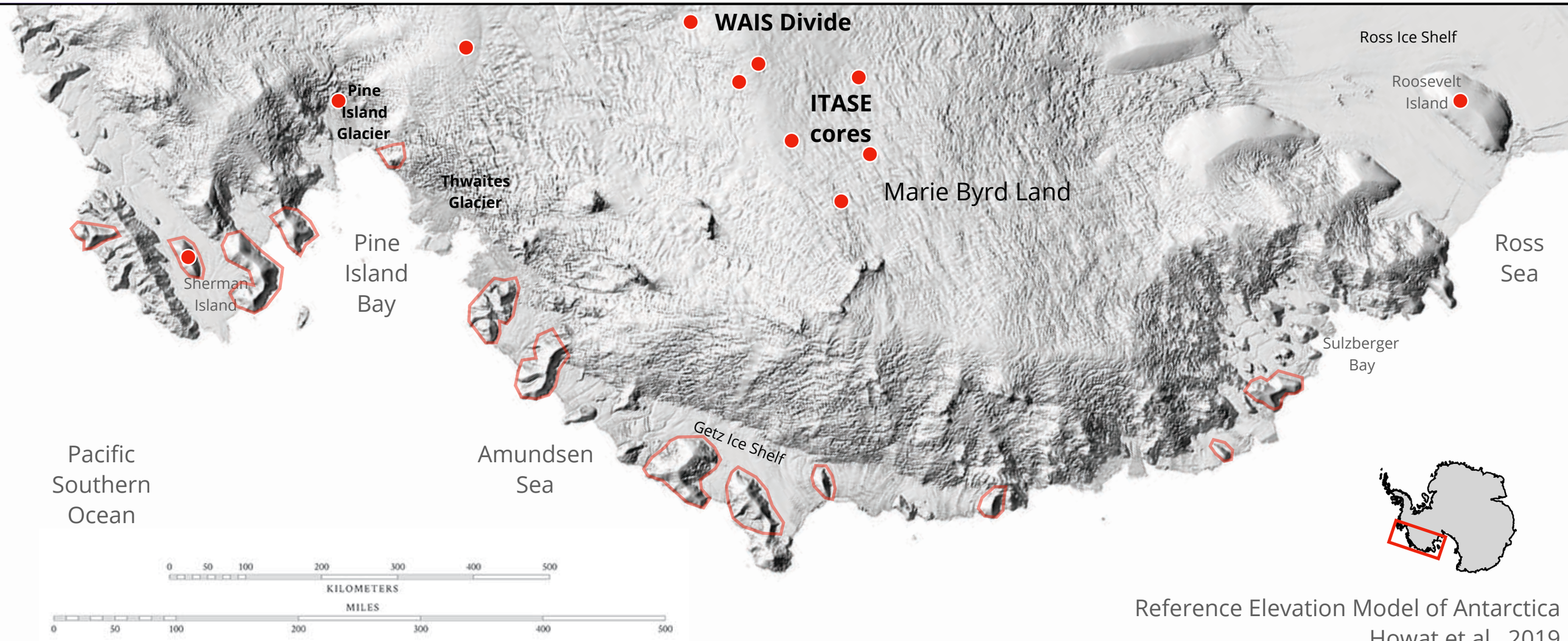
West Antarctic coastal ice cores

High-fidelity records of atmosphere-ocean forcing on outlet glaciers

UNIVERSITY OF MINNESOTA (Aug. 2020)

Peter Neff
@peter_neff



Reference Elevation Model of Antarctica
Howat et al., 2019

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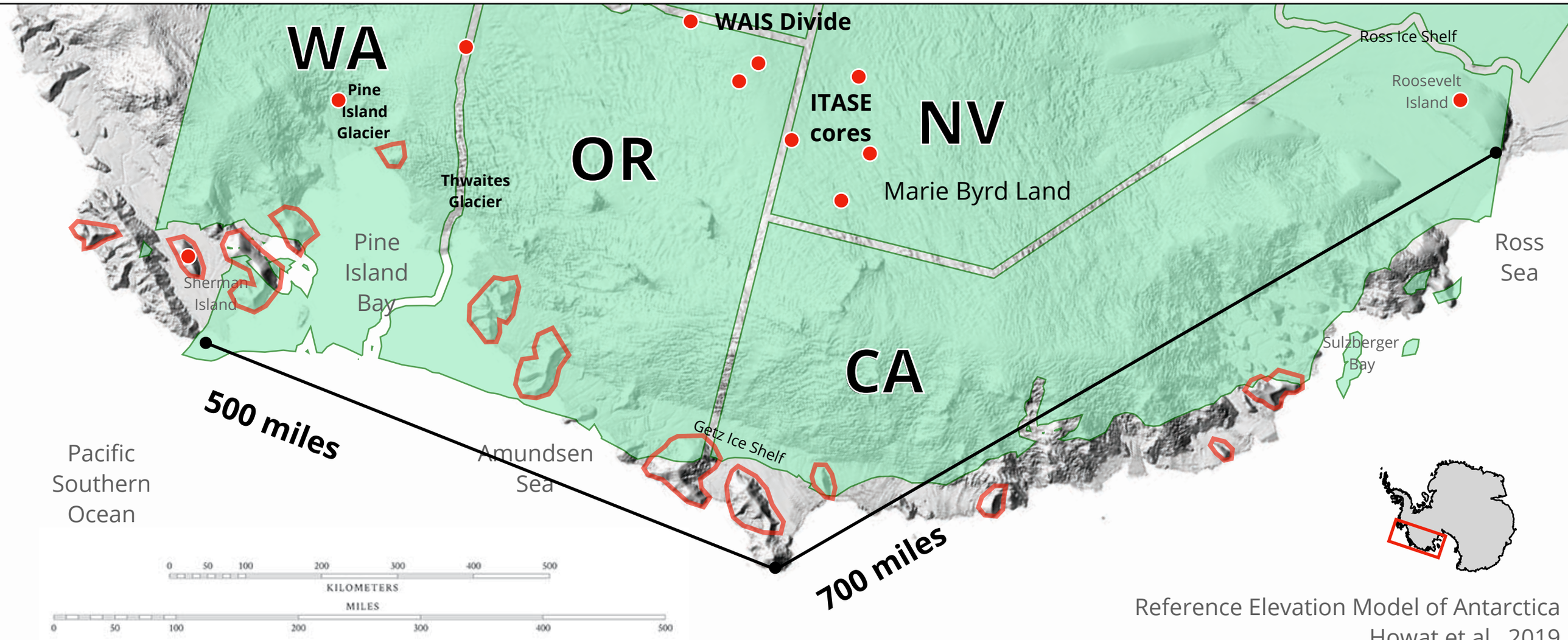

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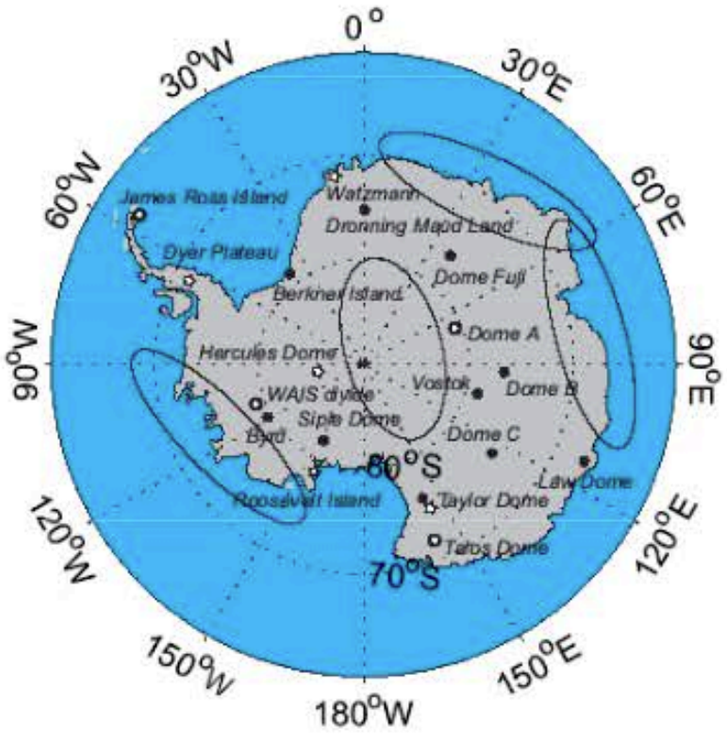
WAIS Coastal Cores

