



TEACHERS AND RESEARCHERS
EXPLORING AND COLLABORATING

Welcome to a C-ISE Event

Applied Earth Sciences II

with PolarTREC Alumni Missy Holzer

Tuesday, 7 August 2012

3:00pm AKDT

(4pm PDT, 5pm MDT, 6pm CDT, 7pm EDT)

Slides will be shown here

Exit the presentation

Click to Talk, Unclick to finish talking

Raise your hand to ask a question

Share with emoticons

List of all participants

Chat with one person or the entire group

The screenshot displays the Blackboard Collaborate interface. The main window shows a presentation slide titled "Welcome to Blackboard Collaborate" with the ARCUS logo and the text "Arctic Research Consortium of the United States". The left sidebar contains several panels: "AUDIO & VIDEO" with a "Talk" button and a "Video" button; "PARTICIPANTS" with a list of participants including Sarah Crowley and Arctic Research Consortium of the US; "MAIN ROOM" with a list of participants; and "CHAT" with a list of messages. A "Recording" indicator is visible in the top right corner of the main window.

Please Note:

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



TEACHERS AND RESEARCHERS
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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.



TEACHERS AND RESEARCHERS
EXPLORING AND COLLABORATING

Questions

During the Presentation:

- Type your question in the text chat box

At the End of the Presentation:

- Raise your hand with the “hand button”.
- PolarTREC staff will call on you.
- Speak loud and clear and directly into the phone to ask your question.

Click on the Talk button to speak.

Unclick when you are done.

A grayscale photograph of a snowy mountain range with a body of water in the foreground. The mountains are covered in snow and partially obscured by clouds. The foreground shows a calm body of water reflecting the sky and mountains.

From Climate Change Research in the Arctic to Authentic Research in the Classroom

**Missy Holzer
PolarTREC Teacher
High Arctic Change 08**

Rifle Practice & the Candy Bar!



From Climate Change Research in the Arctic to Authentic Research in the Classroom

