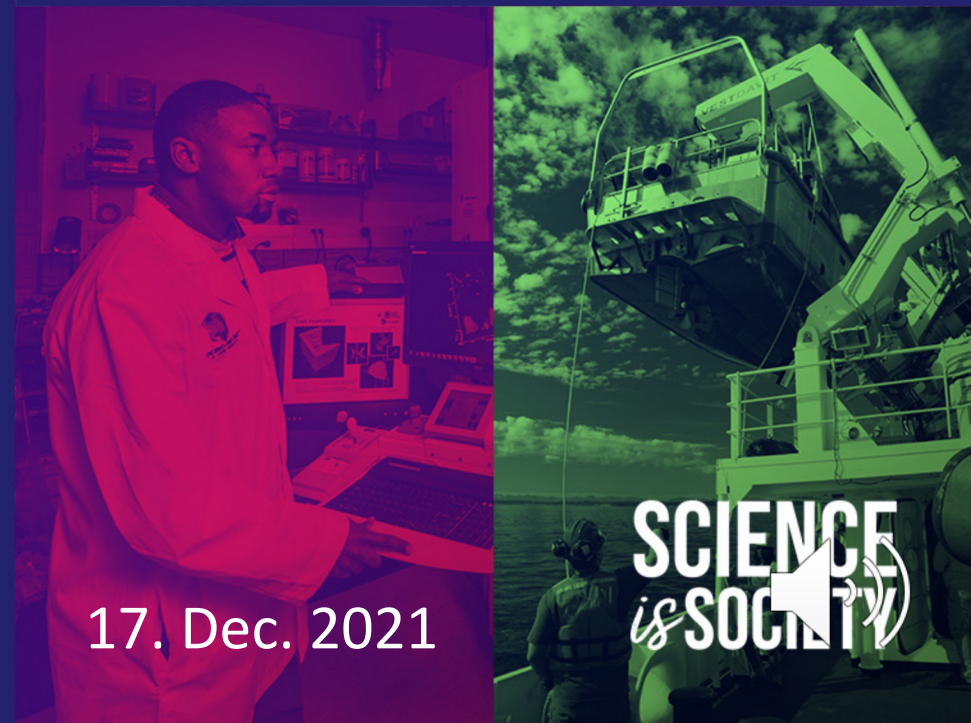
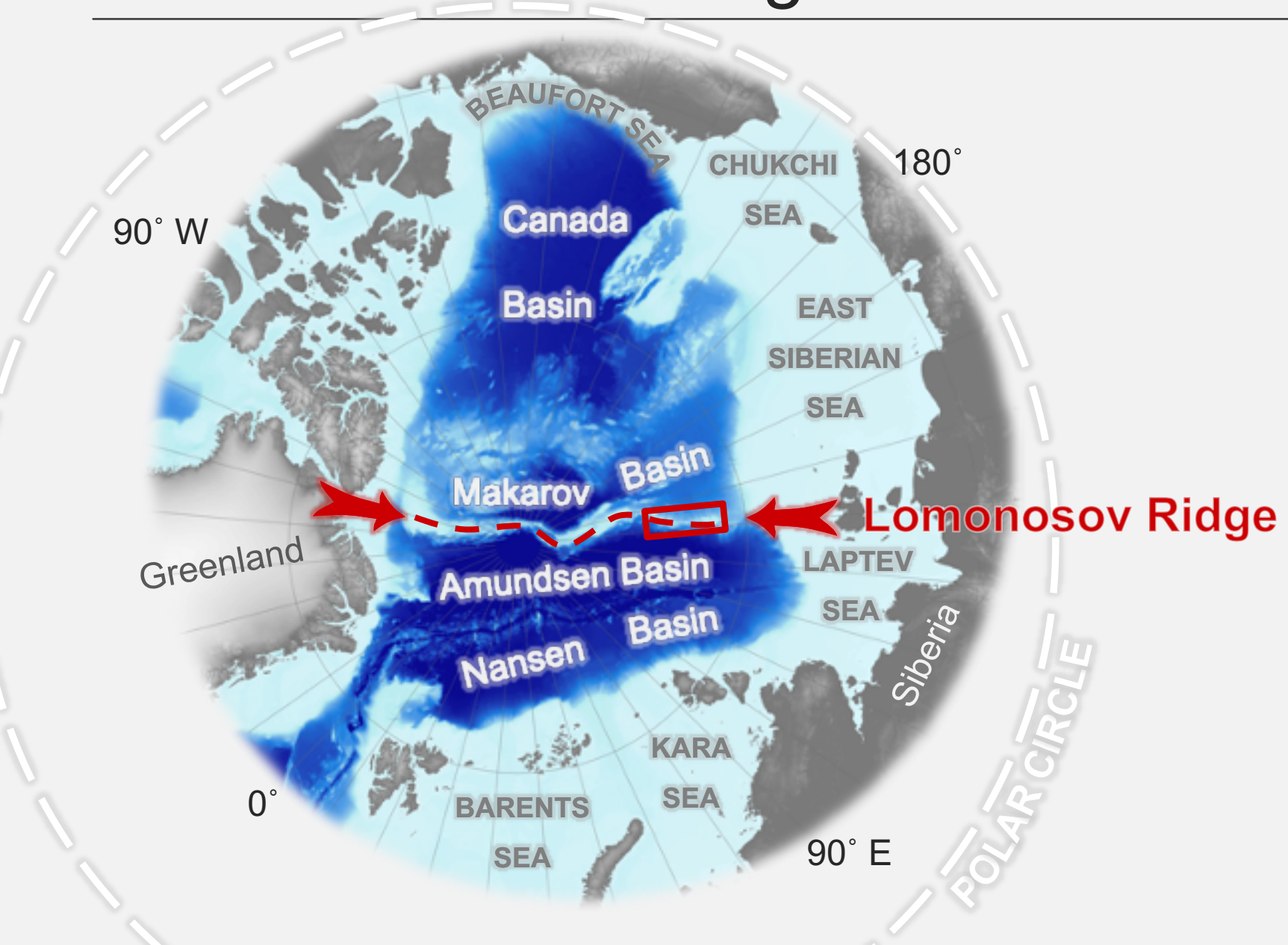
GLACIAL LANDFORMS ON THE SIBERIAN TERMINATION OF THE LOMONOSOV RIDGE – HINTS FOR A 1 KM THICK PAN-ARCTIC ICE SHELF?

