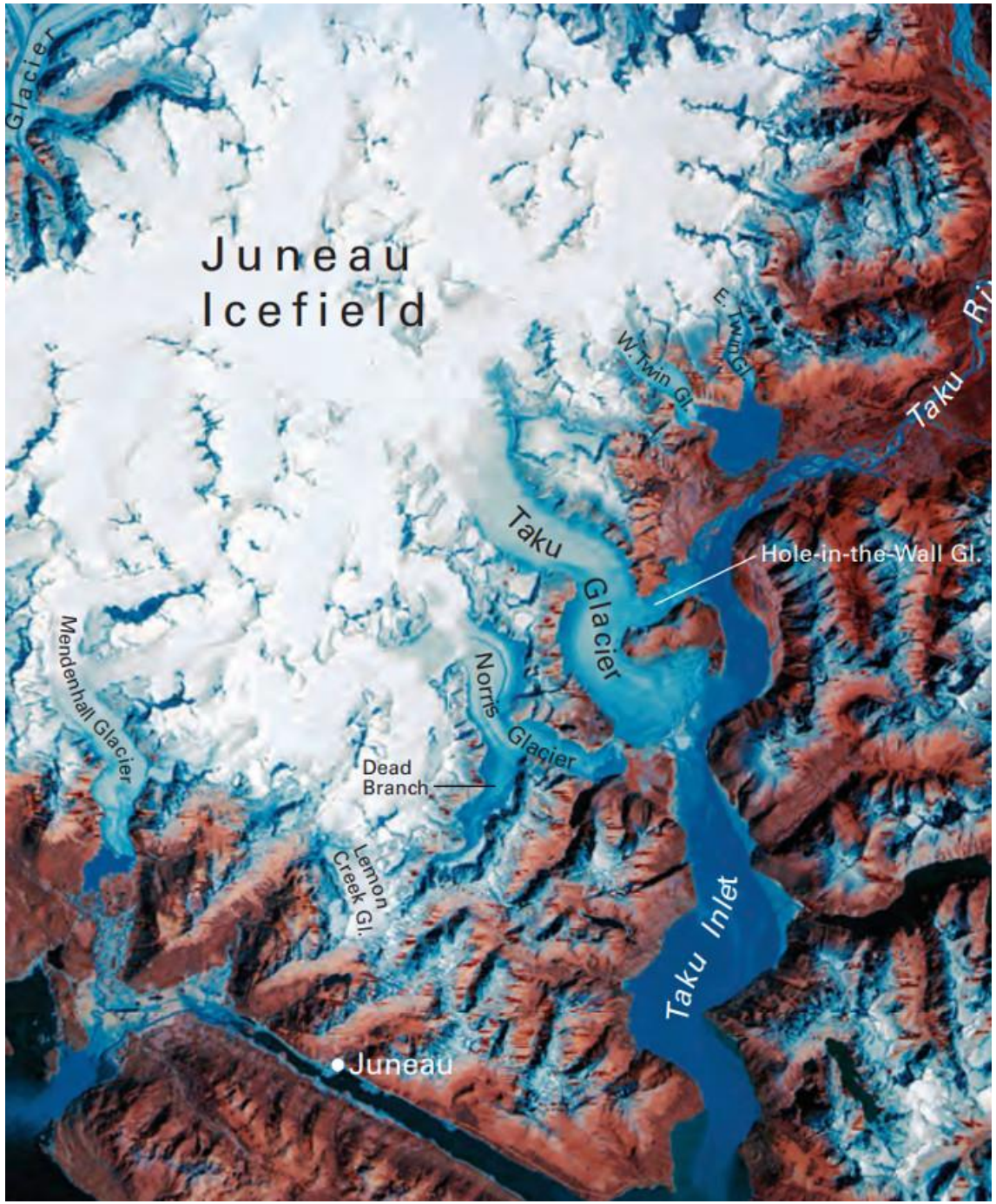

Topographic controls on ice flow and recession for Juneau Icefield (Alaska/British Columbia)

Bethan Davies, Jacob Bendle, Robert McNabb, Chris McNeil, Jonathan Carrivick, Jeremy Ely, Seth Campbell, Mauri Pelto, Bradley Markle

