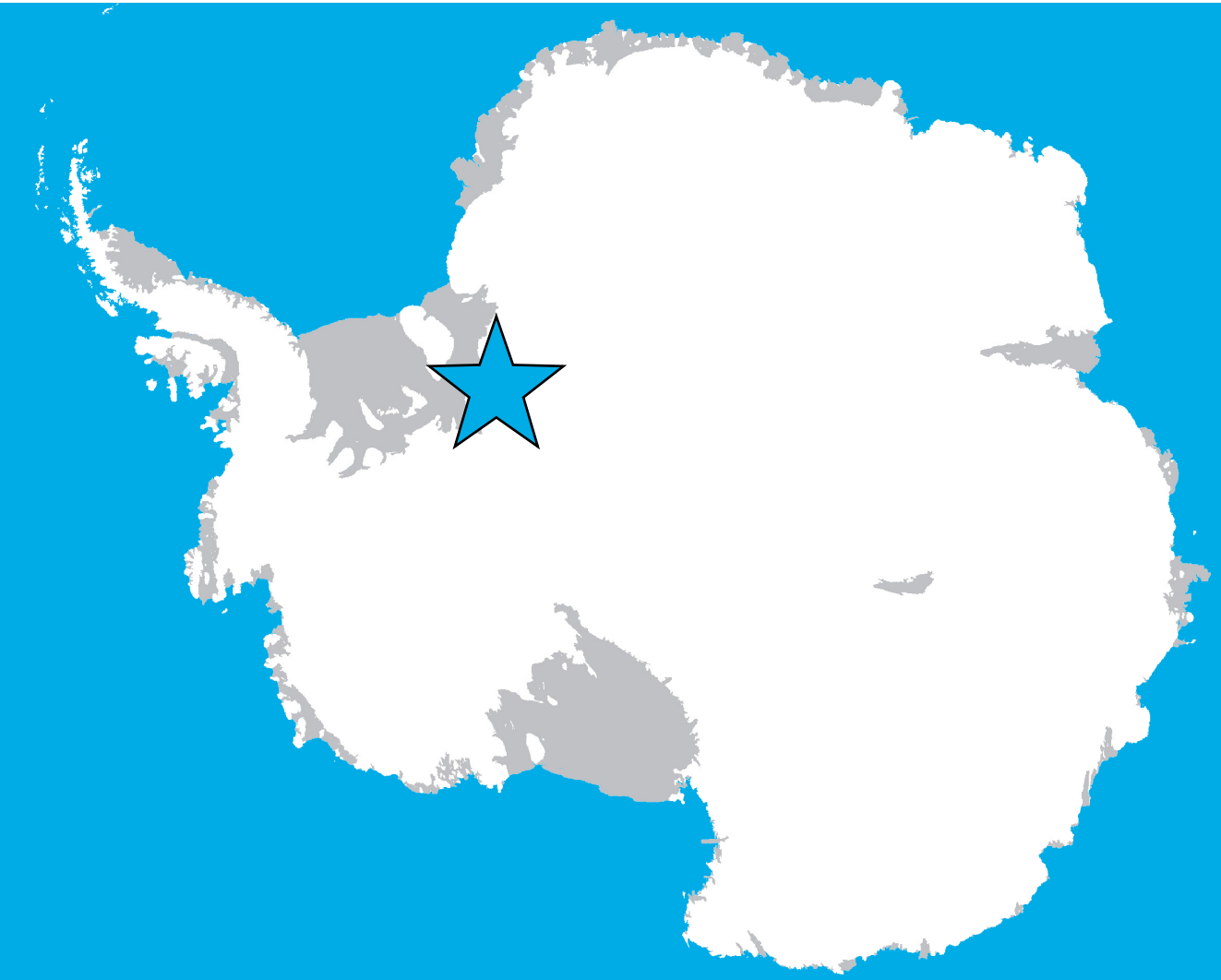


The evolution of a basal melt channel on the southern Filchner Ice Shelf



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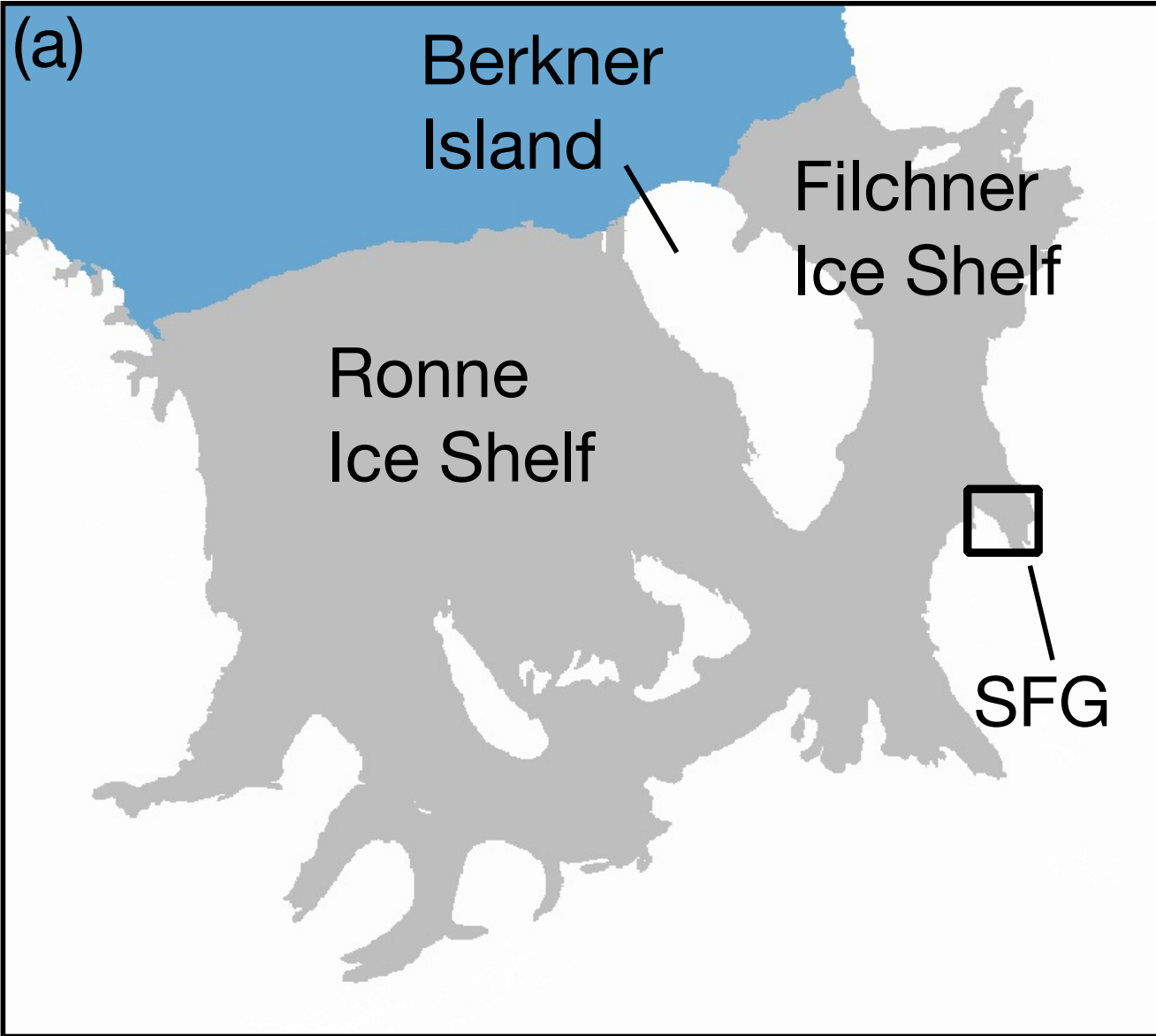
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⁶ Division of Continuum Mechanics, Technical University of Darmstadt, Darmstadt, Germany

