Welcome to Live from IPY!

International Polar Day: Ice Sheets

Thursday 13 December 2007, 1730 UTC

USA: 7:30 HST, 8:30 AST, 9:30 PST, 10:30 MST, 11:30 CST, 12:30 EST, 2:30PM in Greenland, 5:30PM in UK, 6:30PM in continental Europe, 6:30AM next day at McMurdo, Antarctica

To join the audio portion of today's presentation please dial **1-800-315-6338**. You will be prompted to enter your code: **78732#. International participants must be called by our operator to participate. Please email fischer@arcus.org if this applies to you and you need to be called.**

Roll Call

When your name is called please tell us:

- If you are here
- How many adults/students are with you?
- What grade are the students in?
- Where you are calling from?

Please remember to use *6 to mute your phone when you are not talking. You can use *6 to unmute when you want to talk or ask a question. Thank You.

What to Expect Today

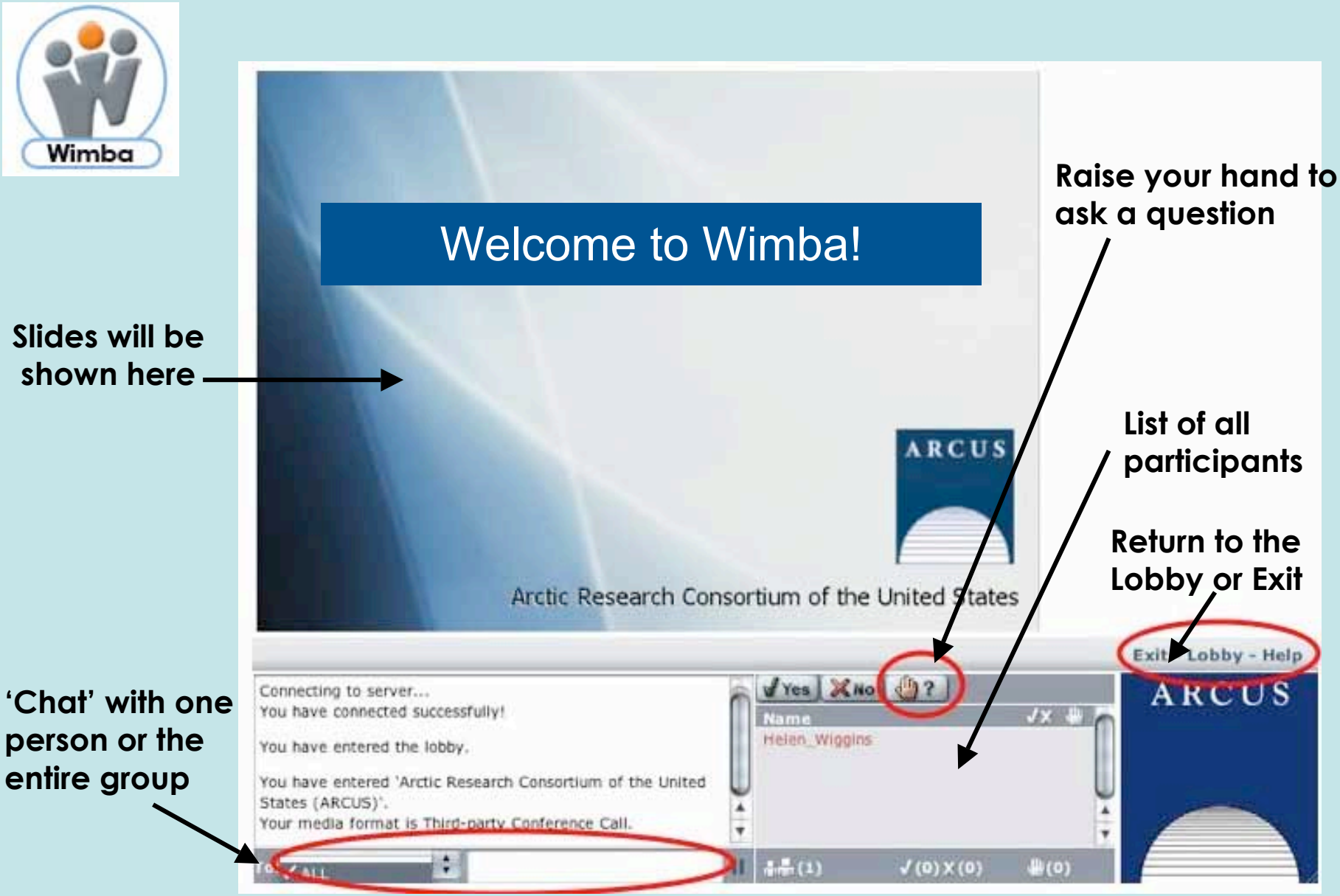
Communication with remote places can be challenging. We hope it will be clear today, but some things to expect include:

- Odd Noises/ Sounds of "chimes"
- Dropped Calls
- Small Delays
- Garbled voices
- Insufficient volume

We will address these problems to the best of our ability. Thank you for your patience!

Presentation Outline

- Introduction
  - Janet Warburton
- The International Polar Year & Ice Sheet Day
  - Rhian Salmon & Mark McCaffrey
- The World's Ice Sheets
  - Zoe Courville
- Live from the WAIS Divide, CReSIS and PolarTREC
  - Brandon Gillette
- Live from McMurdo Station, ANDRILL Project
  - David Harwood
- Live from Antarctica, Norwegian/US Traverse
  - Mary Albert
- Live from Antarctica, Sweden/Japan Traverse
  - Per Holmlund
- Live from Antarctica, US-ITASE Traverse
  - Paul Mayewski
- Research on the Greenland Ice Sheet
  - Zoe Courville
- Questions & Answers
- Wrap up and adjourn



Please Note: Today's event will be recorded and archived at www.polartrec.com.

What is ARCUS?

ARCUS (Arctic Research Consortium of the United States) is a non-profit corporation consisting of institutions operated for educational, professional, or scientific purposes. ARCUS provides leadership in advancing knowledge and understanding of the Polar Regions though a variety of programs and outreach endeavors.

ARCUS and PolarTREC

ARCUS was awarded funding from the National Science Foundation to manage PolarTREC, a three-year (2007-2009) International Polar Year (IPY) Education program.

www.arcus.org

What is PolarTREC?

PolarTREC is a professional development experience in which K-12 teachers are paired with researchers in authentic polar research experiences.

In the next three years **over 40 teachers** from around the United States will join scientists in the Arctic and Antarctica in celebration of the International Polar Year!

www.polartrec.com

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International Polar Year 2007-2009

The International Polar Year (2007-2009) is an exciting scientific campaign focusing on the world's polar regions!

IPY is a time for discovery, science, learning, and awareness about the polar regions with activities for youth, scientists, and the public.

www.ipy.org

International Polar Day:
ICE SHEETS

12.13.07 marks the second of the quarterly International Polar Days, this time focusing on Ice Sheets.

Did You Know…

Only two ice masses are large enough to be classified as ice sheets: the Greenland Ice Sheet and the Antarctic Ice Sheet

The ice sheets are over 1 kilometer thick on average and are the largest reservoir of fresh water on the Earth.

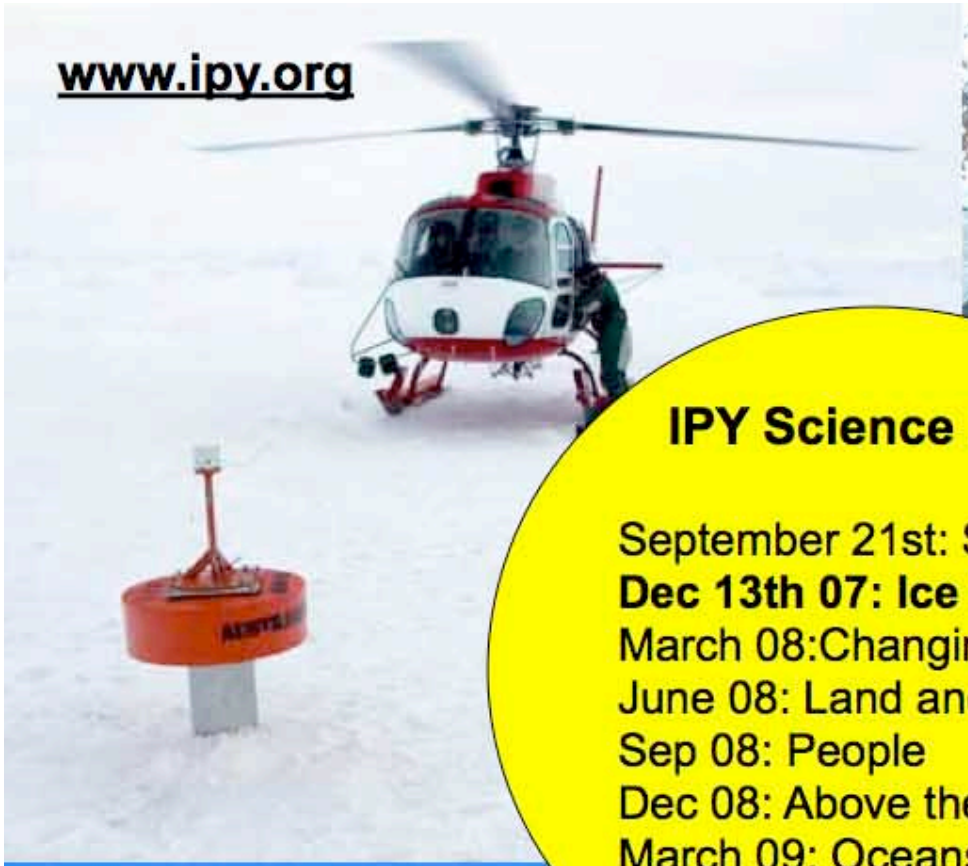
The Antarctic Ice Sheet is over 4.5 km (~ 2.8 miles) deep in its deepest spot. Most (around 90%) of the fresh water on the surface of the earth, and 98% of the Earth's ice, exists as ice in Antarctica; if it all melted, it would raise sea level by approximately 60 meters.

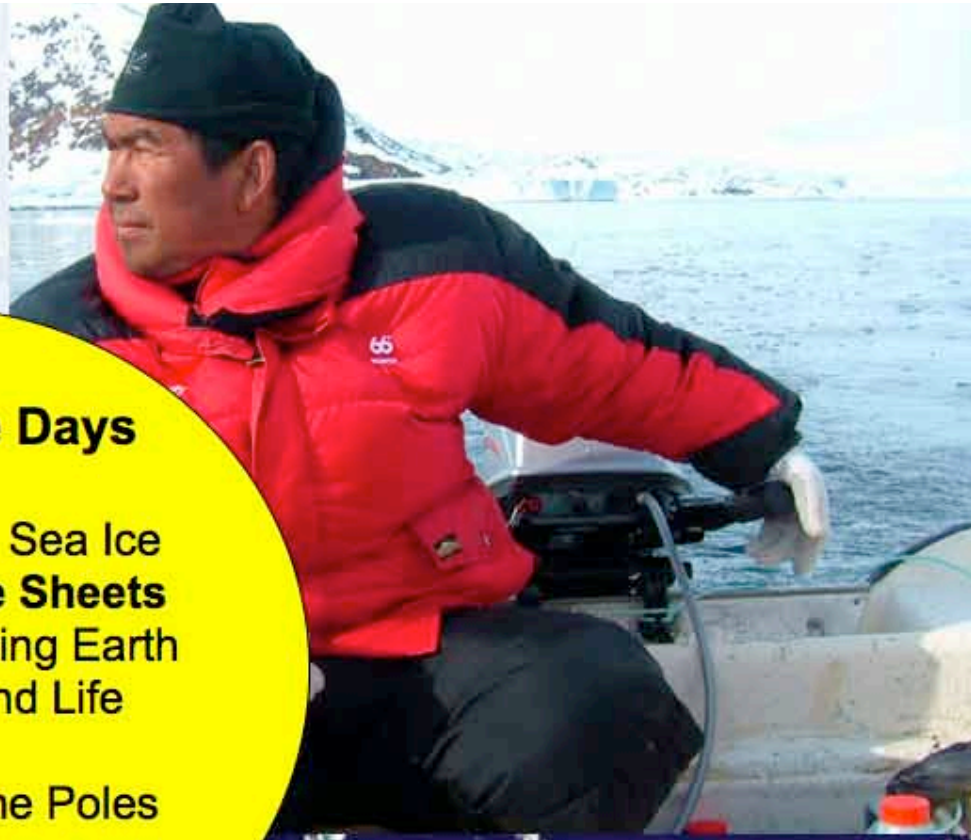
The Greenland Ice Sheet started forming around one million years ago, and in the center it is over three kilometers (~ two miles) deep. If the Greenland Ice Sheet melted, it would raise sea level by approximately 6 meters.

Michael Rynbrandt

The (Fourth) International Polar Year

www.ipy.org





IPY Science Days

September 21st: Sea Ice
Dec 13th 07: Ice Sheets
March 08:Changing Earth
June 08: Land and Life
Sep 08: People
Dec 08: Above the Poles
March 09: Oceans

teachers
students
press releases
live web events
videos
resources

virtual balloon launch

INTERNATIONAL 2007 2008 POLAR YEAR

HOME | ABOUT IPY | EVENTS CALENDAR | CONTACT IPY | RSS FEEDS

Browse by Events Calendar or Search: Go

Advanced Search

FOCUS ON: ATMOSPHERE
ICE
LAND
OCEANS
PEOPLE
SPACE

PARTNERS: EDUCATORS
PARTICIPANTS
PRESS

WHAT IS IPY?

The International Polar Year is a large scientific programme focused on the Arctic and the Antarctic from March 2007 to March 2009. Learn more about IPY.

» Contact IPY
» National IPY Committees
» Youth and Early Career
» Get Involved
» Who's Who
» IPY History
» IPY Site Contributors
» IPY Project Database
» Data and Information

HIGHLIGHTS

Norwegian-US Antarctic Traverse: Traversing with blowing snow

US-Norway Traverse, Dec 9, 2007

Traverse progress continues in spite of the first blowing snow and poor visibility of the traverse. More...

International Polar Day - Ice Sheets

December 13th, 2007, marks the 2nd International Polar day; this time focussing on Ice Sheets, Traverses, and Exploration. More...

IPY in Google Earth

Learn more about IPY projects using Google Earth More...

NEWS & ANNOUNCEMENTS

» IPY-relevant sessions at AGU
Dec 6, 2007

IPY BLOGS

» Norwegian-US Antarctic Traverse: Traversing with blowing snow

FRIENDS OF IPY

» Penguins and Seals and Whales, Oh My!

