Evolution Of An Avalanche Program From The Ground Up

AEL&P

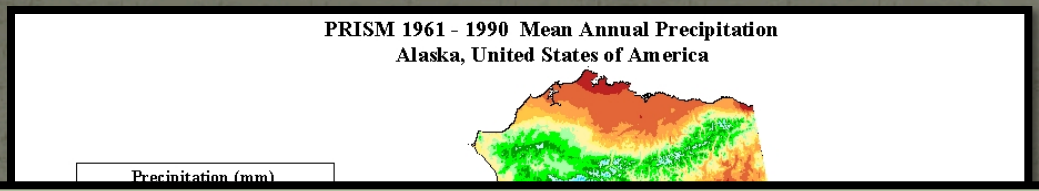
Mike Janes, Avalanche Forecaster

Juneau's Power Grid: From our home to yours

Windfall Lake
Peterson Lake
Tee Harbor
Mendenhall Lake
Mendenhall Valley
Shelter Island
Point Lena
Lena Loop Substation
Auke Bay
- Diesel Powerplant
- Substation
Auke Lake
Loop Substation
Barlow Cove
Airport Substation
Lemon Creek
- Operations Center
- Diesel Powerplant
- Substation
Salmon Creek Reservoir
Auke Bay
Fritz Cove
Salmon Creek
- Hydro Project
- Substation
Juneau
Annex Creek Hydro Project
Annex Lakes
Turner Lake
Douglas Island
Outer Point
Gold Creek - Hydro Project - Diesel Powerplant
Capital Avenue Substation
Second Street Substation
South Franklin Dock Substation
West Juneau Substation
Sunny Cove
Eaglecrest
Thane Substation
Sheep Creek Substation
Gastineau Channel
Thane
Horse Island
Funter Bay
Lieuy Lake
Lake Dorothy
Lake Dorothy Hydro Project
Mansfield Peninsula
Dupont
Taku Inlet
Point Hilda
Bart Lake
Bishop Point
Long Lake
Admiralty Cove
Indian Lake
Young Bay
False Arden
Point Arden
Snettisham Hydro Project
Oliver Inlet
Hawk Inlet Substation
- Owned by Greens Creek
Admiralty Island
Crater Lake
Young Lake
Doty Cove
Hawk Inlet
Greens Creek Mine
Glass Peninsula
Grand Island
Seymour Canal
Taku Harbor
Port Snettisham
138 KV Transmission Line
69 KV Transmission Line
23 KV Transmission Line
Slide Lake
Stephens Passage
Chatham Strait

Terrain Induced Weather: Speel Arm Orographic Lift

Climate

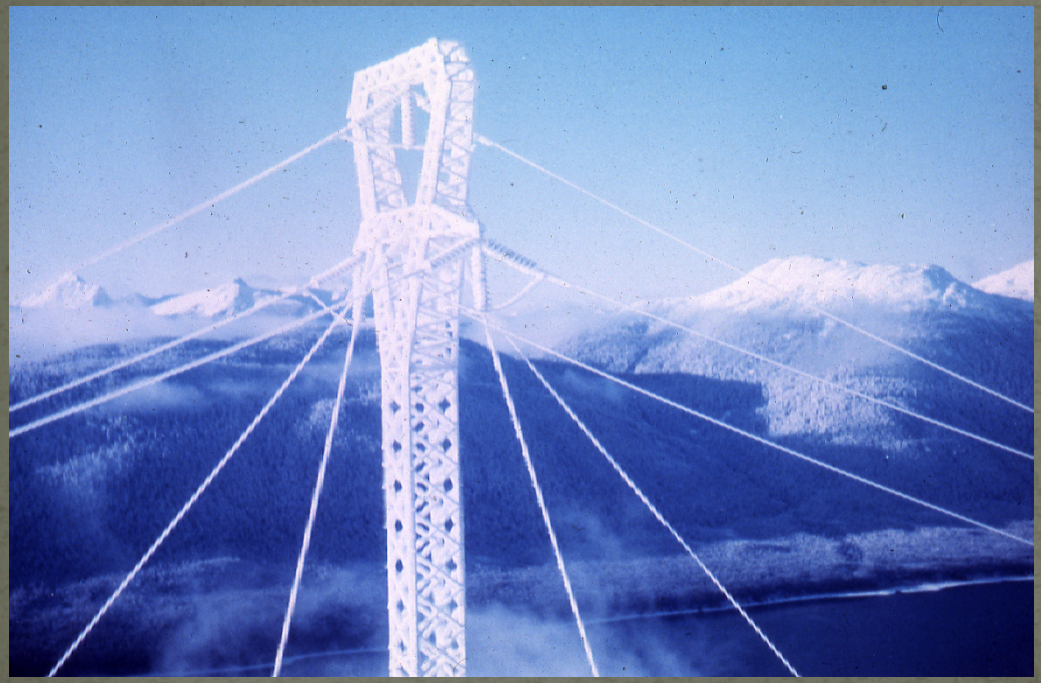


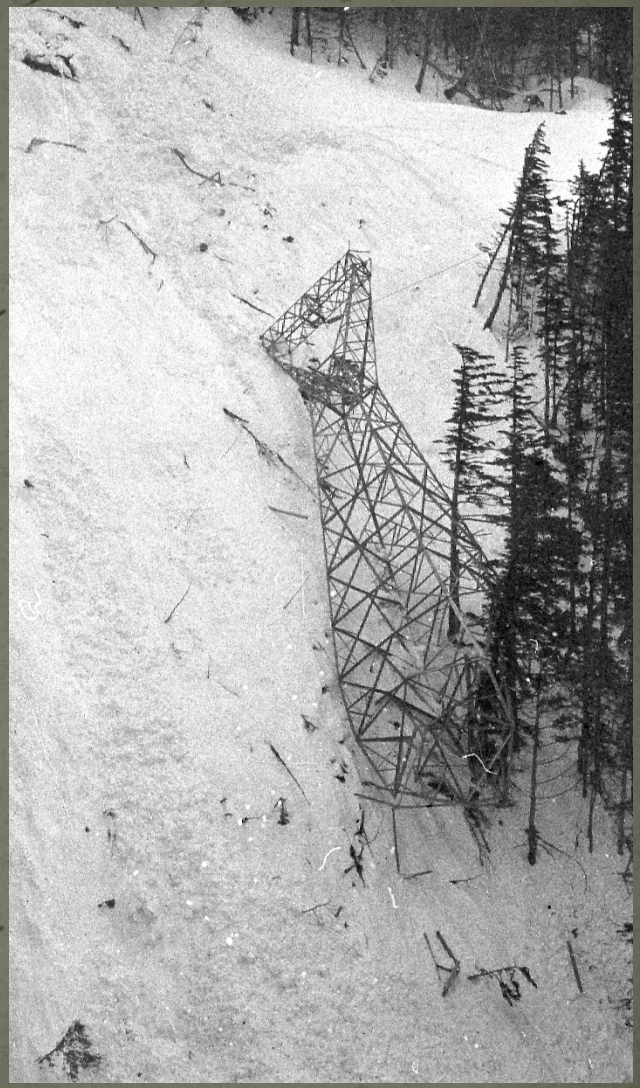
During its heaviest rainfall events, Snettisham can get the same amount of precipitation in a day as Fairbanks gets in a year. . . .