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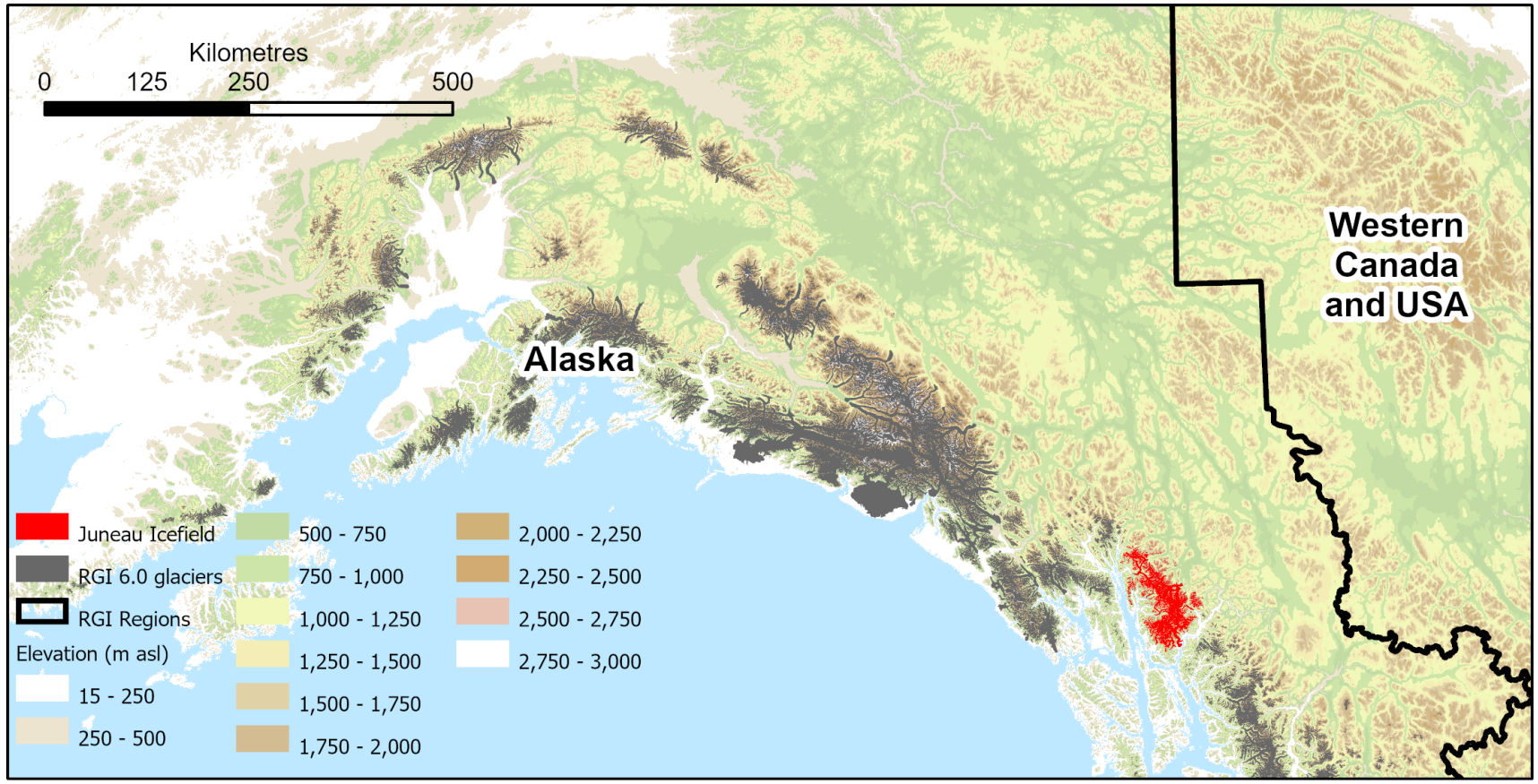
Juneau Icefield, Alaska



Aim: inventory glacier and glacial lake extent, structural characteristics and neoglacial (LIA) geomorphology, across Juneau Icefield, Alaska/BC