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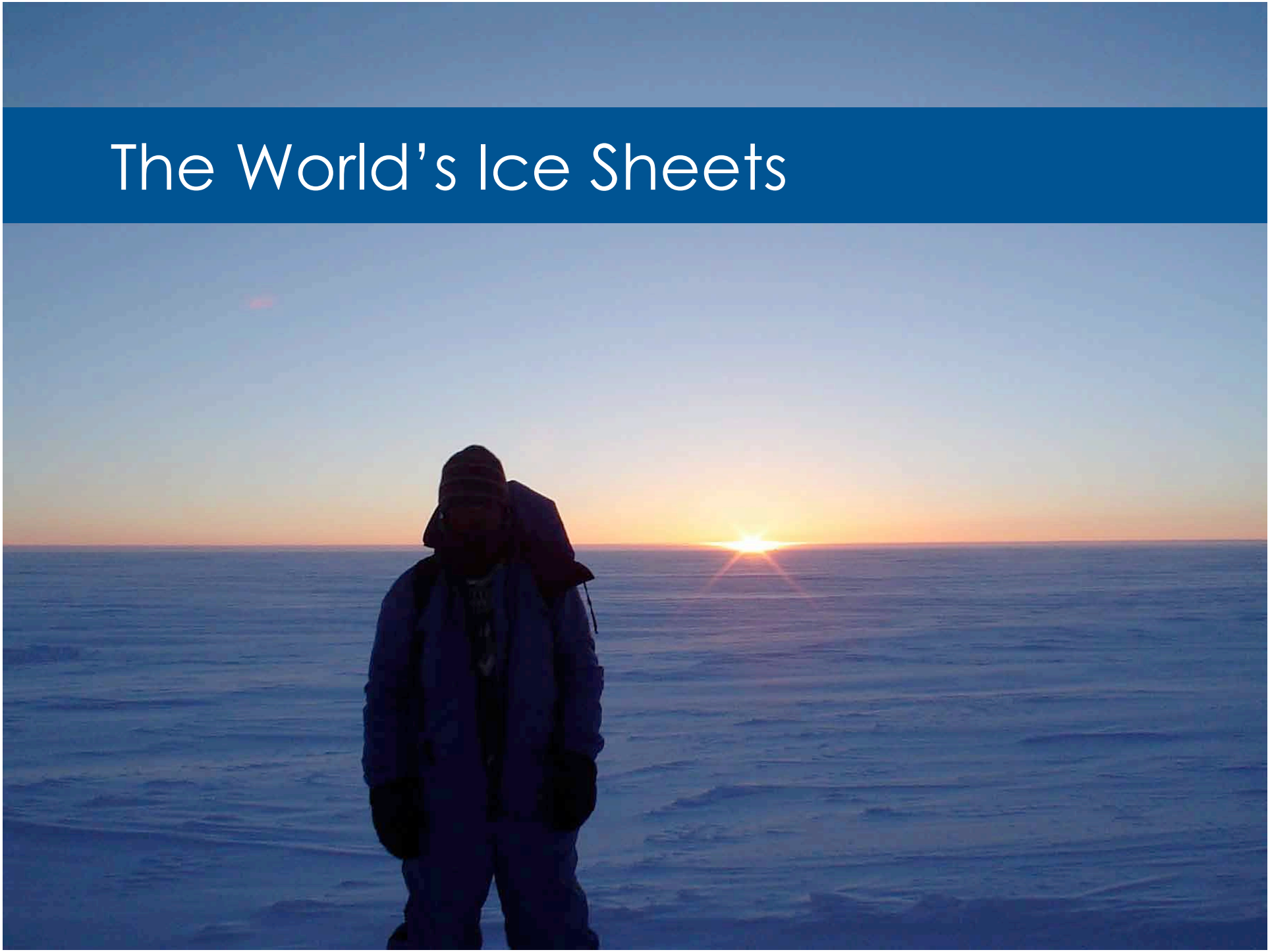
The World's Ice Sheets



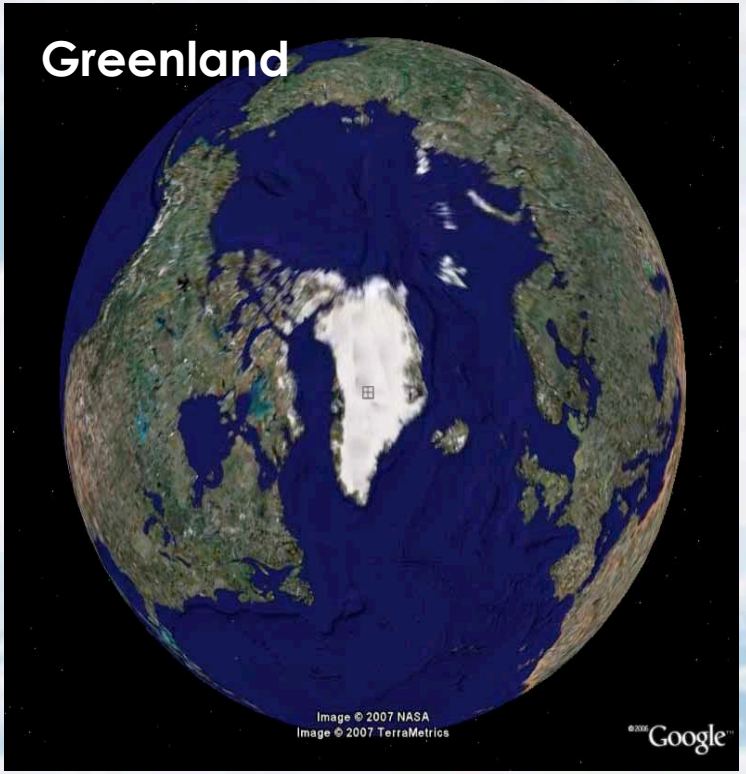
East and West Antarctica

Average annual temp: -50°C at South Pole

Accumulation rate: 20 cm per year

Extent: 14 million km^2 (98% of Antarctica's surface)

Thickness: ~2.7km



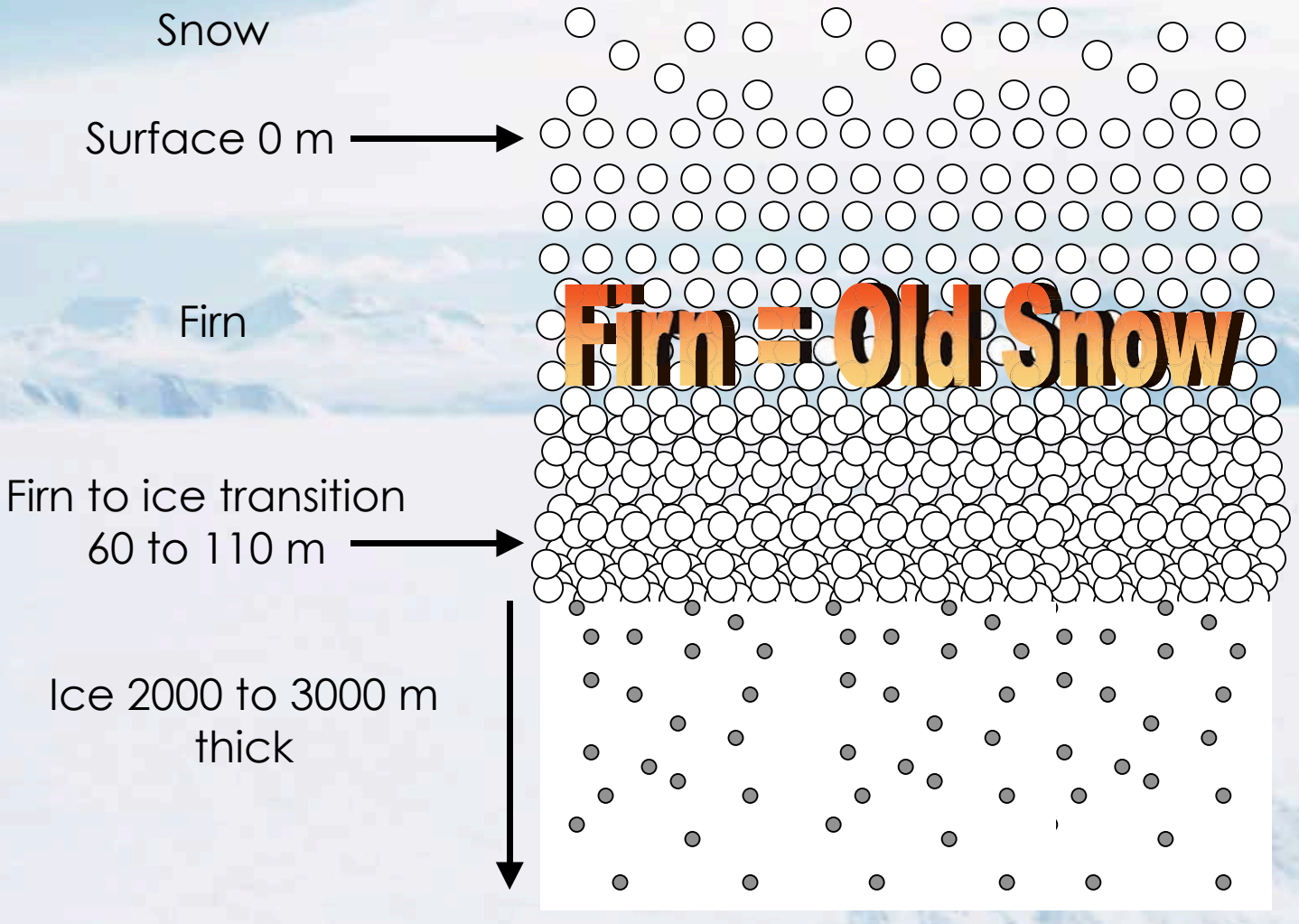
Average annual temp: -31°C at highest elevation

Accumulation rate: 62 cm per year

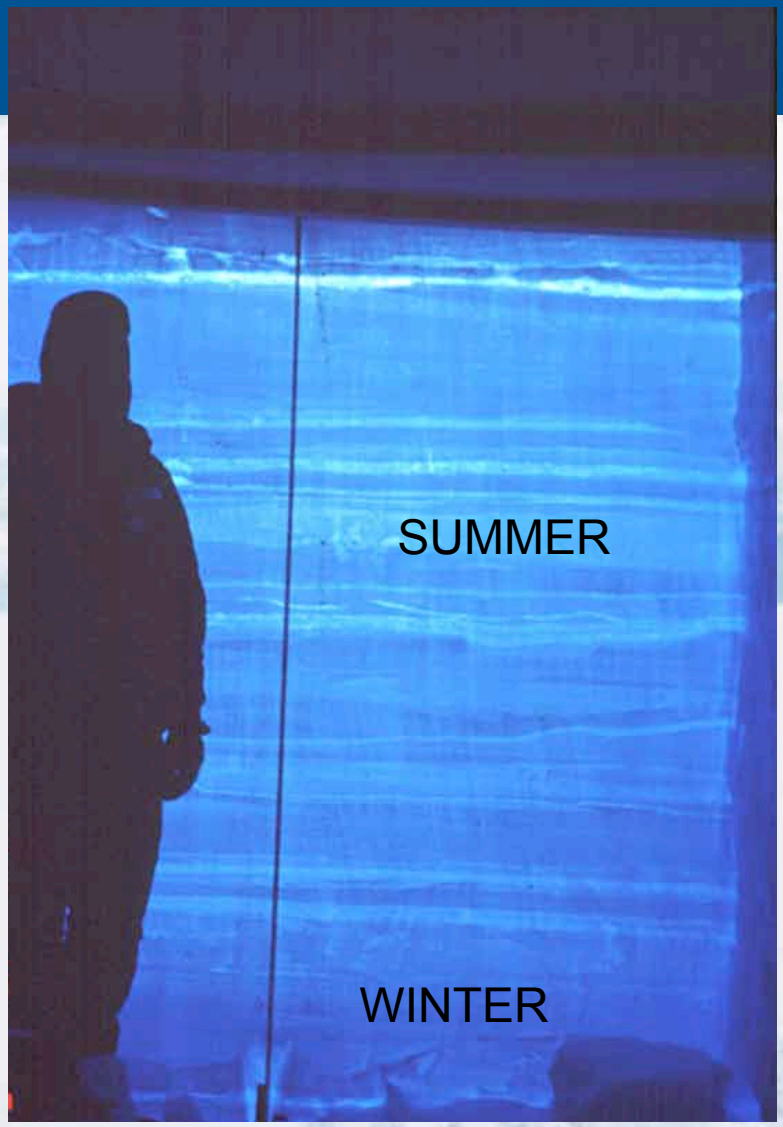
Extent: 1.71 million km^2 (80% of Greenland's surface)