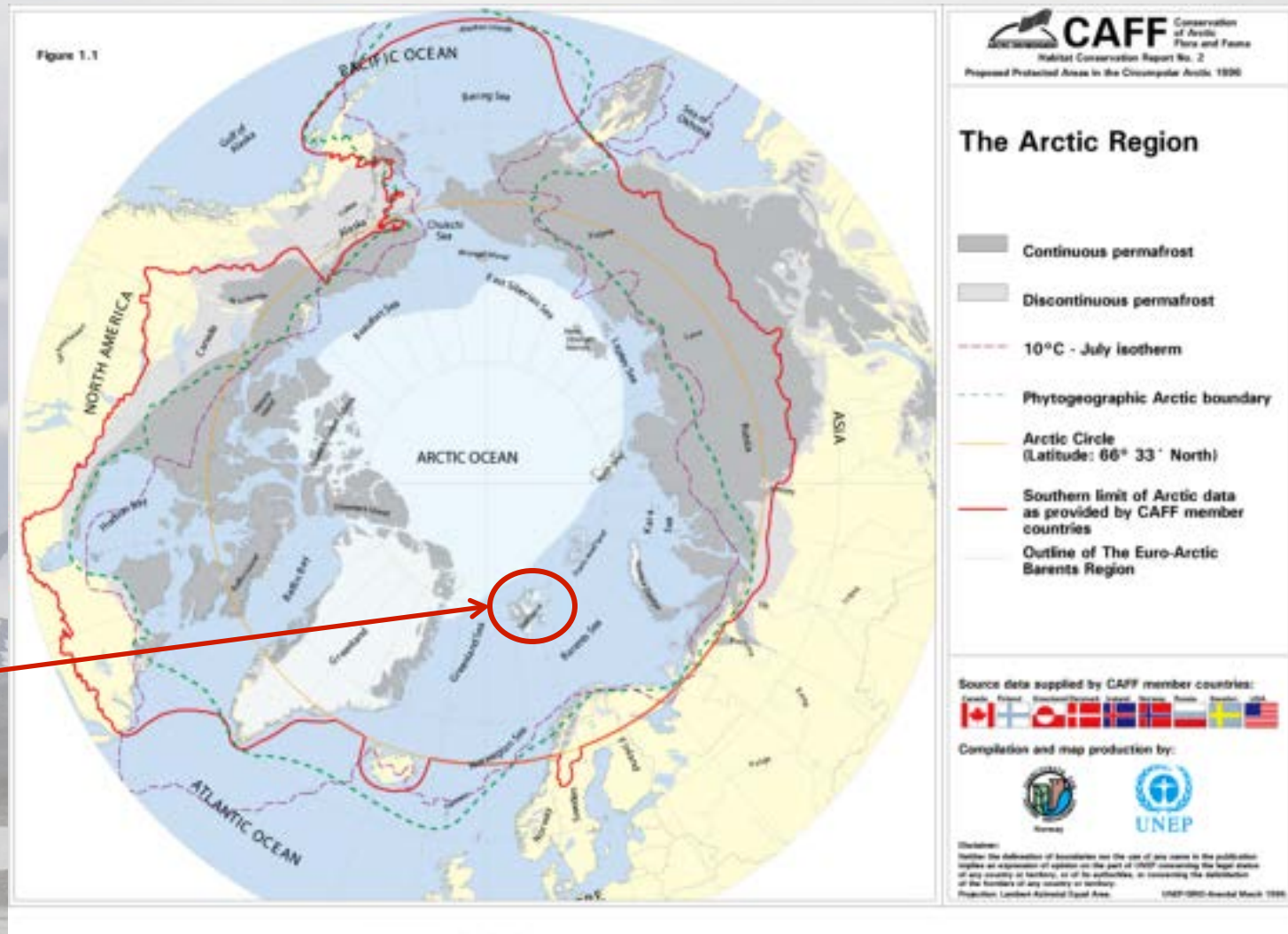
*High Arctic Change 08

- Overview of the Arctic
- Field Research
- Svalbard REU

*Back in the classroom

- Lessons from the field & other places
- Coaching students in authentic inquiry

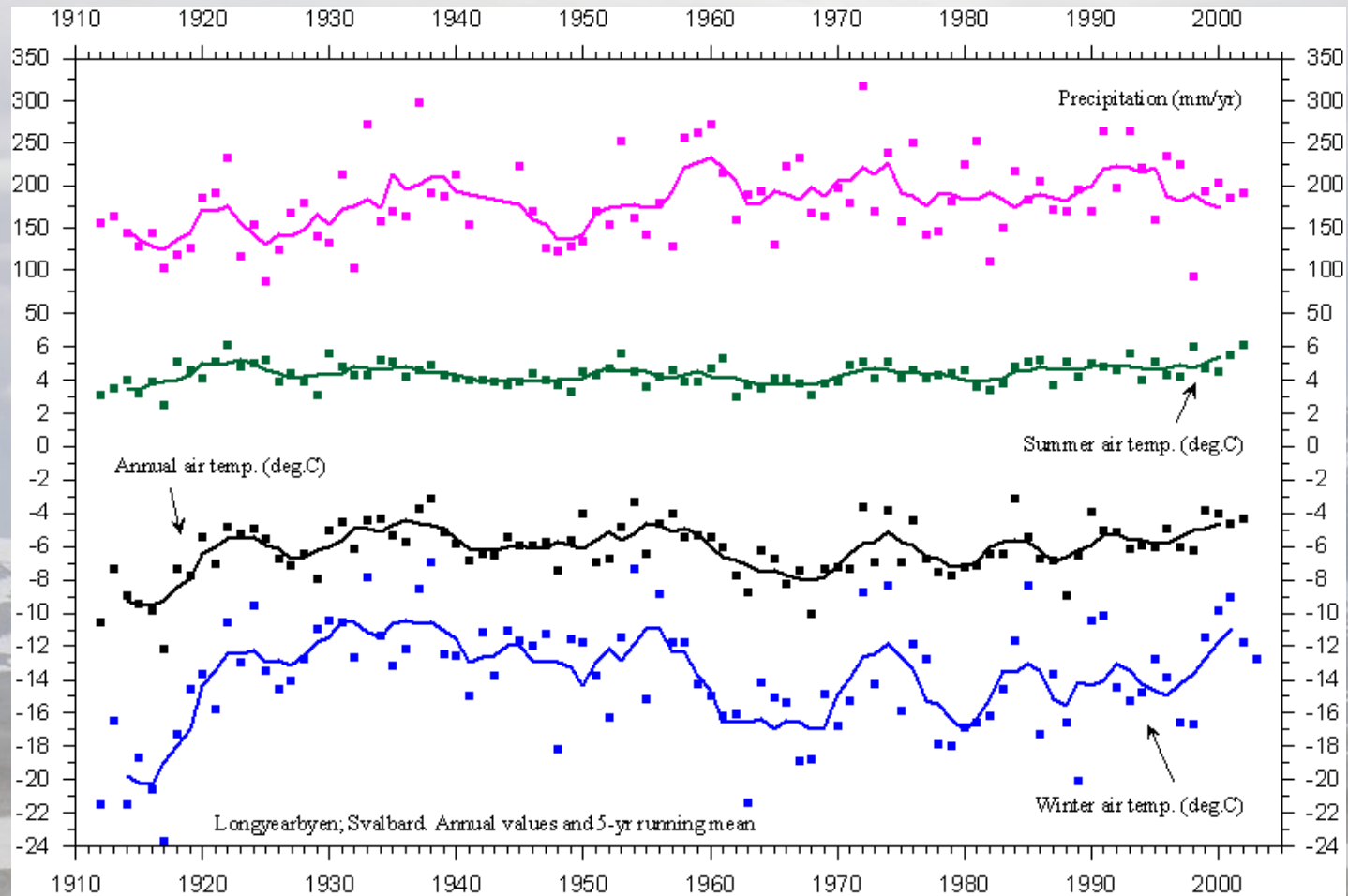
Geographic Overview of the Arctic



Svalbard

http://maps.grida.no/go/graphic/the_arctic_region1

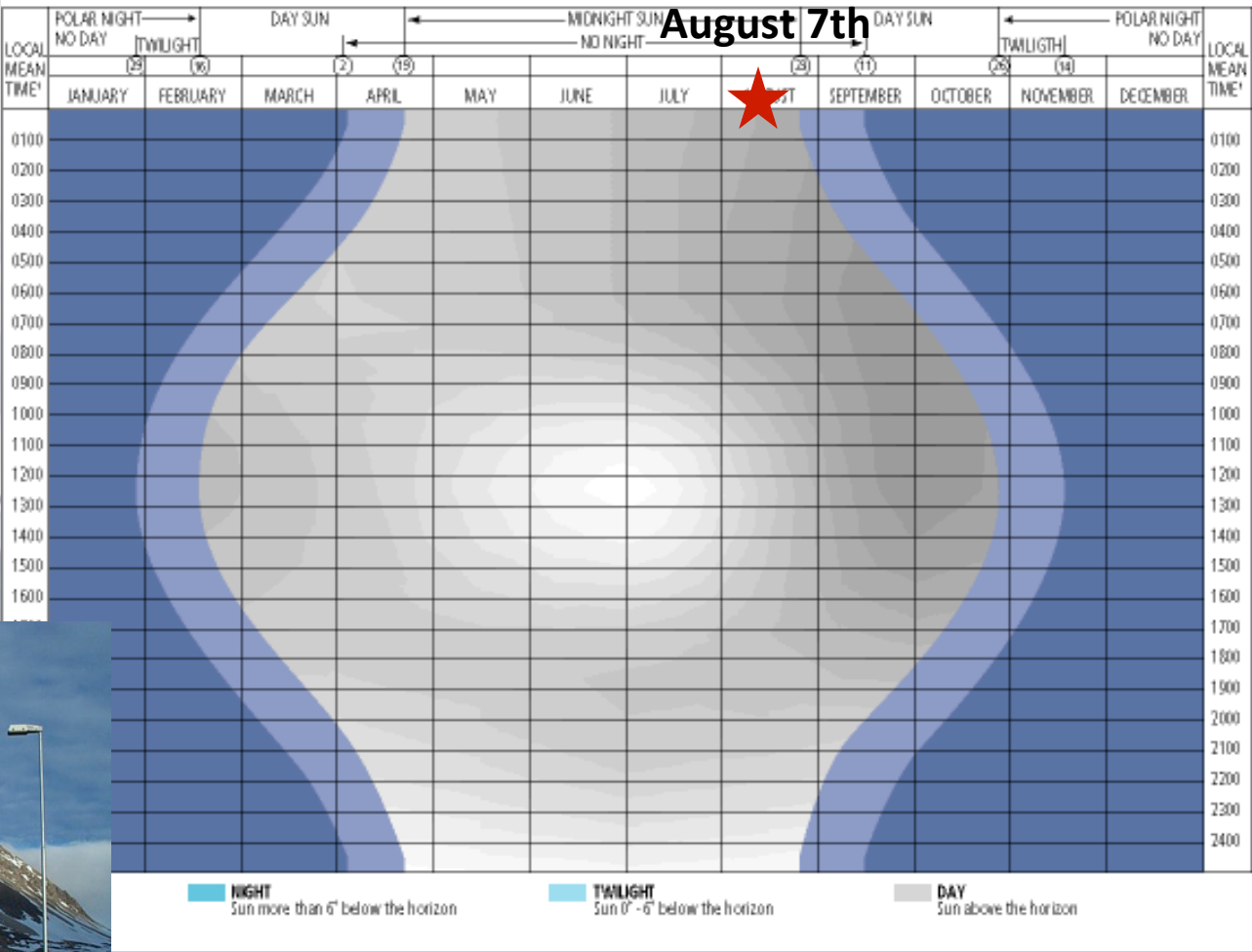
Geographic Overview of Svalbard



Ole Humlum

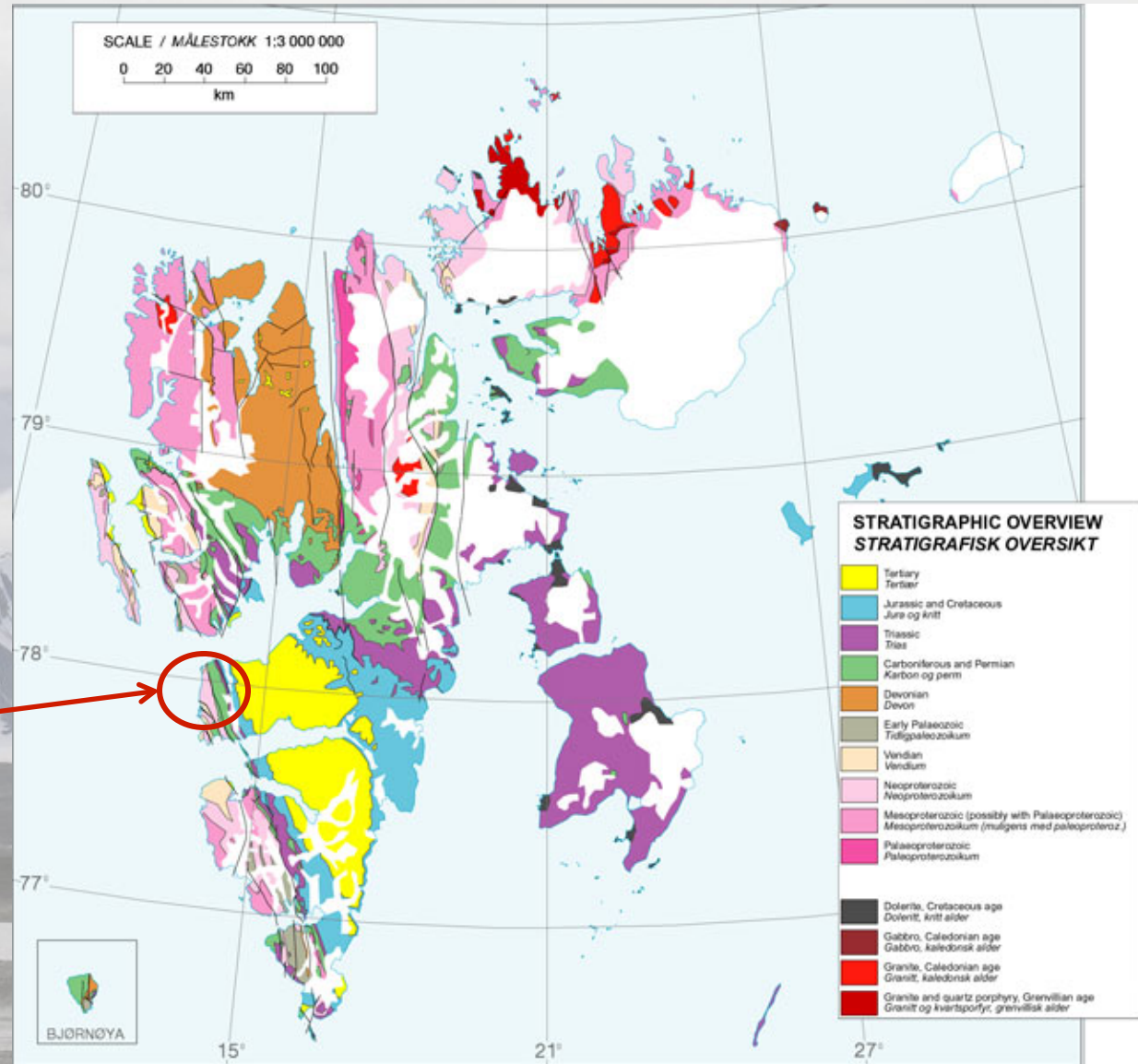
Geographic Overview of Svalbard

17 Sun diagram for Longyearbyen



ed for summer time.
 lbard Samfunnsdrift AS. **More information:** <http://www.ssd.no/>.