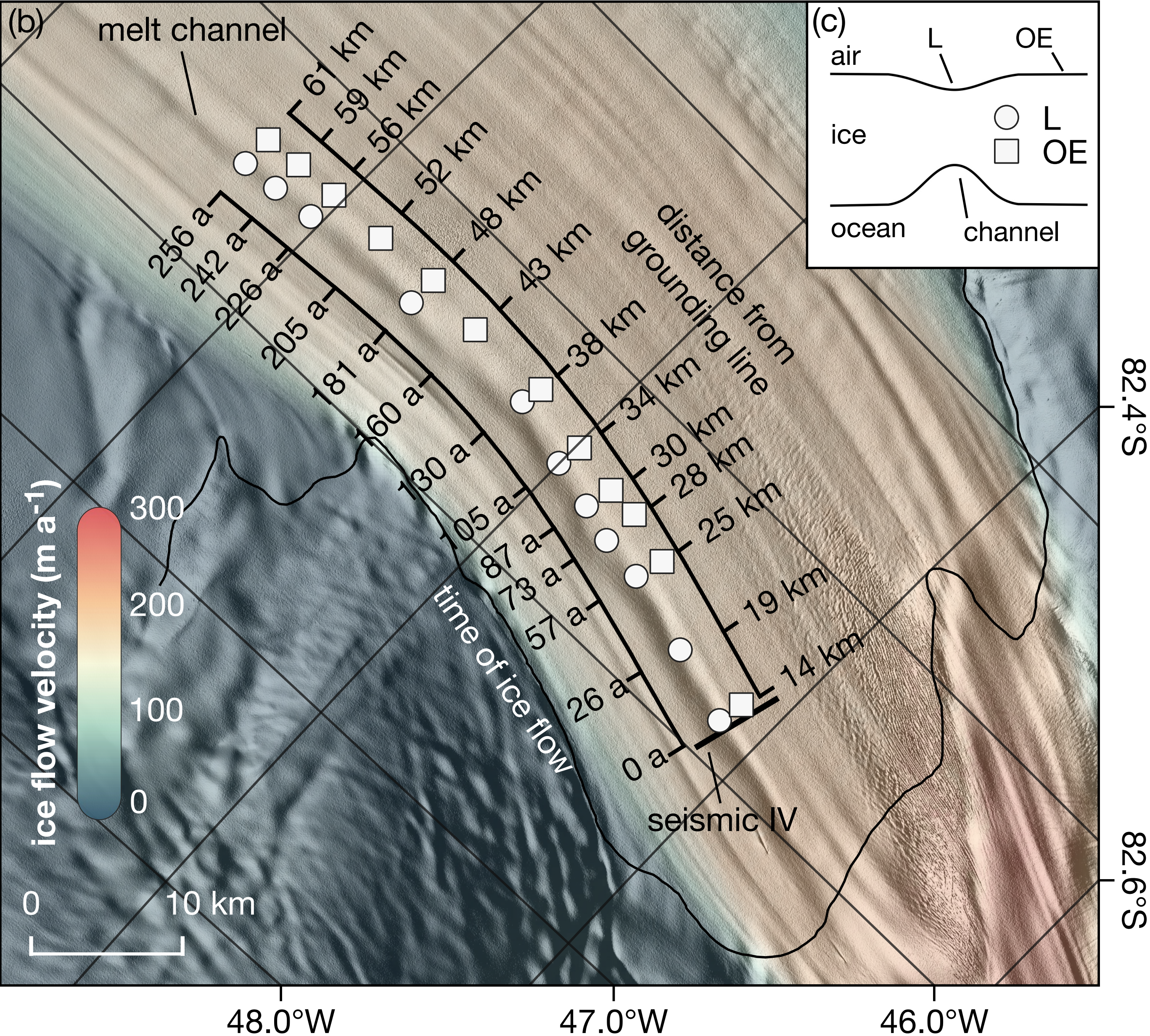
The Cryosphere
Preprint



Observations | phase-sensitive radar (pRES) measurements



Repeated **pRES** measurements from 2015/16 and 2016/17 