# THE UAS-SEAMONSTER PROJECT: A GLACIER SENSOR NETWORK ON THE LEMON CREEK AND MENDENHALL GLACIERS INSPIRED BY THE 1958-59 INTERNATIONAL GEOPHYSICAL YEAR (IGY) AND THE JUNEAU ICEFIELD RESEARCH PROGRAM (JIRP)

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# Acknowledgements

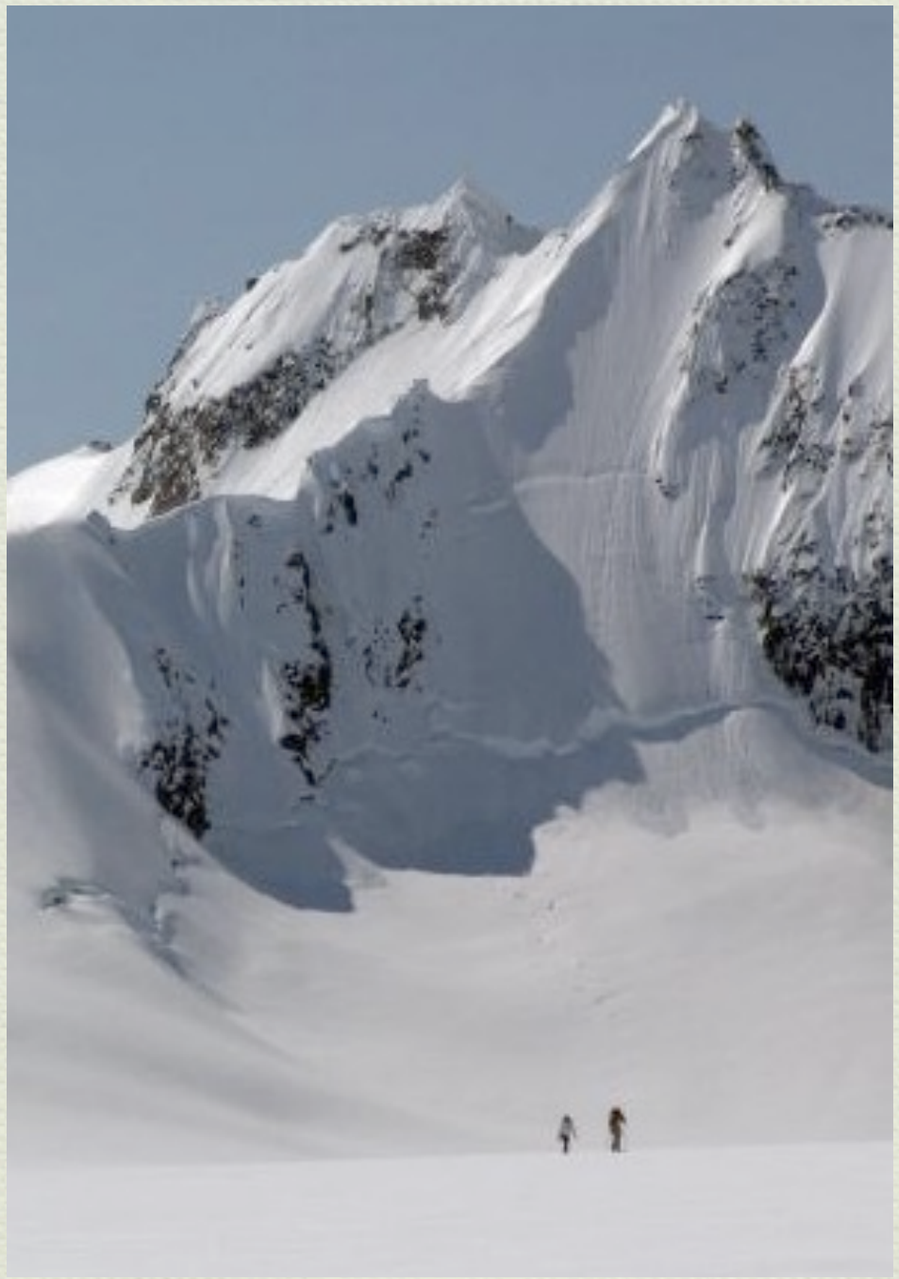

- NASA Earth Science Technology Office grant AIST-05-0105
- NOAA Education Partnership Panel Interdisciplinary Scientific Environmental Technology Cooperative Science Center Grant NA06OAR4810187
- Numerous UAS and UAF/GI students, staff, faculty
- JIRP
- North Star, Era, Coastal, Temsco - helicopter support

# Overview

- Conclusion:

  We face a data intensive future and must prepare the next generation of students

- Outline
  - SM Motivation/Inspiration
  - SM Implementation
  - SM Results



# SEAMONSTER

- South
- East
- Alaska
- MOnitoring
- Network for
- Science
- Technology
- Education &
- Research


N
23.1 km
Image © 2009 TerraMetrics
Image © 2009 DigitalGlobe
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# Science Motivation

