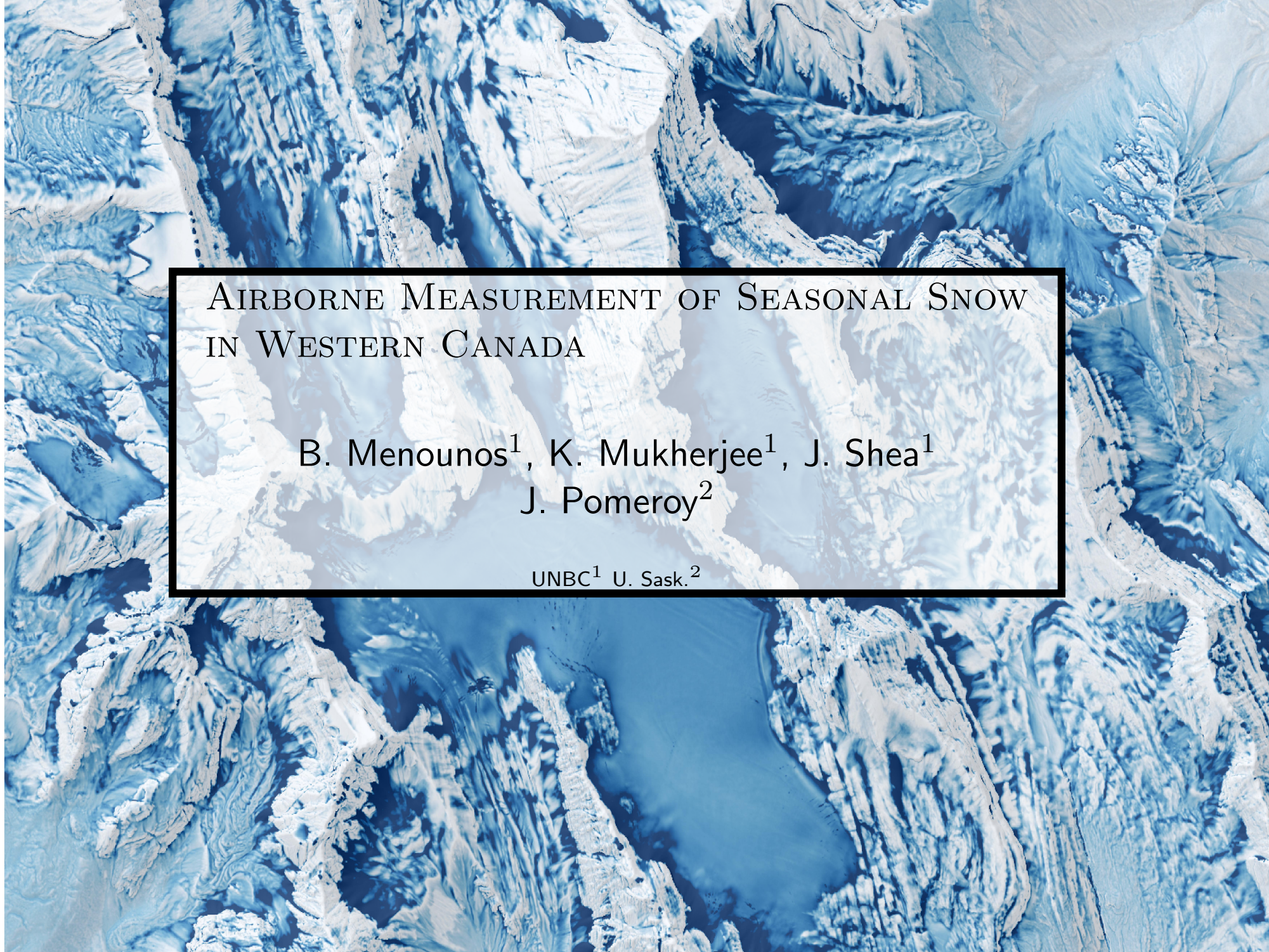
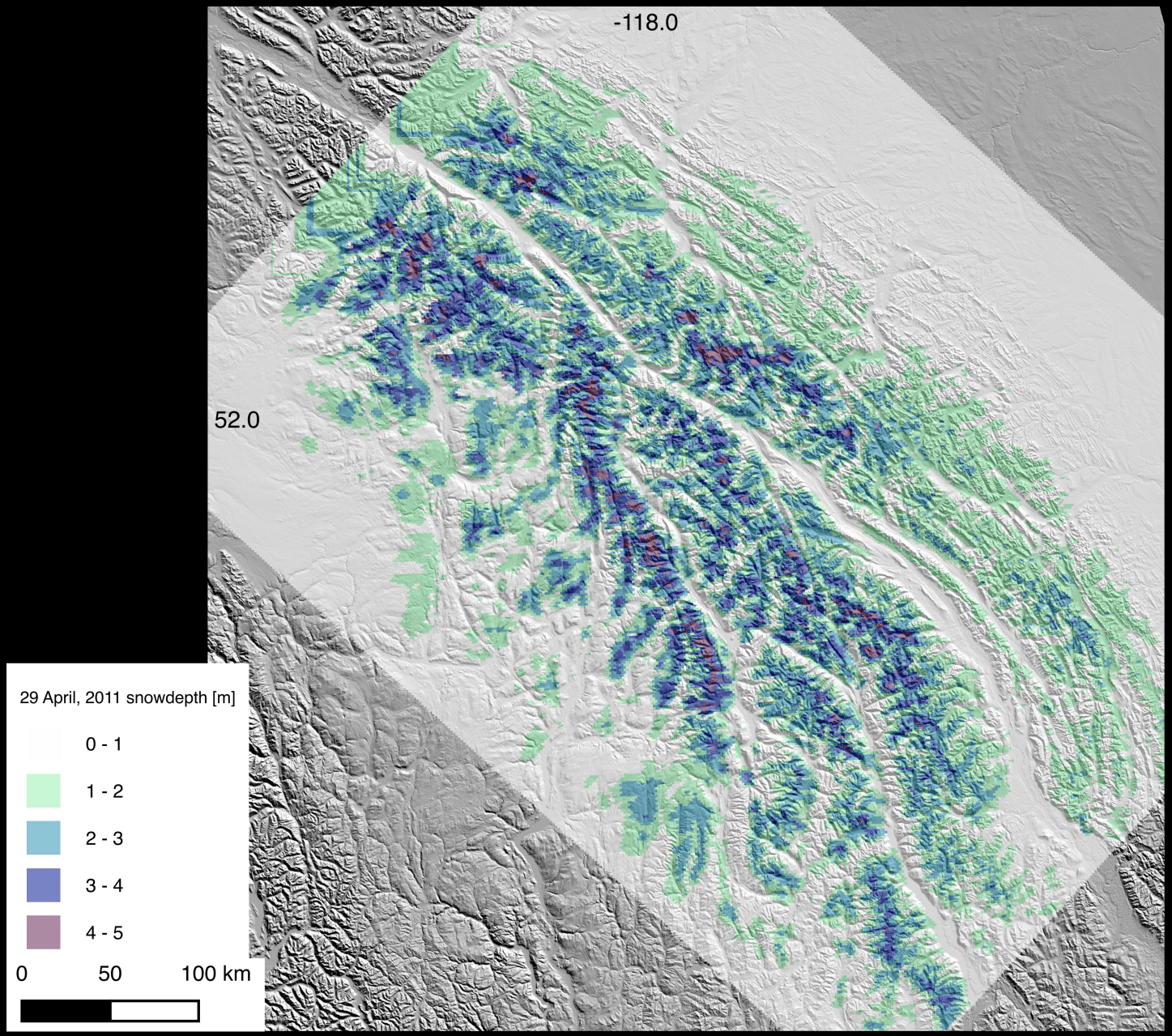


Airborne Measurement of Seasonal Snow in Western Canada

B. Menounos[1], K. Mukherjee[1], J. Shea[1]
J. Pomeroy[2]

UNBC[1] U. Sask.[2]

Dynamically downscaled snowcover (1 km)

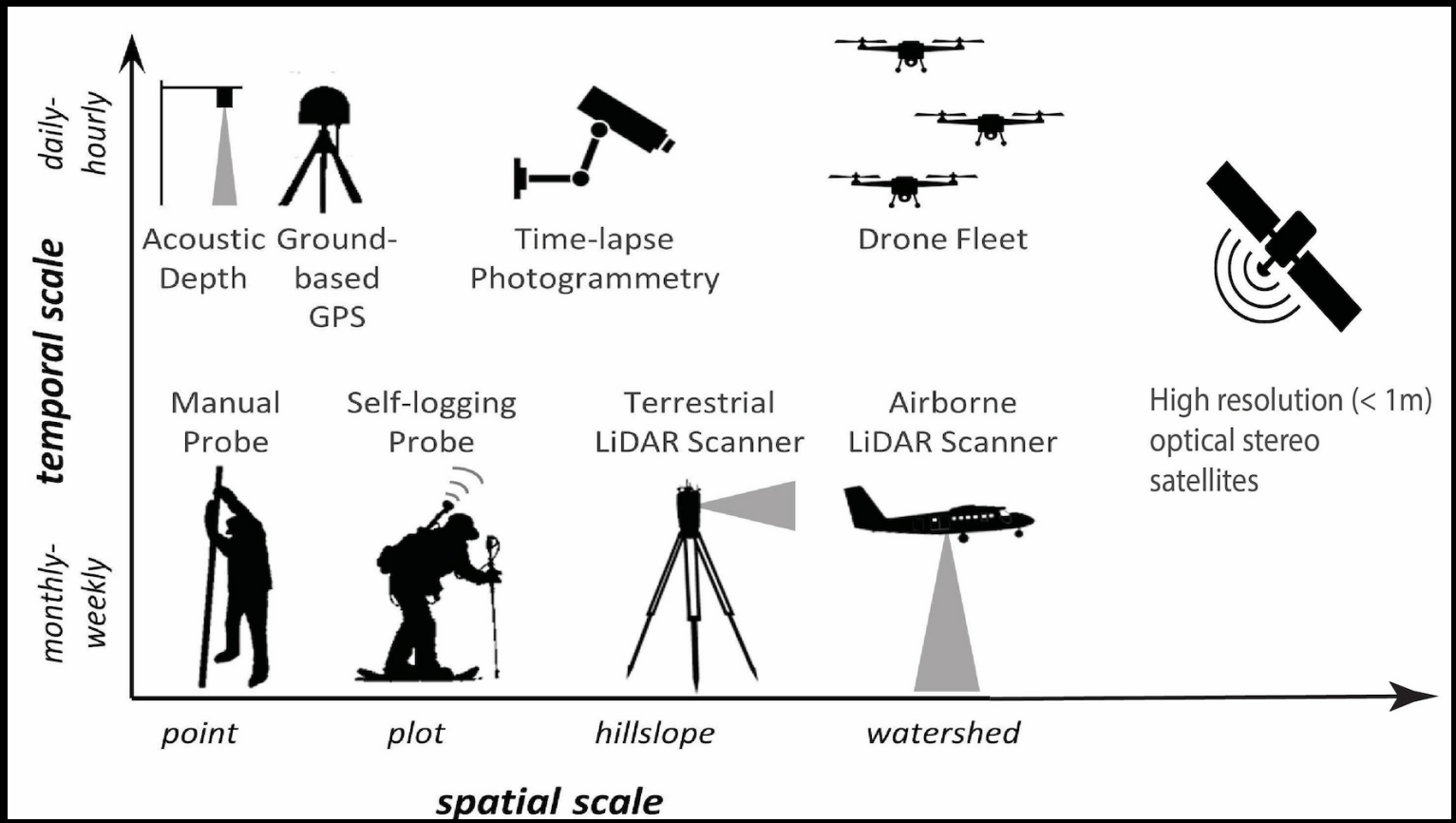


Motivation (Mountain Water Futures)

How do we reliably measure snow depth for entire mountain ranges?