Geologic Overview



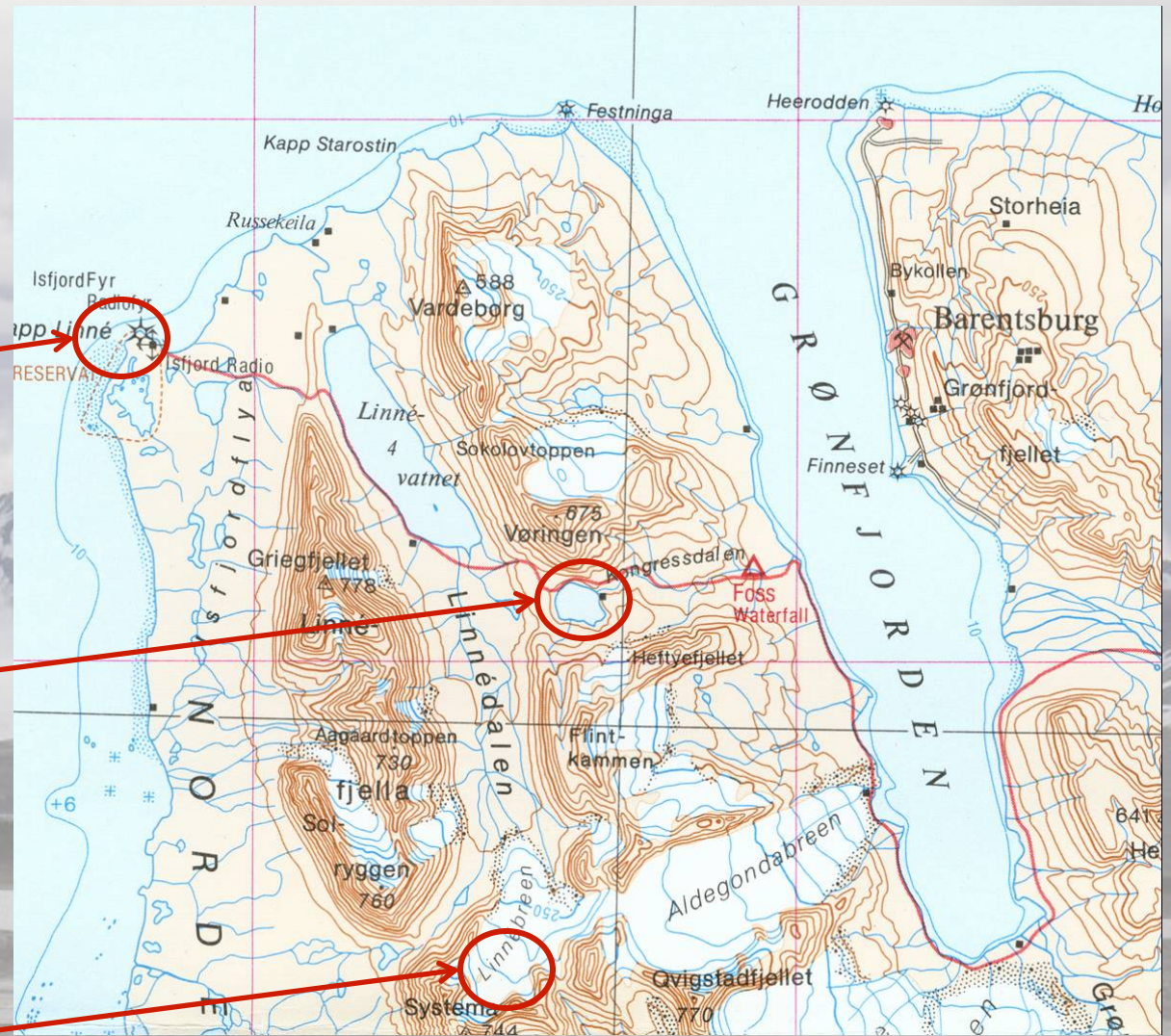
Kapp Linne

Geologic Overview

**Isfjord Radio
(our station)**

Kongressvatnet

Linnebreen



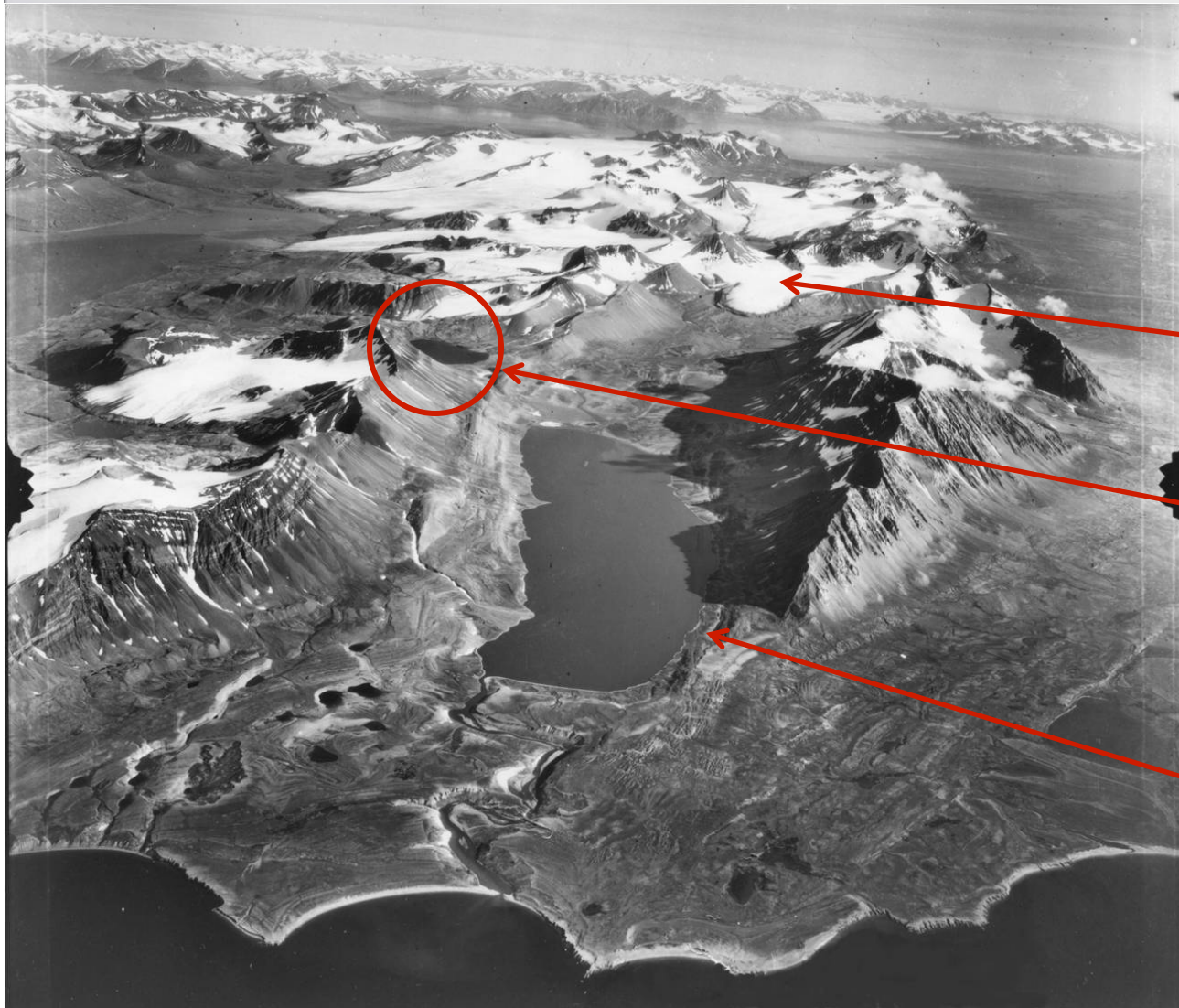
Why is Arctic Research Important to You and I?

- Climate change where we live – Can you see it? – not so obvious
- Climate Change in Svalbard – Very obvious! Many parameters are easily measured.
- Video - Owing the Polar Crisis:
 - <http://cires.colorado.edu/education/outreach/projects/resources.html>



**Ongoing Research & Data
Collection
Wiring The Arctic!**

Sensors Everywhere!

