TEACHERS AND RESEARCHERS EXPLORING AND COLLABORATING

POLAR TREC

Welcome to ***PolarConnect***



Sliding Glaciers

With PolarTREC Teacher Dr. Lauren Neitzke Adamo

& Team Researchers Dr. Lucas Zoet, Dr. Christian Helanow, and Jacob Woodard

August 23, 2018

Getting to Know Adobe Connect

Slides will be shown here

Exit presentation

Mute your speakers

Raise your hand

List of all participants

Follow the chat

Find out more about the presentation

Chat here

Participant Introductions

In the Chat box, please introduce yourself by typing in your:

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

What is PolarTREC?

- Since 2004, the Arctic Research Consortium of the United States (ARCUS), a non-profit organization, has been administrating the PolarTREC Program.

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

- Over 150 teachers from around the United States have joined 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.

ARCUS
ARCTIC RESEARCH CONSORTIUM OF THE UNITED STATES

25 Years of Connecting Arctic Research
www.arcus.org

Questions

During the Presentation:

- Type your question in the text chat box

At the End of the Presentation, two options:

1. Type your question in the text chat box, or
2. Raise your hand with the "hand button".

- PolarTREC staff will call on you and activate your microphone.
- Speak loud and clear, directly into the computer microphone or the phone to ask your question.

Dr. Lucas Zoet

- How glaciers slide over their base
- The landforms glaciers leave behind
- Using seismic, GPR and drones to study glaciers

Sliding Laws of Glaciers

- A glacier flows down a slope just like water moves down slope in a river
- Sort of like if a blob of honey on a inclined board.
- Most glacial motion takes place right at the bottom of the glacier where the ice sits on and slides over the rock beneath.

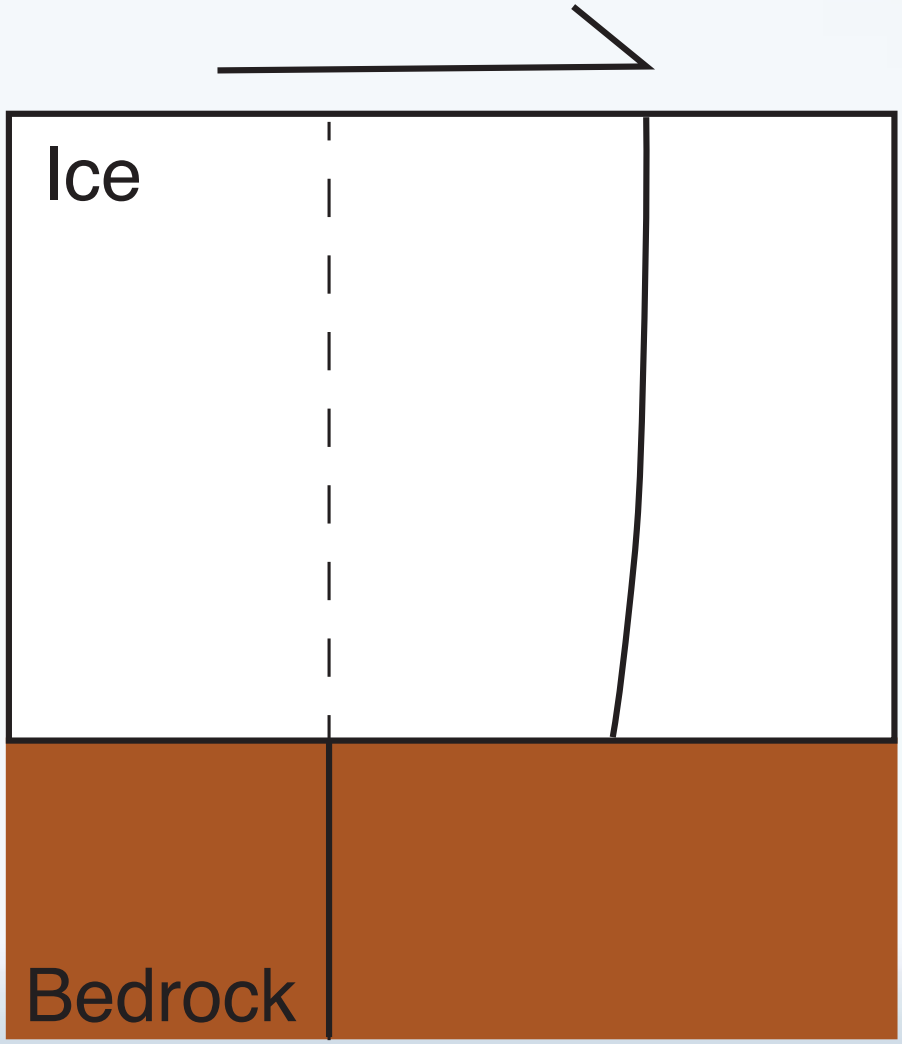


Figure via Luke Zoet

Sliding Laws of Glaciers

- A sliding law allows us to predict the glacier's speed if we know the slope and thickness of ice.

- Sea level rise directly depends on the how fast glaciers move and dump ice into the ocean.

