

May 9, 2017

**Regular Meeting
Board of Supervisors**

Board Reports

May 9, 2017

Dear Supervisors:

I will be in Sacramento for work related meetings on May 16th, and will not be able to attend the workshop regarding the Sierra Center Mall. I have been working on a letter to address the Board of Supervisor's process as it relates to the South County Facility decision, a letter that I expected to send next week. However, yesterday, through your Mono County system, while doing county business, I received this despicable email (see below). I am outraged by this and feel it necessary to get my comments to you today.

As a county worker, I do not want to be a part of the circus that has become the South County Facilities "discussion." That have now been taken to the level of smear campaigns, to create a negative and false narrative, should and must be stopped. The Board has the power and the obligation to keep to a governance process that is reasonable, respectful and fact driven; as a citizen, a taxpayer, and a county employee, I ask you to stop allowing the Hill/Rudder gang to hijack the democratic process by bringing this circus into your Board room. This "cartoon," generated by someone who clearly is in the Hill/Rudder pocket, is just one example of the lengths these people will go to in an effort to disrupt what should be a thoughtful, data/fact influenced process. They are being successful with this effort, to the point where some Board members are willing to make a very important decision based on the emotional chaos that they are creating. This needs to stop.

No more aiding the anti-county people shouting false numbers into the crowd from the Dais (the "\$80 million" comment by Supervisor Johnston). No more allowing Mr. Hill to take over the process and your Boardroom to promote the shell game that allows them to delay the decision such that it plays into their best interest. No more allowing your staff and public to be subjected to office buildings that are dangerous and disgusting.

Show all of us that you trust your county negotiating team by shutting down the circus that the Hill/Rudder (and some Board members) are bringing to Mono County. Get us out of the Sierra Center Mall and into a building that is county owned and controlled. Use the facts and data that has been generated by your county staff to guide your decisions and stop being hypnotized by the Hill/Rudder trickery; you are being bamboozled, they know it, and they continue it because it is working. You owe it to all of us to stop this absurdity and move on so that we can get on with our county business, and not be harassed by the people who generate this kind of crap (in the Boardroom and through our county email); people who, repeatedly, make false promises about a building that is, literally, collapsing onto our heads.

The Hill/Rudder team, the Sheet, and those who have created this cartoon are clearly anti-county. Hill and Rudder stand to make large profits by your decision to stay at the Sierra Center Mall; do not use our tax dollars to subsidize their private, for profit business. They do not care one whit about the county's best interest. Continuing to do business with them, after all of this is, in my opinion, unconscionable.

The South County Facilities decision should never have been mixed with the lease negotiation for the SCM. That was a huge mistake. While one does prompt the other, the County has the obligation to determine what is in the best interest of its people and for the future. That the county would want to own its own facility and house its workers and invite its public/constituents into a healthy, reasonable work place is not just sensible, it's what many, many county governments do; it is the norm. To let it

dissolve into the circus that it has become is a waste of tax payer money. Please use facts and reason to make this decision. Stop undermining your staff by entertaining the shell game that Mr. Hill brings to you each and every time he stands before you; it is a tactic to create an atmosphere of doubt and it is not engaging in good faith negotiations.

Make the decision that is in the best interest of Mono County and stop lining the pockets of people who do not even live here. Mostly, stop the harassment that is being generated by these people by putting Mono County first.

Respectfully,

Robin K. Roberts



My Motto: Do It ! Ask for forgiveness later. Once approved who cares, the public is on the hook. Goody Goody we get a new office

My infill score surveys make all your dreams come true. Right Dan?

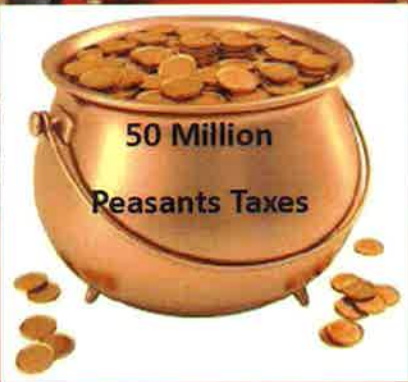
I hope they don't bring up CALPERS debt, can't hire a consultant to make up fake math on that cost!

Whatever works to get my husband promoted.

Any development growth will make my future IPO look better, got to get my puppets in line

Rusty, like the song says, "I'm your puppet"

Yep, Who cares about the peasants. I'm a big time Supl



May 9, 2017

**Regular Meeting
Board of Supervisors**

**Item #9b - Avalanche
Forecasting Program**

Sue Burak

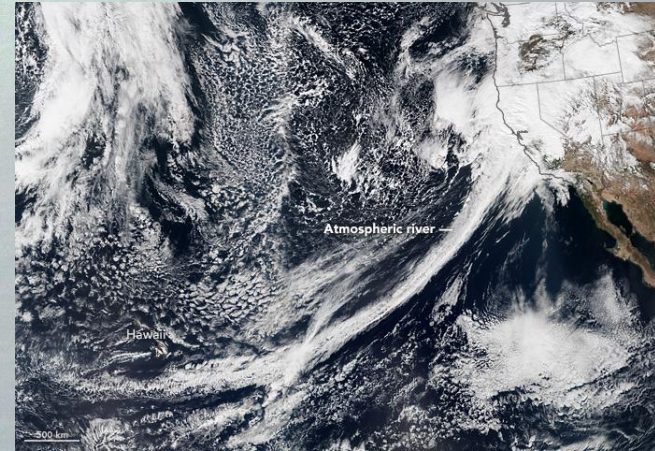
Is 13 OUR LUCKY NUMBER?

Atmospheric Rivers Bring It ON:

Big Storms and Big Avalanches in a Record

Breaking Winter


A Winter on Steroids







1000 Island Lake, March 15 2017



12-13 feet of snow

Mono Basin

Tioga Pass	10,000	May 8	190"
Ellery Lake	9,645	May 6	170"





SNOTEL site.
206 inch
snow depth
& 89 inches
of water
content.
Mt Rose
April 1 2017



