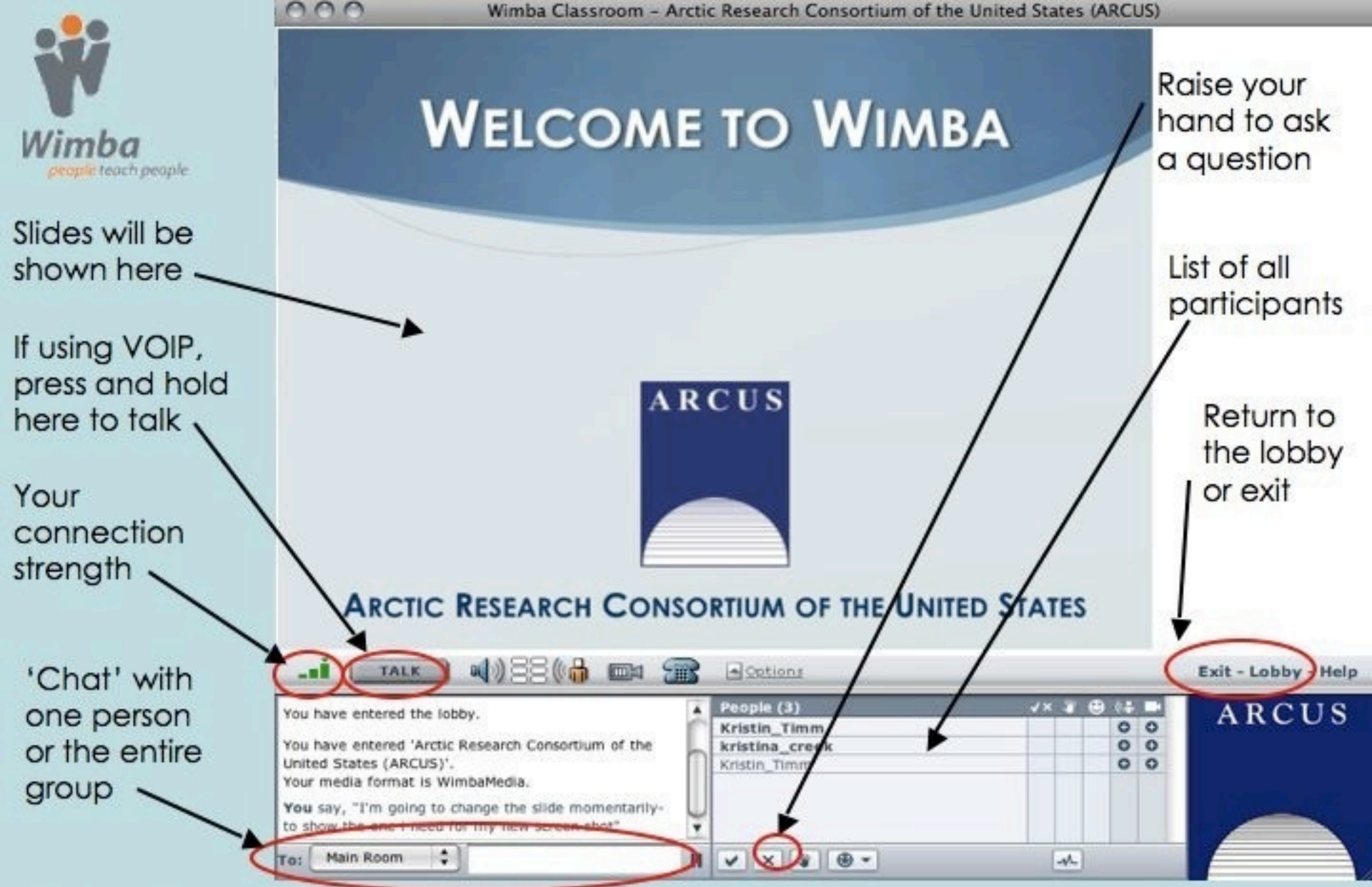
POLAR TREC

TEACHERS AND RESEARCHERS EXPLORING AND COLLABORATING

Welcome to *PolarConnect*

With Mark Goldner and the High Arctic Change 2011 PolarTREC Expedition



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.