Thickness: >3km

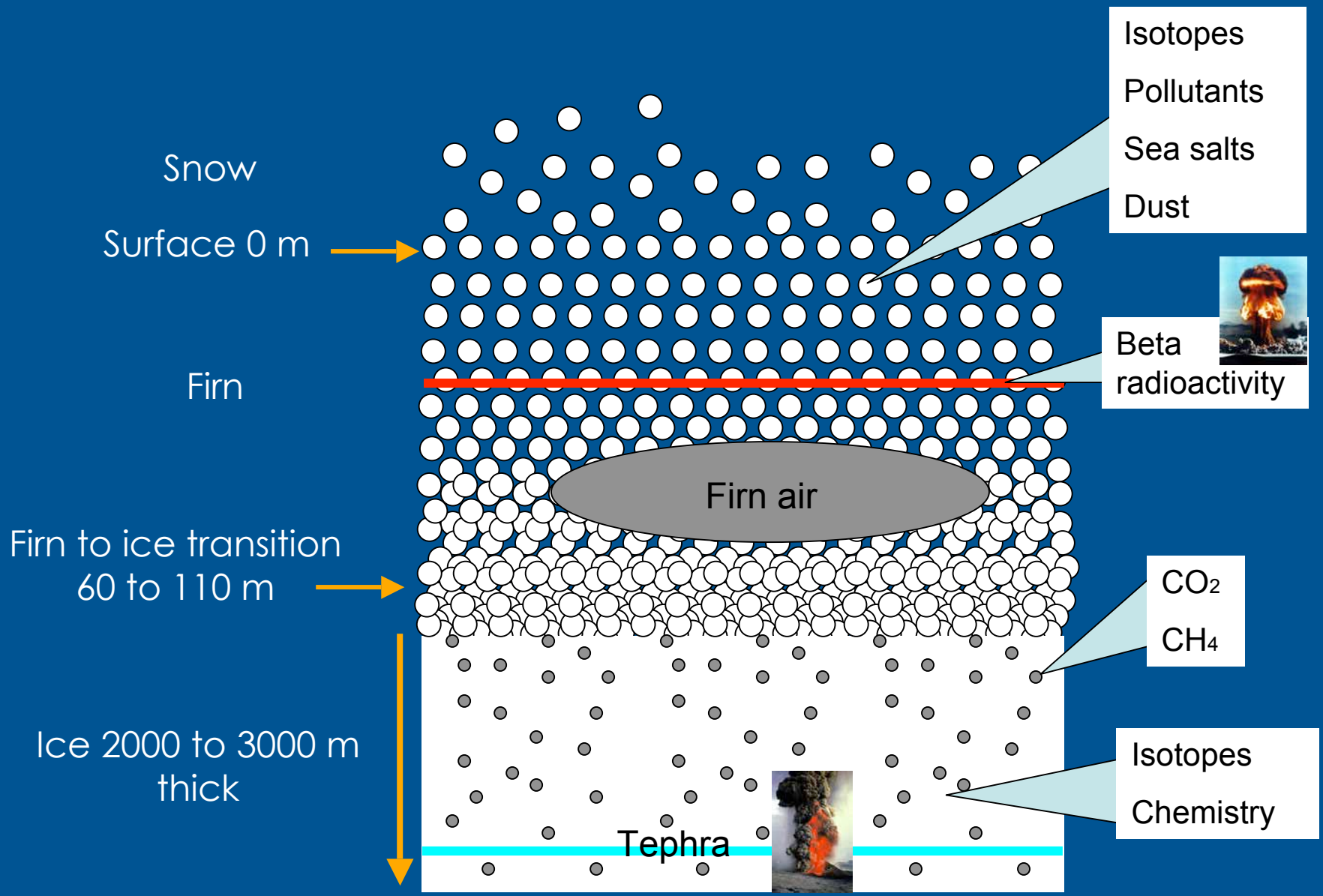
Composition of Ice Sheets



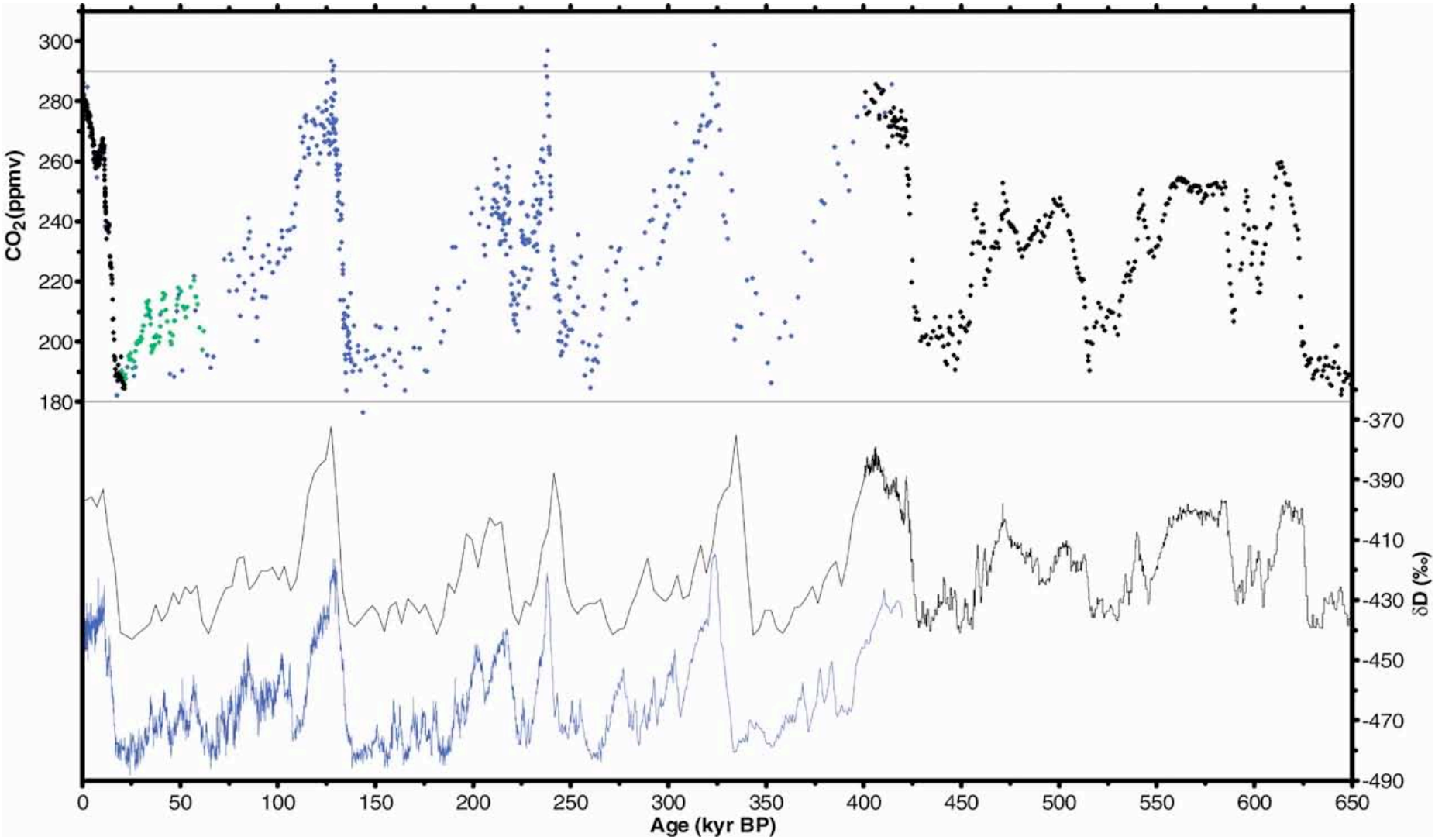
Layering in Firn



Ice Sheets as a Climate Record



Climate Records

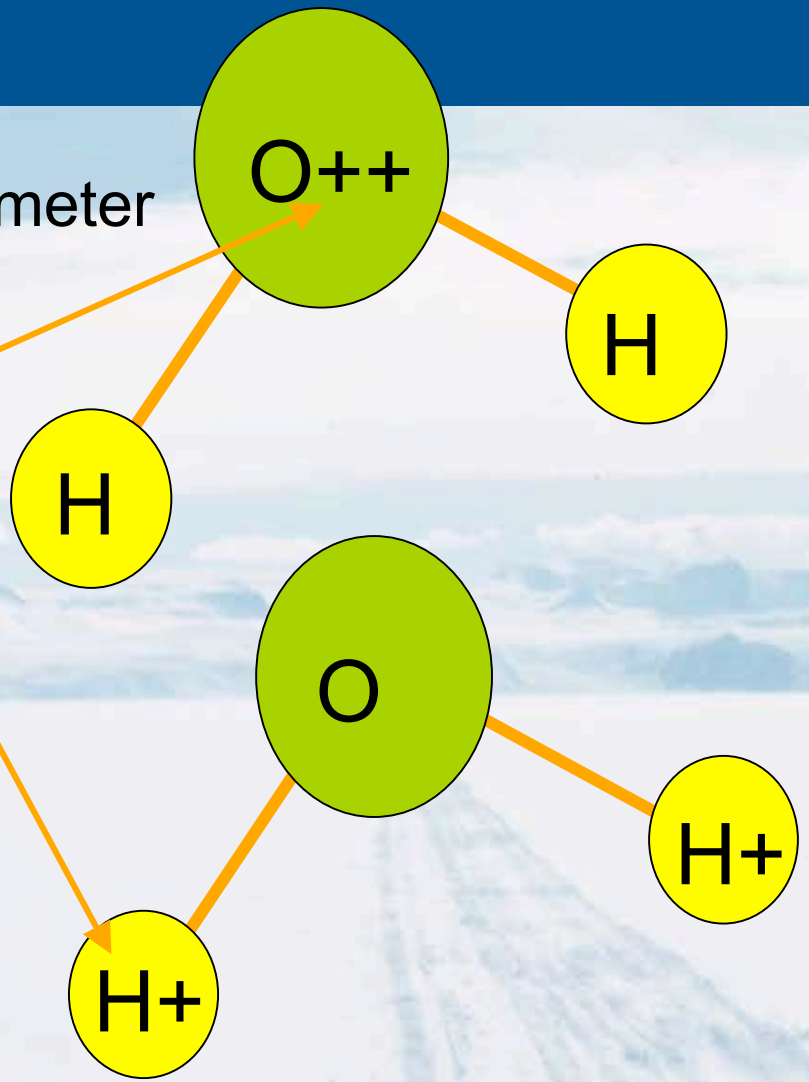


Now → 650,000 years ago

Isotopes

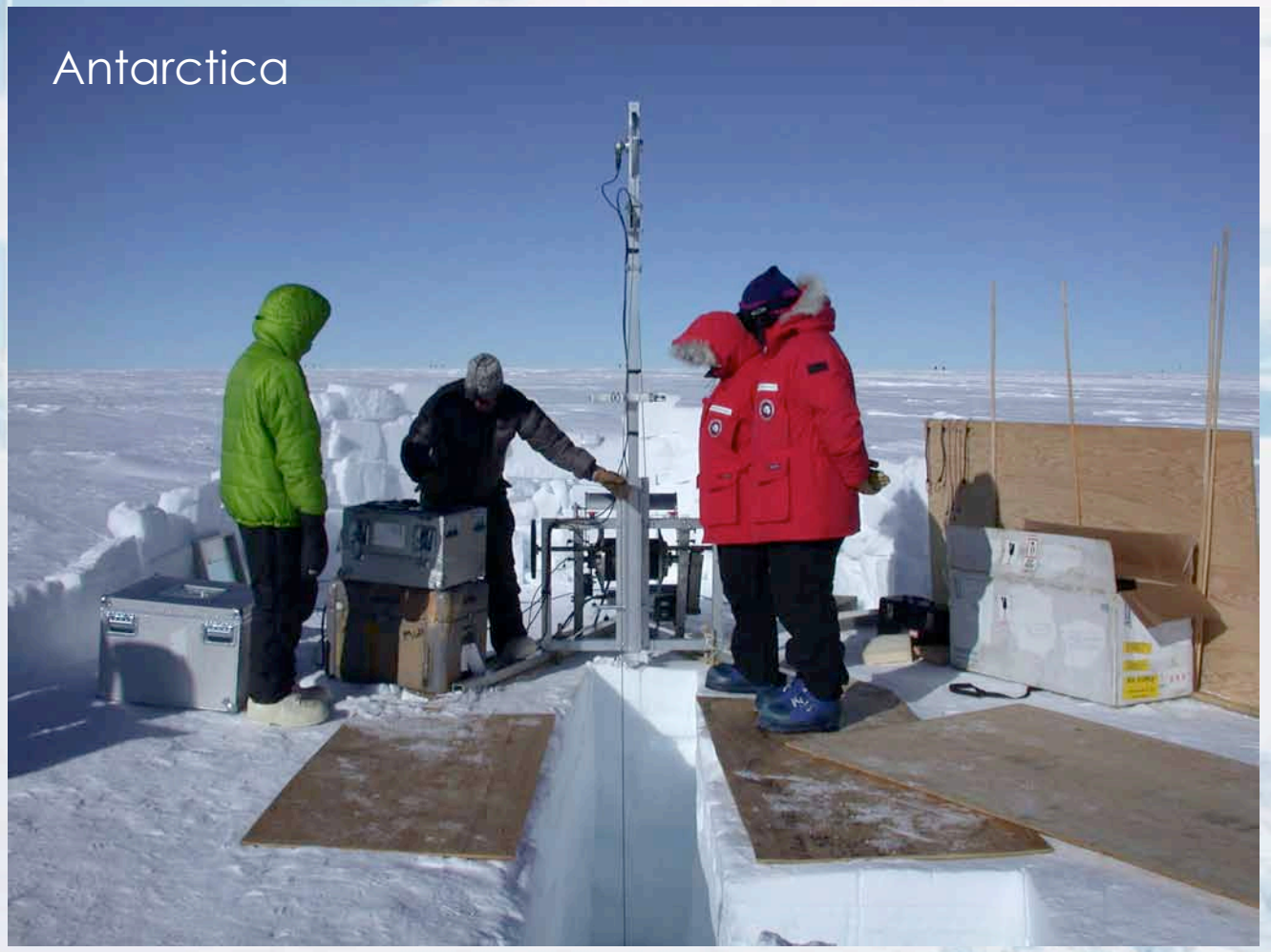
Isotopes = chemical thermometer

Extra protons



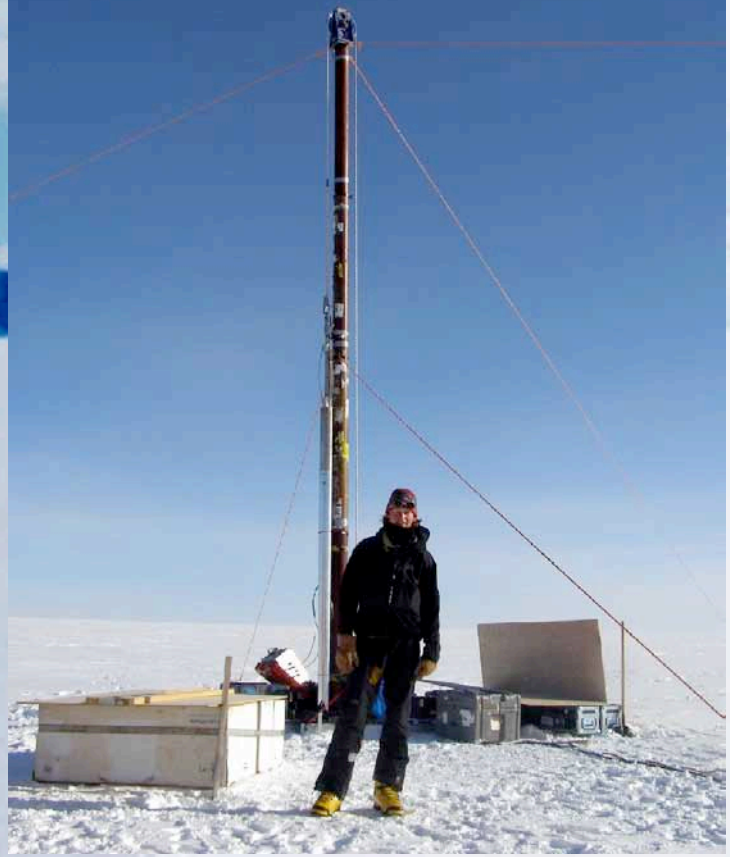
Heavier isotopes more prevalent in summer and in warmer years.