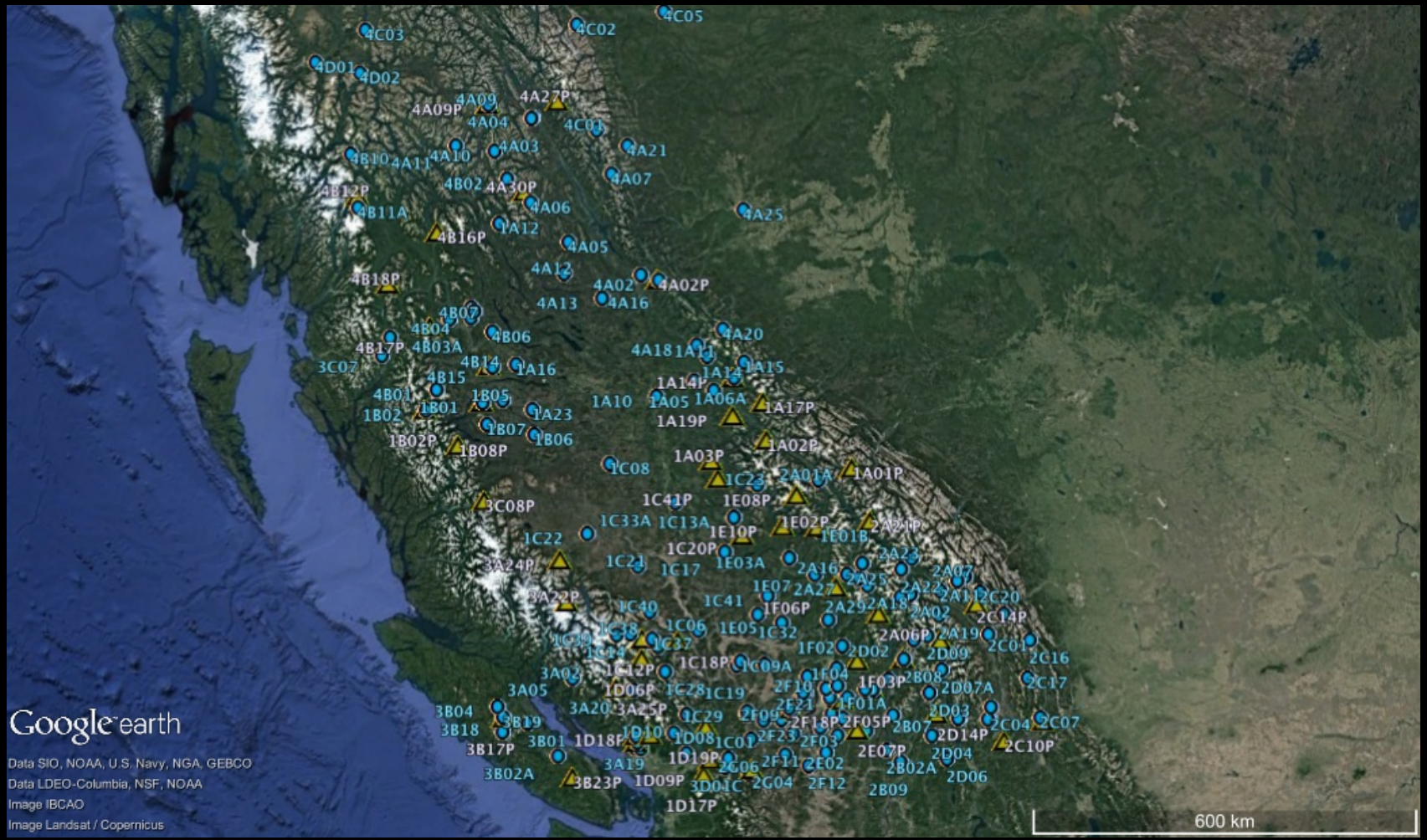
How can we best use observations to improve land surface models (snow)?

