

# Welcome to ***PolarConnect***

With Lesley Urasky and the Glacial  
History in Antarctica Project

**Tuesday 14 December 2010**

5:00 pm AKST

(6:00 pm PST, 7:00 pm MST, 8:00 pm CST, 9:00 pm EST)



# WELCOME TO WIMBA



**ARCTIC RESEARCH CONSORTIUM OF THE UNITED STATES**

Raise your hand to ask a question

List of all participants

Return to the lobby or exit

Slides will be shown here

If using VOIP, press and hold here to talk

Your connection strength

'Chat' with one person or the entire group



TALK

Options

You have entered the lobby.

You have entered 'Arctic Research Consortium of the United States (ARCUS)'.

Your media format is WimbaMedia.

You say, "I'm going to change the slide momentarily- to show the one I need for my new screen shot"

To: Main Room

People (3)

Kristin_Timm			
kristina_creek			
Kristin_Timm			

Exit - Lobby Help

**Please note:**

- Participant using the telephone can mute/unmute by pressing \*6 on the phone.
- Today's event will be recorded and archived.

# Roll Call

## **When called, please state your:**

- ✓ Name
- ✓ School / Institution
- ✓ The number of students and adults participating with you in the same location



# What is PolarTREC?

PolarTREC is a professional development experience in which K-12 teachers are paired with researchers for 2-6 week research experiences in the polar regions.

From 2010-2013, nearly 50 teachers from around the United States will join scientists in the Arctic and Antarctica to learn about science, the polar regions, and to share what they have learned with their students and communities.

# Questions

## **To Ask a Question:**

- ✓ Raise your hand with the “hand button”
- ✓ Type your question in the text chat box
- ✓ Speak loud and clear and directly into the phone to ask your question.



# Glacial History in Antarctica

with  
Lesley Urasky,  
Science Teacher,  
Rawlins, Wyoming



# Team Members



John Stone  
Researcher  
University of Washington



Howard Conway  
Researcher  
University of Washington

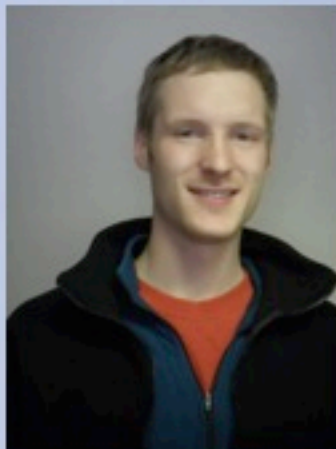




Brenda Hall  
Researcher  
University of Maine  
Climate Change Institute



Perry Spector  
Ph.D. Candidate  
University of Washington



Gordon Bromley  
Researcher  
University of Maine  
Lamont-Doherty Earth Observatory



# How Did I Get Here?





Helicopter  
Supported  
Remote  
Camps





# Where Am I Now?

- McMurdo Station:
  - Base for all American research projects
  - About 1,000-1,100 residents during austral summer
  - Office in Crary Lab
  - Galley
  - Dorm 203a



# Where Will We Be?

- Field Schedule:
  1. Fly from McMurdo to the Central Transantarctic Mountain camp (CTAM) on a C-130
  2. From CTAM, 5 of us will be at a helicopter-supported camp on Cloudmaker peak collecting samples (John, Brenda, Perry, Gordon, and I)



3. Helicopter-supported day trip to Wedge Peak
4. All 7 of us camp at Mt. Kyffin collecting samples
5. Return to CTAM
6. Four people camping at Mt. Hope collecting samples (John, Perry, Maurice, and I)

- We'll set up camp somewhere on Mt. Kyffin








On Mt. Hope  
Looking Toward  
Mt. Kyffin  
(John Stone 2010)



<http://photolibrary.usap.gov/>



An aerial photograph taken from the perspective of someone inside an airplane, looking out over a vast, snow-covered mountain range. The wing and landing gear of the aircraft are visible in the upper portion of the frame. The terrain below is a rugged, snow-dusted ridge with patches of brownish rock or tundra. In the distance, more snow-capped peaks are visible under a clear blue sky. The overall scene is one of a high-altitude, winter landscape.