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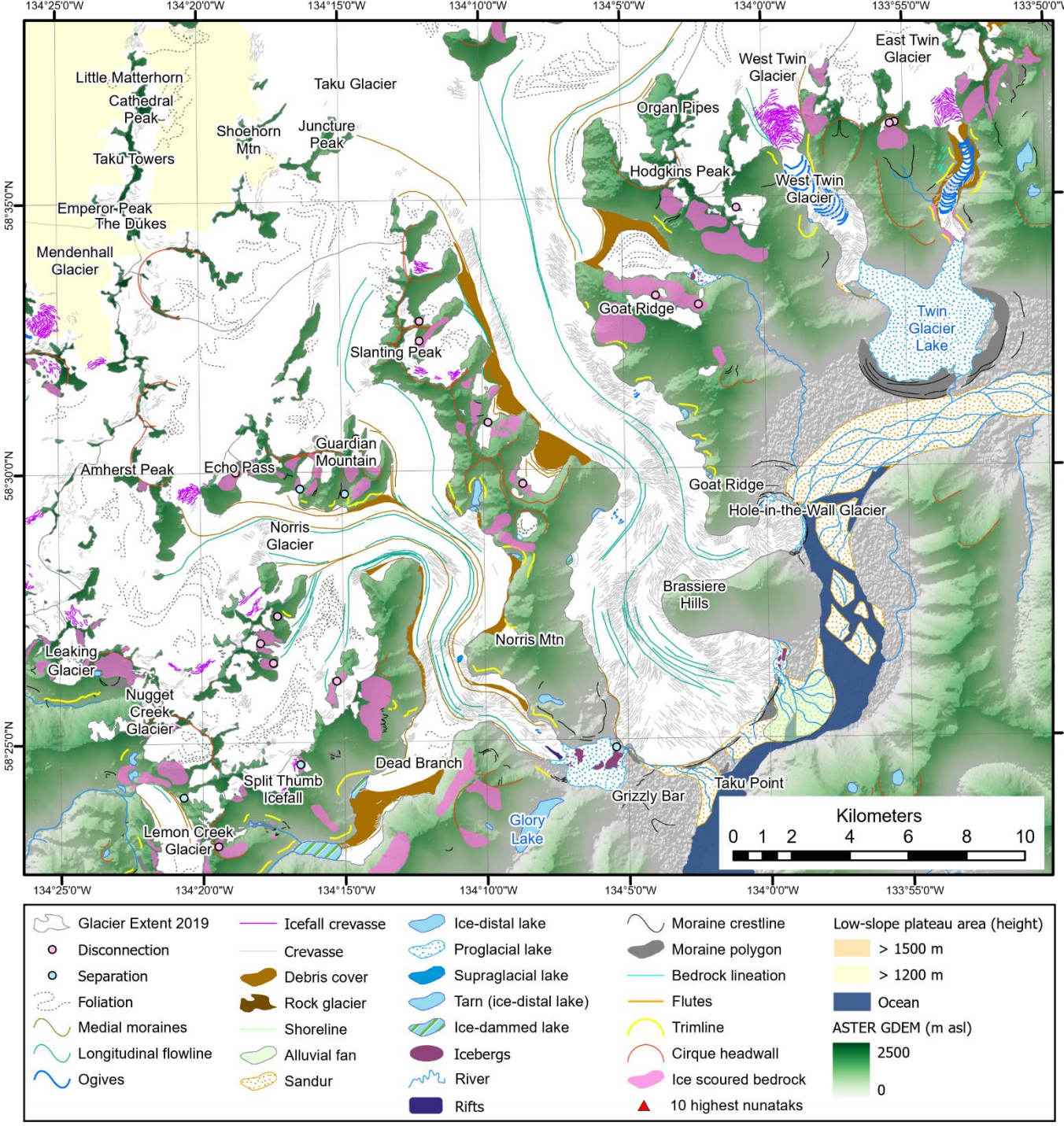
Davies et al., in press, ESPL