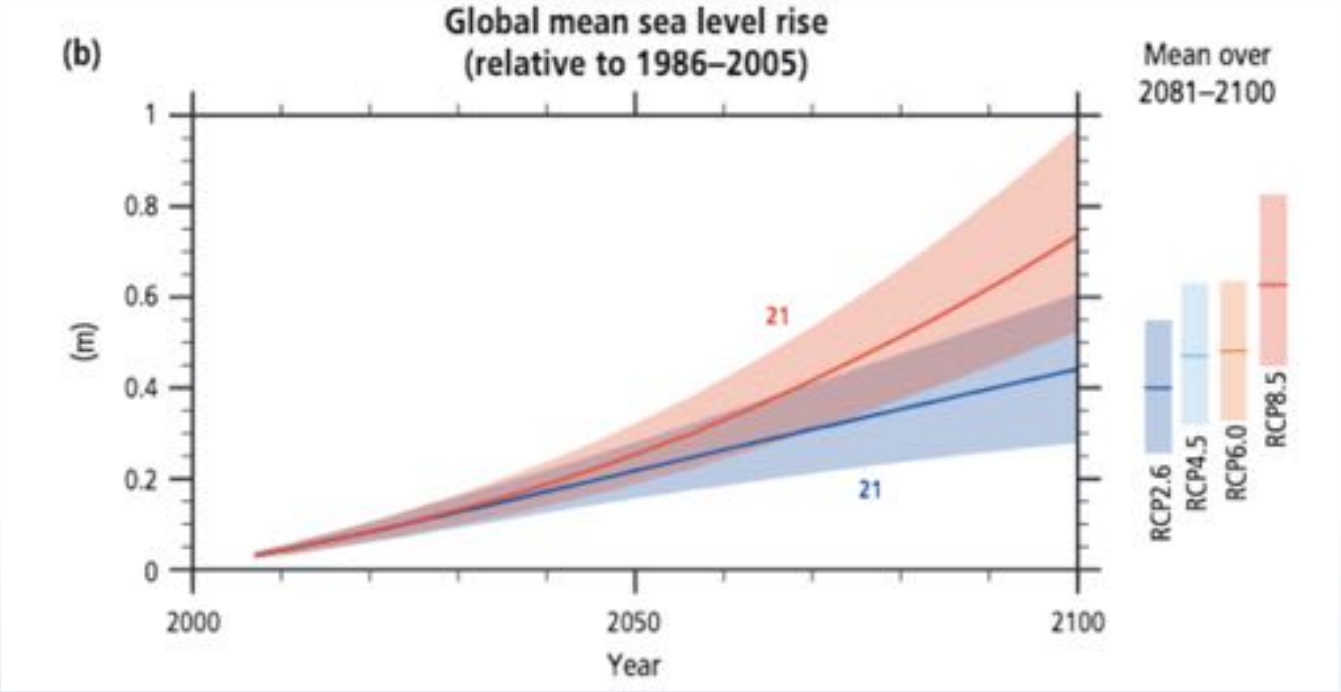


Figure via IPCC 5th Assessment, 2014; Summary for Policy Makers

3 phases to project

Field Measurements of Glacial Forefields

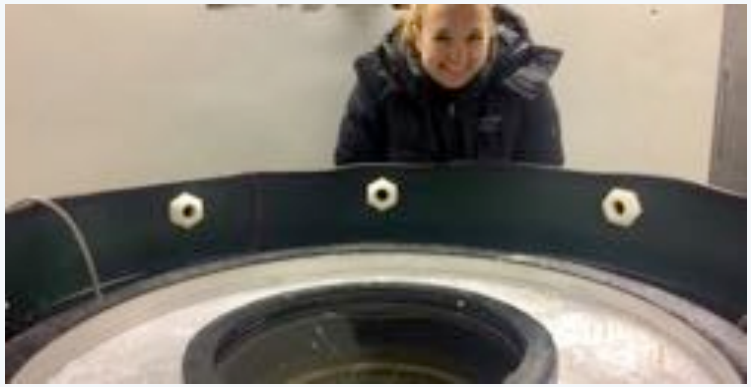


Photo via Charlotte Bate

Lab Experiments to Study Influence of Debris on Glacial Sliding.

