# NSTA National Conference Symposium

**Date:** March 11, 2011

**Time:** 1:30 -6:00 PM

**Location:** Marriott Marquis; Golden Gate C-2
55 Fourth Street
San Francisco, CA 94103

## Title: Clues to the Cryosphere: Lessons from the Ice

**Description:** Rapid change coupled with new discoveries make the Polar Regions an exciting area to study and explore. Sponsored by the National Science Foundation's Polar Program Office, this interactive half-day symposium will feature scientists working in the Arctic and Antarctic. Join us to learn more about the latest in polar science research and participate in hands-on activities for your classroom.

Topics include an overview of the Polar Regions and the impact of changes there, information about ice cores and what they can tell us about climate, and a discussion that focuses on microbial life in ice, and how that transforms our ideas about the carbon cycle and biodiversity. A 45 minute panel discussion with 7 polar scientists will conclude the symposium and provide time for one-on-one interaction. All participants will receive educational materials and resources from a variety of NSF-funded polar projects and learn about ongoing education and outreach opportunities for educators.

**Participants and affiliations:**

Dr. Ed Brooks, Professor of Geosciences, Oregon State University
Dr. Christine Foreman, Assoc. Research Professor, Land Resources and Environmental Sciences, Montana State University
Dr. Ross Powell, Professor of Geology, Northern Illinois University
Ms. Louise Huffman, ANDRILL Outreach Coordinator, University of Nebraska-Lincoln
Ms. Susan Kelly, WISSARD Outreach Coordinator, Montana State University
Ms. Linda Morris, IDPO Outreach Coordinator, Dartmouth College

Panel:
Dr. Cristina Takacs-Vesbach, University of New Mexico, Albuquerque
Dr. Slawek Tulaczyk, University of California, Santa Cruz
Dr. Michael Gooseff, Pennsylvania State University, University Park
Dr. Jill Mikucki, Dartmouth College, Hanover, NH

## Draft Agenda

1: 30-1: 45 Introductions, logistics
Pre Assessment
Sea Ice/Land Ice Demo (Teachers "vote")

1:45-2:15 Presentation (20 min talk; 10 minute Q&A)
*Cryosphere in Crisis*

Key Ideas: The cryosphere is a critical part of earth's interacting systems. Changes in the ice due to global warming cause global impacts. Historic evidence of past climates is archived in ice cores, sediment cores,
and other proxy indicators, brief emphasis on sediment cores.

2:15-2:45 **Hands-on Activity: Evidence of Ice Free Seas**

Key Ideas: Sediment cores are proxy indicators of climate.

2:45-3:10 Presentation (20 min talk; 5 minute Q&A)
*Tiny Bubbles: Greenhouse gases and climate information from polar ice cores"*

Key Ideas: Bubbles of greenhouse gases trapped in deep layers of ice yield historic data on past climates. Ice core $CO_2$ records (a sink) show heightened levels are associated with warm periods throughout time. Analysis shows atmospheric $CO_2$ levels today are higher than in the past 800,000 years.

3:10-3:25 Break
Table 1: Snack and Sea Ice/Land Ice Results

Table 2: Mess Free Rock Cores; Drill Model
Table 3: Drilling Coring head

3:25-3:55 **Hands-on Activity: Polar Detectives**

Key Ideas: Ice cores are formed when layers of snow are compressed into ice.
Physical properties of snow vary depending on temperature and humidity at the time. Observable differences in layering provide evidence of climate patterns. Snow also traps particulate matter and chemicals from

the atmosphere. Scientists can analyze these invisible indicators of past climate history.

3:55-4:20 Presentation (20 min talk; 5 minute Q&A)

Key Ideas: Ice contains a biological and carbon record that must be studied in concert with other geochemical records, because microbial life can transform gases and chemicals, and must be addressed for an accurate interpretation of past and future paleo-climatic records obtained from ice cores. Ice is now recognized as a habitat for life, painting a picture of microbial diversity over long time periods. Can the diversity of these microbes be related to geological and climatological changes; has the composition of modern microbes diverged significantly from those trapped in ice?

4:20-4:55 **Hands-on Activity: Carbon Journey**

Key Ideas: Carbon is an element present in many forms, that moves through

Earth's systems via sources and sinks.

4:55-5:45 Introduction of Panel and 45 minute Panel Discussion

5:45-6:00 Announcement of Saturday Polar Presentations

Wrap up and Post Evaluation

Lesson Handouts and Take-away materials