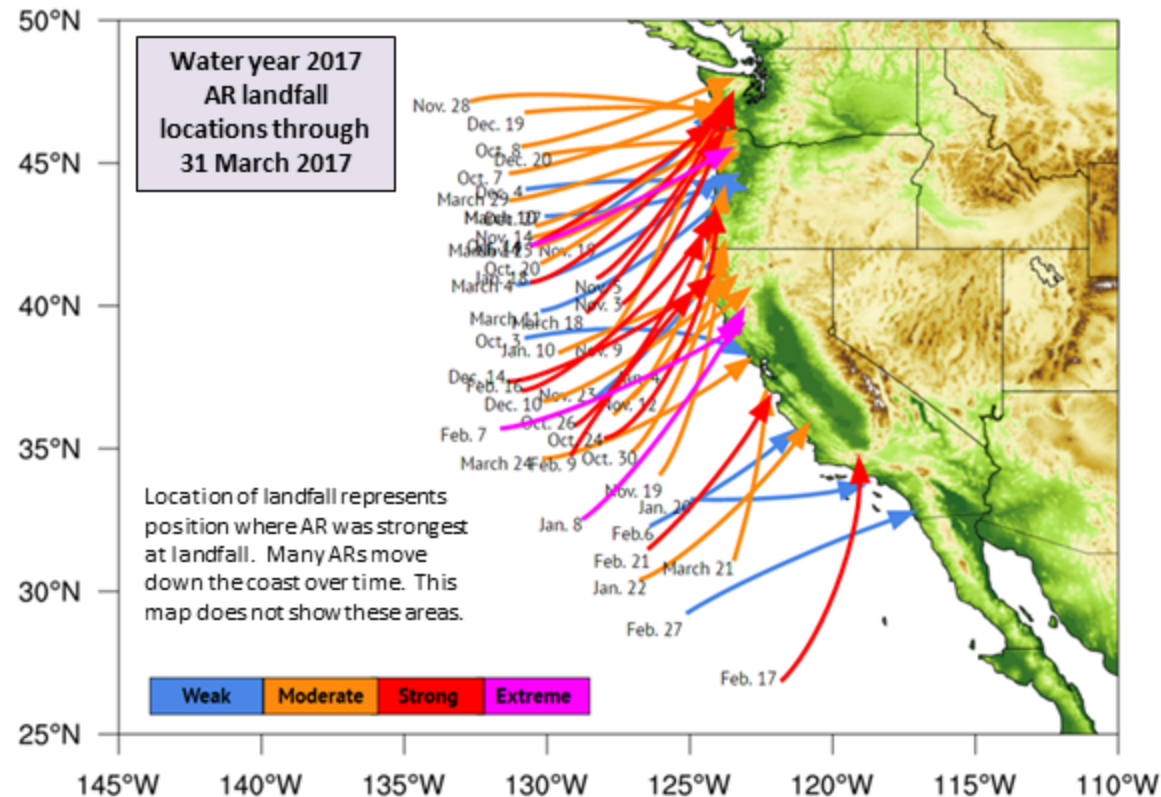
Distribution of Landfalling Atmospheric Rivers on the U.S. West Coast (From 1 Oct 2016 to 31 March 2017)

AR Strength	AR Count*
Weak	11
Moderate	20
Strong	12
Extreme	3

- 45 Atmospheric Rivers have made landfall on the West Coast thus far during the 2017 water year (1 Oct. – 31 March 2017)
- This is much greater than normal
- 1/3 of the landfalling ARs have been “strong” or “extreme”

Ralph/CW3E AR Strength Scale	
■	Weak: $IVT=250-500 \text{ kg m}^{-1} \text{ s}^{-1}$
■	Moderate: $IVT=500-750 \text{ kg m}^{-1} \text{ s}^{-1}$
■	Strong: $IVT=750-1000 \text{ kg m}^{-1} \text{ s}^{-1}$
■	Extreme: $IVT>1000 \text{ kg m}^{-1} \text{ s}^{-1}$

A strong AR transports an amount of water vapor roughly equivalent to 7.5–15 times the average flow of liquid water at the mouth of the Mississippi River.



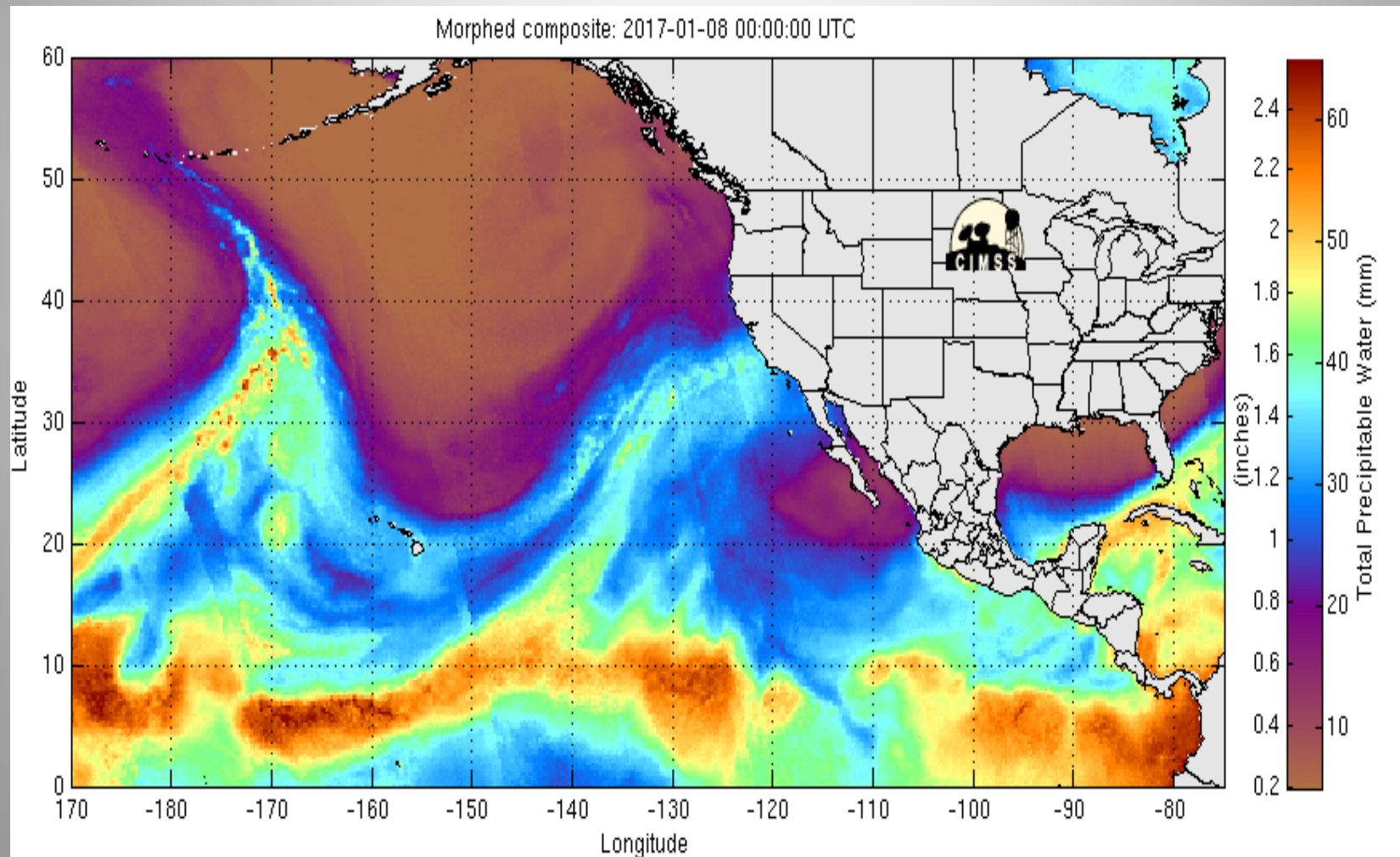
Center for Western Weather
and Water Extremes

SCRIPPS INSTITUTION OF OCEANOGRAPHY
AT UC SAN DIEGO

By F.M. Ralph, B. Kawzenuk, C. Hecht, J. Kalansky

Experimental

Primary driver of weather and climate on the West Coast and the western Great Basin at daily to millennial (1000 year) timescales: Atmospheric rivers

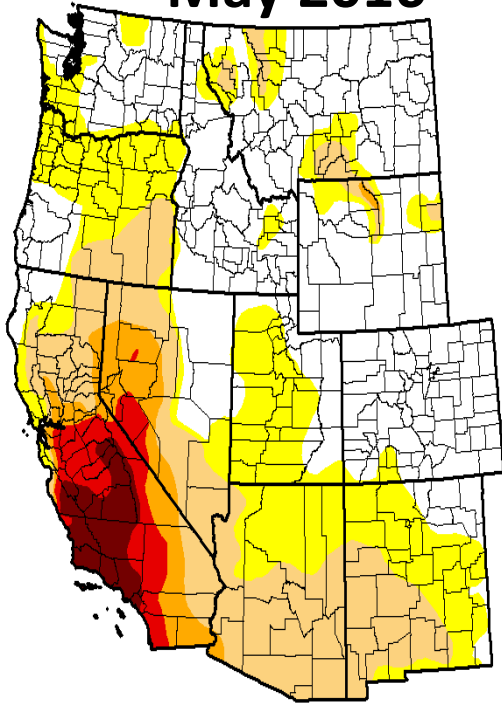


And help to end droughts!