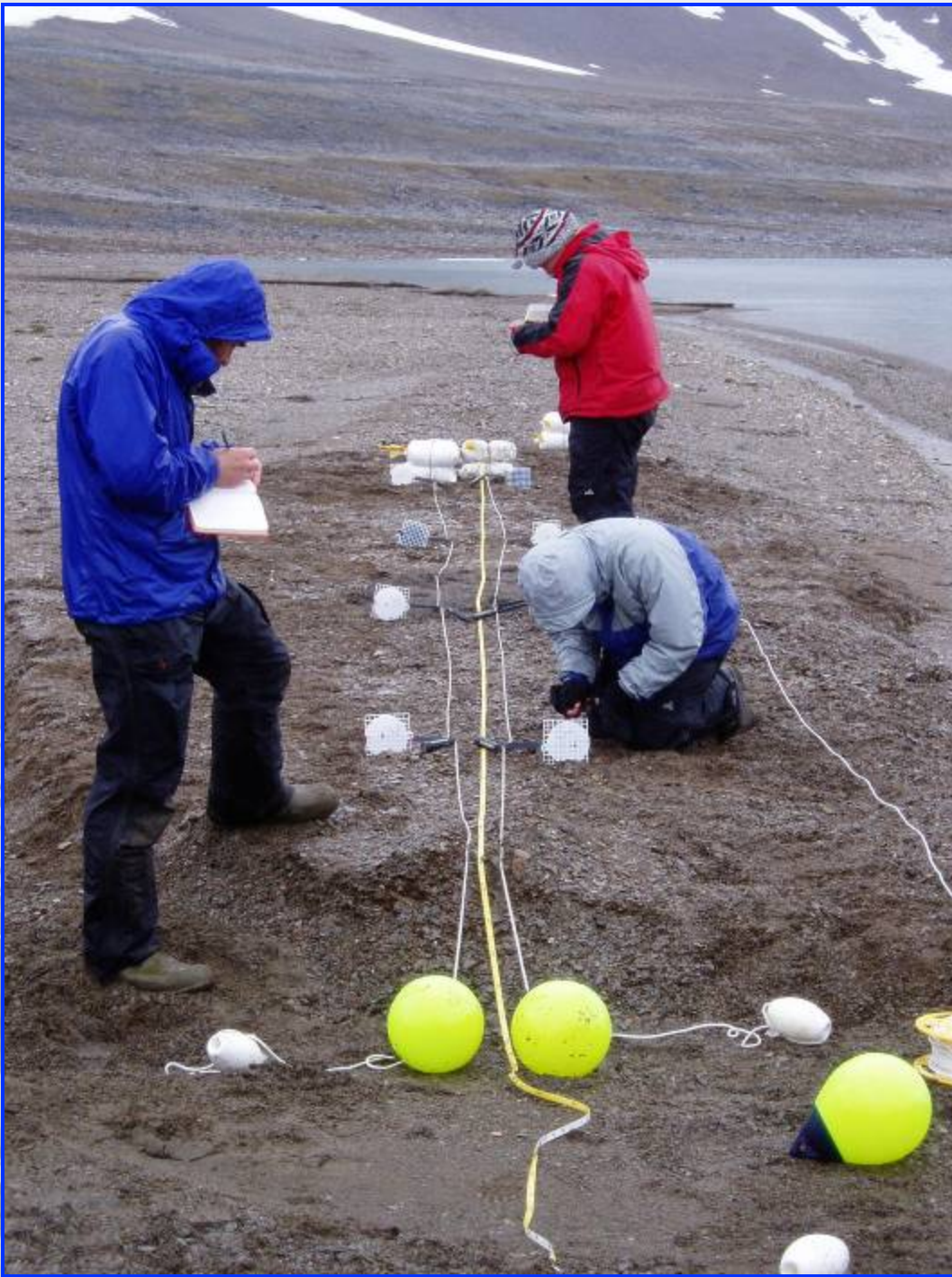


Aerial View of the
Linnedalen
looking South

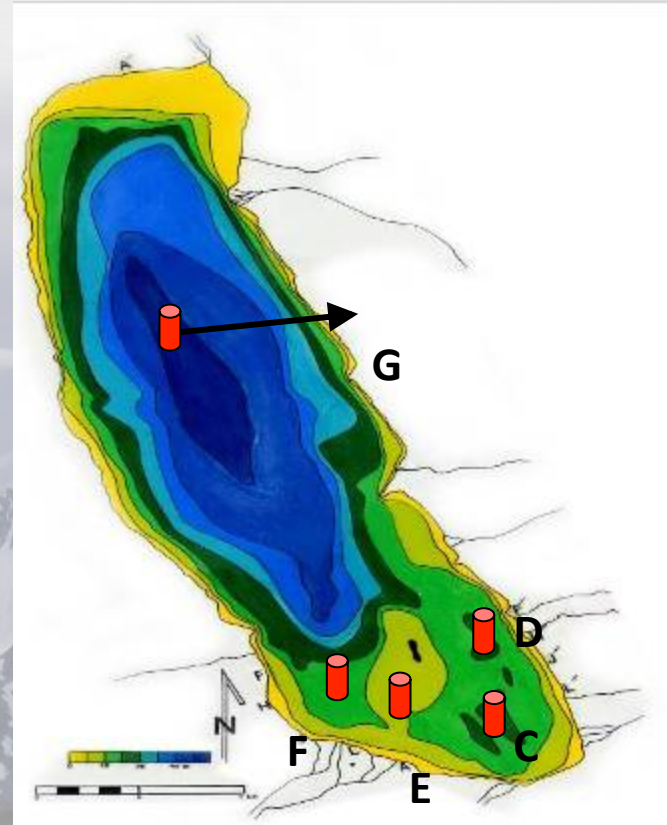
Linnebreen

Kongressvatnet

Linnevatnet



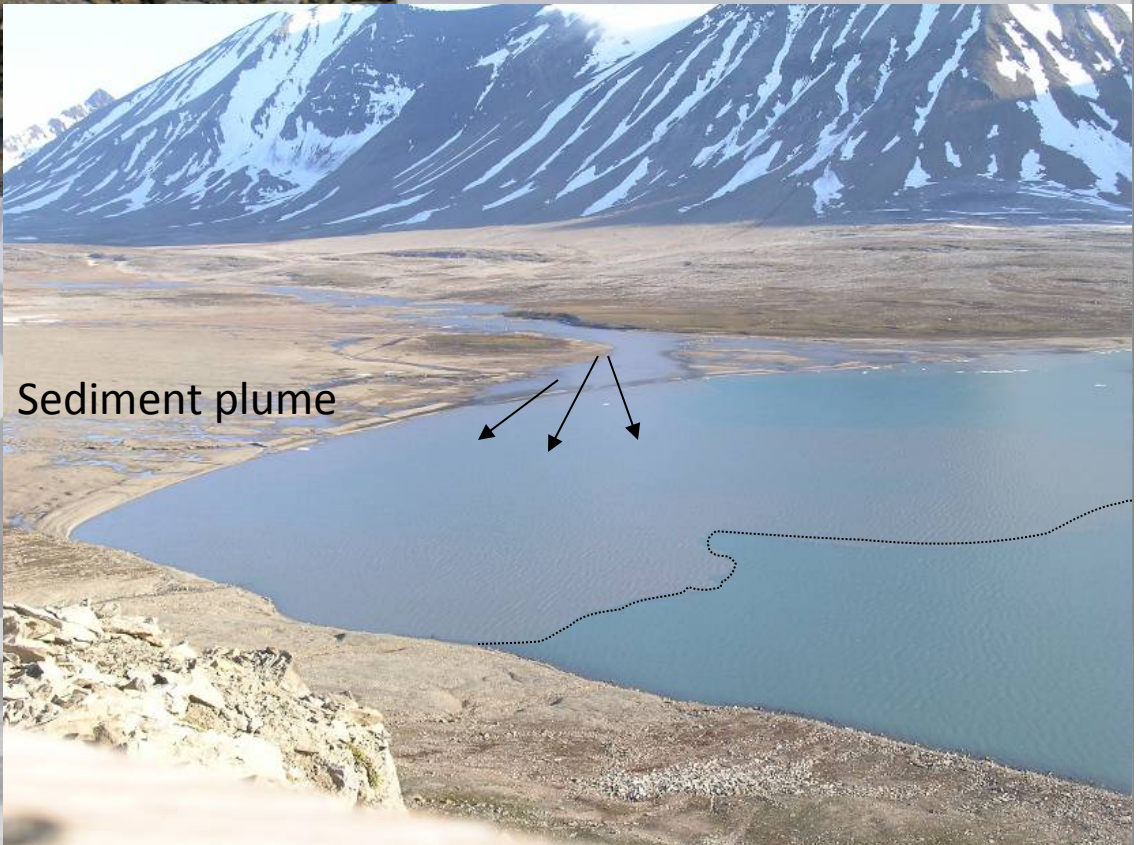
Moorings



- Temp. Loggers
- Sed. Traps

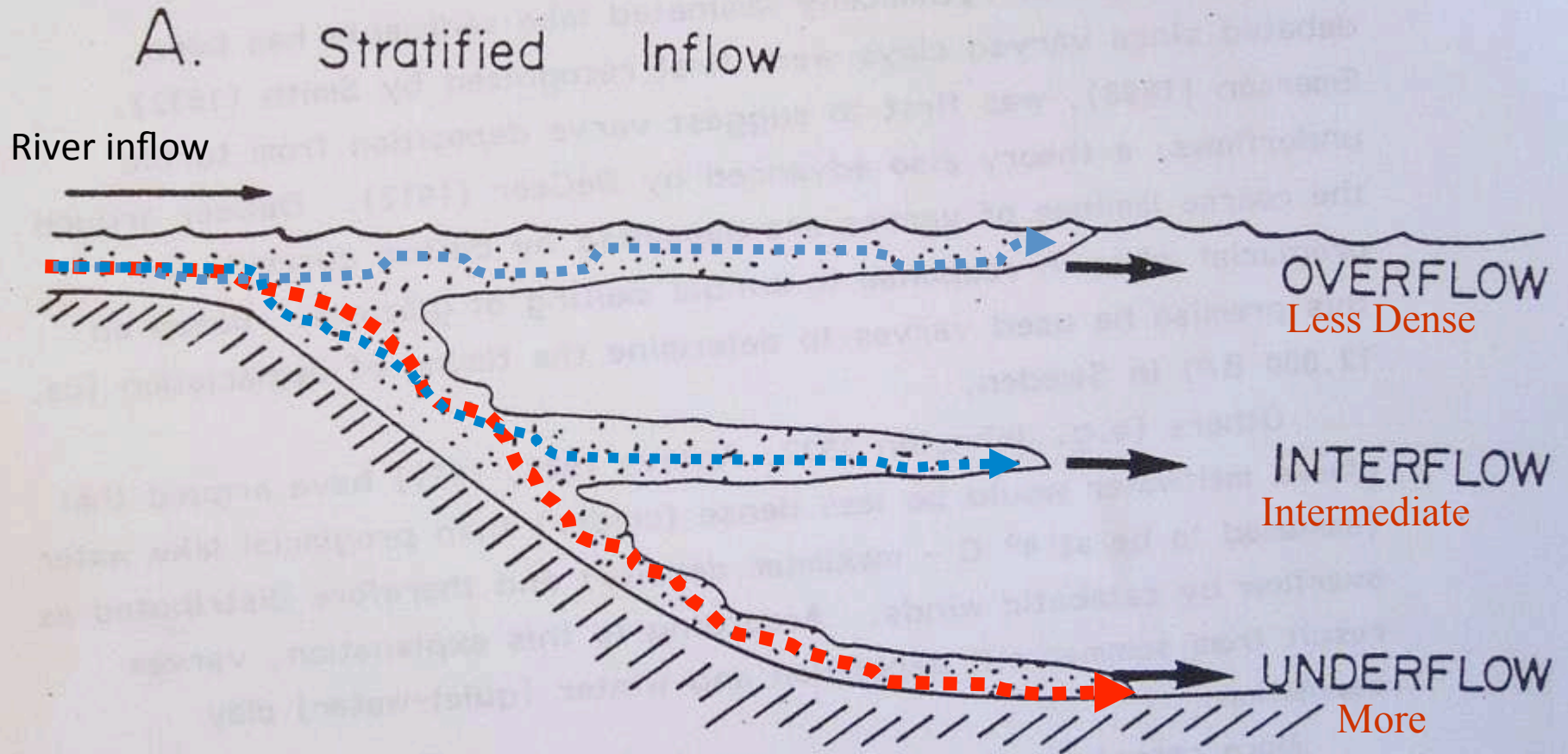


Plume Cam