Structural glaciology

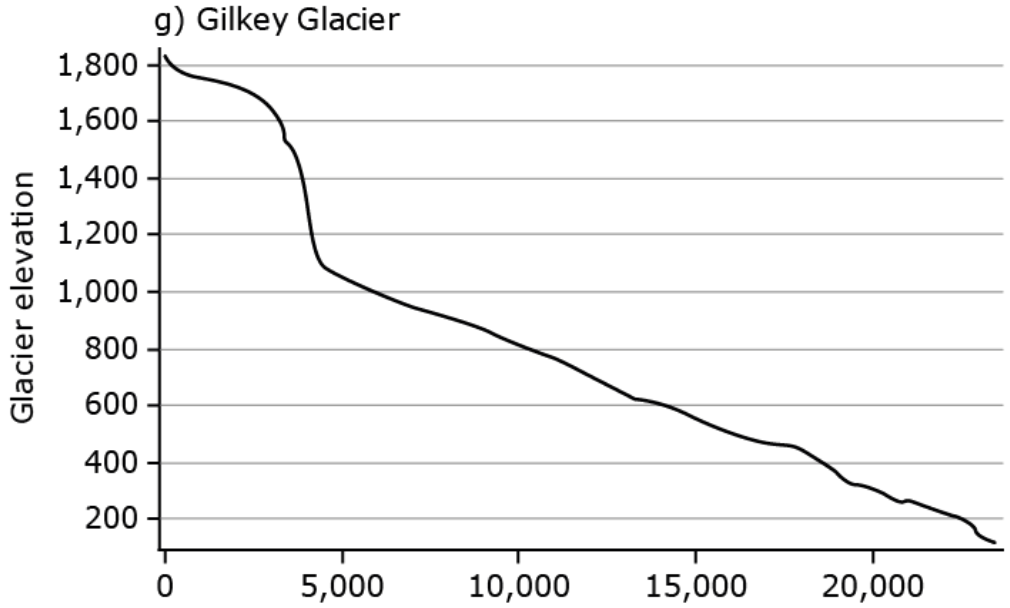
- >20 k structures, with elevation data
  - 16,352 crevasses in 2,387 heavily crevassed zones
  - 926 ogives
  - 348 longitudinal flowlines
  - 599 primary stratification