Snow surveys

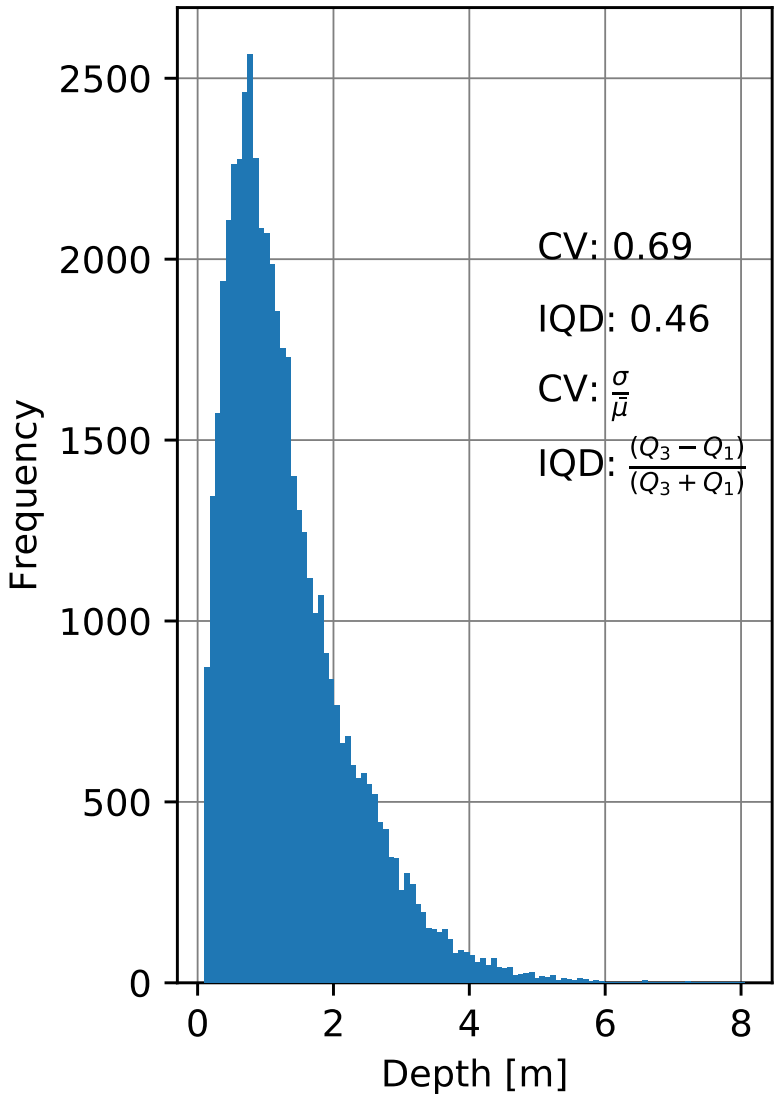


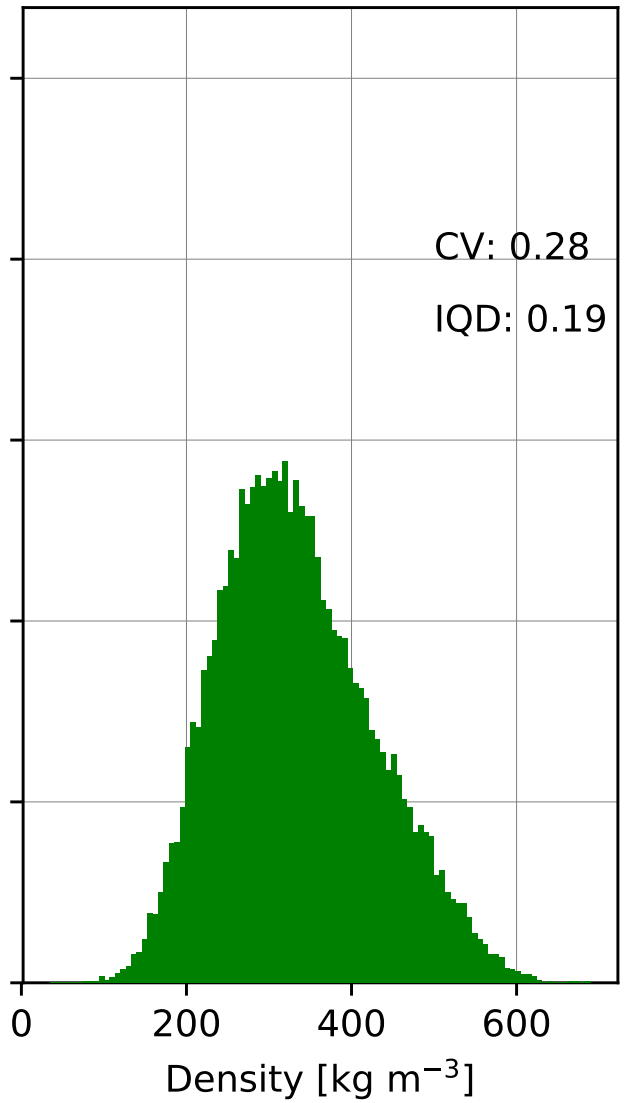
modified from Eric Small

Pillows and snow courses



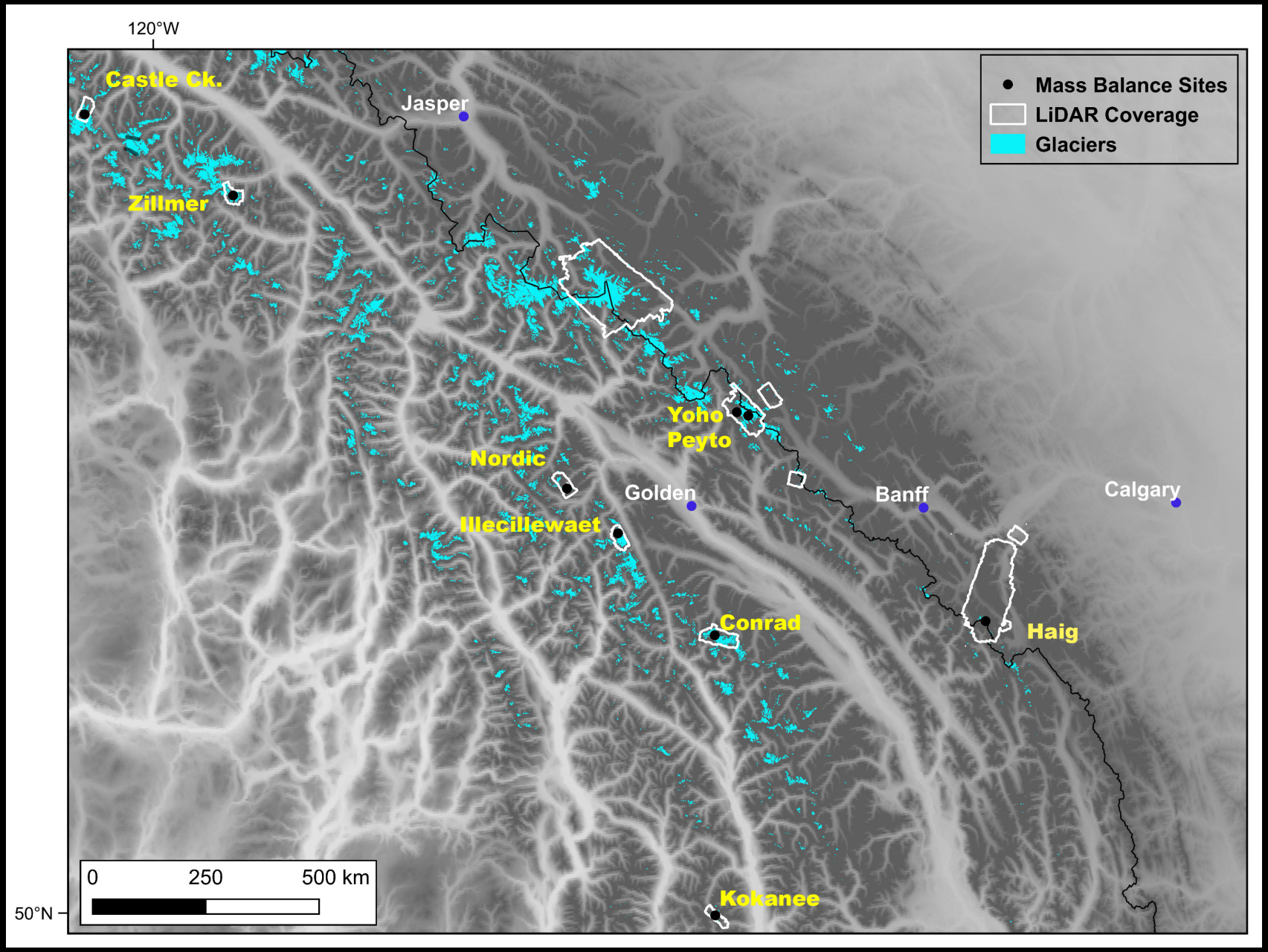
Snow course measurements [1950-2011]



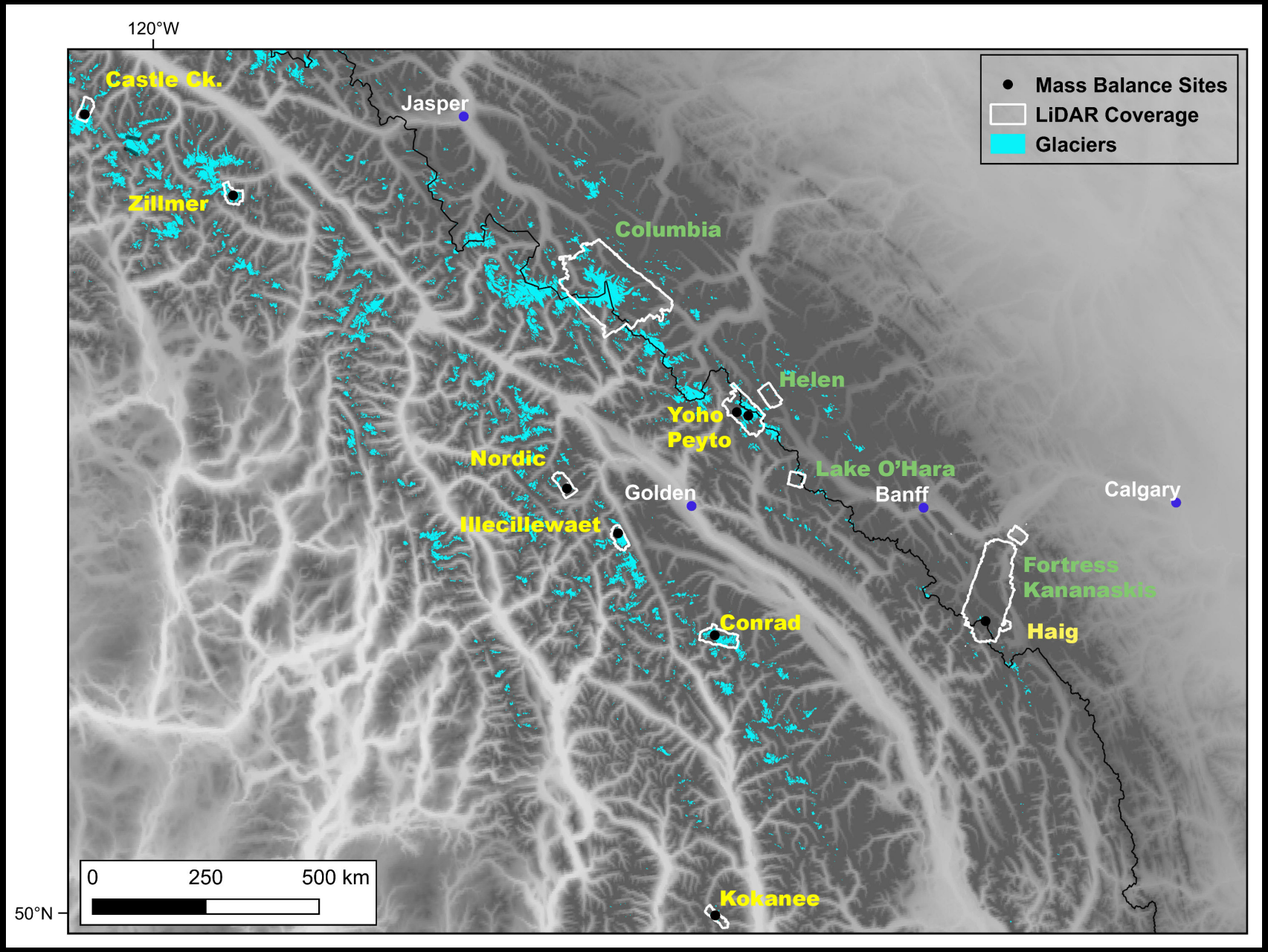


High altitude laser altimetry (UNBC Riegl Q780)

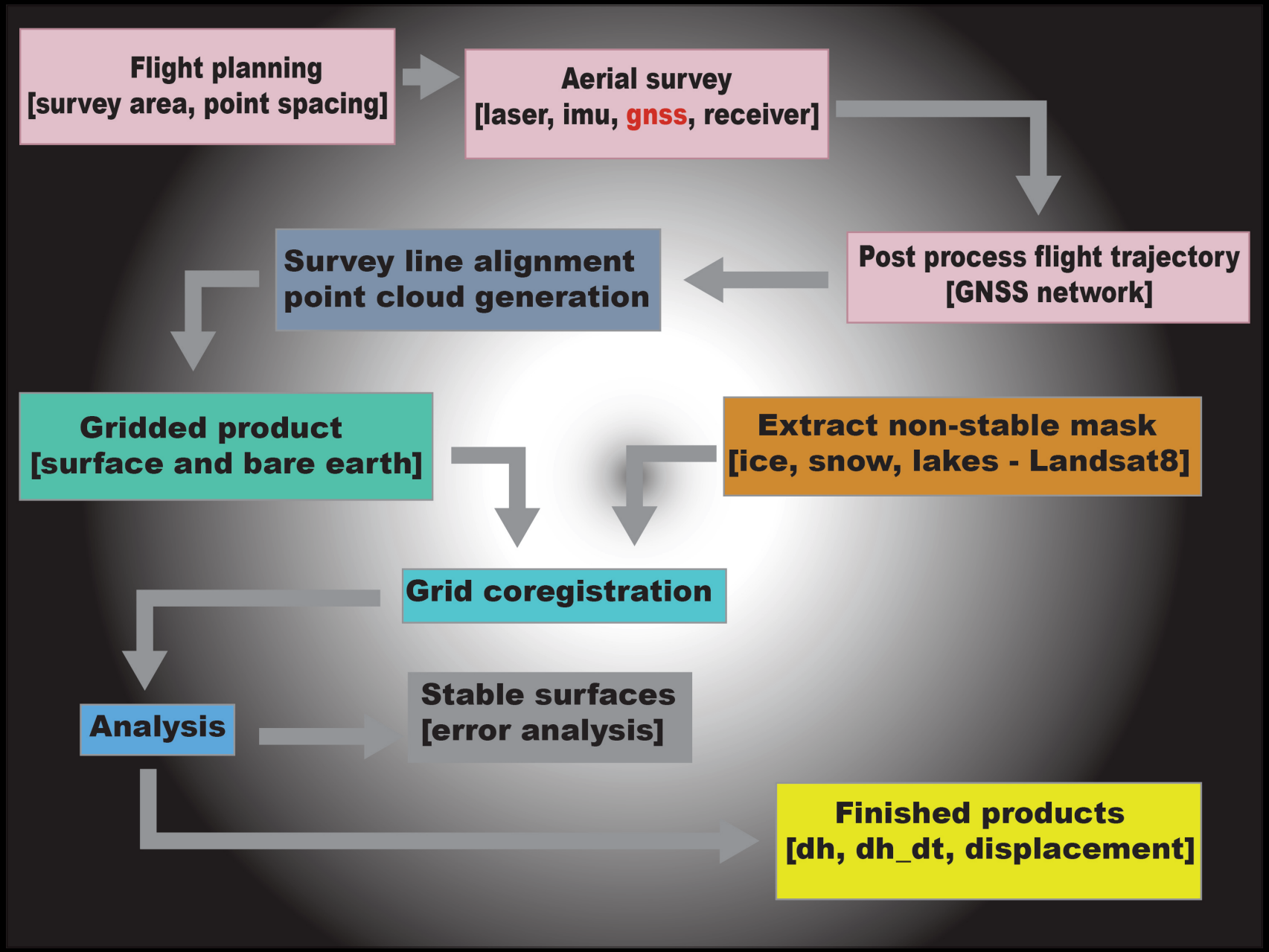
Existing biannual survey areas, Columbia Basin