Field Measurements of Glacial Forefields

Photo via Luke Zoet

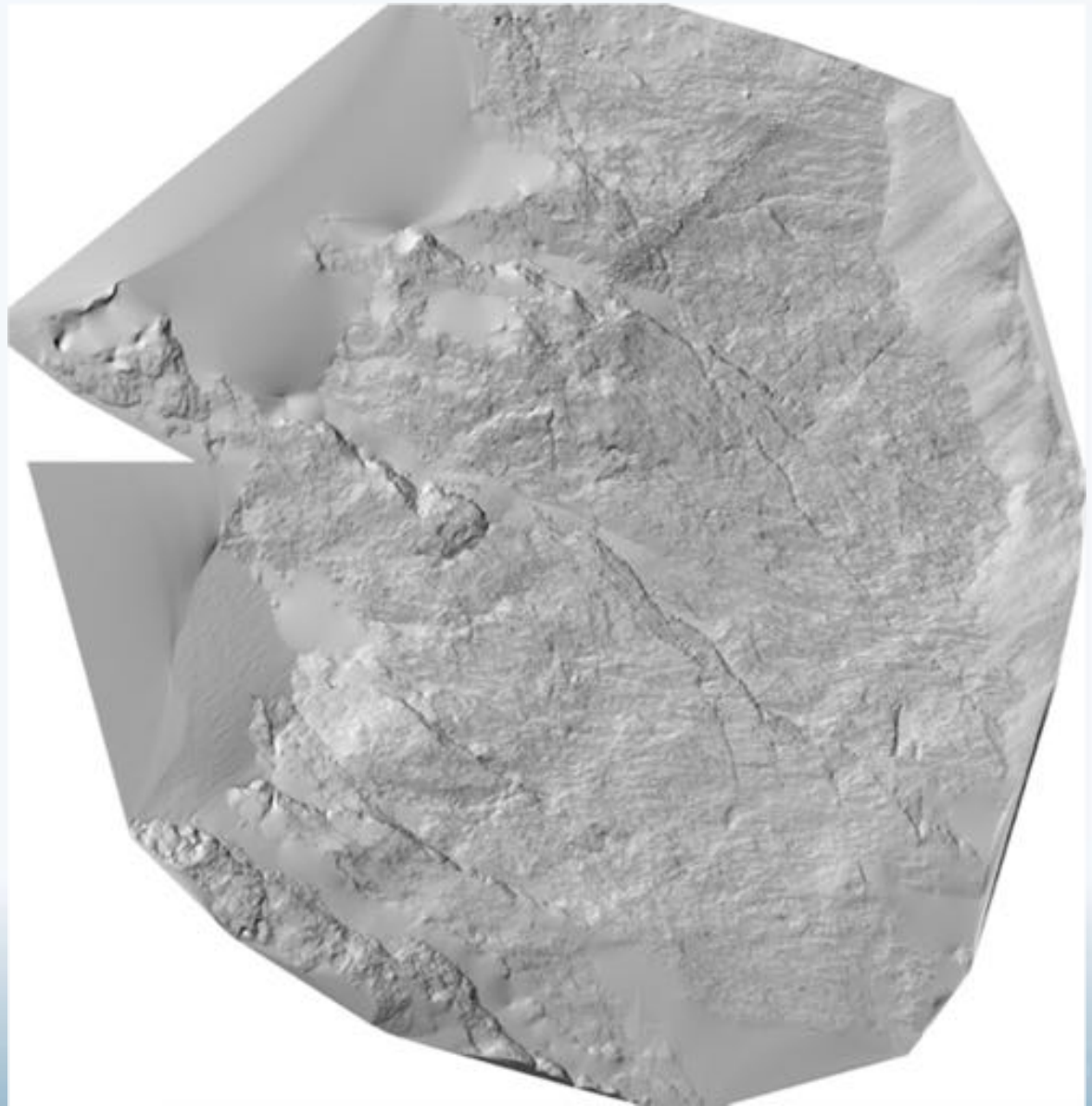
Jacob Woodard

- Understanding sliding laws of glaciers.
- Apply geophysics to glacial processes.