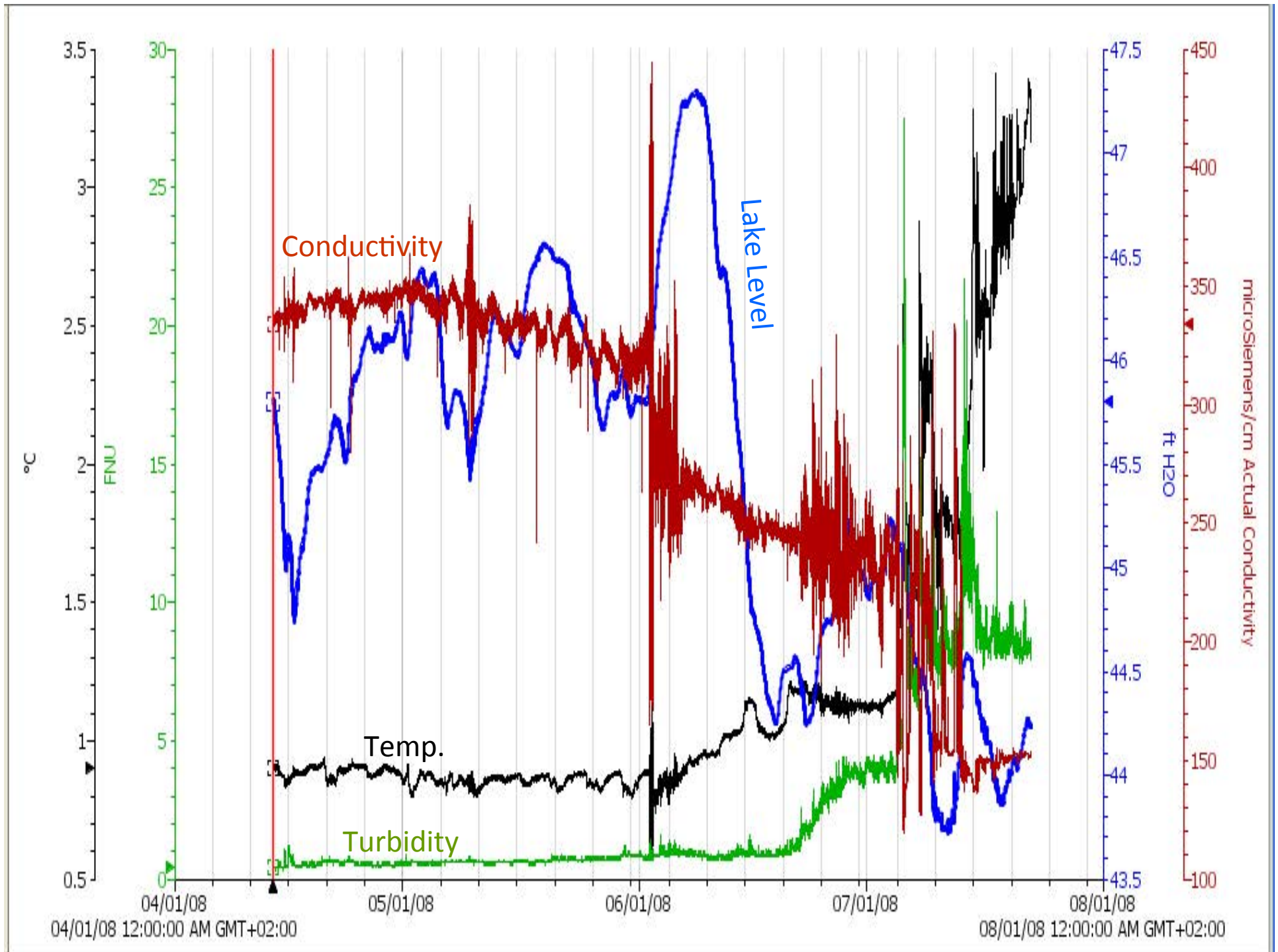


Sediment plume

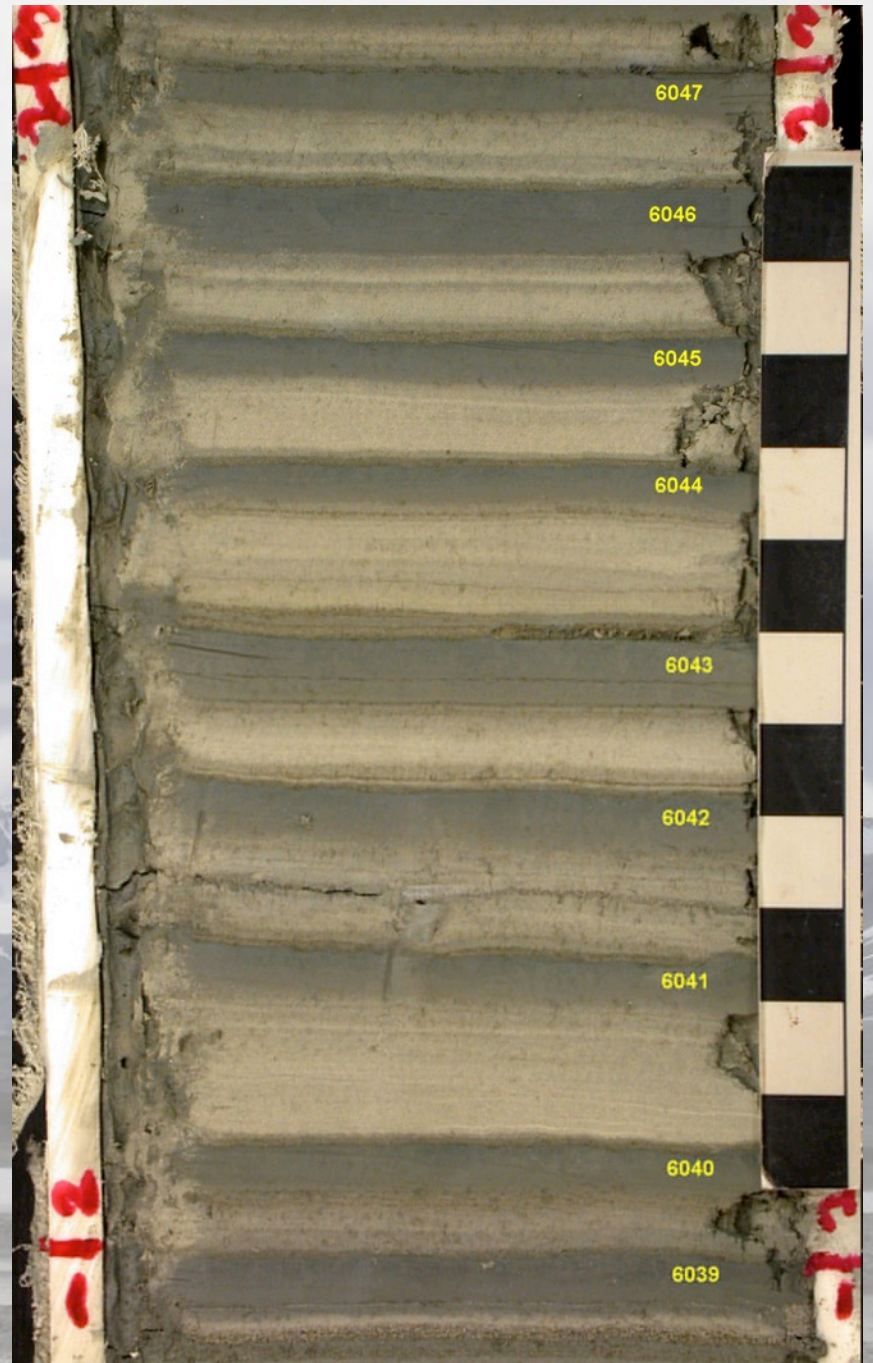
Sediment Distribution

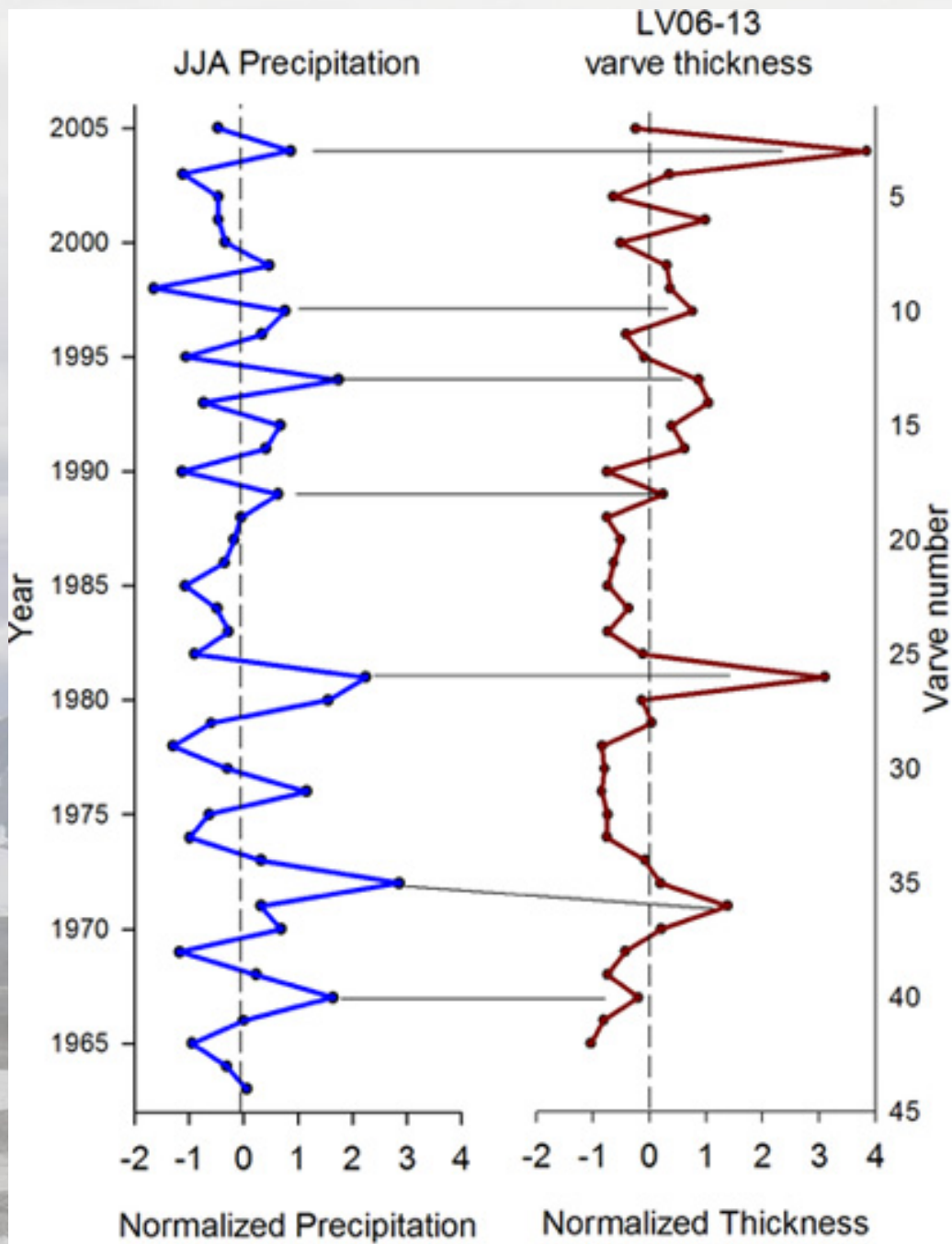


Density = Temp + Sed. Conc.



Varves!





Local conditions



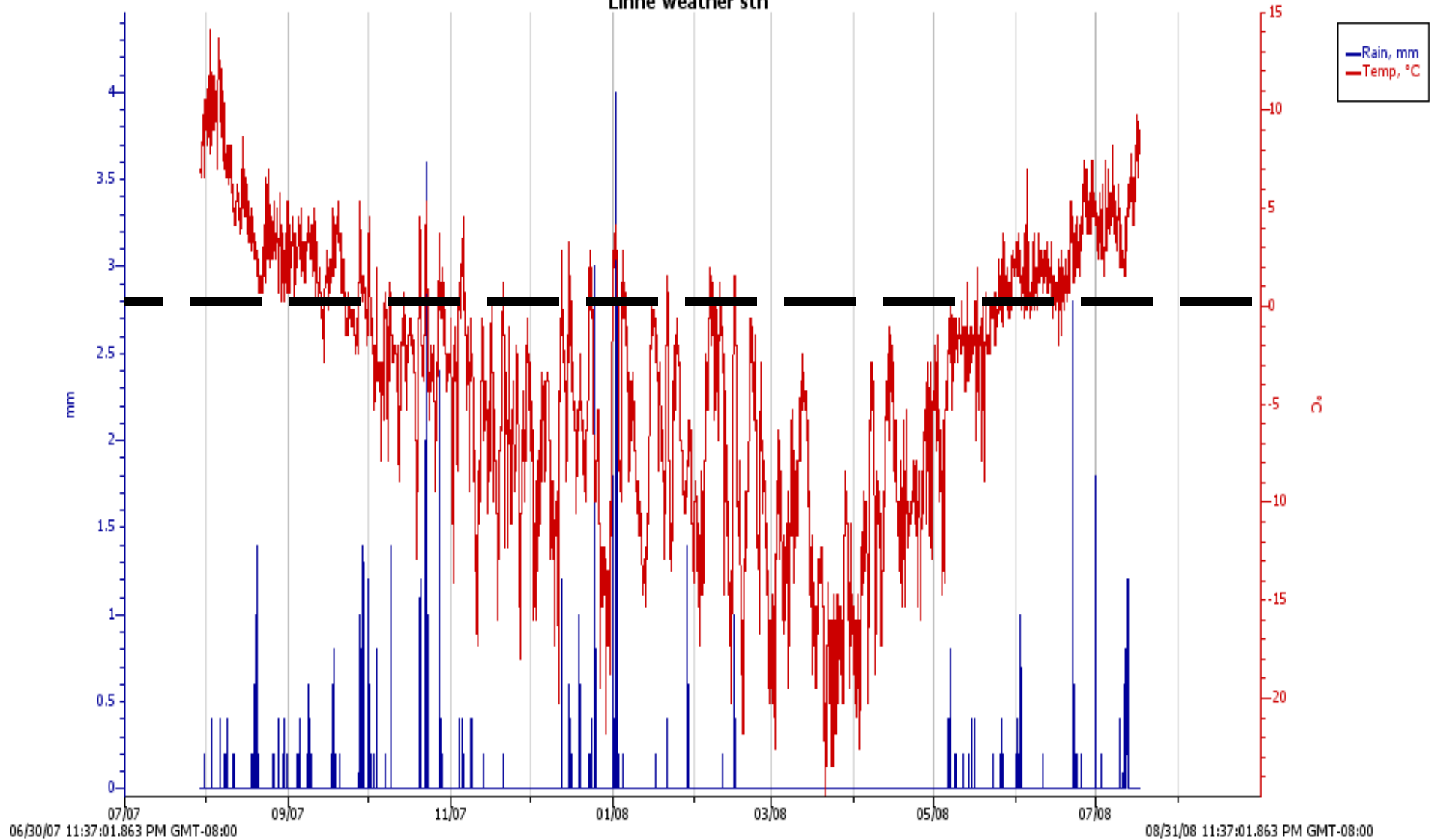
Weather/Climate

Micro - climates



Temp and Precip.