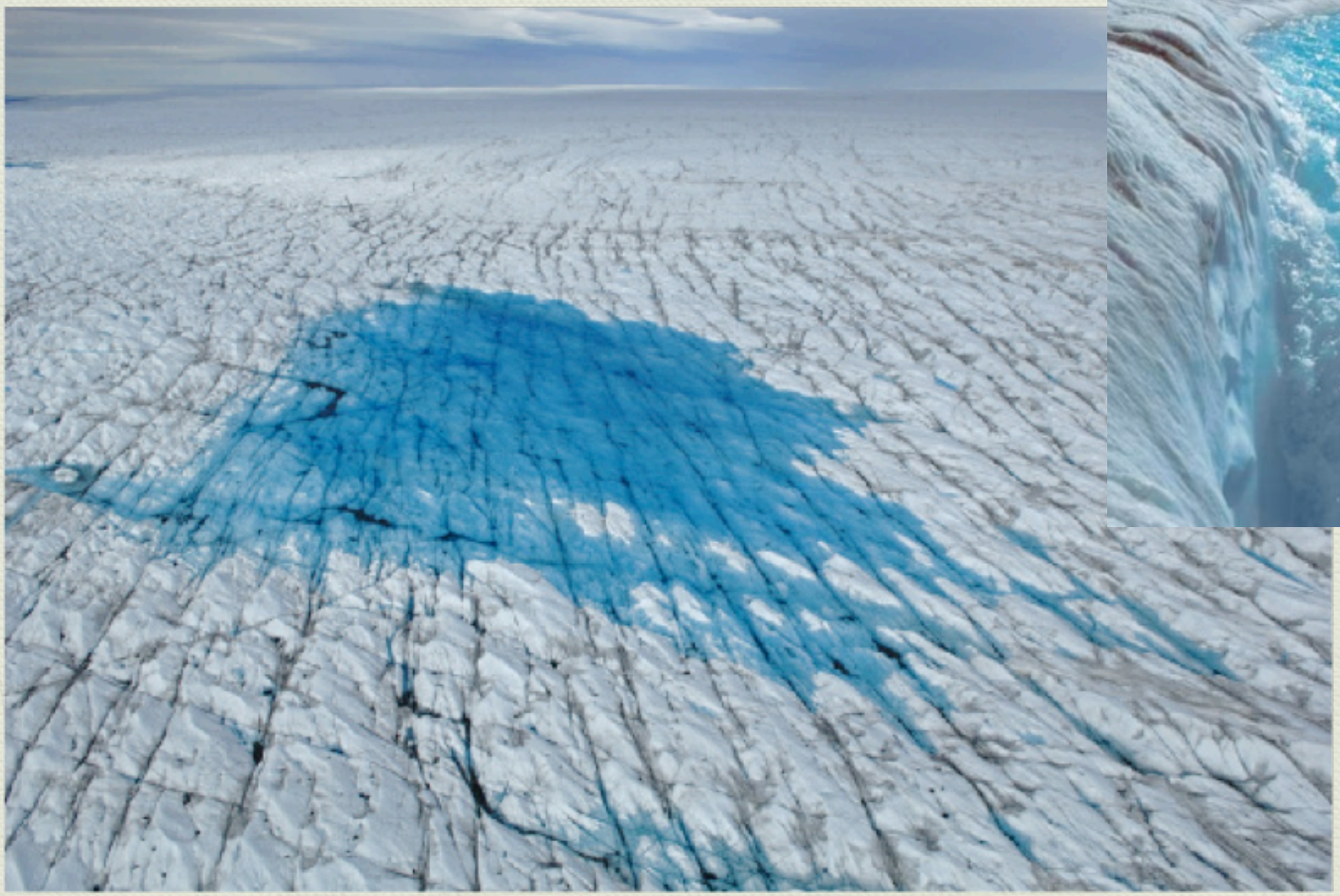


Photo Credit: James Balog, EIS

Saturday, October 8, 2011

UNIVERSITY OF ALASKA SOUTHEAST

N

Hadia

Faiz

Eli

Damon

Mount Wrather

Stroller White Mtn

North Star Base

Caleum

Bandi

Aiko

Indra

Jayla

Gale

McGinnis Mtn

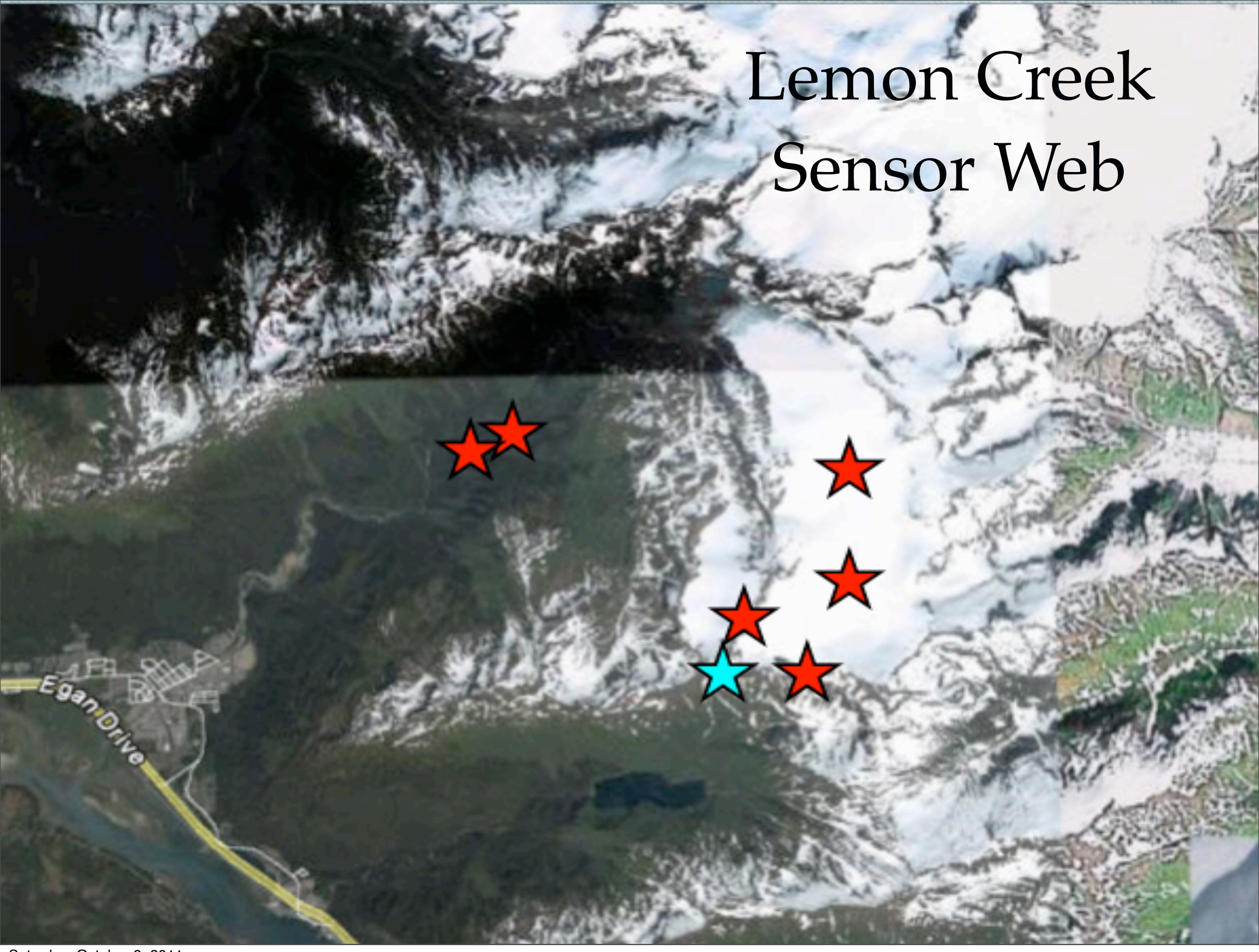
Bullard Mtn

Legend

Tarn

0 1 2 4 km

# Lemon Creek Sensor Web




Saturday, October 8, 2011

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# Instrumentation

Lake Level

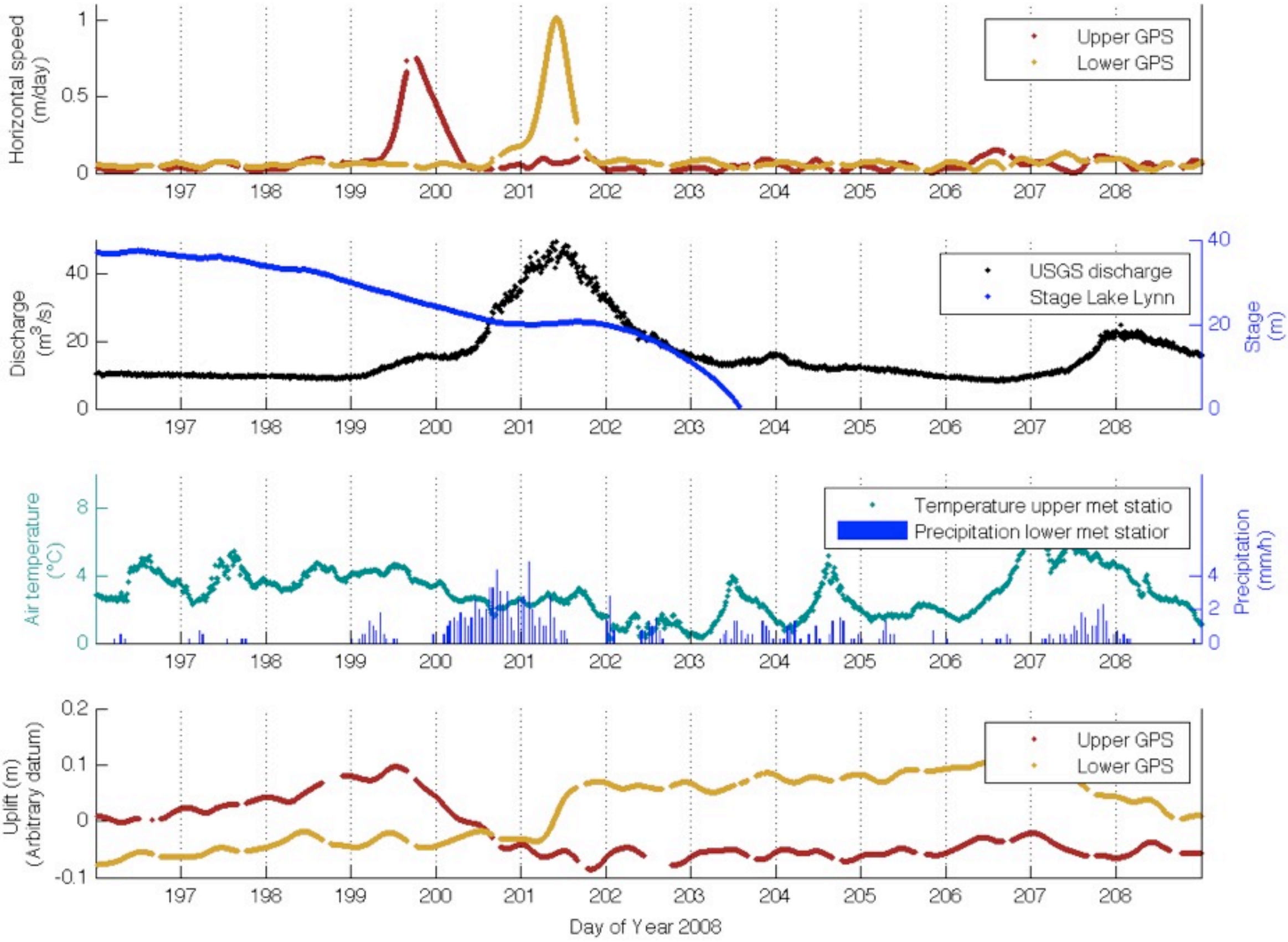
Climate

Water Quality

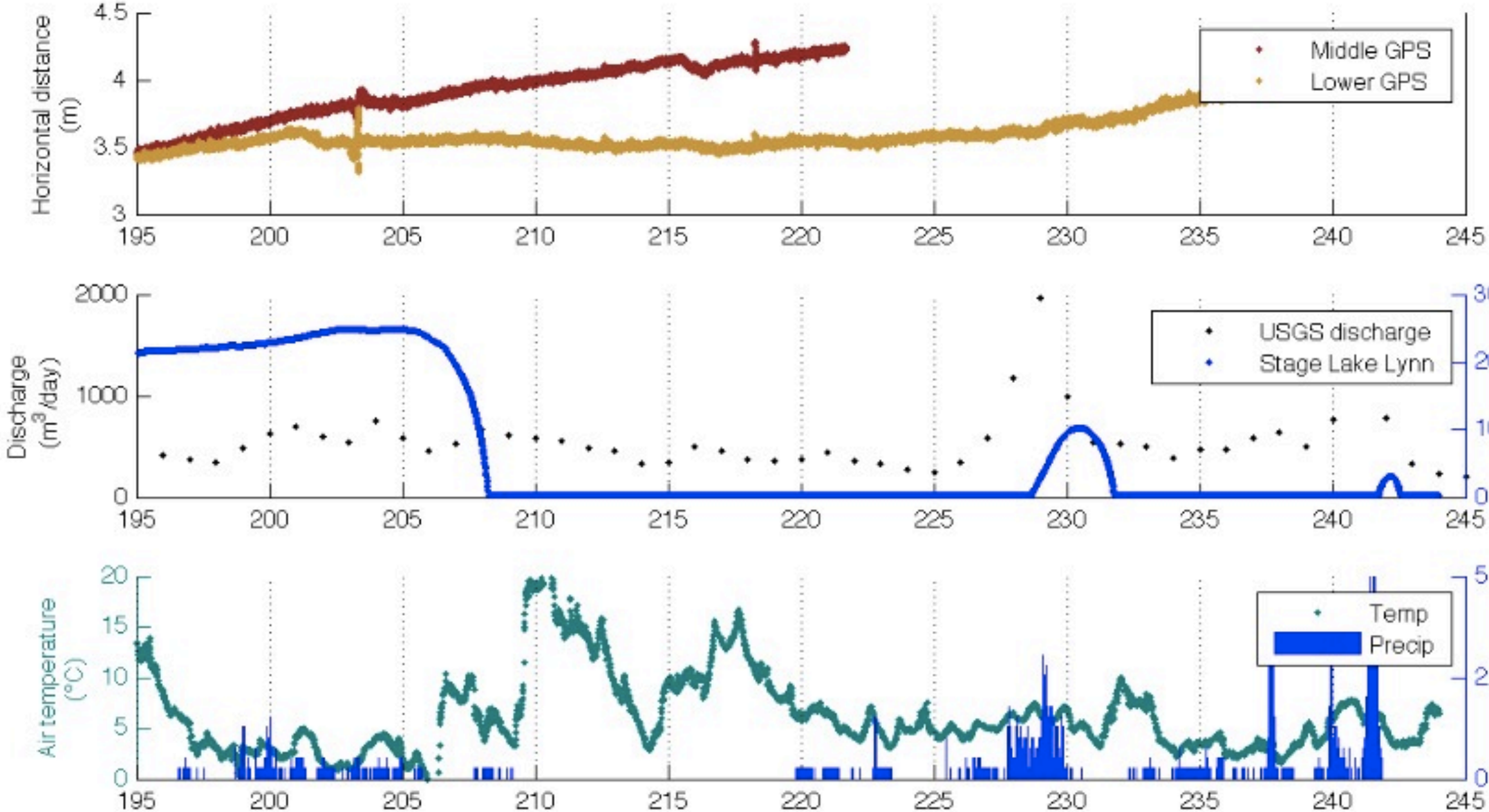