Photo via Luke Zoet

Jacob's one slide

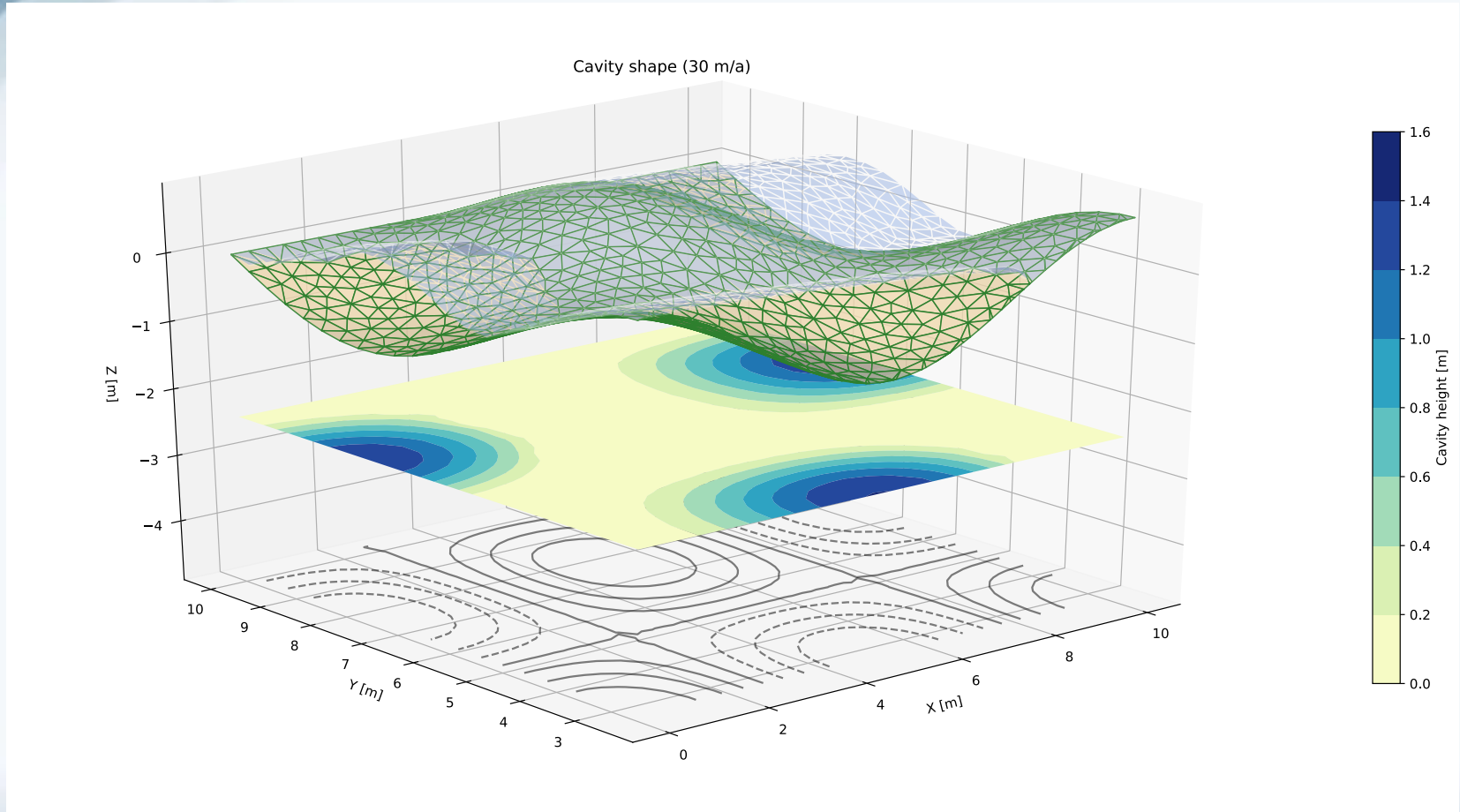
Digital Elevation Model of Castleguard Forefield, Alberta, Canada



Dr. Christian Helanow

- Numerical modeling of glacier processes.
- Investigating how glaciers slide against the underlying bedrock.
- Using radar and other tools to measure ice thickness.

3D Glacier Models



- Modeling changes in ice speed over uneven surfaces

Other team members

Anna Thompson
Graduate Student
Iowa State University

Dr. Neal Iverson
Professor
Iowa State University

Field Site in Canada

- Castle Guard Glacier, Northern Banff (Summer 2017)
  - National park, Alberta Canada

