

The Data Burden

Information Challenges for Snow
Safety Operations

The Data Burden: Definition

- An individual or organization tasked with the avalanche problem has conflicting needs:
 - A: The need for actionable information
 - B: The means to manage that information



The Data Burden

- Background
 - Operating Philosophies
 - Information Management Issues
- Methods
 - The CPG Model
- Discussion
 - Successes and Failures
 - Implications
 - Looking Ahead

Operating Philosophies

- Consensus
- People are visual creatures
- Scientific Method (hypothesis/forecast and testing/modification)
- In-sourcing is better than Out-sourcing
- We face *probabilistic* challenges
- We operate in a significant uncertainty

Information Needs

- Terrain
- Weather
- Snowpack
- Human Factors

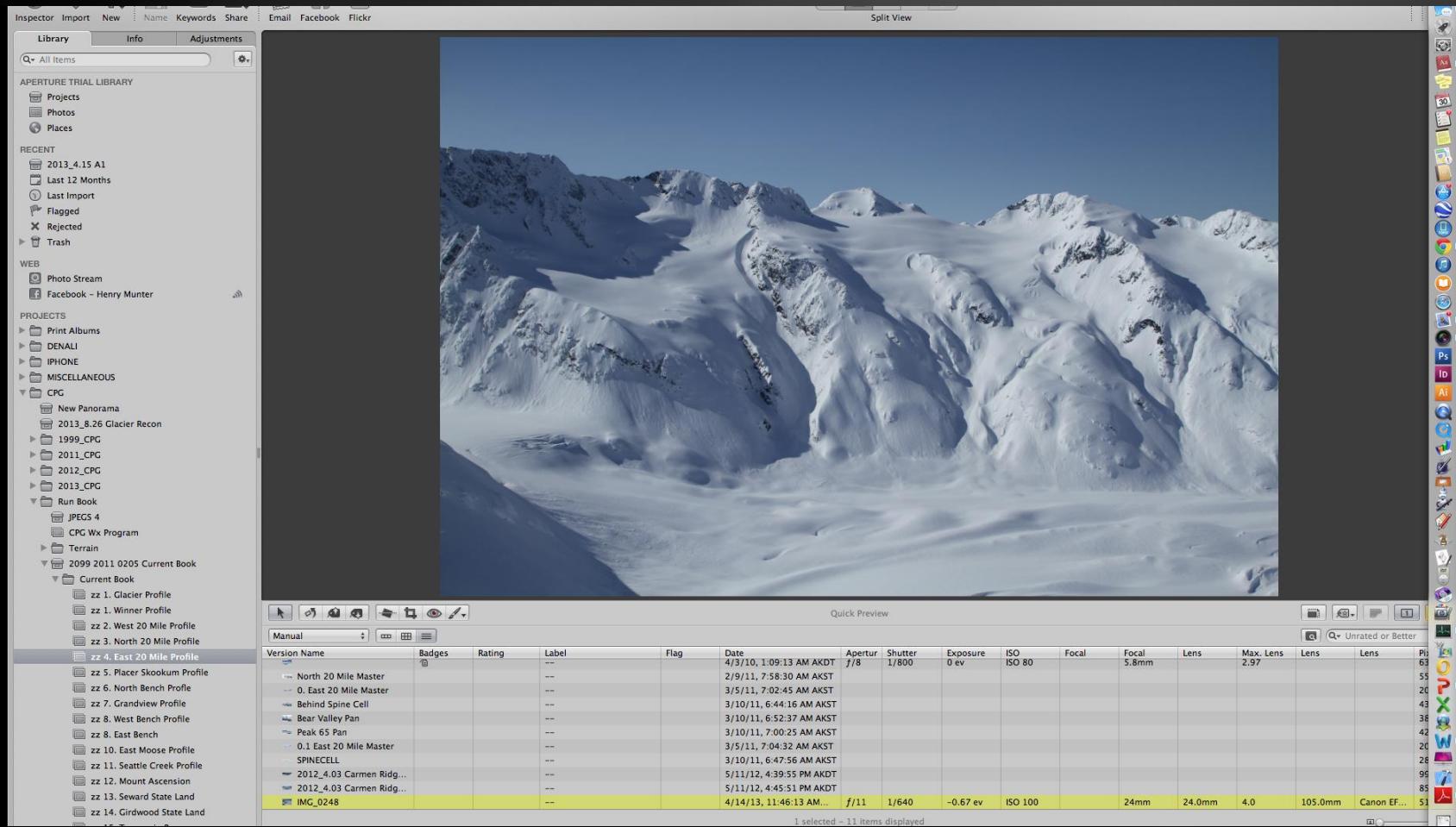
Information Management Issues

- Sorting and Parsing
- Human Issues: Tunnel Vision, Memory and Calibration
- Risky Data Acquisition
- Data Storage and Processing
- Data Accessibility
- Installation Management
- Time Management