GPS/Seismic

Cameras

# Lemon Creek 2008

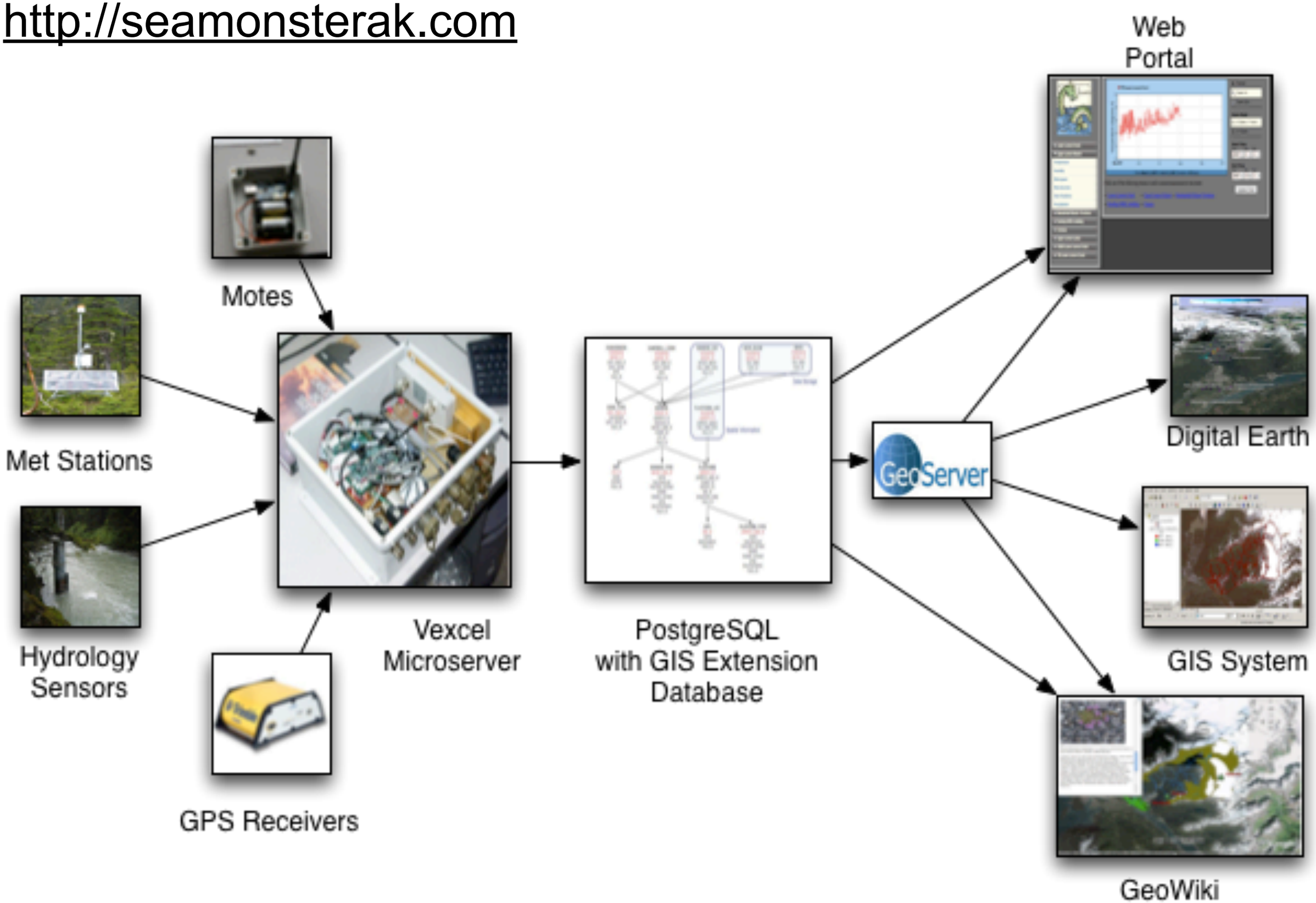


# Lemon Creek 2009



# Database and Access

http://seamonsterak.com



Seamonster Data Browser

http://seamonster.jun.alaska.edu/browser/

Seamonster Data Browser


- ▶ Auke Lake PXD
- ▶ Eaglecrest MET
- ▶ Georgia Tech Snowmobile Robot
- ▼ Lemon Glacier Lakes PXD
  - Stage
  - Voltage
- ▶ Lower Lemon Creek MET
- ▶ Lower Lemon Creek USGS
- ▶ Lower Lemon Creek YSI
- ▶ Mendenhall Glacier Terminus MET
- ▶ Montana Creek YSI
- ▶ Natural Science Research Lab MET
- ▶ UAS Campus MET
- ▶ Upper Lemon Glacier MET


