Understanding the role of avalanches in southeast Alaska

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Research Motivation

1) *Quantify the regional and path-specific frequency of large magnitude avalanches that impact infrastructure in and around the City and Borough of Juneau (CBJ).*

2) *Identify relationships between synoptic weather patterns and/or teleconnections (ENSO, PDO...) and the incidence of large magnitude avalanches.*

3) *Improve numerical modeling of avalanche runout zones for key CBJ avalanche paths.*

4) *Improve our understanding of how avalanches impact forest structure and wildlife habitat.*

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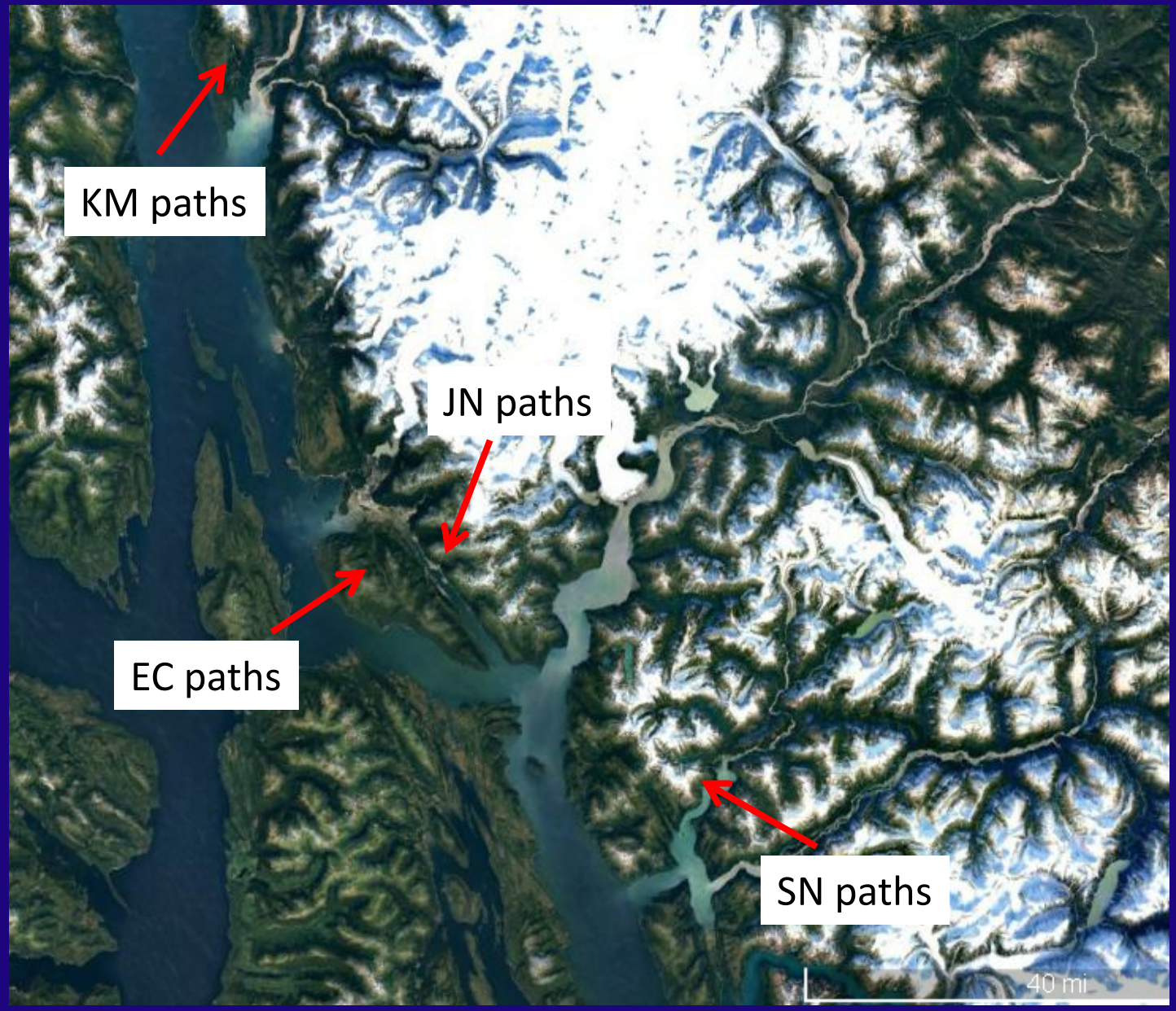
Study Site