Ursula Schlager
W. Jokat
E. Weigelt
C. Gebhardt

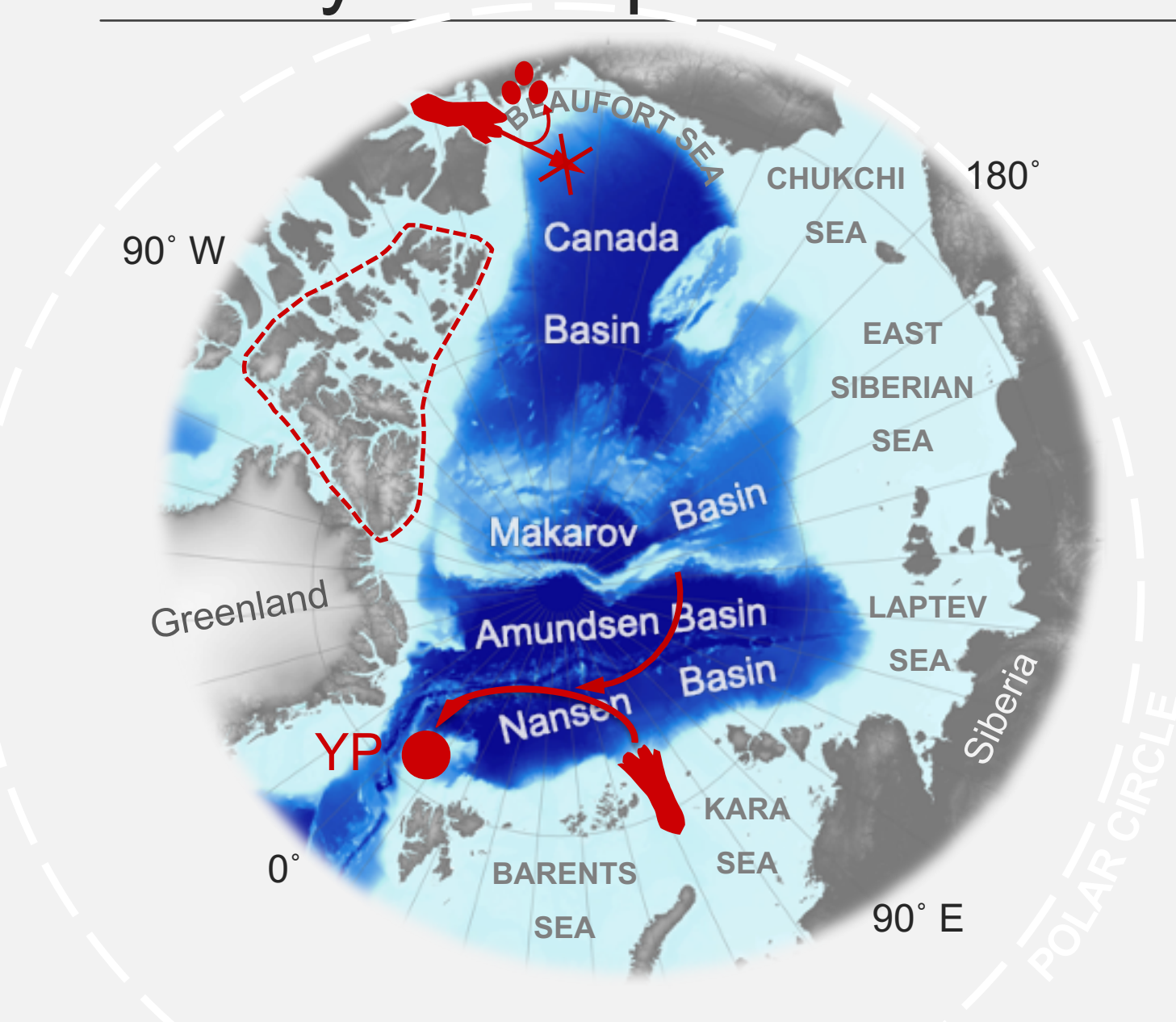
17. Dec. 2021



The Lomonosov Ridge in the Arctic Ocean



History of the pan-Arctic Ice Shelf



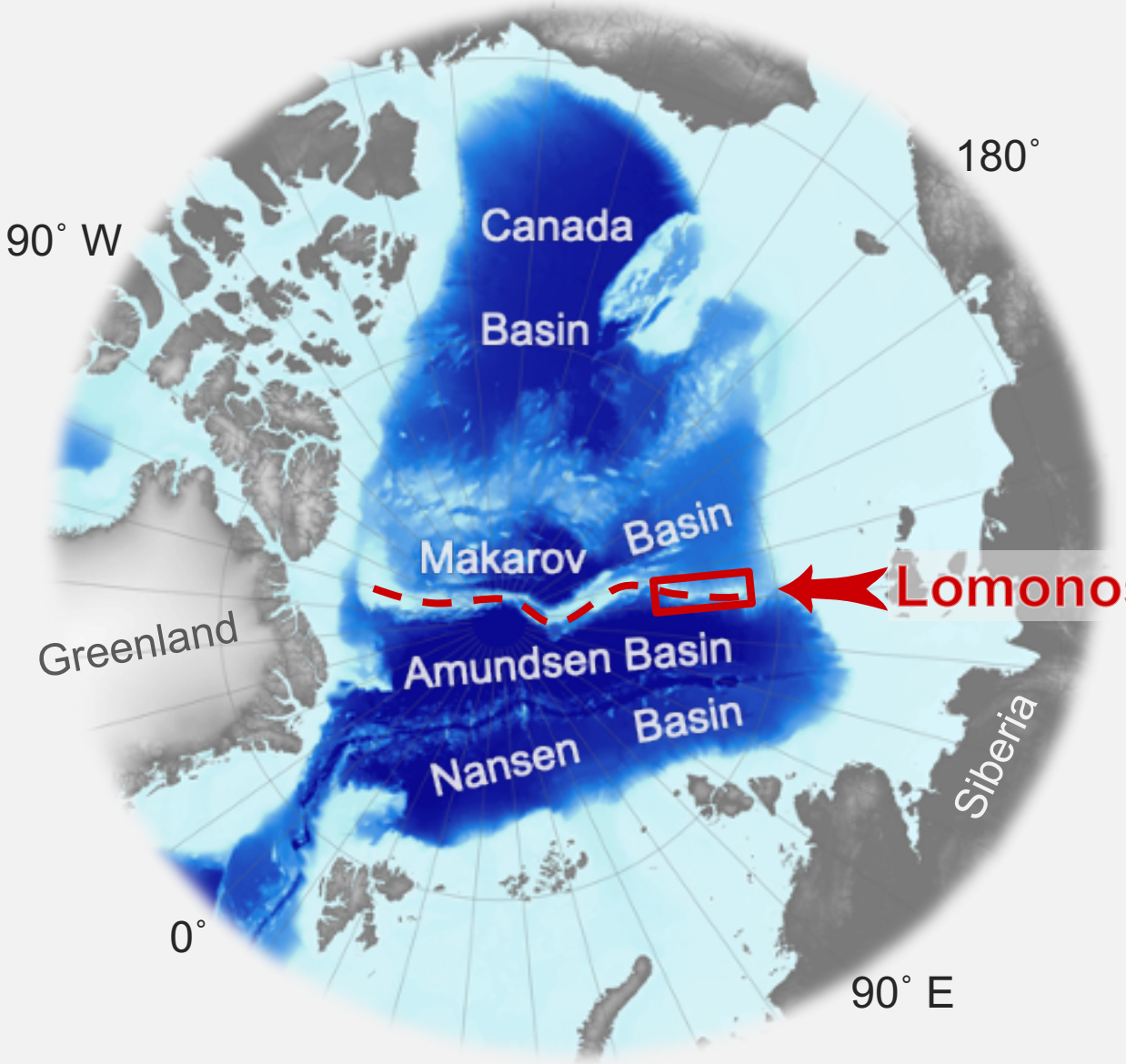