Pointer
Zoom In
Zoom Out

**Zoom Mode**

X Zoom / Y Auto
XY Zoom

**Start Time**

Year 2009 | Mon 7 | Day 9

**End Time**

Year 2009 | Mon 7 | Day 30

Update Chart

Data Download Page

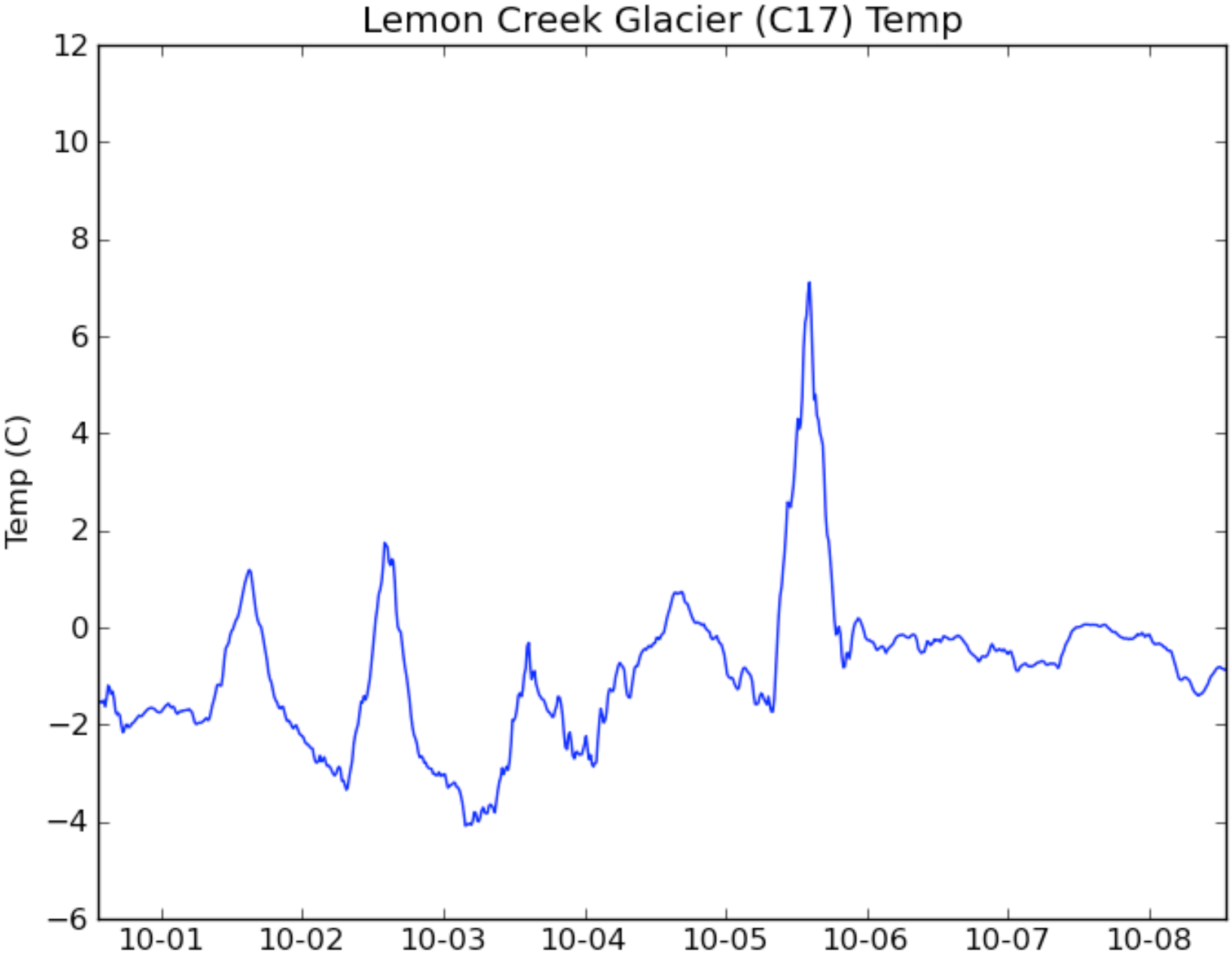
Click one of the following choices to add a second measurement to the chart:

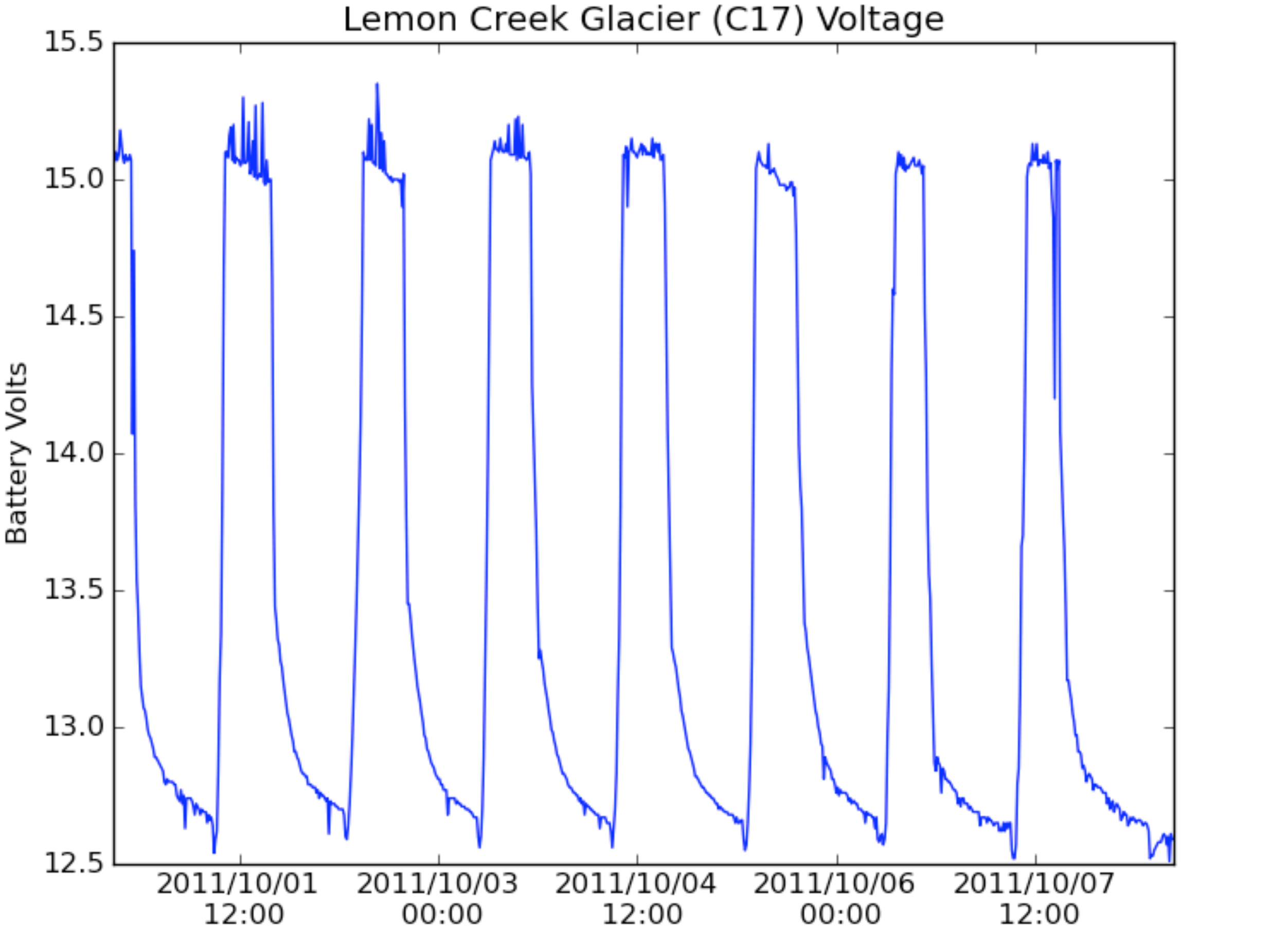
- Auke Lake PXD

# Current Status

## Lemon Creek

Saturday, October 8, 2011


Lemon Creek Glacier (C17) Temp
Temp (C)
12
10
8
6
4
2
0
−2
−4
−6
10-01
10-02
10-03
10-04
10-05
10-06
10-07
10-08