Linne weather stn

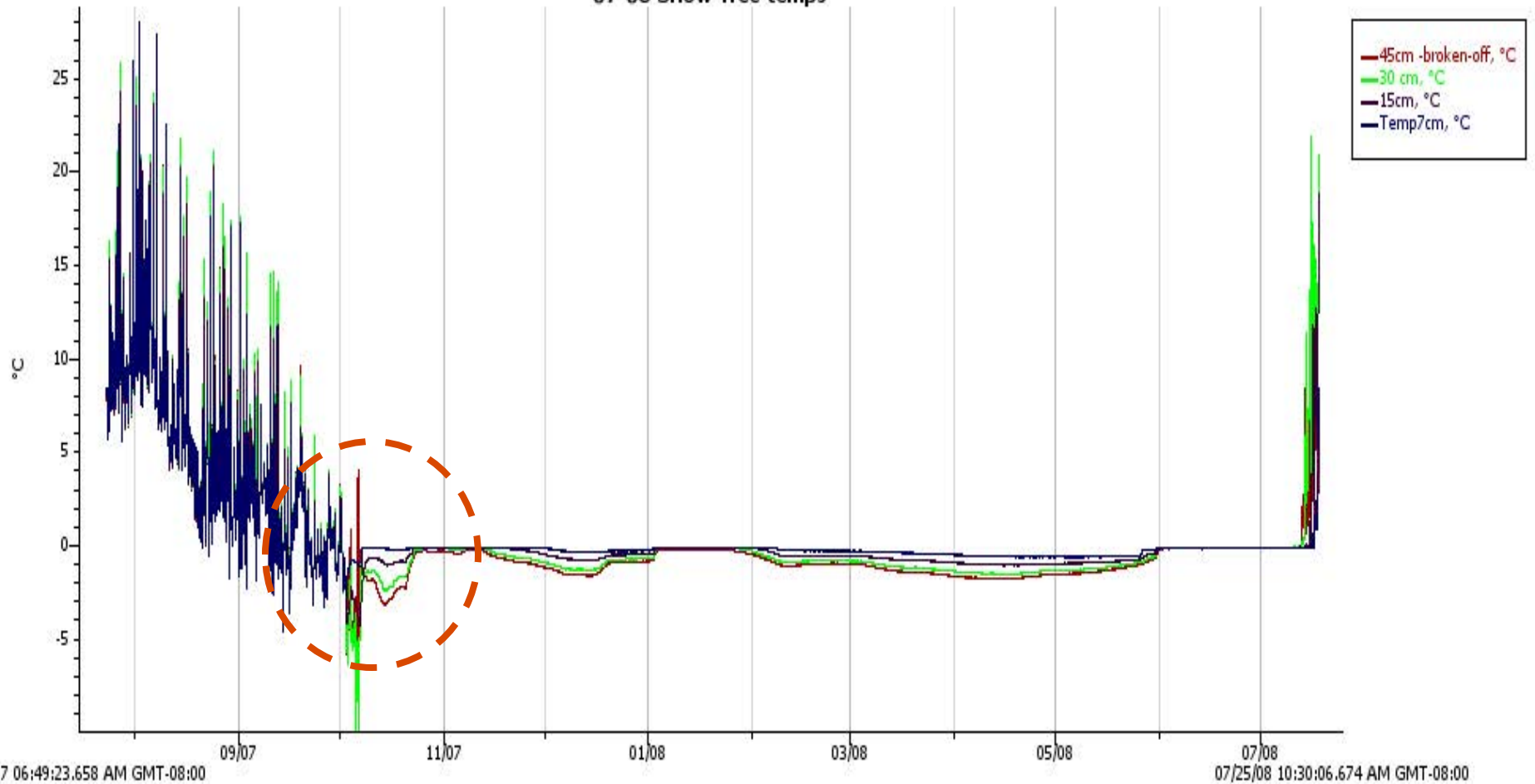




Snow Tree

Snow Tree

07-08 Snow Tree temps



07/15/07 06:49:23.658 AM GMT-08:00

07/25/08 10:30:06.674 AM GMT-08:00

High Arctic Change 08

Svalbard REU

- What is Svalbard REU?
 - NSF funded Research Experience for Undergraduates
 - Experience with field research in the Arctic
 - Develop & carry out original research projects
 - Thesis projects at home academic institutions
 - Collaboration with UNIS (University Centre in Svalbard)



UNIS The University Centre in Svalbard



What were the students doing there?



Back in the Classroom

Investigating the Arctic from Above and Below



Arctic Atlas Map Activity

by Bob Oddo

UNEP GRID-ARENDAL
UN Environment Programme / GRID-Arendal
Arctic Environmental Atlas

GRID-Arendal Home | Contact | Subscribe to news

Zoom to...
Custom

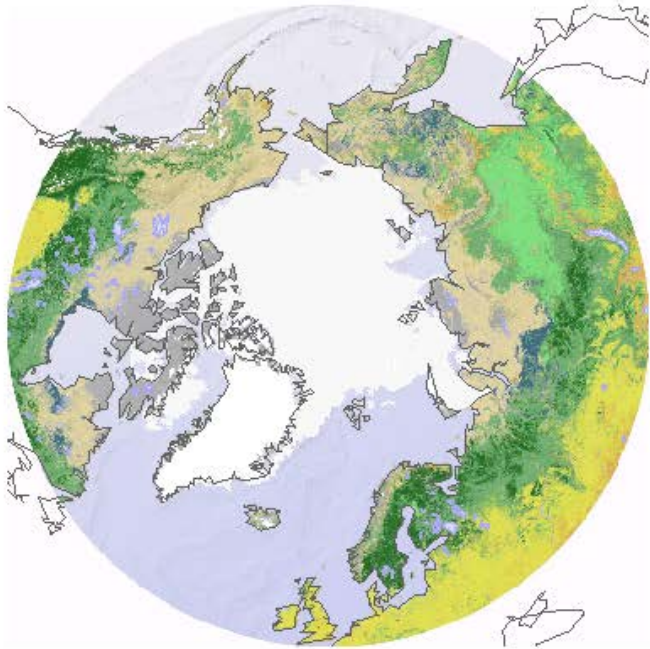
Theme
Landcover

- Arctic circle
- Protected Areas
- WWF Global 200
- Lakes
- Countries
- Cities
- Labels

Refresh Map

Pan

[Full View](#)
[Smaller Map](#) [Larger Map](#)
[Reset](#)
[Print preview](#)
[Advanced Mode](#)



Click to...
 Zoom in
[Zoom Out](#)
 List info

Landcover/Landuse

- Urban, built-up
- Evergreen Forest
- Deciduous Forest
- Mixed Forest
- Shrubland
- Cropland
- Grassland
- Barren
- Wetlands
- Snow and Ice
- Water

[About this map](#)

Global Snow Cover Classroom Activity

RUTGERS UNIVERSITY :: CLIMATE LAB :: GLOBAL SNOW LAB

gsl
RUTGERS UNIVERSITY GLOBAL SNOW LAB

home publications data requests links NASA MEaSUREs

PRODUCTS	LATEST SNOW	MONTHLY CHART
<p>Northern Hemisphere Visible Satellite Charts</p> <ul style="list-style-type: none">* Daily* Weekly* Monthly* Monthly Departure* Monthly Climatology* Documentation <p>Graphs</p> <ul style="list-style-type: none">* Snow Anomalies* Monthly Anomalies* Seasonal Extent <p>Tabular</p> <p>Area of Snow Extent</p> <ul style="list-style-type: none">* Weekly* Monthly* Rankings* Download <p>North America</p> <p>Blended Snow Charts</p> <ul style="list-style-type: none">* 3-Way Pentads	<p>August 2, 2012</p>  <p>Yesterday's snow cover extent across Northern Hemisphere lands. For more daily charts, including the departure from satellite-era normal, click the map.</p> <p>New Snow Extent Product</p> <p>The Rutgers University Global Snow Lab announces revised versions of its historic weekly and monthly Northern Hemisphere</p>	<p>June 2012</p>  <p>Average snow cover extent for the latest month. Based on Rutgers GSL analysis of NOAA daily snow maps. For more results, including the monthly departure from normal for this and other months back to the late 1960s click the map.</p> <p>2011 Annual Report</p> <p>Annual snow cover extent (SCE) over</p>

<http://climate.rutgers.edu/snowcover/>

What can we Learn from Sediments?

North American Glacial Varve Project

HOME
ABOUT
GLACIAL VARVE GEOLOGY
HISTORY OF GLACIAL VARVE CHRONOLOGY
NEW ENGLAND VARVE CHRONOLOGY
NORTH AMERICAN VARVE CHRONOLOGY
FIELD METHODS
LAB METHODS
DATA AND DOWNLOADS
REFERENCE
LINKS
TUFTS EARTH AND OCEAN SCIENCES

2012 Geolimnology Newsletter Figures
[Click Here!](#)

Varve Project News

- 5/15/2008 The Wicked Gap is Dead!
- 5/6/2008 We're Online!
- 8/19/2007 Charlestown and Westmoreland, NH Core Drilling (Summer 2007)
- 7/19/2007 Varve Paleontology, Summer 2007

Welcome to the North American Glacial Varve Website

This site is intended to serve both an educational and research role in promoting the study of glacial varves in North America. Although in existence for close to a century, glacial varve chronologies in North America have been greatly underutilized as a late glacial chronologic and paleoenvironmental tool. They have also been shrouded in misconceptions that have greatly limited their use.

The scope of the web site's coverage is glacial varve chronology in North America, which is heavily dominated by varve studies in New England. Initially the site will focus on the New England Varve Chronology with a few exceptions but should eventually grow to cover more of the continent as the utility of glacial varves is recognized by a greater number of researchers.

Varves of the Month for 7/1/2012 to 9/30/2012

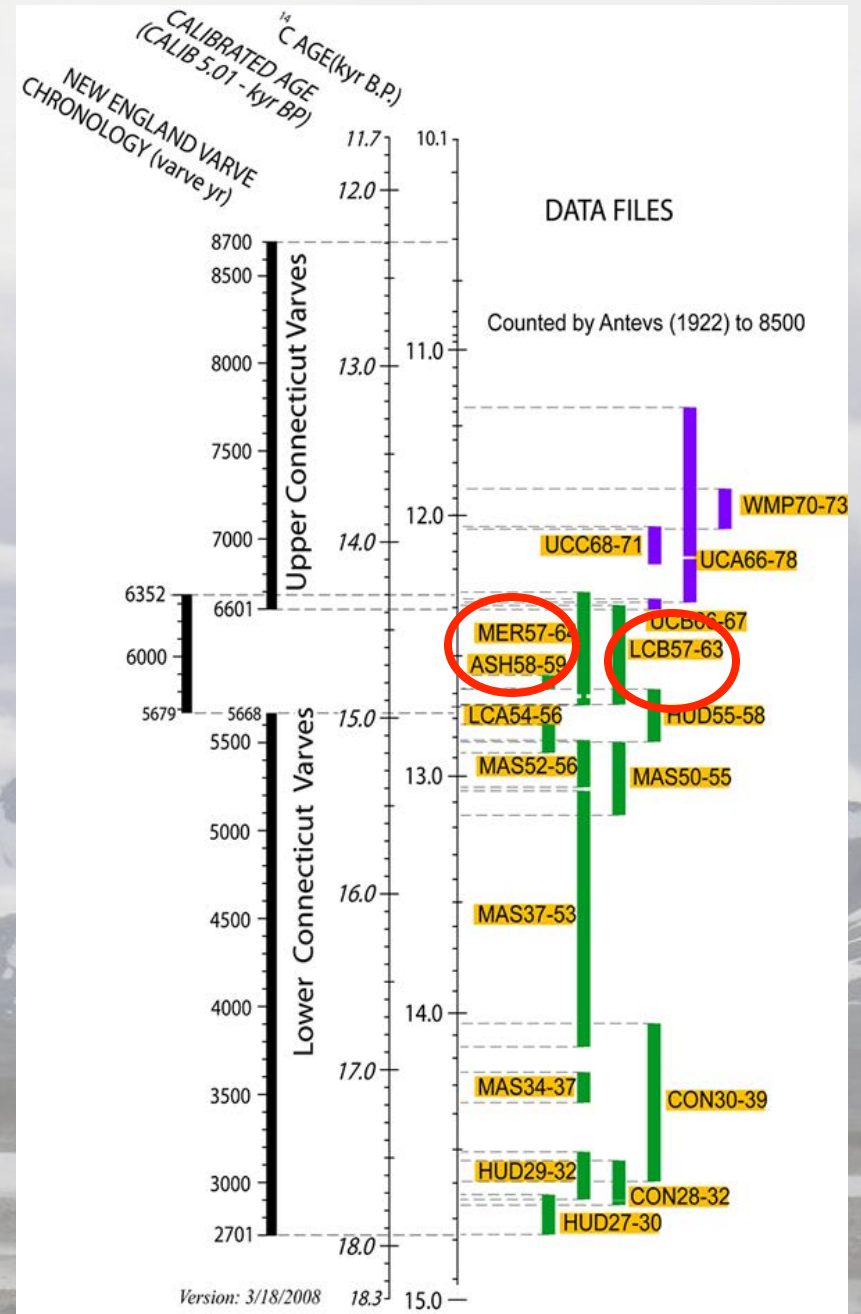
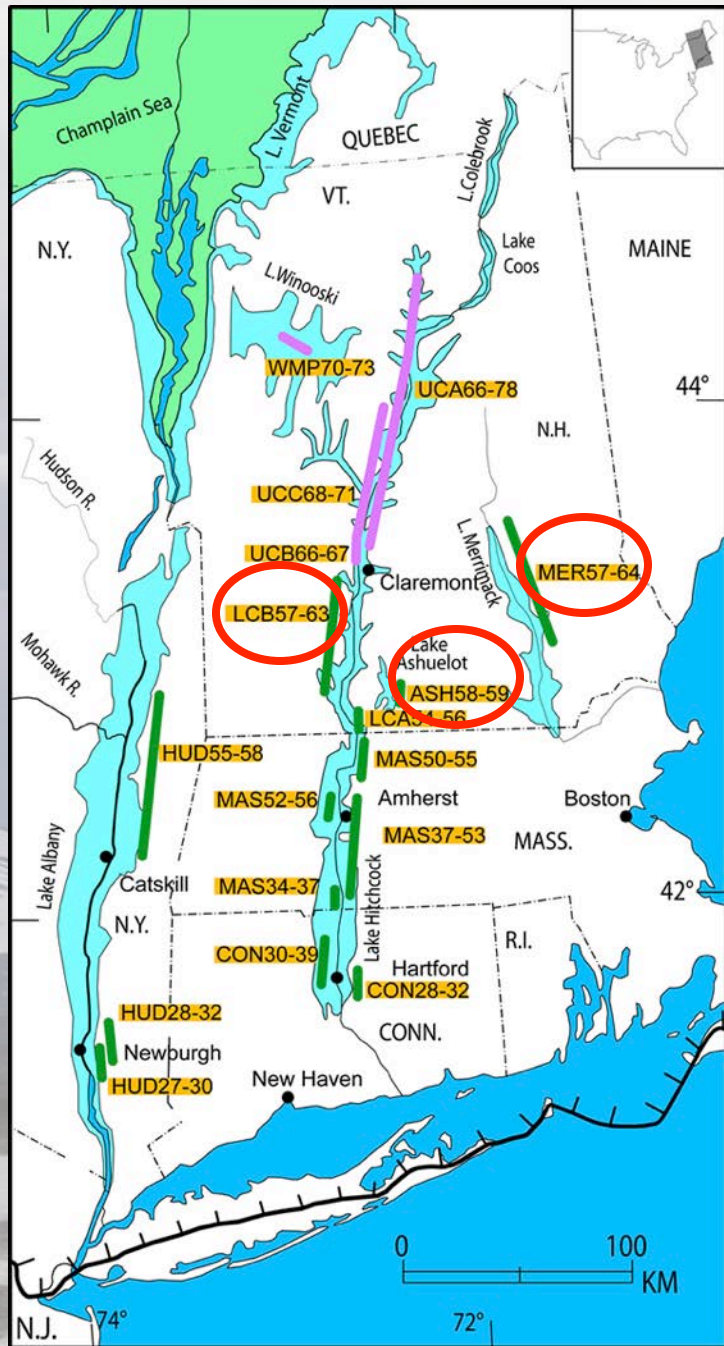
Connecticut Valley Varves at Rt. 12A drill site in North Charlestown, N.H.