Ice Core Drilling



Ice Core Drilling

Greenland



US ITASE- West Antarctica

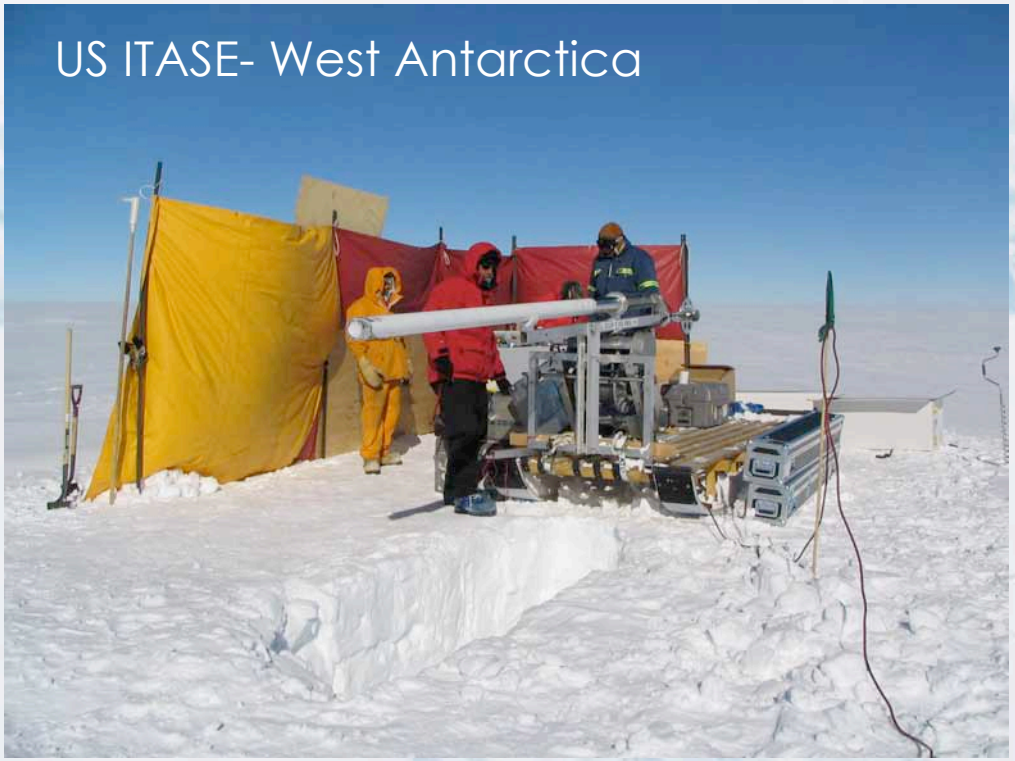
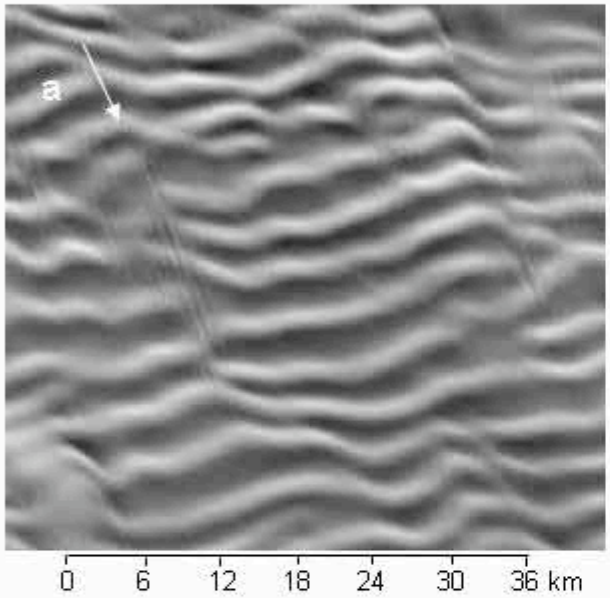
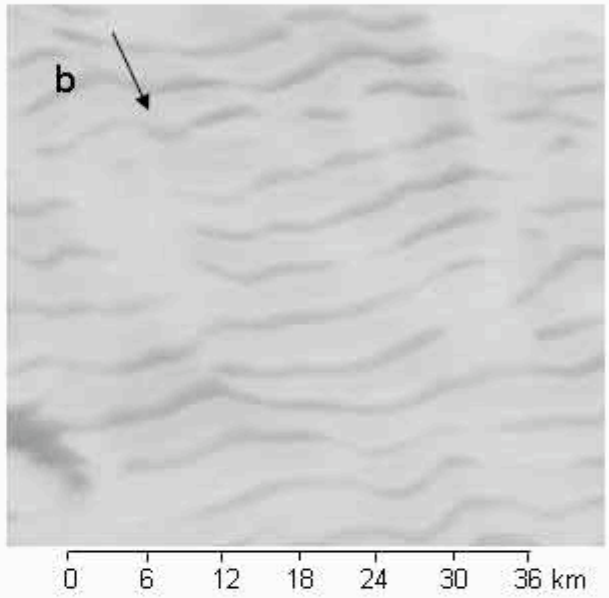


Image courtesy U. Maine

Remote Sensing



MODIS visible-band image composite of megadunes. Illumination from the upper right corner.

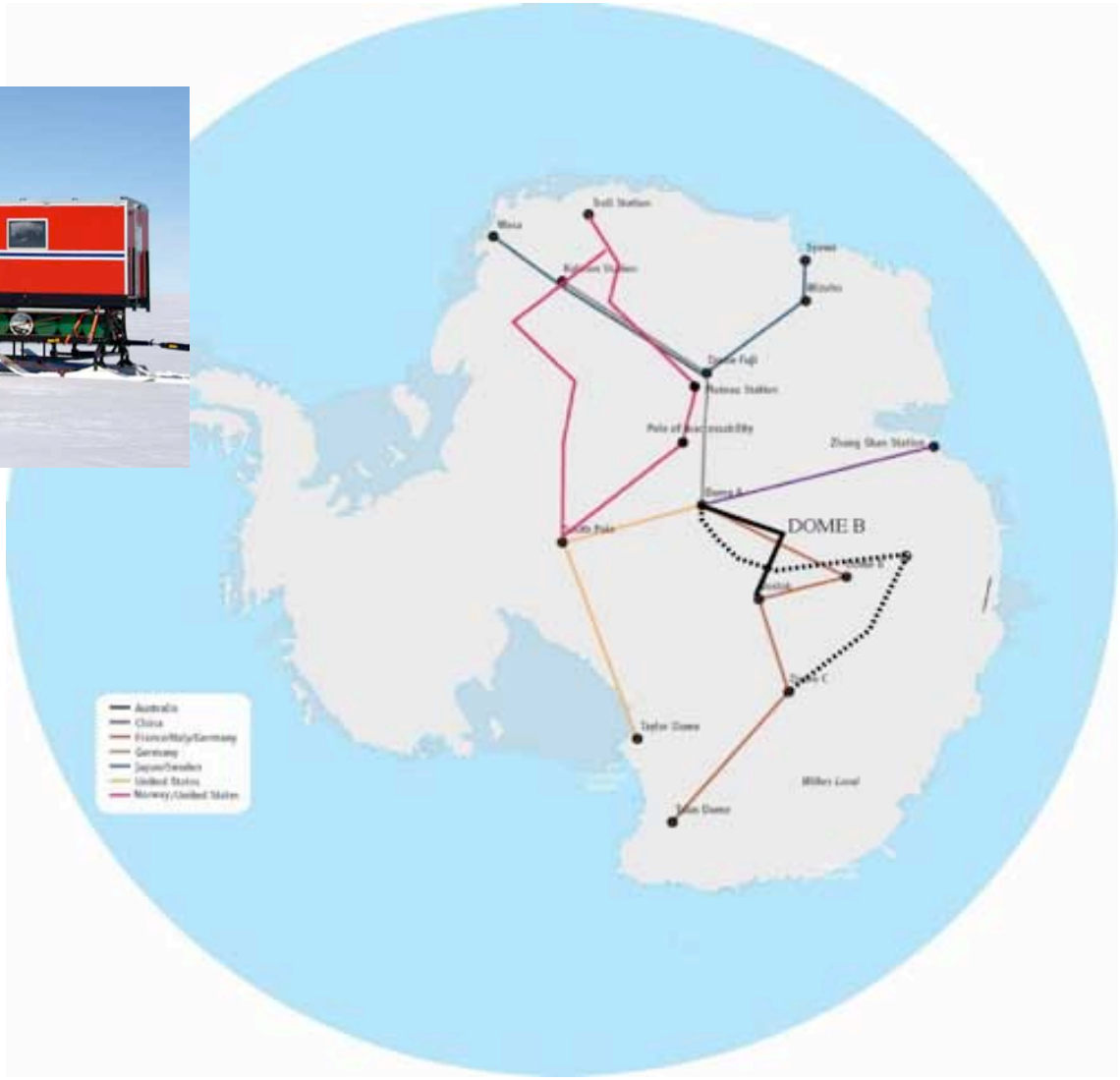


Radarsat C-band backscatter image

Scientific Traverses

Norway-US

US ITASE



For More Information…

The Two Mile Time Machine
by Richard Alley

IPCC (Intergovernmental Panel on Climate Change) 2007 report
www.ipcc.ch

www.realclimate.org (climate blog)

Polarpalooza
www.passporttoknowledge.com
http://passporttoknowledge.com/polar-palooza/pp06.php

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Wrap up and adjourn

Flow Dynamics of Two Amundsen Sea Glaciers, Thwaites and Pine Island

R.B. Alley and S. Anandakrishnan

Field Team: J. P. Winberry, H. Horgan, L. Zoet, L. Peters, K. Christenson, B. Gillette

National Science Foundation :: Kansas Technology Enterprise Corporation :: National Aeronautics and Space Administration

The University of Kansas | The Ohio State University | Pennsylvania State University
The University of Maine | Elizabeth City State University | Haskell Indian Nations University

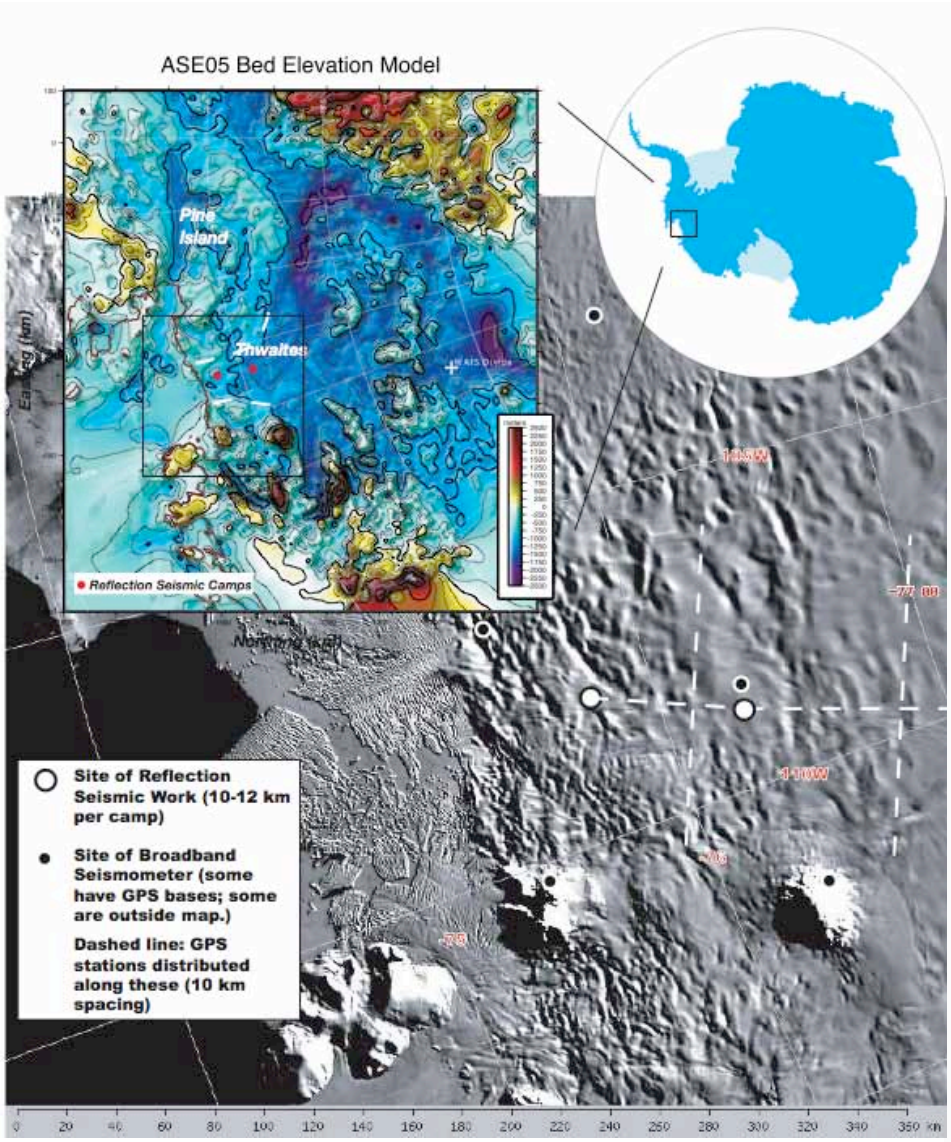
Centre for Polar Observation and Modelling | University of Copenhagen
Technical University of Denmark | Antarctic Climate & Ecosystems CRC

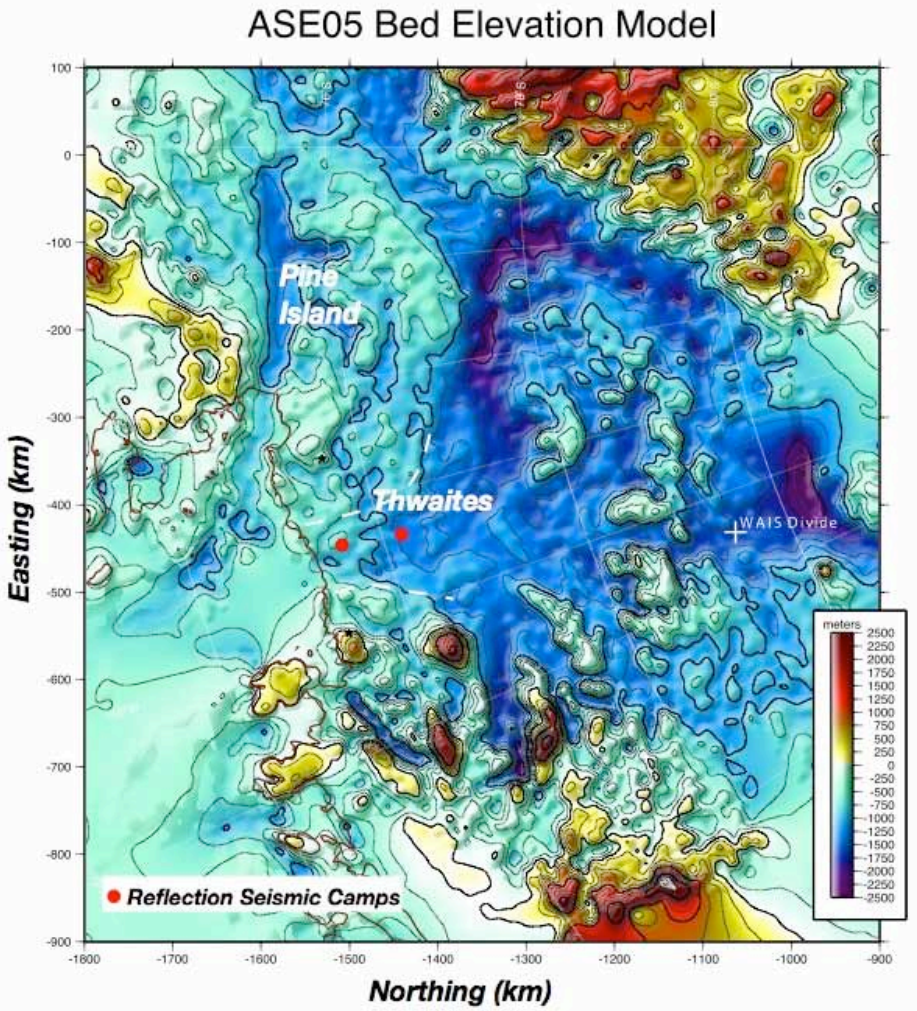
CReSIS

What do we need to know to model ice sheets using computers?

- **Three conditions computer models need to know for accurate models:**
  - –what is at the bed of the ice-sheet: water, rock, or mud?
  - –are there large bumps or is it smooth?
  - –do tides push the ice-sheet back and forth?

- **We hope to find out by using the following techniques:**
  - –reflection seismic imaging uses sound waves to “peer” beneath the ice-sheet telling us what material is below.
  - –and passive seismic monitoring (more sound waves) will tell us which parts are “sticky” and which are smooth.
  - –GPS motion monitoring should reveal the role of tidas.