U.S. Drought Monitor

West

May 2016

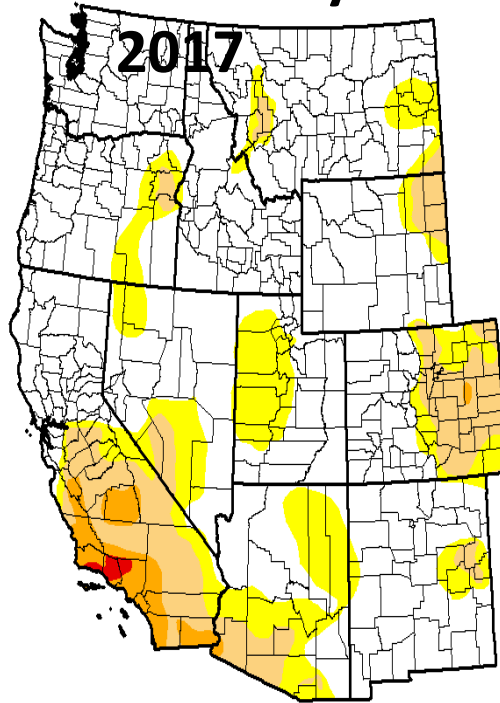


U.S. Drought Monitor

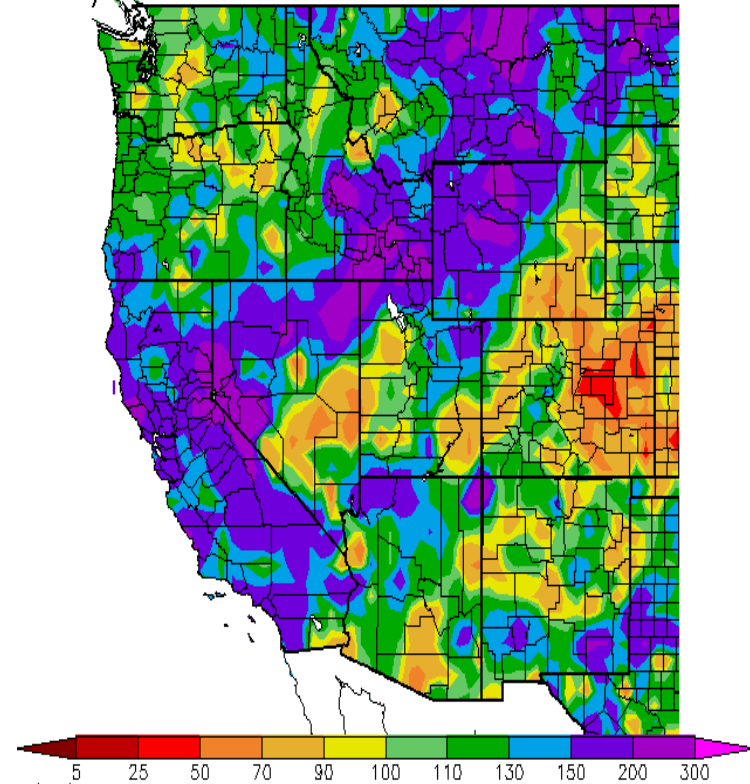
West

February

2017



Percent of Average Precipitation (%)
8/8/2016 - 2/7/2017



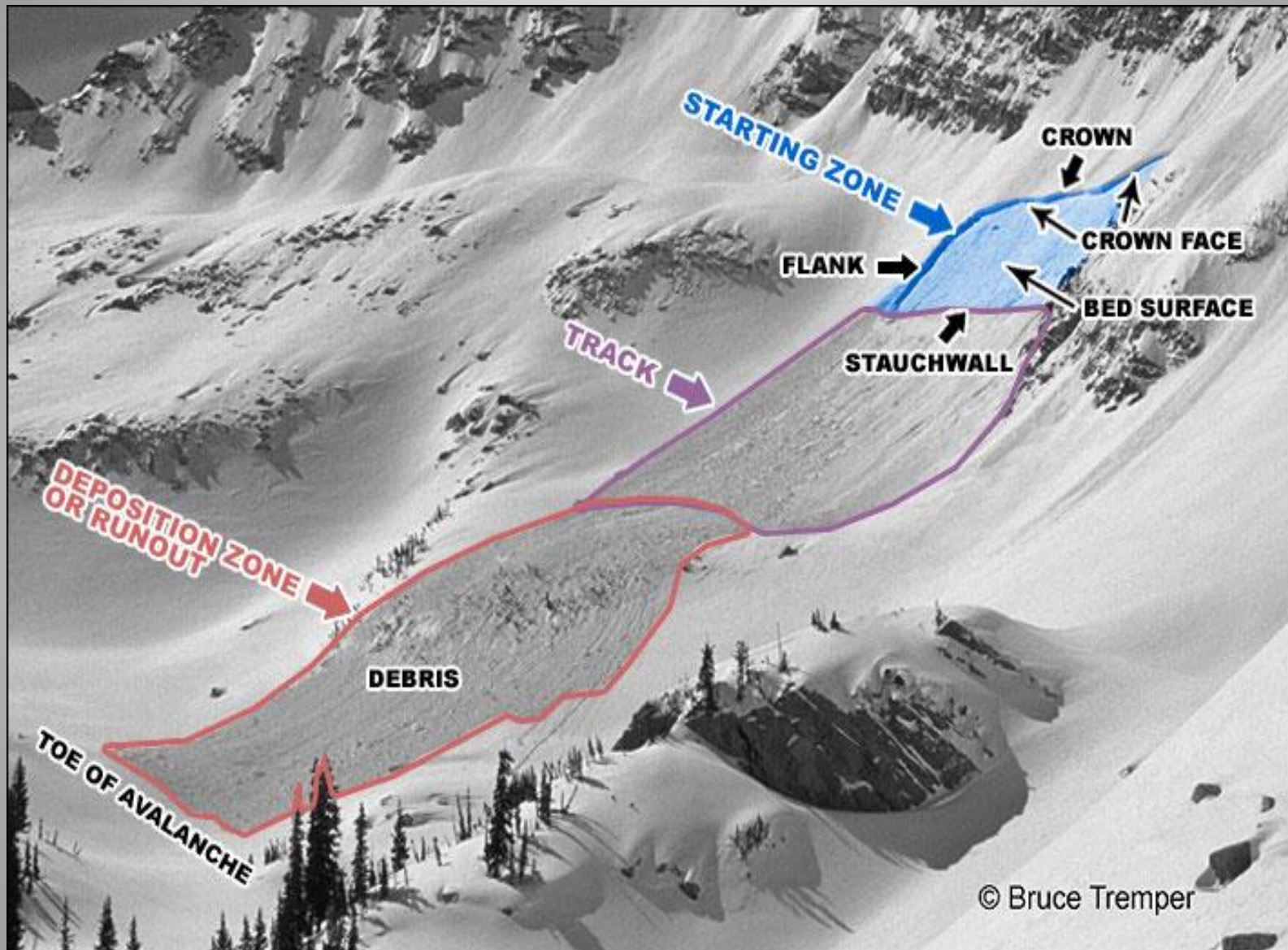
2/08/2017 at WRCC using provisional data.
National Climate Centers