High Arctic Change 2011
PolarTREC and REU

Dr. Ross Powell
N. Illinois University

Dr. Julie Brigham-Grette
UMASS Amherst

Daren McGregor
Colby College

Mark Goldner, Heath School

George Roth
Univ. of Washington

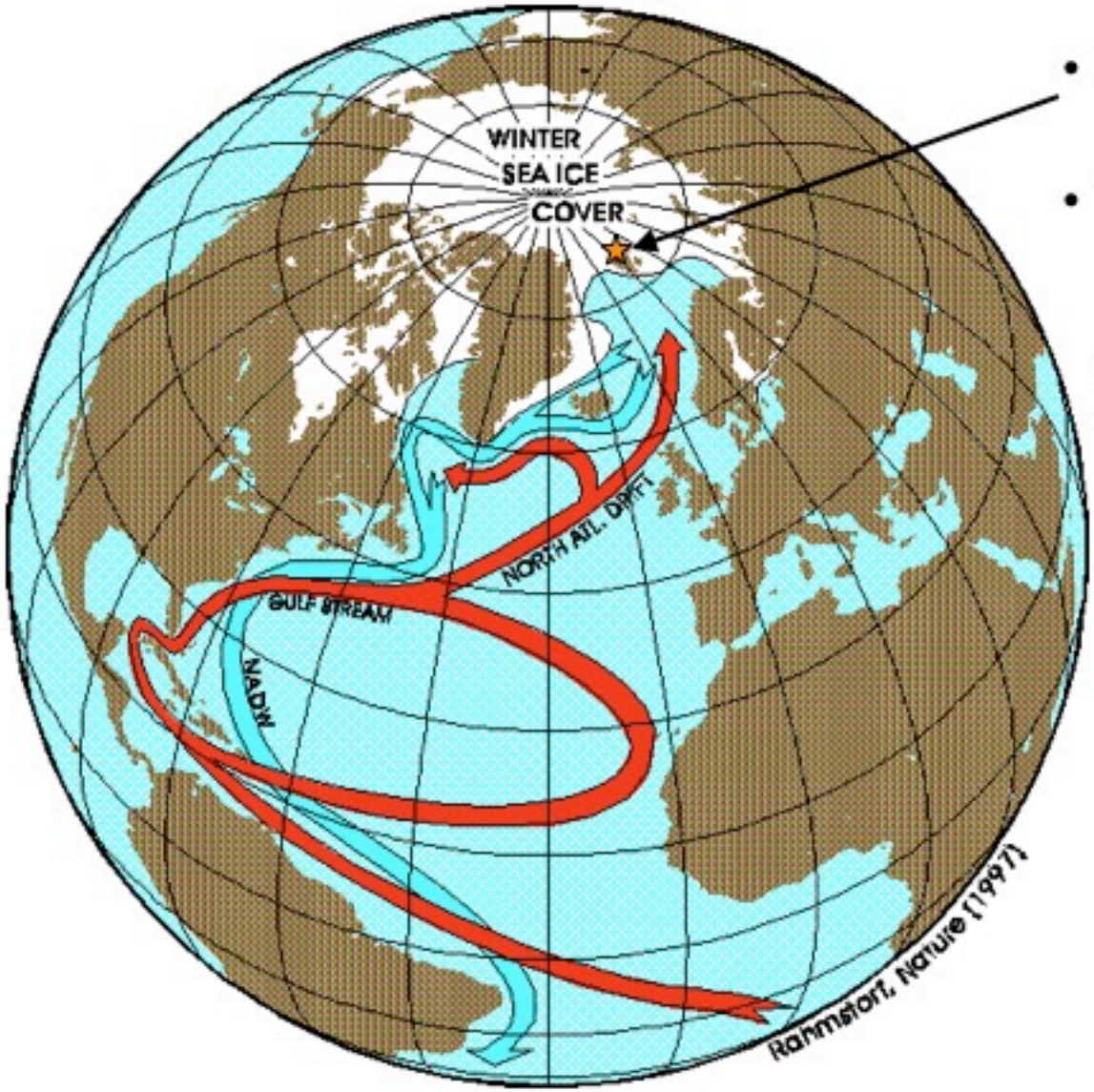
Daksha Rajagopalan
Yale University

Rebecca Siegel
Hampshire College

Rachel Valletta
Syracuse University

Liz Ceperley
Beloit College

Why Svalbard?



- Northern Extent of Gulf Stream
- Very Strong Effects of Climate Change: <u>Rising Temperatures</u> and <u>Melting Glacier Ice</u>

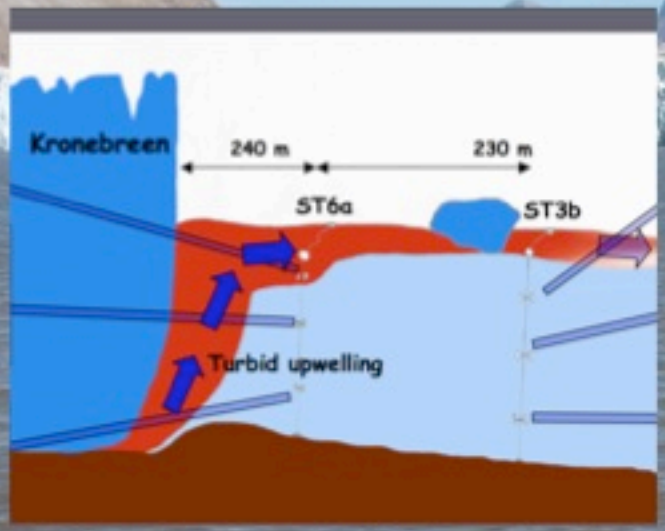

Kvitøya
Nordaustlandet
Vestfonna
Austfonna
Ny Friesland
Ny Ålesund
Olav V land
Oscar II land
Prins Karls forland
SPITSBERGEN
Barentsøya
Edgeøya
Storfjorden
Barentshavet
Hopen

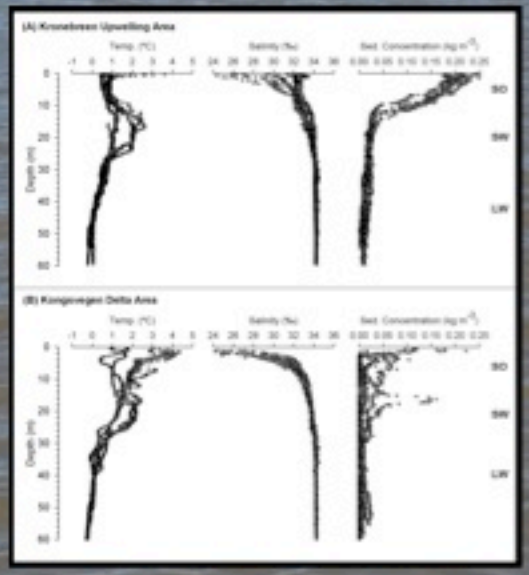
Ny Ålesund, Svalbard

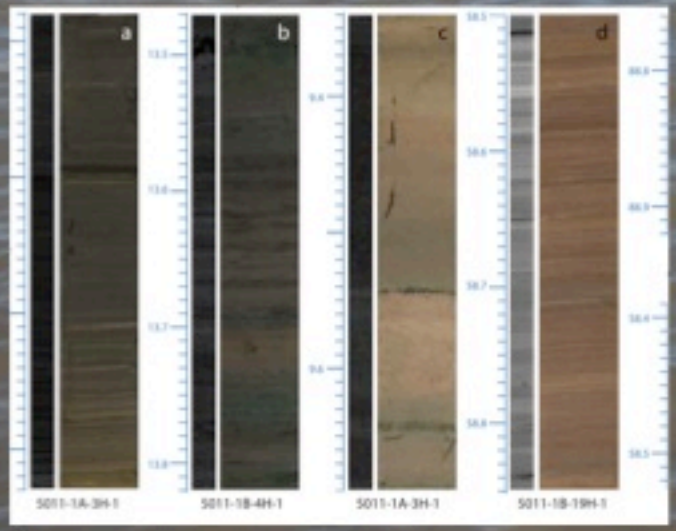
International Research Base at 79° North

Ny Ålesund, Svalbard

Svalbard Research Experience Objectives:







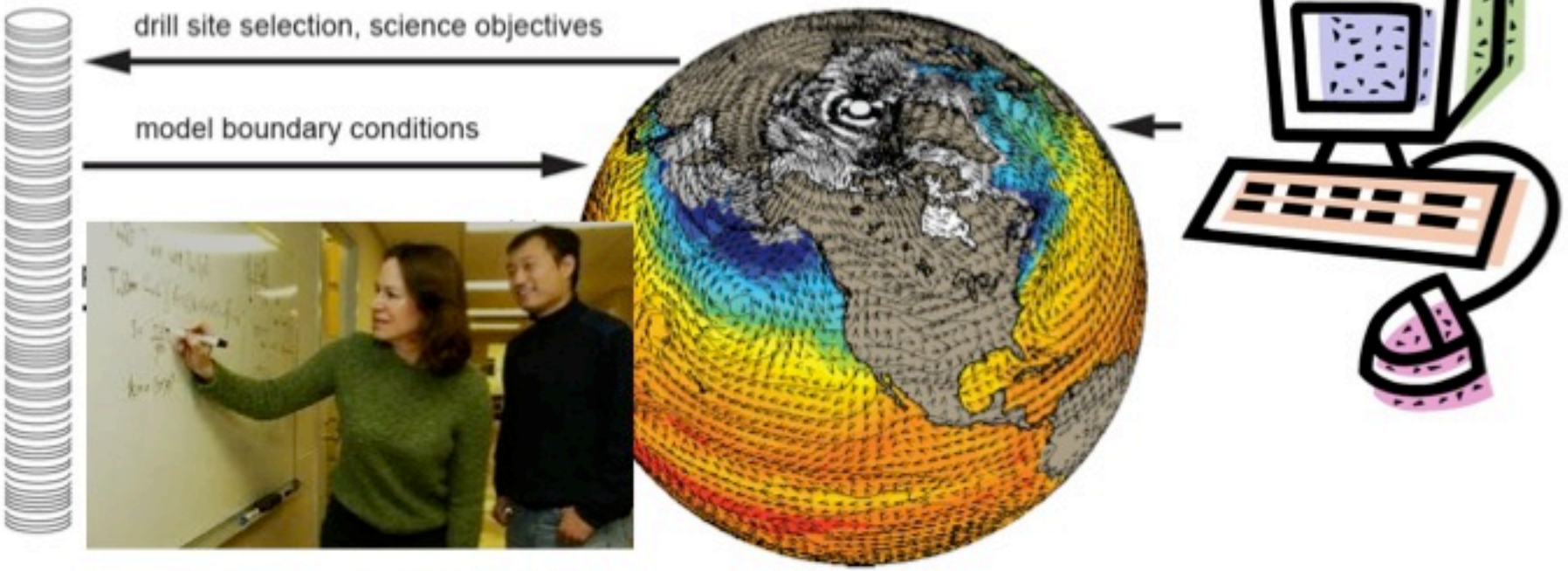
Understand modern geologic and oceanic processes of tide water glaciers

- ✓Calving rates
- ✓Ocean melting
- ✓Sediment rates
- ✓What controls ice margin stability

Modern processes to understand geologic record → Modeling and prediction of future change

Sediment core

Numerical models of climate



Geologists at work!

Finding Ocean Depth near a Changing Glacier
George Roth, University of Washington

