

**Donner Pass in California:
An Examination of Extreme Weather
& The Potential Effects of Climate
Change on Traffic Safety**

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Climate Change and Traffic Safety

- Will Climate Change Greatly Affect Safety?
- Background
- Profile of 50km of Roadway in California
 - Snowfall
 - Crashes
- Climate Simulations
- Future Prediction

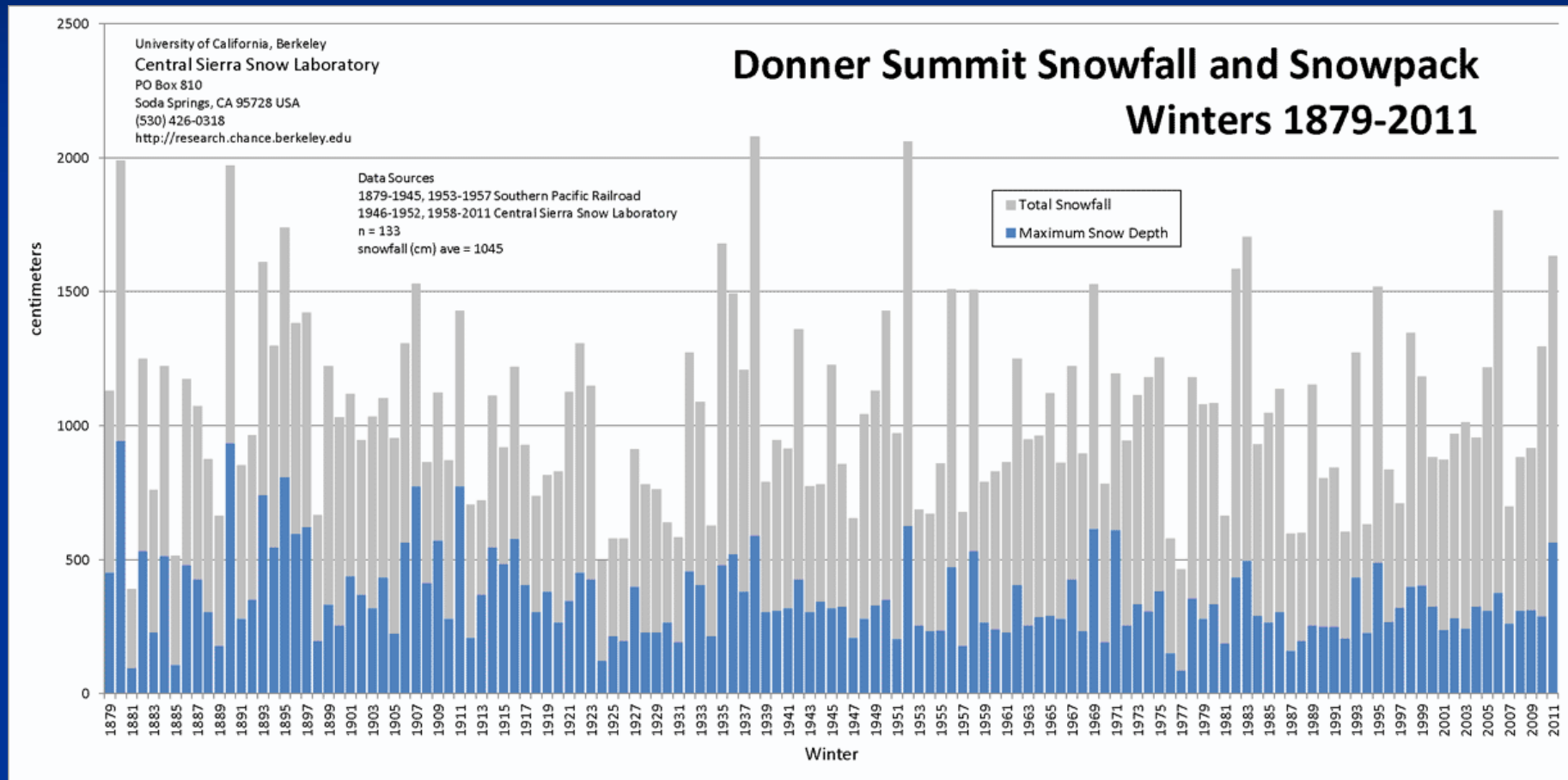


(photo credit: GTspirit.com)

Literature Background

- Snow is extremely dangerous with unfamiliar drivers
 - PDO Crashes Way Up (5-6x)
 - Injury Depends on Familiarity, familiar drivers slow down
- Dramatic Improvements over 20-30 years (unlike in rain)
- UK study predicts fewer crashes with climate change
- Prior literature with this level of snowfall (> 1000cm) is very limited

Location: Donner Pass, California



1987-2013 Mean = 928 cm, Standard Deviation of 286 cm

Incidents vs. Crashes

- “Crashes” require Property Damage (but not injury)
- Everything else is an “incident”
 - Spinout
 - Breakdown
 - Chain malfunction
 - Snowpack issue
 - Anything that requires a response from California Highway Patrol that is not a crash