Field Sites in Switzerland

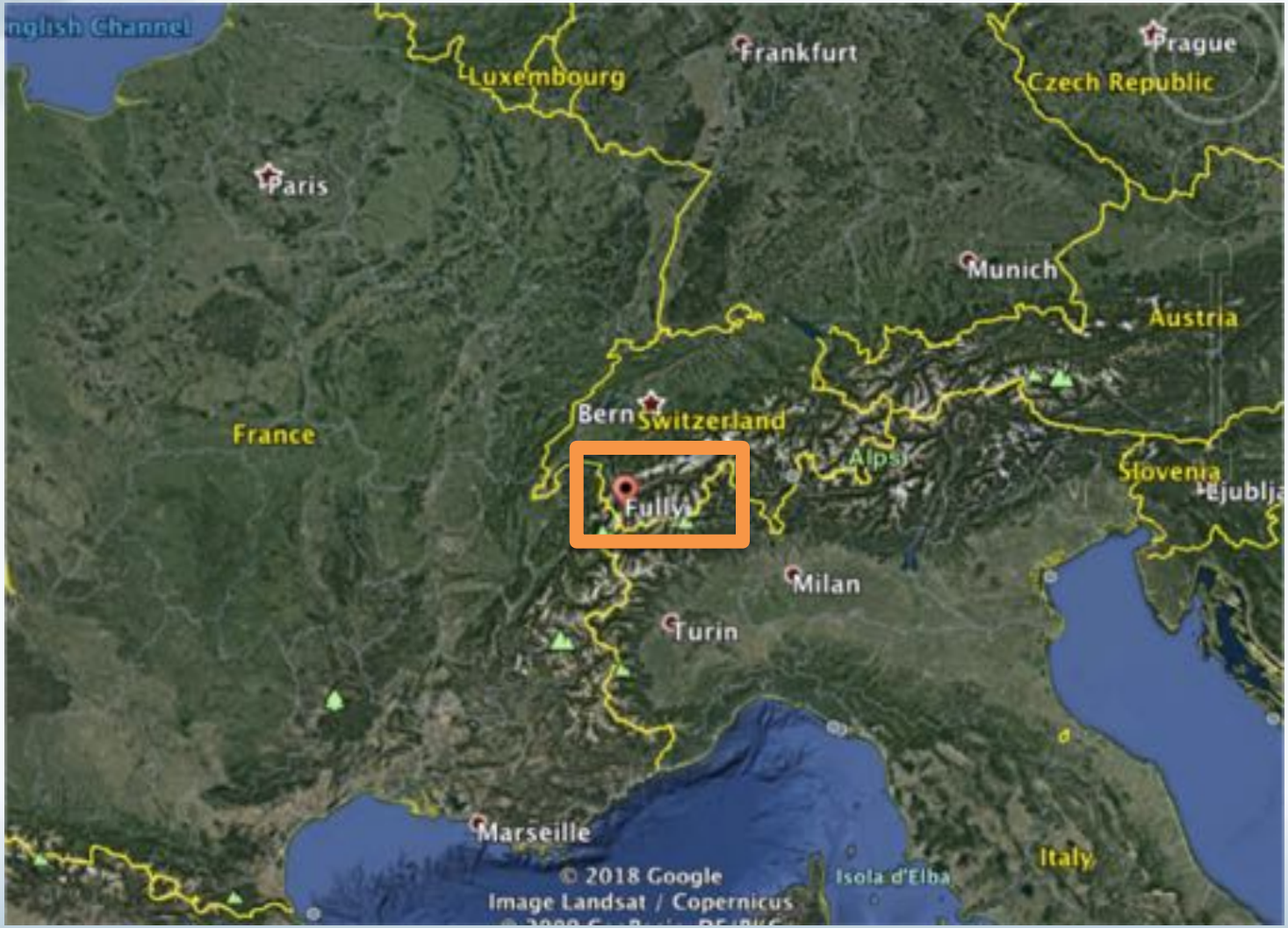


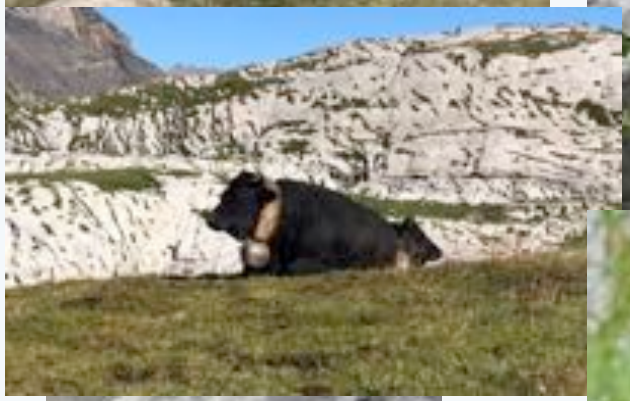
Photo via Google Earth

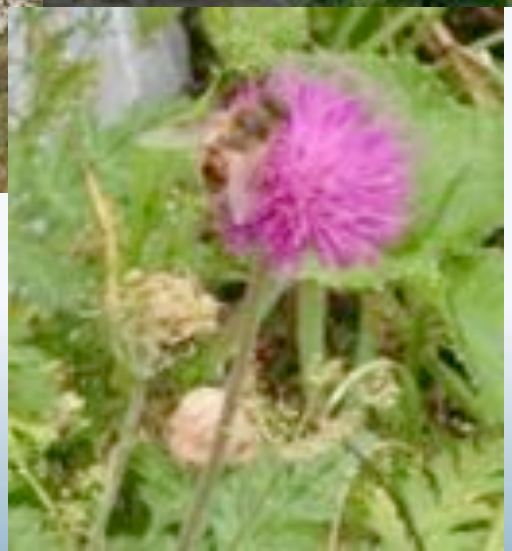
Field Sites in Switzerland

- Tsanflueron
- Trient
- Rhone
- Lang
- Wildhorn
- Aletsch
- Allalin
- Schwartzberg

Photo via Google Earth

Flora and Fauna





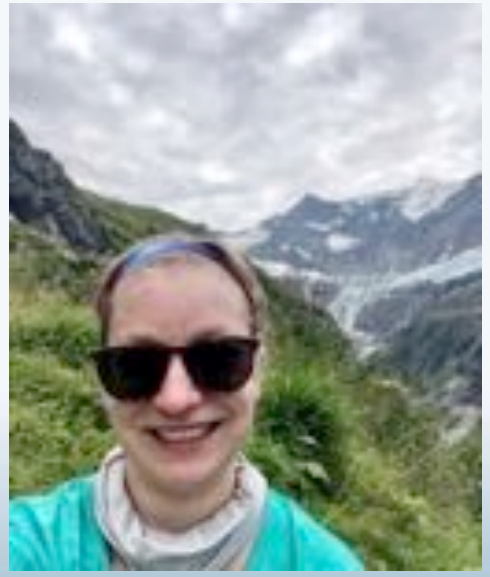
Weather in the Alps

- Altitude and location dependent

-Cold in high elevations (11,000+ feet)