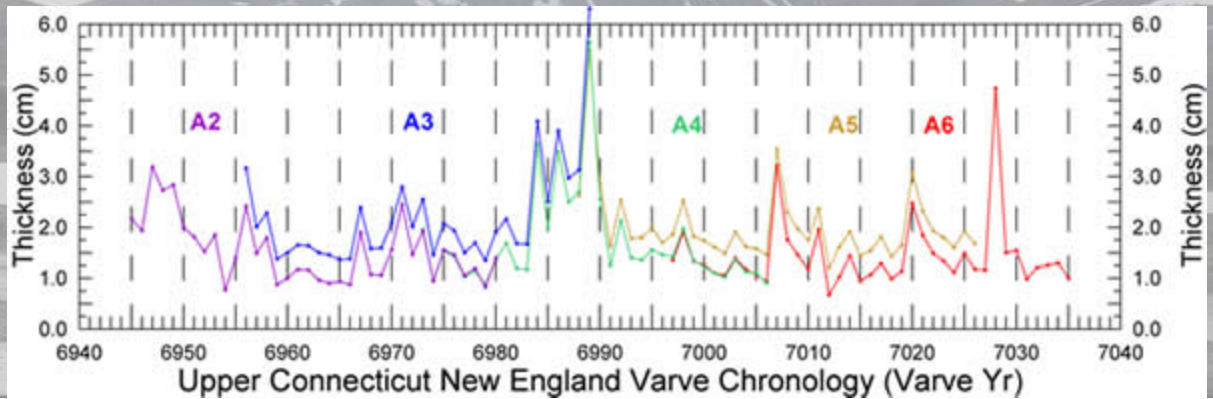
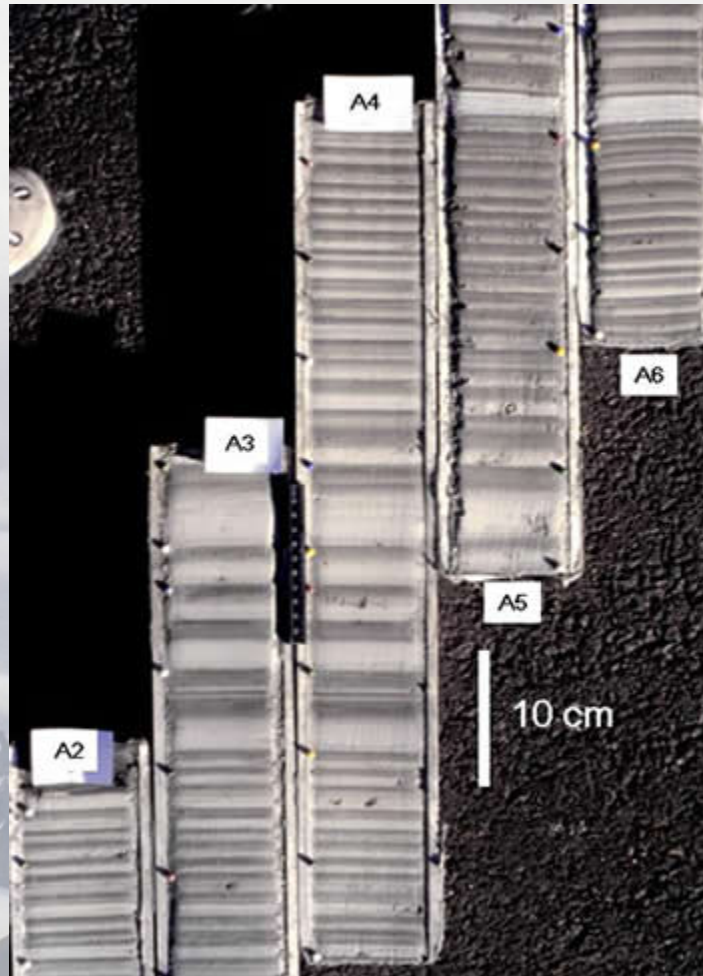
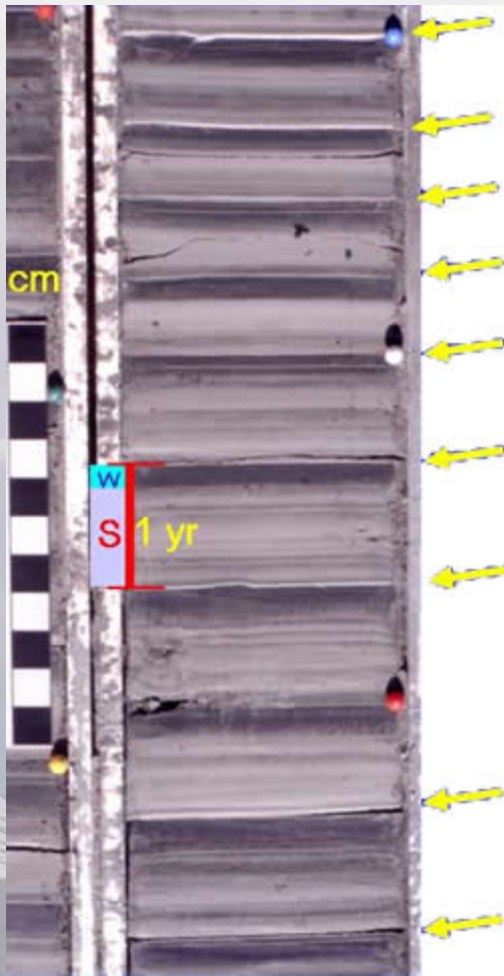
This month's image is three high resolution images stitched together from the bottom of a core collected along Rt. 12A in North Charlestown, N.H. Each varve is labeled with its annual number in the new [North American Varve Chronology \(NAVC\)](#). The varves shown here are distal to the ice front but are thick and sandy as a result of local delta progradation. The varves transition upward into very thick sandy varves and then lacustrine sand as the lake in this area filled with sediment. Sandy sediment was mostly coming from the Sugar and Little Sugar River valleys. The surficial geology of the drill site area is shown on the map below. The drill site sits on a stream terrace cut into sandy lake bottom sediment. A large dune field flanks the western side of Calavant Mountain from when the lake drained and exposed sand blew across the Connecticut Valley. Beneath the drill hole is at least another 50 m of varved silt and clay (Qlb on the map).

The varves shown here are very sandy and get progressively less sandy and thinner downward, and sandier and thicker upward. Pulses of sand clearly show up in the summer layer of each varve. Near the top of each summer layer the very rhythmic alternating layers of sandy and clayey silt may represent diurnal pulses of sediment. This rhythmic character continues into the base of each winter layer. Winter layers are sharply truncated by the summer layers above.

6700

<http://geology.tufts.edu/varves/>





Our Changing Planet

WINDOWS TO THE UNIVERSE
English
Español

Brought to you by the National Earth Science Teachers Association

Sun
Earth
Solar System
Space
Sciences
Culture
People
Games
Teachers
more...

Interior/Surface
Atmosphere
Magnetosphere
Moon
Poles
Climate
Water
Life
Myth
Exploration
more...

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OUR CHANGING PLANET

Changing Mosquito Genes

Grapevines and Drought

Bark Beetle Outbreaks

Survival of Trees

Disappearing Lizards

Infectious Diseases

Adaptation of Species

Rising Sea Level

Thawing Permafrost







Melting Glaciers

Black carbon

Ocean Acidification

Our Changing Planet

When we look around us, we can see that our planet's climate is changing rapidly. The [National Earth Science Teachers Association](#) and [Windows to the Universe](#) are working together with [NBC Learn](#) and the [National Science Foundation](#) to explore the impact that [climate change](#) is having on [our planet](#). The resources below provide links to videos developed by NBC Learn on twelve key indicators of climate change, as well as lesson plans for teachers to use to explore the science behind these indicators with their students at the secondary level.