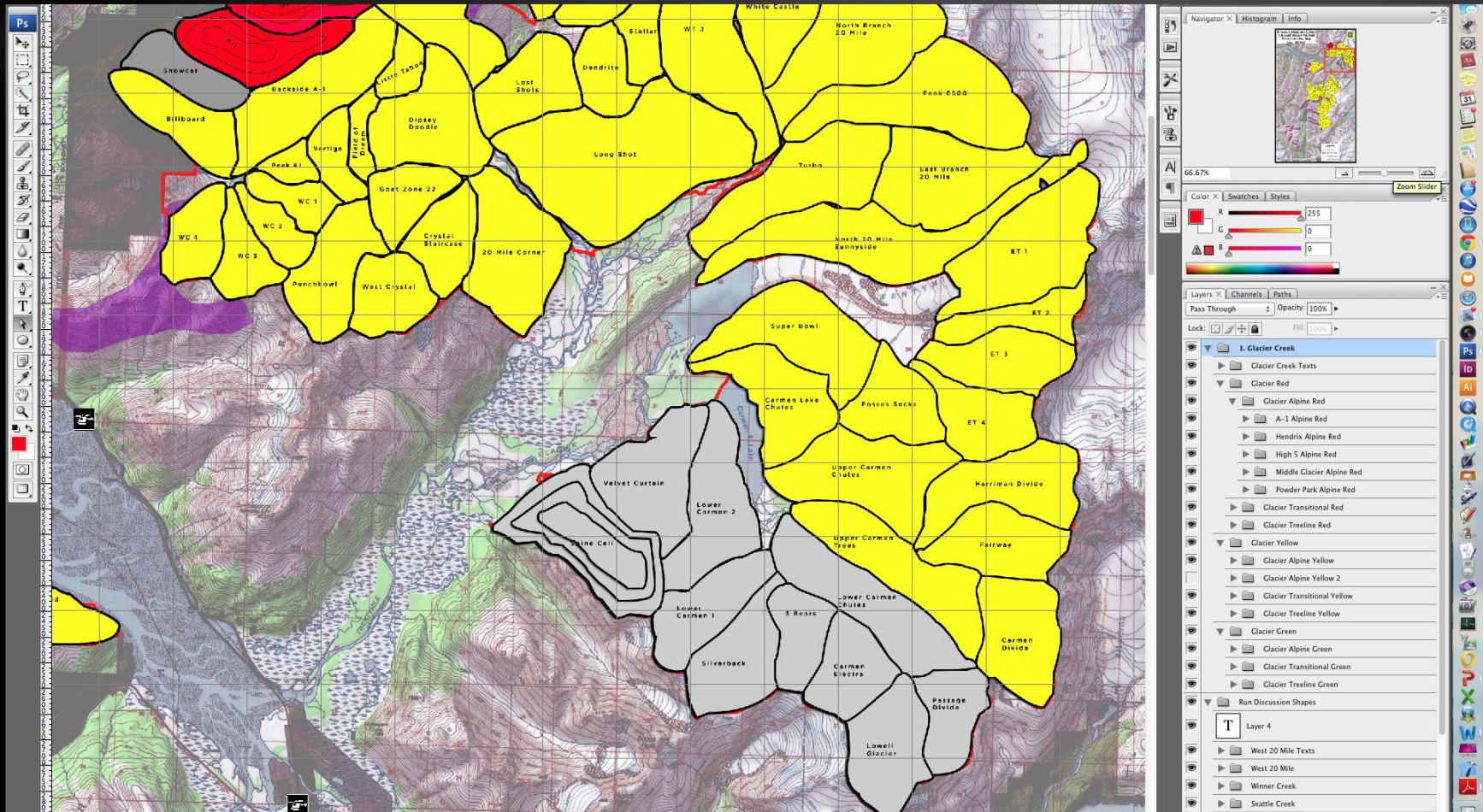
Terrain

- Photos
- Maps
- Google Earth

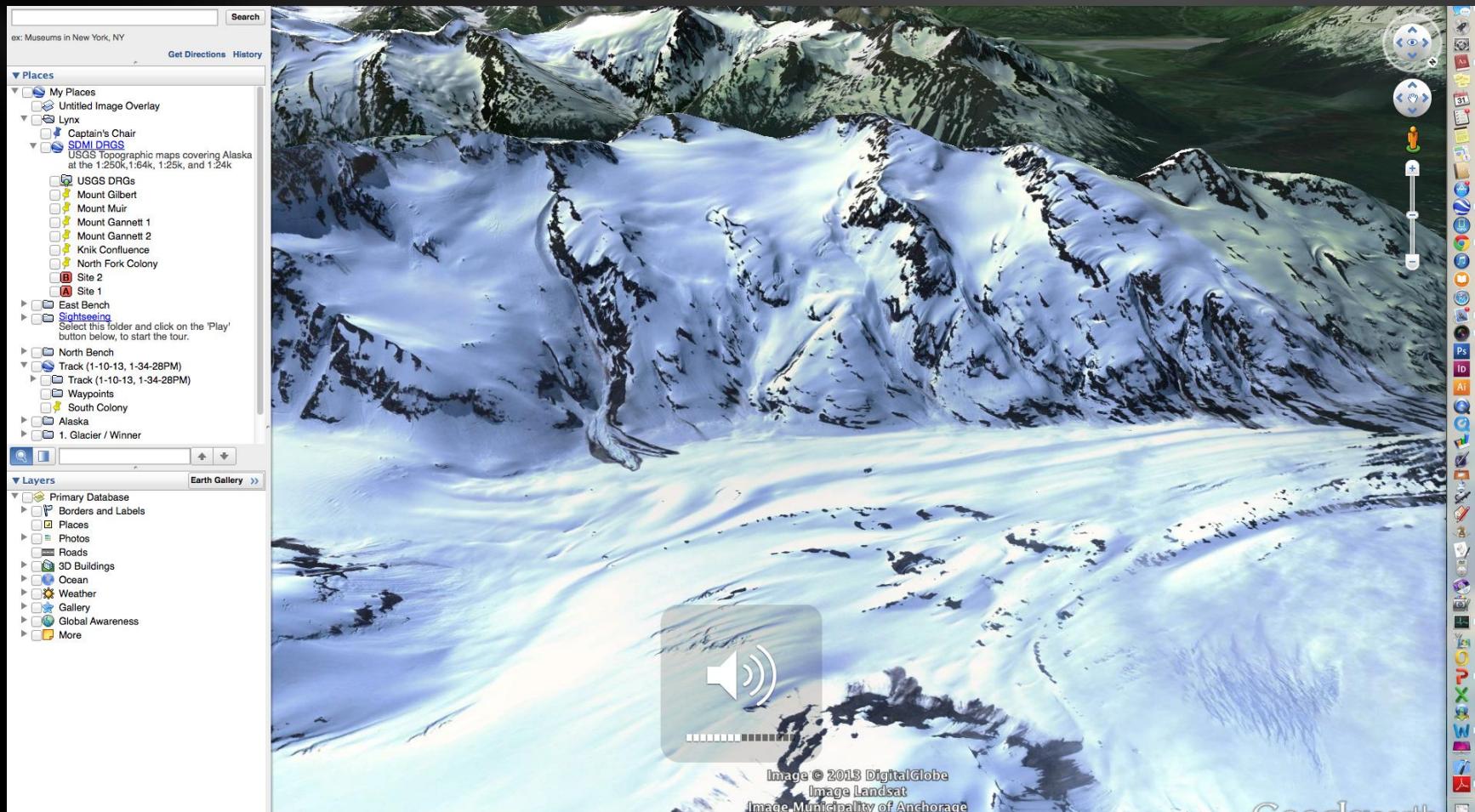