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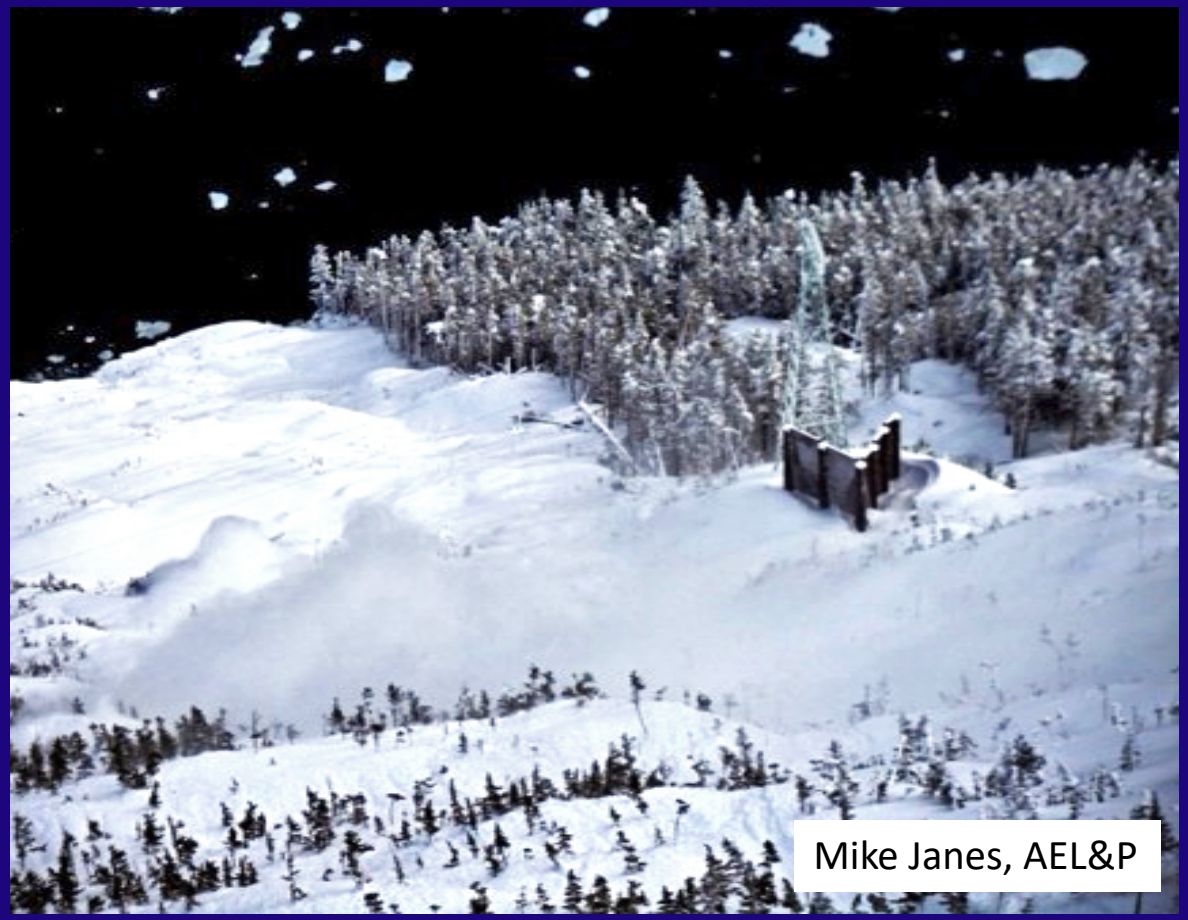
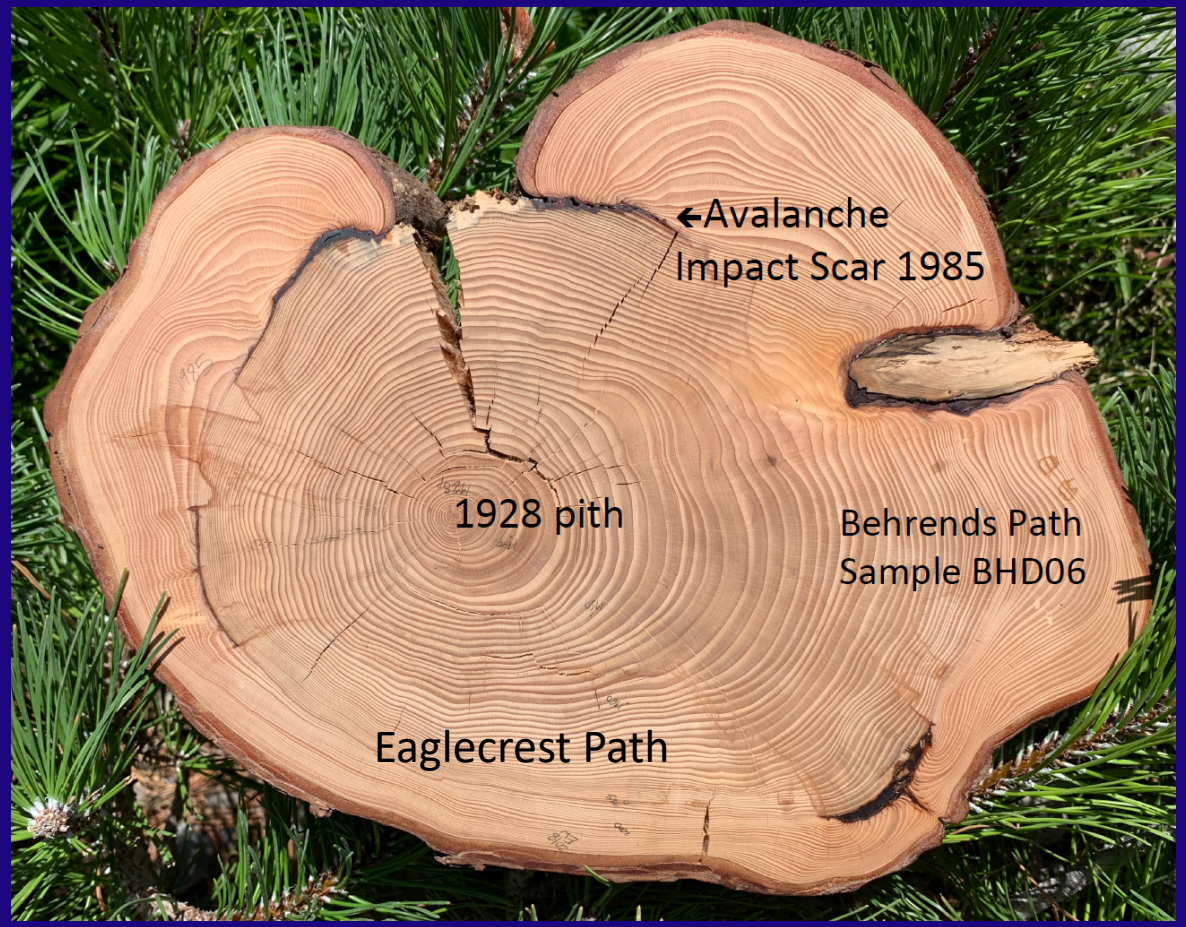


