Englacial Architecture of Lambert Glacier.

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Abstract:

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*Image supplied by Sydney Kirkby, 2018

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Outstanding Student & PhD candidate Presentation contest

Aims	Background	Methods	Results	Conclusions

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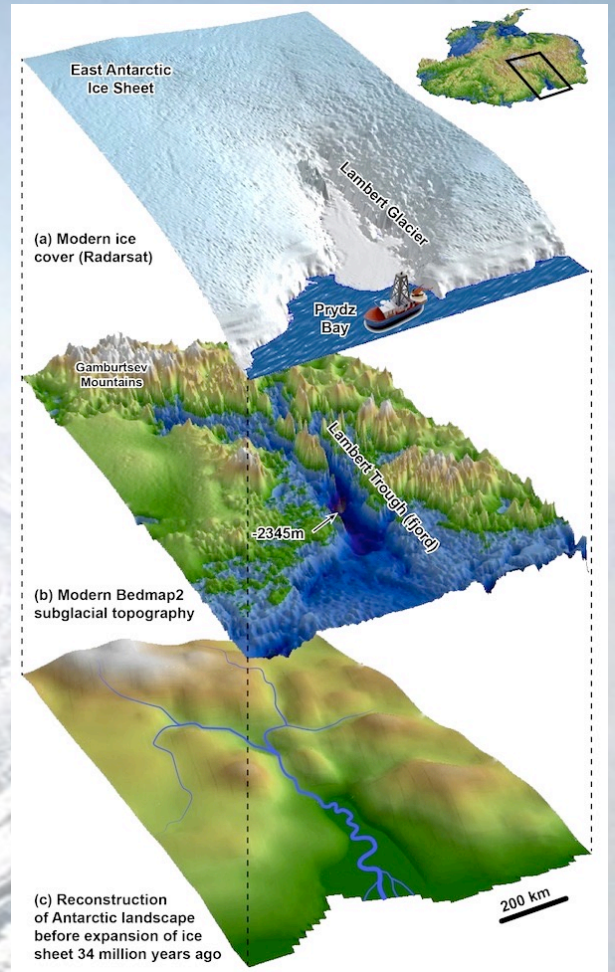
Aim: Evaluate the relationship between englacial architecture and ice flow of the Lambert Glacier catchment.

Objectives:

- Analyse radio-echo sounding data using the Internal Layer Continuity Index (Karlsson et al., 2012).
- Examine the relationship between englacial layers, bed topography, ice flow and surface features.
- Assess how englacial layers in the Lambert Glacier catchment reflect past and present ice dynamics in East Antarctica.



(Thomson et al., 2013)