ANNUAL PRECIPITATION	
Fairbanks International	40 cm
Juneau International	158 cm
Juneau Downtown	234 cm
Snettisham Powerhouse	**444 cm**

Snettisham Line Challenges

- Wind
- Rime
- Snow Avalanches & Rock Slides





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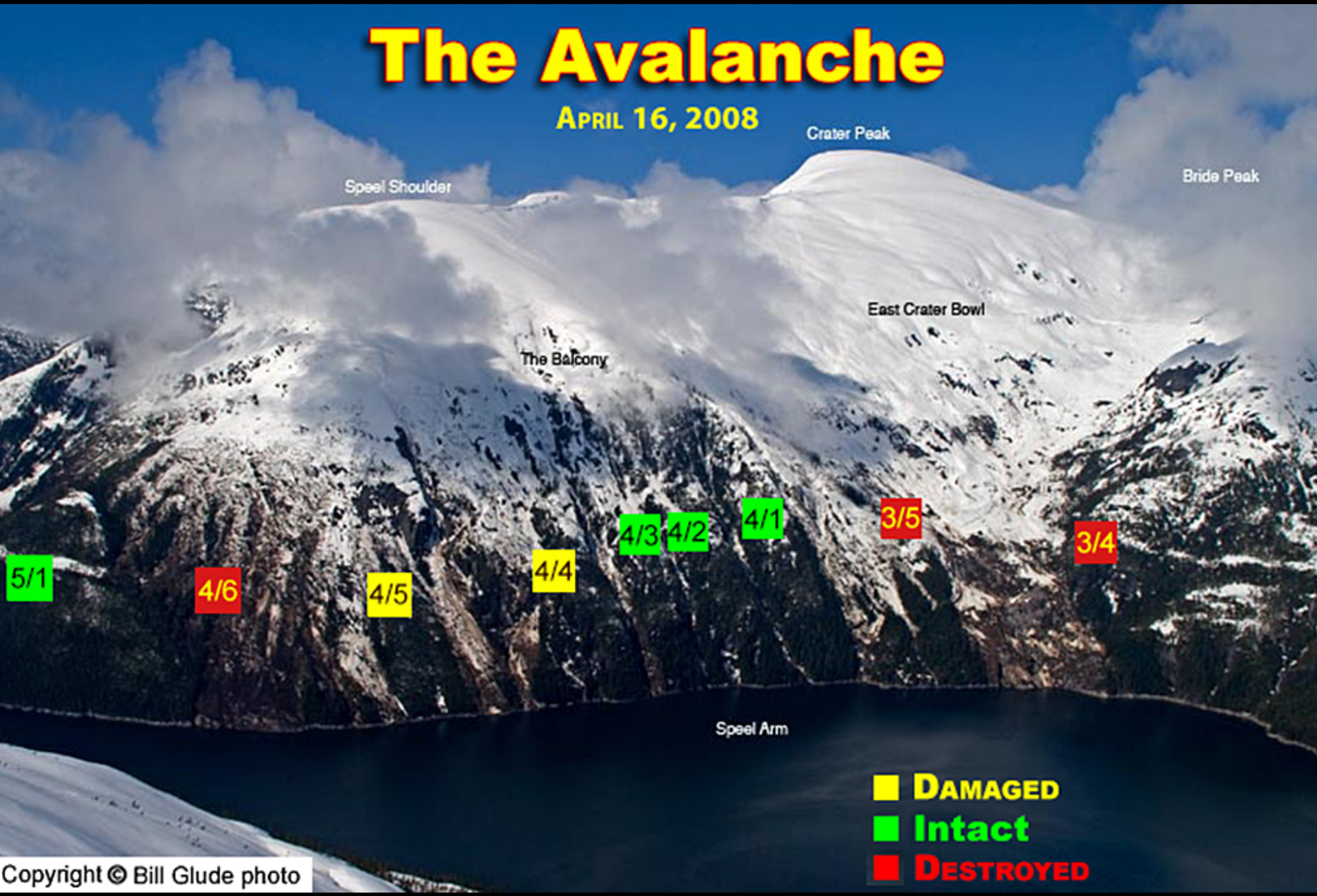
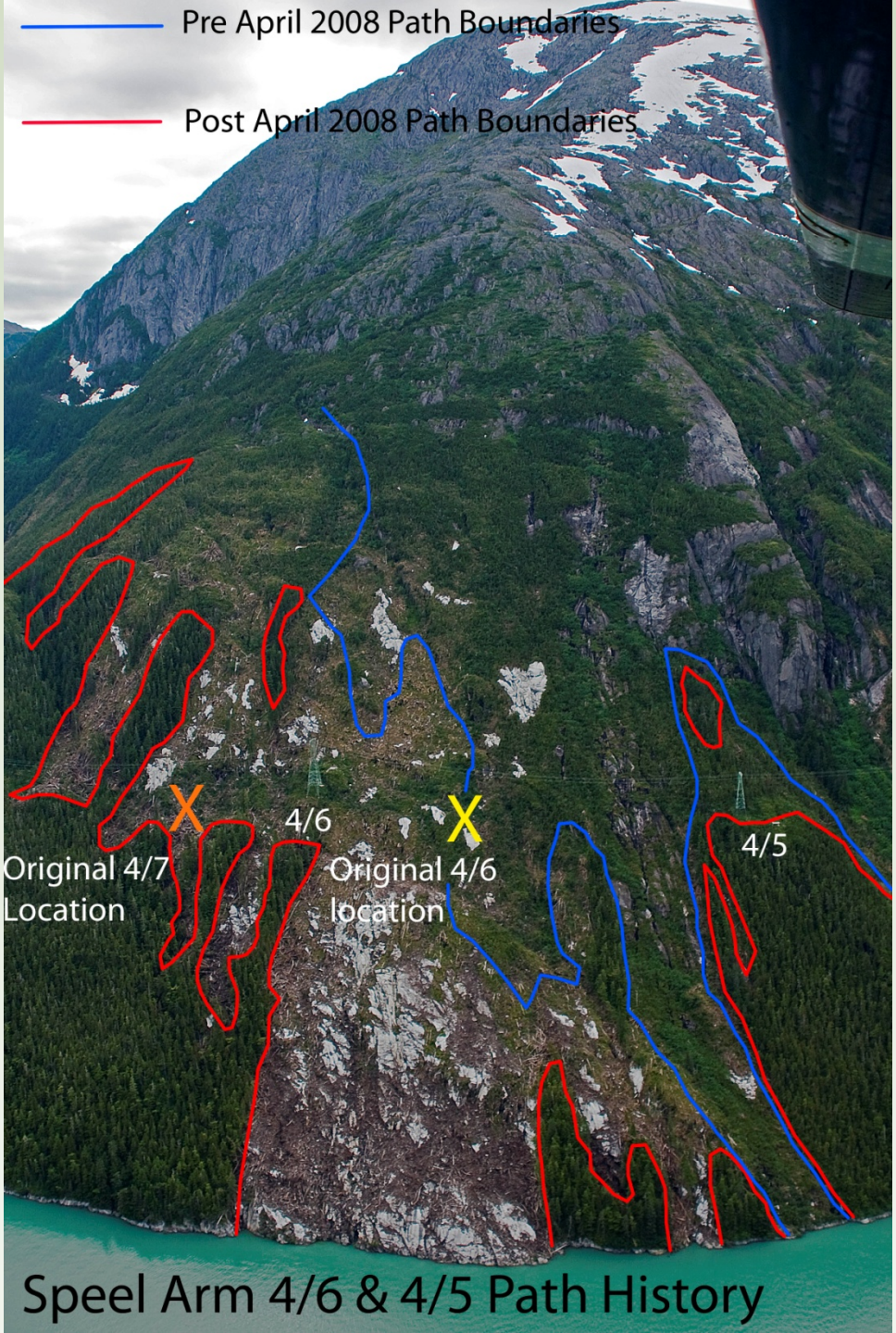
www.AmericanAvalancheAssociation.org

