2. As they add each layer, they can overlap tissue paper slightly to create a "stained glass" effect, allowing light to shine through when displayed.

Note: Depending on age level – encourage participants to add in detail. For littles, this may be noticing changes in color going from one layer to the next. For older students, this can include adding features like ice wedges or small plant roots to the active layer.

Step 5: Optional Labeling

Using sharpies, participants can label each layer of the Earth, including the permafrost, to reinforce their understanding. They should also label the surface features (like cracks or shifting ground) they discussed earlier, which represent observable signs of permafrost changes.

Discussion Points:

- **How do surface changes help us understand changes beneath the surface?**
 - Discuss how surface features like shifting ground, cracking, or even changes in plant life can signal changes in the permafrost below. This helps scientists understand how warming temperatures are impacting the Arctic.
- **What role does permafrost play in supporting Arctic ecosystems?**
 - Without permafrost, the surface would become unstable, which would affect plants, animals, and human infrastructure in Arctic regions. By studying the surface, we can learn more about the impact of thawing permafrost.
- **What can surface features tell us about climate change?**
 - Thawing permafrost is one of the visible signs of climate change. Changes on the surface (like cracks or changes in vegetation) offer clues about the state of the permafrost and broader environmental shifts.