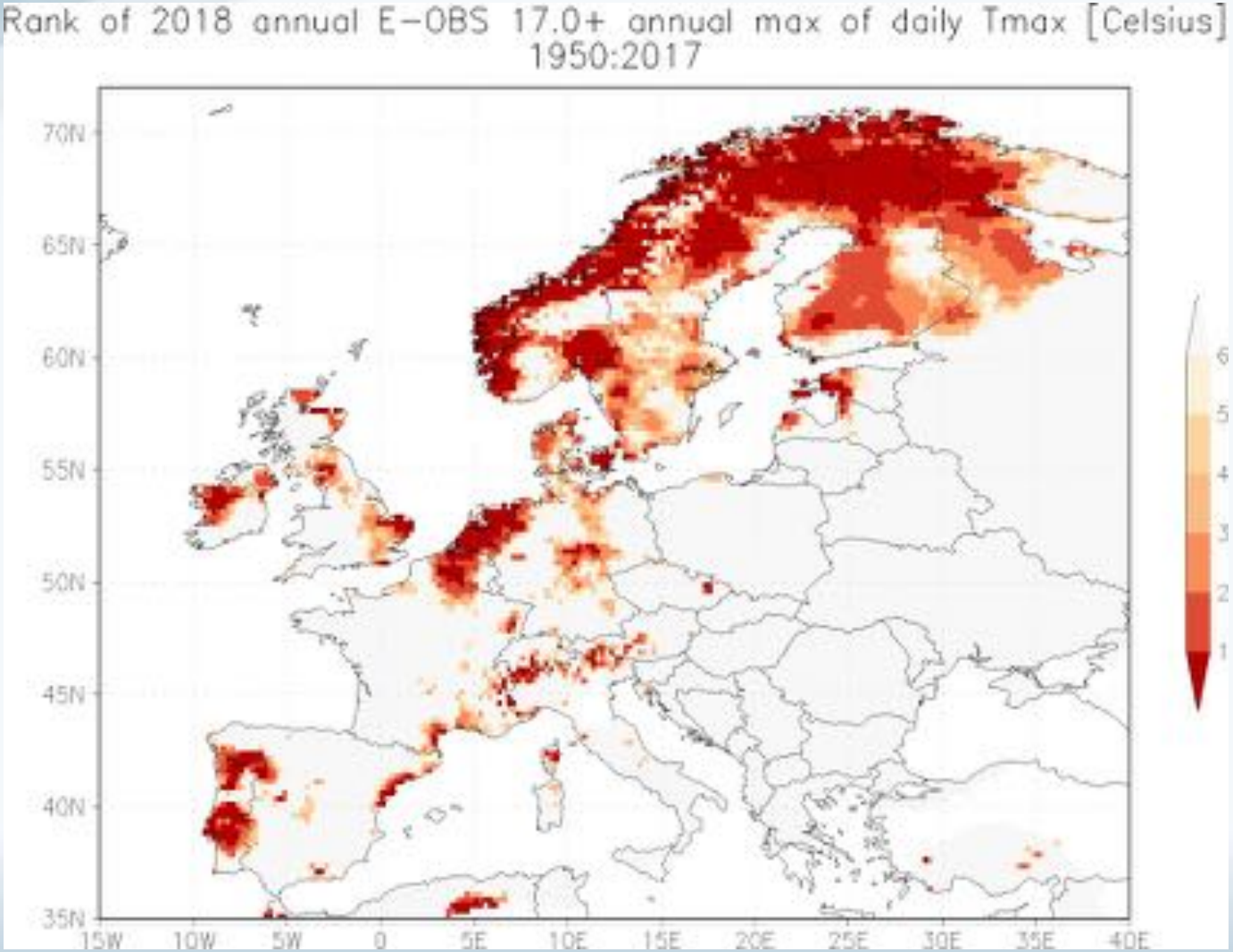
-Afternoon thunderstorms

-Cold and windy in forefields



-Hot during the day

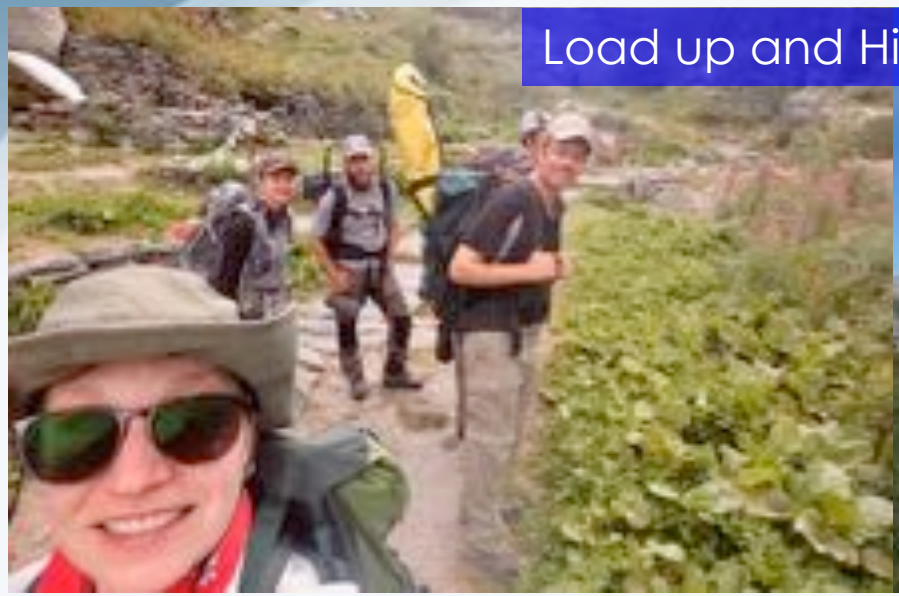
2018 European Heat Wave