SNETTISHAM POWERLINE AVALANCHE

— Juneau, Alaska


The Avalanche
April 16, 2008
Crater Peak
Bride Peak
Speel Shoulder
East Crater Bowl
The Balcony
5/1
4/6
4/5
4/4
4/3
4/2
4/1
3/5
3/4
Speel Arm
Damaged
Intact
Destroyed
Copyright © Bill Glude photo


Pre April 2008 Path Boundaries
Post April 2008 Path Boundaries
X
4/6
Original 4/7
Location
X
Original 4/6
location
4/5
Speel Arm 4/6 & 4/5 Path History

April 16, 2008 Speel Arm Avalanche Statistics:

•Size-Relative: 5 on a scale of 1-5
"Major or maximum, relative to path"

•Size-Destructive: 5 on a scale of 1-5
"*Could gouge the landscape. Largest snow avalanche known.*"

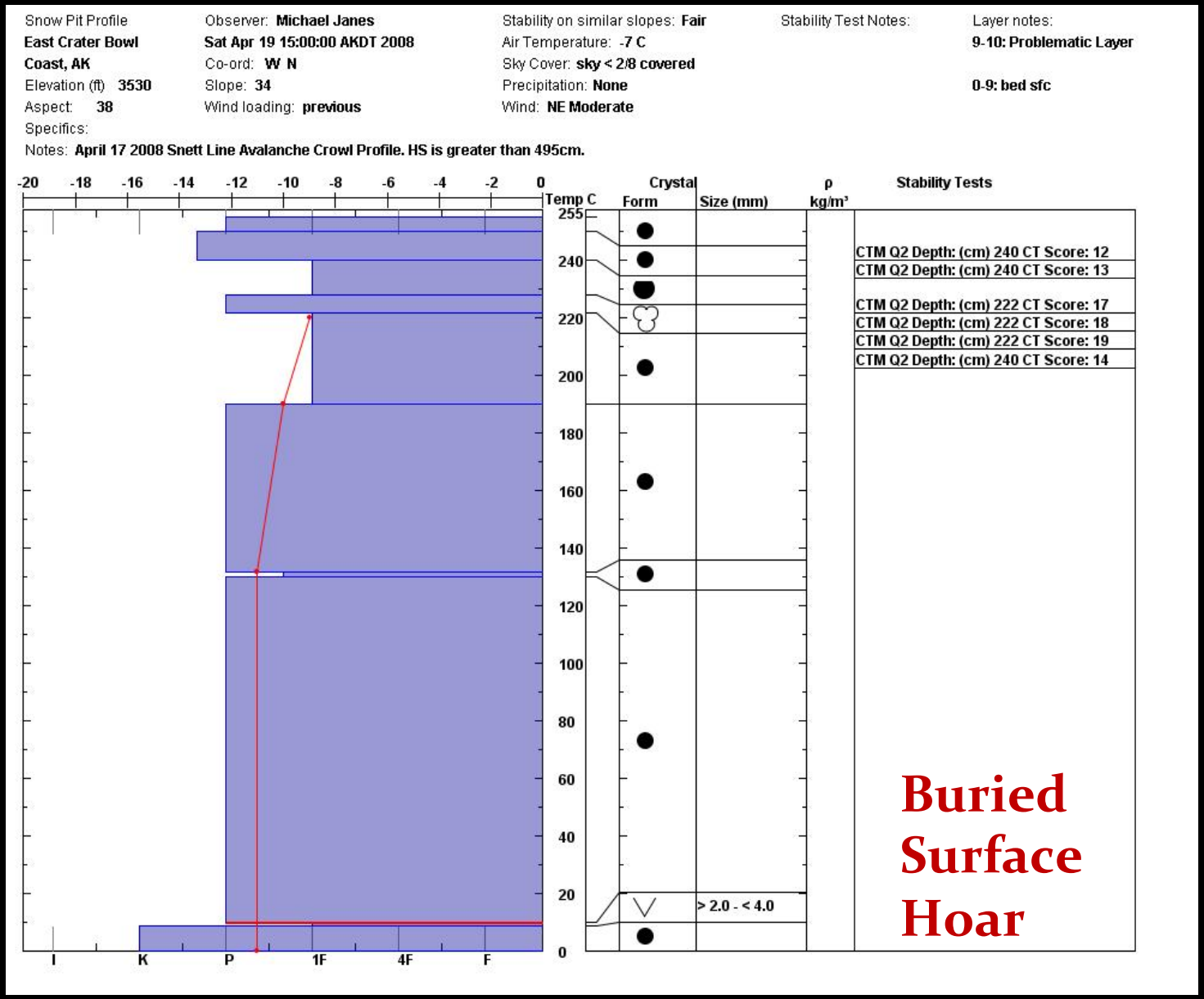
•Crown line (avalanche release area) was over 2 miles across and it fell 4000' to the ocean.

•The slab that released averaged 2 meters (6 ½ feet) deep

•Mapping studies including tree coring determined this to be a 100+ year event.

Don Sharaf

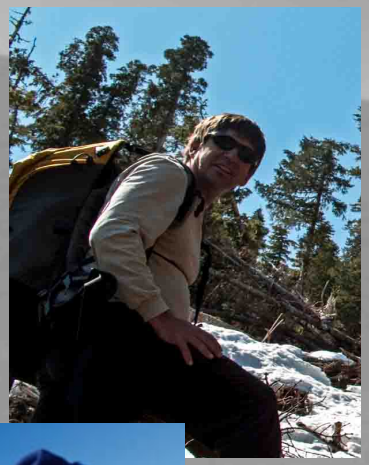
April 19th 2008 Crown Profile from East Crater Bowl



Multifaceted Plan of Attack for Dealing with Avalanche Risk

- Avalanche forecasting program
- Structural mitigation studies & projects
- Active avalanche control program for repair jobs & operational program

AEL&P Avalanche Forecasting









AEL&P

Operational Avalanche Forecast

Valid:0700 Tues, Jan 14, 2014

To:0700 Wed, Jan 15, 2014

Forecaster: Mike Janes cell: 907 723 9831

0600 Observations

	°F	24hr Snow	24hr SWE	Wind
PAJN (40')	43	trace	1.71"	ESE 22
Mt Juneau(2500')	34	15"	--	SE
Tram (1850')	36	19"	2.64"	SE 27
LongLake (850')	37	0"	2.7"	N/A
Snett (30')	33	~2"	2.78"	WSW 2

Weather Discussion

Well, this morning we are in the throes of a deep 968mb Low and its associated occluded front. Satellite imagery shows not only ample moisture content but thick a thick cloud layer fueled by warm air from the tropics. In addition, Biorka radar shows widespread heavy precip continuing to move onshore out of the SW. This flow direction will favor enhanced Speel Arm precipitation.