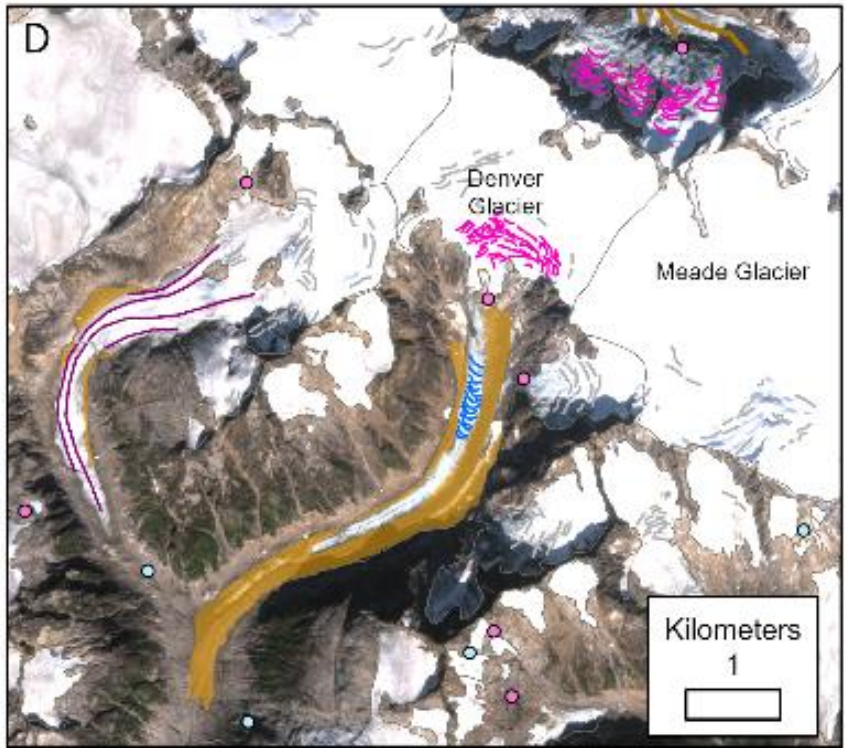
Structural glaciology

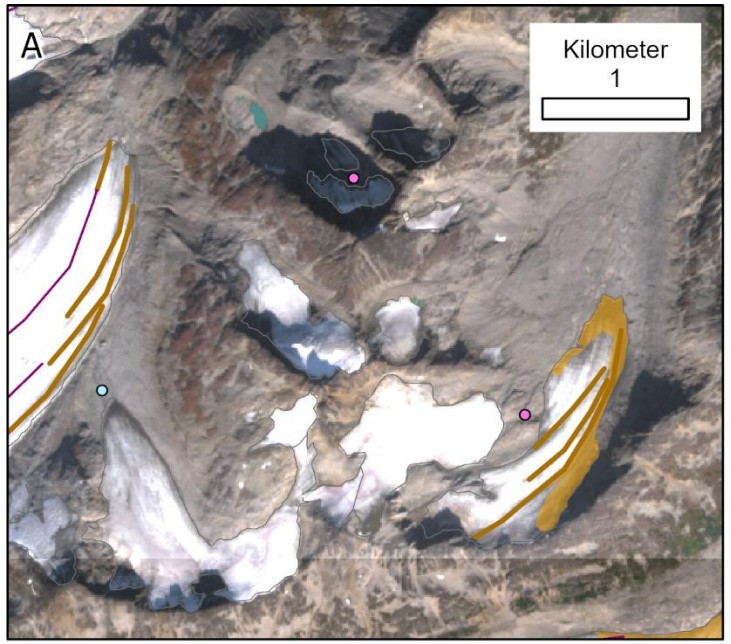
Gilkey Glacier

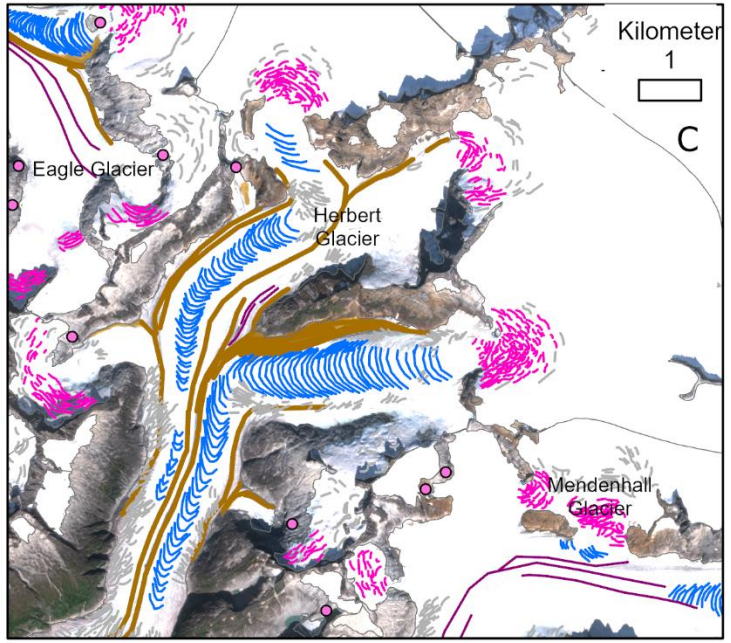
- 150 icefalls mapped on 55 glaciers
- Icefalls occur in region of steep slope around the plateau
- Mean elevation 1481 m

