

Welcome to ***PolarConnect***

With Heidi Roop and the Ice Core
Drilling in Antarctica Team

Thursday 16 December 2010

11:15 am AKST

(12:15 pm PST, 1:15 pm MST, 2:15 pm CST, 3:15 pm EST)



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

The control bar includes a connection strength indicator, a 'TALK' button, and icons for audio, video, and chat. The chat area shows a message: "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?'". The participant list shows three people: Kristin_Timm, kristina_creek, and Kristin_Timm. The 'To:' dropdown is set to 'Main Room'. The 'Exit - Lobby - Help' button is circled in red.

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:

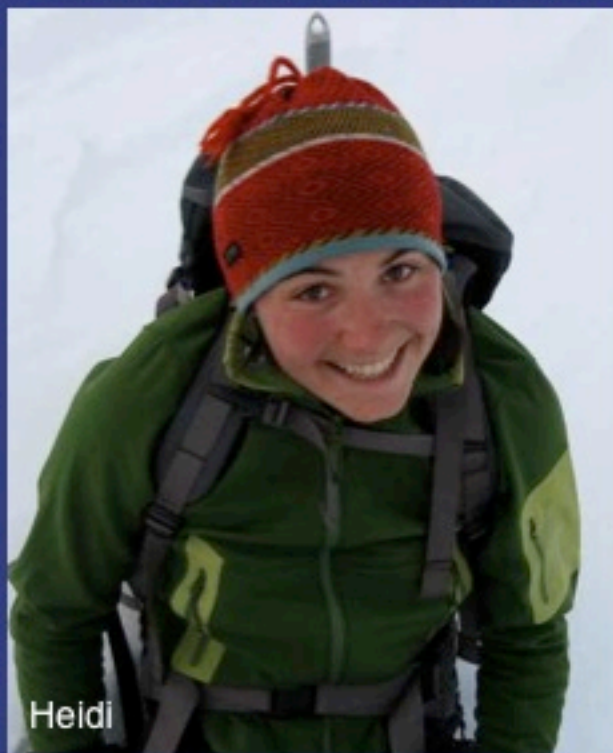
- ✓ Raise your hand with the “hand button”
- ✓ Type your question in the text chat box
- ✓ Speak loud and clear and directly into the phone to ask your question.



NASA

Live from Antarctica!

With PolarTREC Researcher Heidi Roop



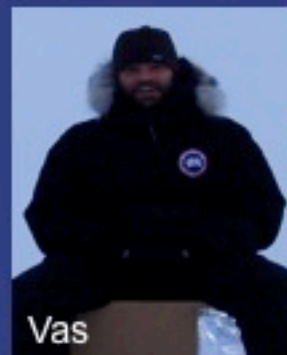
Heidi



Giff



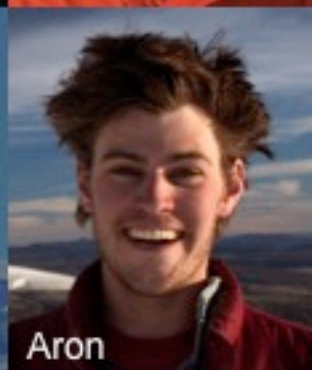
John



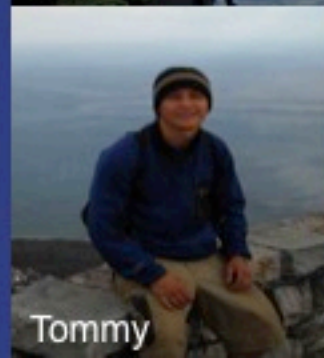
Vas



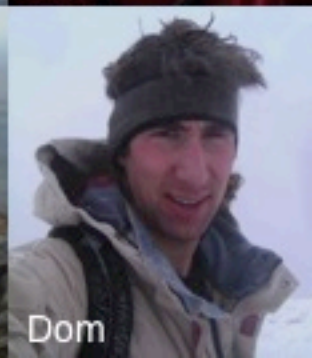
Don



Aron



Tommy



Dom

and the
WAIS Divide Ice Core Team

Where are we in Antarctica?