Incidents and Crashes November 1 – April 31

1987-2013 Average per Storm

	Clear	Rain	0-5cm	5-10cm	10-25cm	25-50cm	50+
Incident Average	2.1	2.4	4.6	7.2	10.0	16.8	23.6
Crash Average	0.5	0.8	1.5	2.1	3.0	4.2	5.0

Climate Change Predictions for Northern California

■ IPCC Scenarios

■ B1

- Carbon Expansion to 2050, 2000=2100

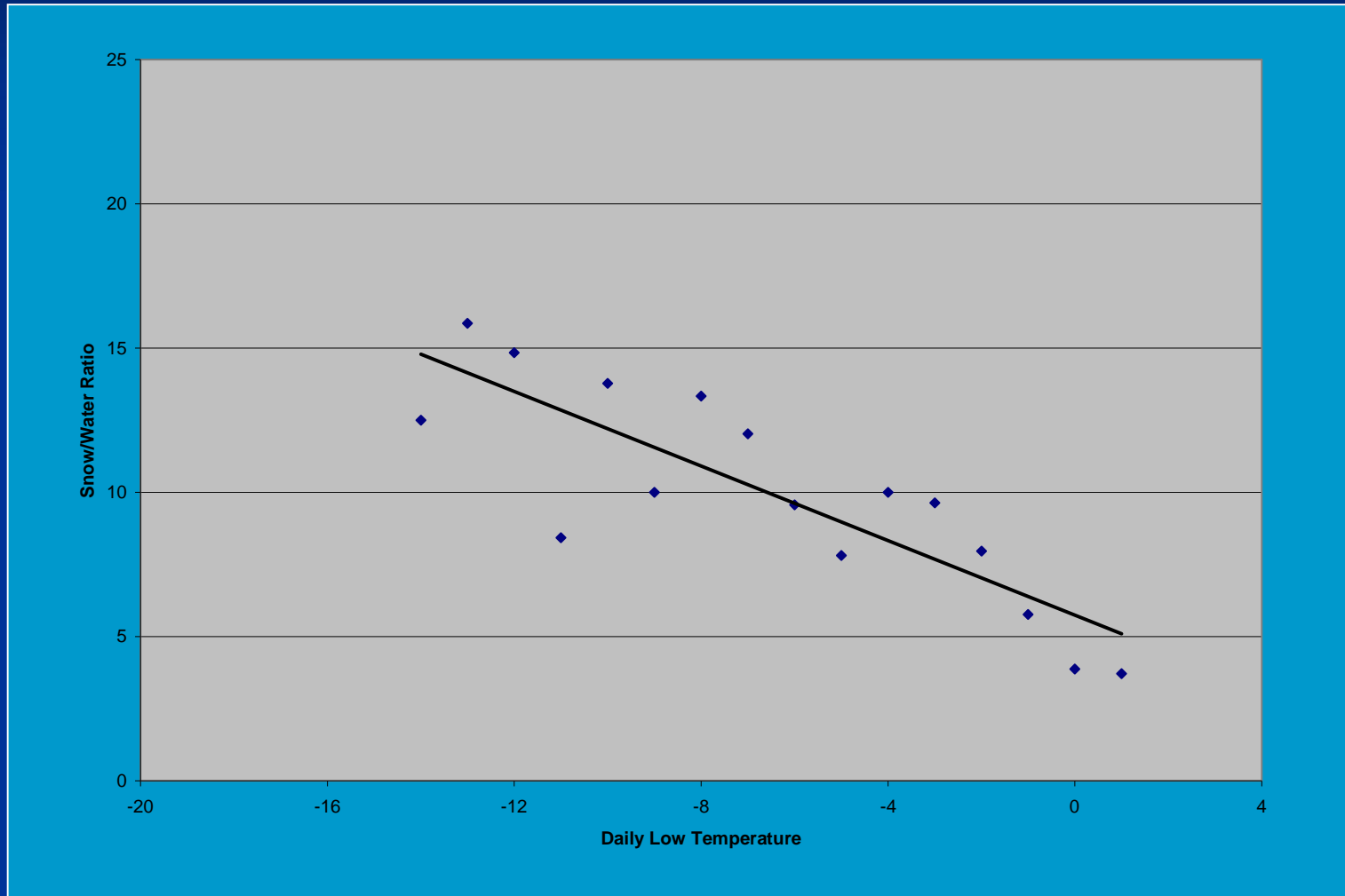
■ A2

- No Curbs on Carbon
- Developing World increase outpaces drop in Developed World

■ No change in precipitation

Deg C Increase	Mid-Century	End of Century
B1	+1.3	+2.0
A2	+2.25	+2.85

Method: Snow / Water Ratio



Regression of 10-25cm Storms

Findings

	Snowfall	Incidents	Crashes
Baseline	928.5	724.3	175.5
B1 Scenario	830.0 -10.7%	694.5 -4.1%	170.0 -3.1%
A2 Worst-Case Scenario	711.2 -23.4%	642.7 -11.3%	160.2 -8.8%

Discussion

- Incident and Crash Reduction due to reduced snowfall somewhat offset by rainy days
 - Costs to emergency services will not decrease
- Other Influences not considered
 - Question of volume decrease due to decline of winter sports industry
 - Storm track due to climate change
 - Decreased costs from winter maintenance