Table of AR's reaching Eastern Sierra Dec 2016-April 17

DATE	AR	MMSP STORM SNOW"	3 DAY PRECIP	AVALANCHE SIZE D scale	AVALANCHE TYPE	COMMENTS
Dec.15-16 2016	strong	39.5	6.9	D3, D4	Wind slab storm slab	Rain to ~9K- Dec 15 rain layer. Early winter depth hoar, cold Christmas, *****powder skiing
Jan. 4-5	Strong winter storm	42.5	6.6	D2,D3, D4 (Rock Cr, MMSA)	Wind slab Storm slab	Cold, depth hoar Rock Cr, Bishop Creek. Wet slabs collapse on DH, S. Fork Bishop Creek
Jan. 7-9	Extreme	32.5	7.66	D1, D2, D3	Wind slabs McGee, Wet slabs Aspendell	Rain On Snow Sub tropics giveth and the subtropics taketh away
Jan. 10-13	Strong	66.5	6.85	Mainline, McCoy's D3	Wind slab storm slab cornice fall	Convection, I-80 closed NWS Blizzard warning
Jan. 20-23	Mod	72	7.5	D3's McGee	Wind slab, storm slab Cornice falls	MMSA Summit Anemometer ends up in NV, WS McGee on Jan 21*

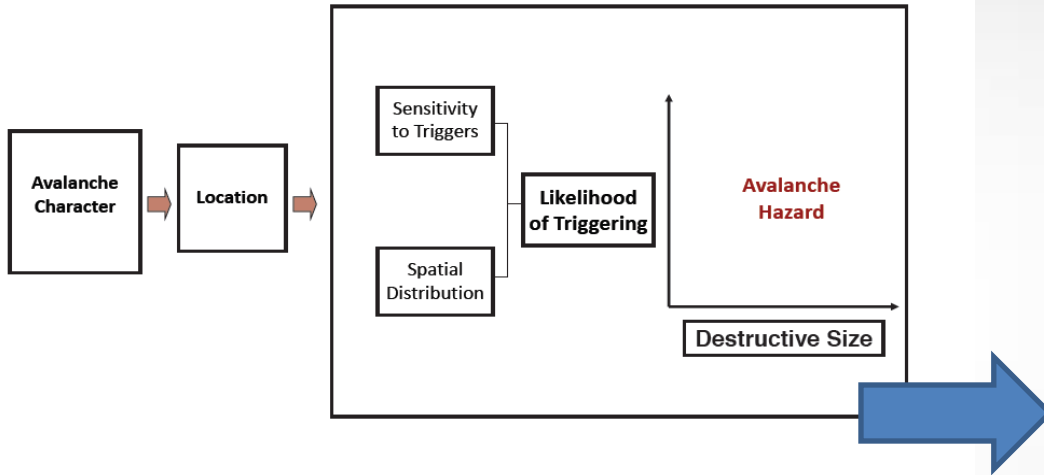
3 AR's Widespread avalanche cycle. South Fork (except main path), Aspendell, Swall, nr (no results) Narrows

Date	AR	MMSP storm snow,"	3 DAY precip	Avalanche size D scale	Avalanche Type	COMMENTS
Feb 6-11, 3 ARs	Weak, extreme strong	68	10.8	D1, D2, D3	Wind , storm slabs, wet loose, wet slab, dry to wet, mixed debris flows	ROS, 3" MMSP. The Sub tropics giveth and taketh away. Oroville in the news. All McGee paths run. Pl's 0.2 to 0.3"/hr. Temps fall during storm, D2's cross road to RC Lodge into campgrounds (again)
Feb 16-17	Strong	38	2.8	D2	Wind slab	Southerly flow, cross loading South Fork Colder storm , "easier to shovel snow" Very little wind, *** skiing
Feb 20-23	strong	42.5	7.2	D2, D3	Wind slab, Wet slab Long running dry snow, wet snow avas.	Trailer Park D3. Rain on snow- again. Storm melting the snowpack high rates. D3 on Sunset, June Mtn, wet slab Silver Lk, large avalanches Pine Creek.
March 25	Weak	11	1.1	D1's	Dry loose	
Apr 7-9	Strong	43.5	7.1	D1, D2, D3	Wind slab, Wet loose 3 days after event	Rain to 9,000-9,500 ft. ROS, flooding OVER IT!



AVALANCHE HAZARD EVALUATION WILL IT REACH THE ROAD?

Avalanche Hazard Evaluation



Scale

Spatial Scale

Narrows
McGee
Swall
Twin Lakes

Temporal Scale

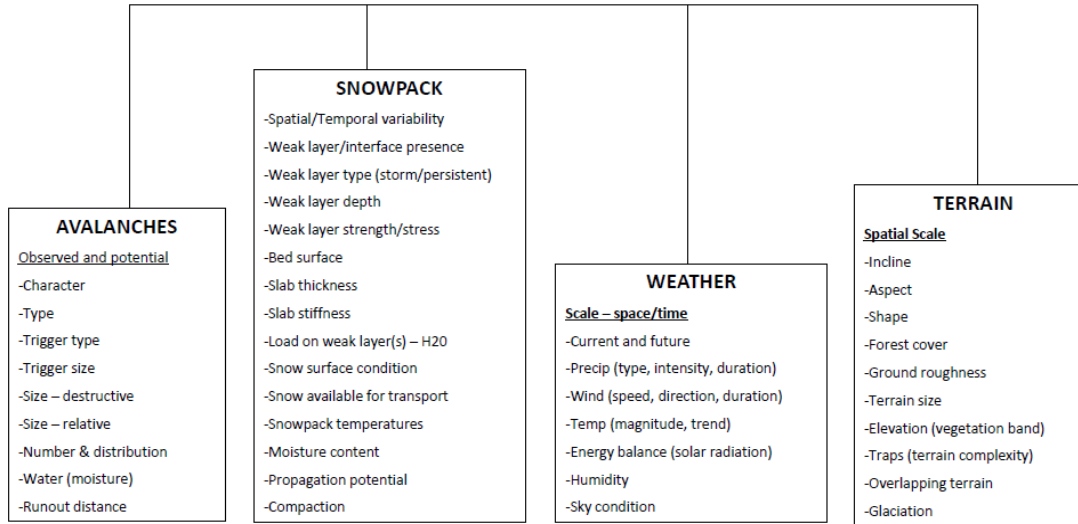
Hours
Days



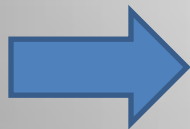
Evidence and Data

Avalanche hazard factors (examples of commonly used factors)