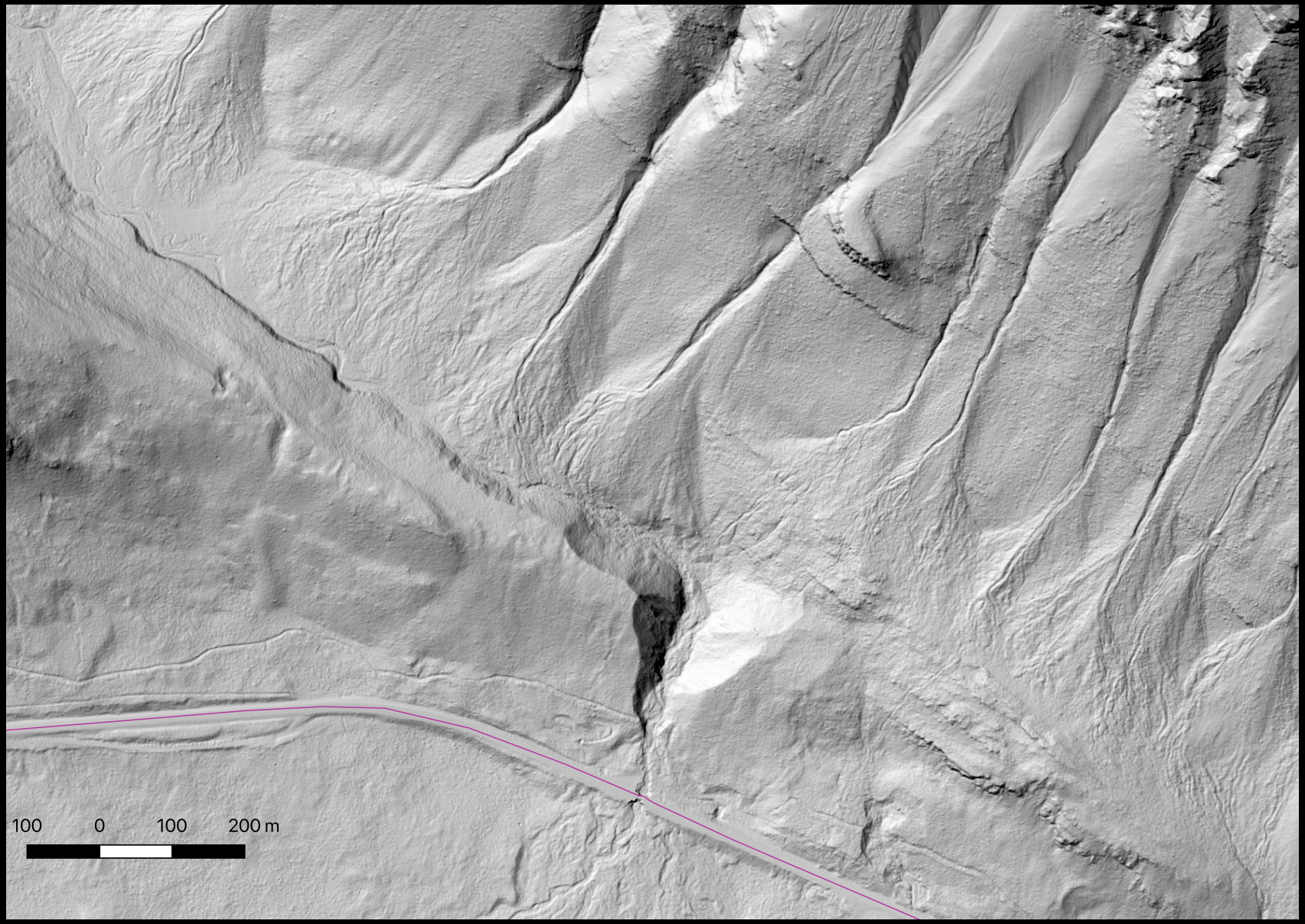
New (GWF) LiDAR survey areas



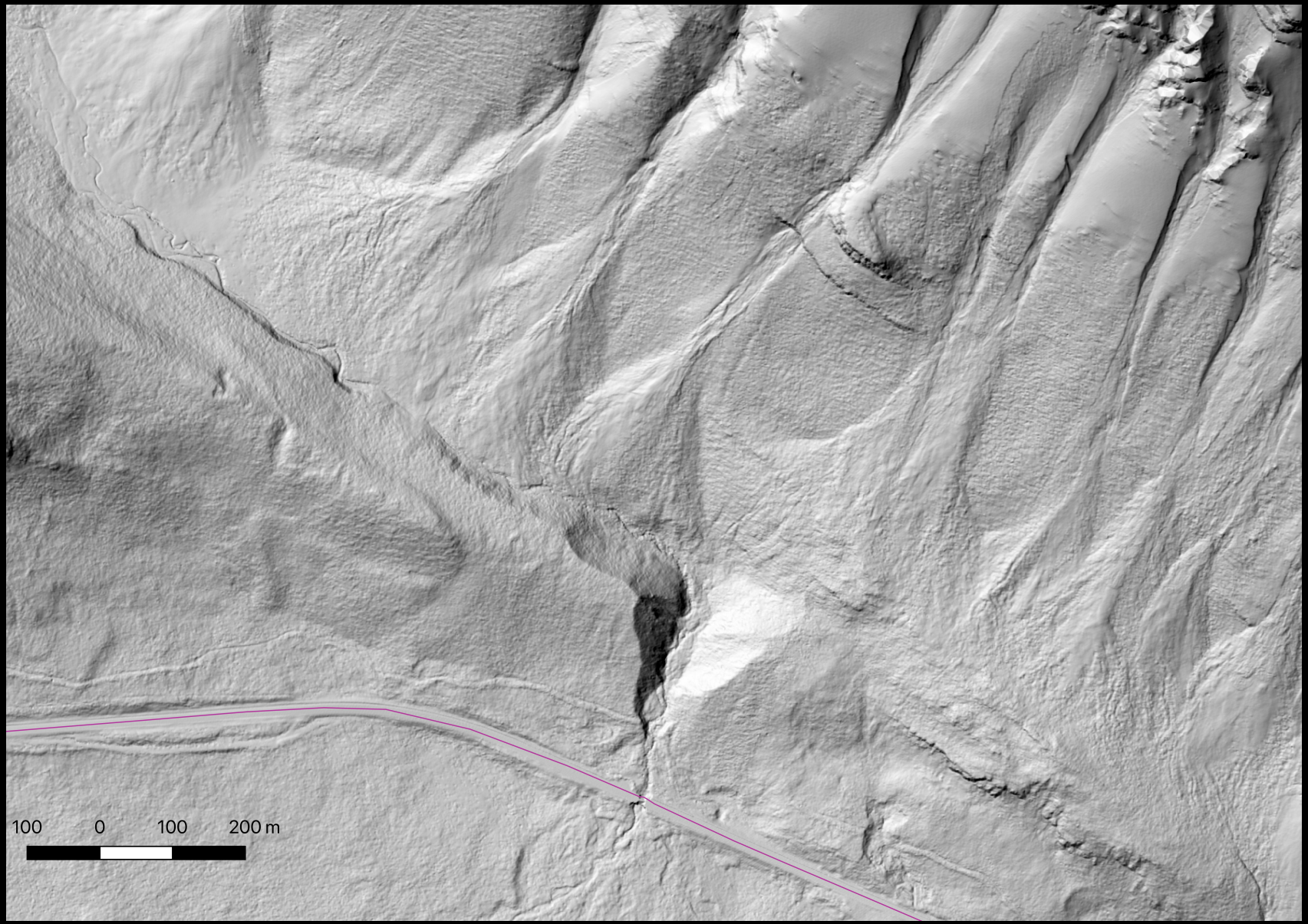
Workflow [glacier mass change]