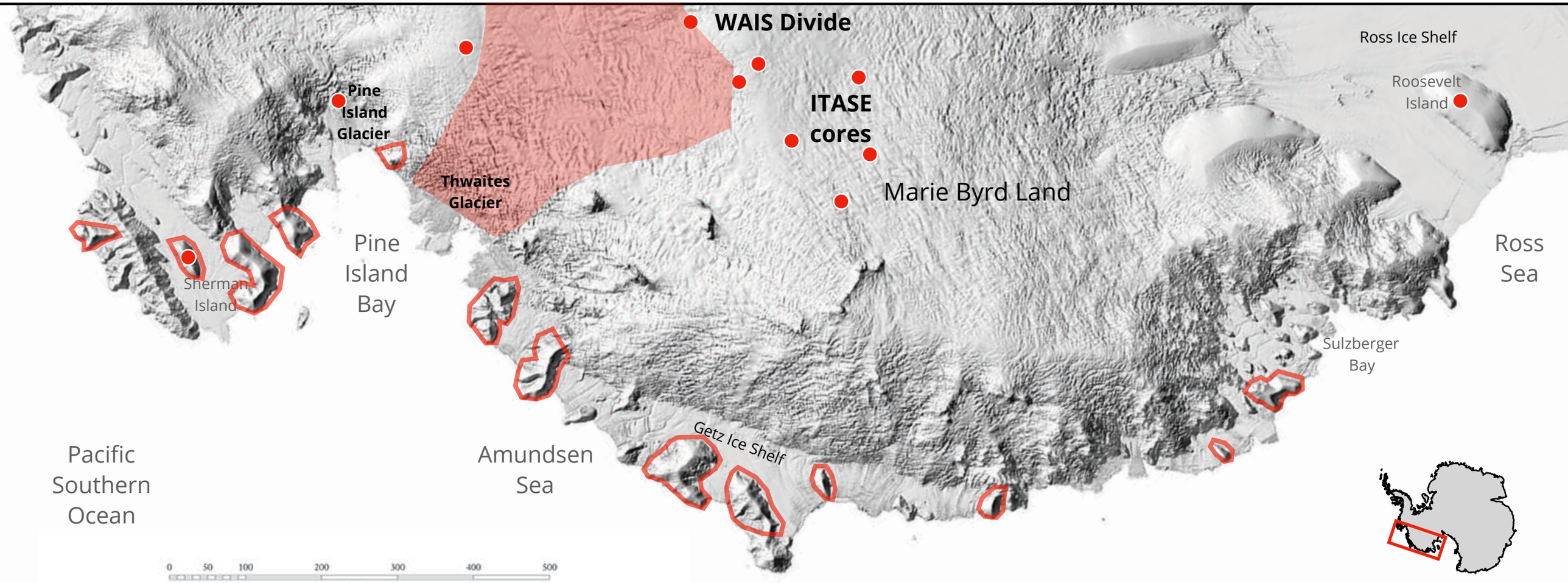
Infill sparse sampling

Capture coastal dynamics
(Accum., temp., melt gradients)

PIG / Thwaites thinning
Centennial ocean-atmosphere forcing



IPICS 40k Array white paper



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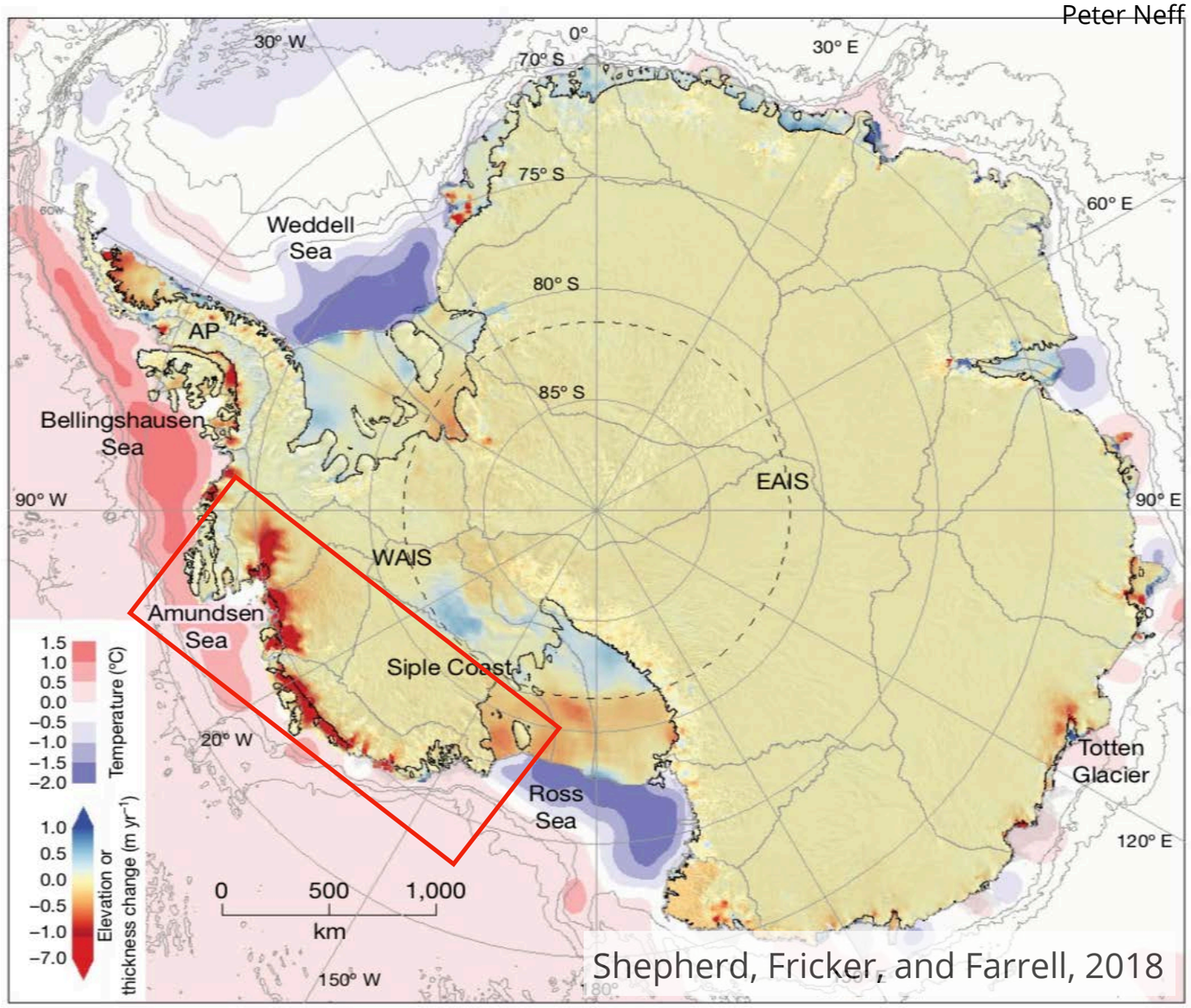
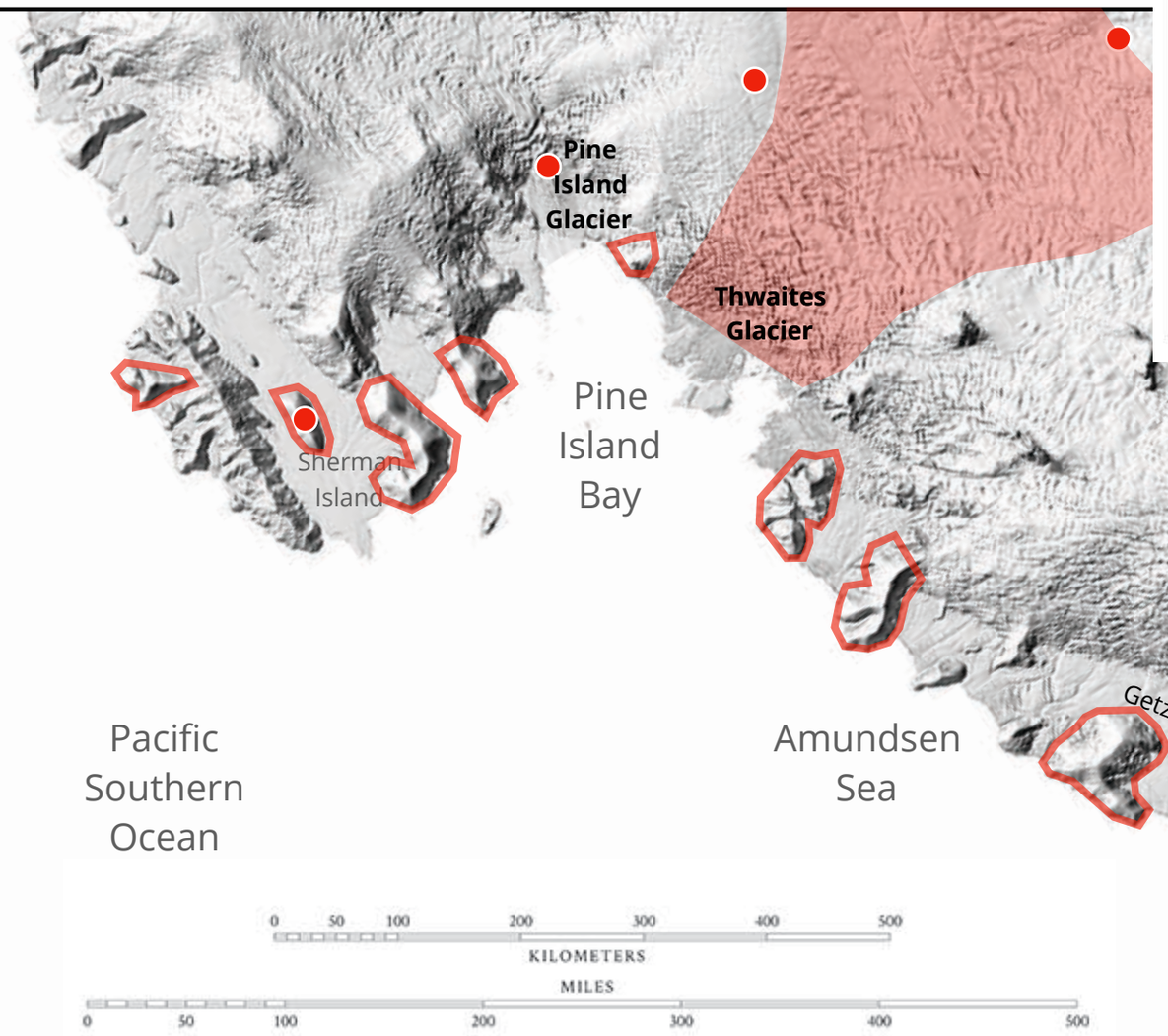