	NBC Learn Videos	Related Lesson Plans
	Changing Mosquito Genes	Changing Mosquito Genes
	Grapevines and Drought	Grapevines and Drought (Climate Change and Your Breakfast!)
	Bark Beetle Outbreaks	Bark Beetle Outbreaks
	Survival of Trees	Survival of Trees
	Disappearing Lizards	Disappearing Lizards
		

http://www.windows2universe.org/earth/changing_planet/changing_planet.html

Our Changing Planet

- 17 videos & lessons from NBC Learn & Windows to the Universe
 - Black Carbon
 - Melting Glaciers
 - Thawing Permafrost
 - Fresh Water in the Arctic

http://www.windows2universe.org/earth/changing_planet/changing_planet.html



Authentic Research

Coaching Students in Science

The Practices of Science

- An integral part of science instruction
 - State Standards
 - National Standards (Inquiry & the NSES, 2000, p.29)
 - NGSS
 - 2009 NAEP Frameworks
- General idea that hands-on science is the same as open inquiry.
- Often taught separately from science content or not at all in fear of not covering content
- But how will our students come to understand how we know what we know in science if we don't help them develop the skills necessary to think in a critical and methodical way?

Not Typically Found in K-12 Science Classes

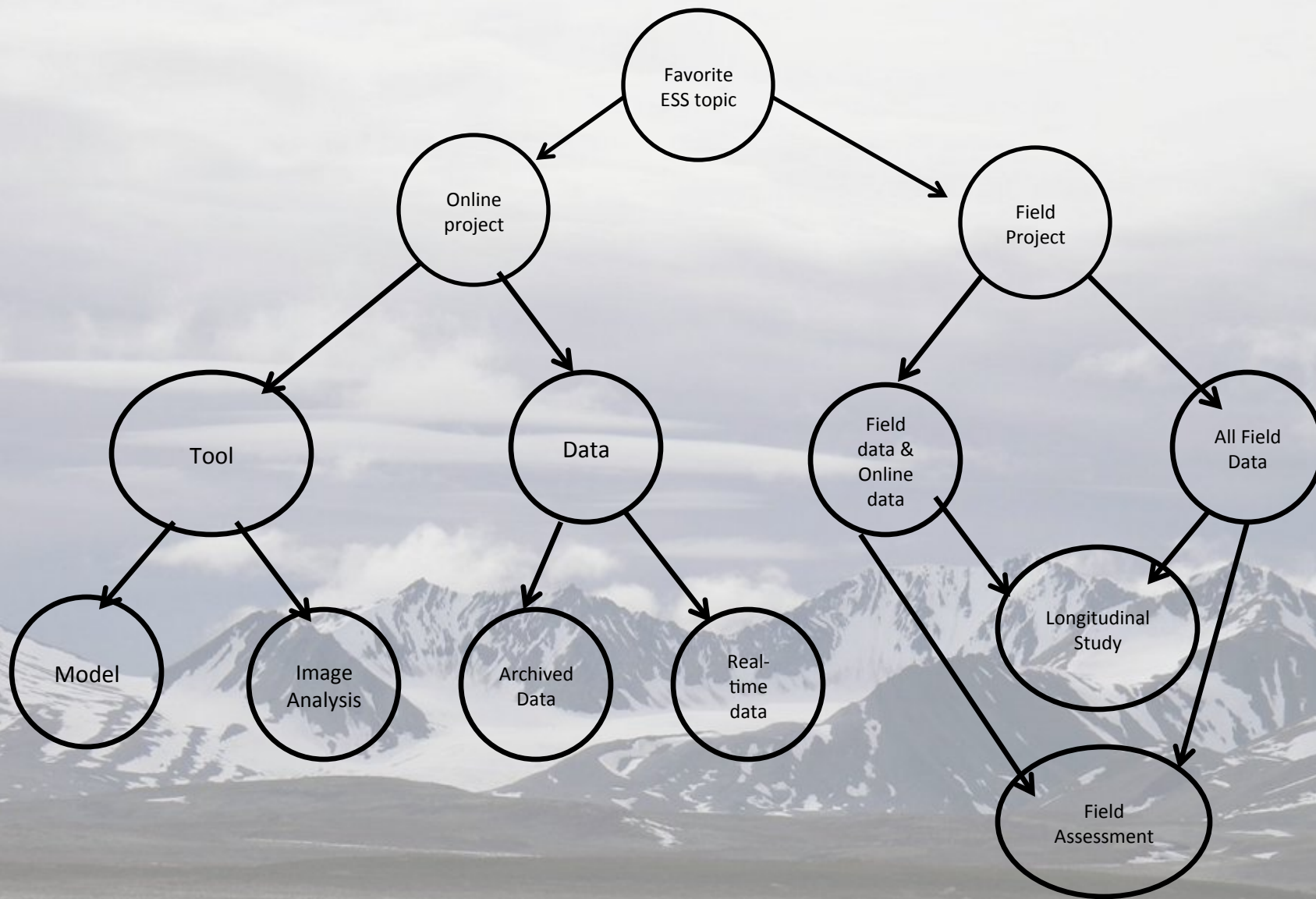
- Most undergraduate science classes are taught as lecture classes
- College labs are generally based on objectives rather than student generated research questions
- The best coach is one who has personal experience – multiple ways to get it:
 - RET's and other professional development opportunities for teachers
 - Graduate level research project
 - Industry Mentor

Are your students ready for authentic research?

- Yes, they can be – by initially scaffolding the practices of science (Metz, 2004)
 - Inferences vs. observations
 - Models in science – types & uses
 - Quantitative & qualitative data
 - Continuous & discrete data
 - Writing research questions & hypotheses
 - Practice in developing effective methods
 - Data collection & display
 - Analysis vs conclusion

Implementing an Open Inquiry Project with your Students – an example

- Year long process
 - 1st marking period – practices of science
 - 2nd marking period – submit proposal
 - 3rd & part of 4th marking period – data collection
 - 4th marking period – data analysis and report-out
- Coaching students in selecting a topic and turning it into a project - challenge early in the school year
 - Know where to send students
 - Ability to gather resources for projects



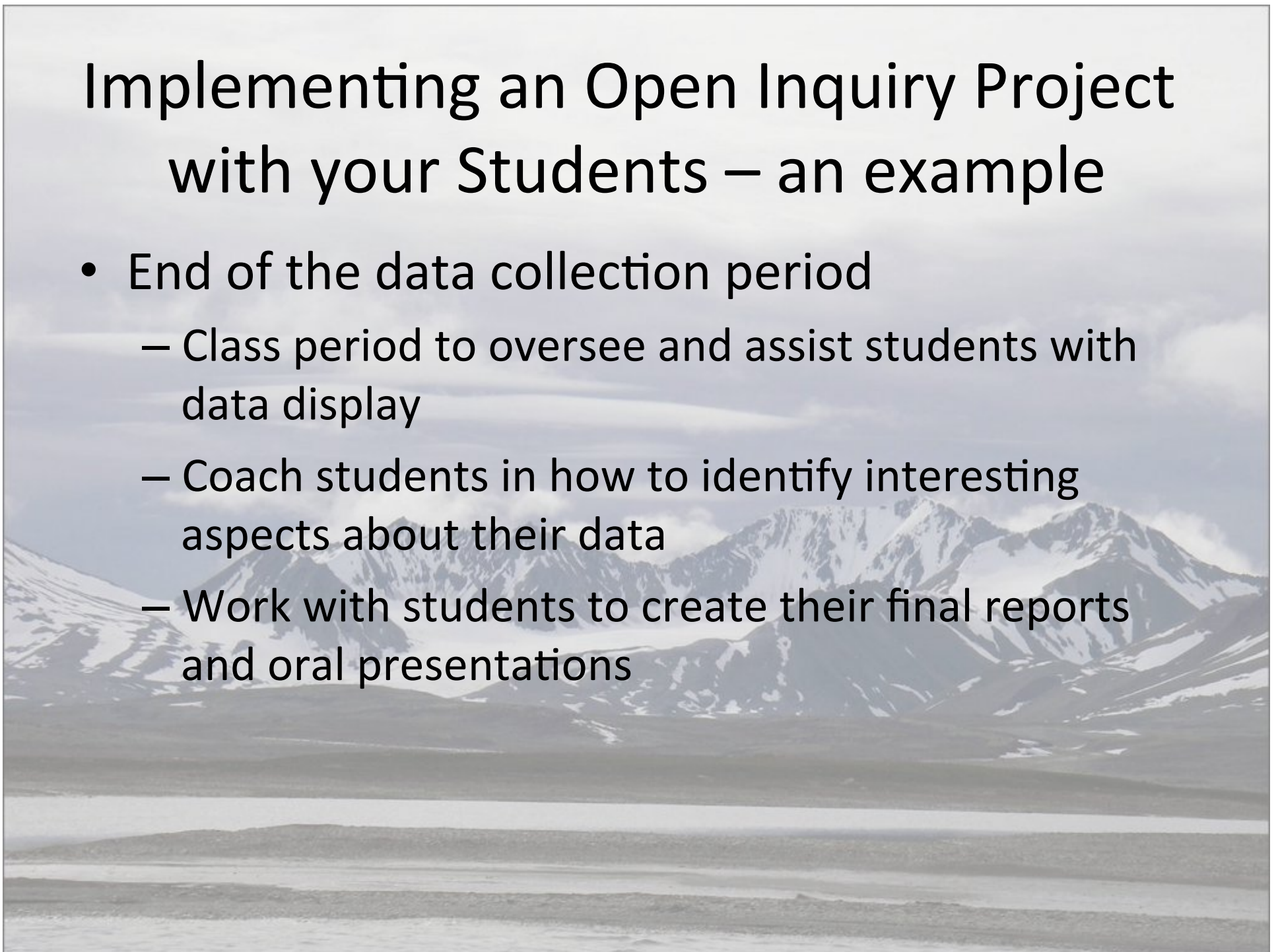
Assisting students with identifying
a research project & question

Implementing an Open Inquiry Project with your Students – an example

- After proposals are submitted
 - Conference with students about their methods, data table set up, etc
 - Copy proposal & return original to student
- Schedule all students for “Brown Bag Lunches” during the data collection period
 - Report out to students working on similar projects
 - Opportunity to view student collected data two times during the data collection period
 - Brainstorming time to work out any issues

Implementing an Open Inquiry Project with your Students – an example

- End of the data collection period
 - Class period to oversee and assist students with data display
 - Coach students in how to identify interesting aspects about their data
 - Work with students to create their final reports and oral presentations



Implementing an Open Inquiry Project with your Students – an example

- Why do it?
 - Students gain confidence in their abilities to “do” science
 - Students practice their metacognitive skills while reflecting on their efforts and understandings
 - Epistemological perspective – students think more critically about how we come to know what we know
 - Teacher perspective – you are teaching your students how to “do science” and not simply “do school”; learn new techniques related to research

Implementing an Open Inquiry Project with your Students – an example

- What to think about...
 - Money for supplies – grants, department, students
 - Support from administrators
 - Finding a mentor for unfamiliar topics
 - Challenge of defining 70+ different projects
 - Dealing with student issues – vacations, illnesses, supplies, web data, data tools, etc

Questions?



<http://www.polartrec.com>



TEACHERS AND RESEARCHERS
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Teachers: Join PolarTREC!

www.polartrec.com/about/join

Every teacher can participate in different ways:

- **Following Expeditions**
- **Participate in PolarConnect Events**
- **Join the Polar Education Email List**
- **Take Online Professional Development Courses**
- **Become a PolarTREC Teacher!**



TEACHERS AND RESEARCHERS
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Upcoming Events

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



TEACHERS AND RESEARCHERS
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Thank You!

An archive of the event will be available shortly.
<http://www.polar-trec.com/polar-connect/archive>