The strength and weight given to these factors is a judgemental assessment with no hierarchy of data type



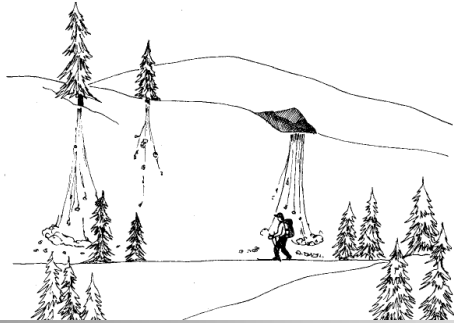
Likelihood of
Natural triggering
Almost Certain
Likely
Possible
Unlikely
Very Unlikely



Destructive Size	Avalanche destructive potential (definition)	Typical mass	Typical impact pressure	Typical path length
1	Relatively harmless to people.	<10 t	1 kPa	10 m
2	Could bury, injure, or kill a person.	10 ² t	10 kPa	100 m
3	Could bury and destroy a car, damage a truck, destroy a wood frame house, or break a few trees.	10 ³ t	100 kPa	1000 m
4	Could destroy a railway car, large truck, several buildings, or a forest area of approximately 4 hectares.	10 ⁴ t	500 kPa	2000 m
5	Largest snow avalanche known. Could destroy a village or a forest area of approximately 40 hectares.	10 ⁵ t	1000 kPa	3000 m

Size 1 Avalanche

Relatively harmless to people



Typically:

- Mass: 10 tonnes
- Run: 10 meters
- Force: 1 kilopascal

Size 2 Avalanche

Could bury, injure or kill a person

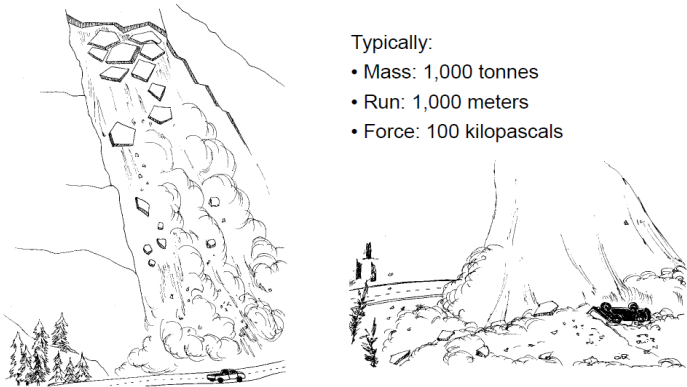


Typically:

- Mass: 100 tonnes
- Run: 100 meters
- Force: 10 kilopascals

Size 3 Avalanche

Could bury or destroy a car, damage a truck, destroy a wood frame house or break a few trees



Typically:

- Mass: 1,000 tonnes
- Run: 1,000 meters
- Force: 100 kilopascals

Destructive Force

D1	Relatively harmless Approximate path length: 33 ft (10 m)
D2	Could bury, injure, or kill a person Approximate path length: 330 ft (100 m)
D3	Could bury and destroy a car, damage a truck, destroy a wood frame house or break a few trees Approximate path length: 3,300 ft, 0.6 miles (1,000 m)
D4	Could destroy a railway car, large truck, several buildings, or a substantial amount of forest Approximate path length: 6,600 ft, 1.25 mi (2,000 m)
D5	Could gouge the landscape Approximate path length: 9,900 ft, 1.9 mi (3,000 m)

The COMET Program & Jim Woodmencey

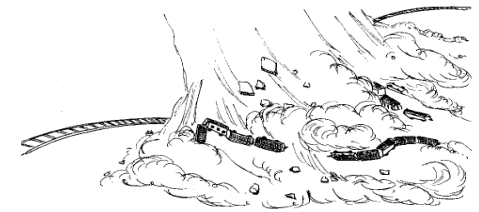
Size 4 Avalanches

Could destroy a railway car, large truck, several buildings or up to 4 hectares of forest.



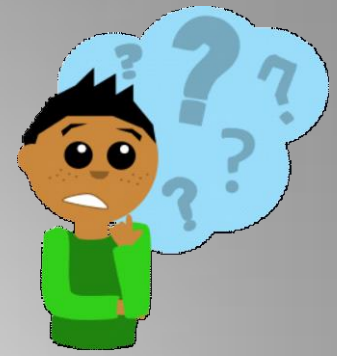
Typically:

- Mass: 10,000 tonnes
- Run: 2,000 meters
- Force: 500 kilopascals



SOURCES OF UNCERTAINTY

“Nothing is for certain, it could always go wrong”



Snowpack

Weather and Climate





☑ **Break Friday!** – Will be chilly. Use it wisely for snow cleanup, preparations for weekend atmospheric river (AR) and flooding.

☑ **High Risk of Flooding Sun-Mon** – Simulations have been consistent showing **intense series of AR's** Sat-Mon. Initial wintry mix Saturday with snow, rain, or freezing rain in Sierra and W Nevada. Warming rapidly with torrential rains Sat night into early Mon. **Widespread flooding including rivers almost certain. One of the most favorable flood scenarios we've seen in years.** Turning back to mountain snow Monday. Another AR mid/late next week????



weather.gov/reno

Reno National Weather Service
Forecasting for the Sierra and western Nevada since 1905



2



☑ **Big Mountain Snow, Wind Tuesday/Wednesday** – Nearly continuous snow in Sierra through Wed, with a **surge of intense snow Tues eve into Wed morning. Blizzard** conditions possible with increasing avalanche hazard. Strong winds W Nev during same timeframe – turbulence, travel impacts on wind prone roads, tree falls and localized power outages due to wet ground.

Dry snow avalanches

Avalanche Type	Wind Slab, Storm slab Avalanches	McGee, Narrows, Swall, Aspendell, South Fork Rd.
What causes them?	Caused by putting too much additional stress on the snowpack	Wind loading Cornice drops
How do they involve people?	Natural releases onto roadway or into communities	Road crew, public traveling on roads, residents
What are the contributing weather factors?	Loading of wind drifted snow or loading of new snow	Snowfall rates of > 2" per hour for at least 12 hours
How do they flow?	Snow slab disaggregates into small fragments, slides, flows and can be airborne.	Fast (80->100 mph or so) usually with a powder cloud

Wet loose, wet slab snow avalanches

Location	McGee Mtn (3 paths) Narrows, Rock Creek, Swall Mdws, Twin Lakes, Bridgeport
What causes them?	Rain on Snow Strong sun, nights do not freeze for more than 3 days Very unpredictable
How do they involve people?	Road crew, public traveling on roads, residents
What are the contributing weather factors?	Strong spring sun Warm nights (warming climate) Rain on Snow- immediate instability
How do they flow?	Slow around 20-40 mph or less
Special case	Glide Avalanches

Jan. 4-5	Strong winter storm	42.5" Snowfall MMSP	6.6" precipitation	D2,D3, D4 (Rock Cr, MMSA)	Wind slab Storm slab	Cold, depth hoar Rock Cr, Bishop Creek. Wet slabs collapse on DH, S. Fork Bishop Creek
----------	---------------------	---------------------	--------------------	---------------------------	----------------------	--

January 4-5 winter storm



Rock Creek Jan 4-5



The Narrows



Jan. 20-23

Mod

72

7.5

D3's McGee

Wind slab,
storm slab
Cornice falls

MMSA Summit Anemometer ends up in NV,
WS D4 Mainline ~10 PM Jan 22
Widespread avalanche cycle Eastern Sierra

January 20-23





**Mainline
Avalanche Path
McGee
Mountain
January 21 2017**

Starting Zone

Track

Runout zone



Mainline Avalanche Path

January 26 2017





Impact pressures
385-500 kPa
8,000-10,000 psf



Height of snow “plastered” on house: 11 ft.
Calculated impact pressure at home $\sim 2\text{kPa}$ (42 lbs per square ft).