Shepherd, Fricker, and Farrell, 2018



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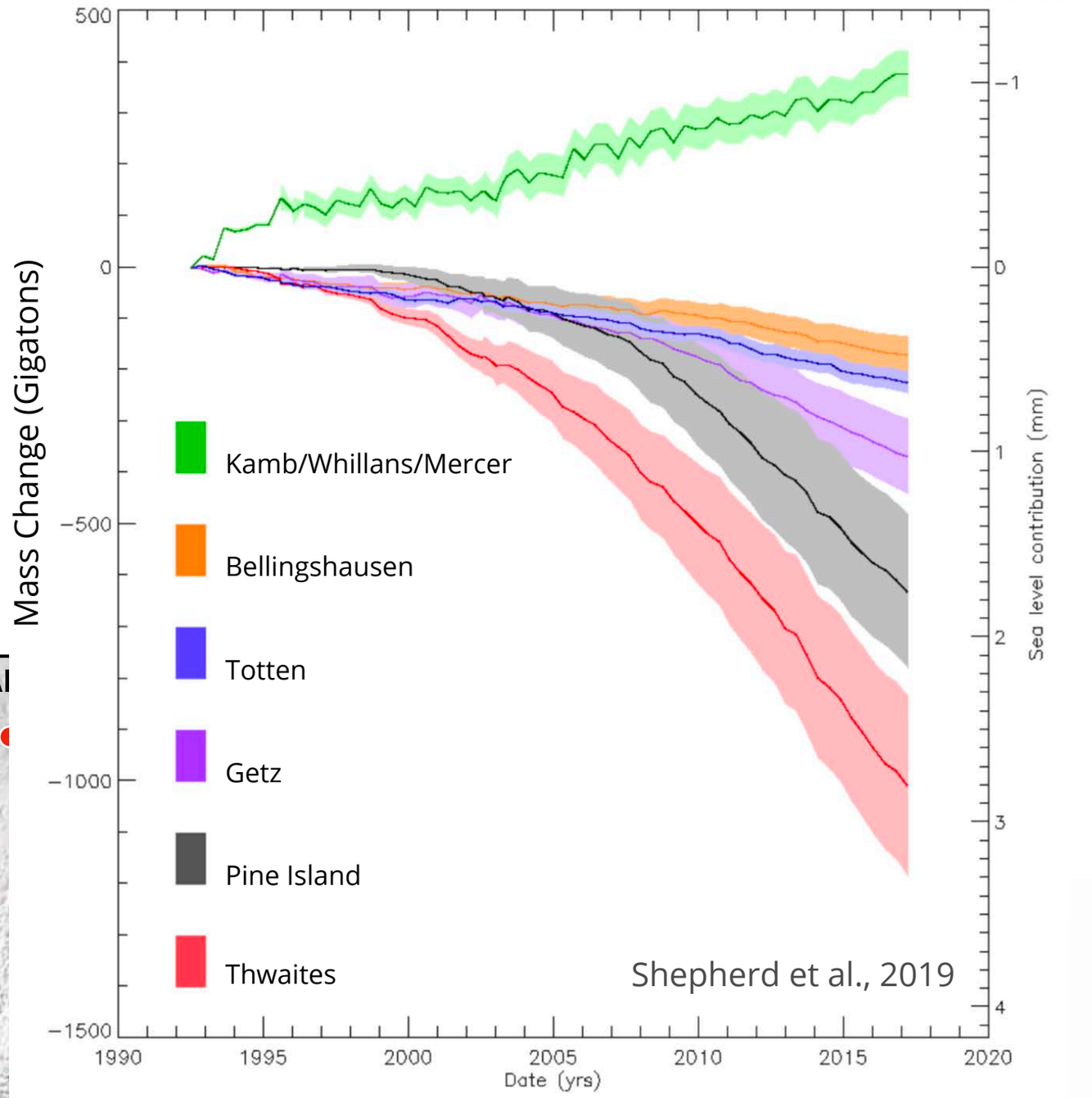

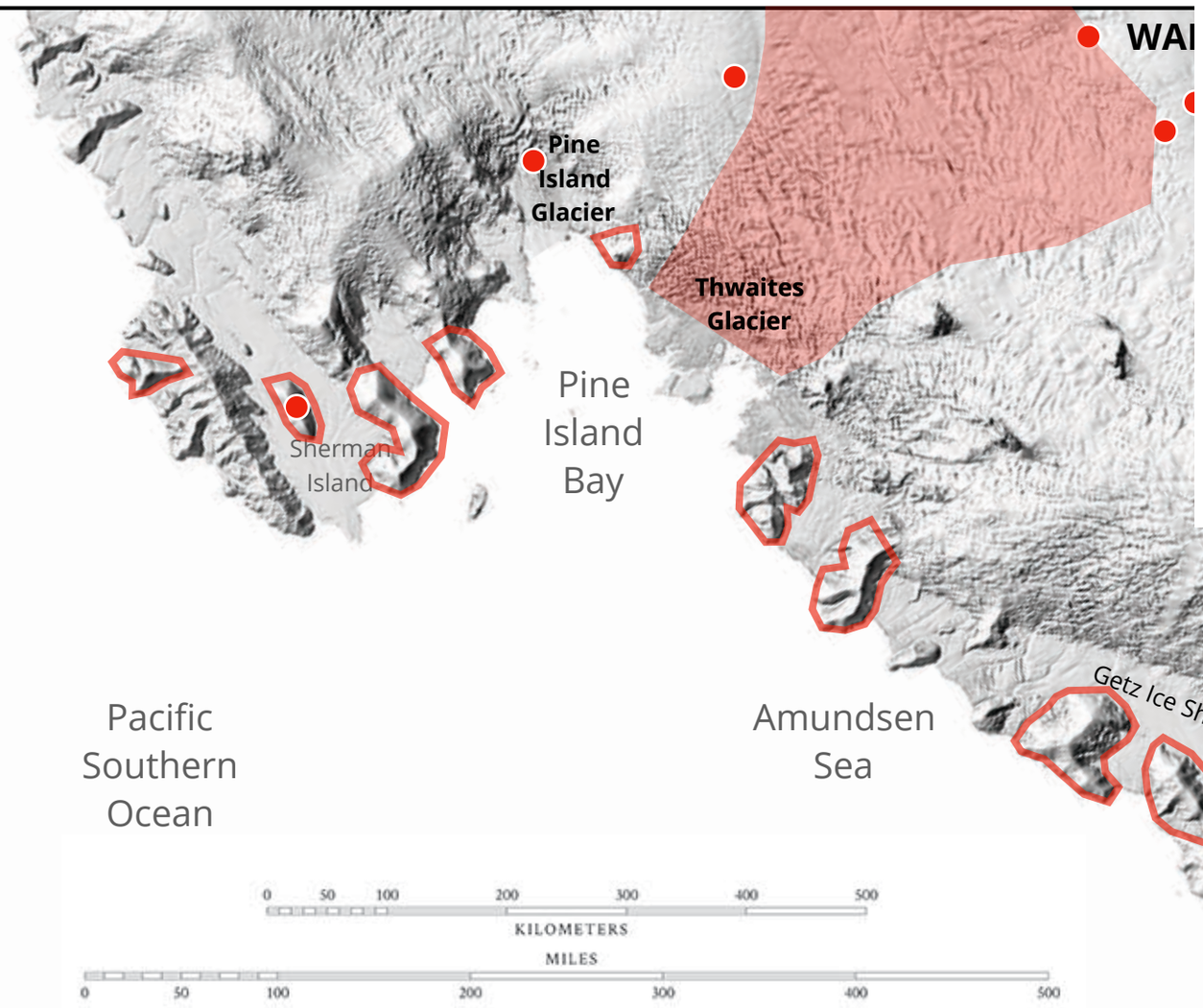

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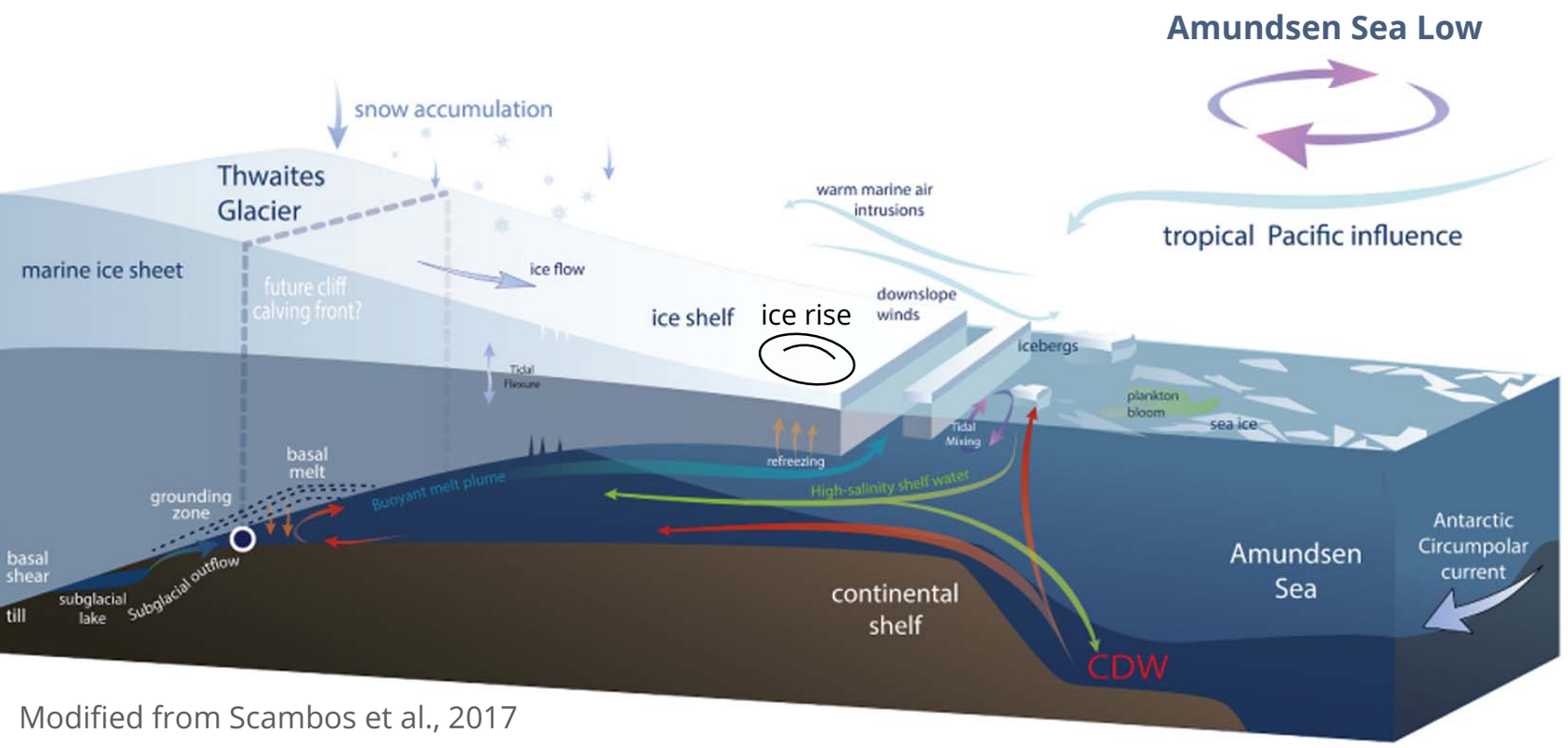