West Antarctic Ice Sheet (WAIS) Divide

Latitude: 79° 28' S

Longitude: 112° 5' W

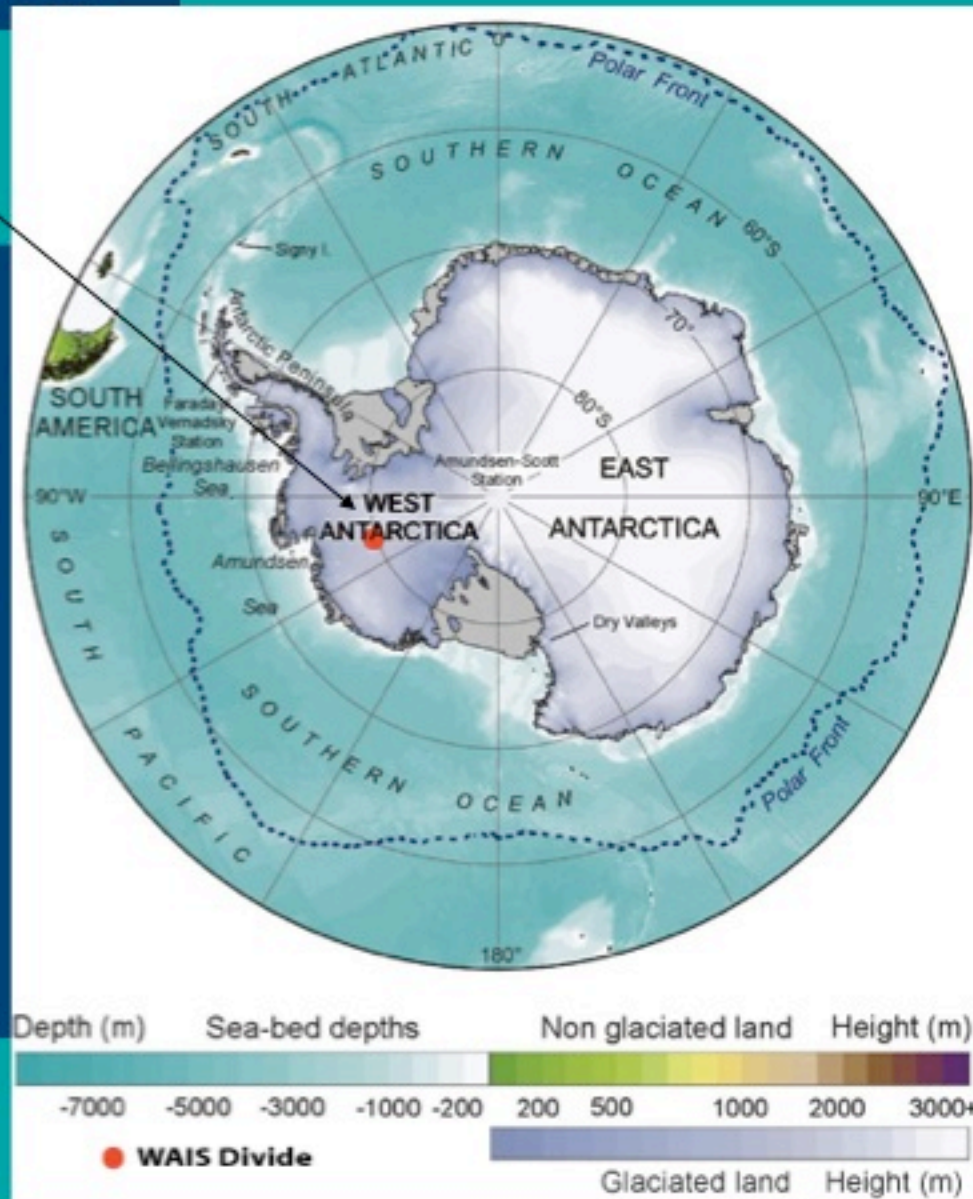
Elevation: 6,500 ft

Ice sheet thickness: 3,465 m

Annual Ice accumulation: 22 cm/yr

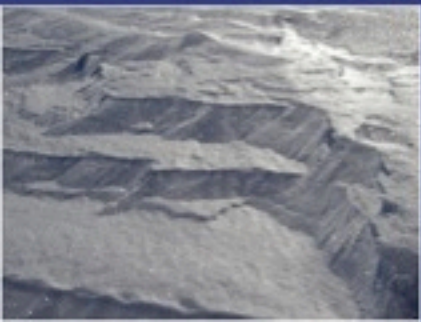
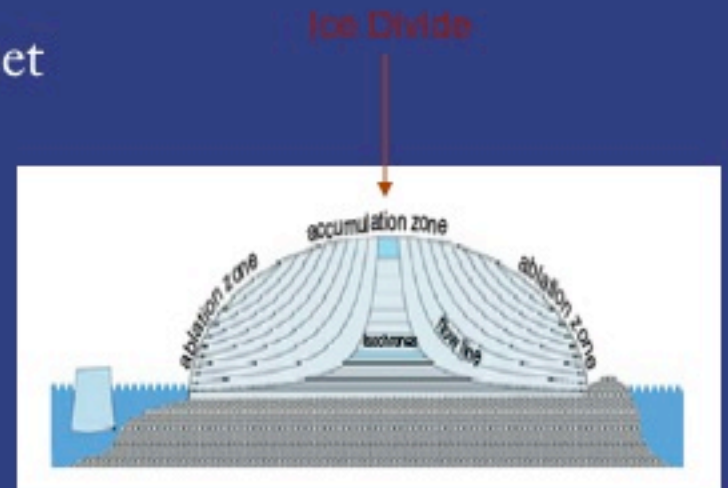
Average surface temp: -31.1°C

