

## **Ice Cores: Unlocking Past Climates**

### **Module 3: Calendar in Ice**

#### **Overview**

In this lesson students will learn how an ice core provides a record of past climates. Students will create a timeline of their life experiences, analyze model glacier data, and create an ice core diagram of the Dust Bowl years.

#### **Content Objectives**

Students will

- Investigate how man-made catastrophes are documented in ice cores.

#### **Process Objectives**

Students will

- Create graphic representations of data
- Analyze data
- Draw evidence-based conclusions

#### **Grade Level: 5-8**

**Suggested Time:** 2-3 class periods

#### **Multimedia Resources**

- [link to video]
- Read•Write•Think Interactive Timeline, <http://www.readwritethink.org/files/resources/interactives/timeline/>
- Xtimeline, <http://www.xtimeline.com/>
- Particles from U.S. Dust Storms of the 1930s May Have Traveled as Far as Greenland, UB Research Shows, <http://www.buffalo.edu/news/fast-execute.cgi/article-page.html?article=61650009>
- Timeline of the Dust Bowl, <http://library.sussex.tec.nj.us/dacunto/Picturing%20the%20Unfamiliar/timeline.htm>
- Black Blizzard Clip, [http://www.youtube.com/watch?v=OPX9CwwOx\\_U](http://www.youtube.com/watch?v=OPX9CwwOx_U)

#### **Materials**

- various materials for glacier models, e.g. ice cream, clay, layer cake
- coring tool, e.g. apple corer

#### **Procedures**

Advance Preparation: Prepare one glacier model per team that consists of alternating light and dark bands. The light bands should be thicker than the dark bands. There should be some variation in the thicknesses of the light bands to indicate variations in the wet seasons. The dark bands should have some variability in thickness to indicate varying conditions during the dry season. One of the layers

should include some noticeably different particles to set it apart. This layer represents an unusual event, e.g. volcanic eruption, forest fire, dust storms

1. Engage students in the topic by showing the *Calendar in Ice* video
  - a. Before showing the video, ask students to create a timeline of important events in their lives. Timelines can be constructed with pencil and paper or an online timeline tool.
    - Read•Write•Think Interactive Timeline, <http://www.readwritethink.org/files/resources/interactives/timeline/>
    - Xtimeline, <http://www.xtimeline.com/>Ask several students to briefly share their timeline. Ask the class what the timelines represent (their personal histories). Then ask the class where they would go to find a timeline of the Earth's climate.
  - b. Ask students to watch for evidence of how nature records Earth's history and the types of events that are recorded.
  - c. After viewing the video ask the students to compare their personal timelines to the timelines found in tree rings and glaciers. Transition to the activity by telling students they will be investigating ice core timelines in 2 ways—analyzing the evidence of a model ice core and diagramming an ice core that involves a 20<sup>th</sup> century event.
2. Analyze model glaciers
  - a. Organize students into teams of 3-4.
  - b. Provide each team with a model glacier and a coring tool.
  - c. Instruct students to extract a core from their model glacier. It may be necessary to demonstrate how to successfully extract a core.
  - d. After extracting the core students should
    - i. Determine how many years are represented in the core sample, measure the thickness of each layer, and respond to the following questions.
      - How many years are represented in the core sample? (each set of dark and light bands represents 1 year)
      - Which year was the wettest? Driest? How do you know? (the wettest year will have the thickest layer, the driest year the thinnest)
      - In which year does it appear that an unusual event occurred? What evidence do you have that something unusual occurred? Identify several possible events that might have left behind this evidence.
  - e. Bring the class back together to discuss the findings. Transition to the next activity by asking students to describe how an ice core might look if a drought occurred.
3. Diagram the Dust Bowl
  - a. Ask students if they think dust from Kansas could end up in a glacier in Greenland. Students should elaborate on their thinking.
  - b. Show the *Black Blizzard Clip*. Allow time for student response either through discussion or a journal entry.
  - c. Ask students to read the *Timeline of the Dust Bowl* webpage and read the article, *Particles from U.S. Dust Storms of the 1930s May Have Traveled as Far as Greenland, UB Research Shows*. Follow up with a class discussion that focuses on the major events of the Dust Bowl and the evidence that Dust Bowl dust particles have been found in ice cores from Greenland.

- d. Discuss with the class how an ice core from Greenland that includes the time period before, during, and after the Dust Bowl might look. Students should consider the deposition of dust and the impact of drought.
  - e. Instruct students to use the information from the timeline, the news article, and class discussions to create a diagram of an ice core that includes the dust bowl years and several years before and after the Dust Bowl. The diagram should be annotated for clarity.
4. Wrap up by asking students to relate their personal timelines to the Dust Bowl ice core diagram, tree rings, and ice cores.