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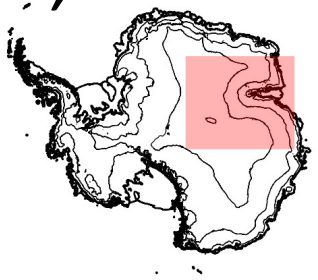
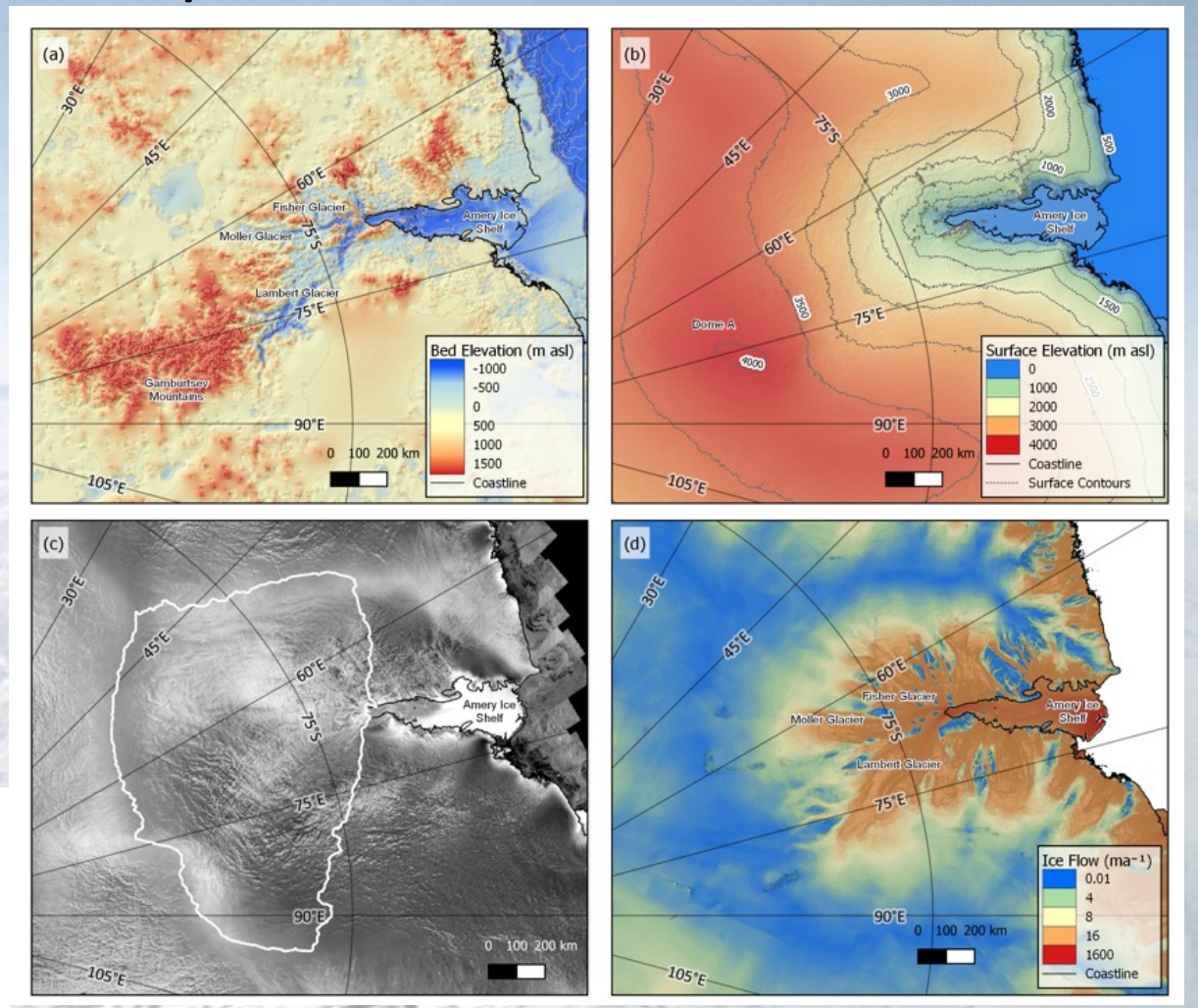
Why is Lambert Glacier important?

- Highly convergent flow pattern that drains ~16% of the EAIS.
- Sustained **Positive** mass balance (Allison 1979, Fricker et al., 2017, Cui, 2020).
- 8m SLE from the Amery catchment (Rignot et al., 2019).





a) Bed elevation (Morlighem et al., 2020) b) Surface elevation (Howat et a., 2019) c) RADARSAT imagery (Jezek et al., 2013) d) Ice velocity (Mouginot et al., 2019) (Sanderson et al., in prep)

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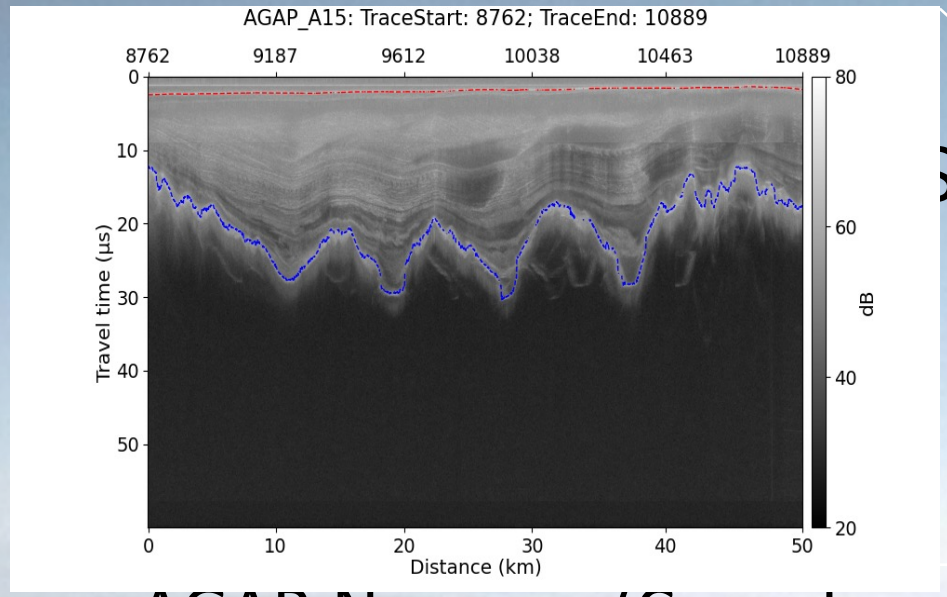