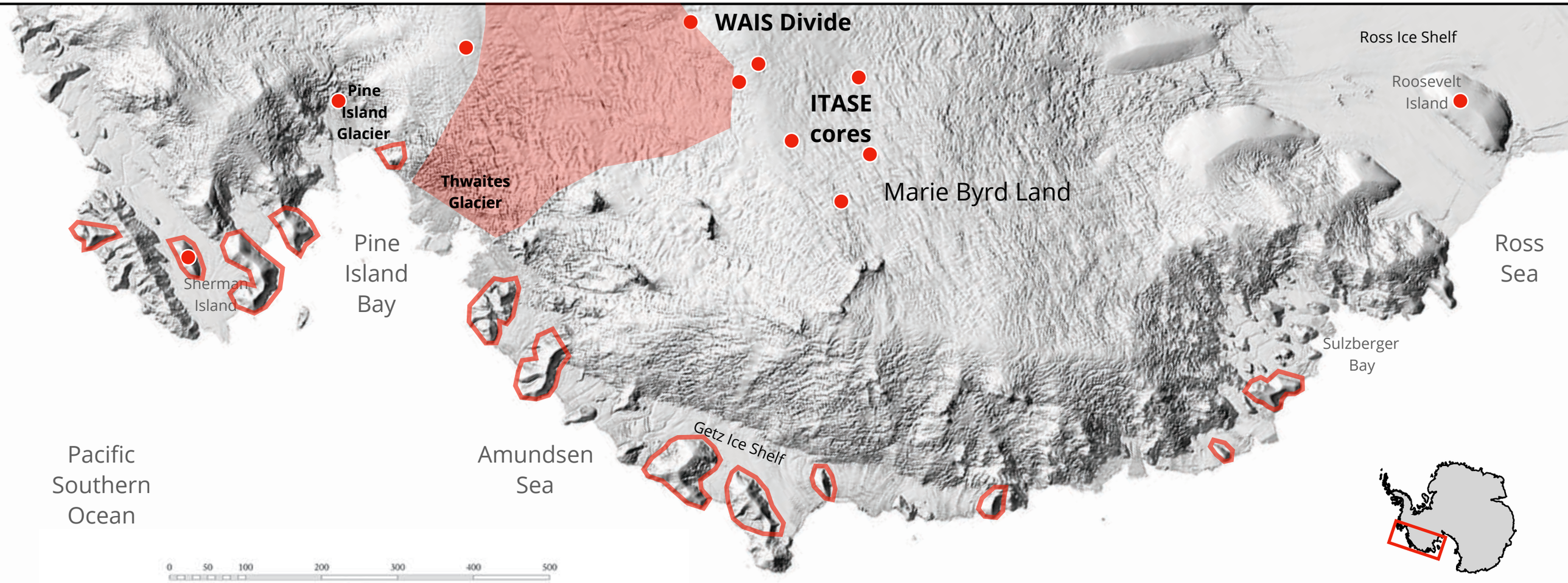
Modified from Scambos et al., 2017

Winds drive
Circumpolar Deep Water
upwelling beneath
ice shelves

Tied to Pacific variability

-Westerlies strengthening-
Human caused?

P. Holland et al., 2019; D. Holland et al., 2020



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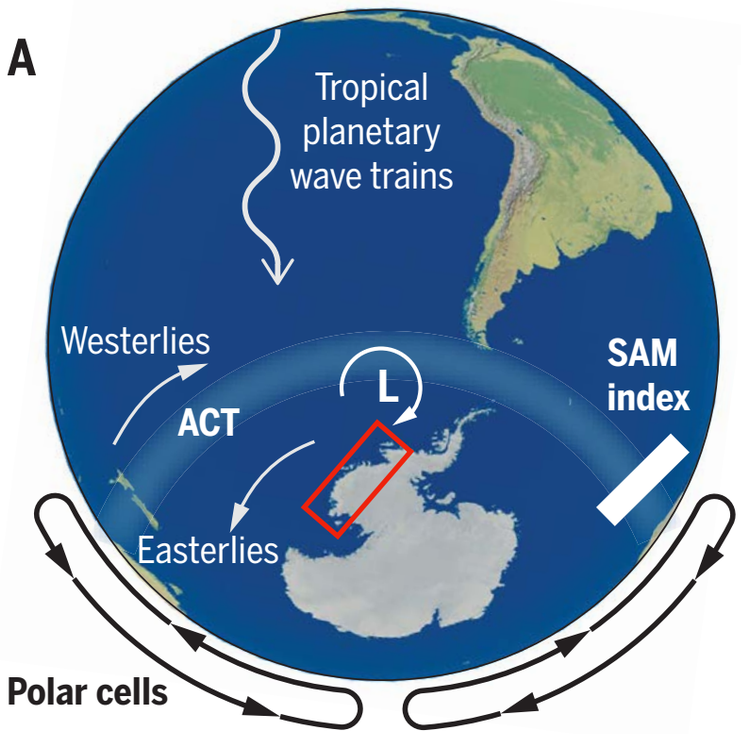
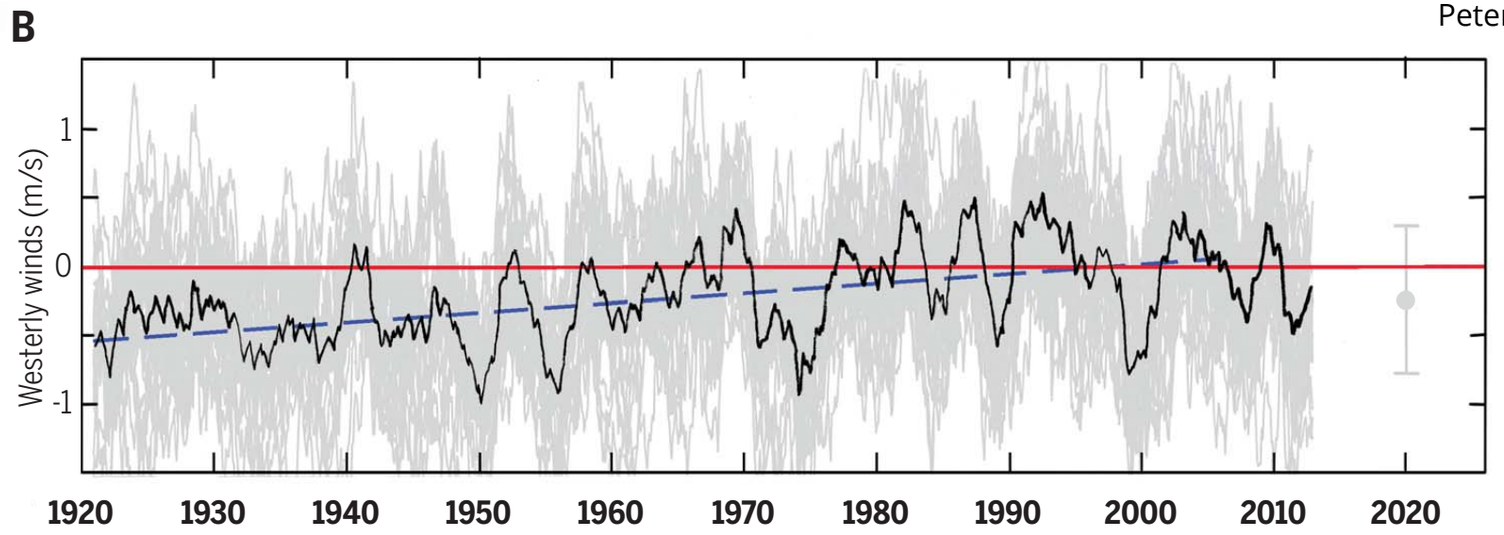
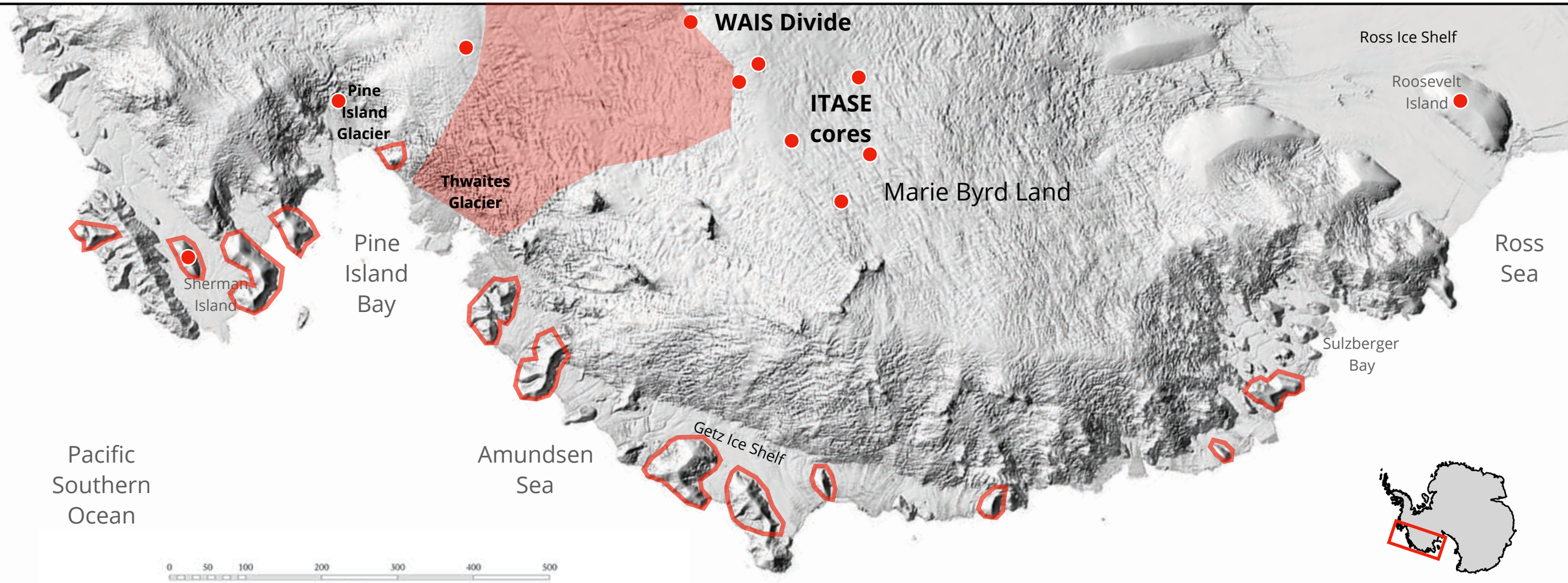