at the lowest surface elevation (**L**) and outside east (**OE**) of the channel.



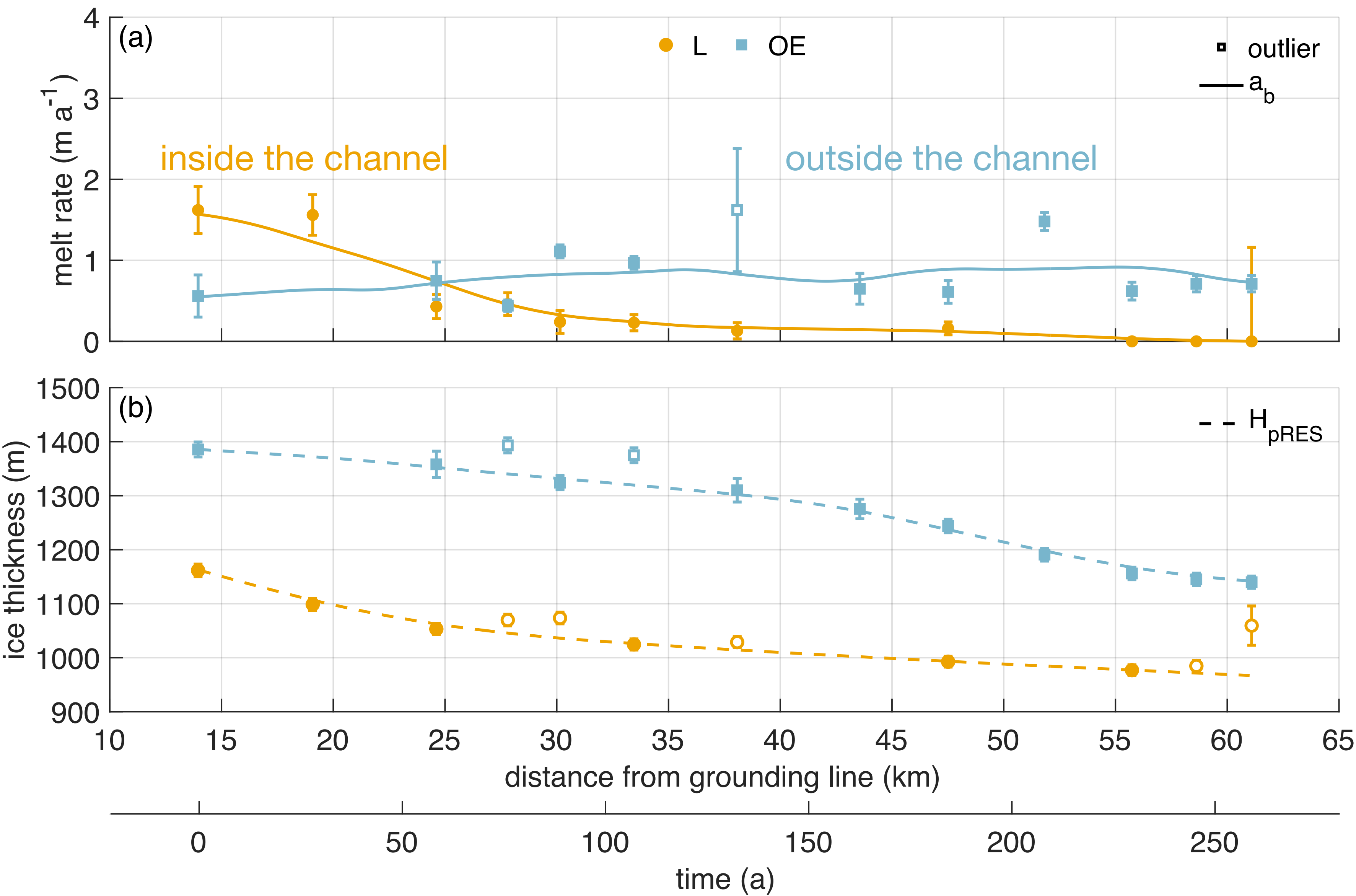
Observations | phase-sensitive radar (pRES) measurements