Current drill depth: 2,561 m
2010/2011 depth goal: 3,330 m



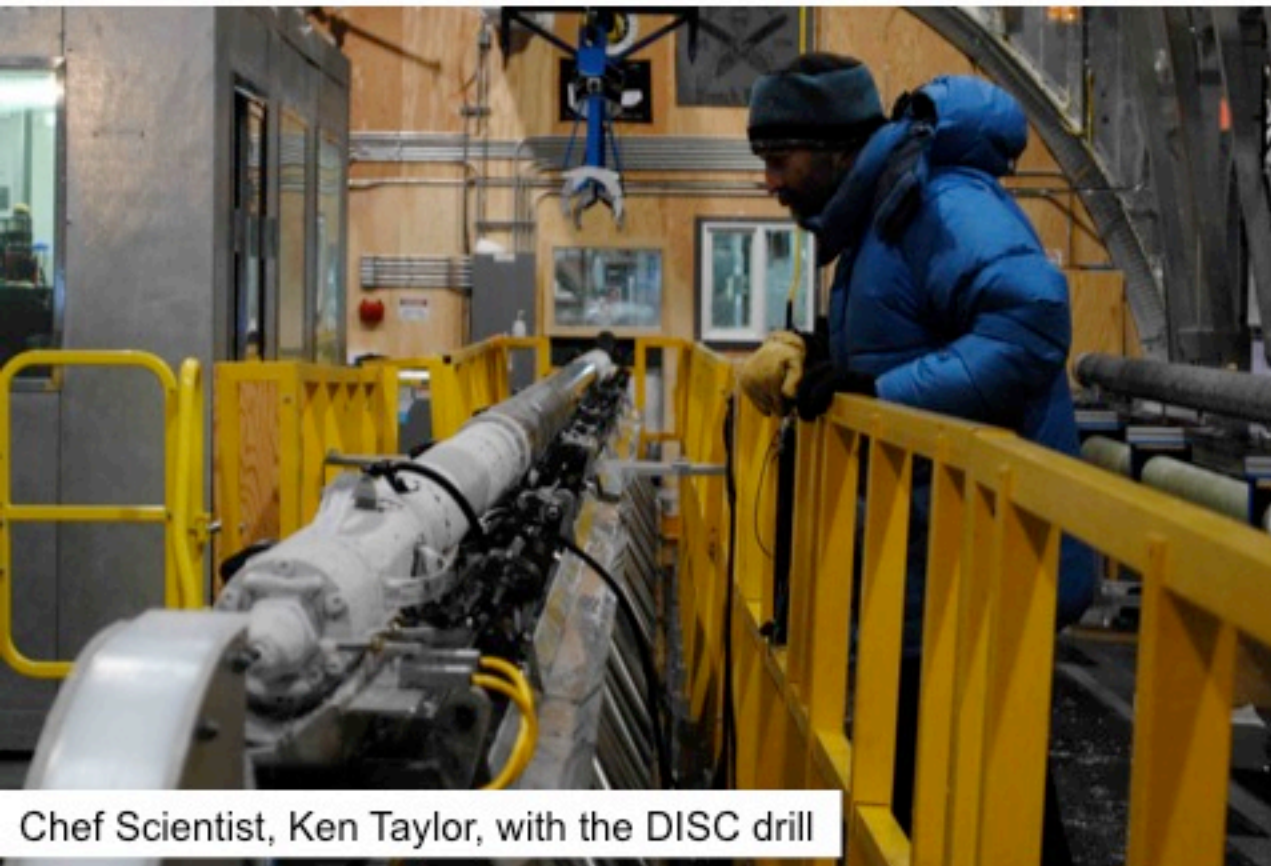
Primary WAIS Divide Ice Core Project Goals

- Recover a 2-mile-long ice core
- Develop a record of the Earth's climate over the last 100,000 years, with annual resolution back 40,000 years
- Compare the WAIS ice core climate record to Greenland ice cores records for a better picture of global climate change
- Study the stability of West Antarctic Ice Sheet
- Study bacteria within the ice cores



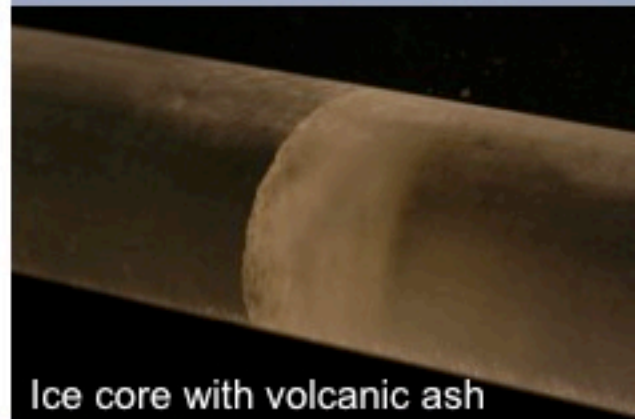
Source: Brook, 2007

How do we collect over 2 miles of ice?

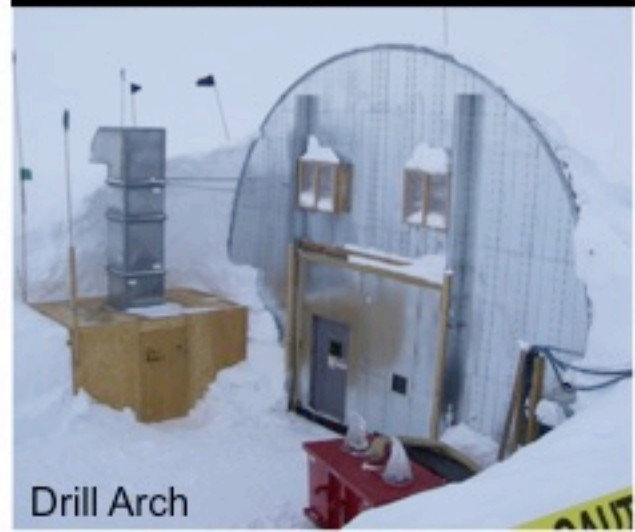


Chef Scientist, Ken Taylor, with the DISC drill

With the Deep Ice Sheet Coring Drill!
(DISC Drill)