Overnight snow and precip totals have been impressive with between 15-20" of snow falling in wind protected spots, and strong winds, it's easy to imagine new slabs of 2-4' in wind loaded pockets.

Gold Creek S aspect (250'-3250')			**24hr Outlook:** SE wind 20-40kts. Snow level peaking before noon ~4000'. 1.75" SWE thru 5pm. • With storm slabs possible in the 2-3' size range in wind loaded pockets, and heavy rain occurring this morning, natural activity is likely on most slopes. ***Avoid the Flume today. Basin Rd vehicle access is okay but minimize exposure time.***
Gastineau Channel SW aspect (0'-3600')			**24hr Outlook:** SE wind 20-40kts. Snow level peaking before noon ~4000'. 1.75" SWE thru 5pm. • With storm slabs in the 2-4' size range for loaded pockets, and rain occurring right now, natural slide activity is likely. I don't anticipate large slides, but size could approach medium.
Stephens Passage W-SW aspect (300'-3500')			**24hr Outlook:** SE wind 20-40kts. Snow level peaking before noon ~4000'. 1.75" SWE thru 5pm. • As with most other paths, storm slabs are likely here, but are not expected to run into the gully or approach the transmission lines.
Speel Fours E-NE aspect (650'-3000')			**24hr Outlook:** SW wind 20-40kts. Snow level peaking before noon ~4000'. 1.85" SWE thru 5pm. • With a decent storm slab building up last night, natural slides are likely today but should remain within the small-medium size range. Some larger slides are possible in bigger paths (East Crater Bowl, etc.) Hazard will be decreasing over the next day as rain tapers off and the snowpack adjusts to the new load.
Snettisham Powerhouse SE aspect (20'-300')			**24hr Outlook:** Variable wind early becoming moderate SW midday. High temps low 40's. ~2" SWE before 5pm. • The snowpack at sealevel was tempered by rain yesterday so some small wet slides are possible but I don't expect big slides. ***Still, with rainfall rates what they are it is a good day to avoid the Erection Bay Adit path.***