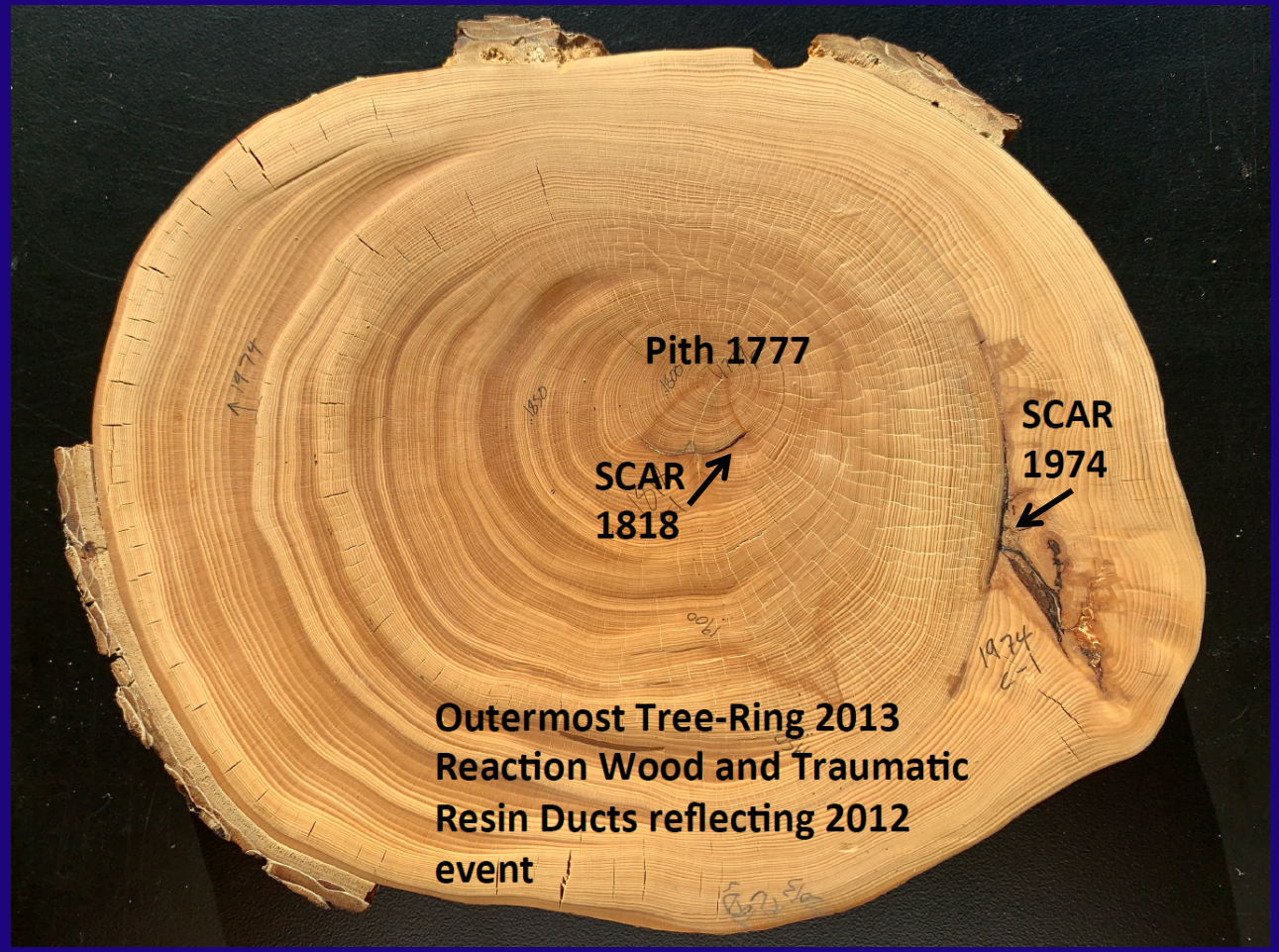
Mike Janes, AEL&P

Jamie Pierce, Kensington

Field Sampling: Dendrochronology

Using tree rings to fingerprint avalanche activity



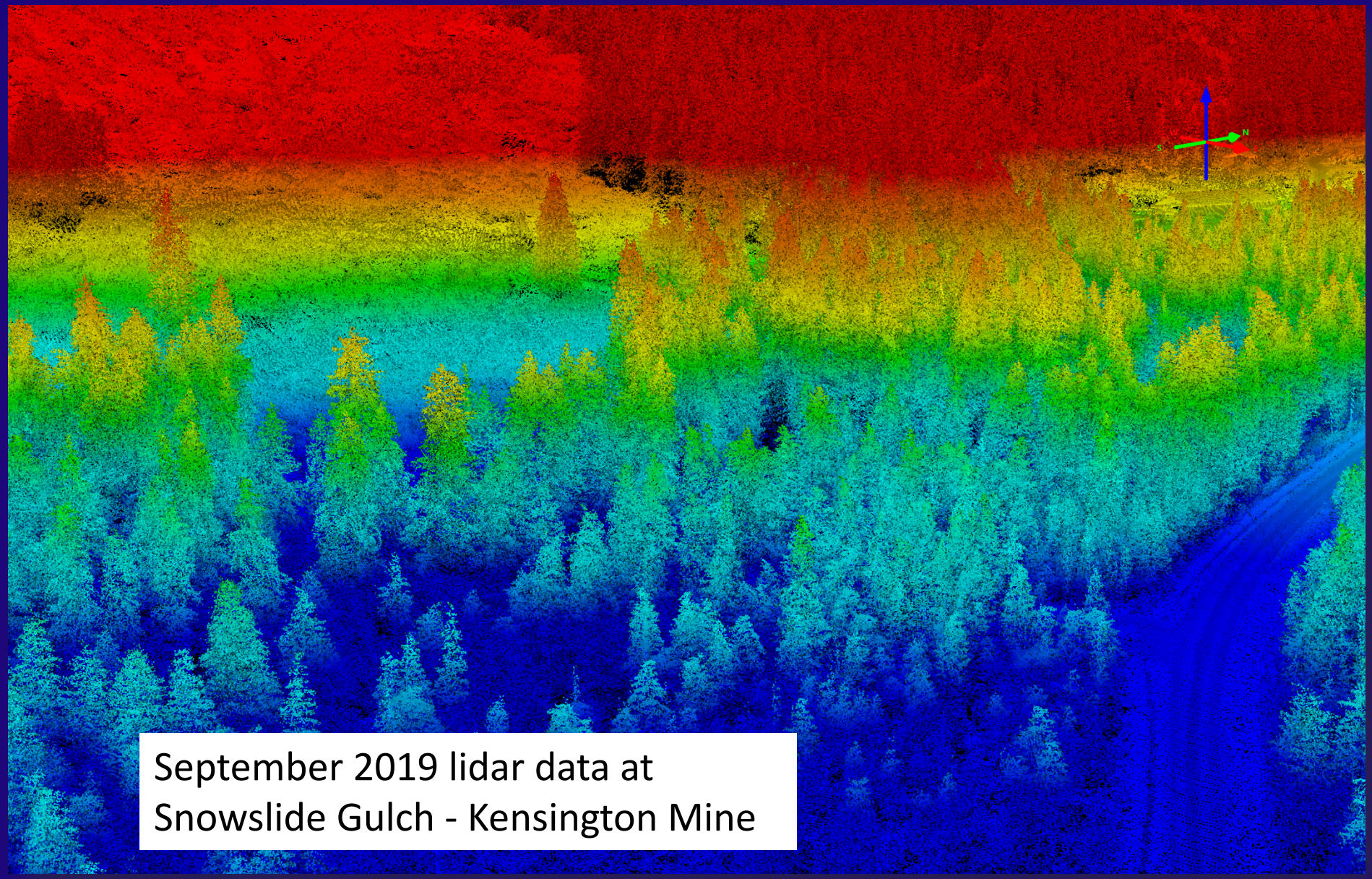


Field Sampling: Lidar Surveys