Finding 1:

At ~25 km from the grounding line:

- Melt rates inside the channel < outside
- Height of the channel starts to decrease



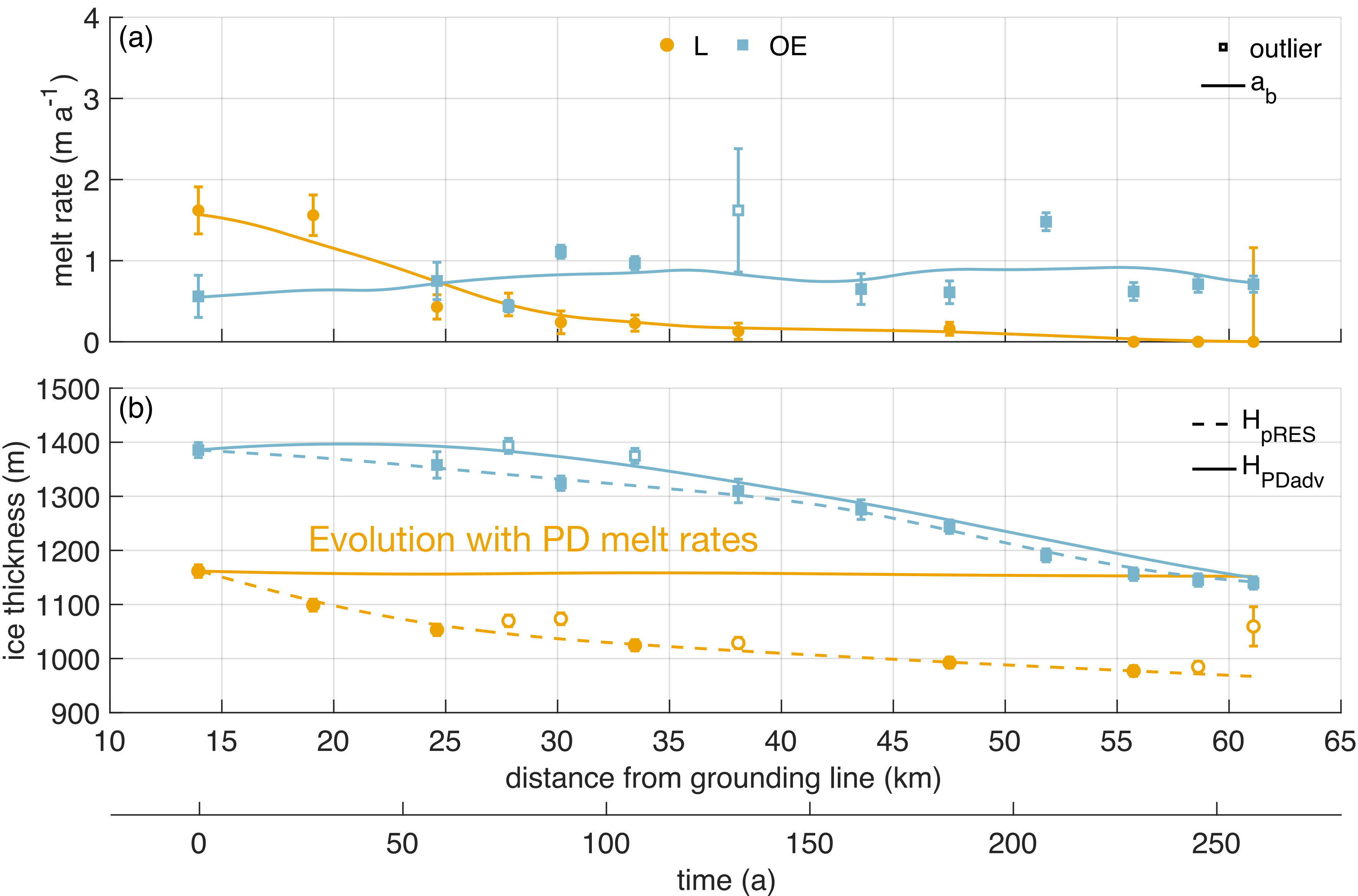
Observations | phase-sensitive radar (pRES) measurements