Fieldwork and Snowpack


Arthur Peak
February 2014


Speel Arm Balcony
Alpine Weather Station
Mile 4 Snettisham Line

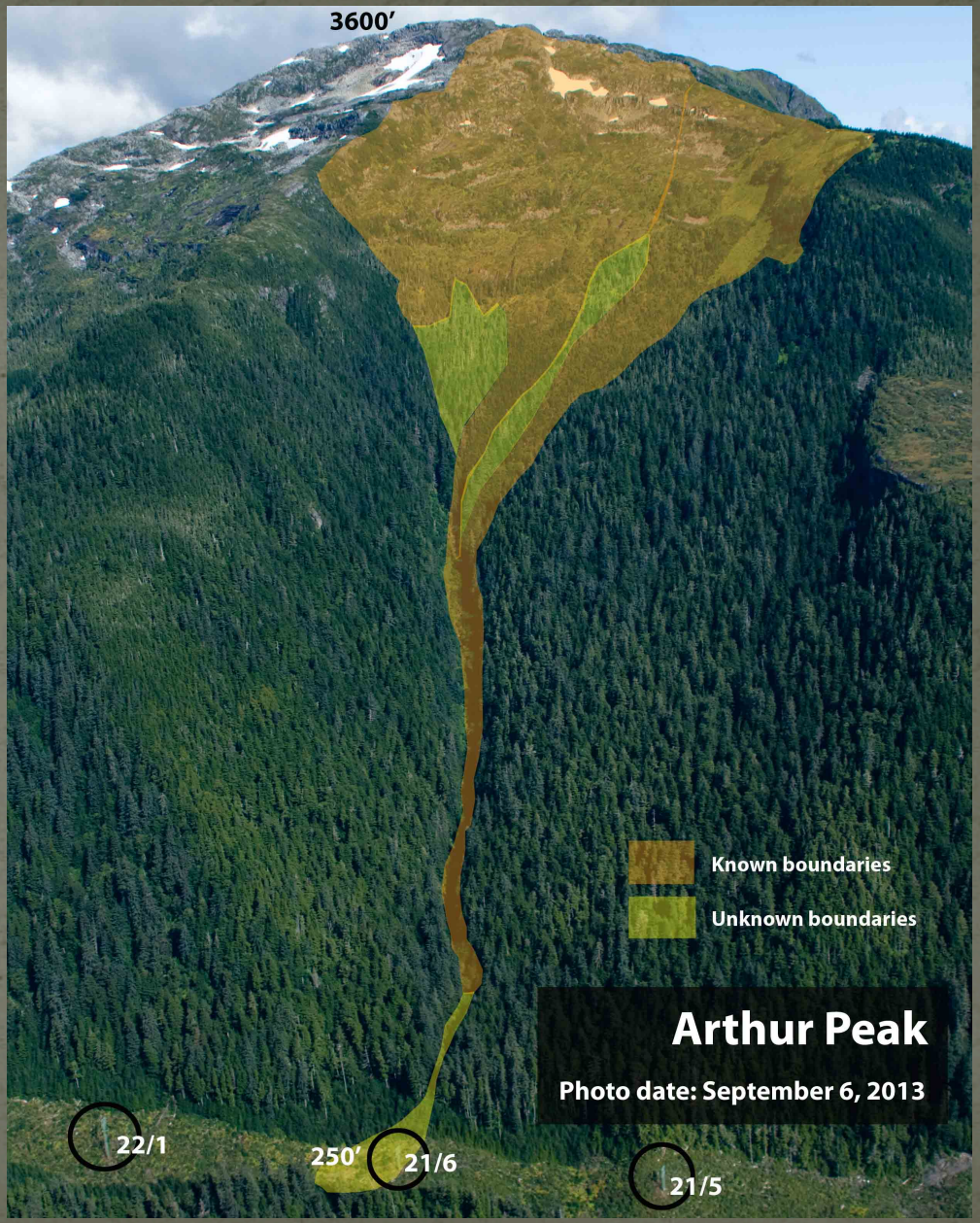
Inter-Agency Partnerships

UAS
AKDOT
AEL&P
CBJ
Alaska Powder Descents
Coeur Alaska/Kensington Mine

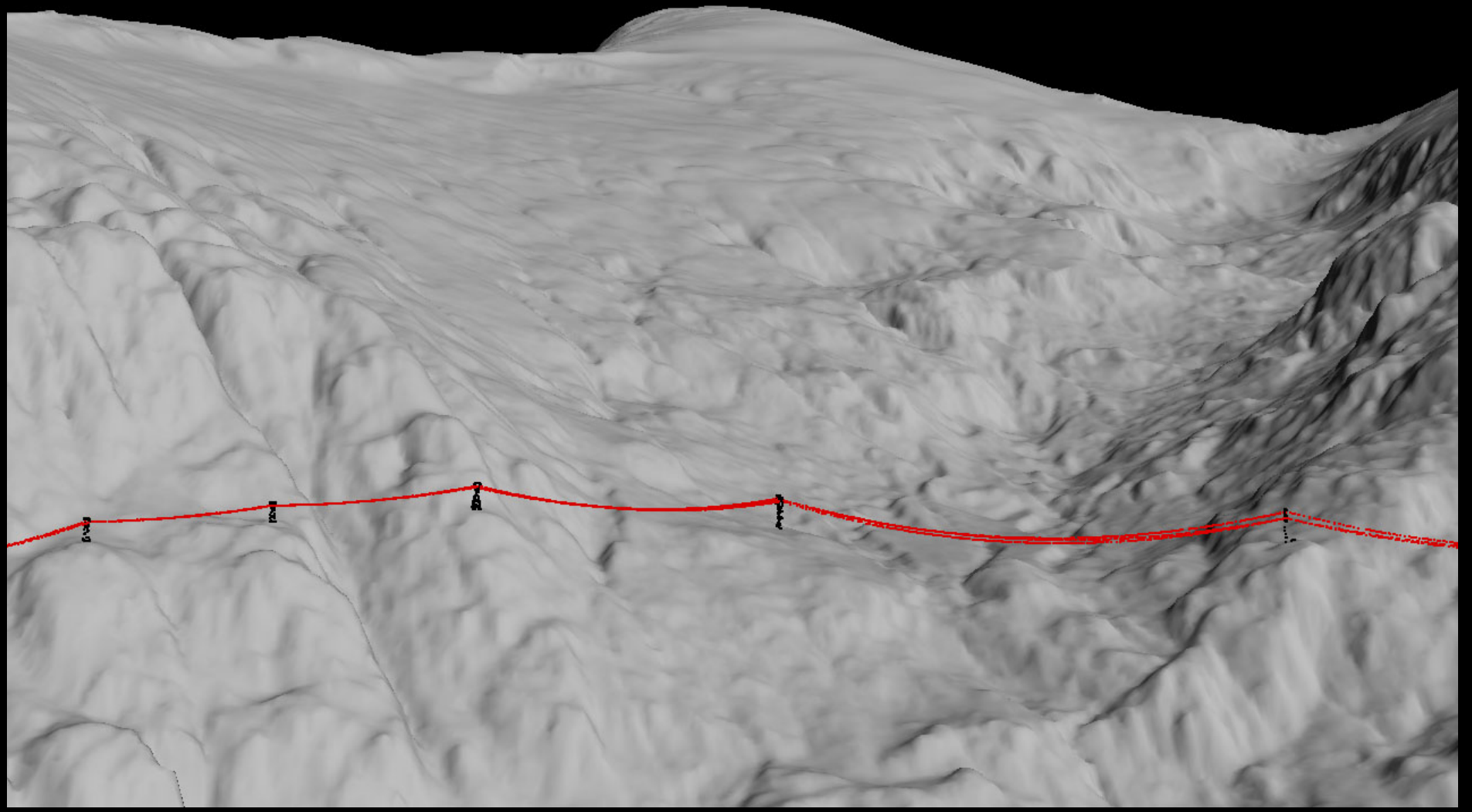
Structural Mitigation:

- Avalanche Diverters
- Breakaway Links
- East Crater Bowl Span & Added 3-4 Poles

Path Rankings, Mapping, & Modeling Efforts



LiDAR



Avalanche Terrain Atlas

- Snettisham Line
- Juneau Urban
- Annex Creek
- Lake Dorothy

22 paths

23 paths

14+ paths

12 paths

2006

58°07'22.72" N 133°45'16.36" W elev 1089 ft


Thane Road-
Snowslide Creek Path -T011
Photo date: March 13, 2013
14328
14329
14330
14435
14434
14433
DOT
Camera
Meter#
061917
10984
10985
10986
10987
DOT Camera
Meter #061916
14340
10988
10989
10990