Lemon Creek Glacier (C17) Voltage
Battery Volts
15.5
15.0
14.5
14.0
13.5
13.0
12.5
2011/10/01 12:00
2011/10/03 00:00
2011/10/04 12:00
2011/10/06 00:00
2011/10/07 12:00

# Current Status
## Mendenhall

Saturday, October 8, 2011

# Current Status
## Mendenhall

# Current Status Mendenhall

Saturday, October 8, 2011

# Current Status Mendenhall


Saturday, October 8, 2011

UNIVERSITY OF ALASKA SOUTHEAST

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North Star Base

Caleum

Bandi

Aiko

Indra

Jayla

Gale

McGinnis Mtn

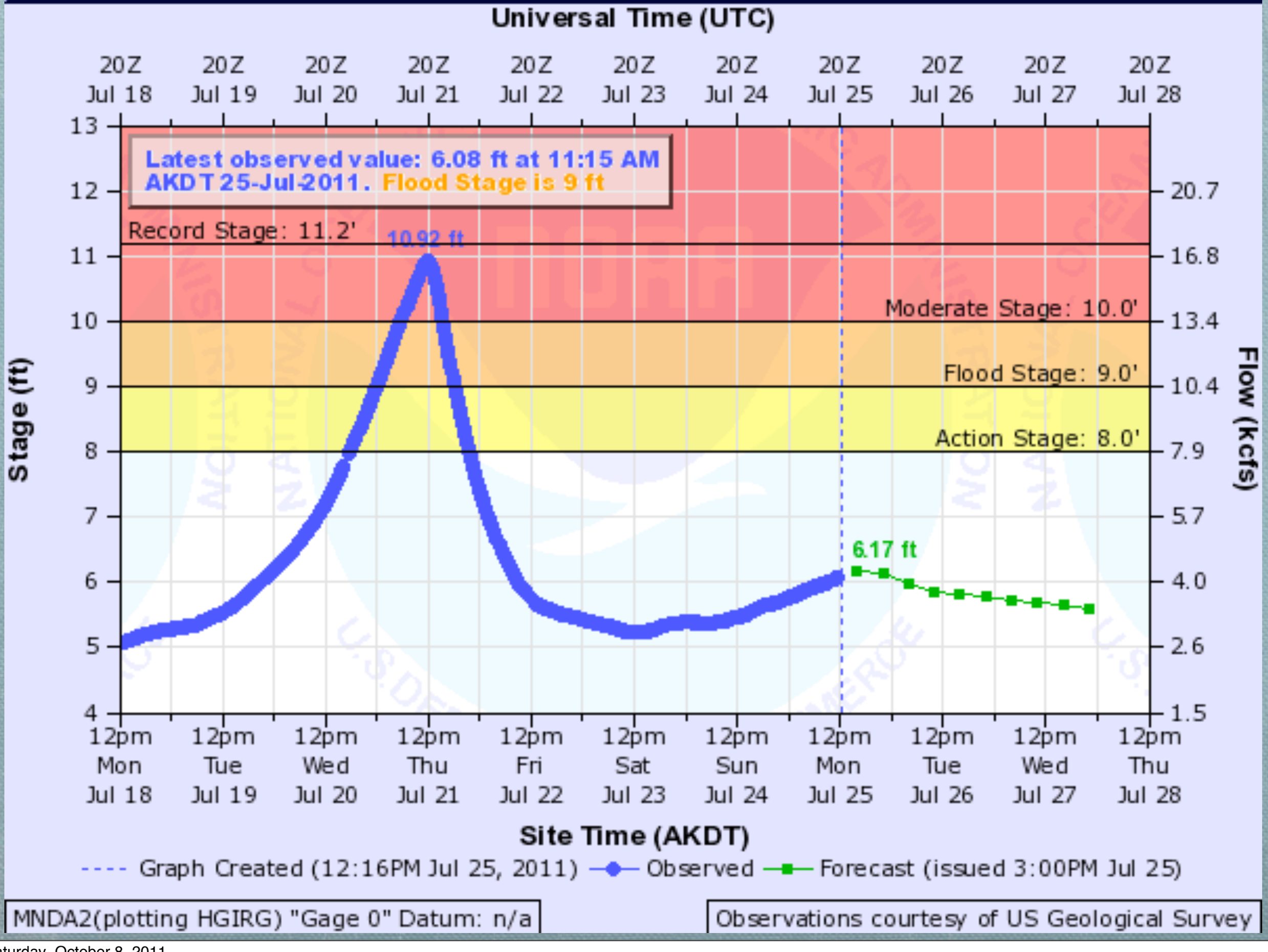
Bullard Mtn

Legend

Tarn

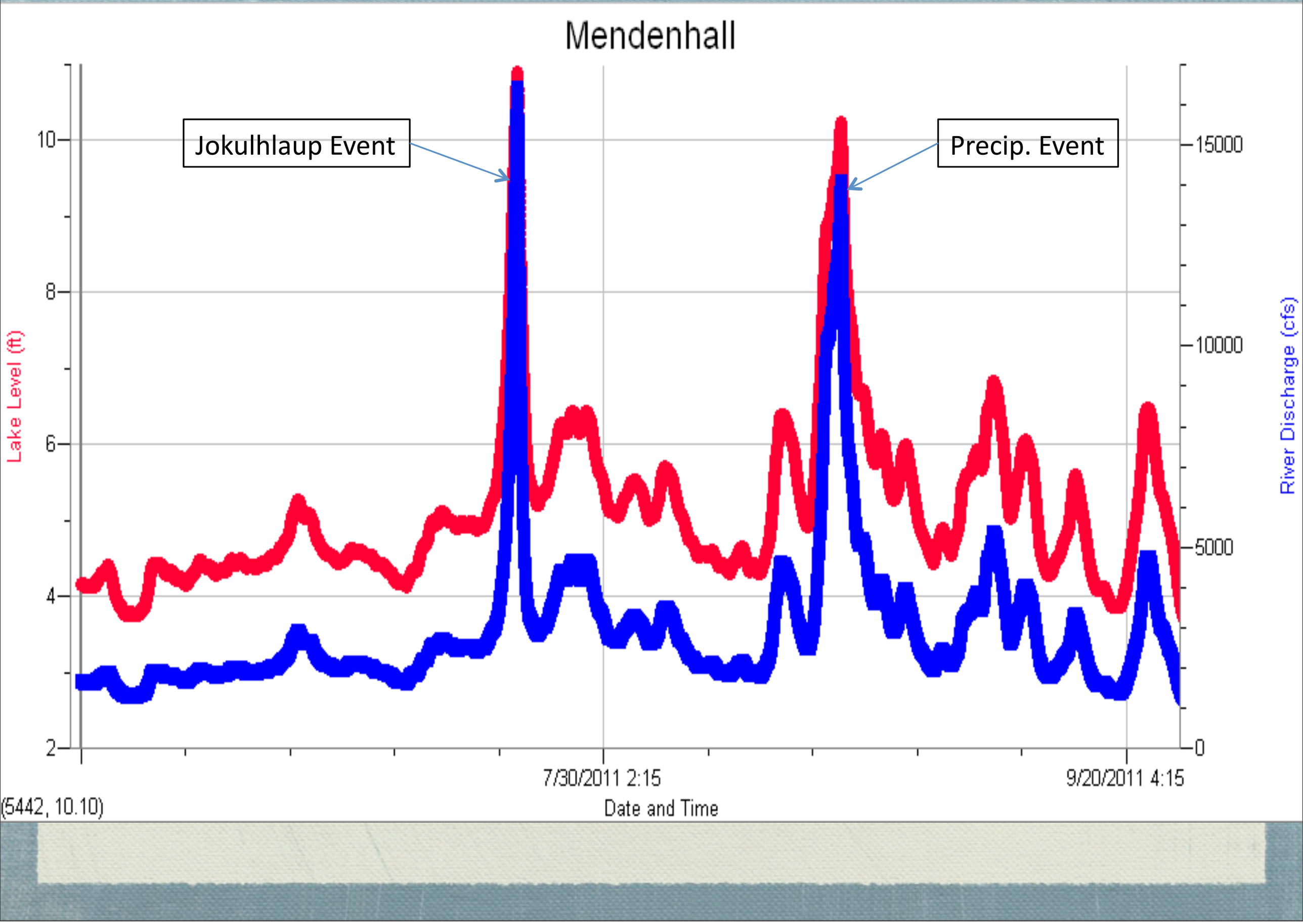
0 1 2 4 km

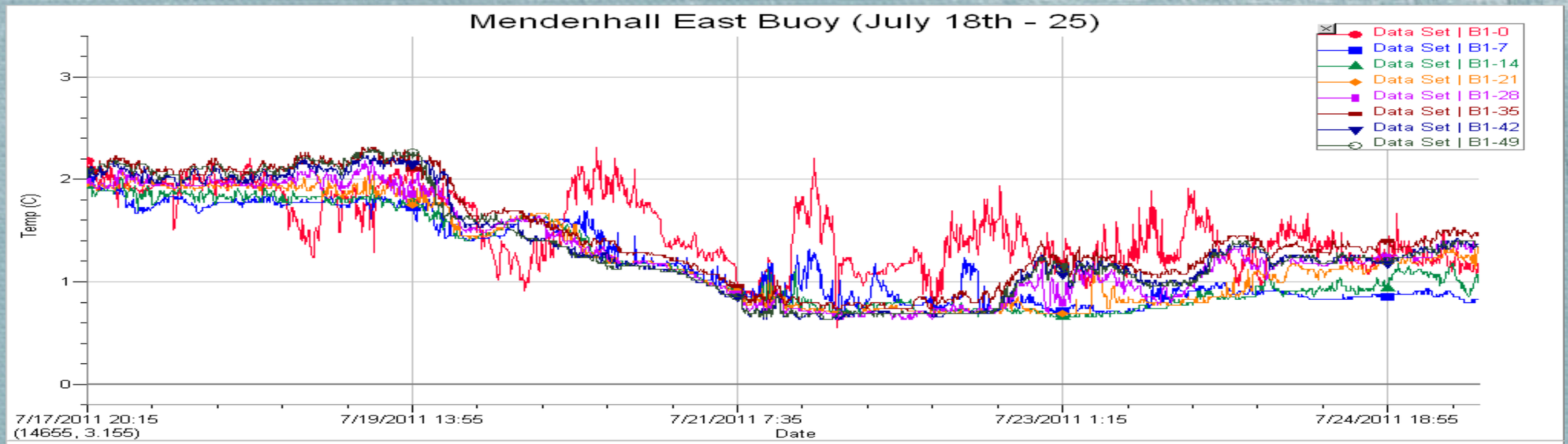
# MENDENHALL LAKE AT LAKE LEVEL

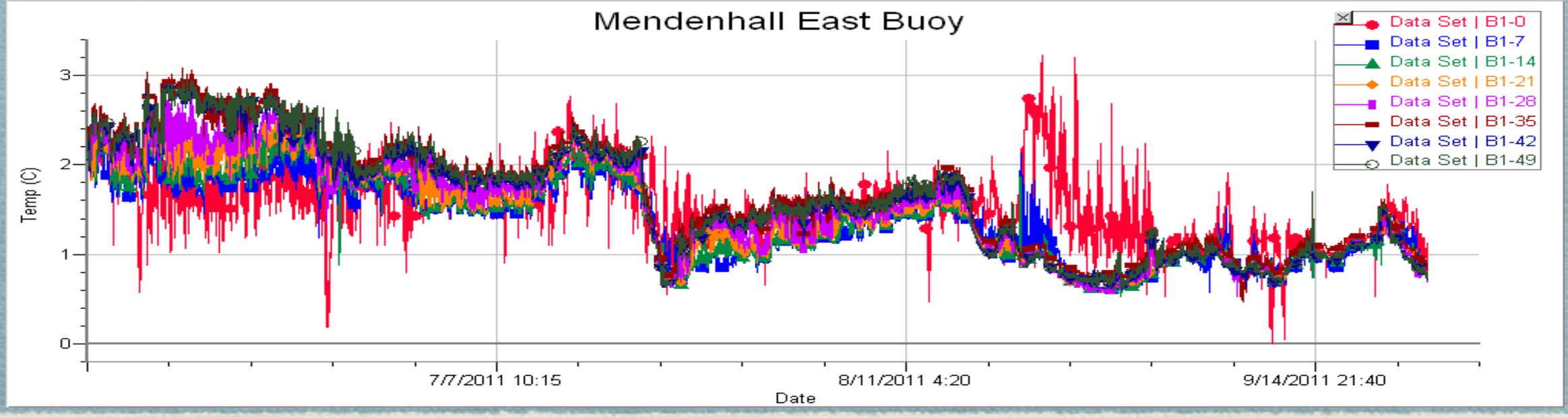


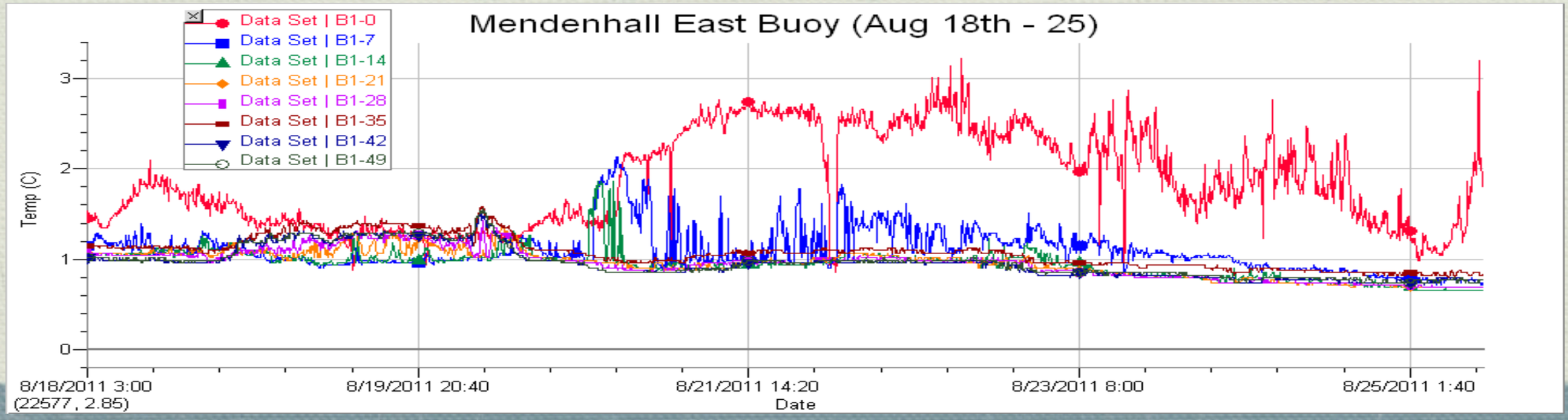

MNDA2(plotting HGIRG) "Gage 0" Datum: n/a

Observations courtesy of US Geological Survey


Mendenhall
Jokulhlaup Event
Precip. Event
10
8
6
4
2
15000
10000
5000
0
Lake Level (ft)
River Discharge (cfs)
7/30/2011 2:15
9/20/2011 4:15
(5442, 10.10)
Date and Time


Mendenhall East Buoy (July 18th - 25)
Data Set | B1-0
Data Set | B1-7
Data Set | B1-14
Data Set | B1-21
Data Set | B1-28
Data Set | B1-35
Data Set | B1-42
Data Set | B1-49
Temp (C)
3
2
1
0
7/17/2011 20:15
(14655, 3.155)
7/19/2011 13:55
7/21/2011 7:35
7/23/2011 1:15
7/24/2011 18:55
Date


Mendenhall East Buoy
Data Set | B1-0
Data Set | B1-7
Data Set | B1-14
Data Set | B1-21
Data Set | B1-28
Data Set | B1-35
Data Set | B1-42
Data Set | B1-49
Temp (C)
3
2
1
0
7/7/2011 10:15
8/11/2011 4:20
9/14/2011 21:40
Date