Run Catalog



Terrain Map



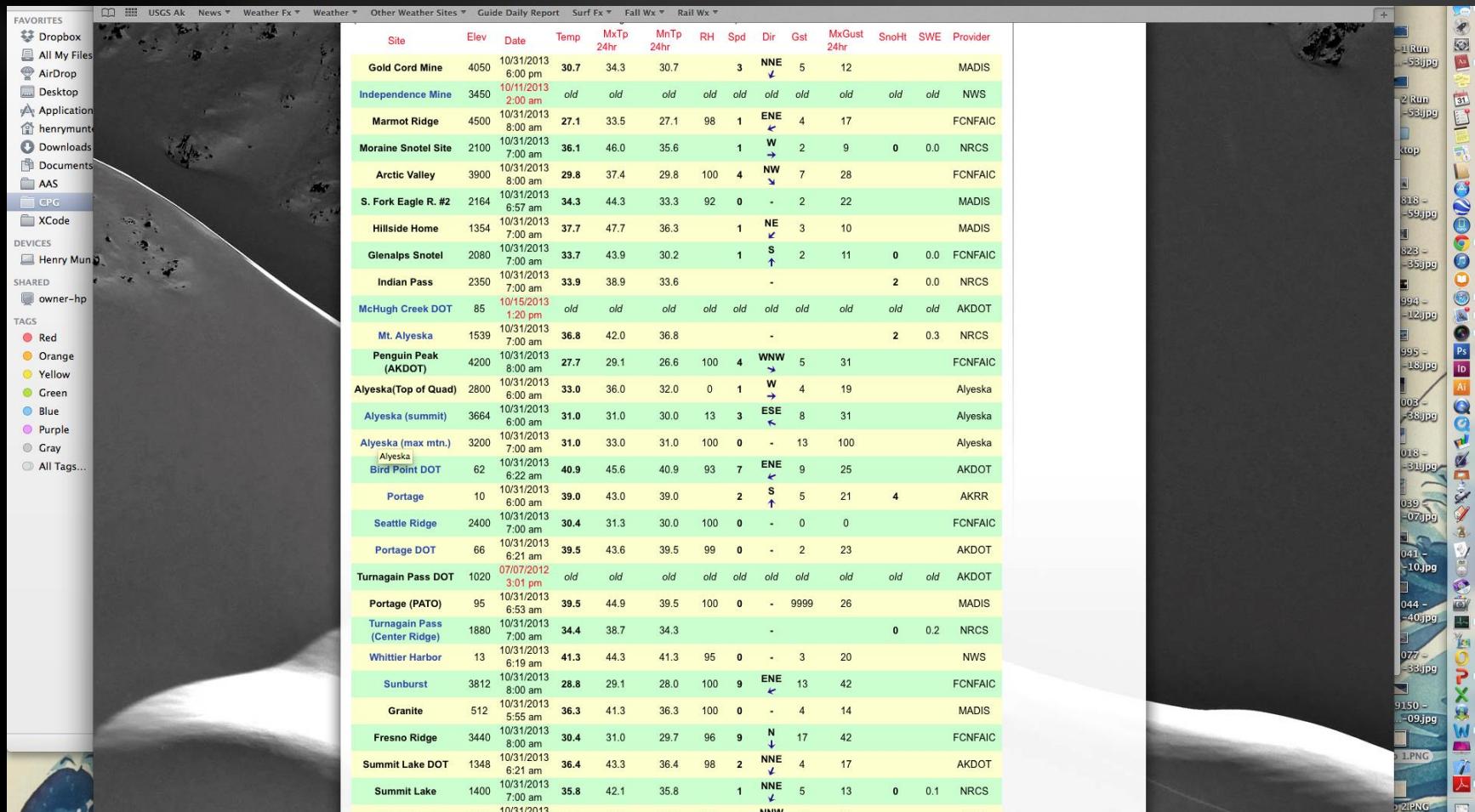
Google Earth



Weather

- Telemetry