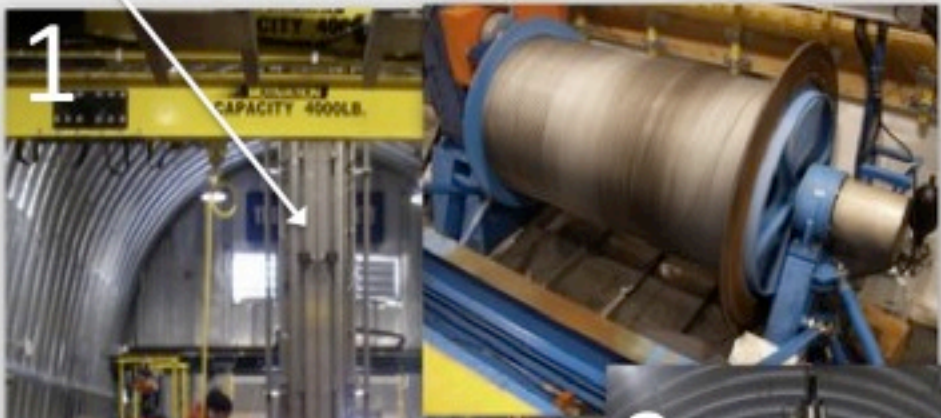


Ice core with volcanic ash



Drill Arch

Send the drill down the borehole



The core goes through a hole in the wall to the cold side of the arch, then the ice gets documented, cut, and packed.



Once you break the core out of the hole you bring it up and tilt the drill to a horizontal position.

Ice Core Science 101

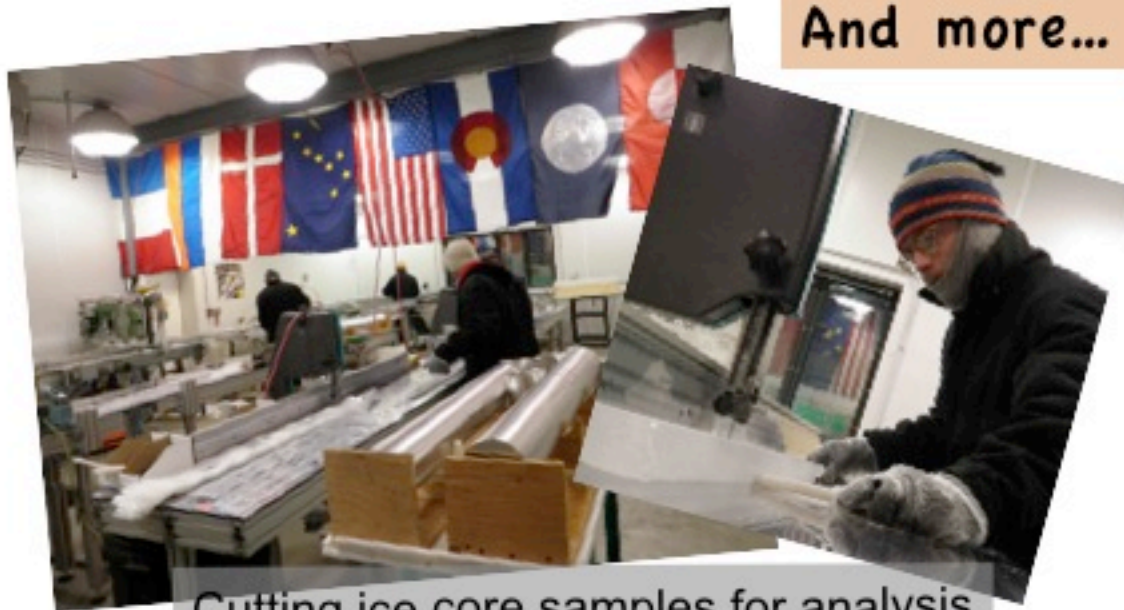


West Antarctic Ice Sheet (WAIS) Divide Deep Ice Core Project

What can ice cores tell us about past climate?

- Greenhouse gas concentration fluctuations
 - Changes in Earth's past temperature
 - Local and distal volcanism
- Ocean circulation patterns and sea ice extents
 - Atmospheric circulation patterns
- Variability in annual snow accumulation in West Antarctica

And more...