—20th century wind trend is model-based—

WAIS coastal ice cores will test this

"The Southern Ocean and its interaction with the Antarctic Ice Sheet," D. Holland et al., *Science*, March 20th, 2020



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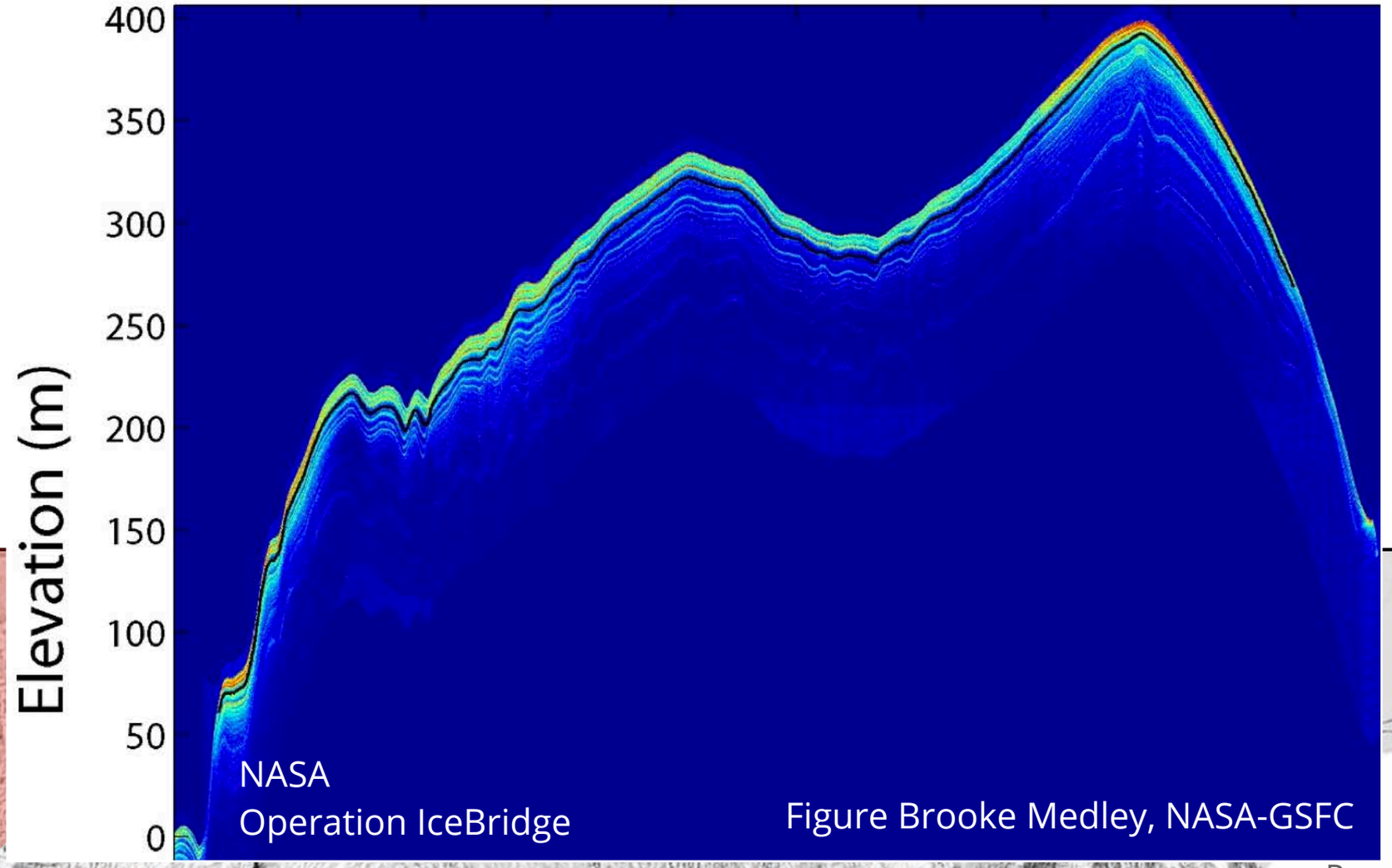
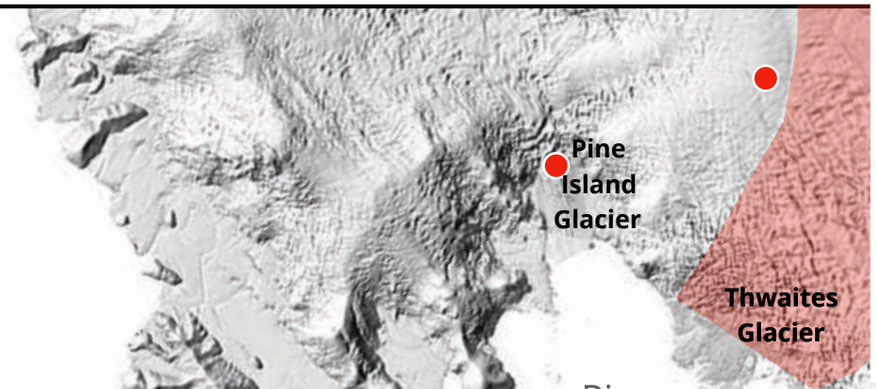
WAIS Coastal Ice Domes: site features