Terrain Induced Challenges


2009
4/6 Diversion Structure

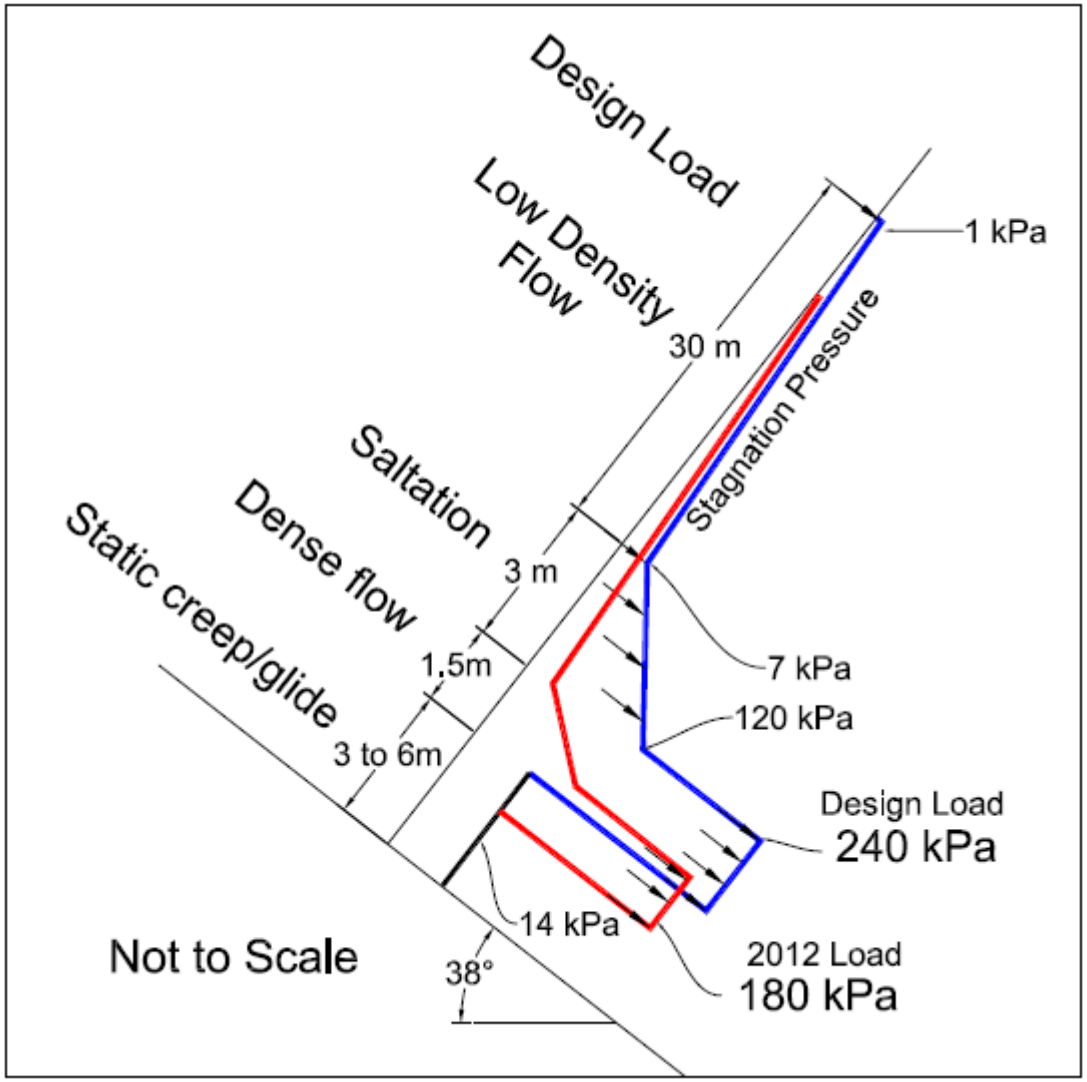
2009/2011
East Crater Bowl Bypass

Mike Janes

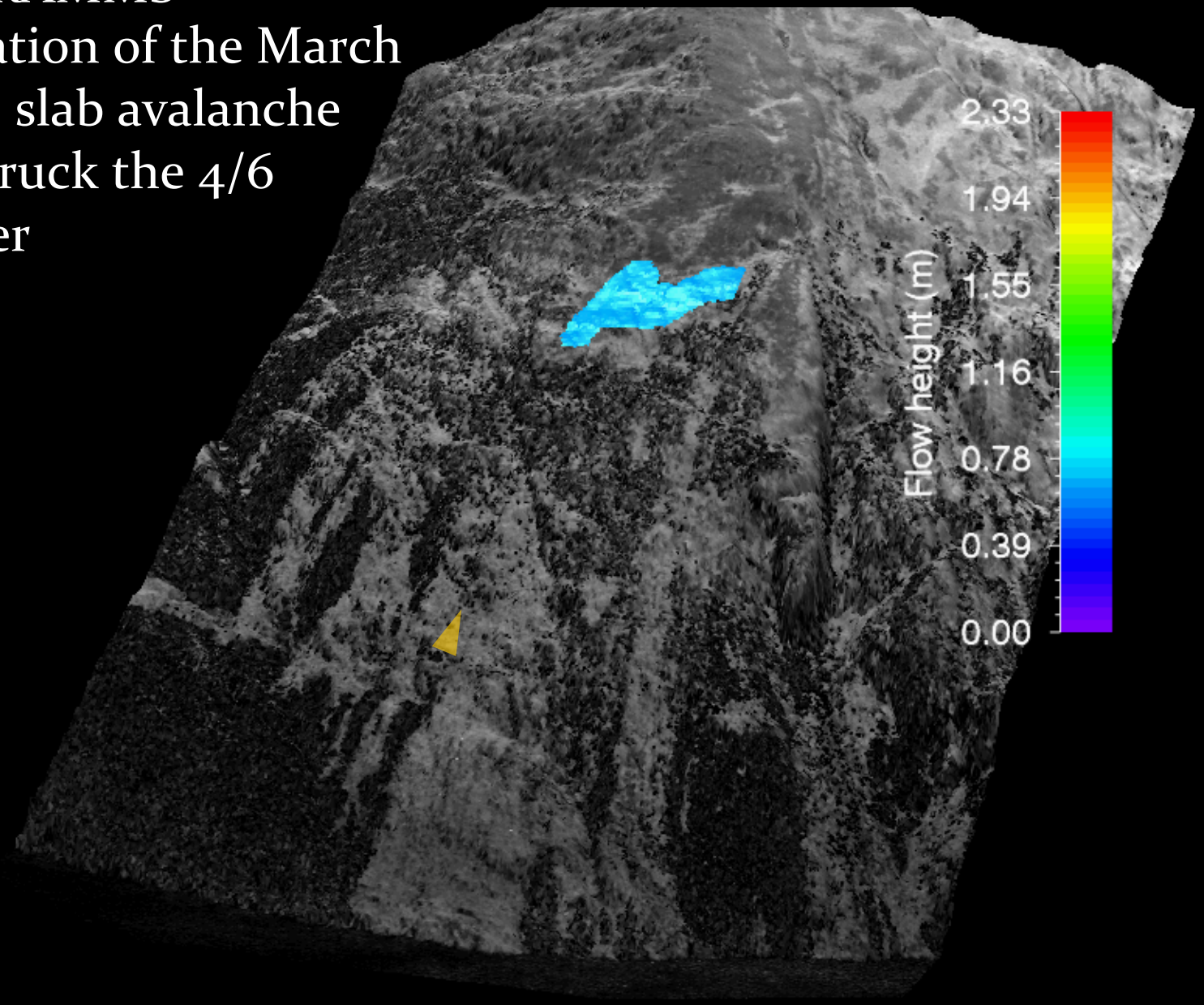
Tower 4/5 Diversion Structure

Tower 4-4 Diversion Structure

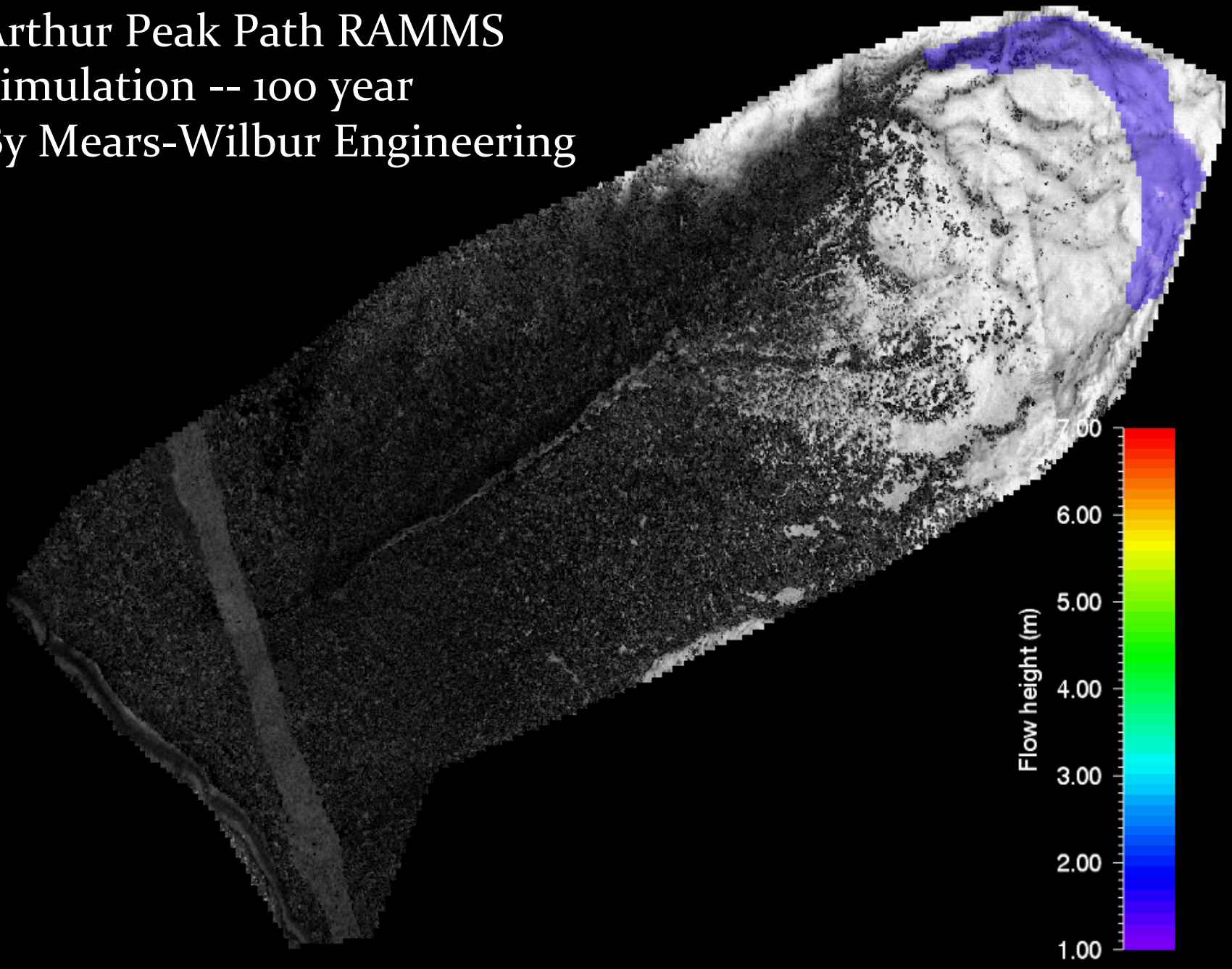
March 2012
4/6 Diversion



Swiss RAMMS Simulation of the March 8, 2012 slab avalanche that struck the 4/6 diverter