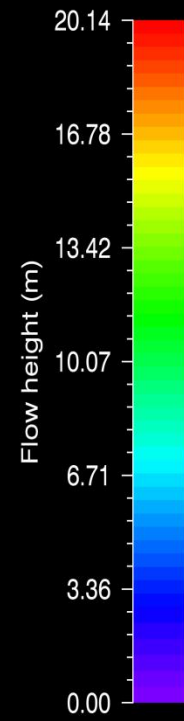
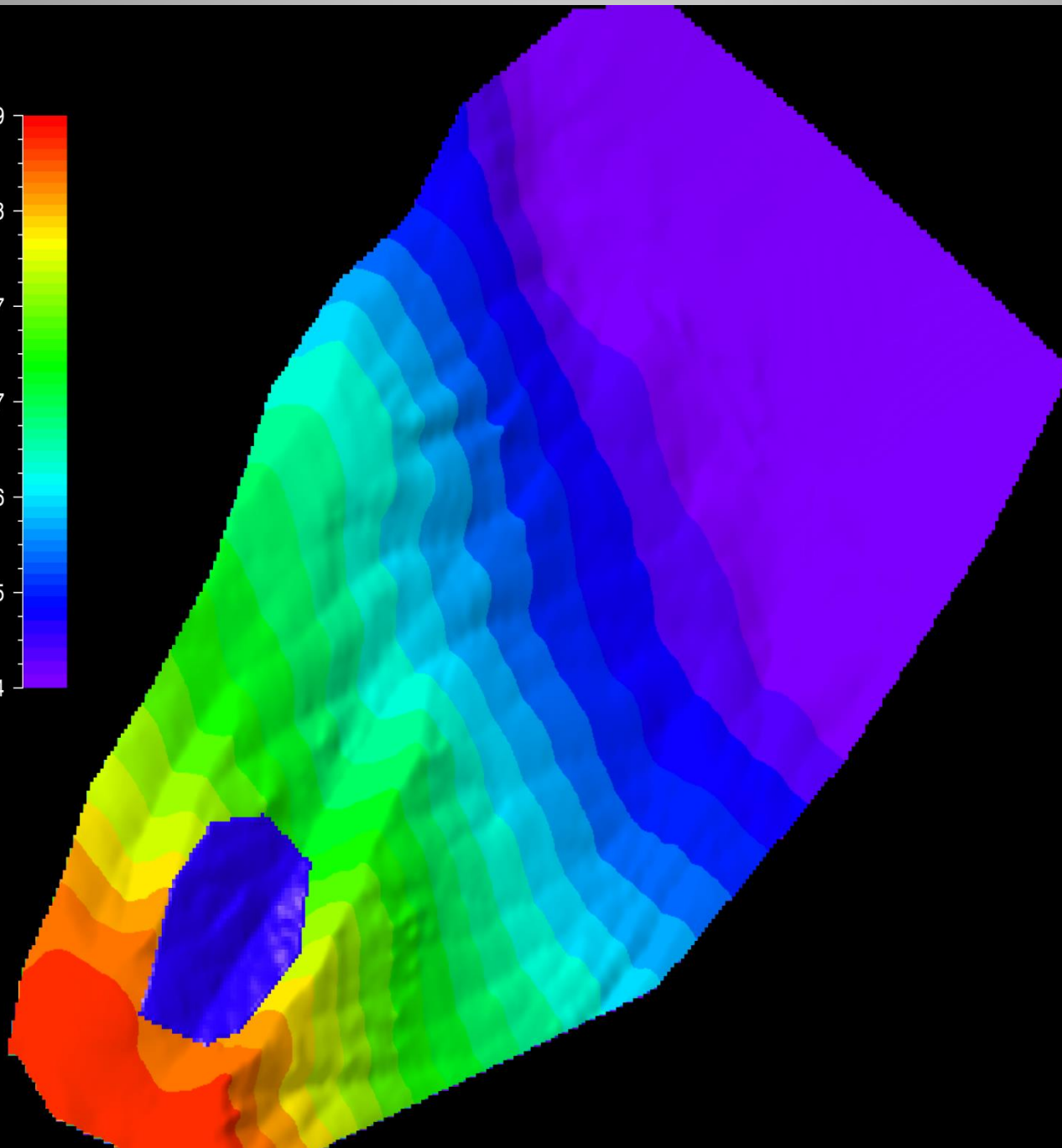
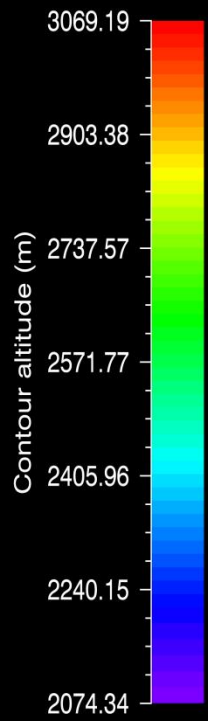
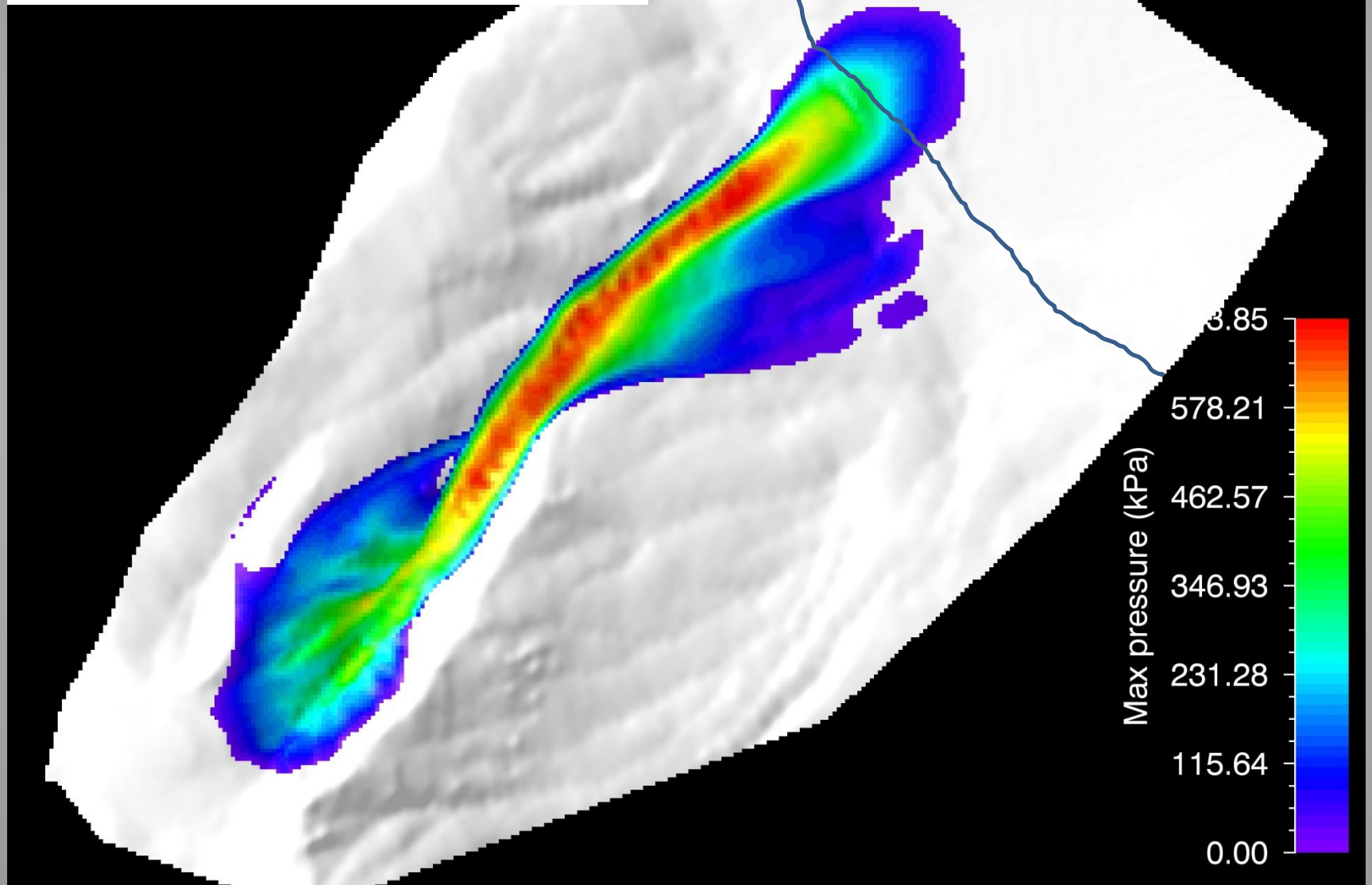