Mendenhall East Buoy (Aug 18th - 25)
Data Set | B1-0
Data Set | B1-7
Data Set | B1-14
Data Set | B1-21
Data Set | B1-28
Data Set | B1-35
Data Set | B1-42
Data Set | B1-49
Temp (C)
3
2
1
0
8/18/2011 3:00
(22577, 2.85)
8/19/2011 20:40
8/21/2011 14:20
8/23/2011 8:00
8/25/2011 1:40
Date

# Conclusion

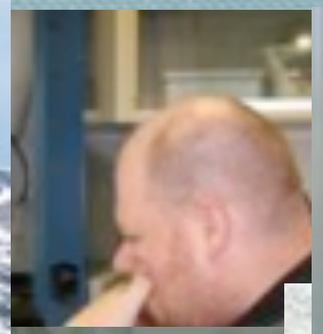
We face a data intensive future and must prepare the next generation of students

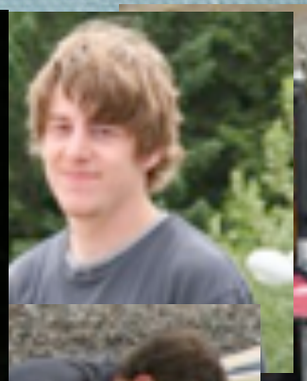
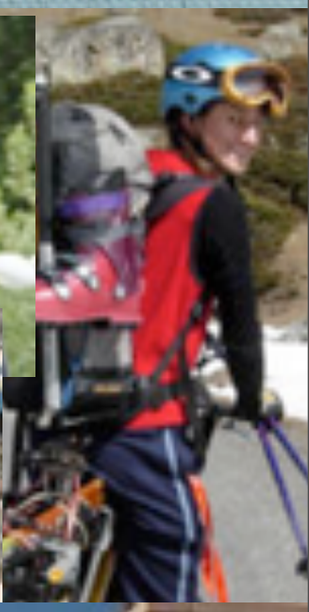
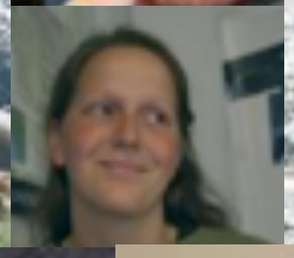
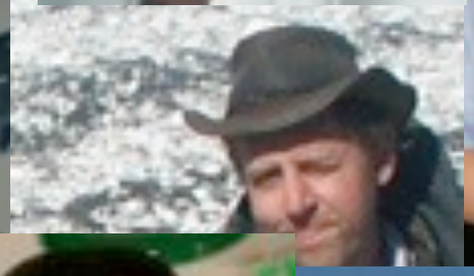
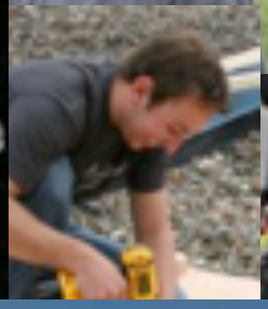
**All SEAMONSTER code, results, and methods are available online through our project wiki, outreach wiki, data browser, and svn code repository.**
**http://seamonsterak.com/**

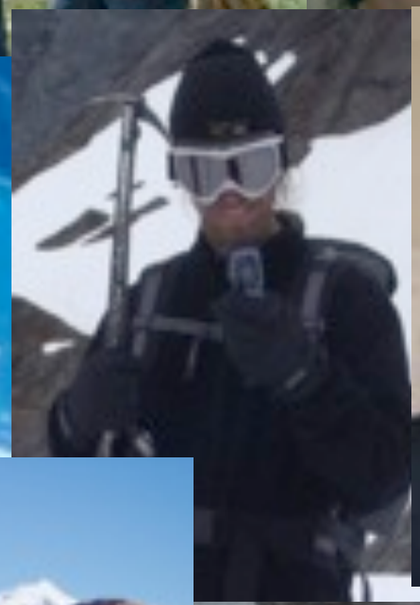
# Thank you for your attention!

## Questions?

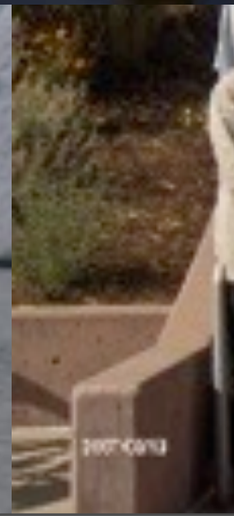
# Acknowledgements






Dr. Ayanna Howard,
Georgia Tech

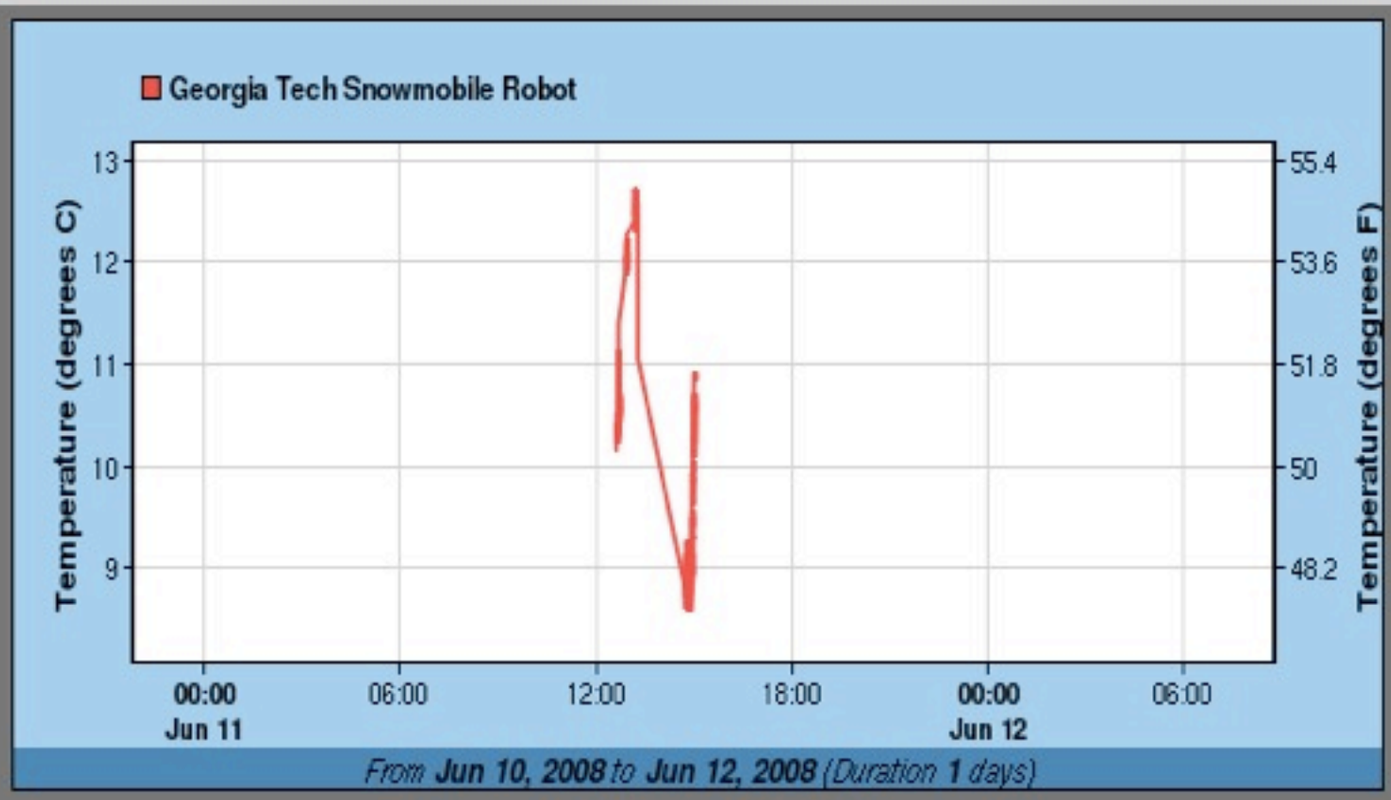
Saturday, October 8, 2011

Seamonster Data Browser

http://seamonster.jun.alaska.edu/browser/

Google


- ▶ Auke Lake PXD
- ▶ Eaglecrest MET
- ▼ Georgia Tech Snowmobile Robot
  - Temperature
  - Humidity
  - Pressure
- ▶ Lemon Glacier Lakes PXD
- ▶ Lower Lemon Creek MET
- ▶ Lower Lemon Creek USGS
- ▶ Lower Lemon Creek YSI
- ▶ Mendenhall Glacier Terminus MET
- ▶ Natural Science Research Lab MET
- ▶ UAS Campus MET
- ▶ Upper Lemon Glacier MET