Arthur Peak Path RAMMS Simulation -- 100 year By Mears-Wilbur Engineering



Active Mitigation on the Snettisham Line


ARCTERYX


pastal
elicopters

Avalanche Control Cost Comparison

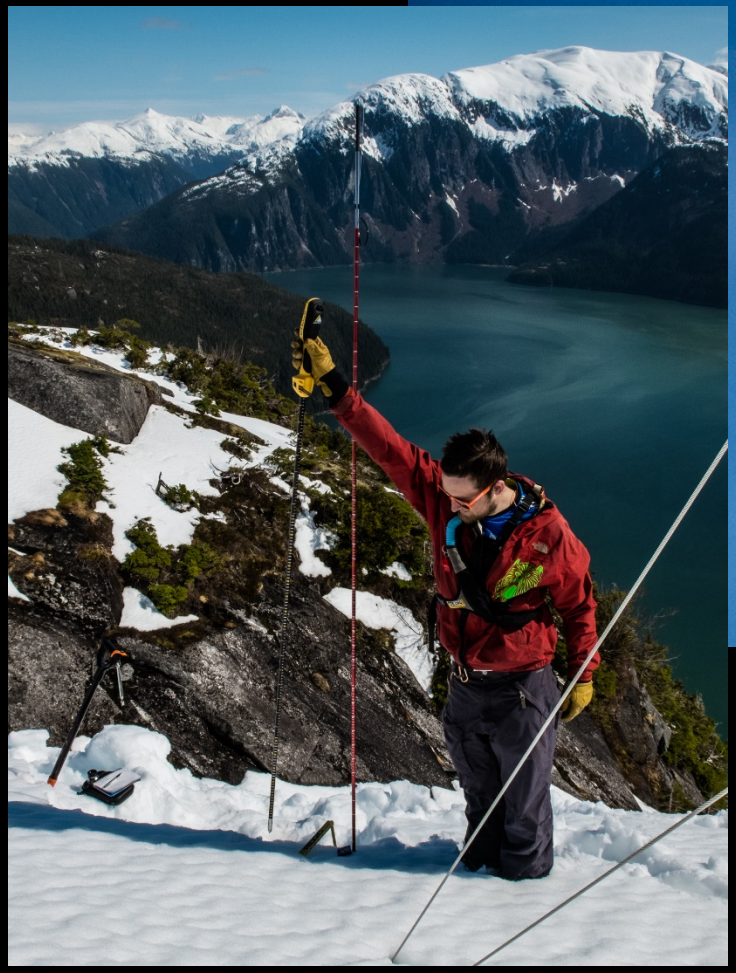
Average Mission Cost

Explosives: $11,174
Daisybell: $4,648

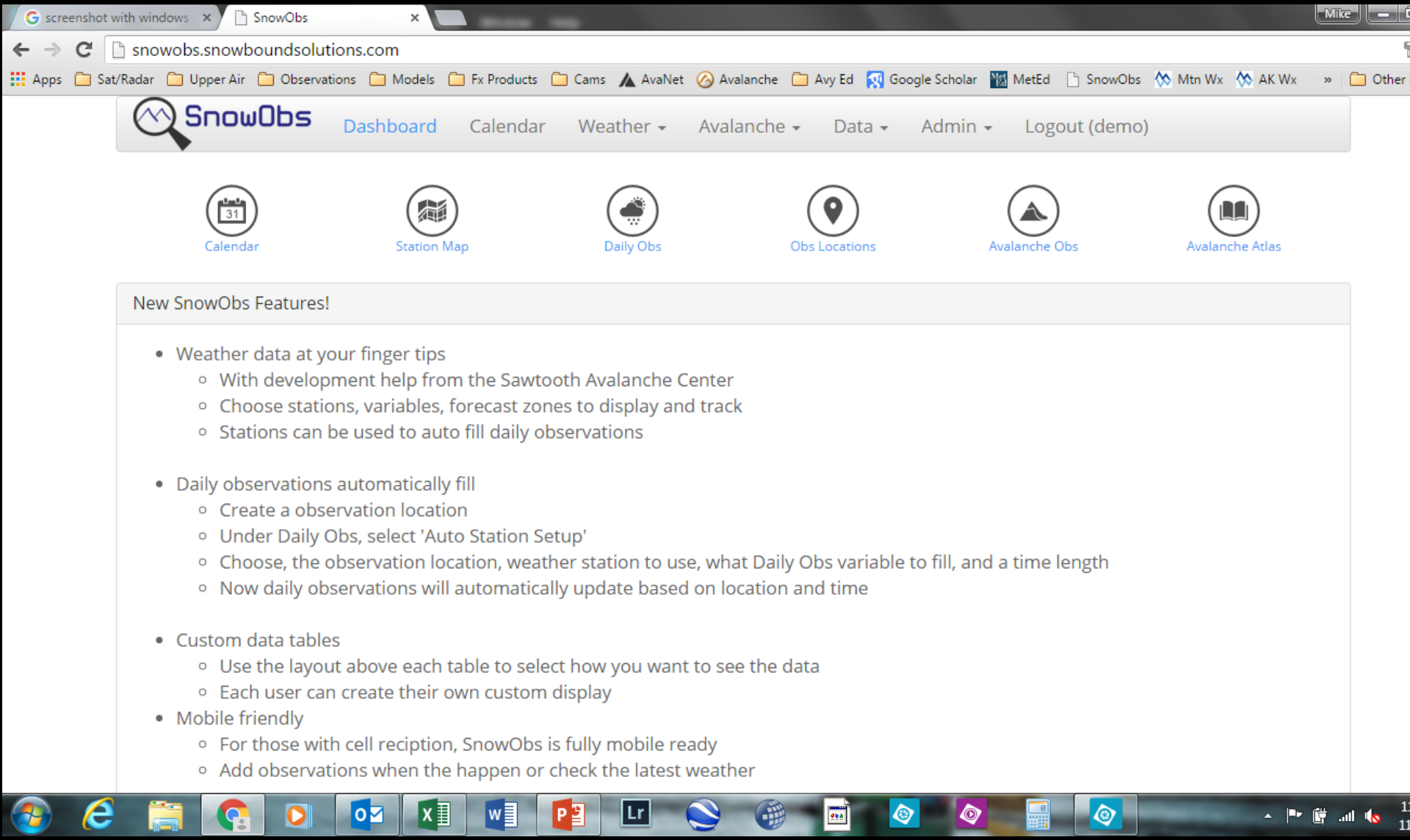
Assuming an average of 11 missions per season, it took ***2 seasons*** to recoup the cost of Daisybell purchase ($140,000)