North Ridge,  
Mt. Hope  
(John Stone 2010)





## Why is This Research Important?

- Helps scientists better understand current changes in the West Antarctic Ice Sheet
- Past & current changes can be used as indicators of future climate change
  - If West Antarctic Ice Sheet were to melt, global sea level would rise around 4-6 m

# The Effect of a 6m (~18 ft.) Sea Level Change on the Southeastern United States & the Gulf of Mexico







## Field Work

- Searching for exposed, glacially transported rocks, deposited during & since last ice age
  - Collection of samples (~1 kg each):
    - From areas around the glacier and
    - Right up to its edges
- Collected samples will be boxed and shipped to the University of Washington for analysis





Sampling: photo courtesy of John Stone 2003



Fosdick Mts.: photo courtesy of John Stone 2003



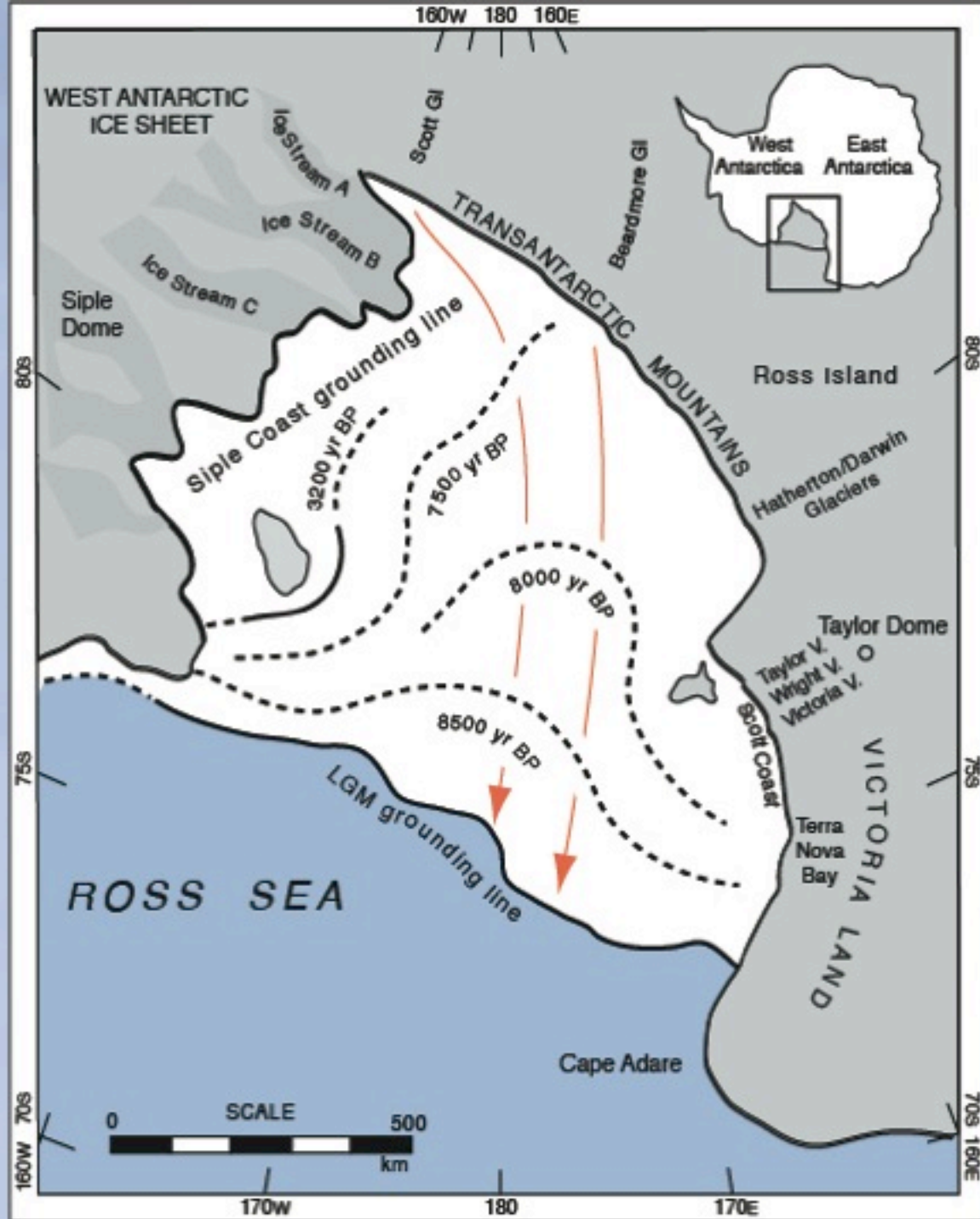
Surveying: photo courtesy John Stone 2003