Pointer

Zoom In

Zoom Out

**Zoom Mode**

X Zoom / Y Auto

XY Zoom

**Start Time**

Year 2008 Mon 6 Day 10

**End Time**

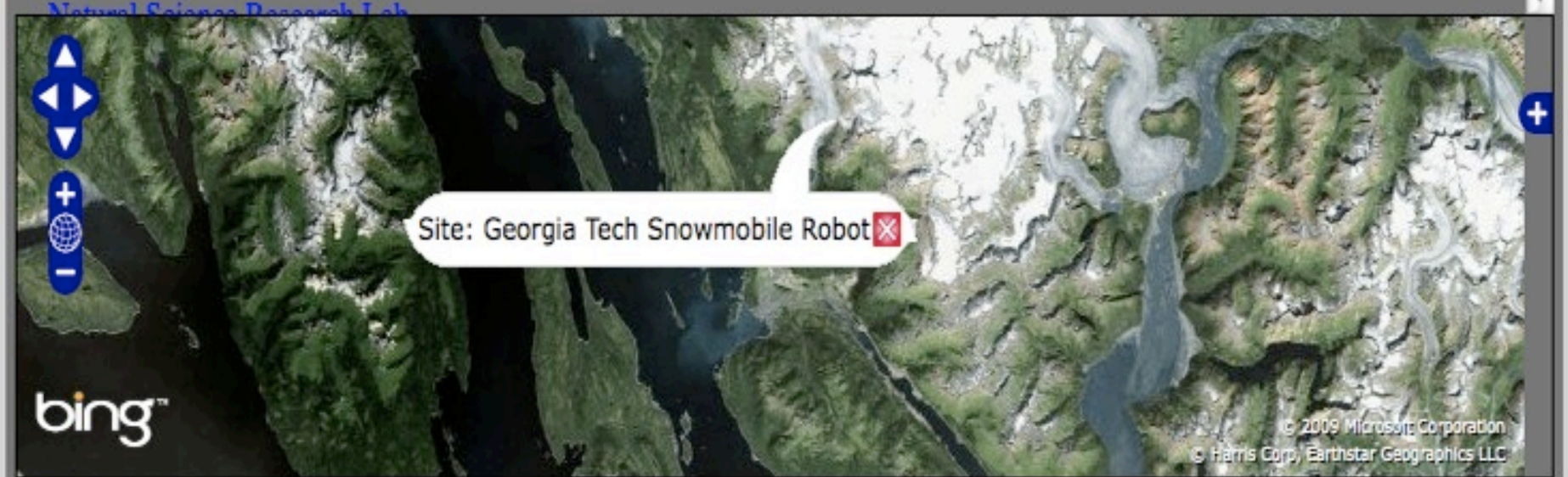
Year 2008 Mon 6 Day 12

Update Chart

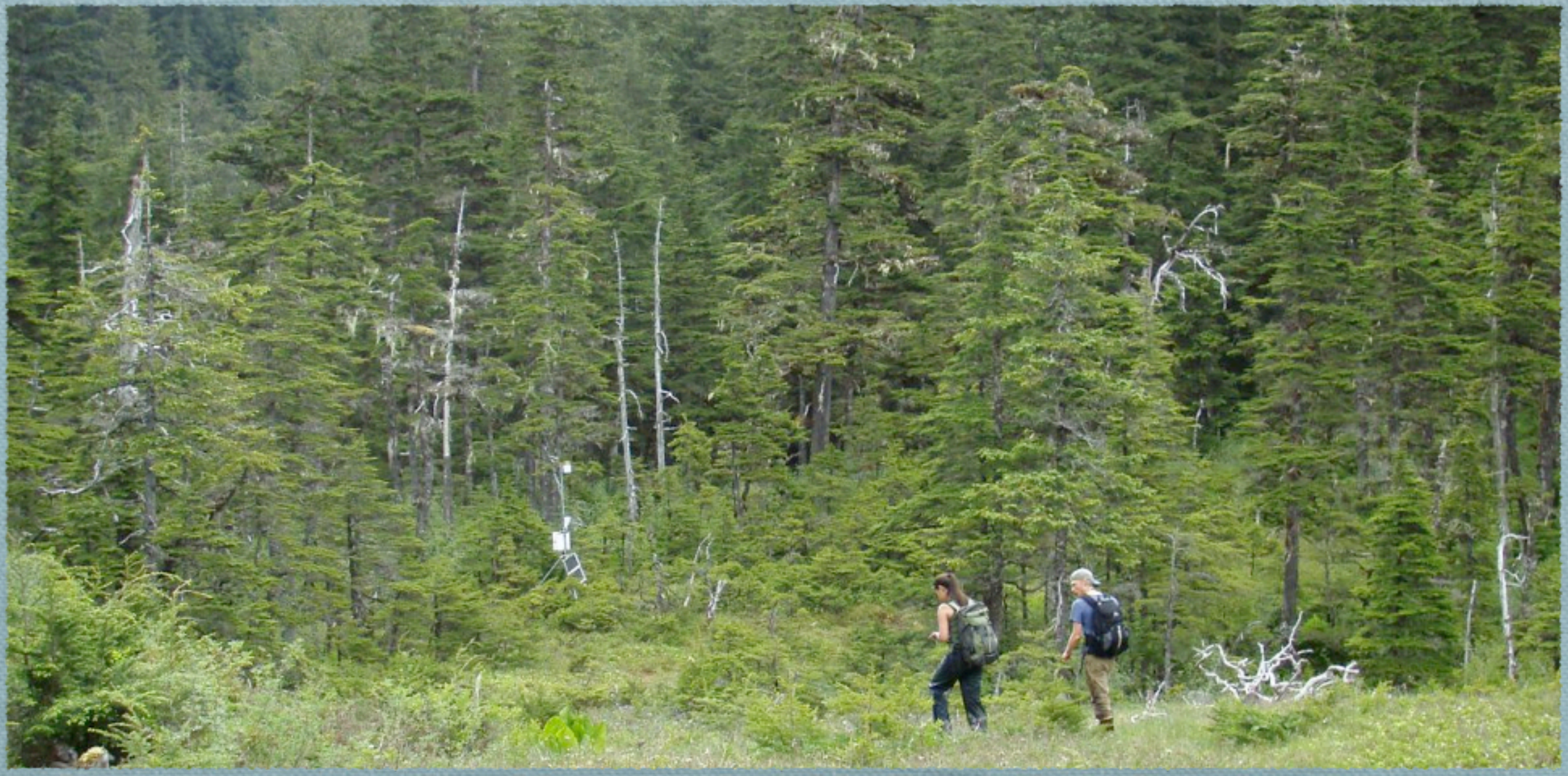
Data Download Page

Click one of the following choices to add a second measurement to the chart:

- Lower Lemon Creek MET
- Upper Lemon Glacier MET
- Mendenhall Glacier Terminus MET



# Lemon Creek Glacier



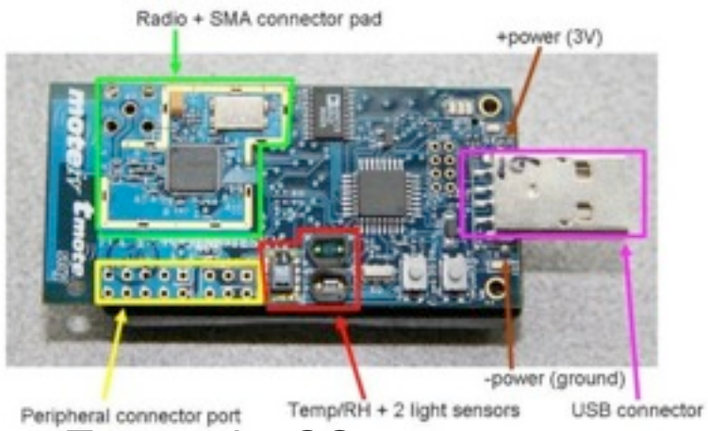
# Lower Lemon Met Station

# Platforms

Vexcel Microserver, Linux

There are three different platforms in use, with relative computation, storage, and sensing capabilities as well as power requirements and cost.

Linksys NSLU-2, a UAS testbed platform, Linux




Tmote, tinyOS

Deployment-ready tmote