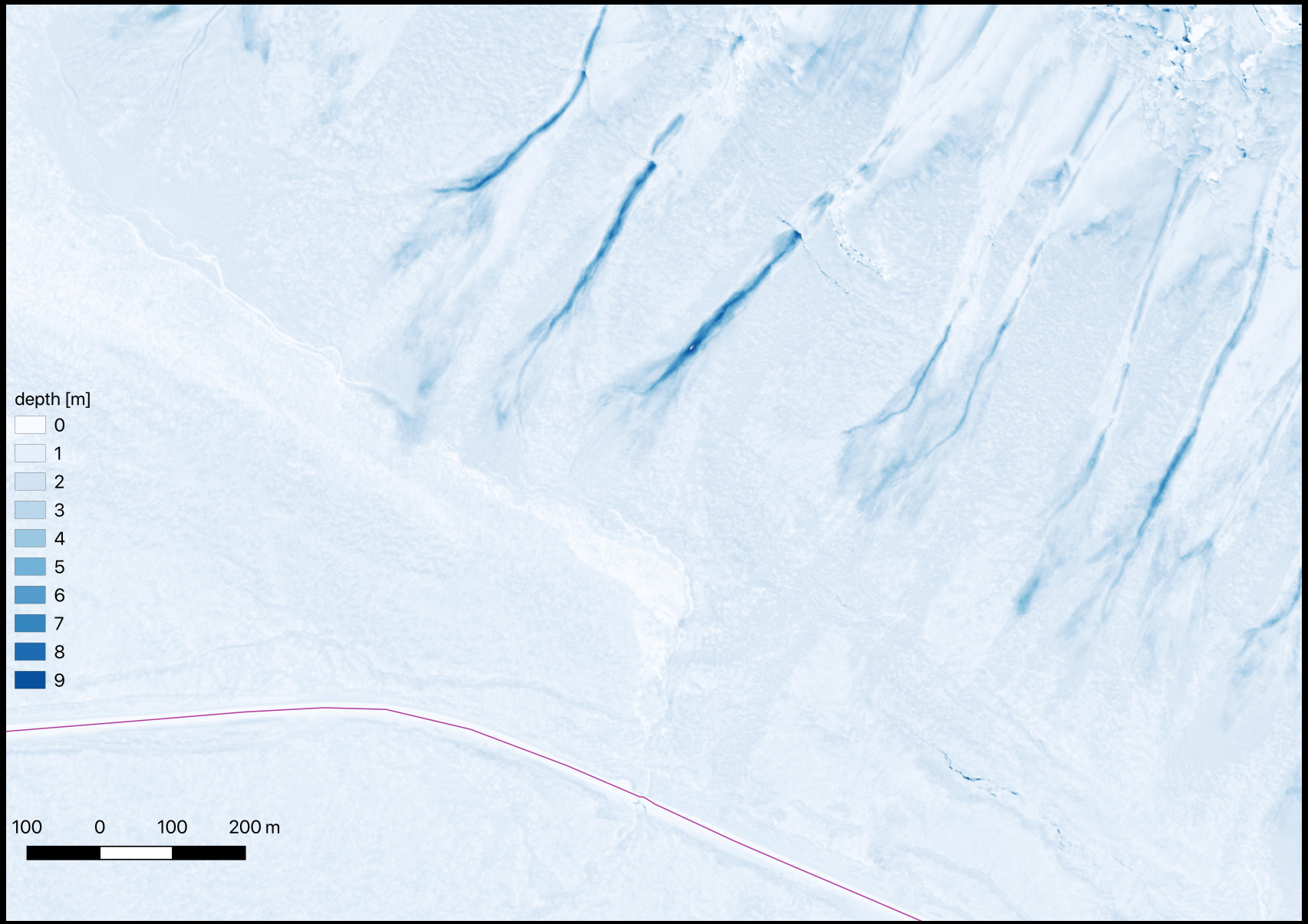
Helen Lake, Sept, 2017



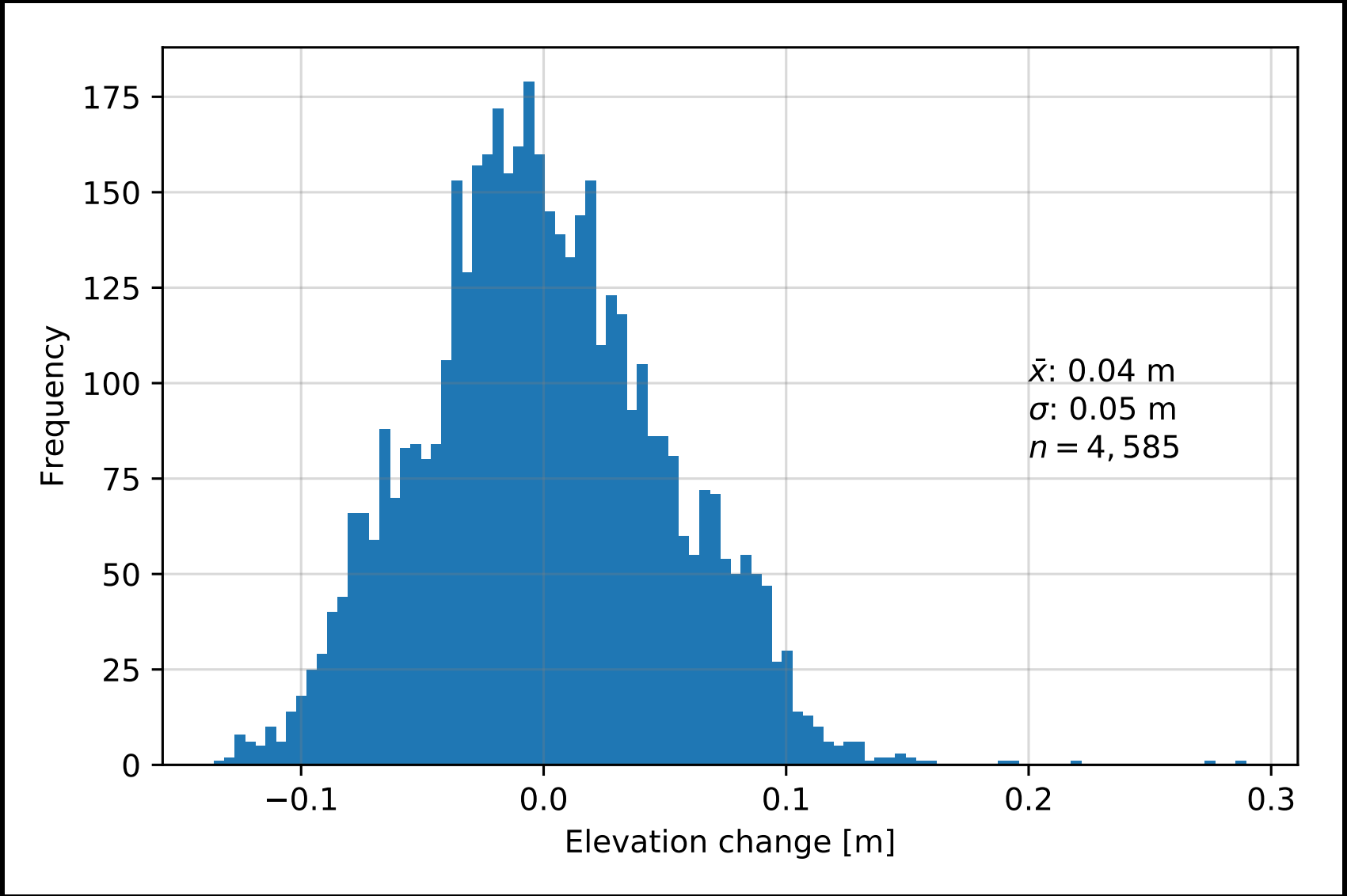
Helen Lake, April, 2018



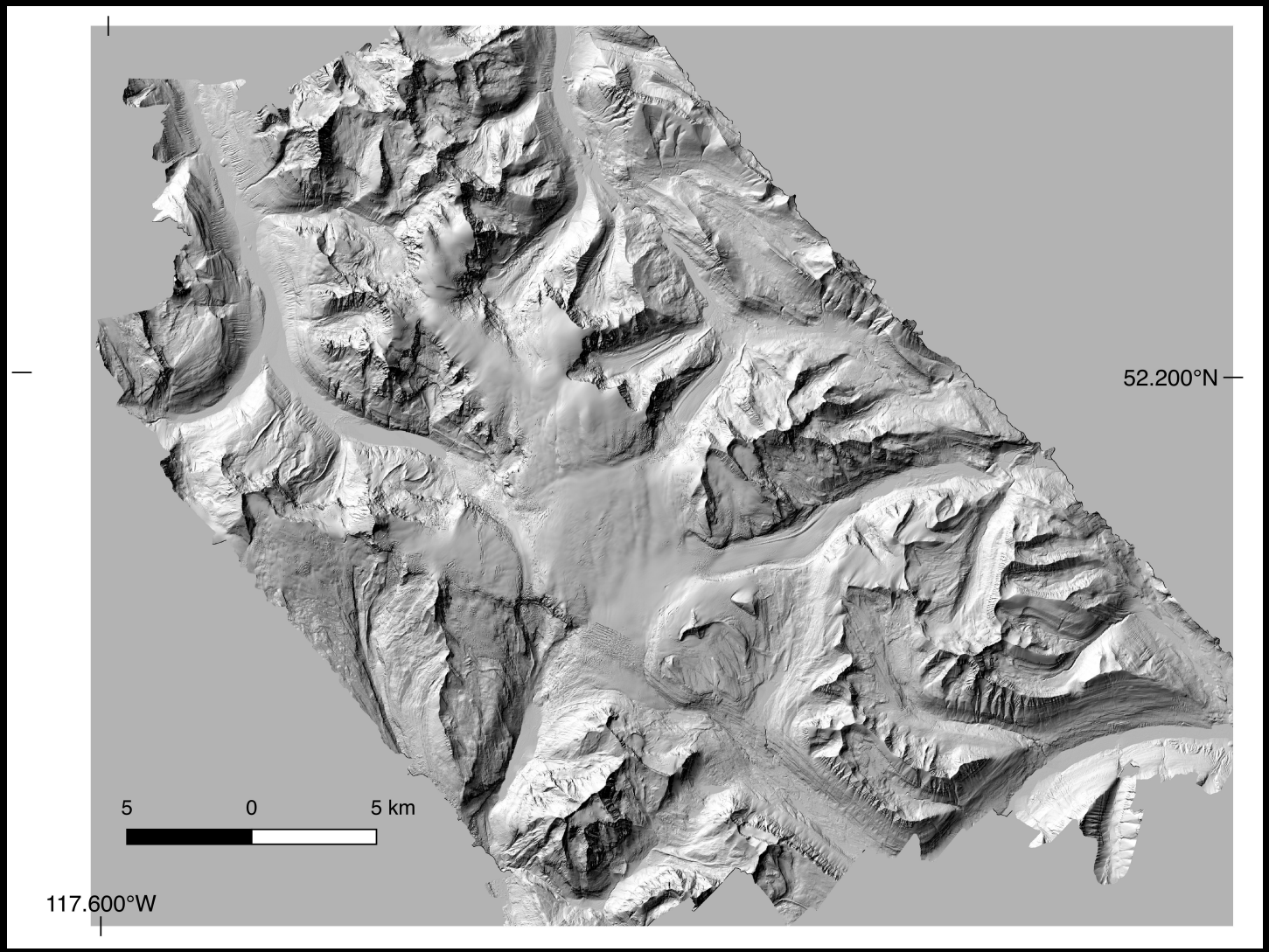
Snow depth



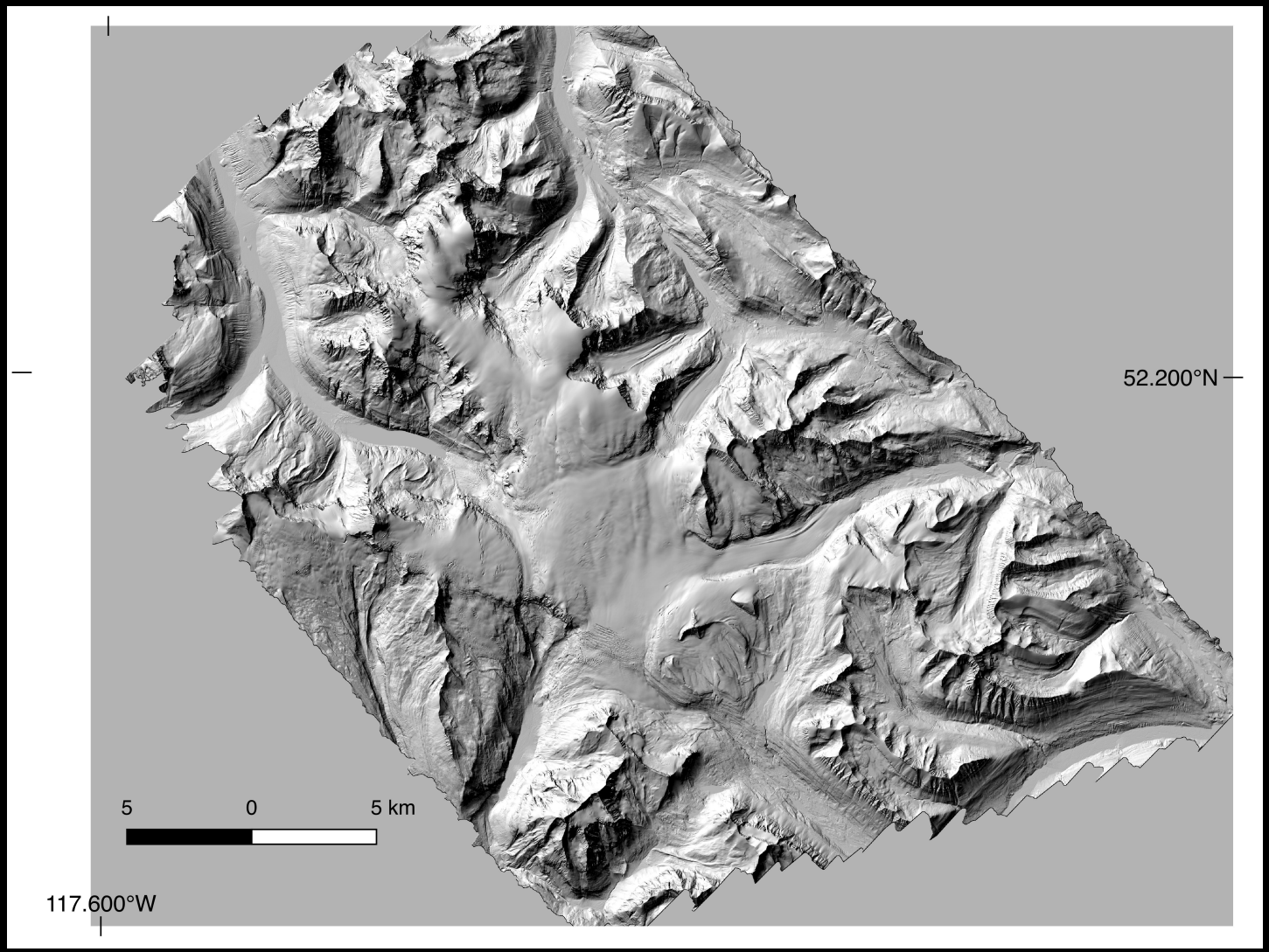
Post Coregistration - Elevation change along Rt. 93