Lidar data

- Bare earth DEMs for snow mapping

- Forest structure and regeneration rates



September 2019 lidar data at Snowslide Gulch - Kensington Mine

Data Analysis: Dendrochronology

Samples by Year

Total # of responses (growth disturbances): **2304 (647 samples)**

Oldest response: **163**

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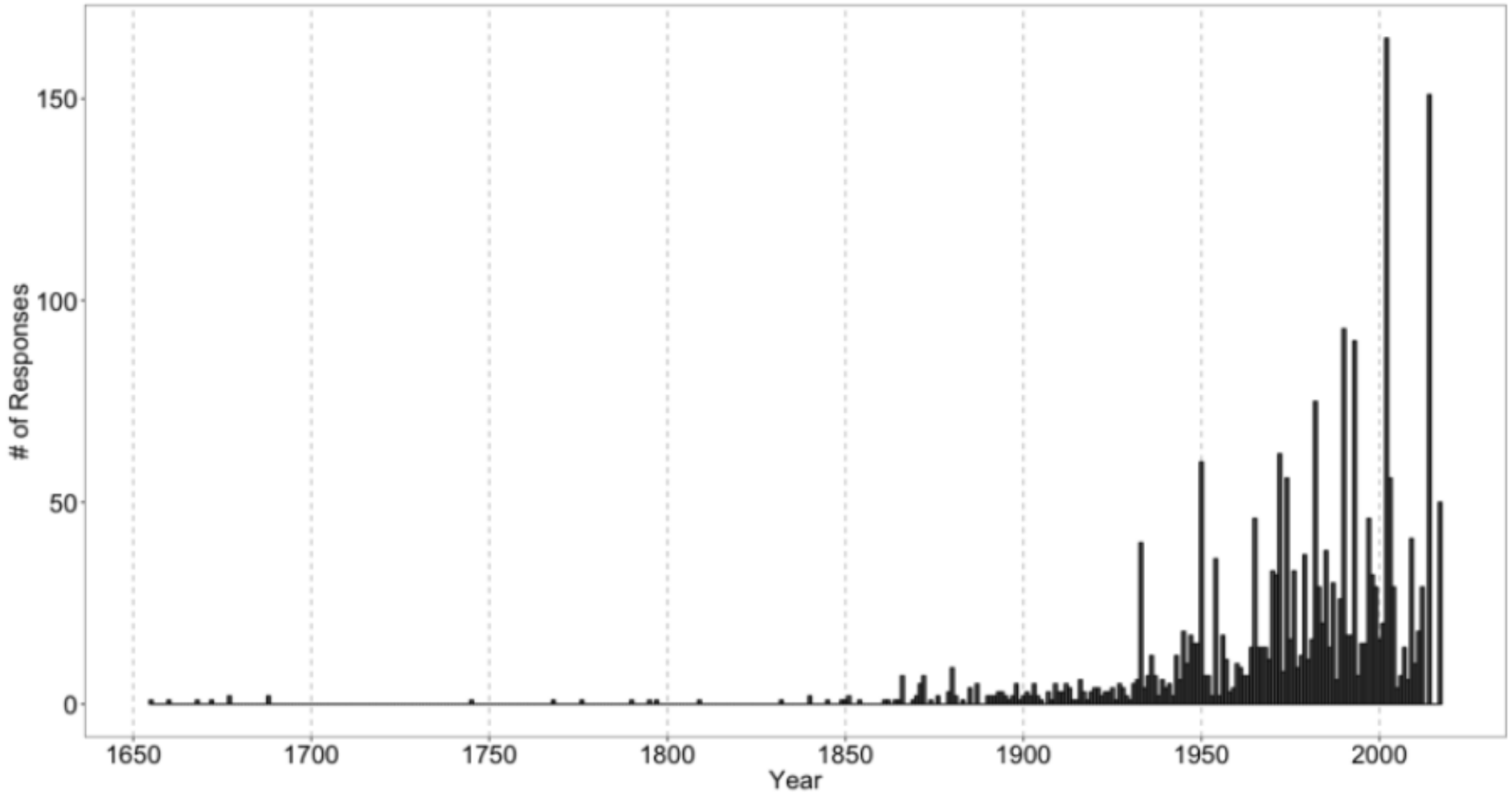
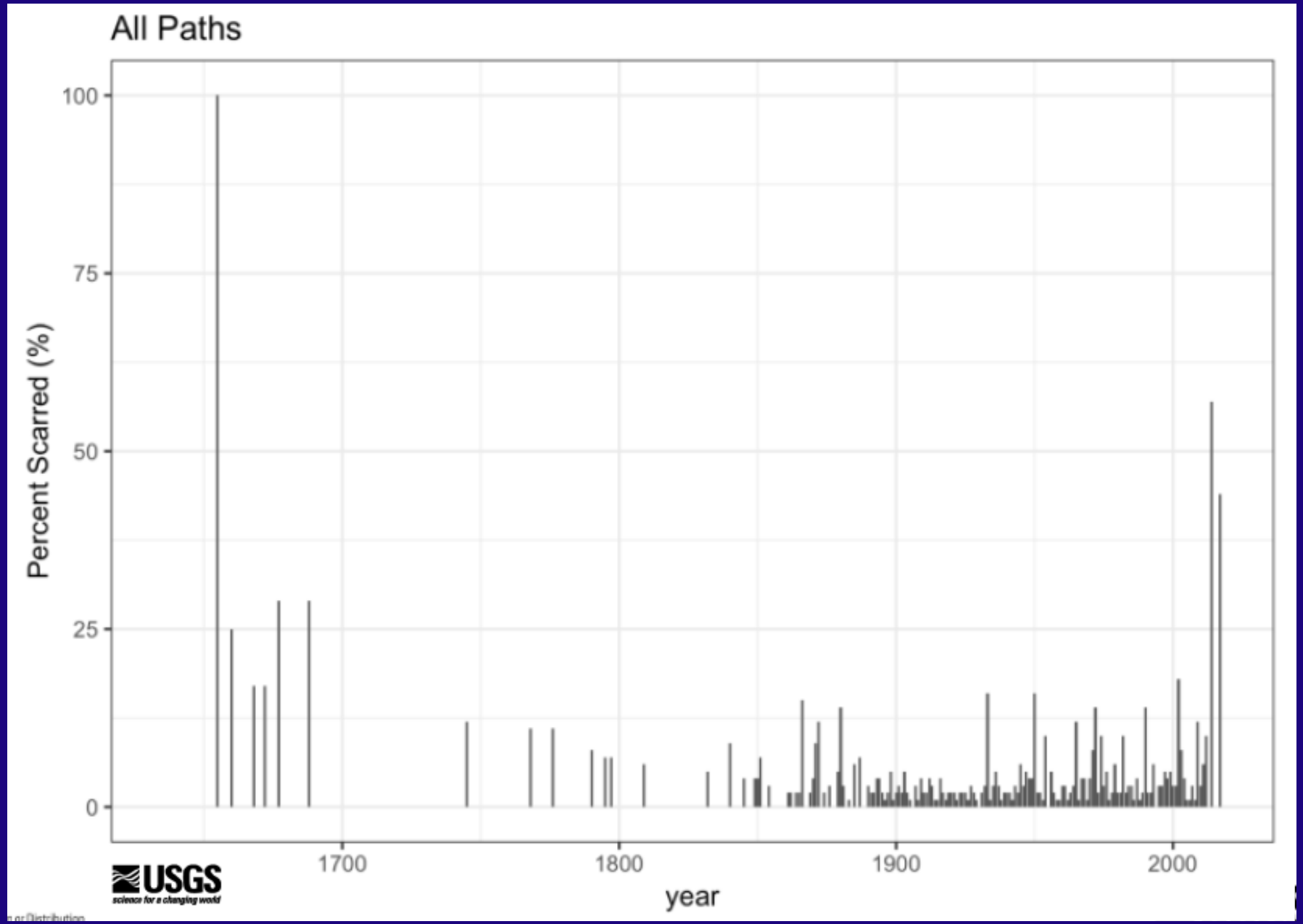
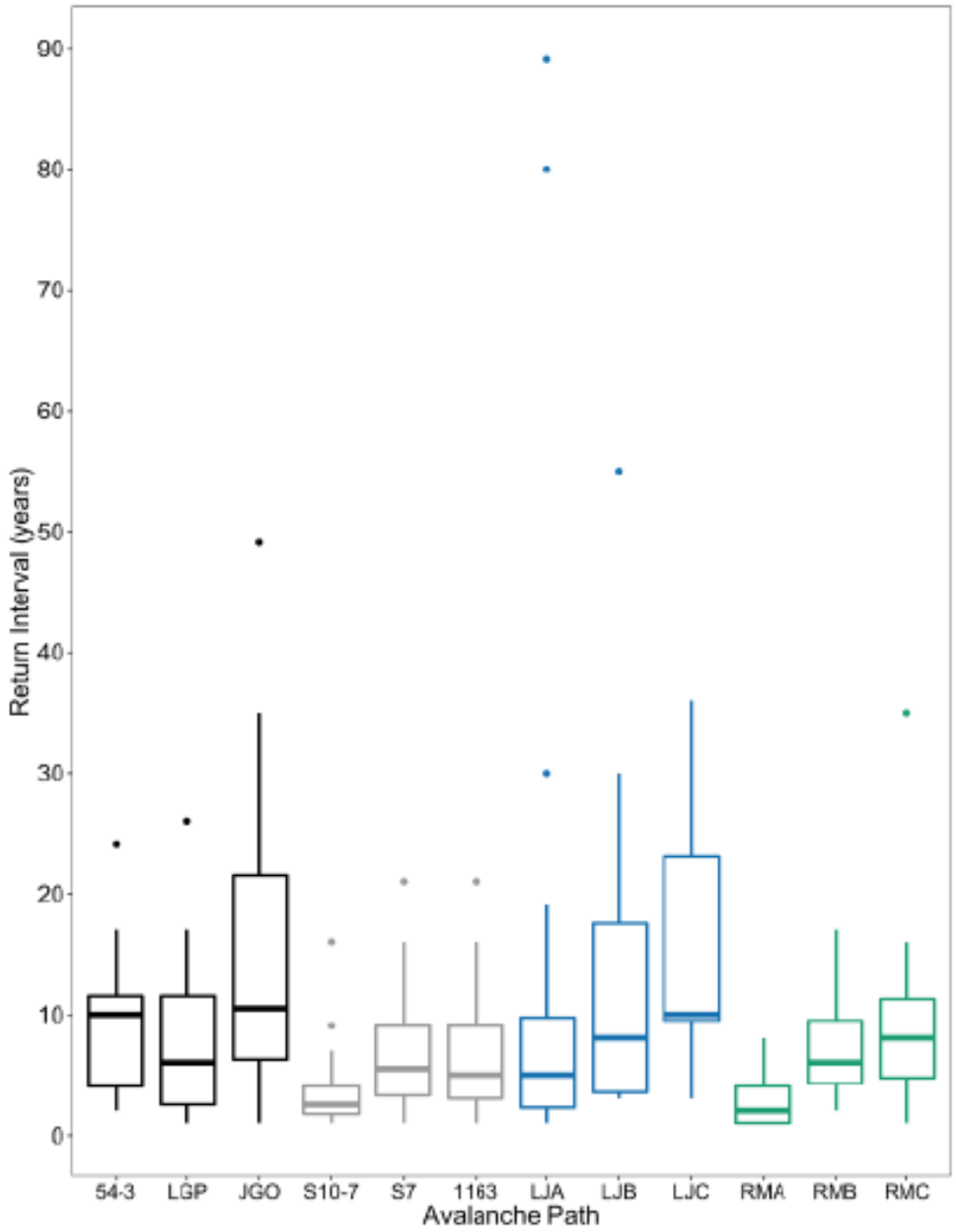




Notable years:

1933
1950
1971
1982
2002
2003
2014

Mean return interval of regional large magnitude avalanche = **8.4** years



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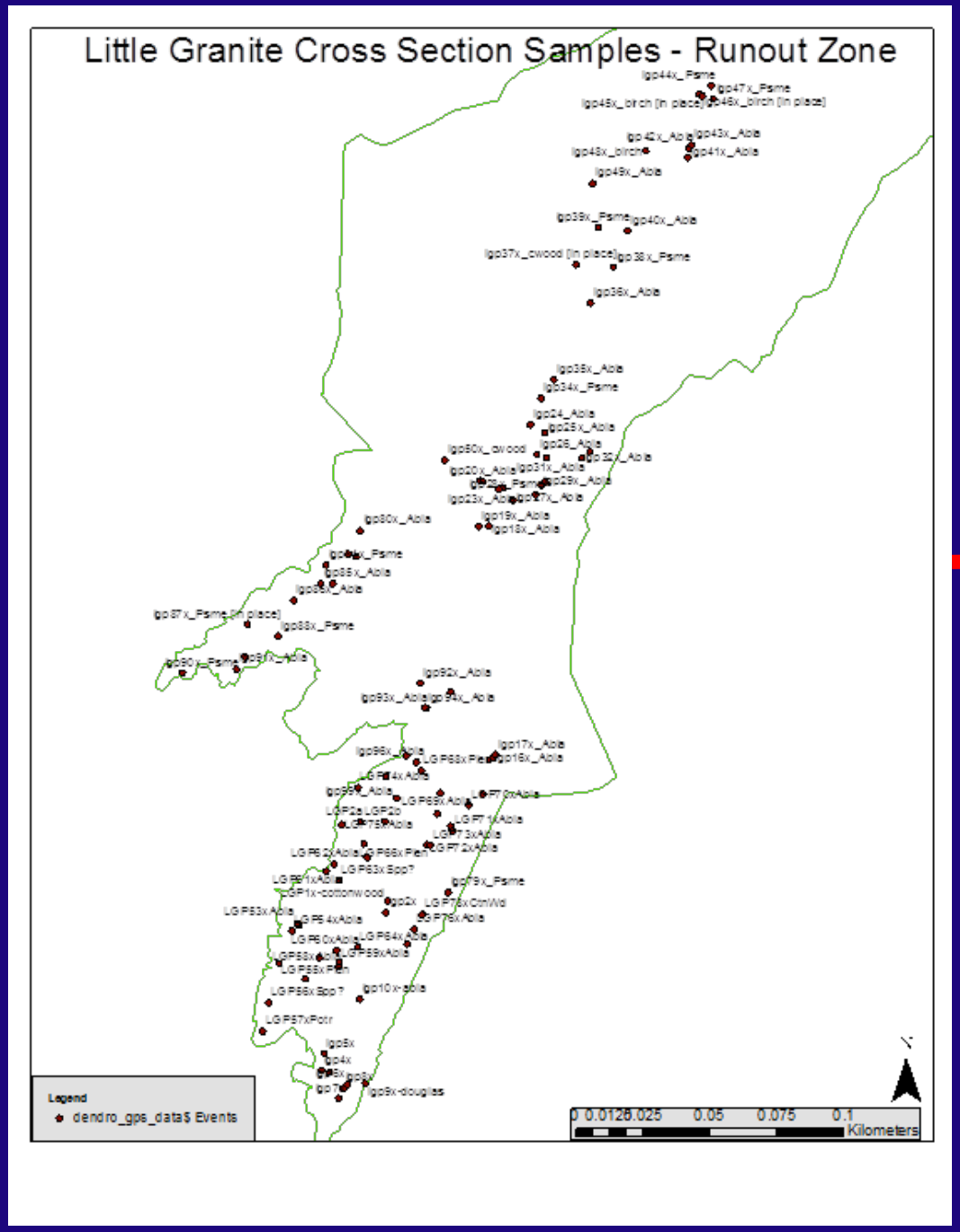
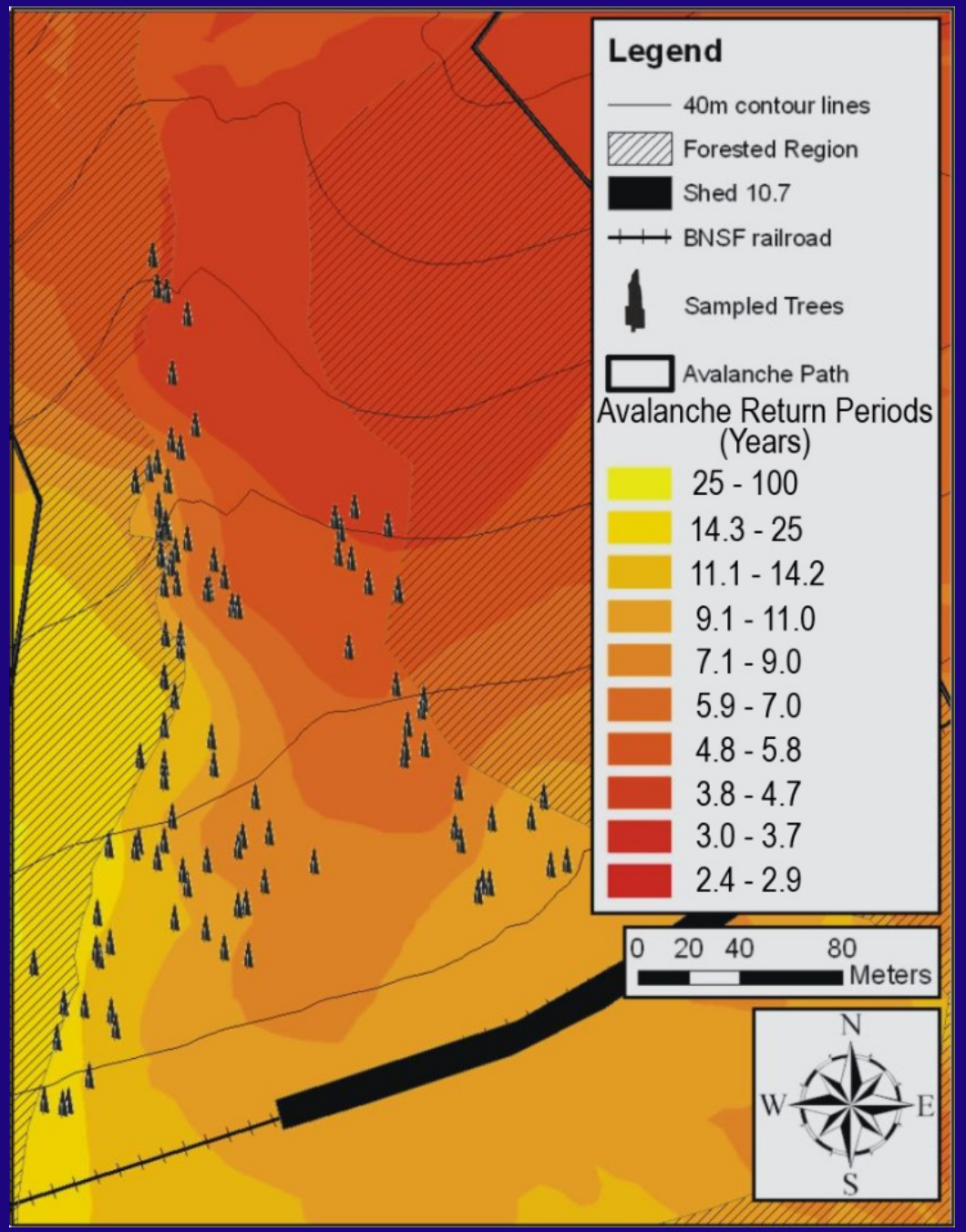
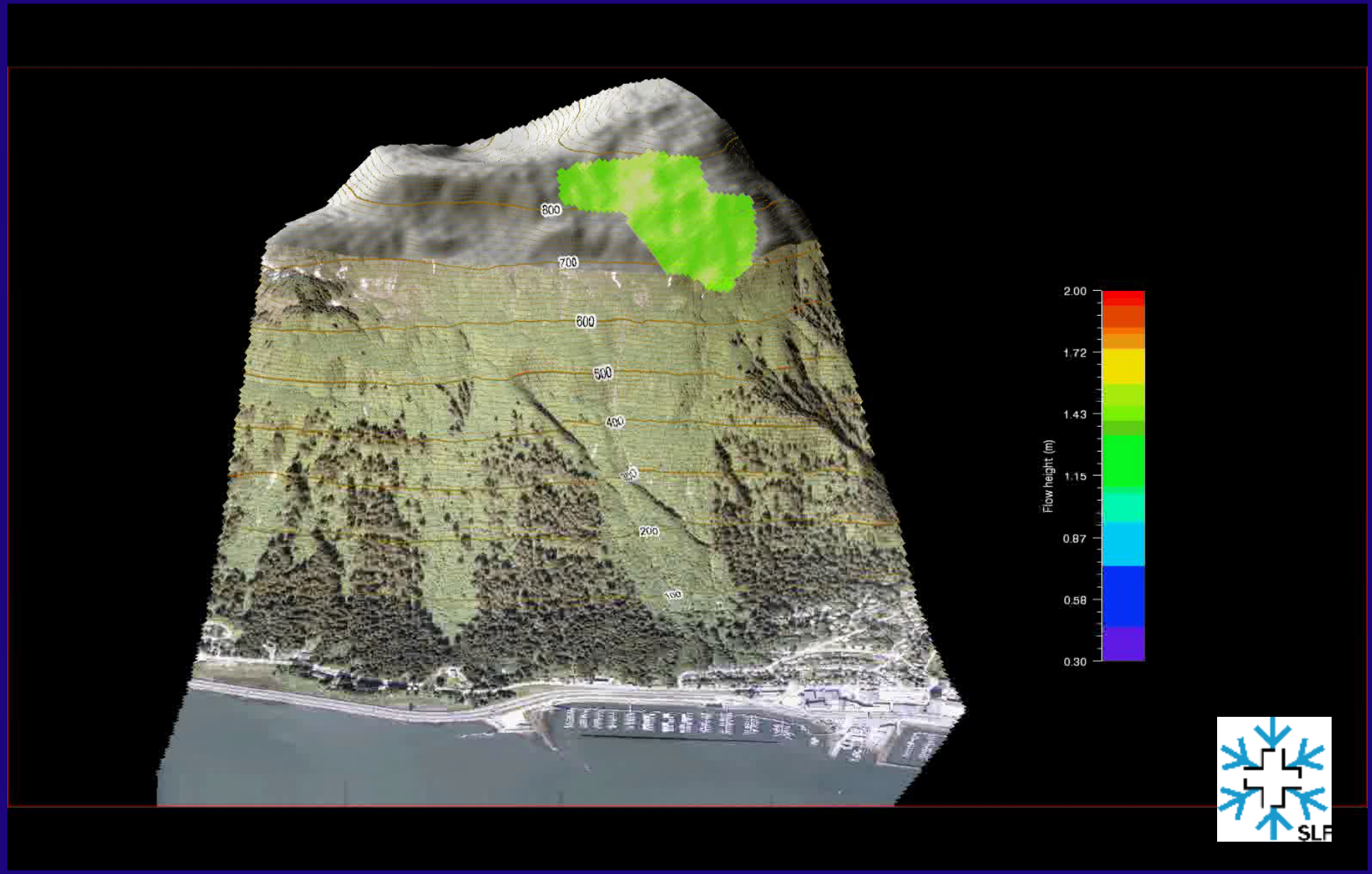