Finding 2:

Channel evolution over 250 years under present-day melt rates:

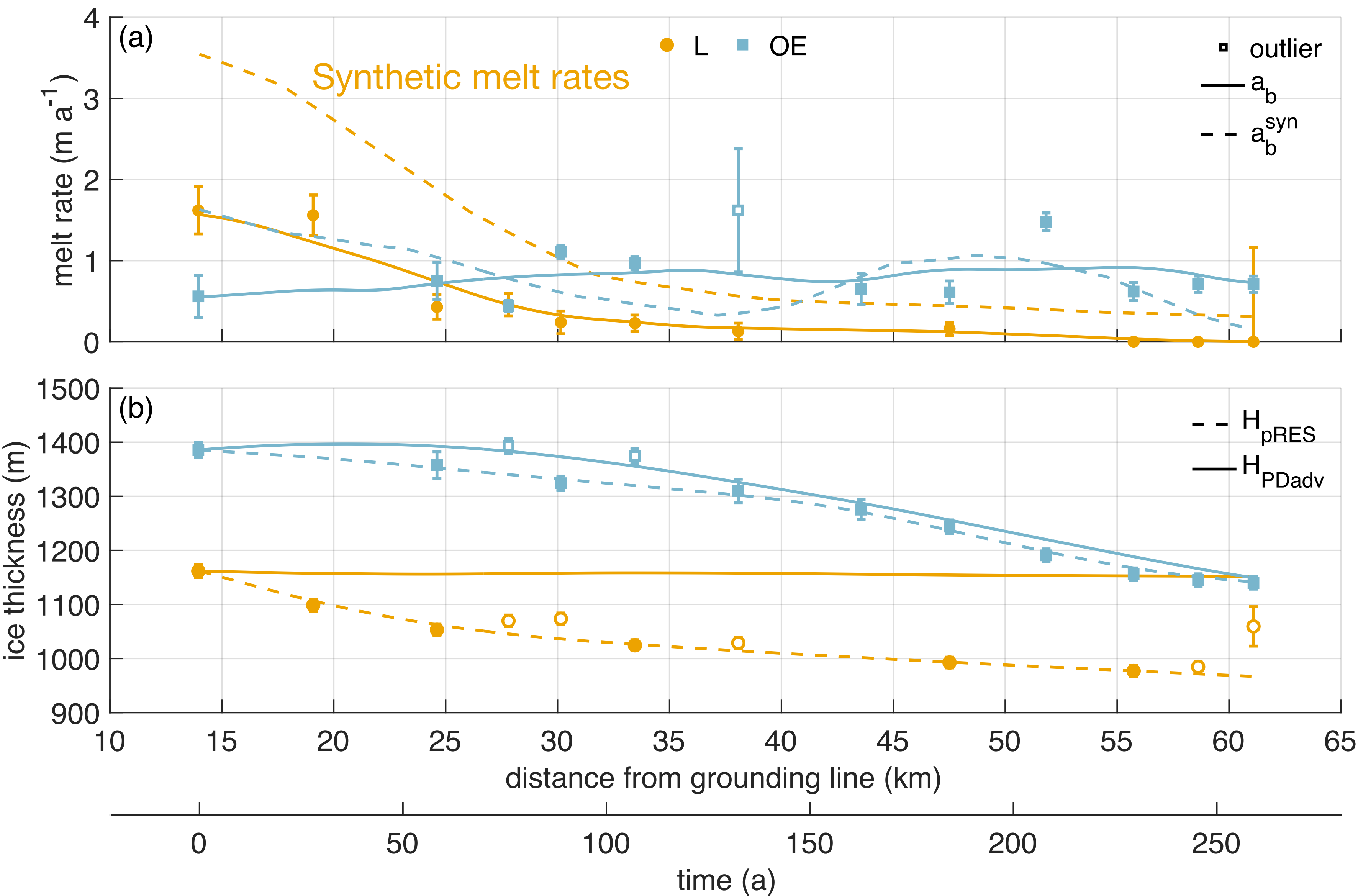
- Mismatch to present geometry!
- Closure of the channel