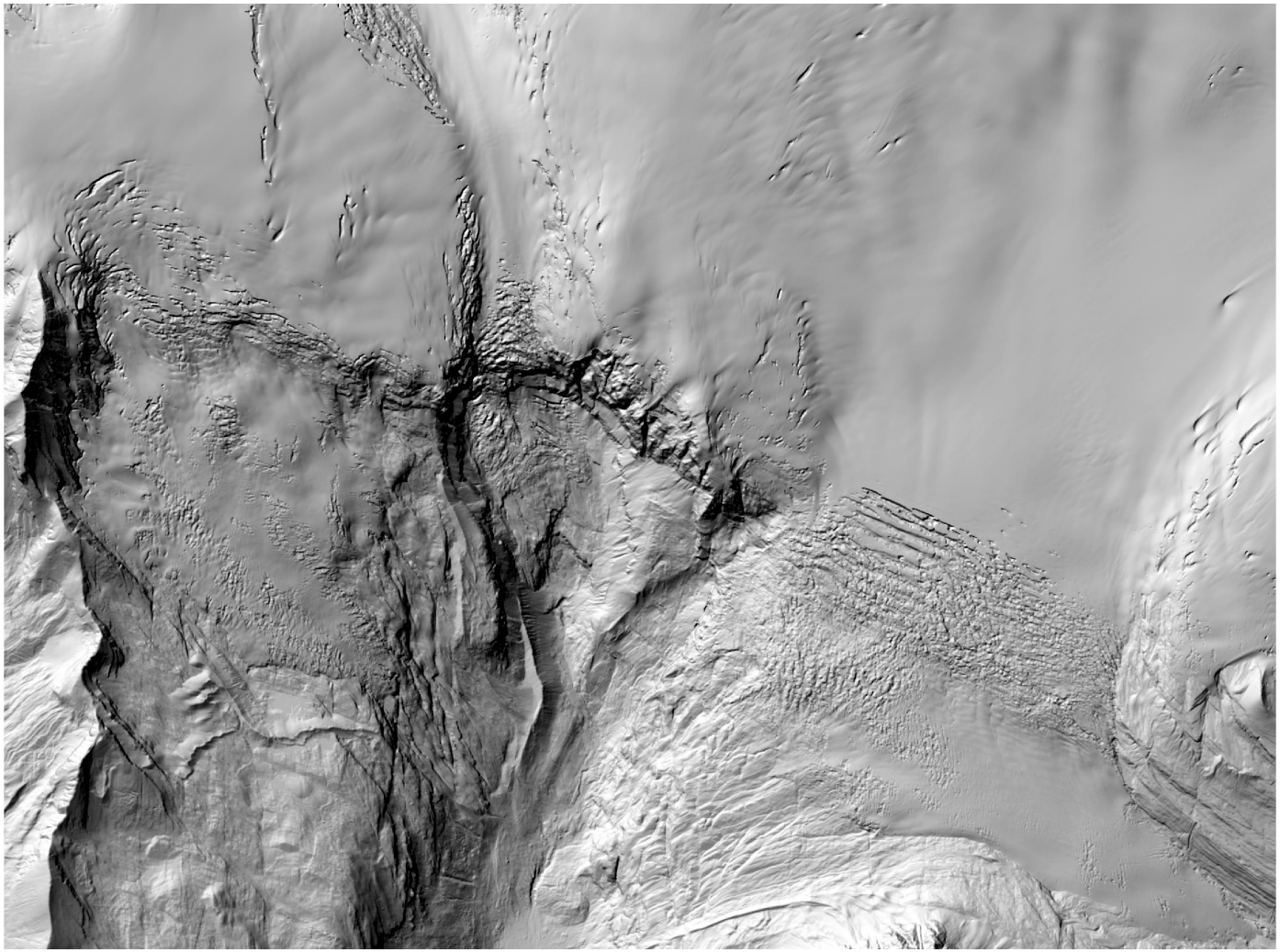
Columbia Icefield



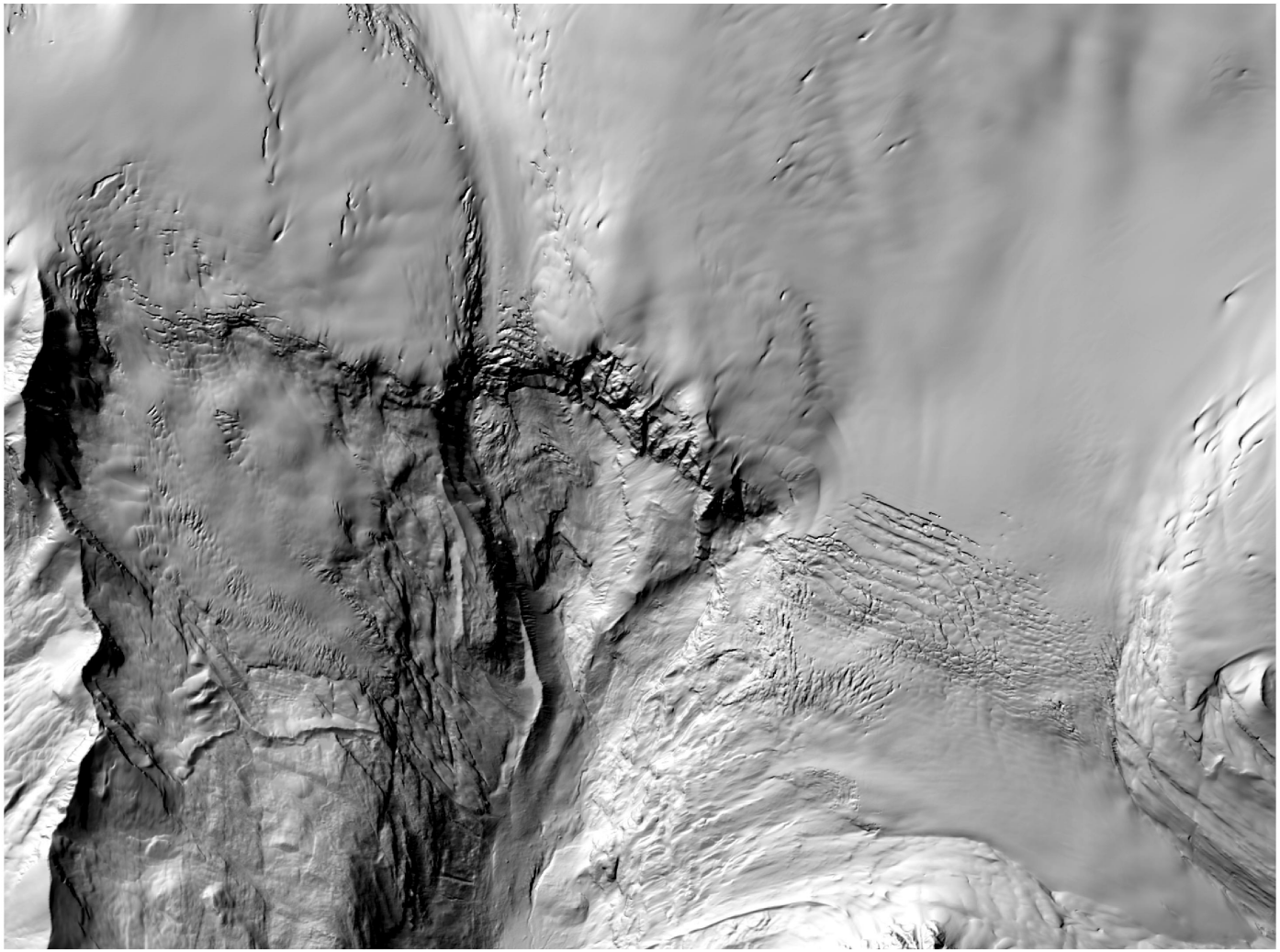
Columbia Icefield



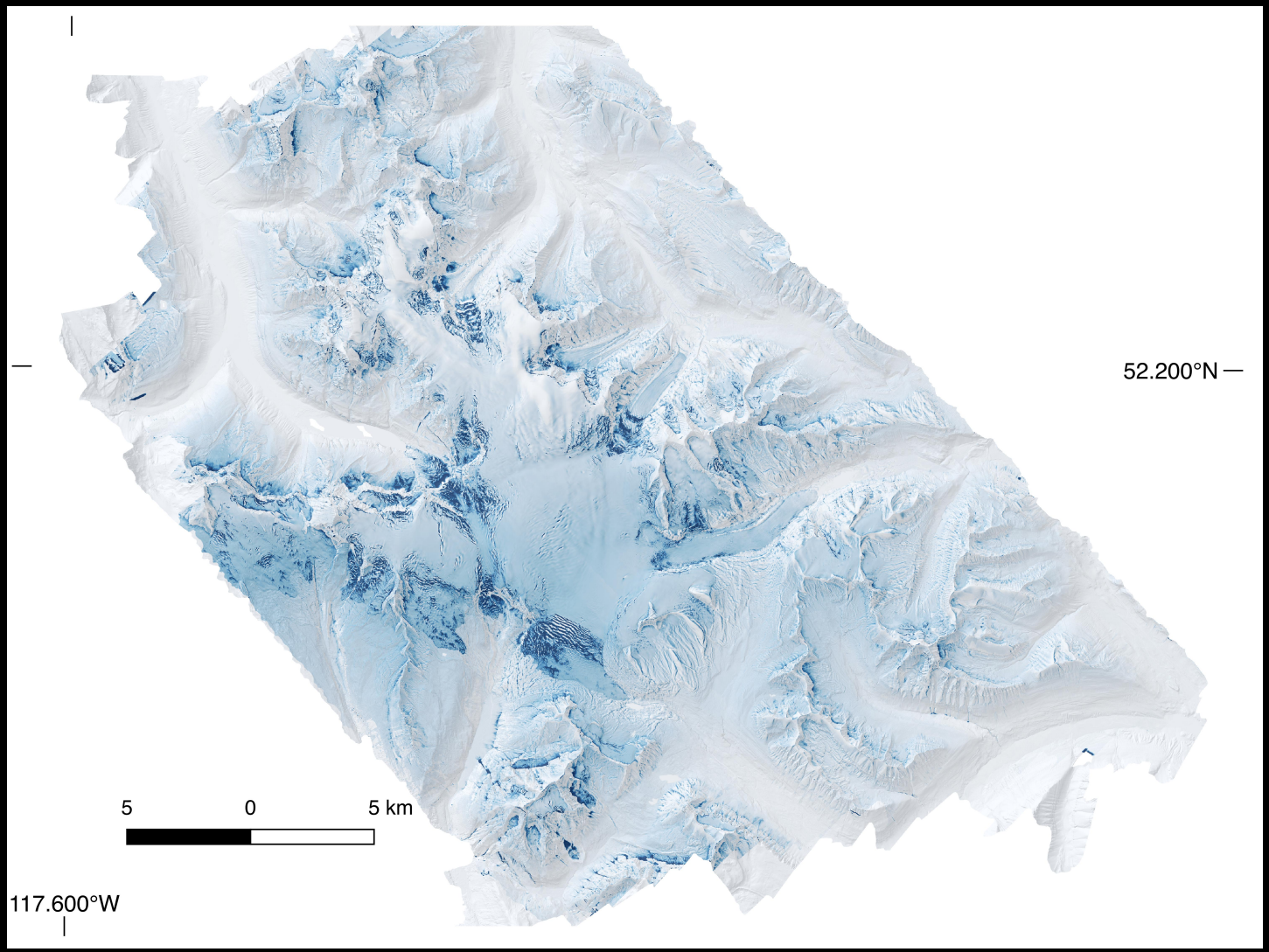
Columbia Icefield



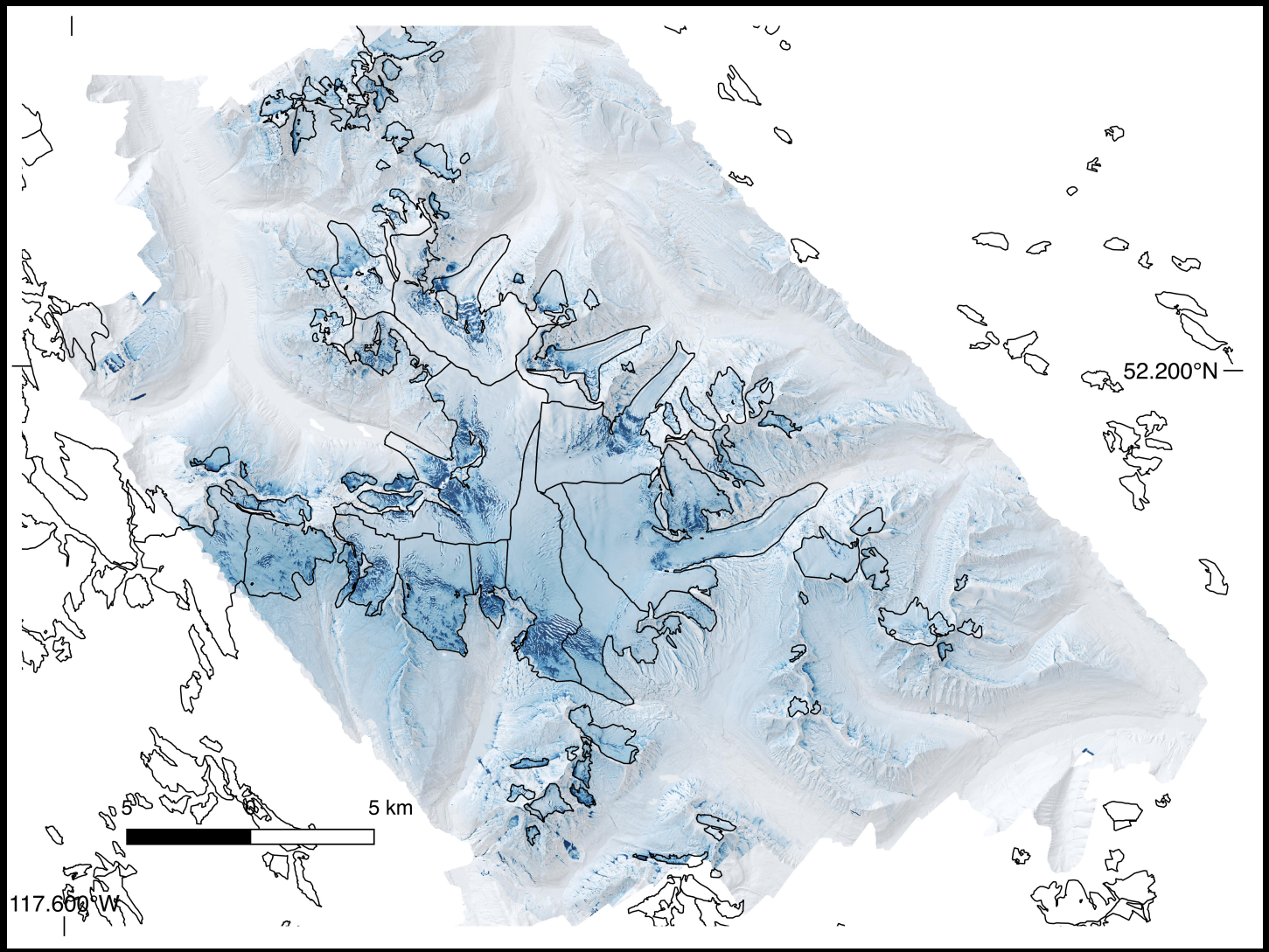
Columbia Icefield



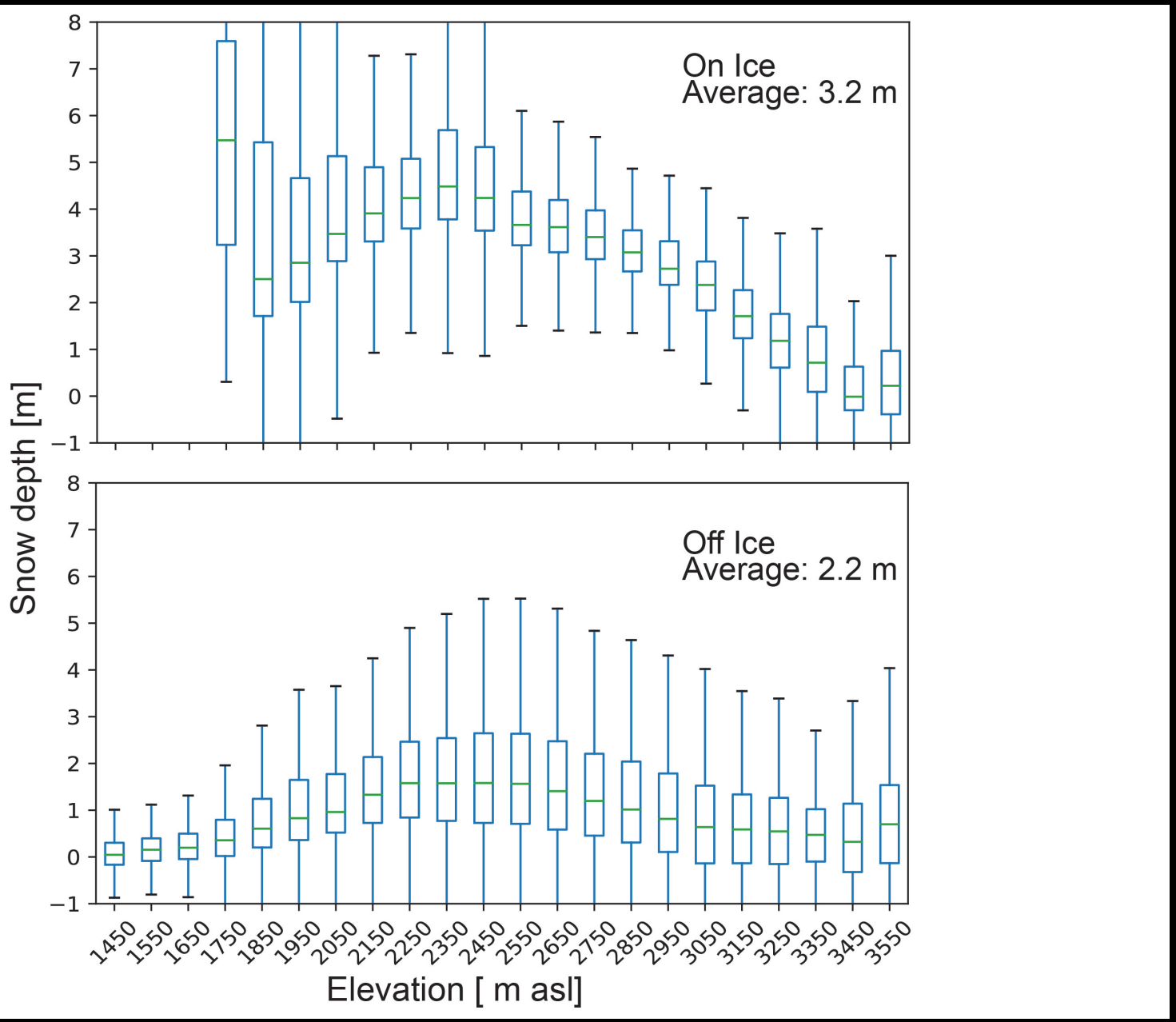
Columbia Icefield Elevation Change



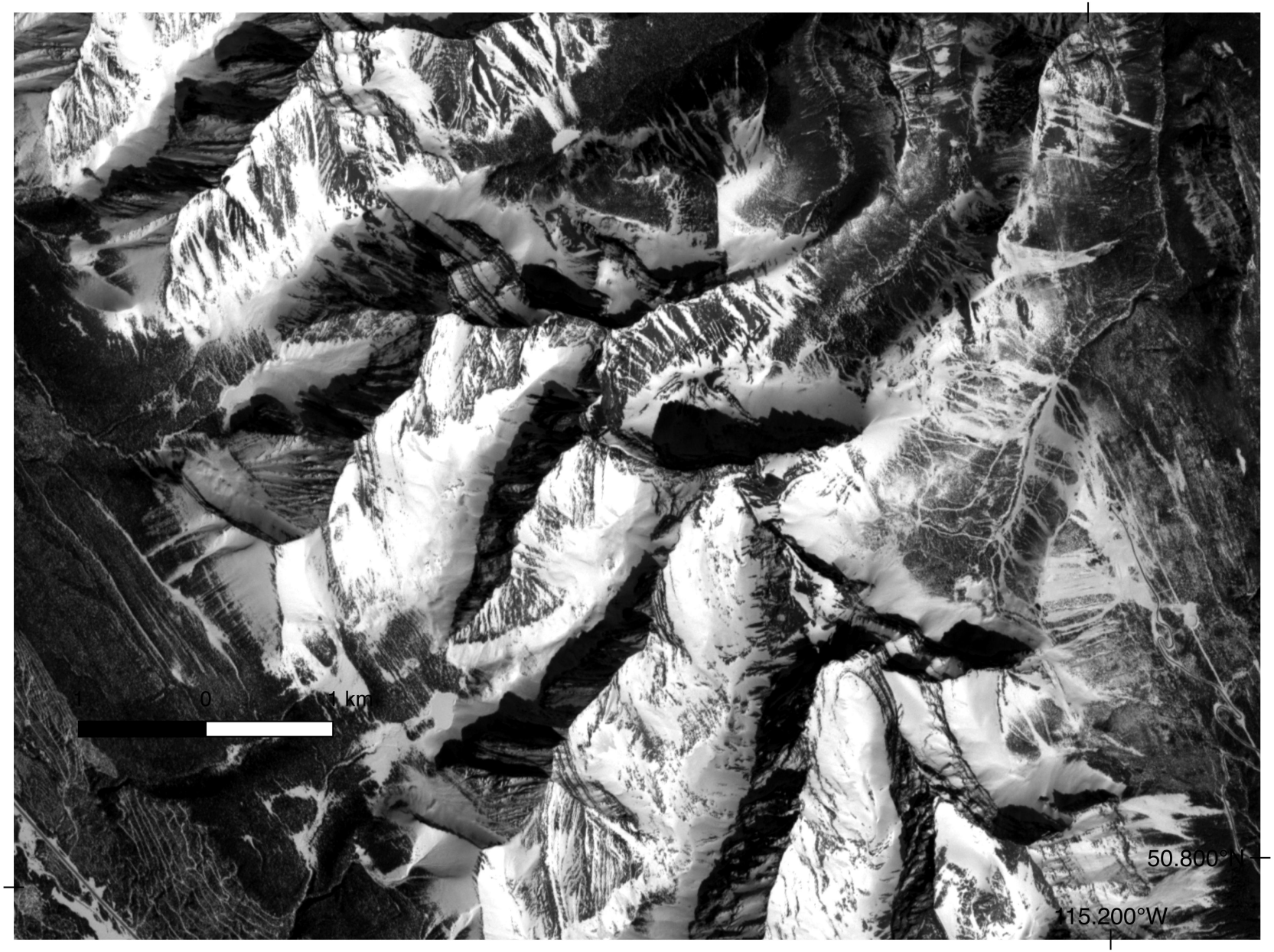
Columbia Icefield Elevation Change



Elevation change over glaciers is not snow depth at a point