## Why Are These Rocks Important?

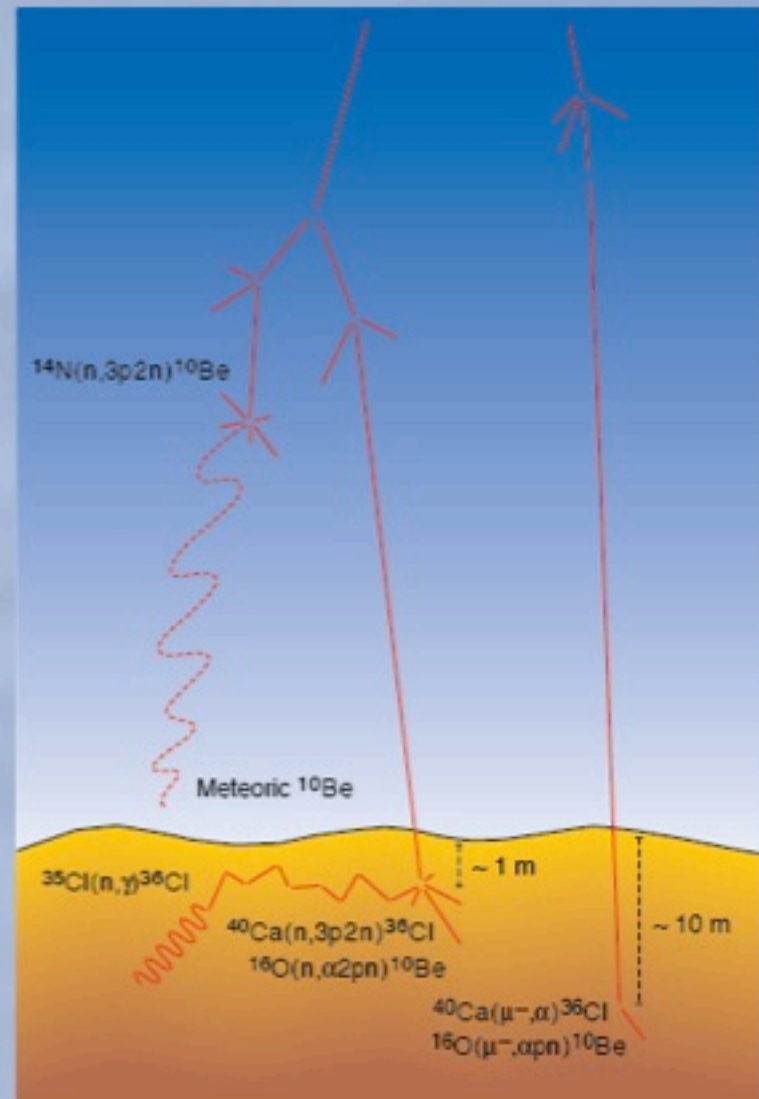
- They can serve as indicators of:
  - When the West Antarctic Ice Sheet receded after the last ice age
    - 10,000-20,000 years ago
  - How rapidly it retreated





# How Do Cosmic Ray Produced Nuclides Tell Us the Age of Rocks?

- Rocks on Earth's surface are constantly bombarded by cosmic rays
  - They penetrate solid materials to a depth of a few meters





- What are they?
  - Energetic particles originating in outer space
  - Causes subatomic particles to be dislodged
    - Turning the atom into:
      - » Rare isotopes of different elements





## How are Cosmogenic Nuclides Measured?

1. Rocks are broken into very small fragments
2. Pieces treated to separate mineral types using dense liquids and flotation
  - Minerals used:
    - Quartz for Be-10
    - Feldspar for Cl-36



### 3. Minerals dissolved to separate elements

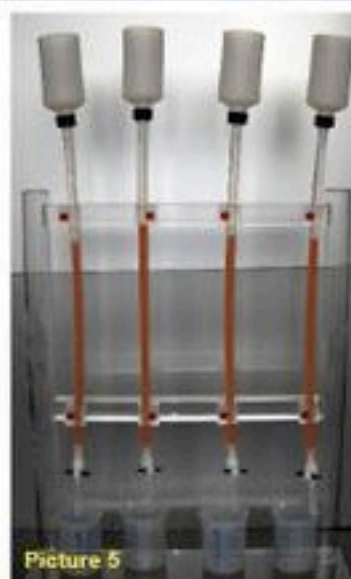
- Uses hydrofluoric acid (HF)



Department of Geography, University of Zurich

#### 4. Undergoes further complex purification techniques

- Purified elements make up a **very** small portion of the entire rock sample
  - Few hundred micrograms of which may be less than 1 part per trillion of isotope for dating