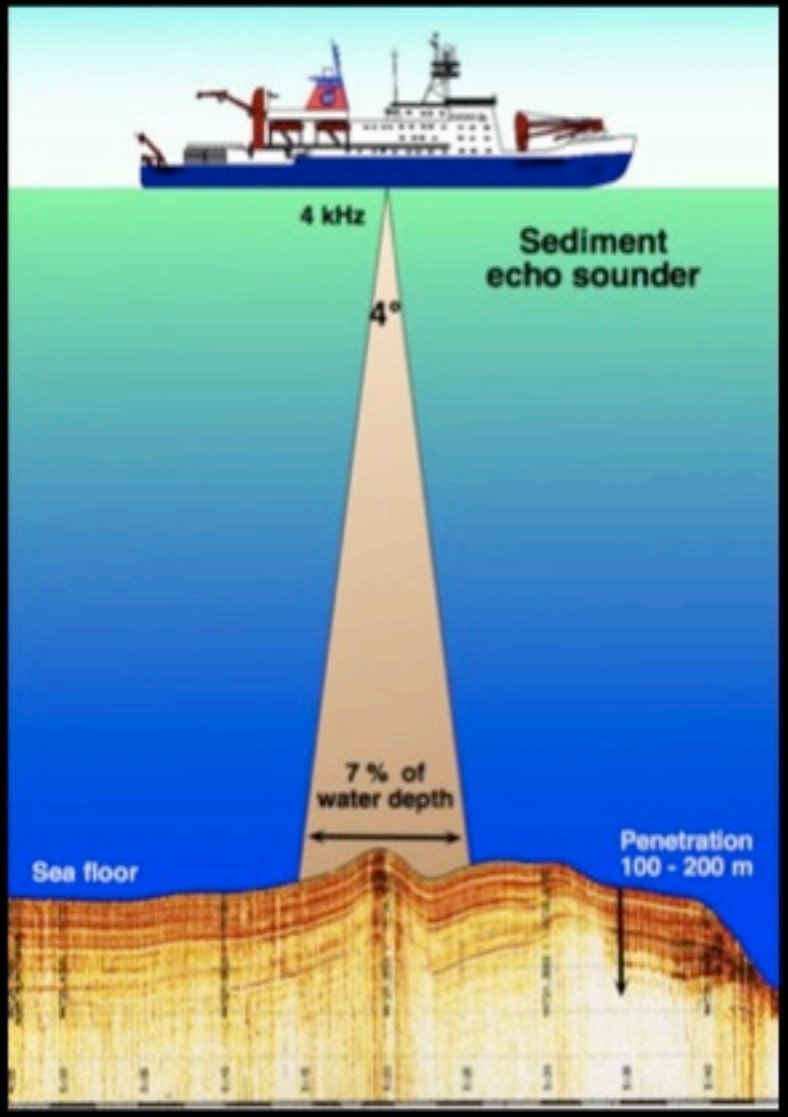
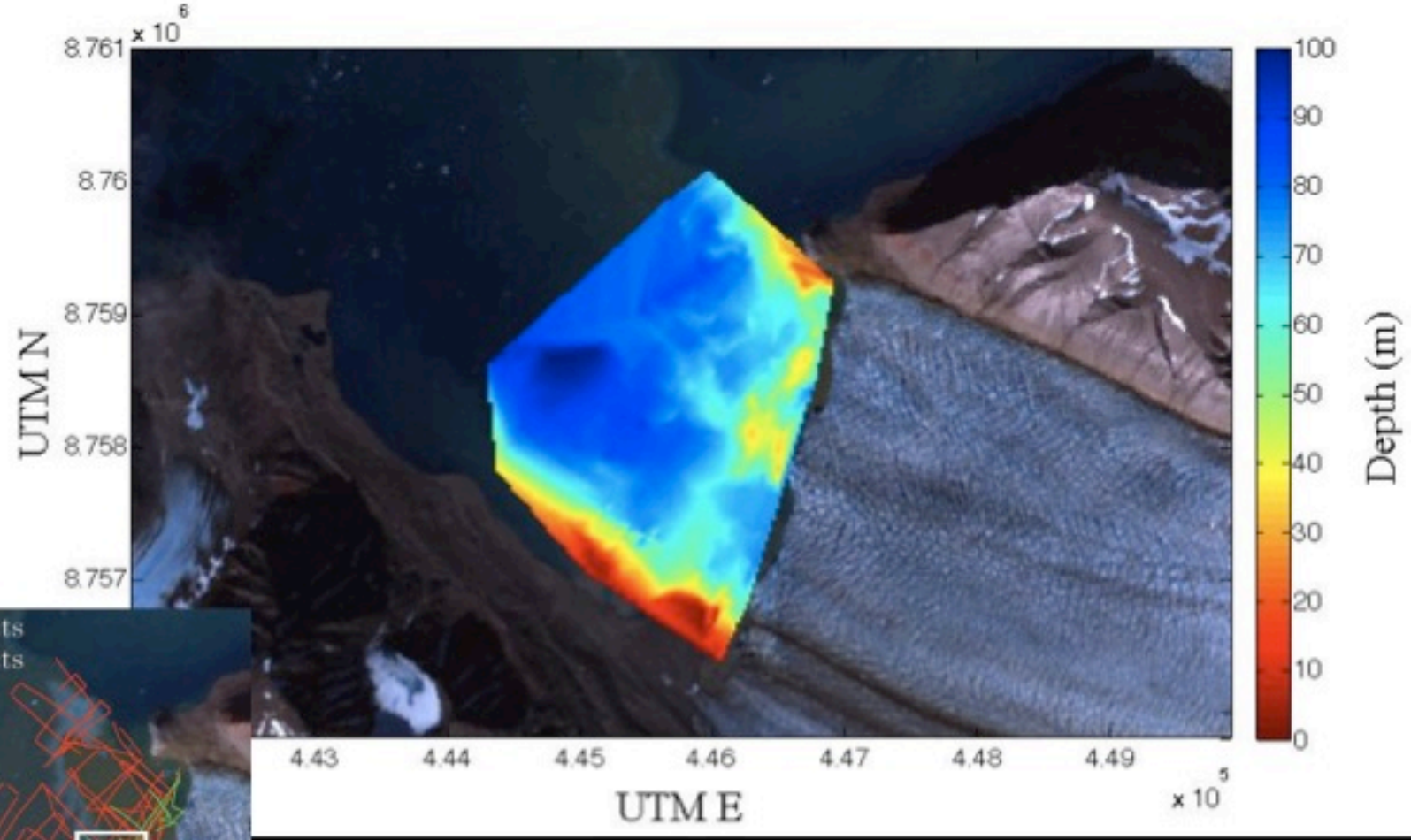


Image: Hannes Grobe, Alfred Wegener Institute for Polar and Marine Research



We know the glacier is getting smaller.

- Where is the water depth changing?
- How much is it changing?
- Using what we know about the depth in front of the glacier, what can we say about the glacier this year and in the future?

Images from 2009 REU member Laura Kehrl

Daksha Rajagopalan, Yale University

How Do Tidewater Glaciers Retreat?

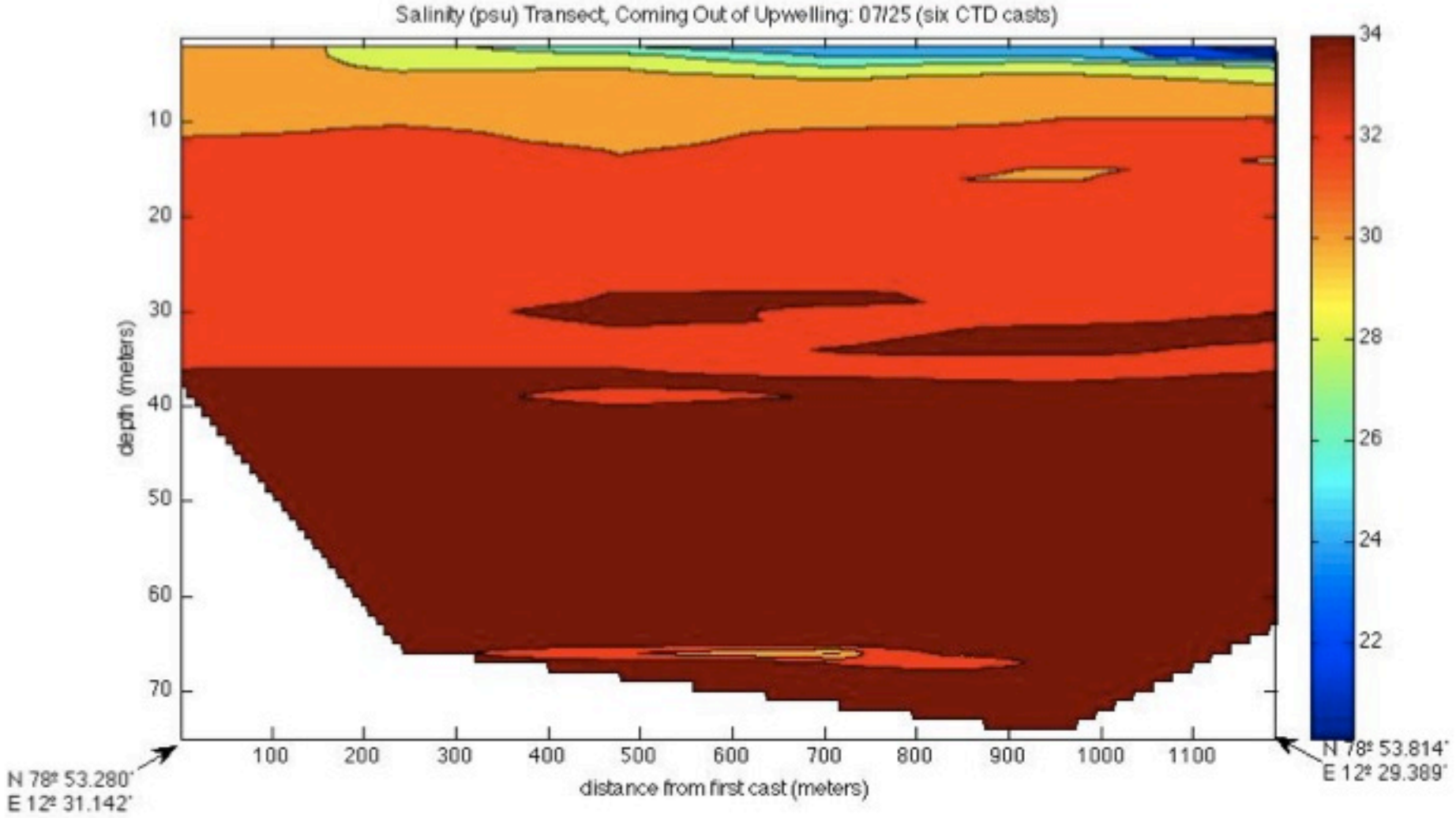
- They can calve
- They can melt
  - Above the sea
  - *Under the sea!*