ASE05 Bed Elevation Model
Pine Island
Thwaites
WAIS Divide
Reflection Seismic Camps
meters
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
-250
-500
-750
-1000
-1250
-1500
-1750
-2000
-2250
-2500
105°W
-77° 00'
110°W
-75°
Site of Reflection Seismic Work (10-12 km per camp)
Site of Broadband Seismometer (some have GPS bases; some are outside map.)
Dashed line: GPS stations distributed along these (10 km spacing)
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360 km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Easting (km)
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-200
-300
-400
-500
-600
-700
-800
-900
Northing (km)
-1800 -1700 -1600 -1500 -1400 -1300 -1200 -1100 -1000 -900

Brandon and the Team

WAIS Divide Camp

Drilling Practice

For more information:

www.cresis.ku.edu

www.psice.psu.edu

Read journals, ask questions, and see pictures at:

www.polartrec.com

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ANDRILL
ANtarctic geological DRILLing

ANDRILL is a multinational collaboration comprised of more than 200 scientists, students, and educators from five nations to recover stratigraphic records from the Antarctic margin using Cape Roberts Project (CRP) technology.

The chief objective is to drill back in time to recover a history of paleoenvironmental changes that will guide our understanding of how fast, how large, and how frequent were glacial and interglacial changes in the Antarctica region. Future scenarios of global warming require guidance and constraint from past history that will reveal potential timing frequency and site of future changes.

ARISE Team

ANDRILL Research Immersion for Science Educators

2007

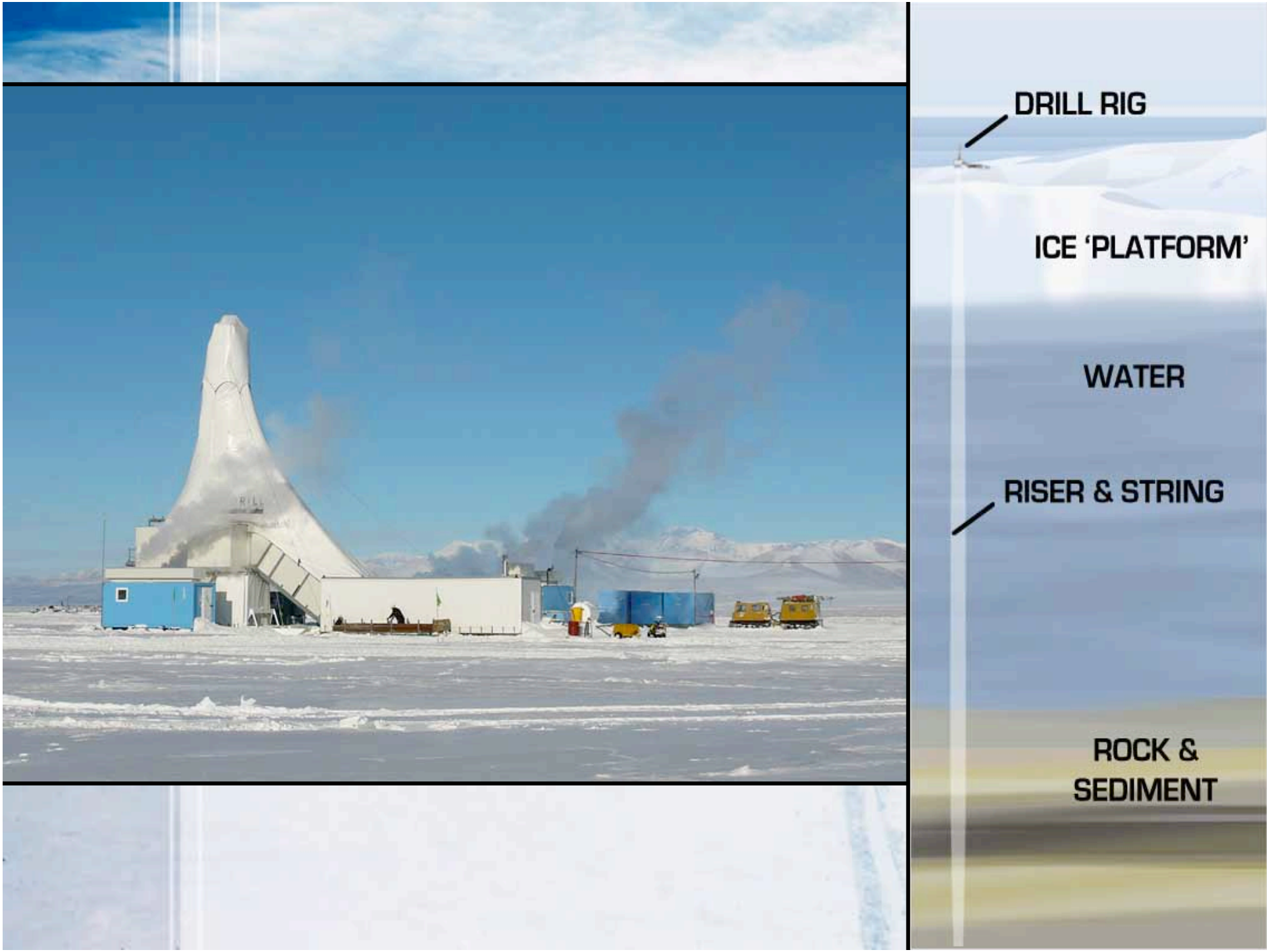
Front row: Kate Pound, Julia Dooley, Robin Frisch-Gleason, Louise Huffman

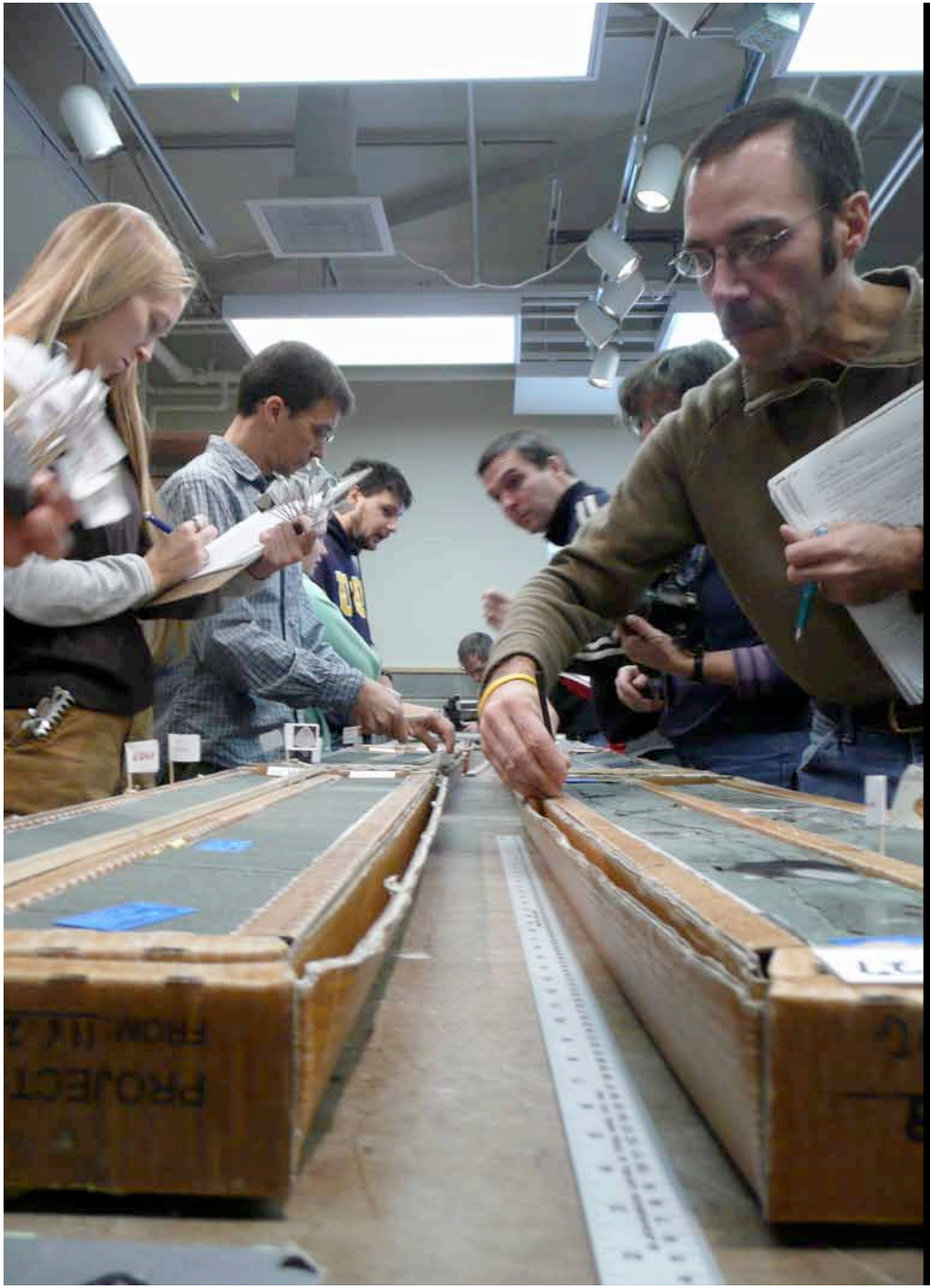
Back row: Joanna Hubbard, Rainer Lehmann, Bob Williams, Ken Mankoff, Graziano Scotto di Clemente

2006

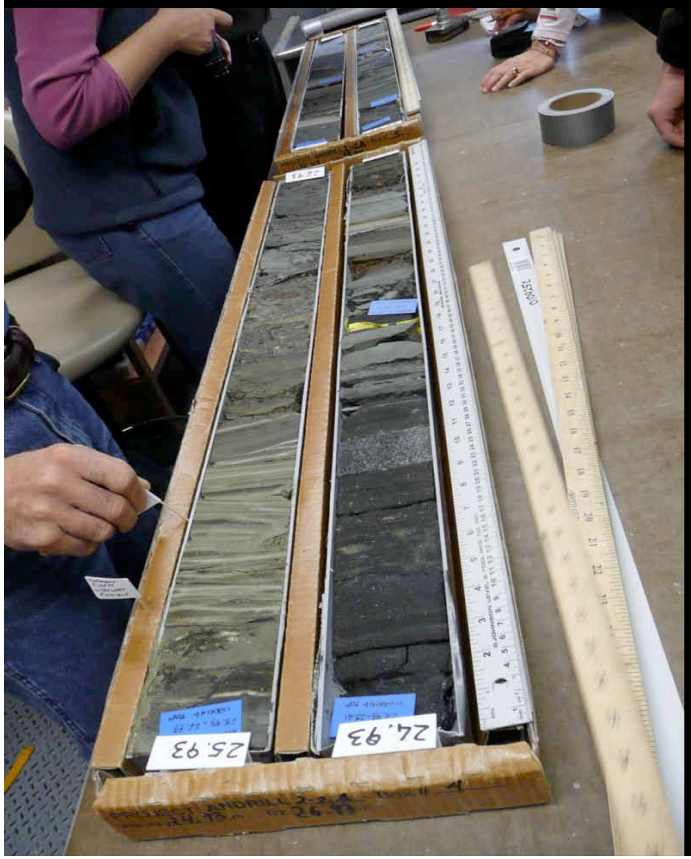
Vanessa Miller, Matteo Cattadori, Julian Thomson, Betty Trummel, Alexander Siegmund, LuAnn Dahlman