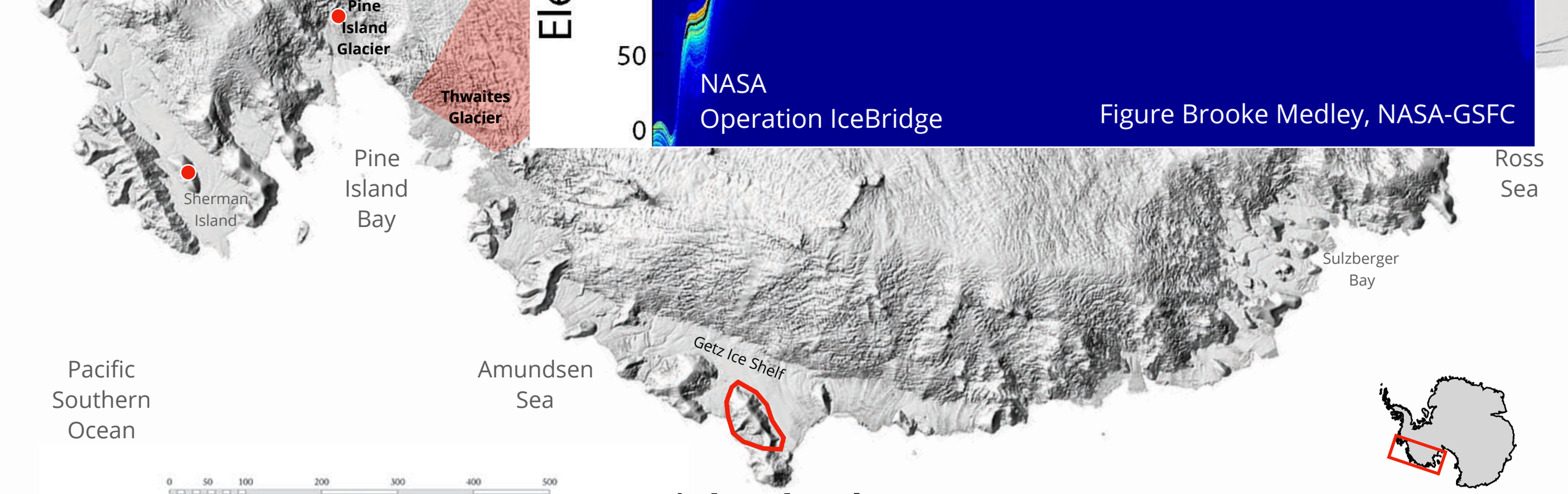
Siple Island

Accumulation
at divide
1.3 m/yr

Lenaerts et al., 2017







Siple Island

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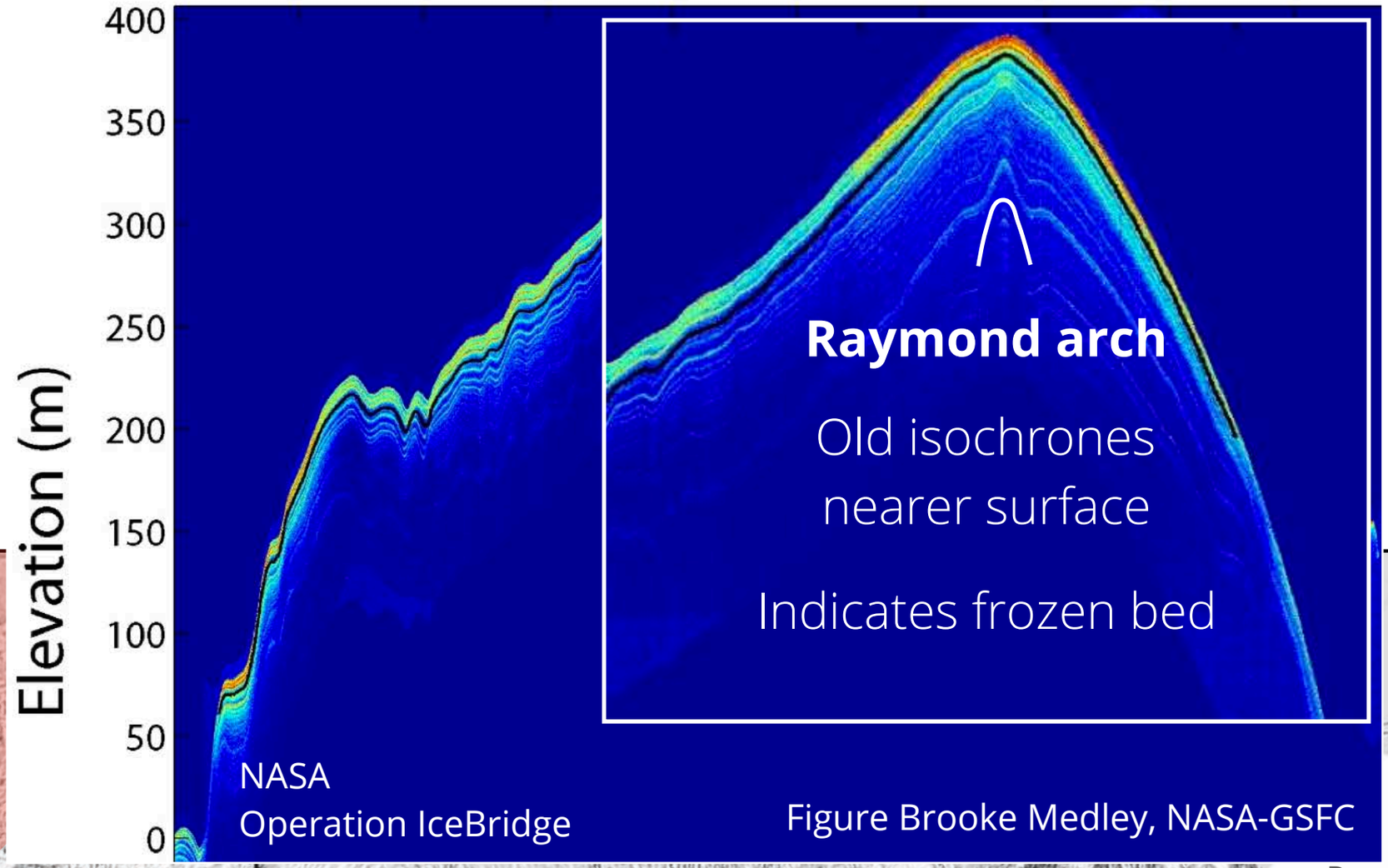

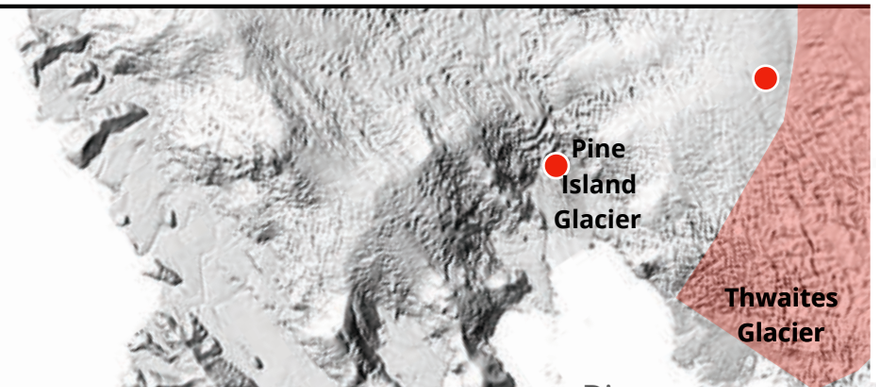

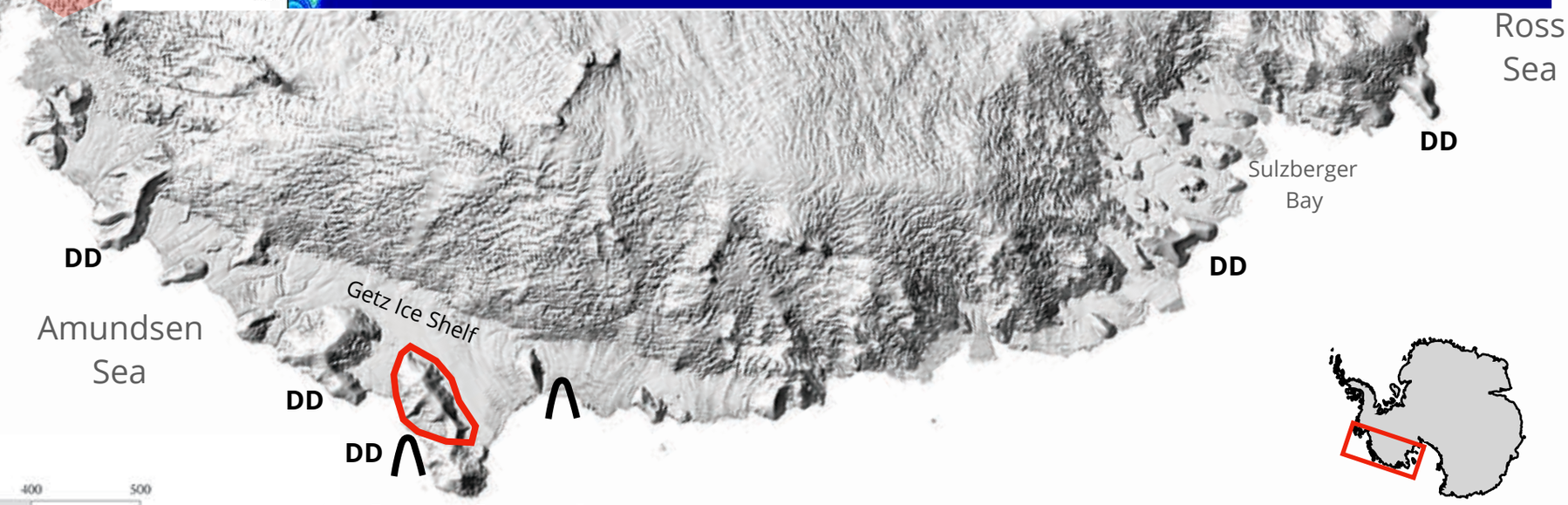

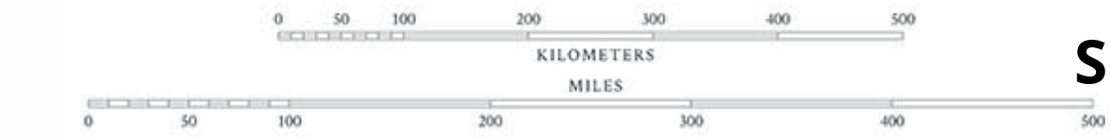

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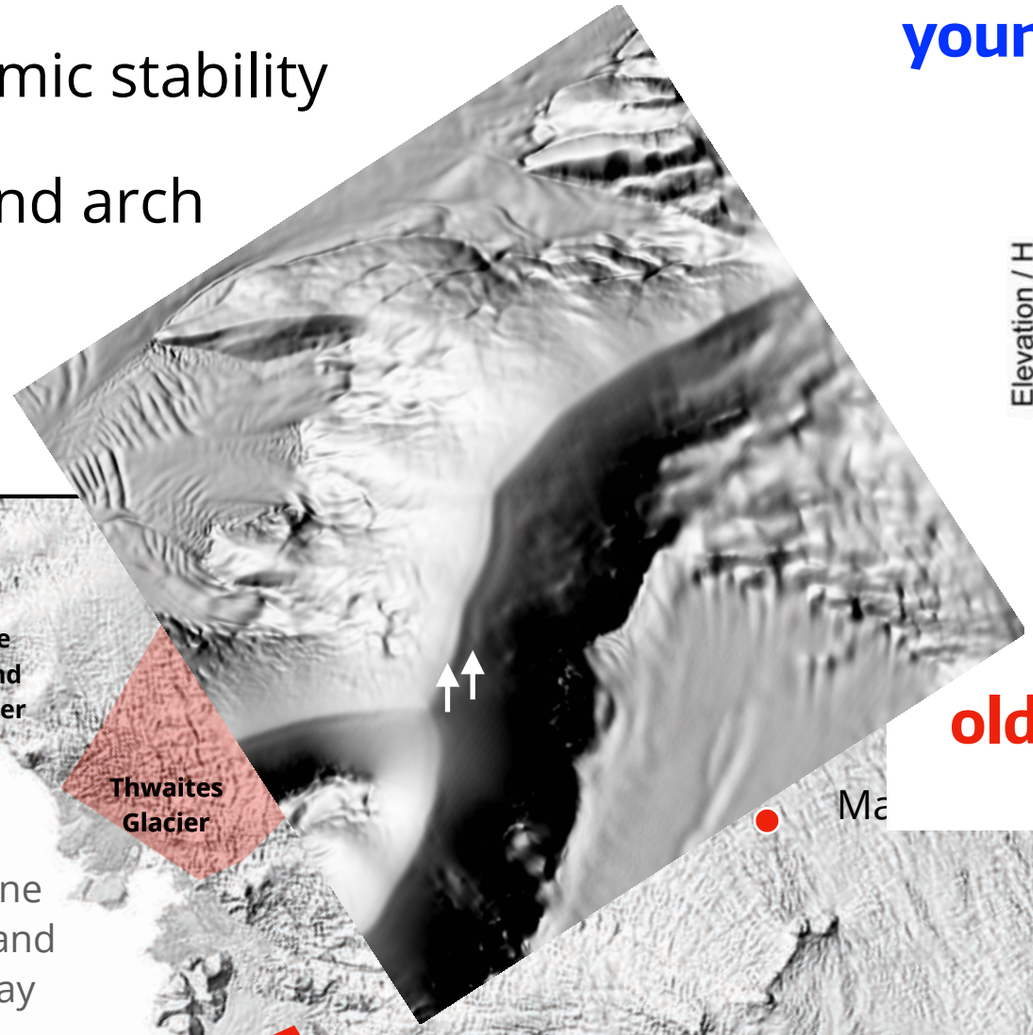
WAIS Coastal Ice Domes: site features