- The Equipment: CTDs :

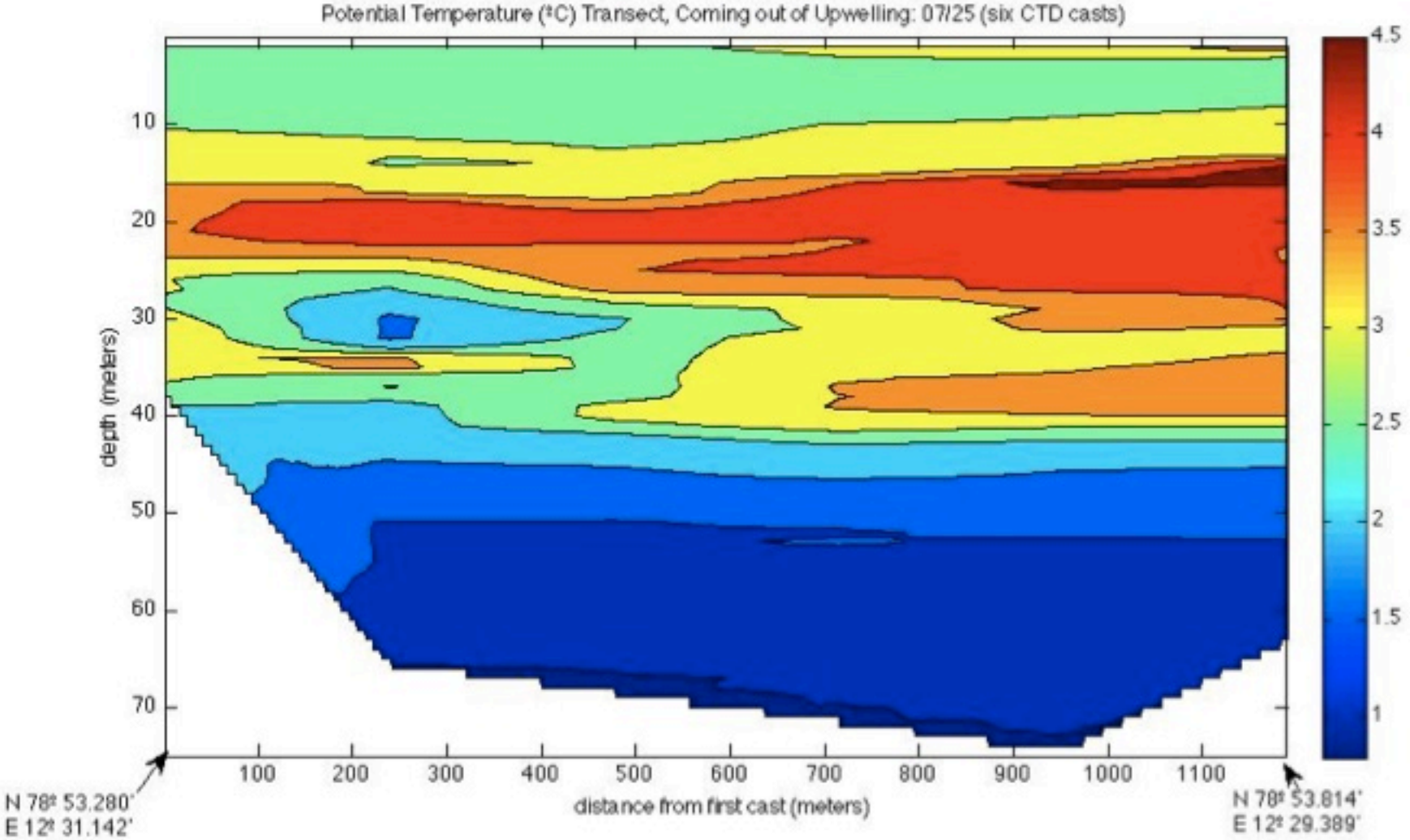
conductivity, temperature, depth


N
Image NASA
Image © 2011 GeoEye
©2010 Google
lat 78.883518° lon 12.465609° elev 0 ft
Eye alt 14553 ft