Little Granite Cross Section Samples - Runout Zone
Legend
dendro_gps_data$ Events
0 0.0125 0.025 0.05 0.075 0.1
Kilometers

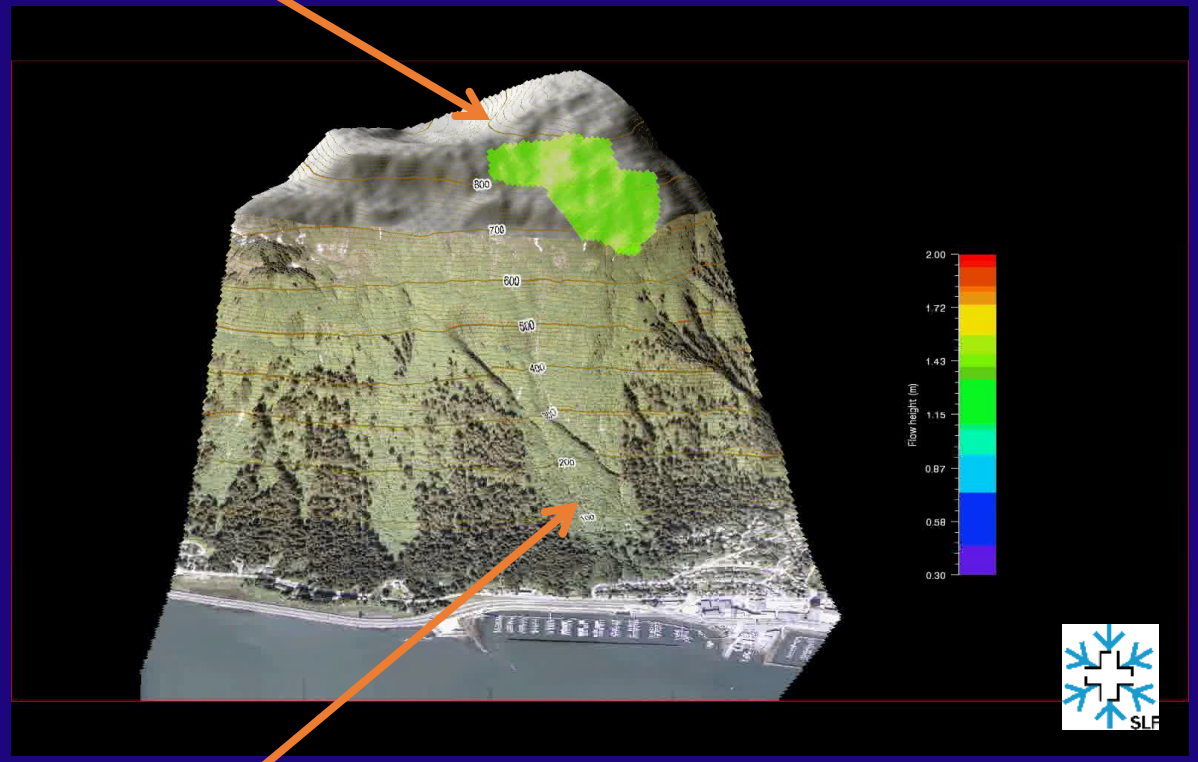

Legend
40m contour lines
Forested Region
Shed 10.7
BNSF railroad
Sampled Trees
Avalanche Path
Avalanche Return Periods (Years)
25 - 100
14.3 - 25
11.1 - 14.2
9.1 - 11.0
7.1 - 9.0
5.9 - 7.0
4.8 - 5.8
3.8 - 4.7
3.0 - 3.7
2.4 - 2.9
0 20 40 80
Meters
N
W
E
S

Avalanche Modeling



Improving model accuracy

Snow distribution mapping in the starting zone using lidar and drone data

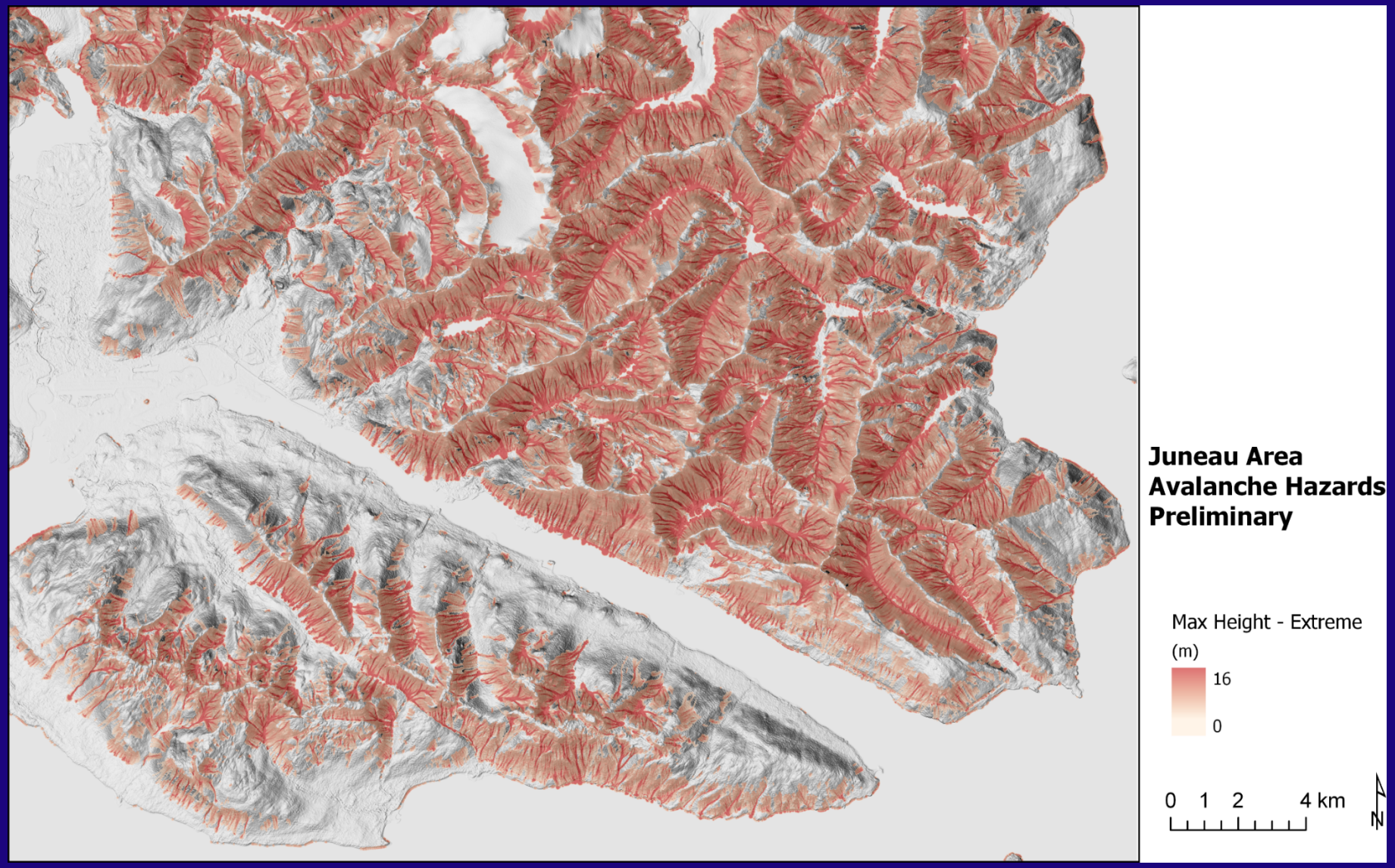


Dendrochronological and lidar data improve estimates of the movement and distribution of snow in the runout zone

Improved numerical modeling of avalanche dynamics at local scales

Avalanche Hazard Mapping

- Local scale avalanche simulations will aid with calibrating the regional-scale avalanche modeling used to generate hazard indication maps



Questions?