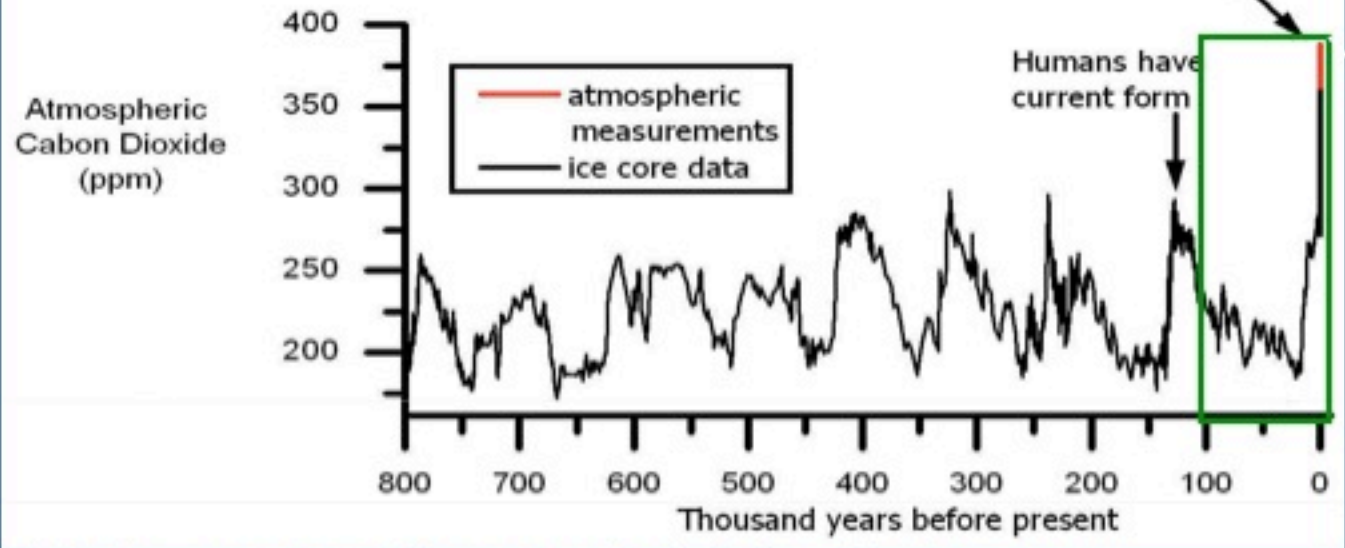
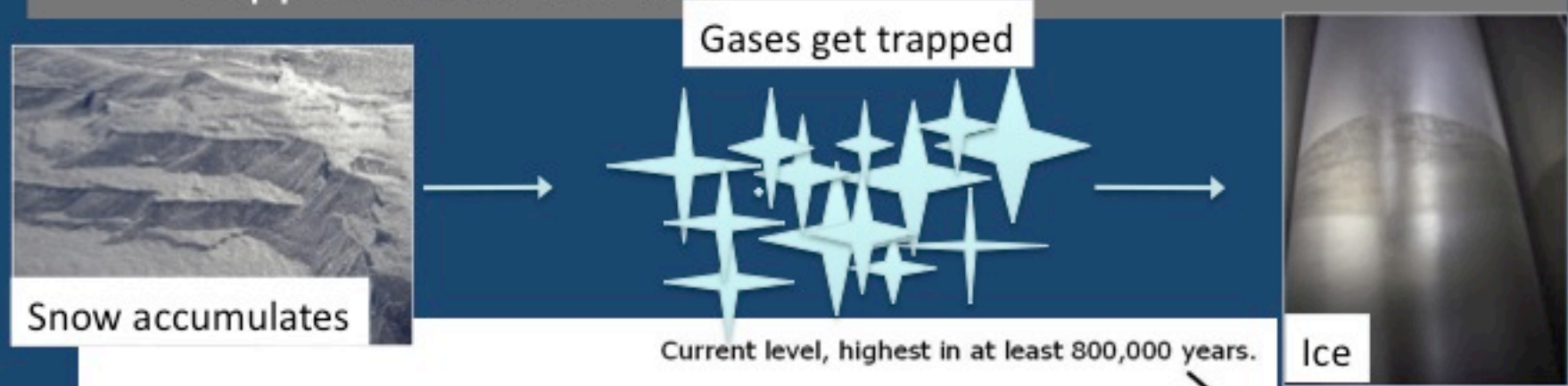
Cutting ice core samples for analysis



Ice archive at the National Ice Core Lab

Greenhouse gas concentration fluctuations

- **Ice can preserve ancient atmospheres**
 - The concentrations of greenhouse gas like carbon dioxide and methane can be extracted from air bubbles trapped within the ice.



The length of the WAIS record

This is a composite record of Antarctic ice cores

Changes in Earth's past temperature

Using isotopic ratios of hydrogen or oxygen scientists can reconstruct past temperature