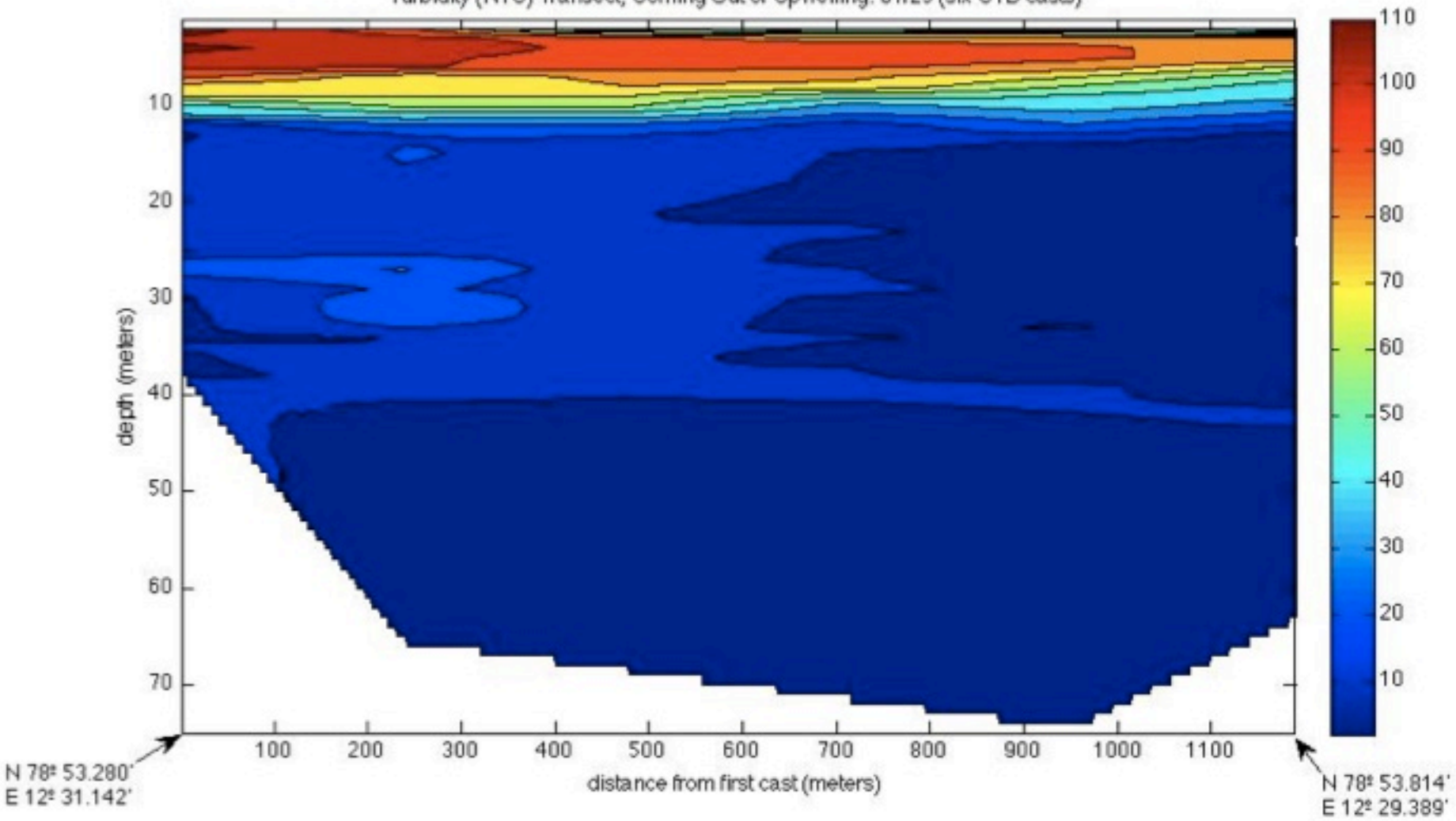
Salinity


Salinity (psu) Transect, Coming Out of Upwelling: 07/25 (six CTD casts)
depth (meters)
10
20
30
40
50
60
70
100
200
300
400
500
600
700
800
900
1000
1100
distance from first cast (meters)
34
32
30
28
26
24
22
N 78º 53.280'
E 12º 31.142'
N 78º 53.814'
E 12º 29.389'

Temperature



Turbidity


Turbidity (NTU) Transect, Coming Out of Upwelling: 07/25 (six CTD casts)
depth (meters)
10
20
30
40
50
60
70
100
200
300
400
500
600
700
800
900
1000
1100
distance from first cast (meters)
110
100
90
80
70
60
50
40
30
20
10
N 78º 53.280'
E 12º 31.142'
N 78º 53.814'
E 12º 29.389'

More Equipment

- In addition to CTDs, we also use a drogue:

  To measure current velocities

  - How does it work?
  - Current velocities are useful for calculating tidewater glacier submarine melt