Observations | phase-sensitive radar (pRES) measurements



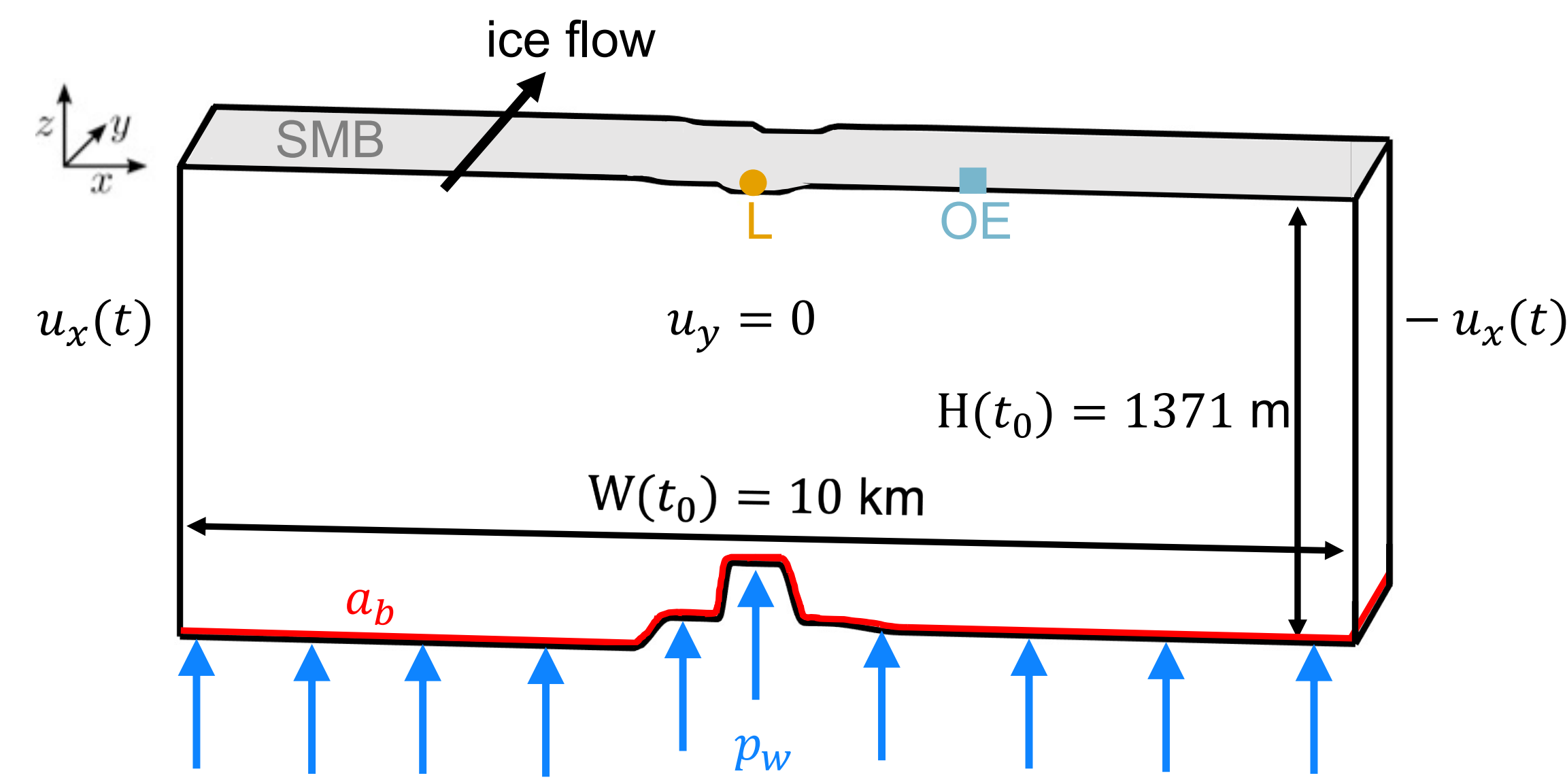
Finding 3:
Twice as high melt rates in the channel would have needed to form today's channel geometry!