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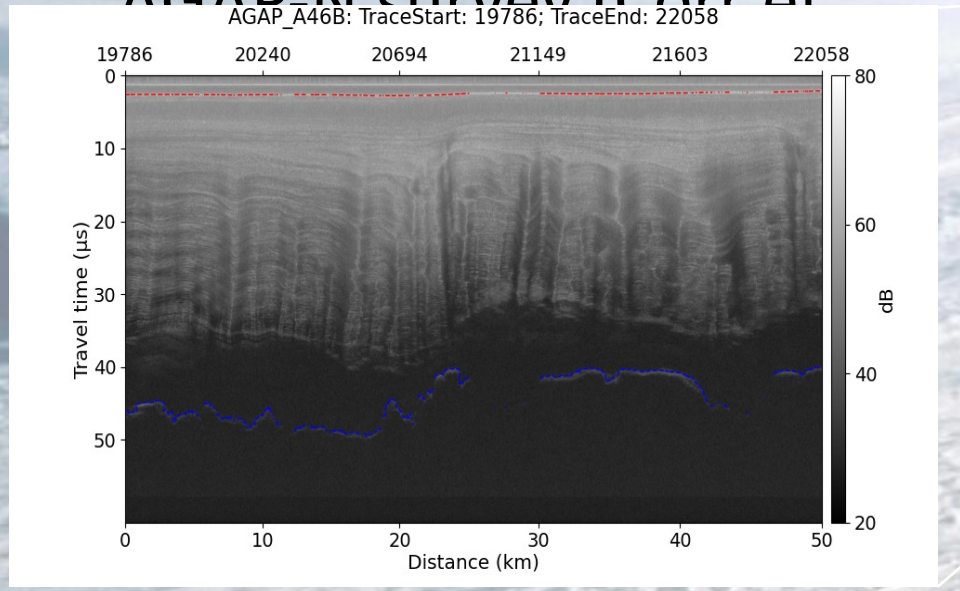