Speel Arm Fou
Feb 29, 201
South Crater
Bowl
Sh
4/6
(790')
4/4 Path Shots
Feb 29, 2012
Balcony
(1900')
4/4
Hi Shot
Fall
Line
Rock
Slab
LZ
(760')
ter Peak (4673')
Crater Bowl
4/1
Speel Arm

Long Range Receiver



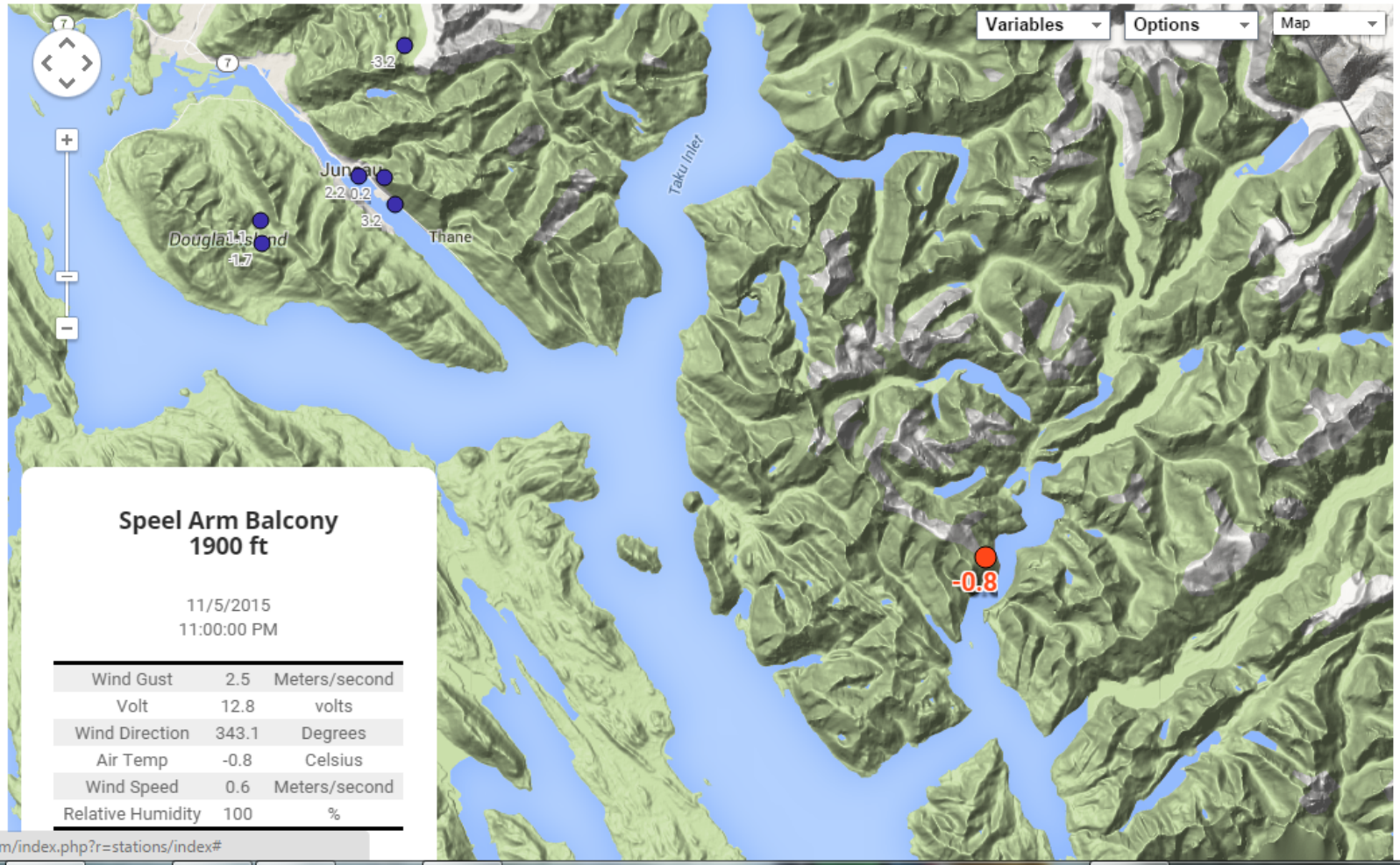
Avatech SP-1 & Avanet


screenshot with windows
SnowObs
Mike
snowobs.snowboundsolutions.com
Apps
Sat/Radar
Upper Air
Observations
Models
Fx Products
Cams
AvaNet
Avalanche
Avy Ed
Google Scholar
MetEd
SnowObs
Mtn Wx
AK Wx
Other
SnowObs
Dashboard
Calendar
Weather
Avalanche
Data
Admin
Logout (demo)
Calendar
Station Map
Daily Obs
Obs Locations
Avalanche Obs
Avalanche Atlas
New SnowObs Features!
Weather data at your finger tips
With development help from the Sawtooth Avalanche Center
Choose stations, variables, forecast zones to display and track
Stations can be used to auto fill daily observations
Daily observations automatically fill
Create a observation location
Under Daily Obs, select 'Auto Station Setup'
Choose, the observation location, weather station to use, what Daily Obs variable to fill, and a time length
Now daily observations will automatically update based on location and time
Custom data tables
Use the layout above each table to select how you want to see the data
Each user can create their own custom display
Mobile friendly
For those with cell reception, SnowObs is fully mobile ready
Add observations when the happen or check the latest weather

screenshot with windows | SnowObs - Stations

snowobs.snowboundsolutions.com/index.php?r=stations/index

Apps | Sat/Radar | Upper Air | Observations | Models | Fx Products | Cams | AvaNet | Avalanche | Avy Ed | Google Scholar | MetEd | SnowObs | Mtn Wx | AK Wx



Upda

List V

Speel Arm Balcony
1900 ft

11/5/2015
11:00:00 PM

Wind Gust	2.5	Meters/second
Volt	12.8	volts
Wind Direction	343.1	Degrees
Air Temp	-0.8	Celsius
Wind Speed	0.6	Meters/second
Relative Humidity	100	%

wobs.snowboundsolutions.com/index.php?r=stations/index#