Table 5.1: Avalanche impact pressures and corresponding examples of potential damage (Perla and Martinelli, 1976; Mears, 1992).

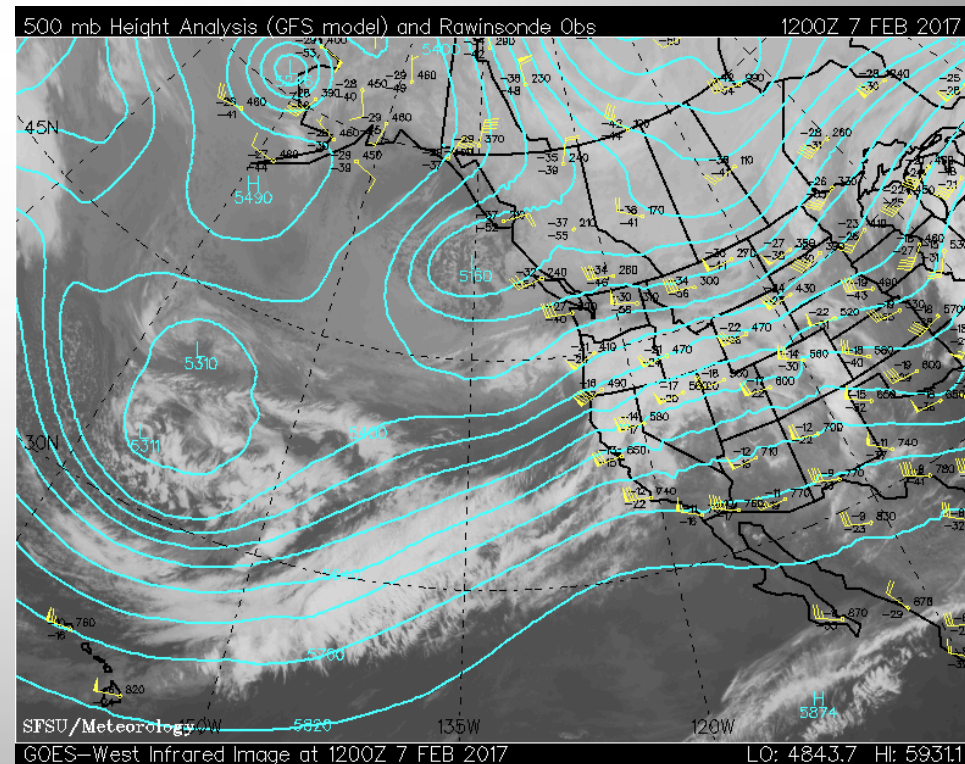
Impact pressure (kPa)	Potential damages
1	Breaks windows
5	Pushes in doors
30	Destroys wood-frame structures
100	Uproots mature spruce
1000	Moves reinforced concrete structures



Feb 6-11, 3 ARs	Weak, extreme strong	68	10.8	D1, D2, D3	Wind , storm slabs, wet loose, wet slab, dry to wet, mixed debris flows	ROS, 3" MMSP. The Sub tropics giveth and taketh away. Oroville in the news. All McGee paths run PI's 0.2 to 0.3"/hr. Temps fall during storm D2's cross road to RC Lodge into campgrounds (again)
-----------------	----------------------	----	------	------------	---	---