Deuterium =
an isotope of hydrogen



=

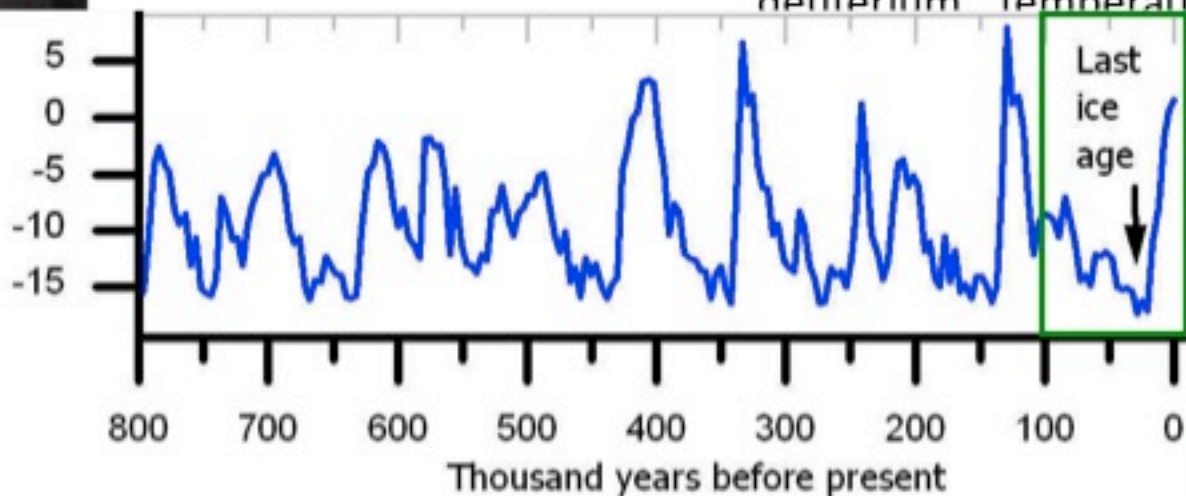


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warmer

deuterium temperature

Change in Antarctic surface temperature (°F) from current time



Data sources: Jouzel (2007), Lüthi (2008), Siegenthaler (2005), MacFarling (2006), NOAA

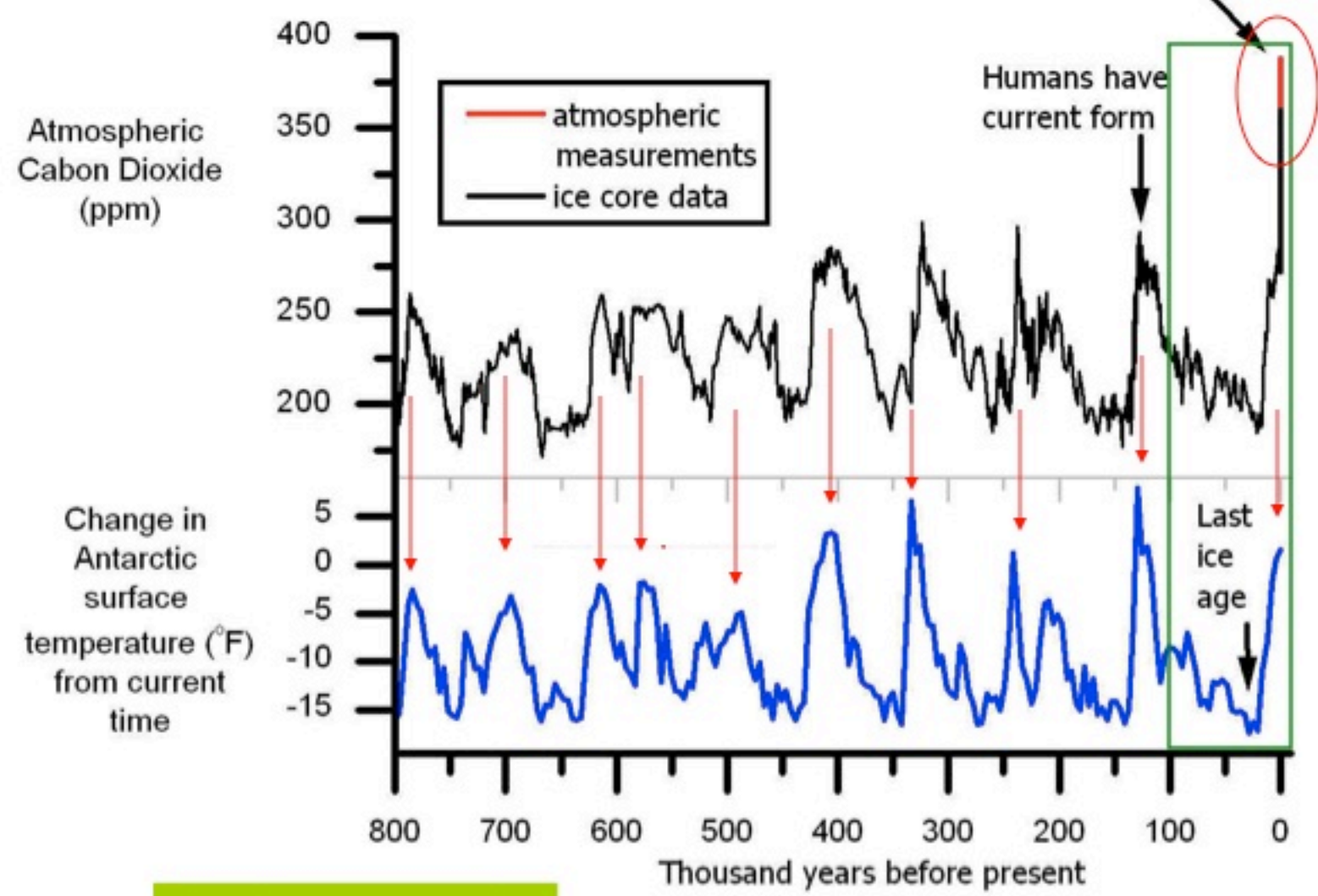
The length of the WAIS

This is a composite record of different Antarctic ice cores

Carbon Dioxide and Temperature Combined

WAIS Record

Current level, highest in at least 800,000 years.