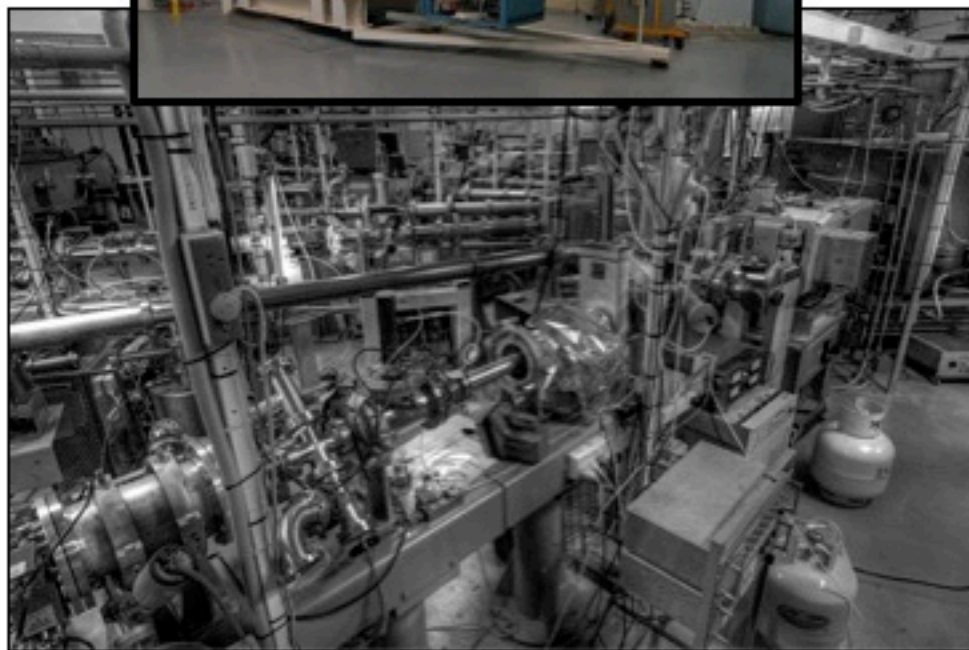
5. Measure the ratio of rare isotope (Be-10) to common isotope (Be-9)

– Uses Accelerator Mass Spectrometry (AMS)

- Nuclear physics technique
- Beam of accelerated Be ions can be separated into different Be isotopes
- Uses magnetic and electrostatic deflection



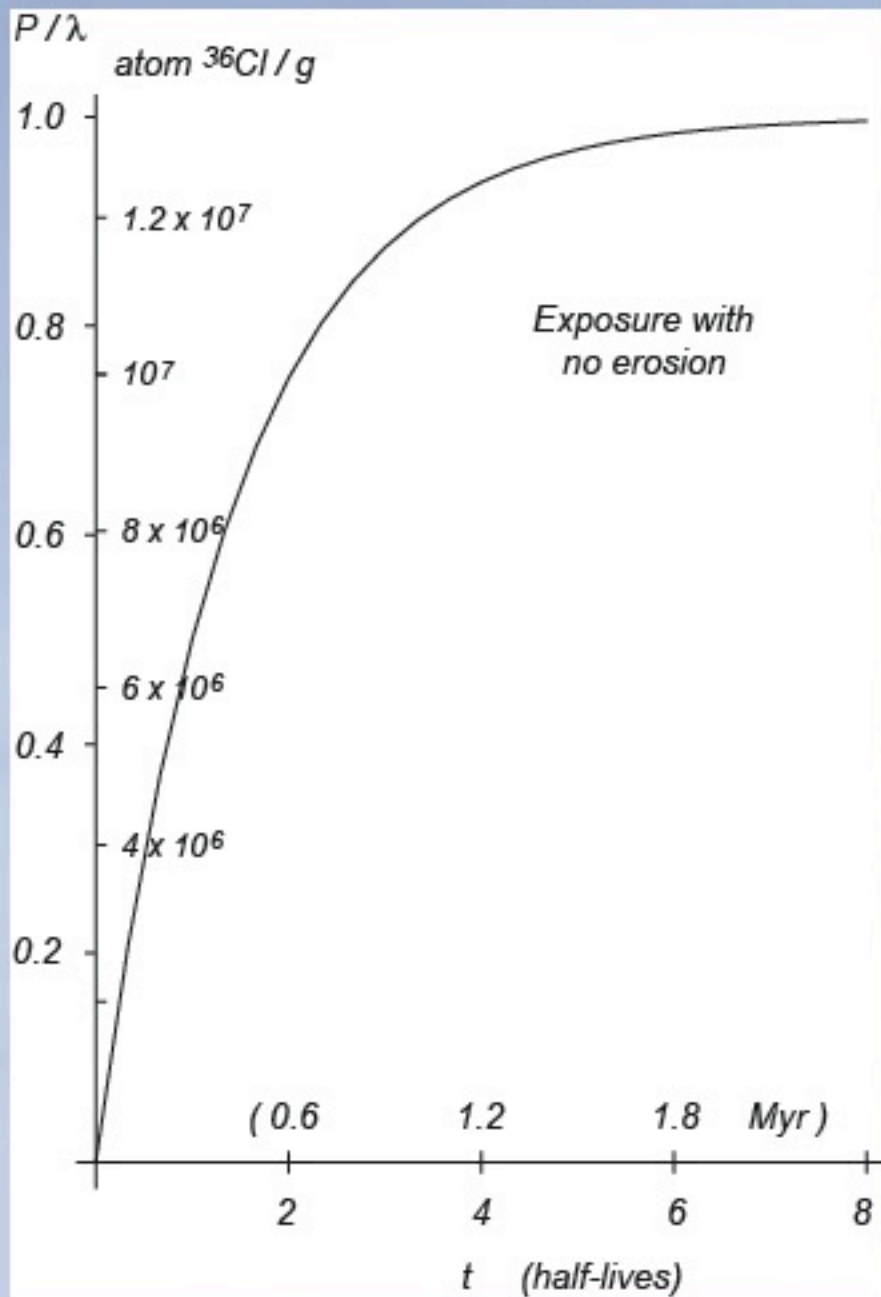
Accelerator Mass Spectrometer at the Australian National University in Canberra