- Storm Interval Tracking
- Time-Scaling Products

Telemetry



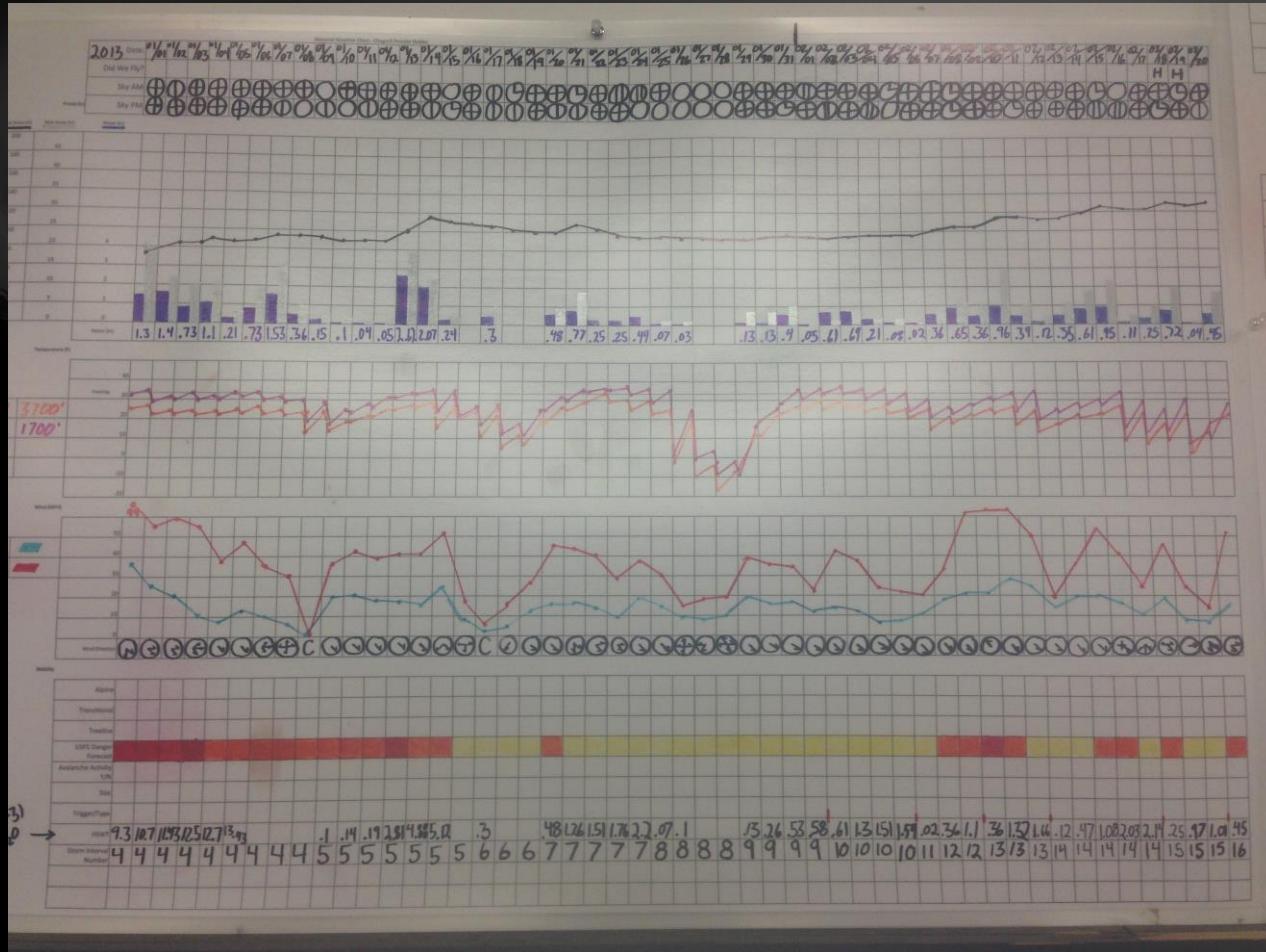
The screenshot shows a Mac OS X desktop with a weather data application window in the foreground and a file browser window in the background.