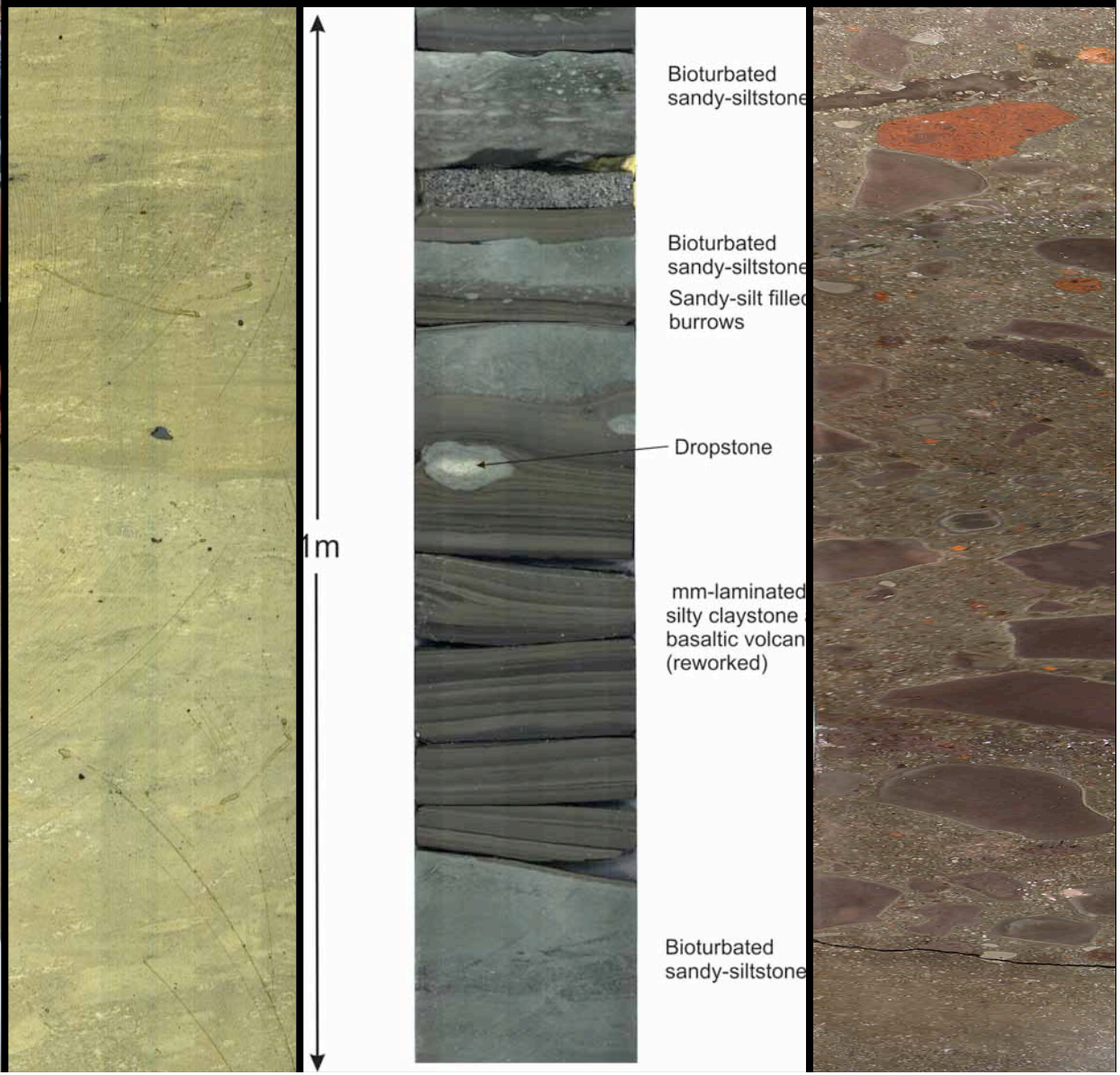
ANDRILL Drill Site


DRILL RIG
ICE 'PLATFORM'
WATER
RISER & STRING
ROCK &
SEDIMENT



Characterizing the Core





More Information…

About ANDRILL:
http://www.andrill.org/

For Educators:
http://www.andrill.org/iceberg/

C. Millan

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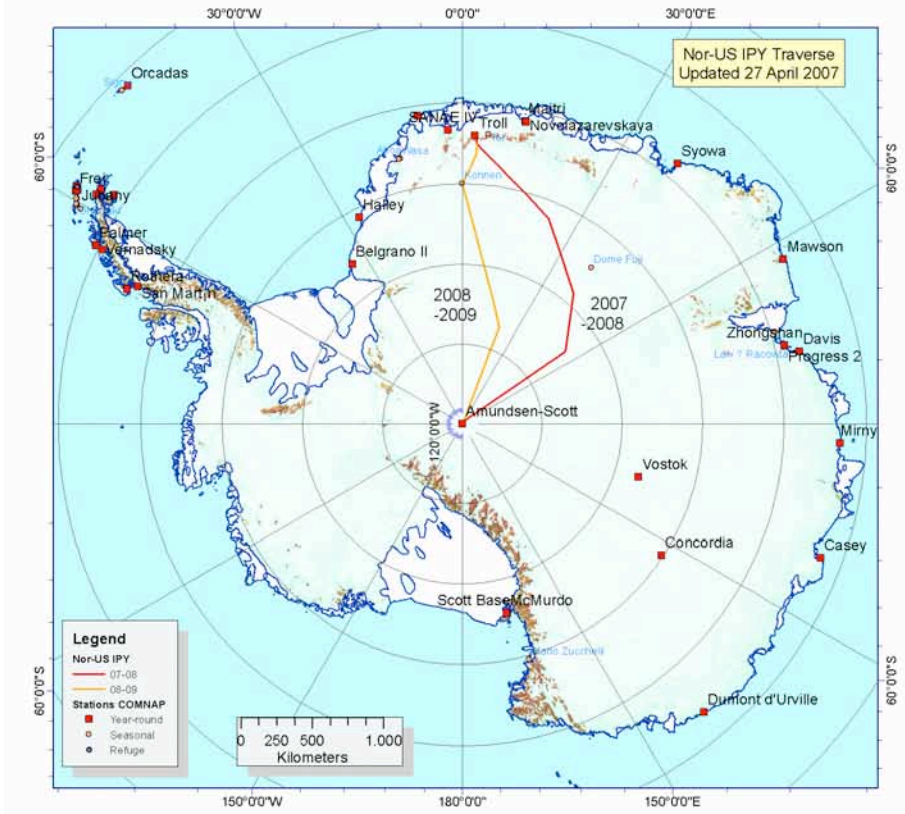
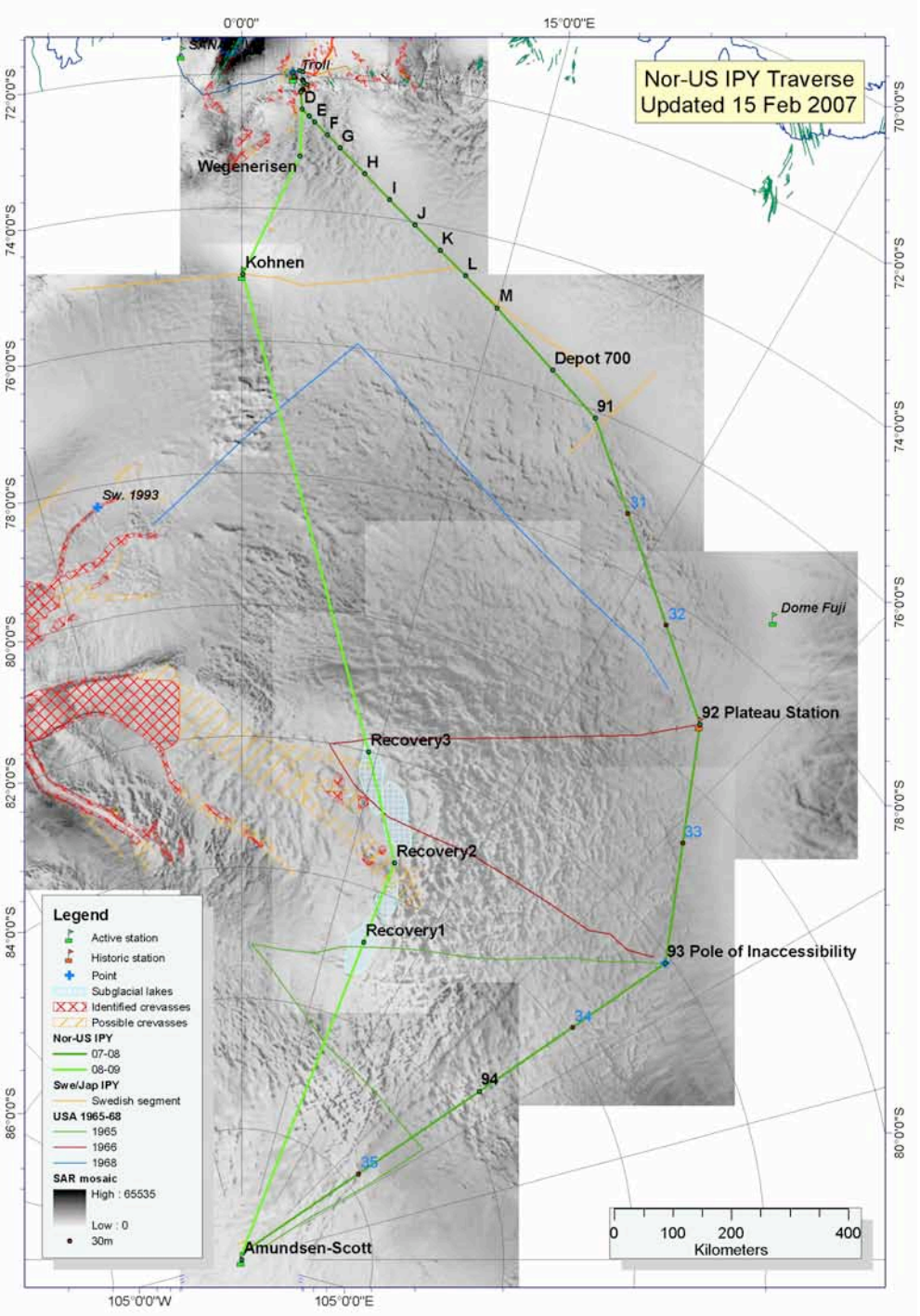
Norwegian-US Scientific Traverse of East Antarctica 2007-9

Traverse Route





Nor-US Traverse Goals

A massive, largely unexplored region, the East Antarctic ice sheet looms large in the global climate system, yet relatively little is known about its climate variability or the contribution it makes to sea level changes. This project will investigate climate change in East Antarctica, with the following goals:

- Investigate climate variability in Dronning Maud Land of East Antarctica on time scales of years to a million years.

- Establish spatial and temporal variability in snow accumulation over this area of Antarctica to understand its impact on sea level, using UAVs, deep and shallow cores and ground penetrating radar.

- Investigate the impact of atmospheric and oceanic variability on the chemical composition of firn and ice in the region.

- Revisit areas and sites first explored by traverses in the 1960's, for detection of possible changes and to establish benchmark data sets for future research efforts.

Website and Contact Information

Jan-Gunnar Winther, Norwegian
Lead and overall expedition lead

Mary Albert, U.S. Lead

http://traverse.npolar.no

US-Nor Website

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JASE
Japanese-Swedish Antarctic Expedition

Per Holmlund

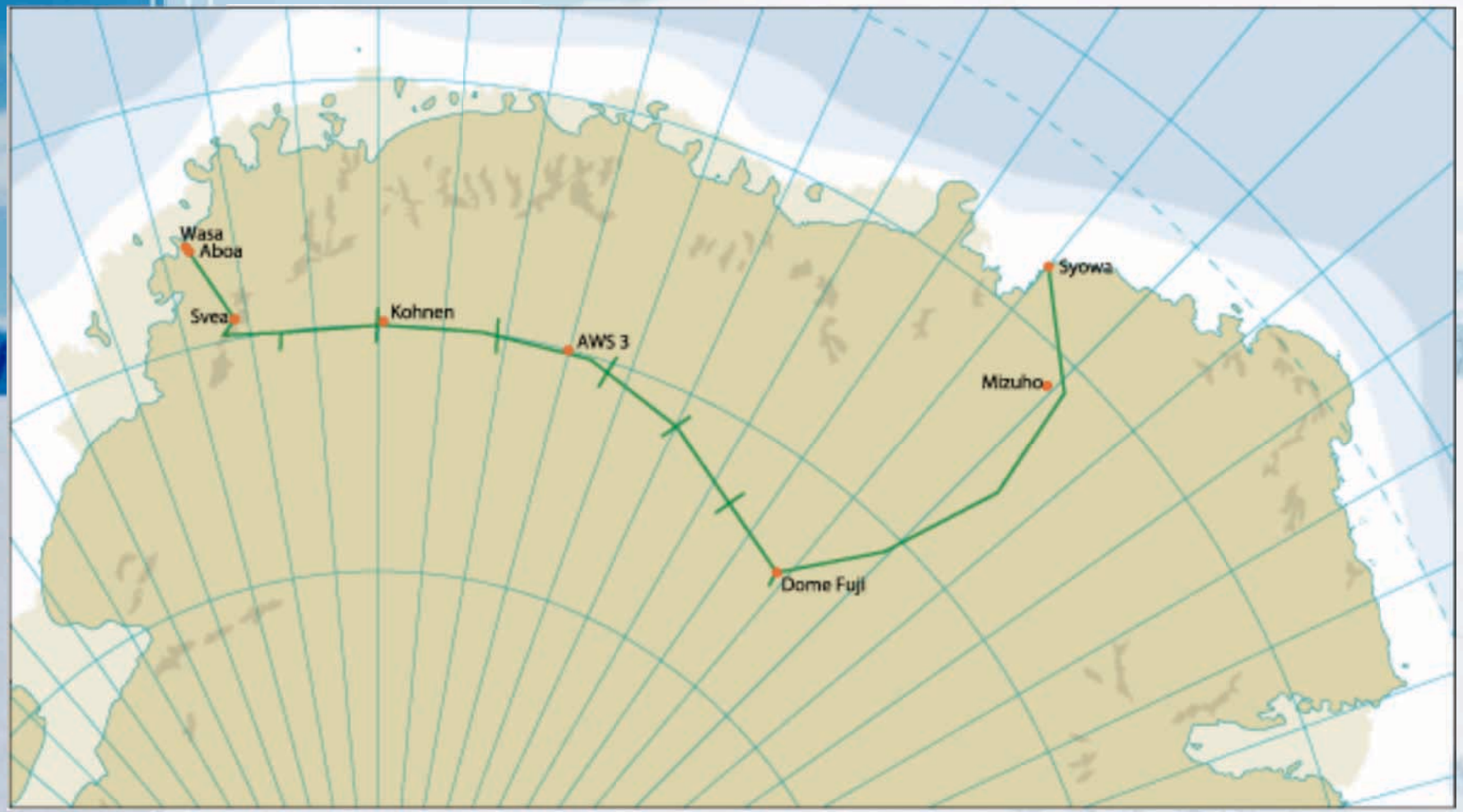
Per Holmlund

Project Goals

Primary Work Being Conducted:

- surface snow sampling
- aerosol sampling
- snow radar soundings
- internal ice layers in top 1000 m (radar)
- depth soundings (subglacial lakes and landforms)
- GPS mapping of surface topography and absolute positioning

JASE Route



More Information…

Per Holmlund, Stockholm university, Sweden

Dr Shuji Fujita, National Institute of Polar Research, Japan

http://www.polar.se/english/expeditions/swedarp2007_08/index.html

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US ITASE Traverse 2007-2008

Photo: Dan Dixon, U. Maine

US ITASE Goals

2007-2008 marks the seventh US ITASE traverse. The combination of disciplines represented by US ITASE provides a unique, logistically efficient, multi-dimensional view of the atmosphere, the ice sheet and their histories. The US ITASE logistics platform is designed to accommodate interactive research programs such as: meteorology, remote sensing, geophysics, ice core glaciology, atmospheric chemistry, and glacial geology. The specific scientific objectives of US ITASE address the following questions:

1. What is the current rate of change in mass balance over West Antarctica?

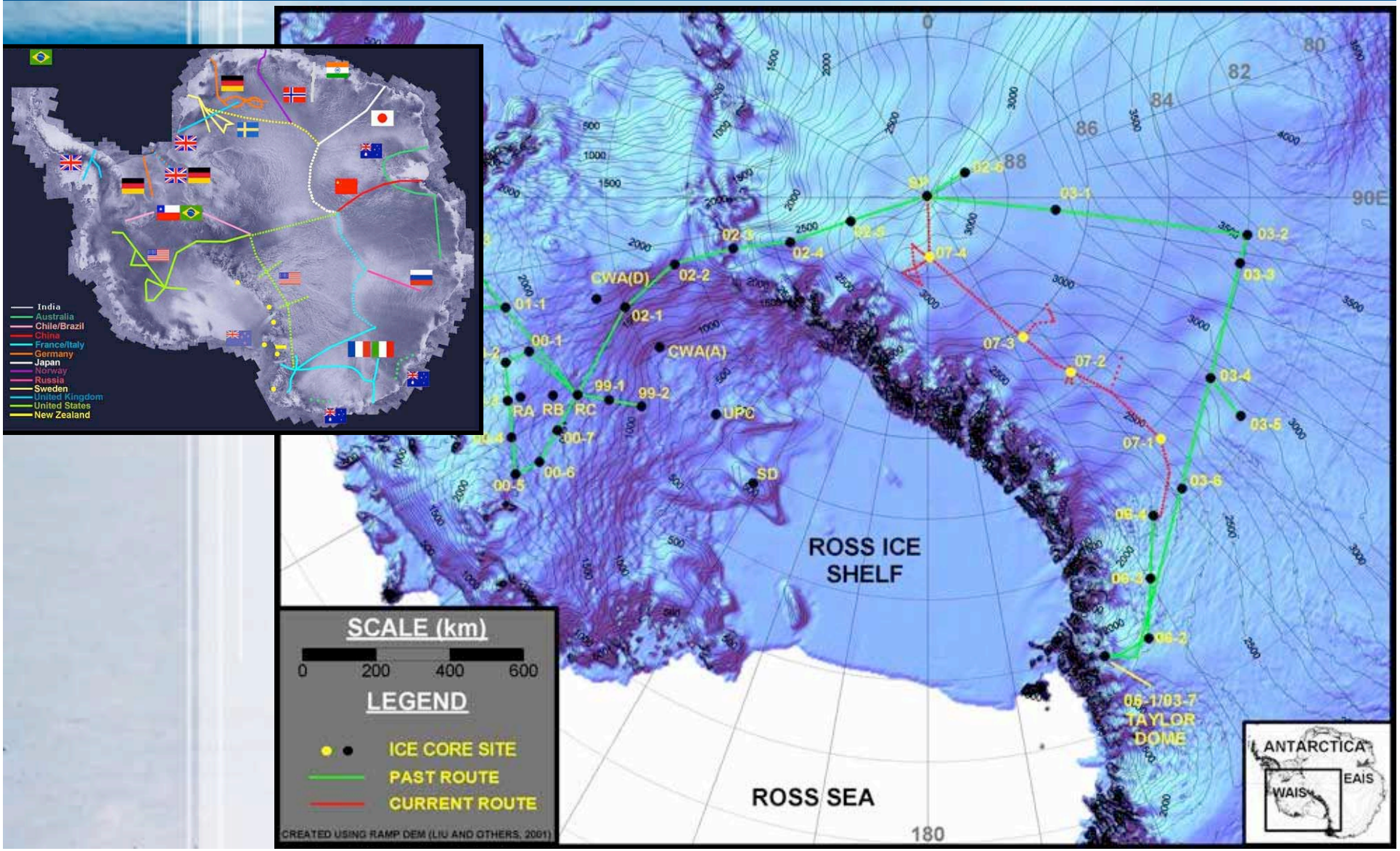
2. What is the influence of major atmospheric circulation systems and oceanic circulation on the moisture flux over West Antarctica?