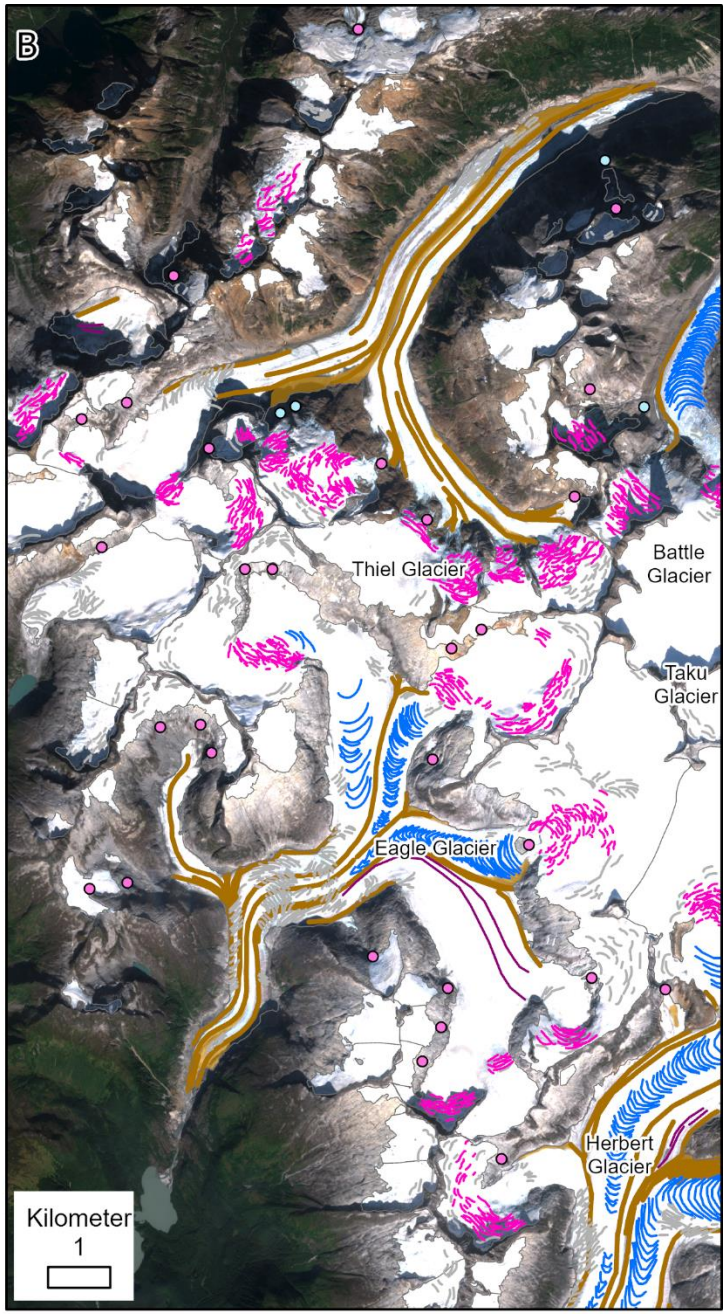


Glacier disconnections









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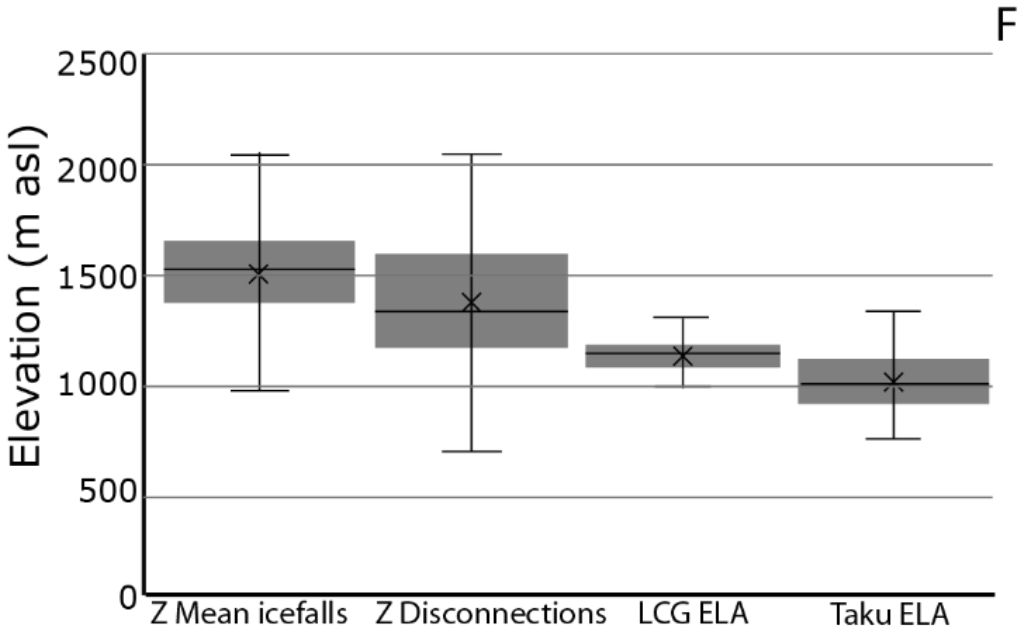
Davies et al., in press, ESPL