Weather Data Application (Frontmost Window):

- Menu Bar:** USGS Ak, News, Weather Ex, Weather, Other Weather Sites, Guide Daily Report, Surf Fx, Fall Fx, Fall Wx, Rail Wx.
- Left Sidebar (Favorites):**
 - Dropbox
 - All My Files
 - AirDrop
 - Desktop
 - Application
 - henrymunt
 - Downloads
 - Documents
 - AAS
 - CPG
 - XCode
- Left Sidebar (Devices):**
 - Henry Mun
- Left Sidebar (Shared):**
 - owner-hp
- Left Sidebar (Tags):**
 - Red
 - Orange
 - Yellow
 - Green
 - Blue
 - Purple
 - Gray
 - All Tags...
- Table Data:**

Site	Elev	Date	Temp	MxTp 24hr	MnTp 24hr	RH	Spd	Dir	Gst	MxGust 24hr	SnoHt	SWE	Provider
Gold Cord Mine	4050	10/31/2013 6:00 pm	30.7	34.3	30.7	old	old	NNE	5	12			MADIS
Independence Mine	3450	10/11/2013 2:00 am	old	old	old	old	old	old	old	old	old	old	NWS
Marmot Ridge	4500	10/31/2013 8:00 am	27.1	33.5	27.1	98	1	ENE	4	17			FCNFAIC
Moraine Snotel Site	2100	10/31/2013 7:00 am	36.1	46.0	35.6	1	W	2	9	0	0.0	0.0	NRCS
Arctic Valley	3900	10/31/2013 8:00 am	29.8	37.4	29.8	100	4	NW	7	28			FCNFAIC
S. Fork Eagle R. #2	2164	10/31/2013 6:57 am	34.3	44.3	33.3	92	0	-	2	22			MADIS
Hillside Home	1354	10/31/2013 7:00 am	37.7	47.7	36.3	1	NE	4	3	10			MADIS
Glenalps Snotel	2080	10/31/2013 7:00 am	33.7	43.9	30.2	1	S	2	11	0	0.0	0.0	FCNFAIC
Indian Pass	2350	10/31/2013 7:00 am	33.9	38.9	33.6			-		2	0.0	0.0	NRCS
McHugh Creek DOT	85	10/15/2013 1:20 pm	old	old	old	old	old	old	old	old	old	old	AKDOT
Mt. Alyeska	1539	10/31/2013 7:00 am	36.8	42.0	36.8			-		2	0.3	0.0	NRCS
Penguin Peak (AKDOT)	4200	10/31/2013 8:00 am	27.7	29.1	26.6	100	4	WNW	5	31			FCNFAIC
Alyeska(Top of Quad)	2800	10/31/2013 6:00 am	33.0	36.0	32.0	0	1	W	4	19			Alyeska
Alyeska (summit)	3664	10/31/2013 6:00 am	31.0	31.0	30.0	13	3	ESE	8	31			Alyeska
Alyeska (max mtn.)	3200	10/31/2013 7:00 am	31.0	33.0	31.0	100	0	-	13	100			Alyeska
Alyeska	3200	10/31/2013 6:22 am	40.9	45.6	40.9	93	7	ENE	9	25			AKDOT
Portage	10	10/31/2013 6:00 am	39.0	43.0	39.0	2	S	5	21	4			AKRR
Seattle Ridge	2400	10/31/2013 7:00 am	30.4	31.3	30.0	100	0	-	0	0			FCNFAIC
Portage DOT	66	10/31/2013 6:21 am	39.5	43.6	39.5	99	0	-	2	23			AKDOT
Turnagain Pass DOT	1020	07/07/2012 3:01 pm	old	old	old	old	old	old	old	old	old	old	AKDOT
Portage (PATO)	95	10/31/2013 6:53 am	39.5	44.9	39.5	100	0	-	9999	26			MADIS
Turnagain Pass (Center Ridge)	1880	10/31/2013 7:00 am	34.4	38.7	34.3			-		0	0.2	0.0	NRCS
Whittier Harbor	13	10/31/2013 6:19 am	41.3	44.3	41.3	95	0	-	3	20			NWS
Sunburst	3812	10/31/2013 8:00 am	28.8	29.1	28.0	100	9	ENE	13	42			FCNFAIC
Granite	512	10/31/2013 5:55 am	36.3	41.3	36.3	100	0	-	4	14			MADIS
Fresno Ridge	3440	10/31/2013 8:00 am	30.4	31.0	29.7	96	9	N	17	42			FCNFAIC
Summit Lake DOT	1348	10/31/2013 6:21 am	36.4	43.3	36.4	98	2	NNE	4	17			AKDOT
Summit Lake	1400	10/31/2013 7:00 am	35.8	42.1	35.8	1	NNE	5	13	0	0.1	0.1	NRCS
		10/31/2013						NNW					
- Background Window (File Browser):** Shows a list of files in a Finder window, including numerous jpg and png files, likely related to the weather data or satellite imagery.