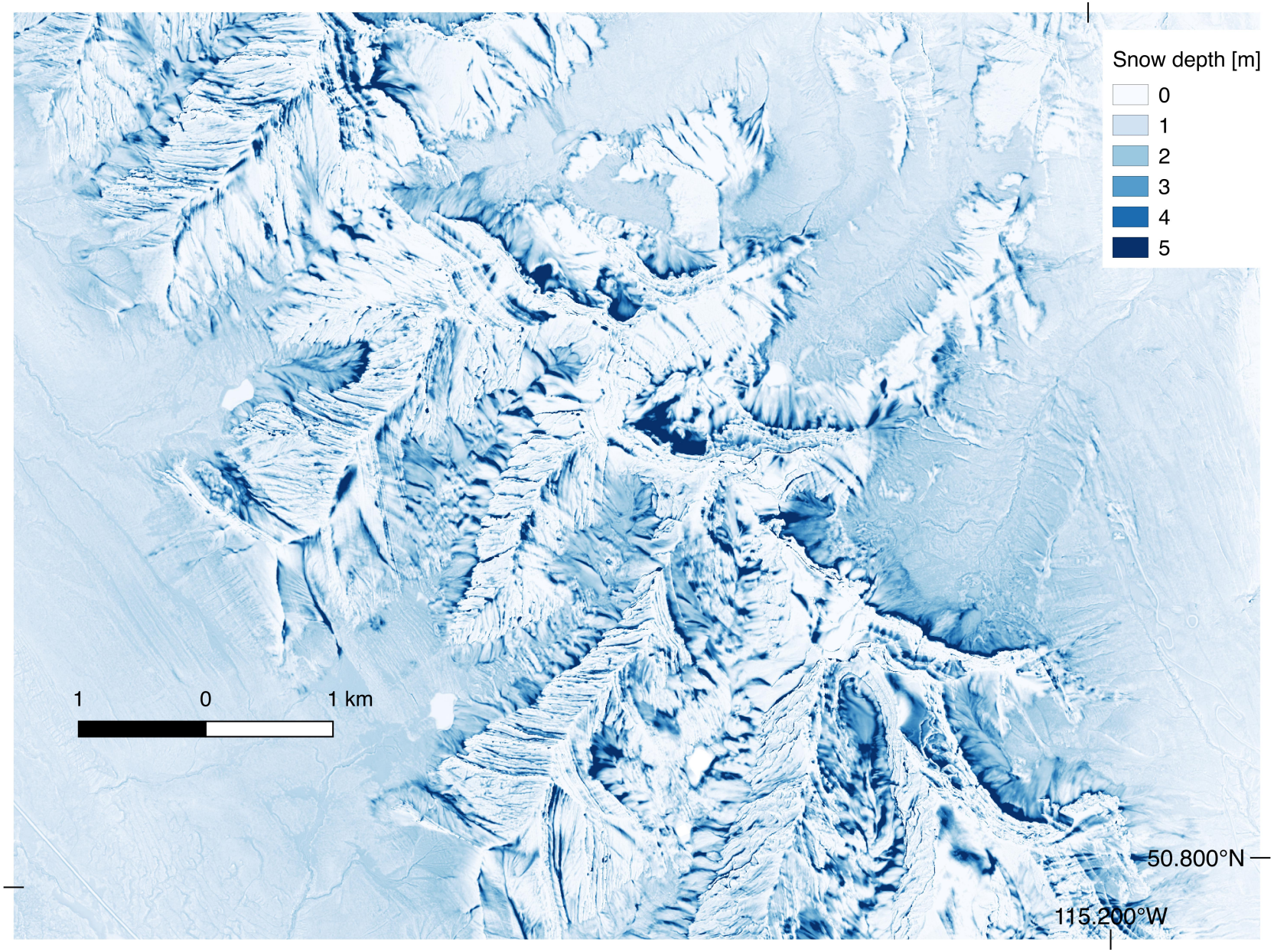


Kananaskis region: 3 m Planet Lab Imagery, 27 April, 2018

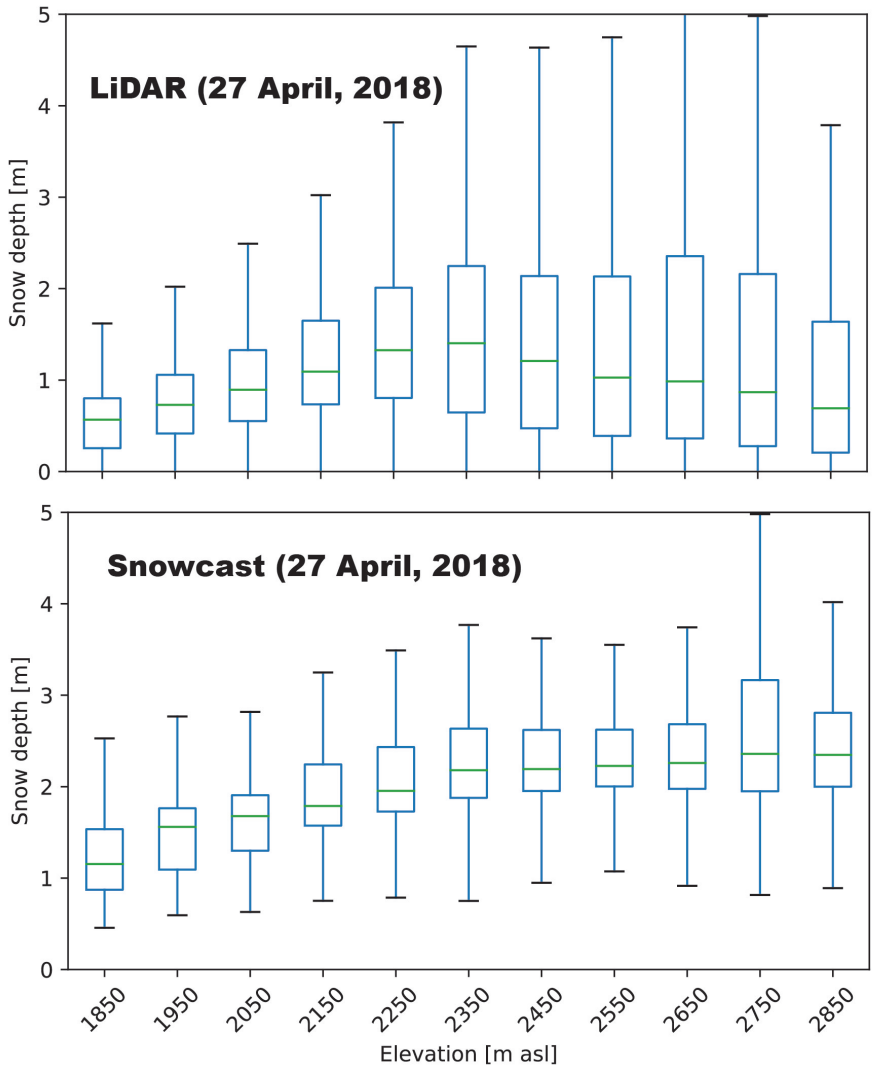


Kananaskis region

Kananaskis region

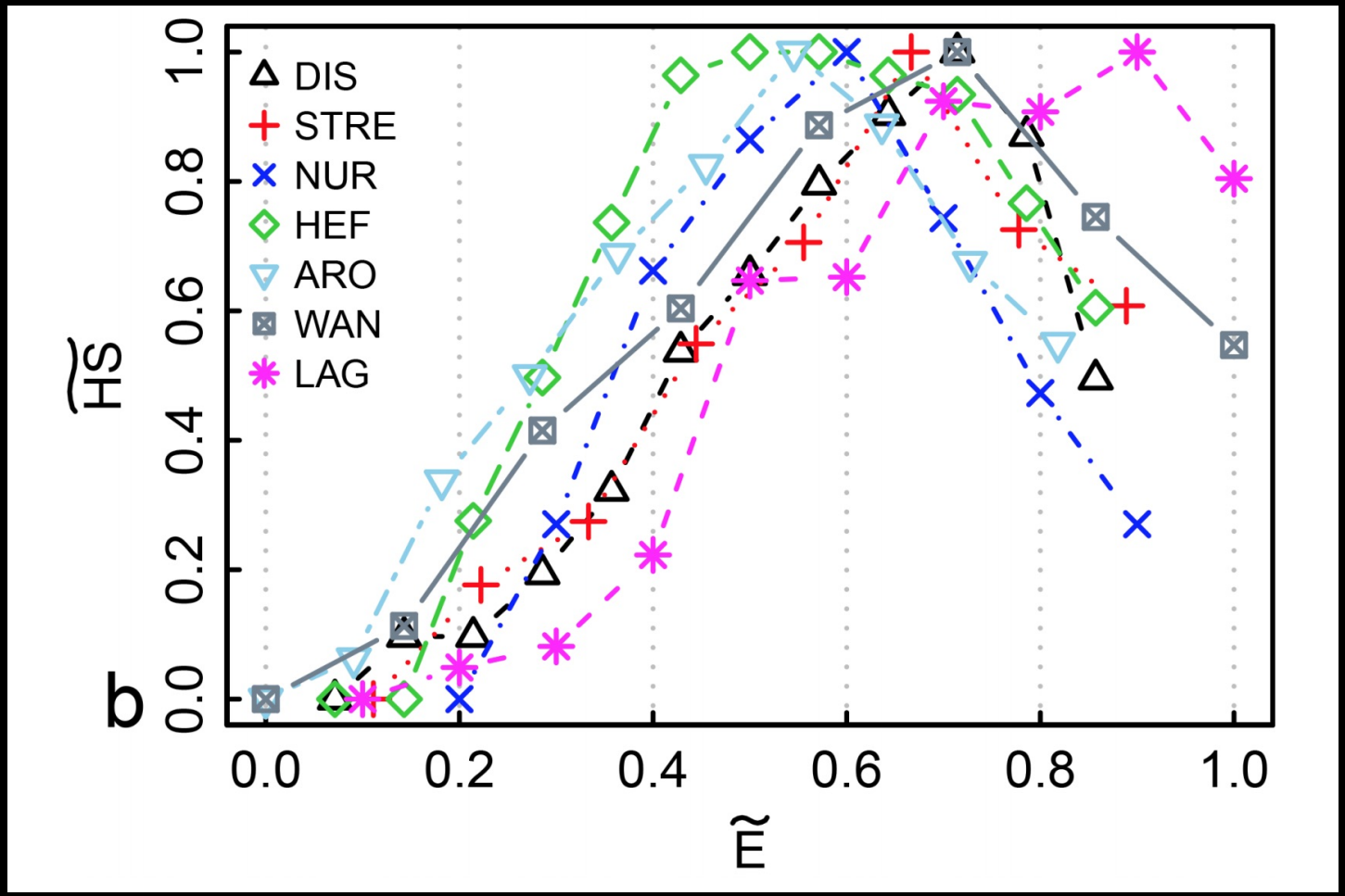


Kananaskis region: Snowcast/LiDAR Comparison



Acknowledgements: C. Marsh and N. Wayland

Snow depth and elevation, European Alps



Grünewald et al., 2014

Conclusions

- We can reliably measure snow depth, the greatest contributor for mountain SWE variability, over many thousands of square kilometers.
- Depth is primarily related to elevation, topographic complexity (redistribution caused by wind and mass wasting, shading) and windward/leeward location of individual mountain ranges.
- Snow depth products will be used for calibration/validation of snow and climate models and to improve theory of snow distribution in complex terrain.

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BC Hydro
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