By Geert Jan van Oldenborgh [CC0], via Wikimedia Commons

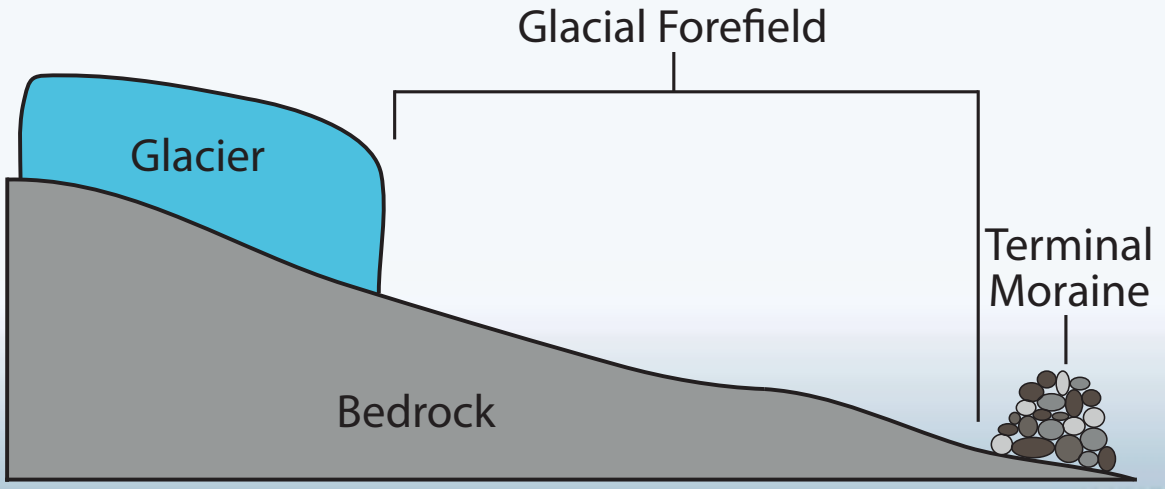
Day in the Field

Load up and Hike in to the Forefield



Setup equipment and place markers with GPS

What is a Forefield?