Cool fact: The age of dinosaurs would plot 19 feet to the left on this graph!

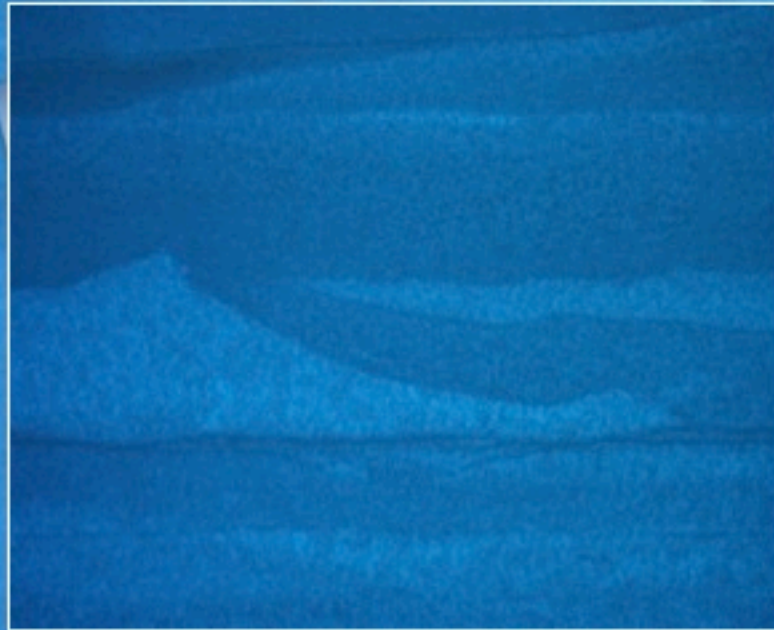
Data sources: Jouzel (2007), Lüthi (2008), Siegenthaler (2005), MacFarling (2006), NOAA

Local and Distal (far away) Volcanic Eruptions



- Chemical signatures of ash can be diagnostic of the source volcano
- Several ash and cloudy layers were documented in the WAIS Divide cores
- Preliminary results suggest WAIS cores preserve volcanic ash from Mt. Berlin and the Pleaides volcanoes (both Antarctic; Dunbar et al., 2010).
- There is hope that there is evidence of eruptions from around the world

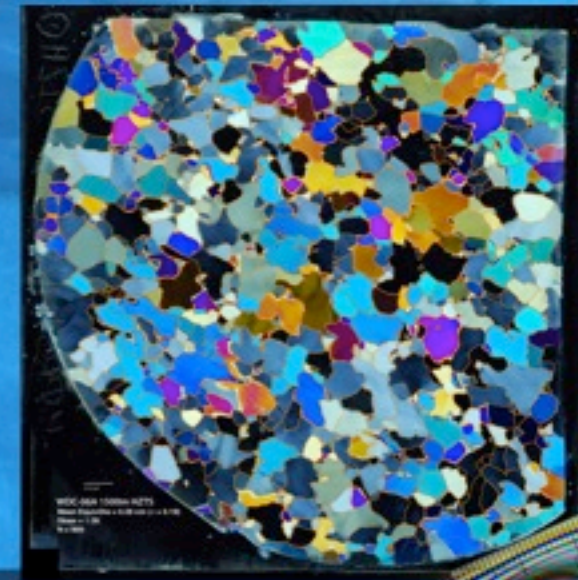
Variability in annual snow accumulation in West Antarctica