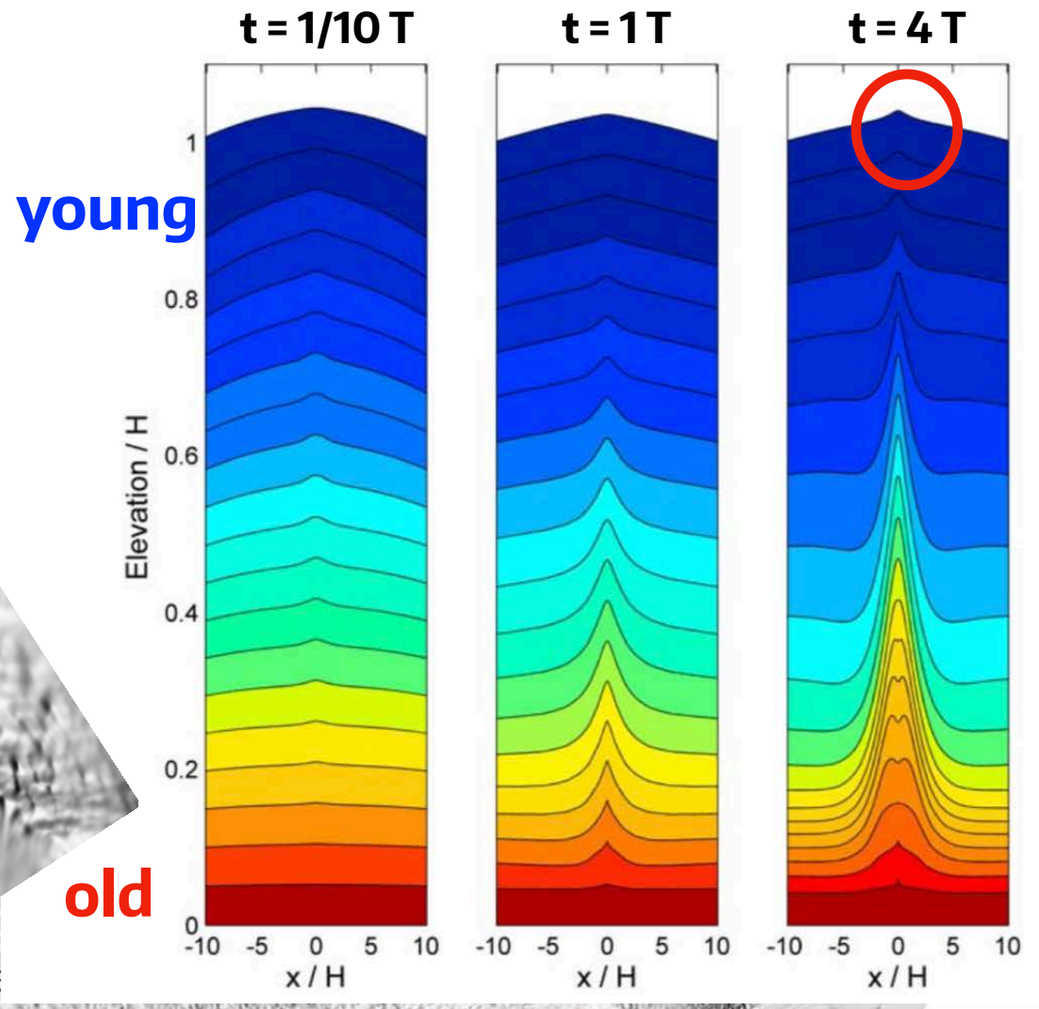
Double divide ridges

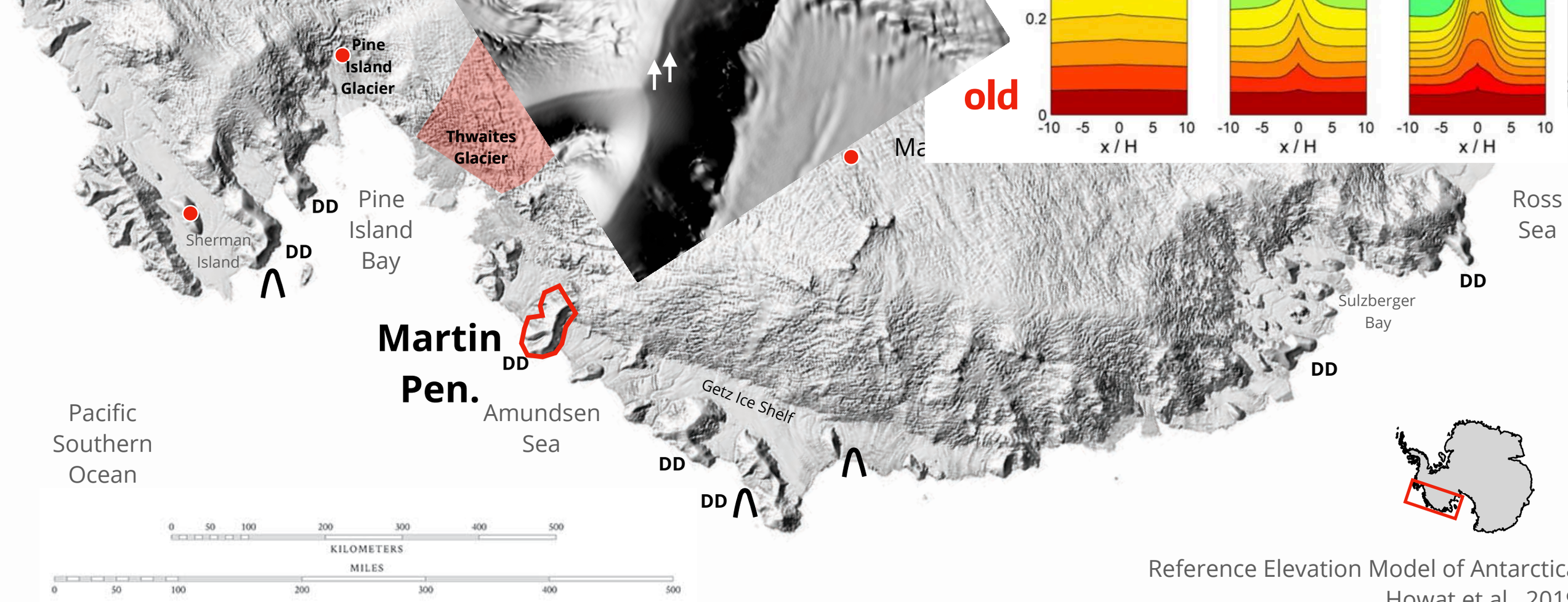
Indicative of dynamic stability

Likely Raymond arch



Martín et al., 2009





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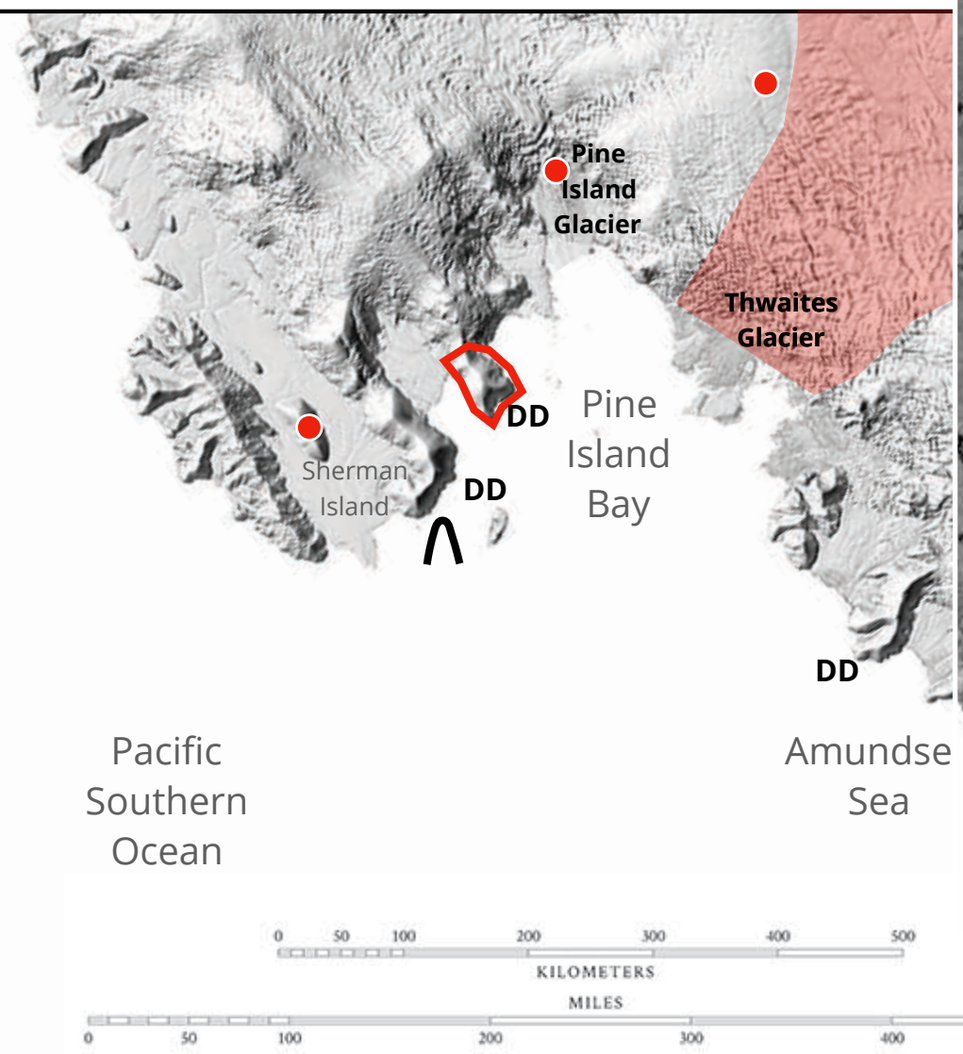
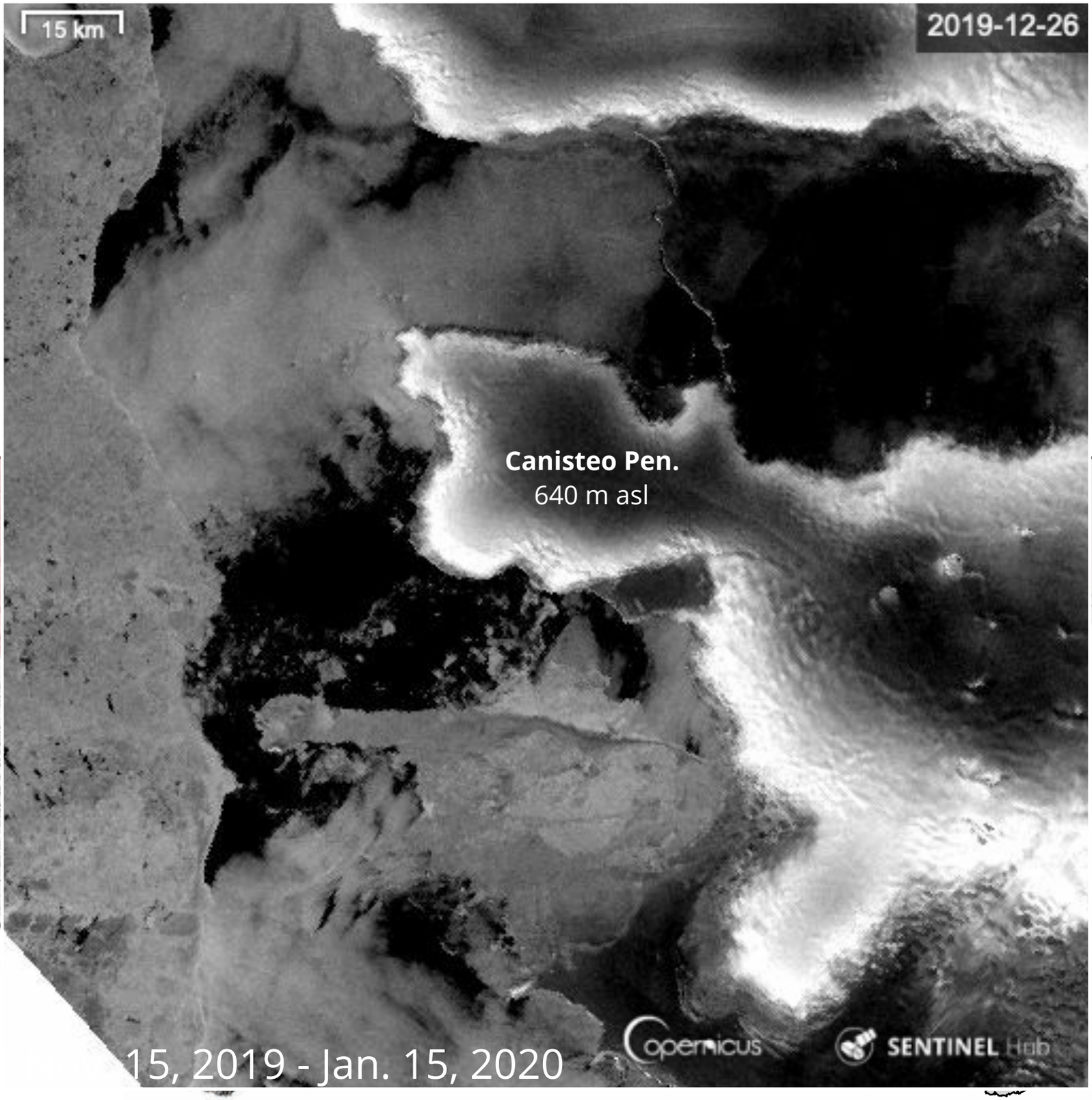
WAIS Coastal Ice Domes: site features