Glacier disconnections and glacier ELA

- ELAs (mean 1242 m) now increasingly intersect with icefalls (mean 1481 m)
- Increased ablation and thinning at the icefall → increased glacier disconnections.
- Mean elevation of disconnections: 1350 m (SD 283 m)



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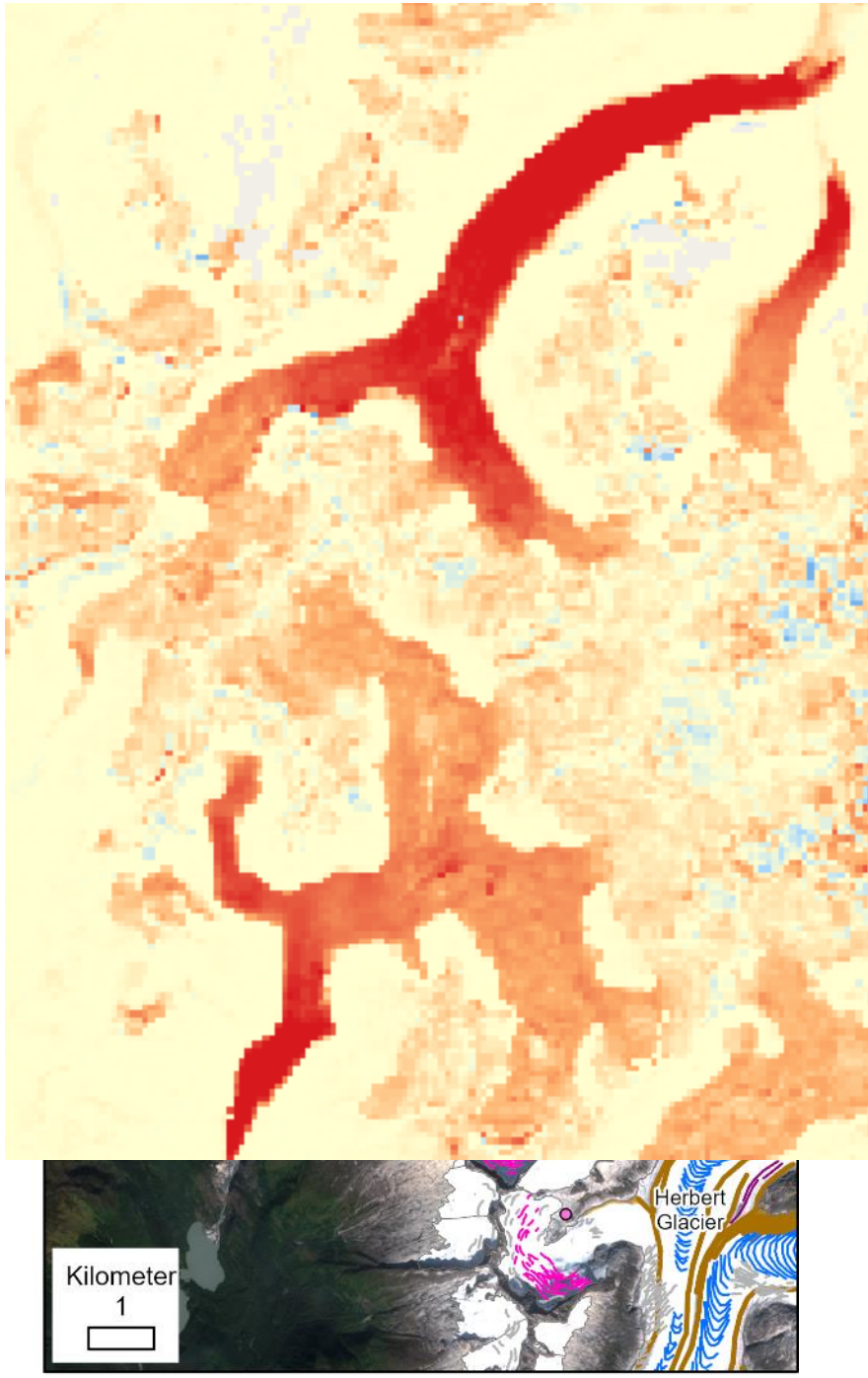
Davies et al., in press, ESPL