Time Interval Tracking



Snowpack

- Review of Runs Skied
- The Digital Camera
- The Snowpit Problem

Review of Runs Skied

USGS Ak News Weather Fx Weather Other Weather Sites Guide Daily Report Surf Fx Fall Wx Rail Wx

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Daily Report (Form File & Responses)

File Edit Insert Table View Help

FORMSCENTRAL Daily Report

Design Options Test Distribute View Responses Summary Report

Save as Excel Save as PDF Filter Sort

All Responses Sheet1 Sheet2 Sheet3 Sheet4 +

		BL	BL	BL	BL	BL	BL	BL	BL	BL	BL	BL
	Additional Comments	Local Stability of this Concern			Primary Concern	Snowpack Observation	Related File?	General Observations	Description	Avalanches Observed?		
		0' - 2000'	2000' - 4000'	4000' - 6000'								
1	Good	Fair	Fair	Wet Loose	travel only				Wet loose slides	Natural		
2	Good	Good	Good	Dry Loose	none					None		
3	Fair	Fair	Fair	Cornice, Ice, Glide	travel only					None		
4	Good	Fair	Good	Persistent Slab	travel only; test, test + pits			Soft snow on N'erly with various wind texture and skins. Overall good quality snow. Super Mumble was very good surface faceted snow.	Lost Shots, D-1, 20 cm deep, 50' wide 100' run Facets on old snow new snow interface.	Human		
5	Good	Good	Good	Wind Slab	hand, pole, other pits			Warming on south half in the afternoon		None		
6	Good skiing on white buffalo...	Very Good	Good	Wind Slab	hand, pole, other pits					None		
7		Fair	Fair	Persistent Slab	hand, pole, other pits			Good snow with pockets of windcrust & suncrust	Skier triggered slide rollies Skier triggered slide lo 20 mile corner Surface hoar related Both approx 20 cm deep	Human		
8		Fair	Fair	Persistent Slab	travel only				My last skier triggered a small D1 off a knob in the gulley sking to the valley floor from two thousand feet. He was the sixth skier on slope. Broke about 30 feet wide, 35 cm deep and ran for about 50 feet. I assume buried surface hoar.	Human		
9	Fun day.... Skied 20,300'	Good	Good	Persistent Slab	test, test + pits					None		
10		Good	Good	Wind Slab	hand, pole, other pits			Decomposing wind board and pow in protected areas		None		
11		Good	Good	Wind Slab	travel only					None		