Elevated above ice shelf melt

Ice divides in reach of only most significant melt events





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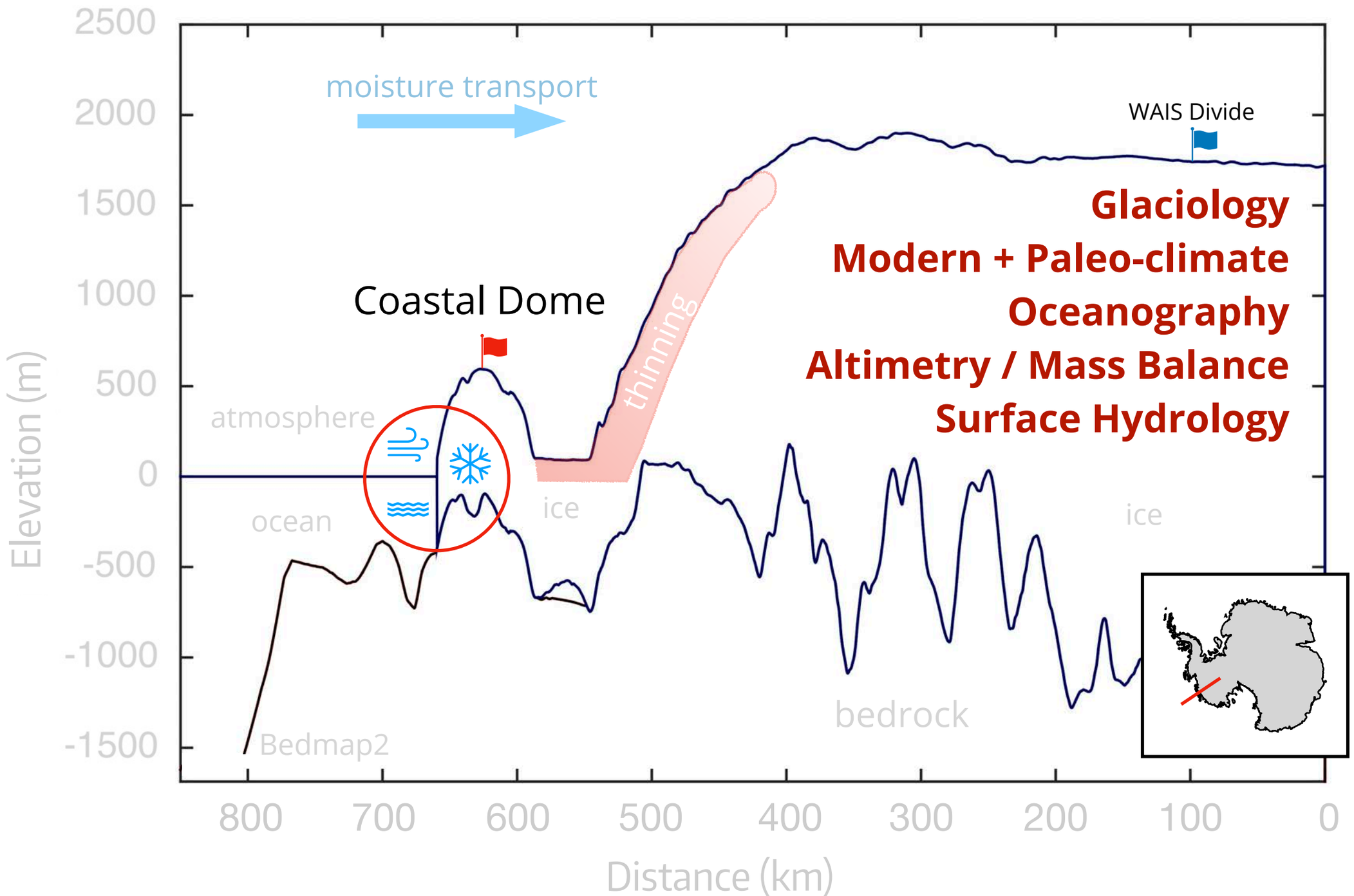

Glaciology
Modern + Paleo-climate
Oceanography
Altimetry / Mass Balance
Surface Hydrology

Peter Neff

University of Minnesota

April 2, 2020