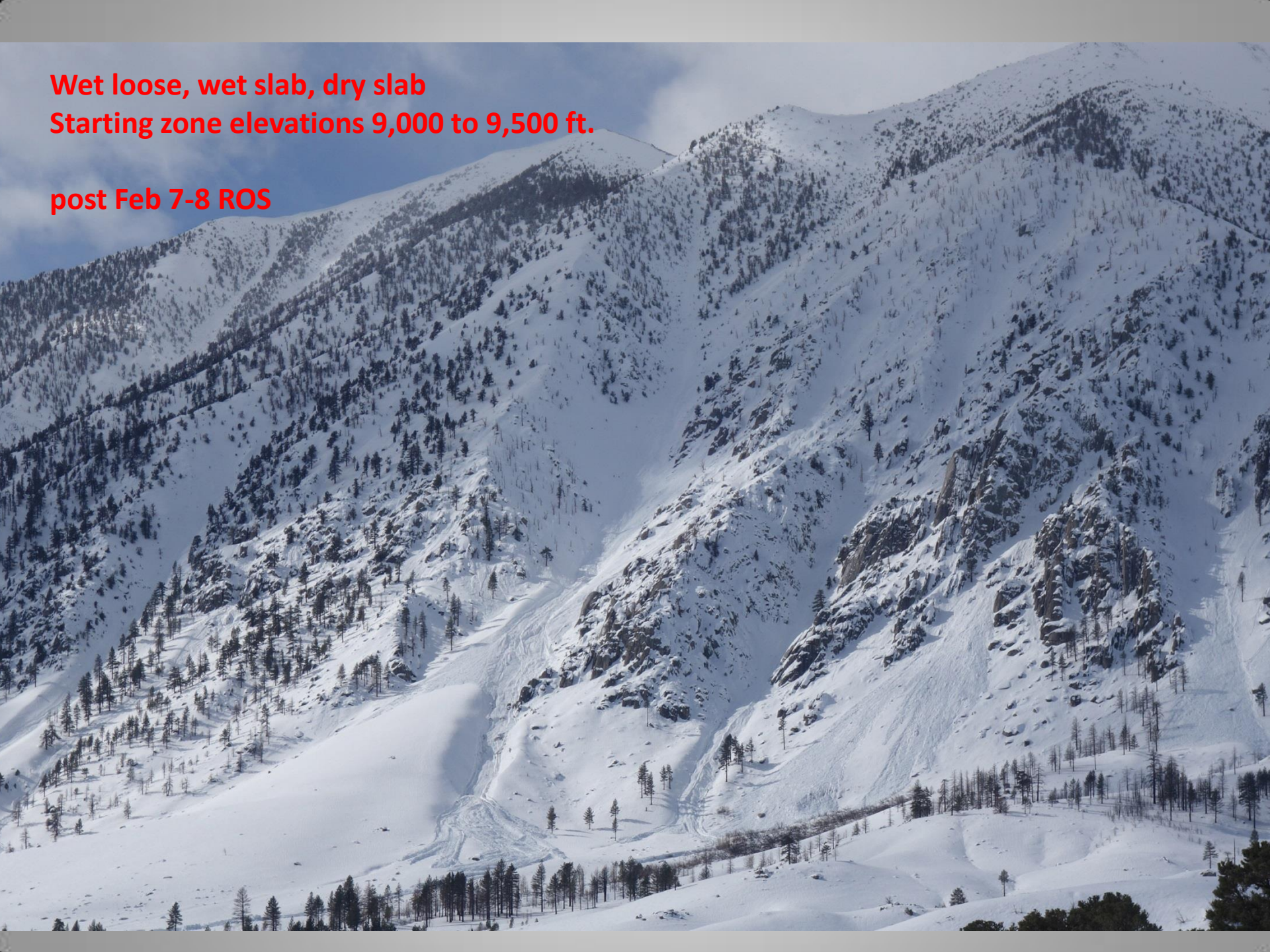
February 6-11

- McGee- wind slabs avalanches entrained wet snow as dry slab flowed downslope into rain affected snow.
- Swall, numerous wet point releases, D1, D2's First widespread Rain on Snow event Rain to 10,000 ft.



Wet loose, wet slab, dry slab
Starting zone elevations 9,000 to 9,500 ft.

post Feb 7-8 ROS



Whaatt? It's going to RAIN to 10,000 ft????





Rain on Snow

The funny business begins

Rain adds water to dry snow

Flow fingers form to transport water to any significant capillary barrier while the storm snow is still a dry slab.

Water runs along the capillary barrier, strength goes to ~nil and wet slabs can occur.



SNOW

RAIN

Feb
1986

3170 ft

Google earth





The funny business
Wet slab avalanches

Feb 20-23

strong

42.5

7.2

D2, D3

Wind slab,
Wet slab Long
running dry
snow, wet
snow avas.

Trailer Park D3. Rain on snow- again.
Storm melting the snowpack high rates.
D3 on Sunset, June Mtn, wet slab Silver Lk,
D4's Pine Creek.

February 20-23



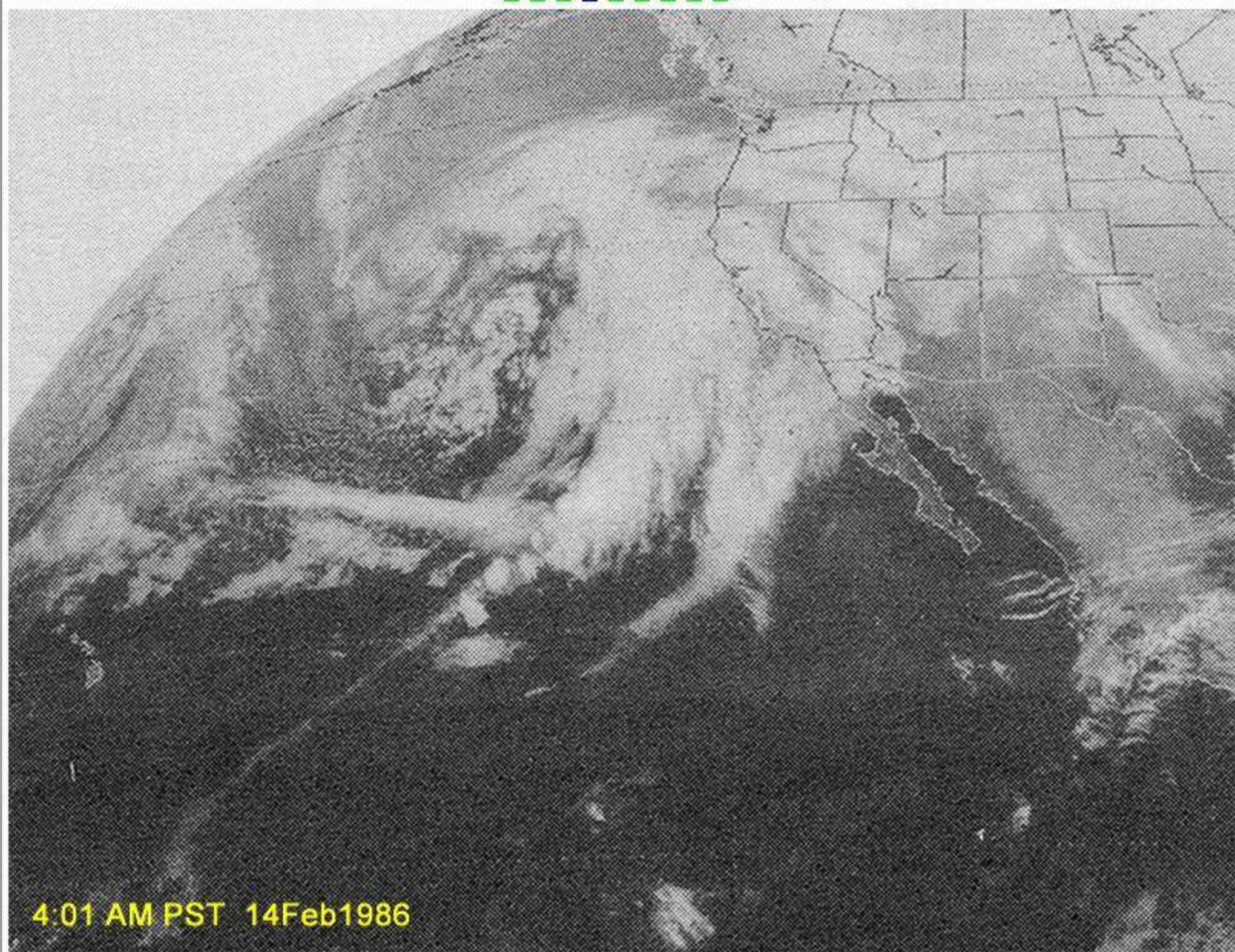


Rock Creek Road February 24 2017









Summary

- Never trust long range seasonal forecasts
- Be prepared for extreme weather that causes relentless loading of the snowpack
- Snowlines, freezing levels can be +/- 1,000 ft *higher* or lower than forecasts

Thank you Brett McCurry and Jeff Walters!



QUESTIONS?