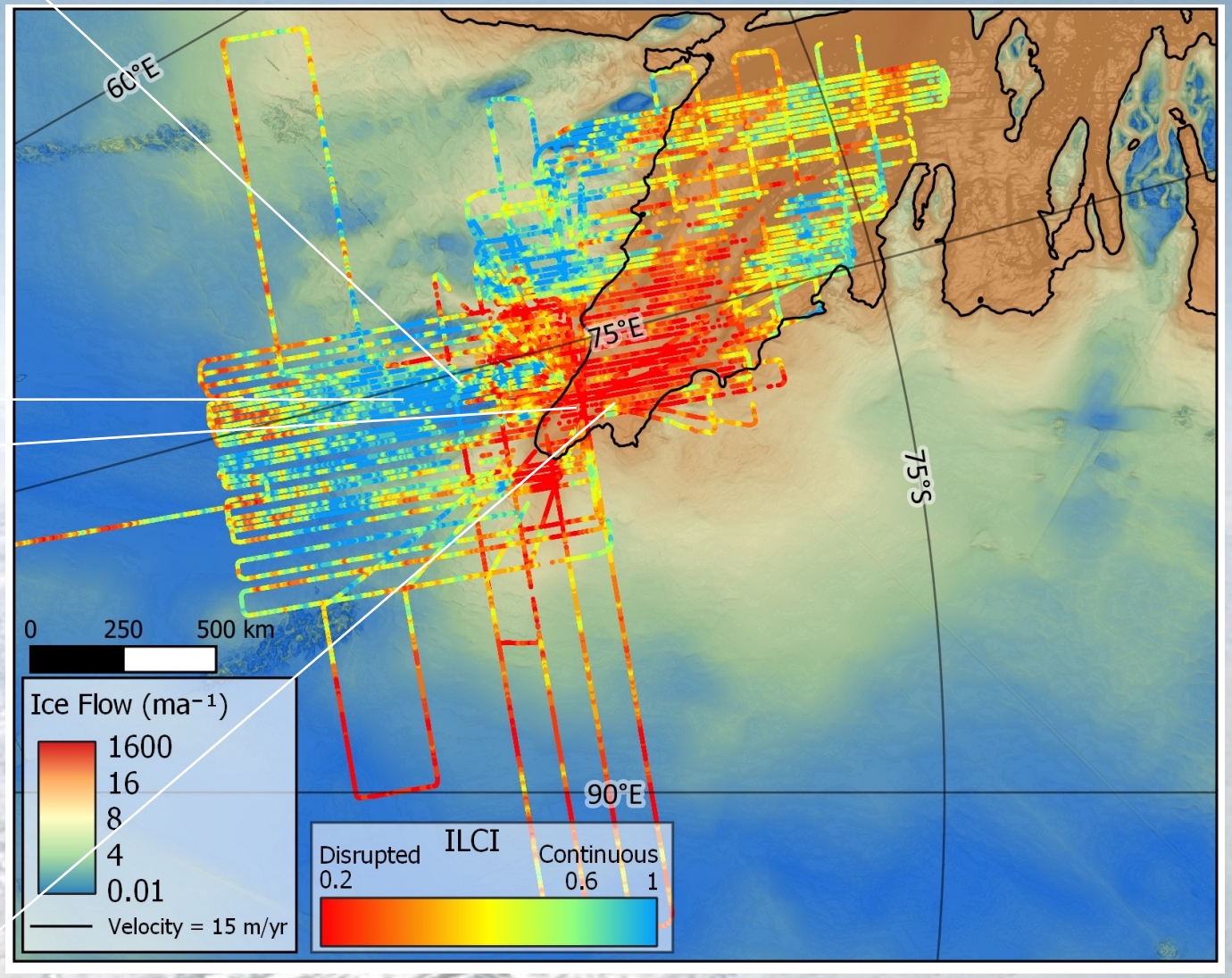

Ice velocity (Mouginot et al., 2019) (Sanderson et al., in prep)