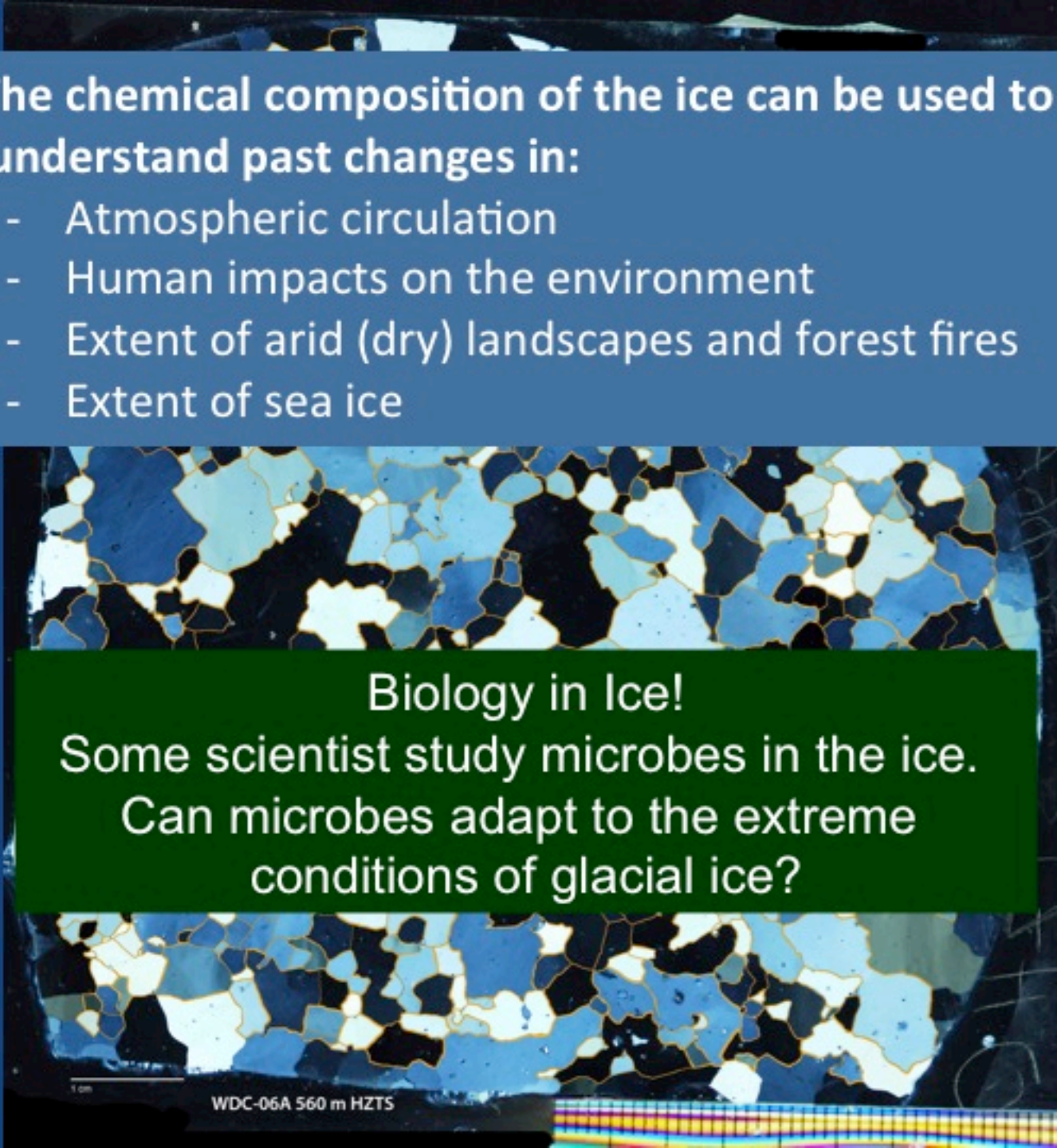


John Fegyveresi looking at annual layers of snow accumulation



Measuring snow density to determine when the snow was deposited (winter vs. summer)



A microscopic view of ice crystals, showing a complex, interconnected network of light blue and white crystalline structures. The crystals vary in size and shape, creating a porous, cellular appearance. The background is dark, making the lighter-colored ice stand out. A scale bar is visible in the bottom left corner, and a colorful calibration strip is at the bottom right.

The chemical composition of the ice can be used to understand past changes in:

- Atmospheric circulation
- Human impacts on the environment
- Extent of arid (dry) landscapes and forest fires
- Extent of sea ice

Biology in Ice!

Some scientist study microbes in the ice.
Can microbes adapt to the extreme
conditions of glacial ice?

2010-2011 is the last main drill season!

After that...

- **February-April 2011**- Ice is transported from Antarctica to Lakewood, Colorado
- **June-August 2011**- Ice cores are cut into several pieces and shipped to various labs for analysis
- **2011-2014**- continued studies at WAIS Divide including borehole geophysics and replicate coring
- **Ongoing**: Data are produced, interpreted, and published





Upcoming WAIS PolarConnect Events:



Life on an Ice Sheet- what is it like to live in the deep field in Antarctica?

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)

Reaching our icy goals: a summary of the last main WAIS drill season

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)



Special thanks to:

Janet Warburton and Kristin Timm

Ronnie Owens

Don Voigt

Kendrick Taylor

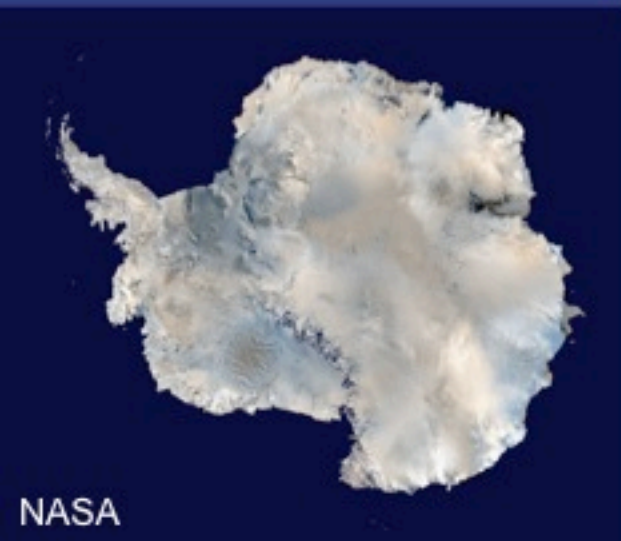
Mark Twickler and Joe Souney

Cara Sucher

Barney Peterson and the students at James Monroe Elementary

Anna McKee

Peter Neff



NASA



QUESTIONS?

Heidi's footprints after a storm

Upcoming Events

Watch for and register for upcoming events at www.polartrac.com!

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>