Glacier disconnections

- Increased debris cover down-ice of glacier disconnections (e.g., Thiel, Denver)
- Stagnation of ice (e.g. deformed longitudinal foliation)
- Increased thinning down-ice of disconnections (Hugonnet et al., 2021)



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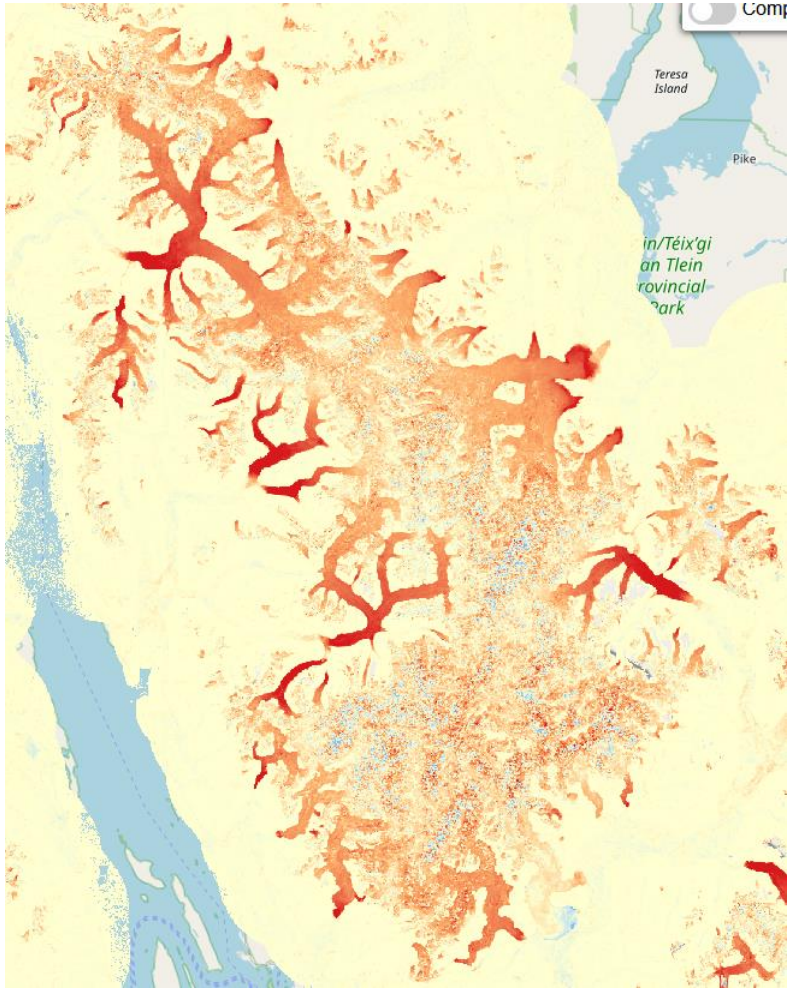
Topographic controls on glacier recession

- Warming trends: rising ELAs and thinning of glaciers in Juneau (cf. Hugonnet et al., 2021).
- Glacier disconnections at peripheral glaciers:
  - increased fragmentation
  - decreased down-glacier nourishment
  - Stagnation and downwasting of ice below disconnections
- 13 of the 40 outlet glaciers from the plateau have ablation zones joined to the plateau via icefalls
- Increased ablation of glacier tongues, especially on thinner glaciers with icefalls, is likely to increase, driving further icefield fragmentation.



Glacier elevation change, 2000-2019
Hugonet et al., 2021

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