3. How does climate vary over West Antarctica on seasonal, interannual, decadal and centennial scales, and what are the controls on this variability?
4. What is the frequency, magnitude and effect (local to global) of any extreme climate events recorded in West Antarctica?

5. What is the impact of anthropogenic activity (e.g., ozone depletion, pollutants) on the climate and atmospheric chemistry of West Antarctica?

6. How much has biogeochemical cycling of S, N and C, as recorded in West Antarctica, varied over the last 200+ years?

US ITASE 2007-2008 Route



Website and Contact Information


US ITASE

Paul Mayewski, University of Maine, team leader

Gordon Hamilton, University of Maine, associate team leader

http://www2.umaine.edu/USITASE/index.html

Presentation Outline

Introduction
Janet Warburton

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Questions & Answers

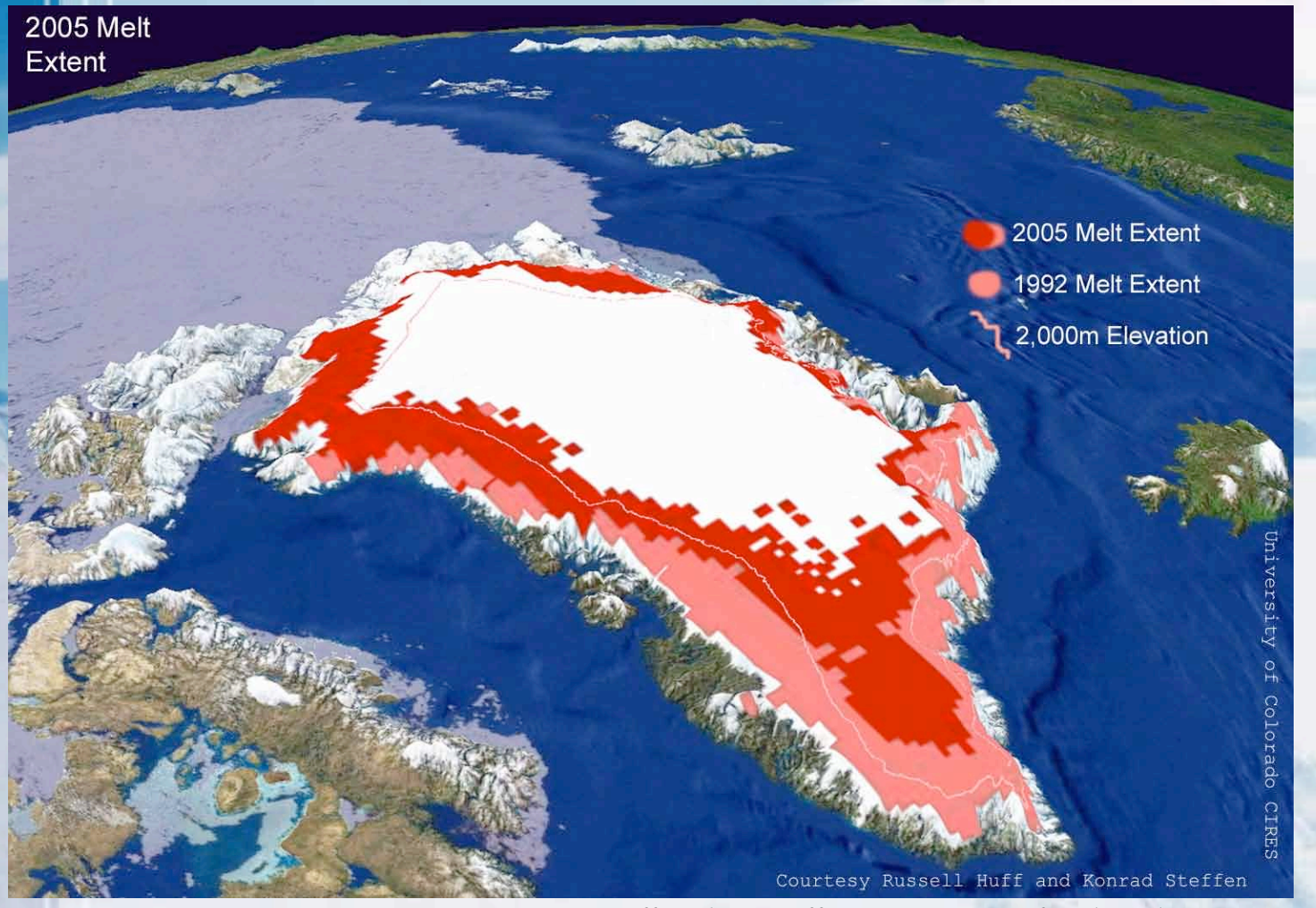
Wrap up and adjourn

Greenland

Greenland Ice Sheet

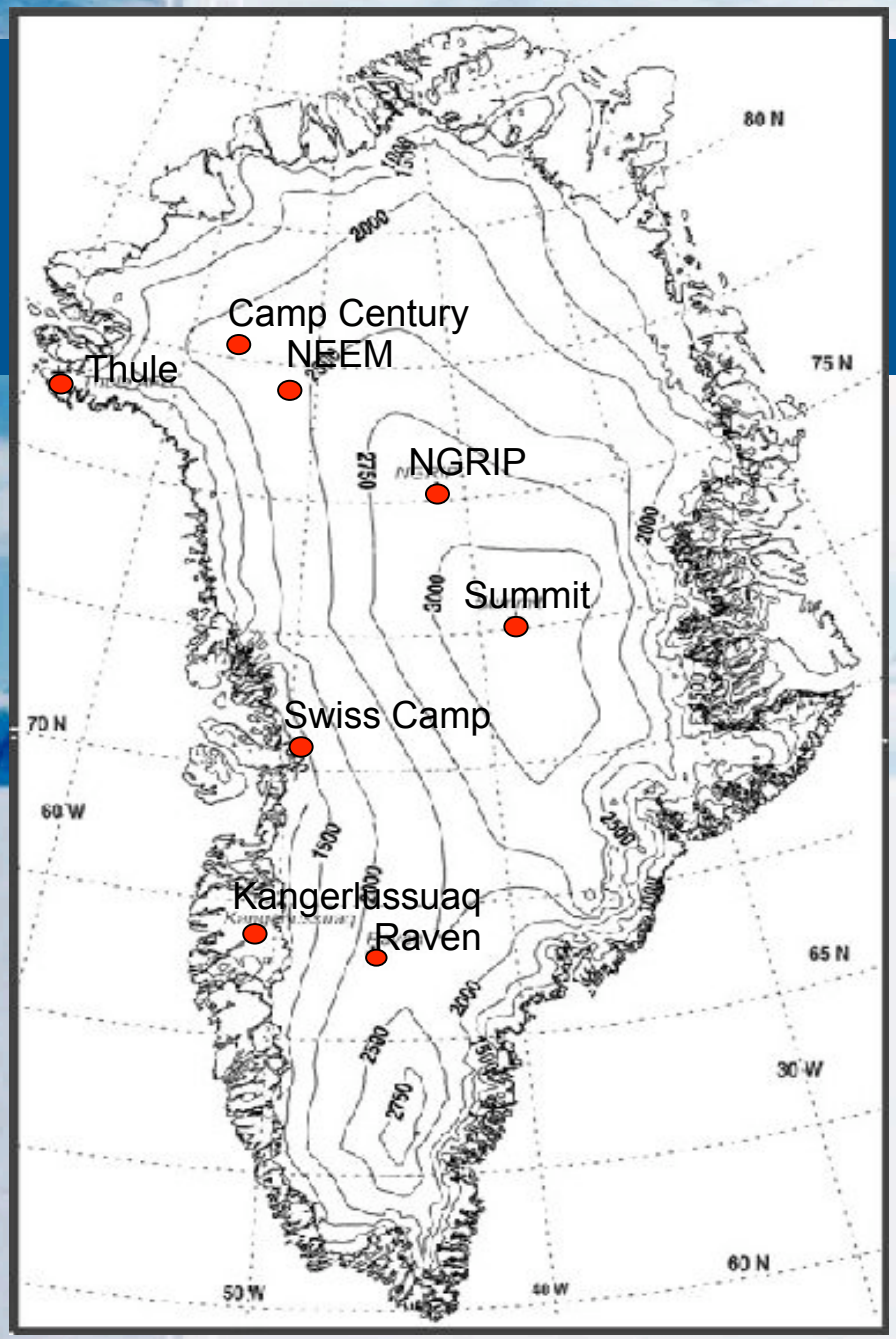
Photo: Mark Battle, Bowdoin College

Extent of Sheet Melting



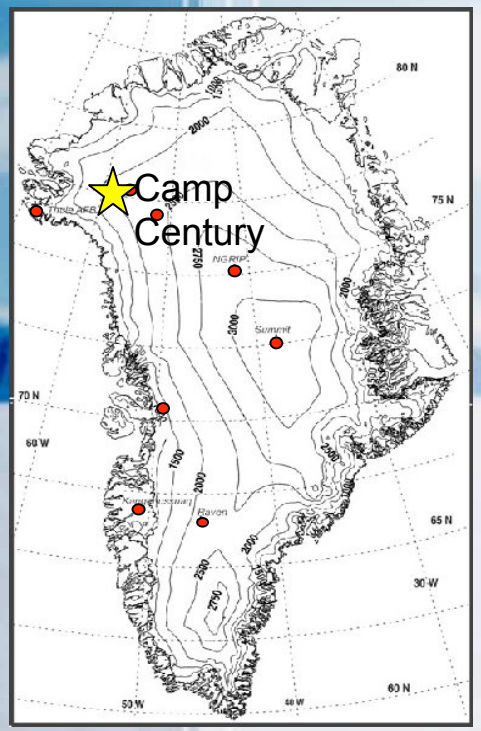
From R. Huff and K. Steffen, University of Colorado CIRES

Field Camp Locations



Busy place!

Camp Century



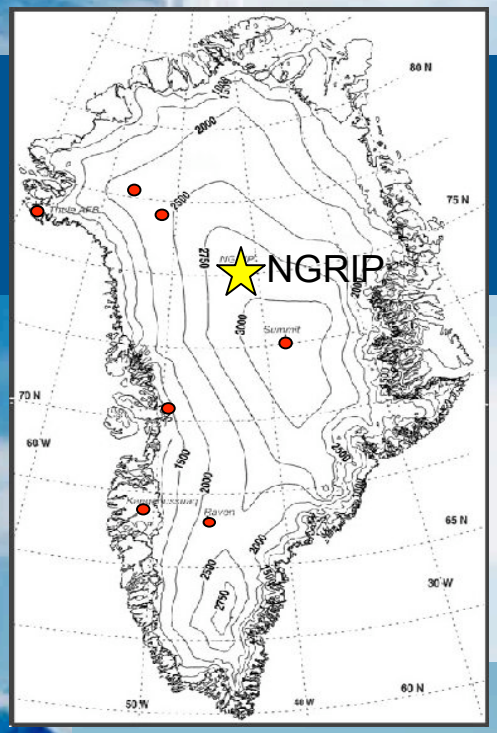
- Research at Camp Century included studies of the structural properties of snow and its use in construction, development of transportation equipment, meteorological studies and ice core studies.
- Including 3 year project to drill to bottom of Greenland ice sheet, 1391 m at the camp site, completed 1966 as part of IGY
- 120,000 year old climate record longest available at the time
- First core to bedrock in Greenland

GISP2 and GRIP

- Greenland Ice Sheet Project 2 (GISP2)
  - –US project
  - –Drilling completed July 1st, 1993
  - –5 years drilling
  - –3053.4 meters in depth and 1.55 meters of bedrock

- Greenland Ice core Project (GRIP)
  - –European collaboration
  - –located 28 Km to the east of GISP2
  - –3 years drilling
  - –3028.8 meters of core recovered

NGRIP



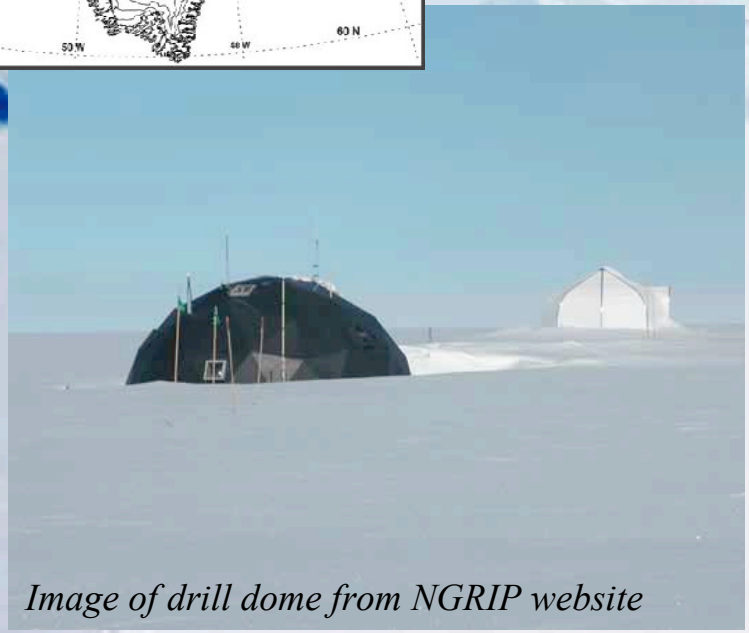
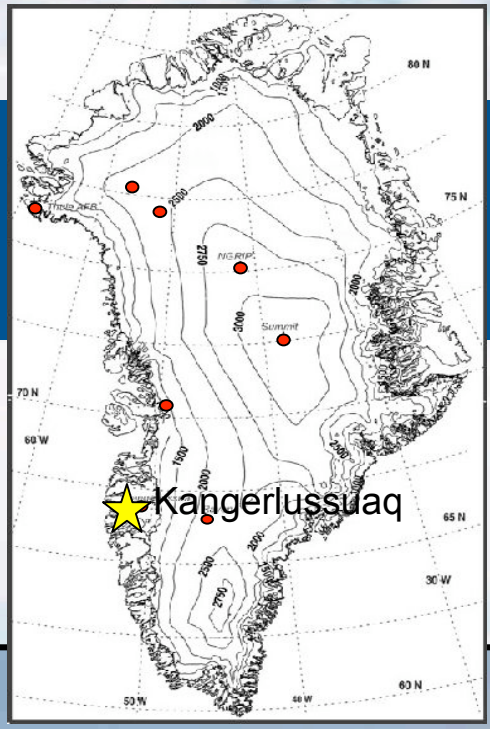