6. Known Be-10 concentration can be used to estimate exposure age if production rate is known
- Higher concentrations = longer exposure time
  - Complex calculations because cosmic rays are affected by:
    - Latitude (Earth's magnetic field shields against cosmic radiation)
    - Altitude (shielding by atmosphere)





Cosmic-ray-produced nuclides accumulate in a freshly exposed surface

Assumptions:

- Steady production
- Continuous exposure
- No erosion





## Accuracy of Exposure Dating

- Most accurate for samples:
  - With long exposure times
  - From high altitude
- Young (few 100 years ) samples have accuracy of  $\pm 5-10\%$ 
  - For example, if a sample is dated to be 350 years old, in reality, it could be anywhere from (315-385 years old)

- Old or high altitude samples with nearby calibration site may have an accuracy of  $\pm 1-2\%$ 
  - If a sample is dated to be 16,000 years old, in reality, it could be anywhere from (15,680-16,320 years old)





TEACHERS AND RESEARCHERS  
EXPLORING AND COLLABORATING

# Upcoming Events

Watch for and register for upcoming events at [www.polartrac.com](http://www.polartrac.com)!

## **PolarConnect Event with Heidi Roop and the [Ice Core Drilling in West Antarctica 2010 Expedition](#)**

**DATE:** Thursday, 16 December 2010 **TIME:** 11:15 AM AST (12:15 PM PST, 1:15 PM MST, 2:15 PM CST, 3:15 PM EST) Note: We will be broadcasting this event live from the San Francisco Marriott, Sierra Room K at the American Geophysical Union Meeting in San Francisco, California.

## **PolarConnect Event with Lesley Urasky and the [Glacial History in Antarctica Expedition](#)**

**DATE:** Thursday, 6 January 2011 **TIME:** 12:00 noon AST (1:00 PM PST, 2:00 PM MST, 3:00 PM CST, 4:00 PM EST)

## **PolarConnect Event with Heidi Roop and the [Ice Core Drilling in West Antarctica 2010 Expedition](#)**

**DATE:** Friday, 7 January 2011 **TIME:** 9:00 AM AST (10:00 AM PST, 11:00 AM MST, 12:00 PM CST, 1:00 PM EST)

## **PolarConnect Event with Heidi Roop and the [Ice Core Drilling in West Antarctica 2010 Expedition](#)**

**DATE:** Friday, 21 January 2011 **TIME:** 9:00 AM AST (10:00 AM PST, 11:00 AM MST, 12:00 PM CST, 1:00 PM EST)

# Thank You!

*An archive of the event will be available shortly.*

<http://www.polar-trec.com/polar-connect/archive>