The iPhone as a fieldbook

Inspector Import New Name Keywords Share Email Facebook Flickr Loupe

Library Info Adjustments

Projects Date

2013 Avalanches

2013_Feb_18_1944_607892568-2

2013_Feb_18_1944_607892568-3

2013_Feb_18_1944_607892568-4

2013_2.18 Small's Wall

2013_4.11 Placer

2013_4.11 AM West Crystal

2013_4.12 East Bench

2013_4.13 North to East Bench

2013_4.13 Isthmus Recon Flight

2013_4.14 East 20 Mile

2013_4.14 PM Winner

2013_4.15 A1

2013_4.16 East 20 Mile

2013_4.18 Finger

2013_4.19 Ard landing stakes

2013 Avalanches

2013 Stitch to-dos

Run Book

2013 Media Albums

Print Albums

DENALI

IPHONE

MISCELLANEOUS

CFG

New Panorama

2013_8.26 Glacier Recon

1999_CPG

2011_CPG

2012_CPG

2013_CPG

A-1 Road Pics

so far

2013 MEDIA ALBUMS

2013 PRESEASON

2013 WEEK 1

2013 WEEK 2

2013 WEEK 3

2013 WEEK 4

2013 WEEK 5

2013 WEEK 6

2013 WEEK 7

2013 WEEK 8

2013 WEEK 9

2013 WEEK 10

2013_4.11 Placer

2013_4.11 AM West Crystal

2013_4.12 East Bench

2013_4.13 North to East Bench

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2013_4.14 East 20 Mile

2013_4.14 PM Winner

2013_4.15 A1

2013_4.16 East 20 Mile

2013_4.18 Finger

2013_4.19 Ard landing stakes

1 selected - 133 items displayed

Human Factors

- Decision-Making Review
- Incident Documentation

Decision-Making Review

USGS Ak News Weather Fx Weather Other Weather Sites Guide Daily Report Surf Fx Fall Wx Rail Wx

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Daily Report (Form File & Responses)

FORMSCENTRAL Daily Report

Design Options Test Distribute View Responses Summary Report

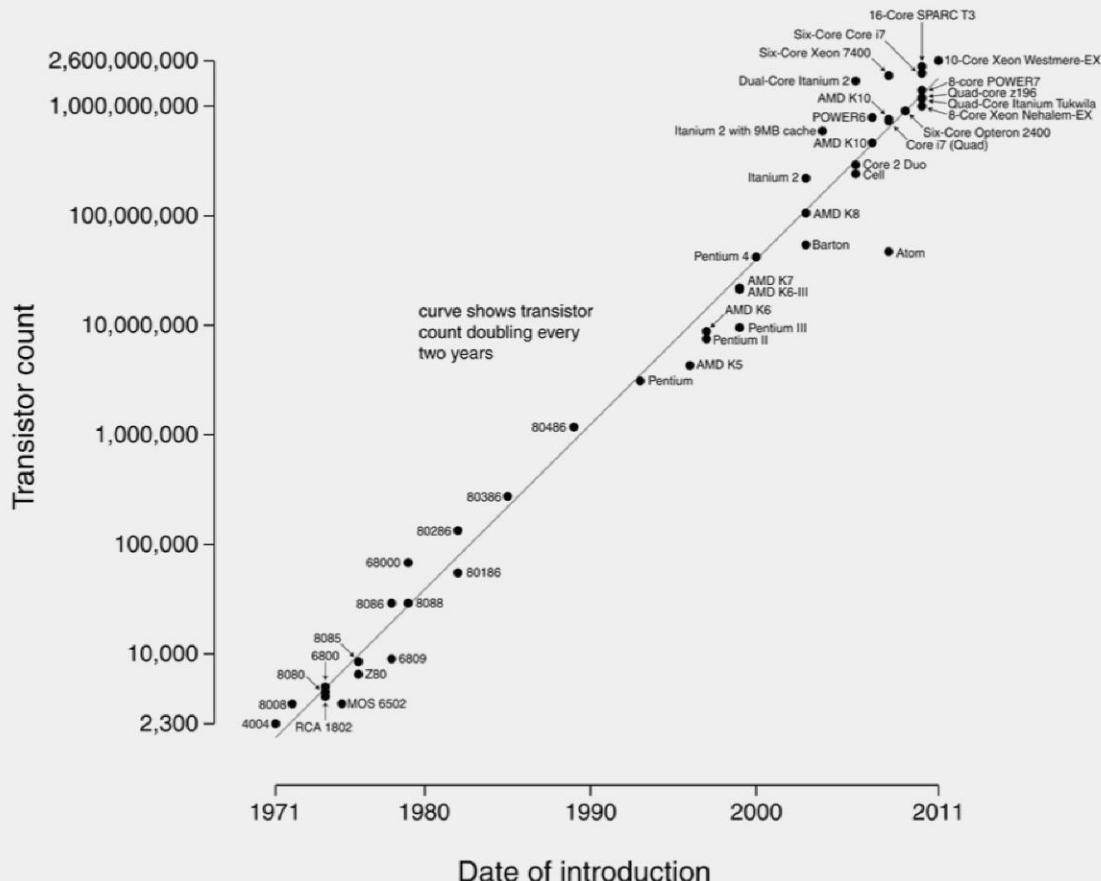
Save as Excel Save as PDF Filter Sort

All Responses Sheet1 Sheet2 Sheet3 Sheet4 +

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Discussion

Microprocessor Transistor Counts 1971-2011 & Moore's Law



Thank You