Image of drill dome from NGRIP website

- Completed July 2003
- Drilling took 4 years
- 3085 meters depth
- Collaboration with several countries, led by Department of Geophysics, University of Copenhagen
- Record spans the termination of the last ice age **11,500 years ago**, the last ice age, as well as the last interglacial **120,000 years ago**

Kangerlussuaq

Photo: Mac Cathles



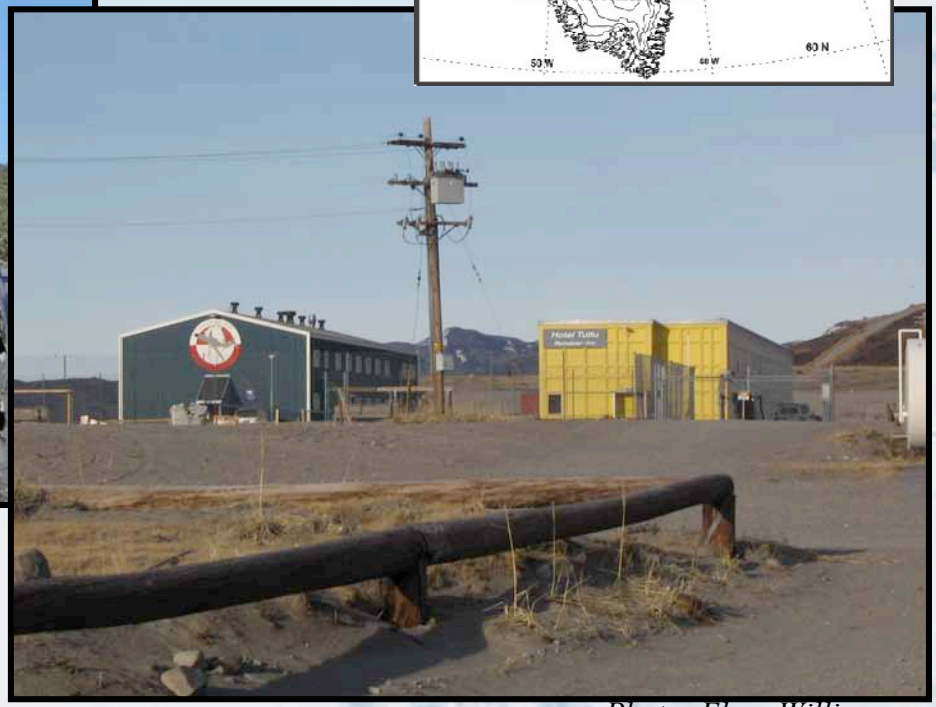


Photo: Elyse Williamson

Raven

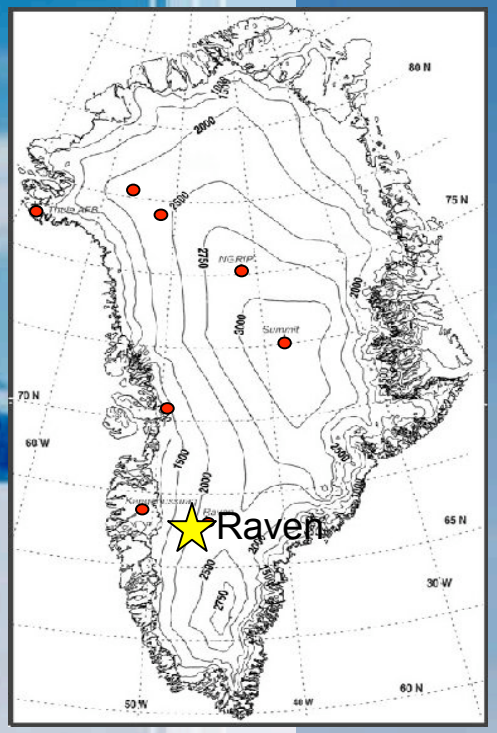


Image from Veco Polar website

Swiss Camp

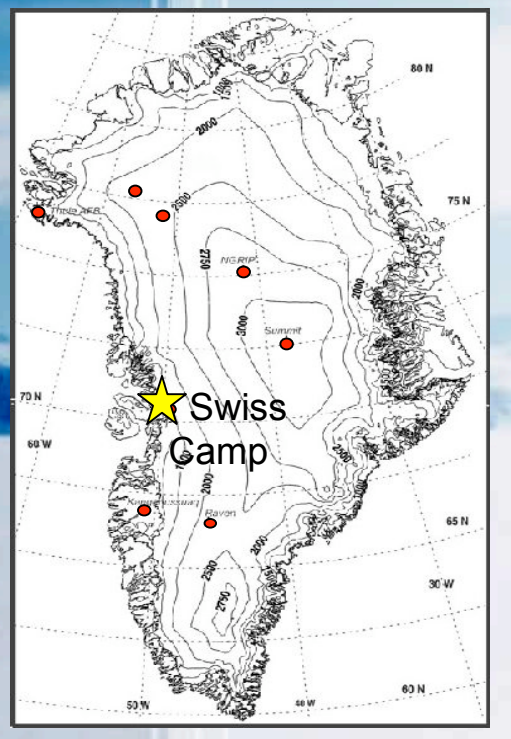


Image from "Postcards from the Arctic," Andy Revkin, NY Times, 2004

Summit Camp

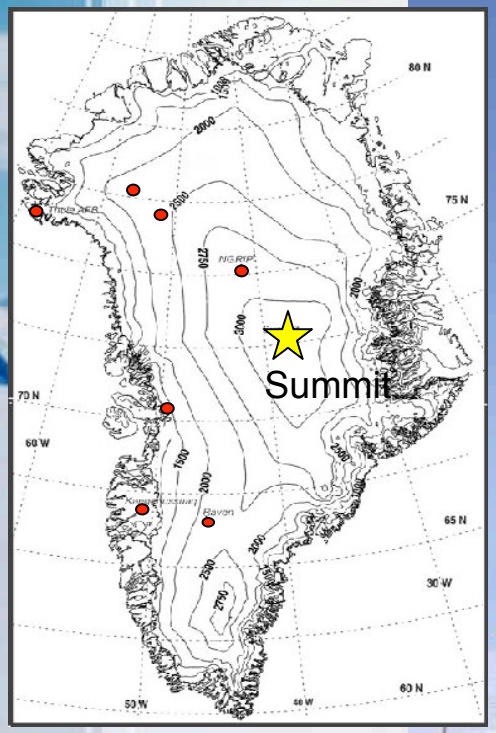


Photo: Xavier Fain

Travel

Photo: Jay Kyne

Lodging

Photo: Mary Albert

Food

Summit camp's 18th birthday cake

Some days are better than others…

Photos: Jay Kyne

NEEM

North Greenland Eemian Ice Drilling

- Goal: to obtain ice samples from the previous interglacial period, the Eemian
- Drilling to start 2008, in 2007 a group traversed from Thule to bring drill, camp, equipment
- Radar measurements show that the ice is 2542 meter thick
- The Eemian ice is believed to be located 2-300 meter above the bedrock, which is almost entirely flat.
- Modeling of the ice flow suggests that the thickness of individual annual layers in the Eemian ice is about 7 mm. It will thus be possible to study the onset and end of the previous interglacial with annual resolution.

NEEM Traverse team, 2007

Images from NEEM project site

NEEM traverse, 2007

Not just an ice sheet!

- Autonomous Danish province
- Inuit comprise 80% of people living in Greenland and have lived there for 4500 years

Driftwood carving of woman riding Narwhale

Dolls dressed in traditional southern Greenland dress

Port of Qaqortoq

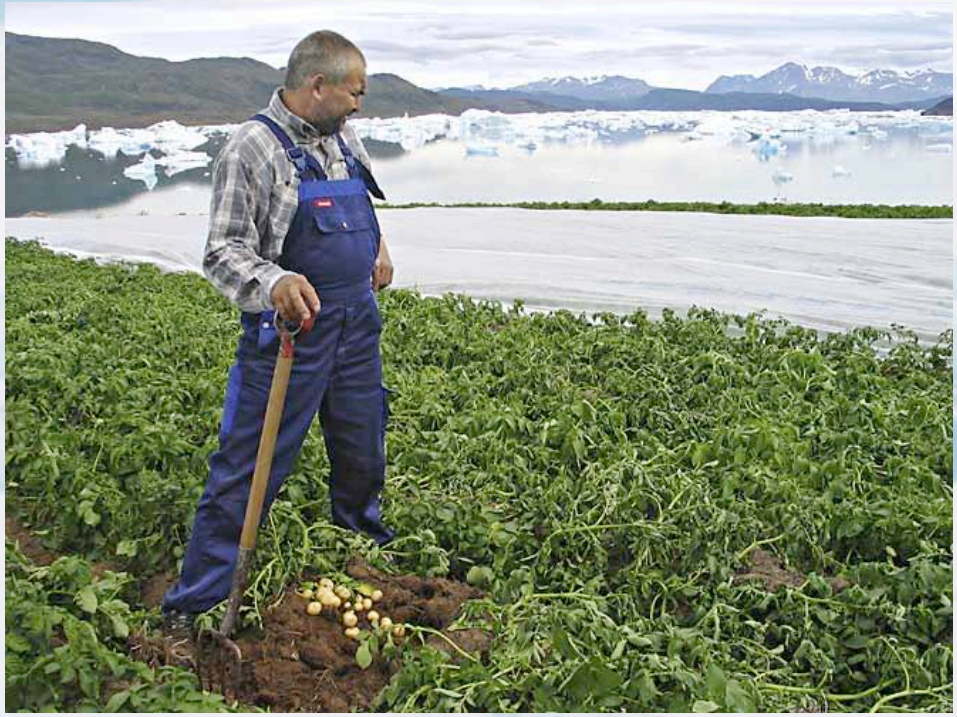
Gerald Traufetter / DER SPIEGEL (2006)

Thriving in one of the planet's harshest environments…

Roald Amundsen, first to South Pole

Used 97 Greenlandic sled dogs, traditional Greenlandic dog team design and Inuit fur skin clothing

From Frammuseet website



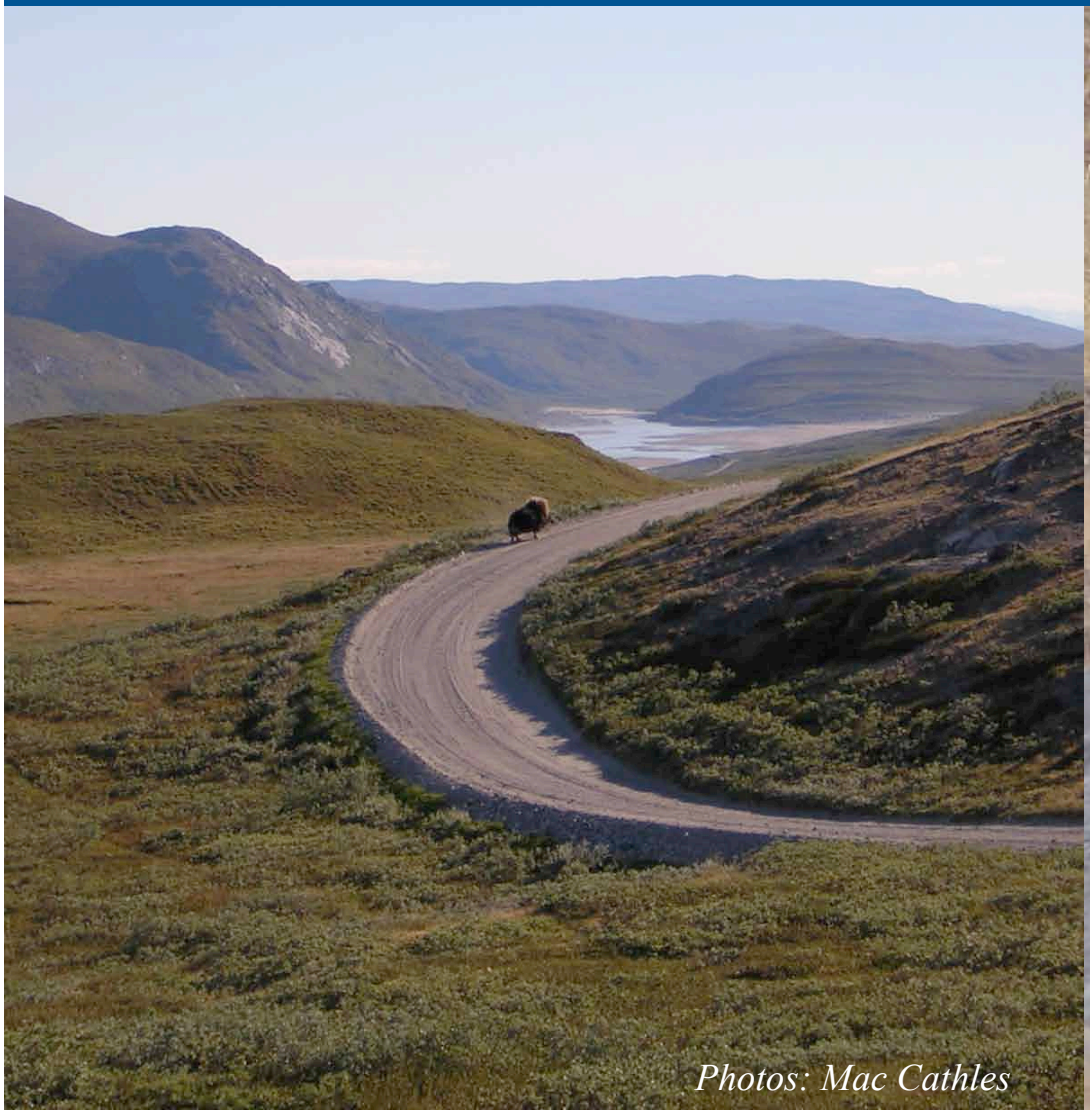
Ferdinand Edede, potato farmer in Qagortoq, Greenland

From "Artic Harvest: Global warming a boon for Greenland's farmers" by Gerald Traufetter, Spiegal Magazine, 2006

Greenland

Photos: Mac Cathles

Muskoxen & Caribou



Photos: Mac Cathles

Photo: Vas Petrenko

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Questions & Answers

Wrap up and adjourn

Questions

To ask a question, please click the "hand" button on the Wimba screen.

For each question, remember to include:

- Your Name, School or Location
- Who your question is being addressed to
- Loudly and clearly state your question

Schools & Groups: Please be prepared to ask a few questions at a time.

Check out and register for upcoming events!

www.polartrec.com

Thank You for you Participation today's event and the International Polar Year!

This event will be accessible via an archive at www.polartrec.com

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