Field Measurements

Photo via Luke Zoet

Tsanfleuron and Trient






Wildhorn and Lang






Evidence of Glacial Erosion

Smoothed surfaces and striations

Calcite precipitate

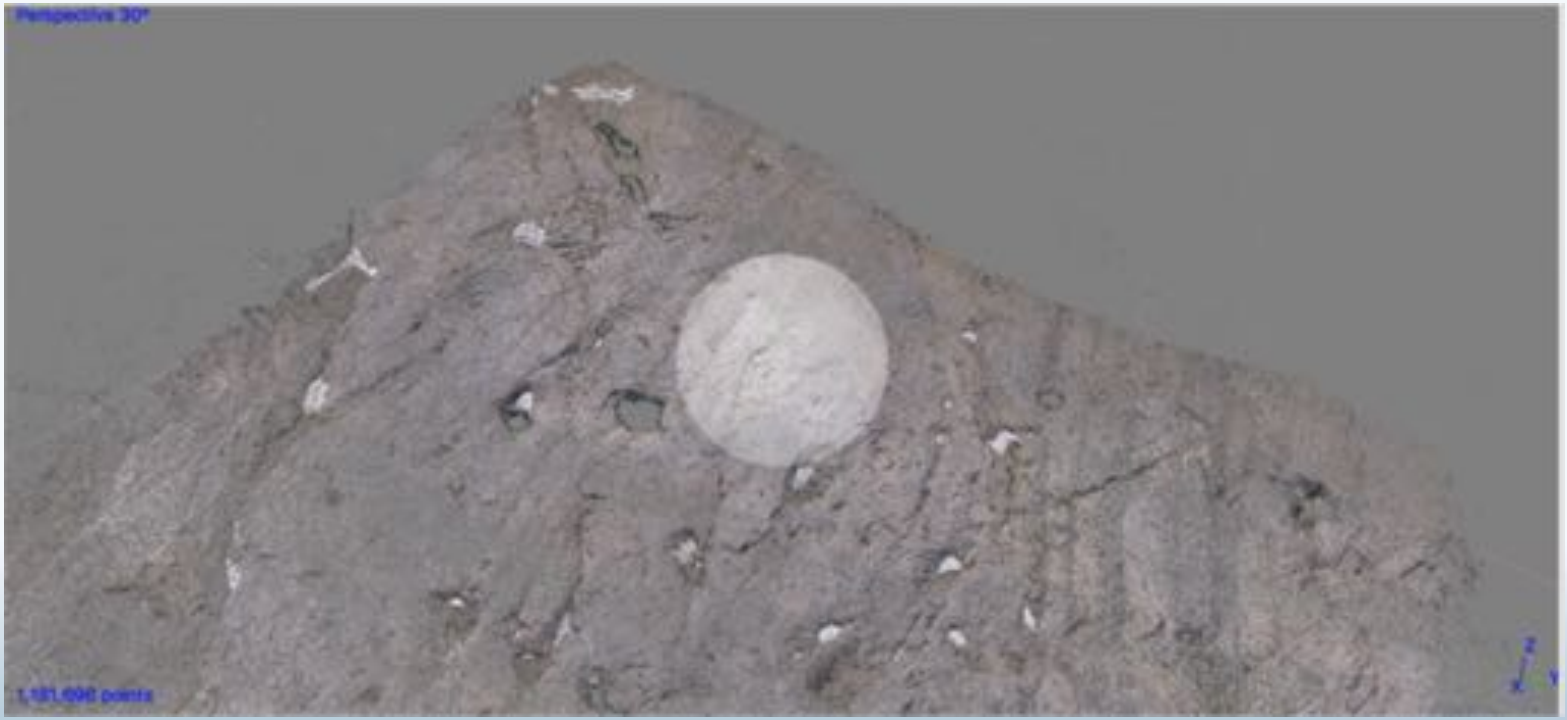
Evidence of Glacial Erosion

U-shaped Valley

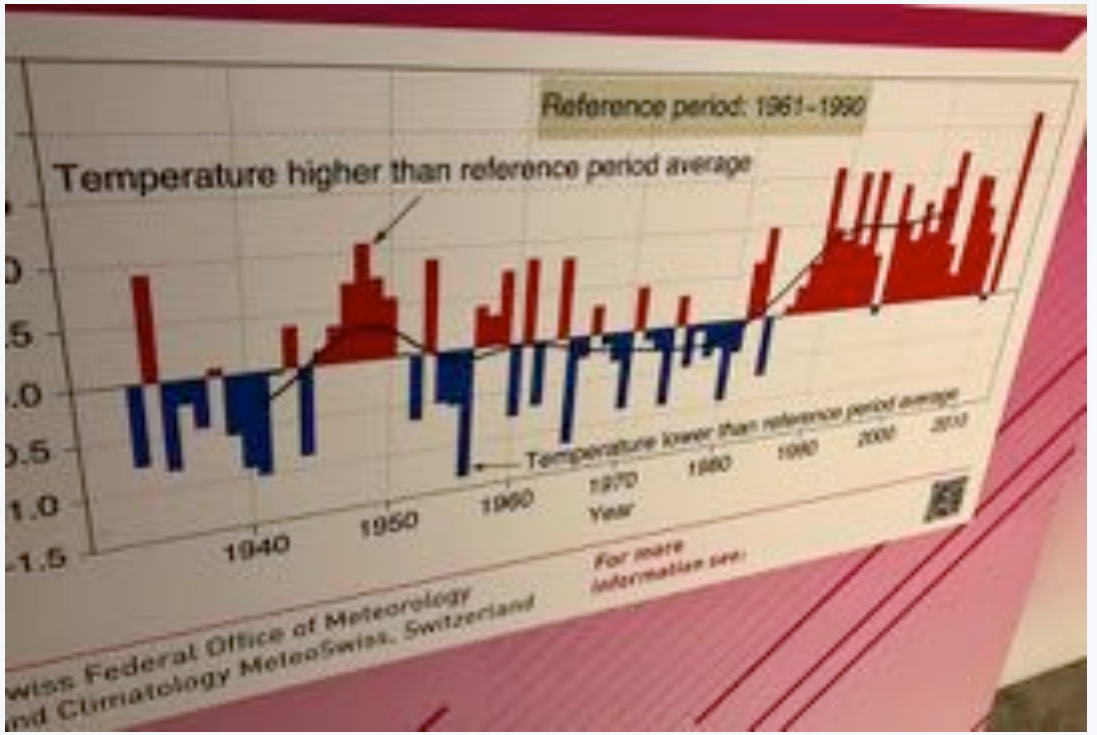
Terminal Moraine

Generation of 3D Surfaces

- Test in field = ~1 million points, 1 day to generate
- High resolution= 10 millions points, several days to generate.



Glaciers and Climate Change



Air temperature measurements above Jungfraujoch.

Join PolarTREC!

www.polartrec.com/about/join

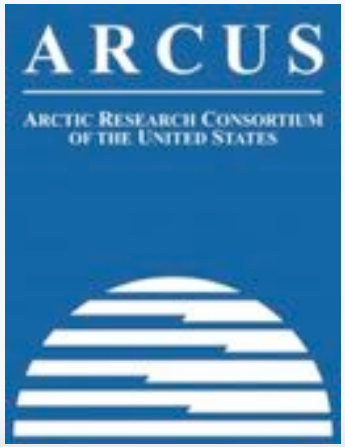
Everyone can participate in different ways:

- **Follow Expeditions**
- **Participate in PolarConnect Events**
- **Join the Polar Education Email List**
- **Check out the great resources**
- **Become a PolarTREC Teacher or Researcher**
- **Become a member of ARCUS**

Thank You!

An archive of the event will be available shortly.

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



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