Calving Rates

Rebecca Siegel, Hampshire College

Programming the Hobo

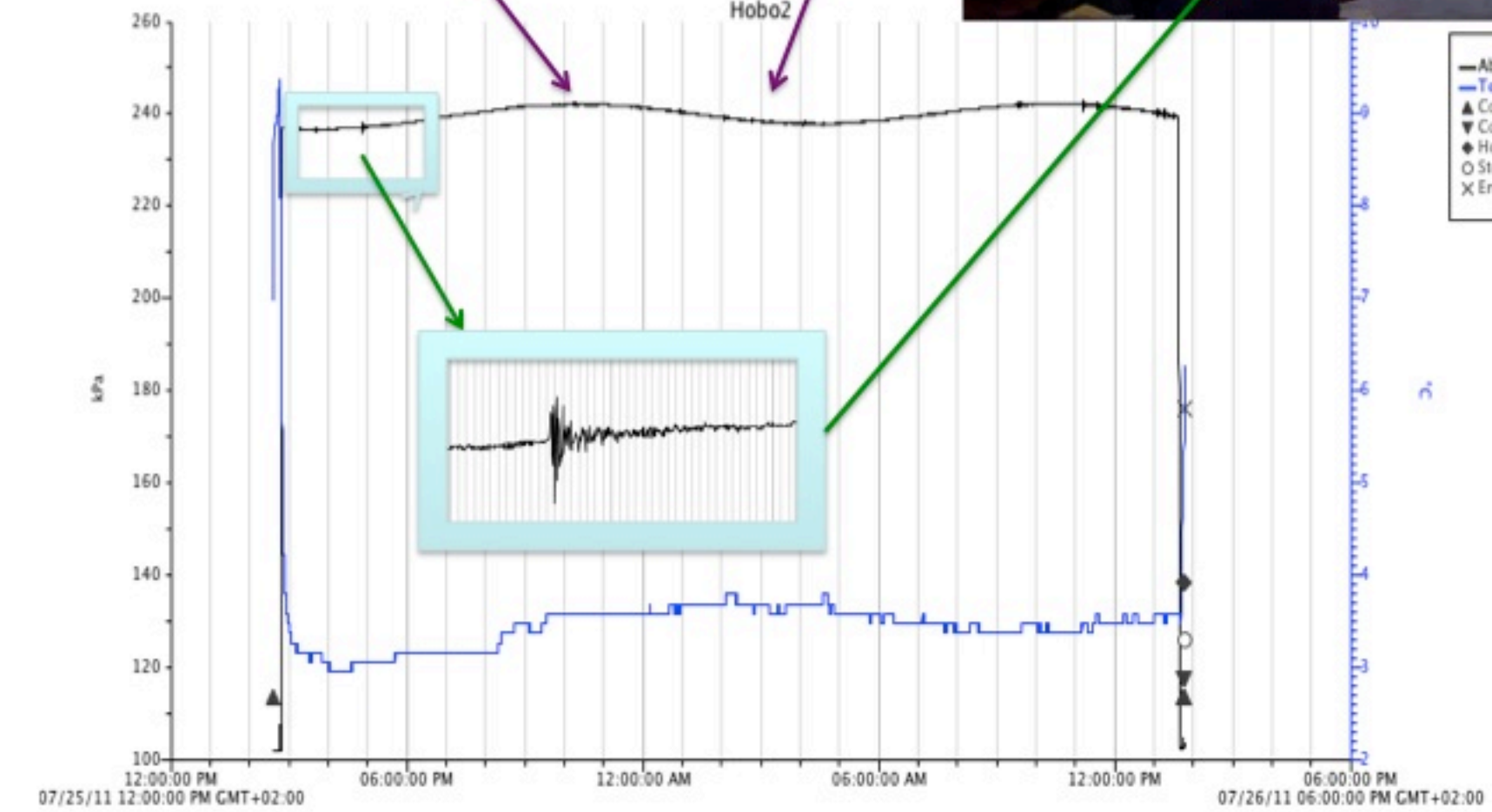
Delta Hobo Site

Rock Hobo Site

A Hobo

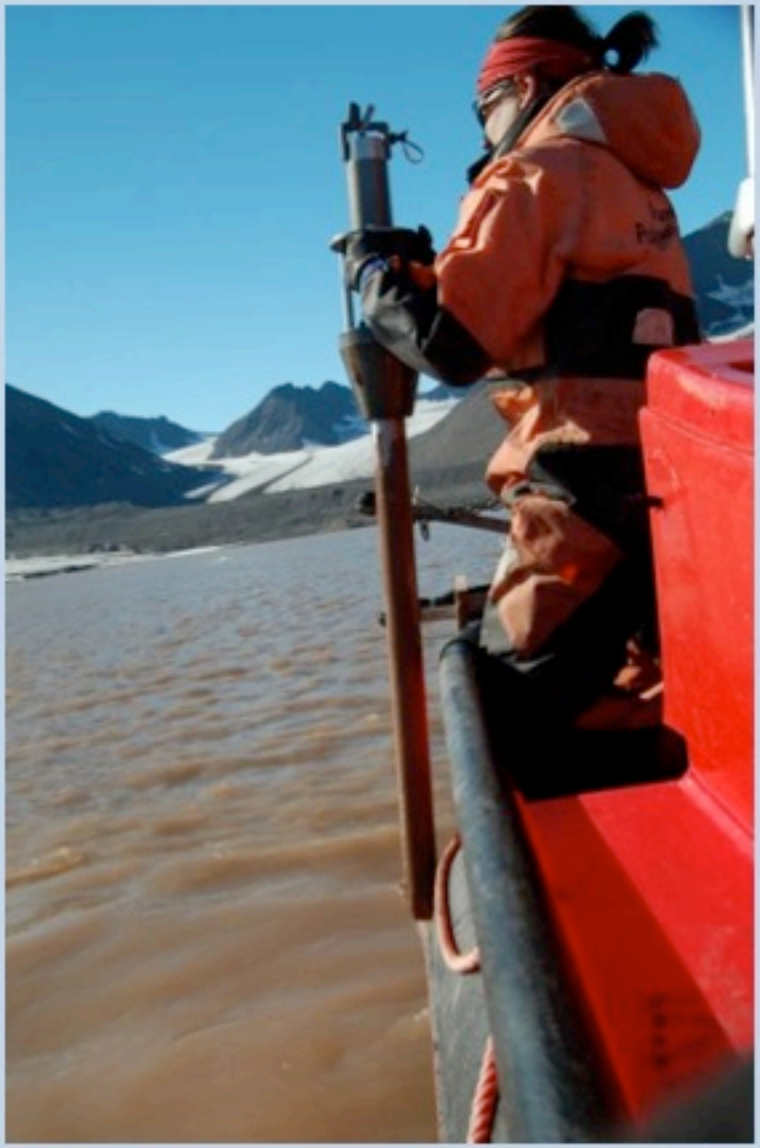
www.onsetcomp.com/

Delta Hobo Graph from July 26



Gravity Coring

Daren McGregor, Colby College



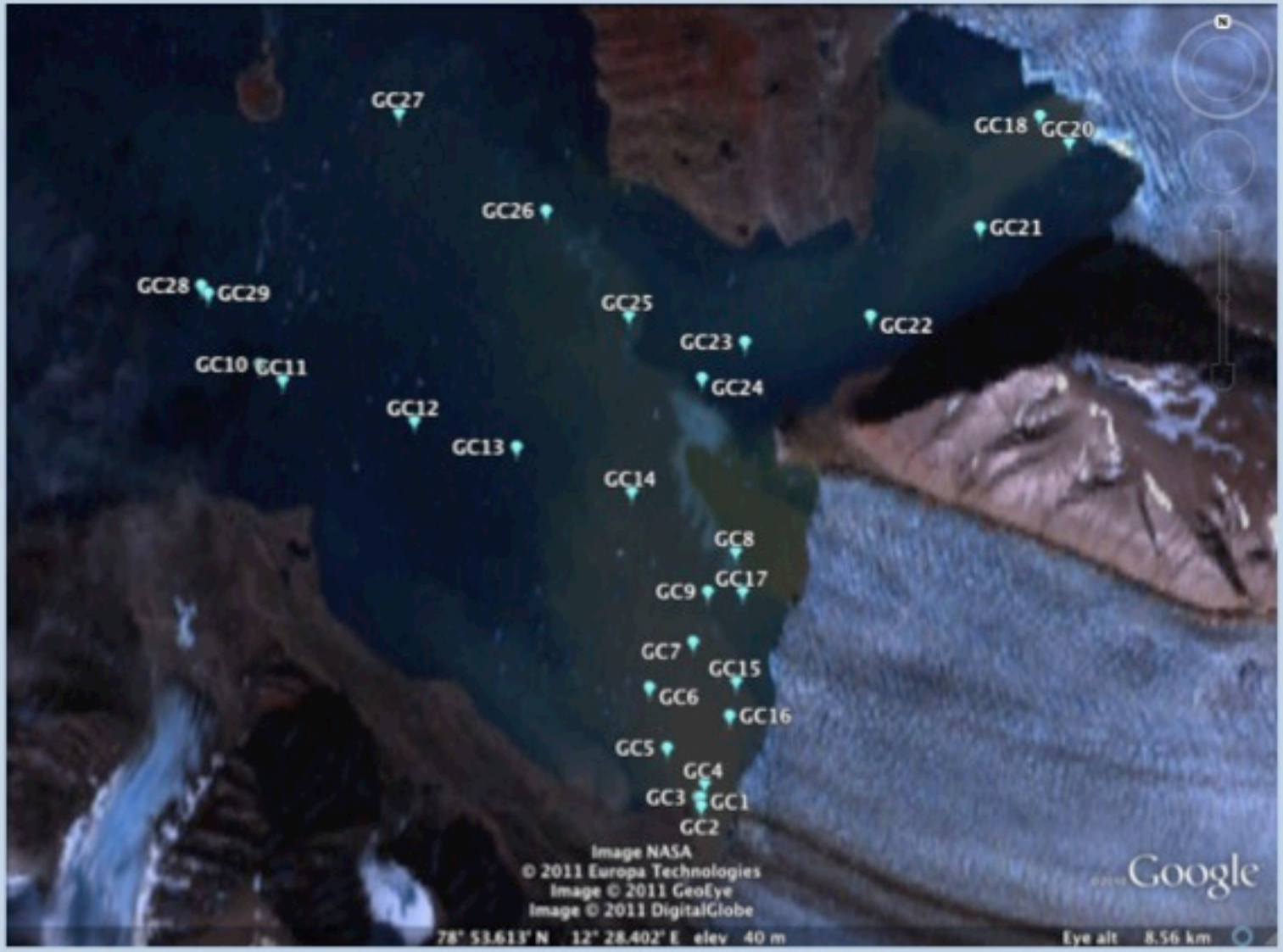
- Lower a winch within ten meters of the seafloor.
- Release the winch, allowing the core to free fall.
- Pummels a seven-square-inch area of the seafloor with almost 2,000 joules of energy.
- The core sample preserves mud from the past.

The Goals of My Project

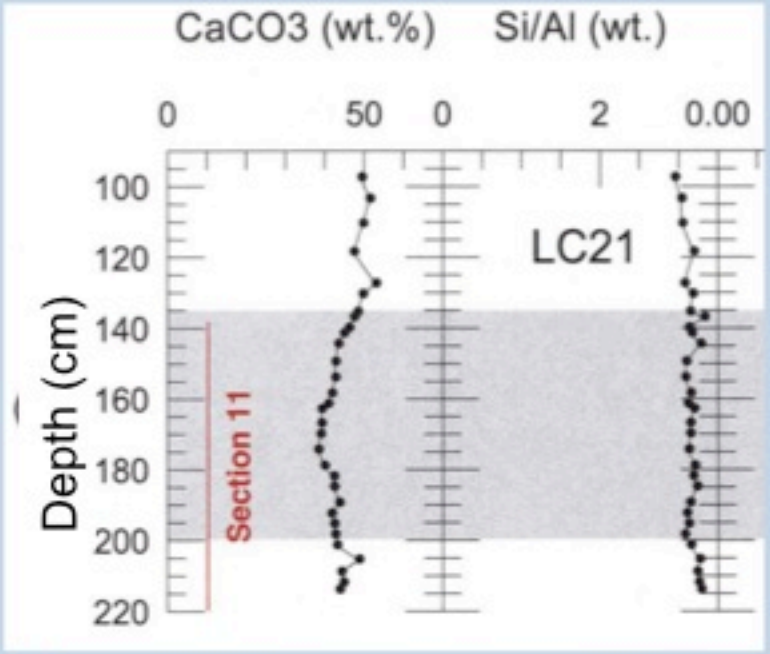
How does core chemistry change as I go along the ice face of the glacier?

Are there chemical patterns and relationships that change with respect to distance from the glacier/ down the fjord?

Localities


GC27
GC18
GC20
GC26
GC21
GC28
GC29
GC25
GC22
GC23
GC10
GC11
GC24
GC12
GC13
GC14
GC8
GC17
GC9
GC7
GC15
GC6
GC16
GC5
GC4
GC3
GC1
GC2
Image NASA
© 2011 Europa Technologies
Image © 2011 GeoEye
Image © 2011 DigitalGlobe
Google
78° 53.613' N 12° 28.402' E elev 40 m
Eye alt 8.56 km

XRF and Analysis Techniques



Techniques like x-ray fluorescence allow me to study the chemical relationships at work in the fjord, and figure out is going on with the glacier.

Learning Science Together is Fun!

- ✓ Hands on inquiry based learning and science planning
- ✓ Individual ownership of a research project

- ✓Team effort with use of jointly collected data sets
- ✓ Self reliance and problem solving.






As a Teacher, What am I bringing home?

- Experience of Polar Field Research
- Deeper understanding of glacial processes and climate change
- How and why scientific data is collected and what we do with it

Funding provided by

US National Science Foundation
Office of Polar Programs

Who support

REU – Research Experience for Undergraduates

Polar TREC – Teachers & Researchers Experiencing and Collaborating

NIU Northern Illinois University

UMASS AMHERST

POLAR TREC

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.

Teachers: Join PolarTREC!

Information Webinar:

Thursday, 11 August 2011, at 3:00 p.m. Alaska Daylight Time (1:00 p.m. HST, 4:00 p.m. PDT; 5:00 p.m. MDT; 6:00 p.m. CDT; 7:00 p.m. EDT)

Application Period: Monday, 1 August 2011 through Friday, 30 September 2011

www.polartrec.com/teachers

Upcoming Events

Watch for and register for upcoming events at **www.polartrec.com!**

Thank You!

An archive of the event will be available shortly.

http://www.polartrec.com/polar-connect/archive