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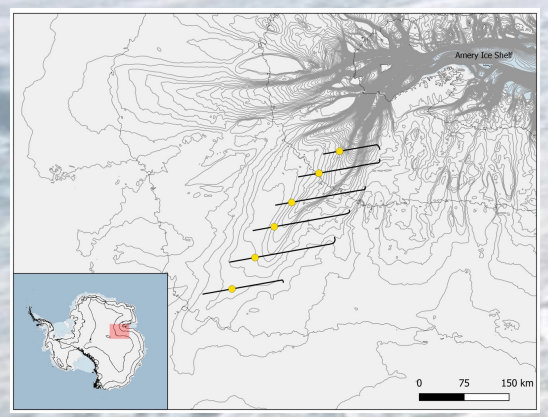
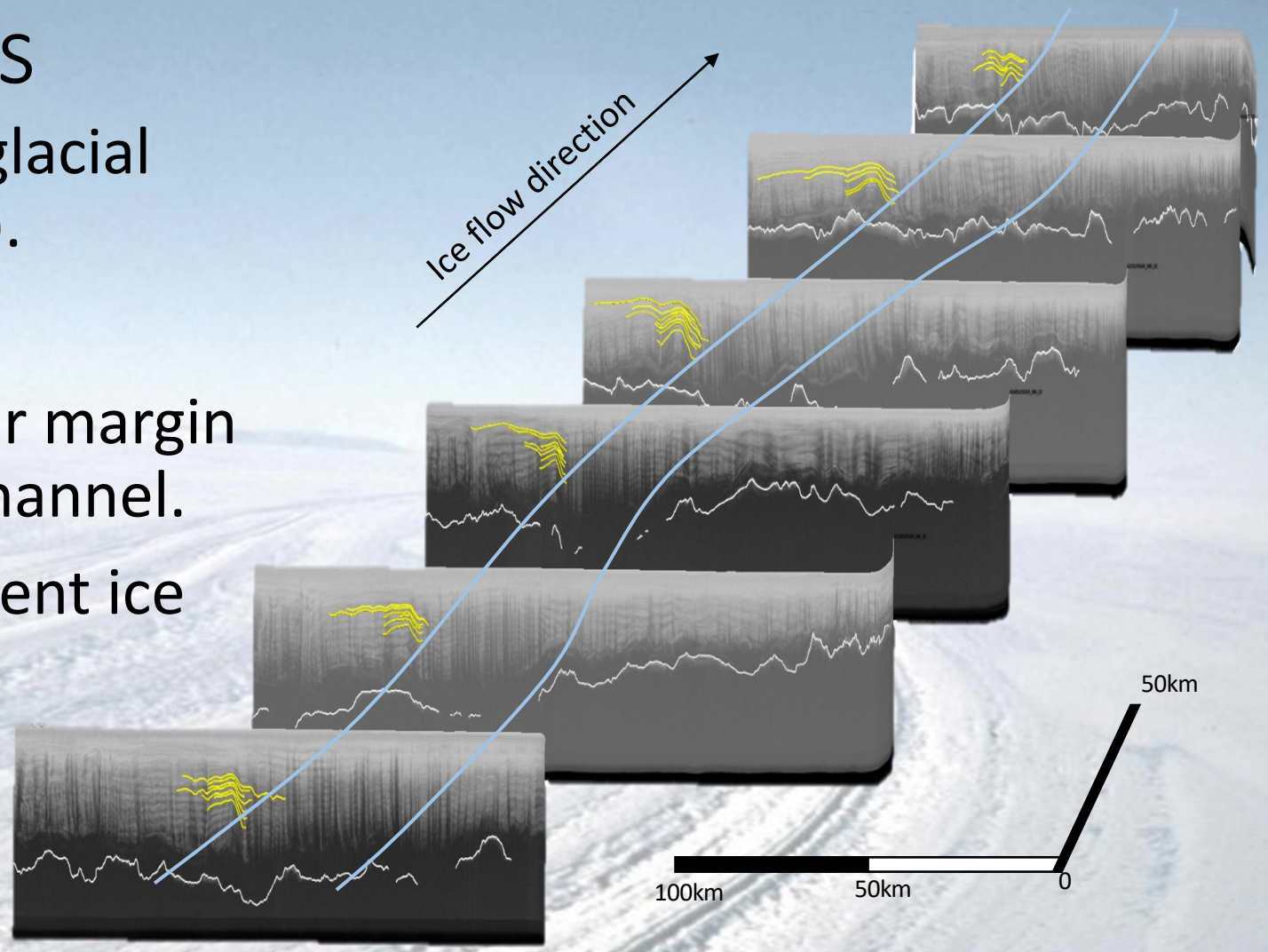
Englacial features

- Persistent large scale englacial folding (yellow on figure).
- Fold traced for 360 km.
- Located adjacent to shear margin of the central Lambert channel.
- Formed through convergent ice flow?





(Sanderson et al., in prep)