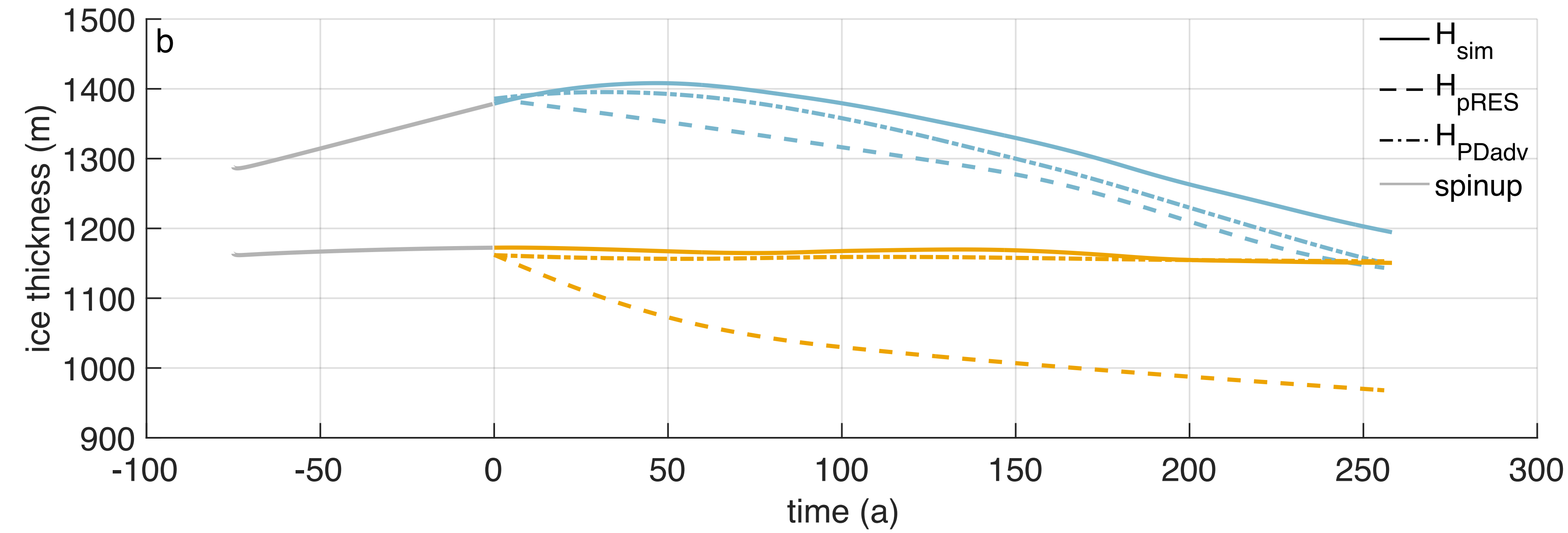
Finding 4:

Viscoelastic modelling confirms observations:

- Present-day melt rates lead to a closure of the channel



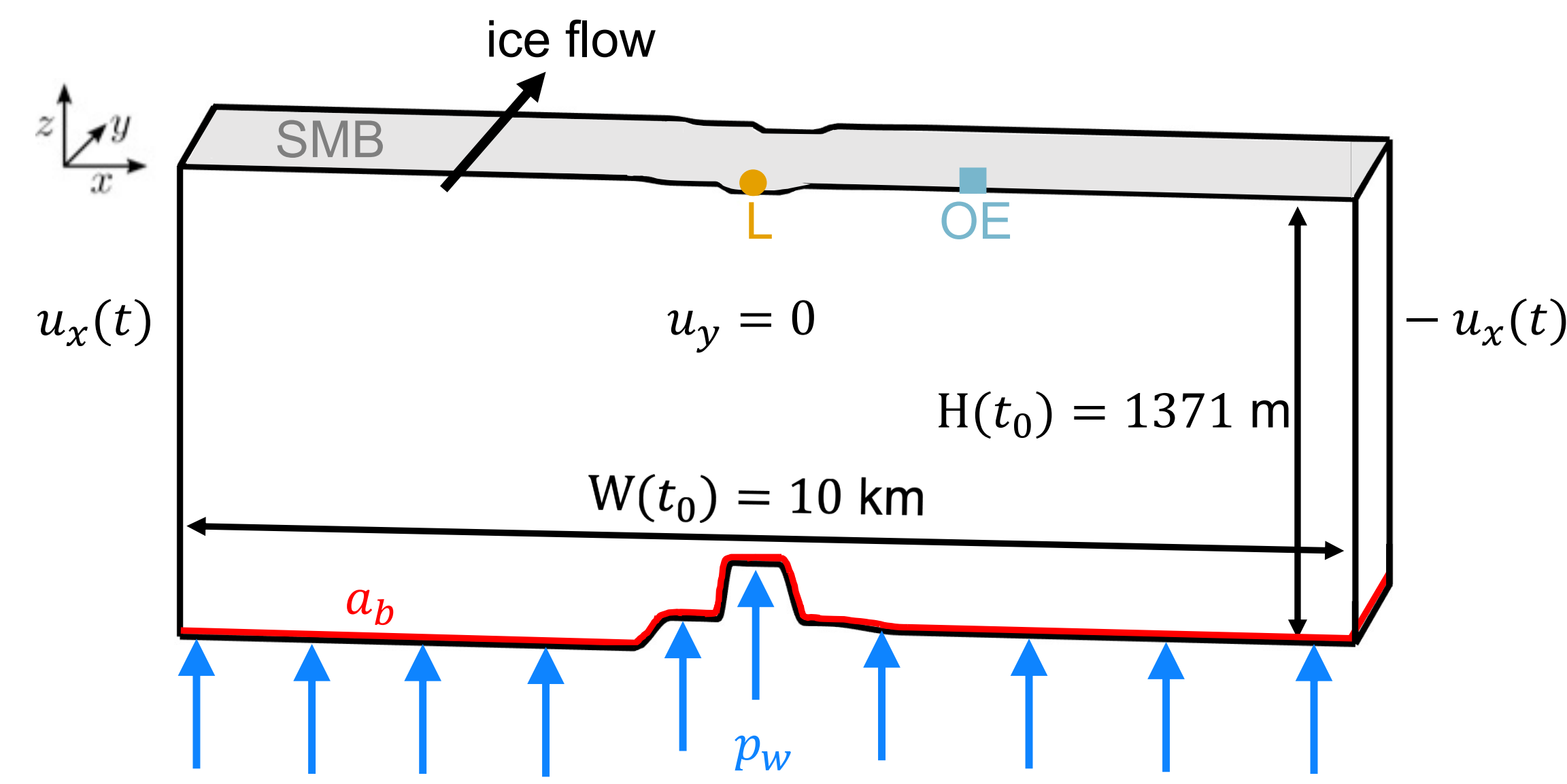
Observed melt rates



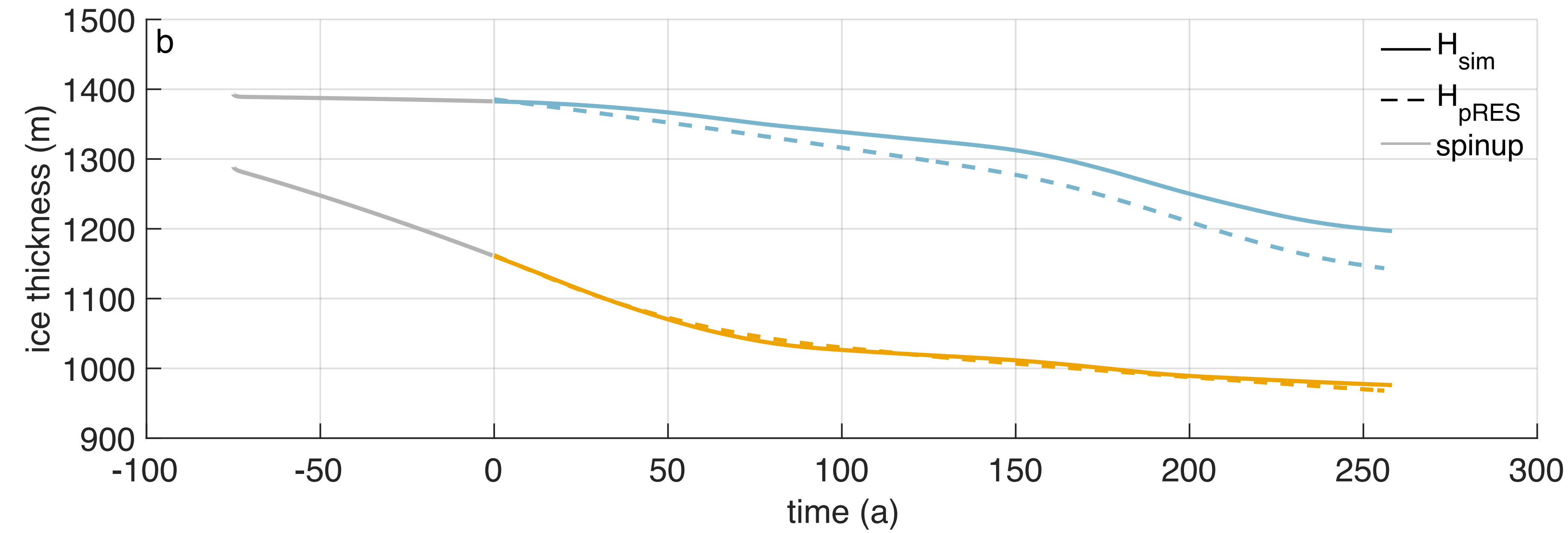
Finding 4:

Viscoelastic modelling confirms observations:

- Present-day melt rates lead to a closure of the channel
- Synthetic melt rates reproduce current channel geometry



Synthetic melt rates



Present-day melt rates inside the channel are below average and result in closure of the channel.



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Abstract (OSPP)



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