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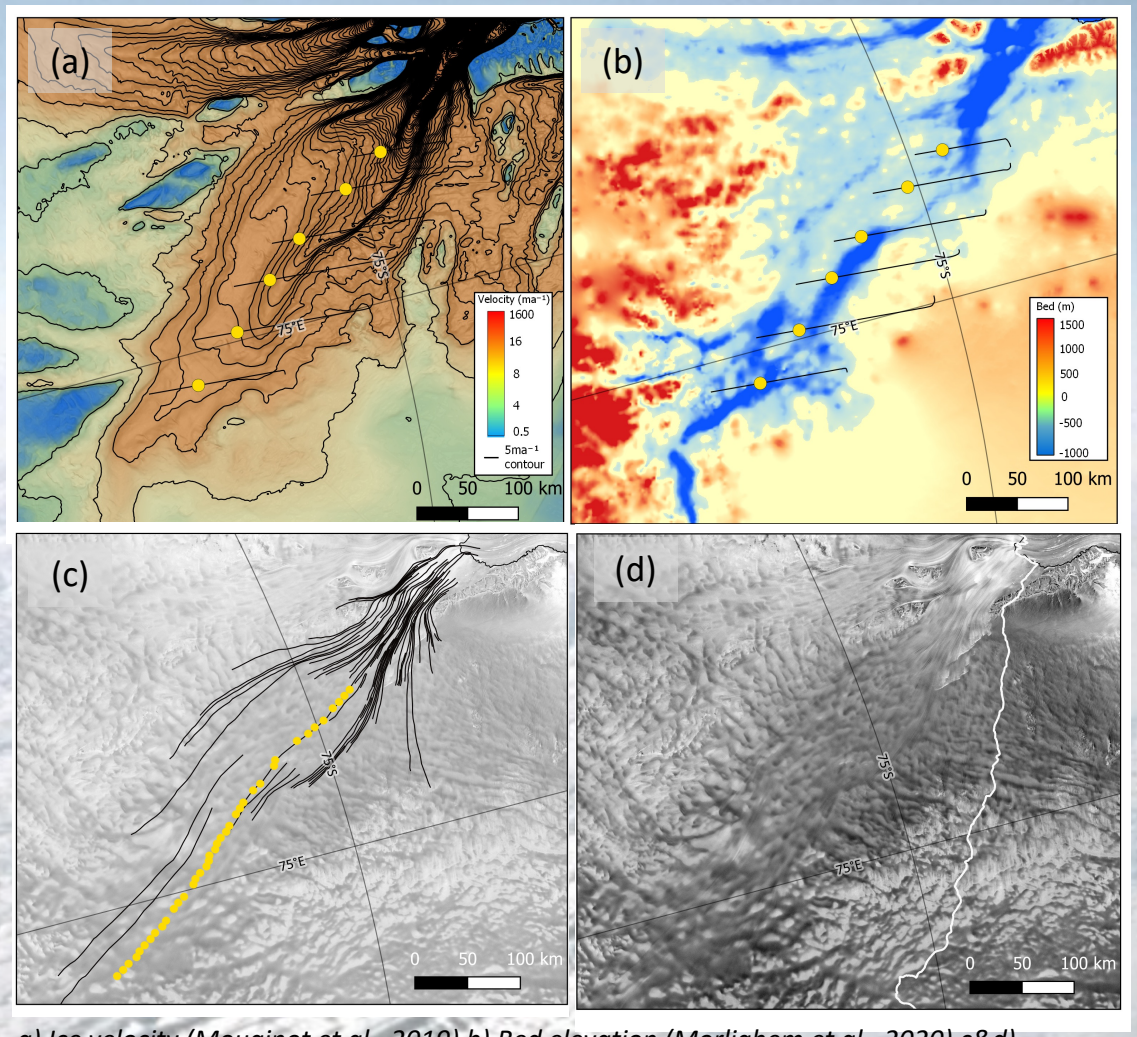
Possible controls on englacial structure

- Spatial coincidence between the fold and a surface flow line.
- The fold is located at steep velocity and bed topography gradients.
- Persistence of the shape and orientation of fold over the distance suggests stability of ice flow throughout the Holocene (10-11ka).



a) Ice velocity (Mouginot et al., 2019) b) Bed elevation (Morlighem et al., 2020) c&d) RADARSAT imagery (Jezek et al., 2013) (Sanderson et al., in prep)

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Conclusions

- Significant wide-spread disruption of englacial layers at the onset of the Lambert Glacier. As well as evidence of a sliding onset upstream of enhanced flow (>15 ma^{-1}).
- The englacial architecture is consistent with current ice flow.
- Persistent englacial features formed from flow dynamics demonstrate long term ice flow stability over the Holocene.
- Understanding these complex features can help to refine ice sheet models by incorporating long term observational records.