Thomson, 1888: assumed

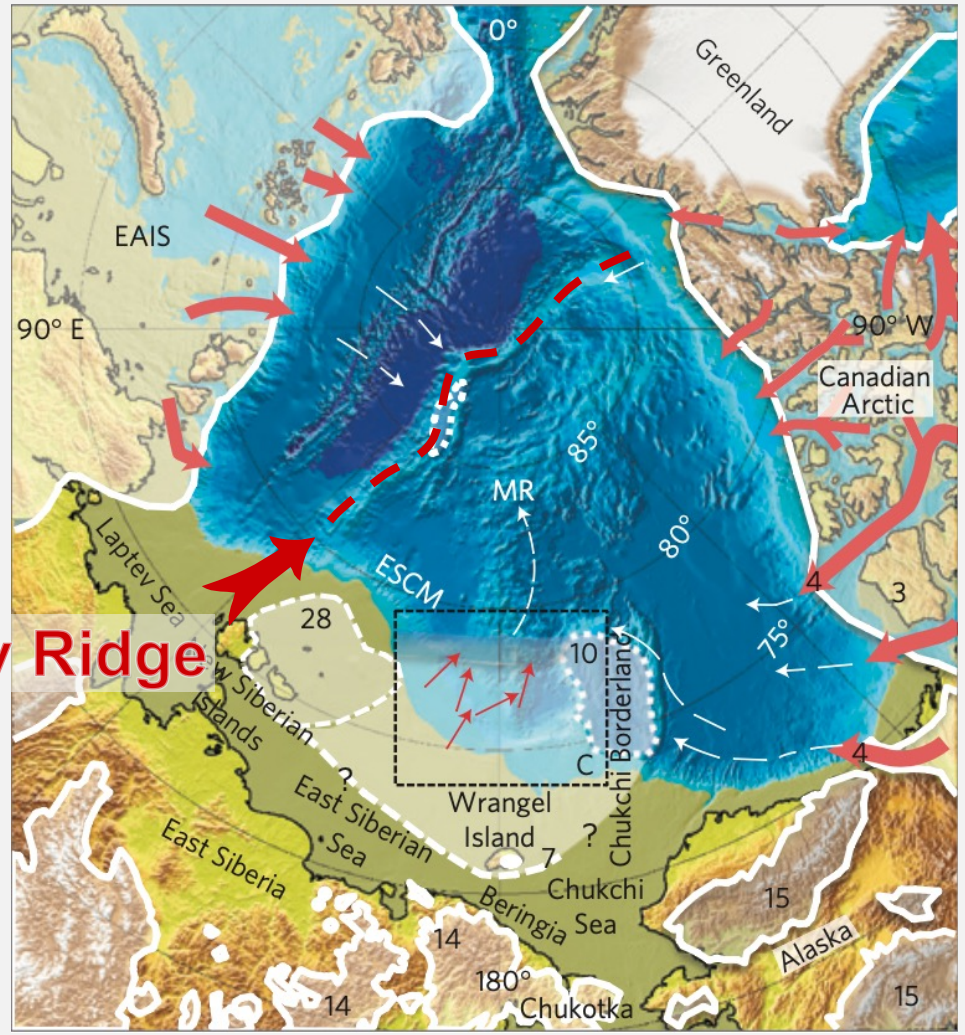
Mercer, 1970: scientific postulation

Grosswald & Hughes, 1999: model of ice shelf thinning → 1 km at grounding line

Geibert et al., 2021: absence of thorium-230 in marine sediments implies pan-Arctic Ice Shelf

Source areas for pan-Arctic Ice Shelf





Maximum Pleistocene (0.0117 – 2.58 Ma) glaciations in the Arctic (as far as known, regardless of age) [1]

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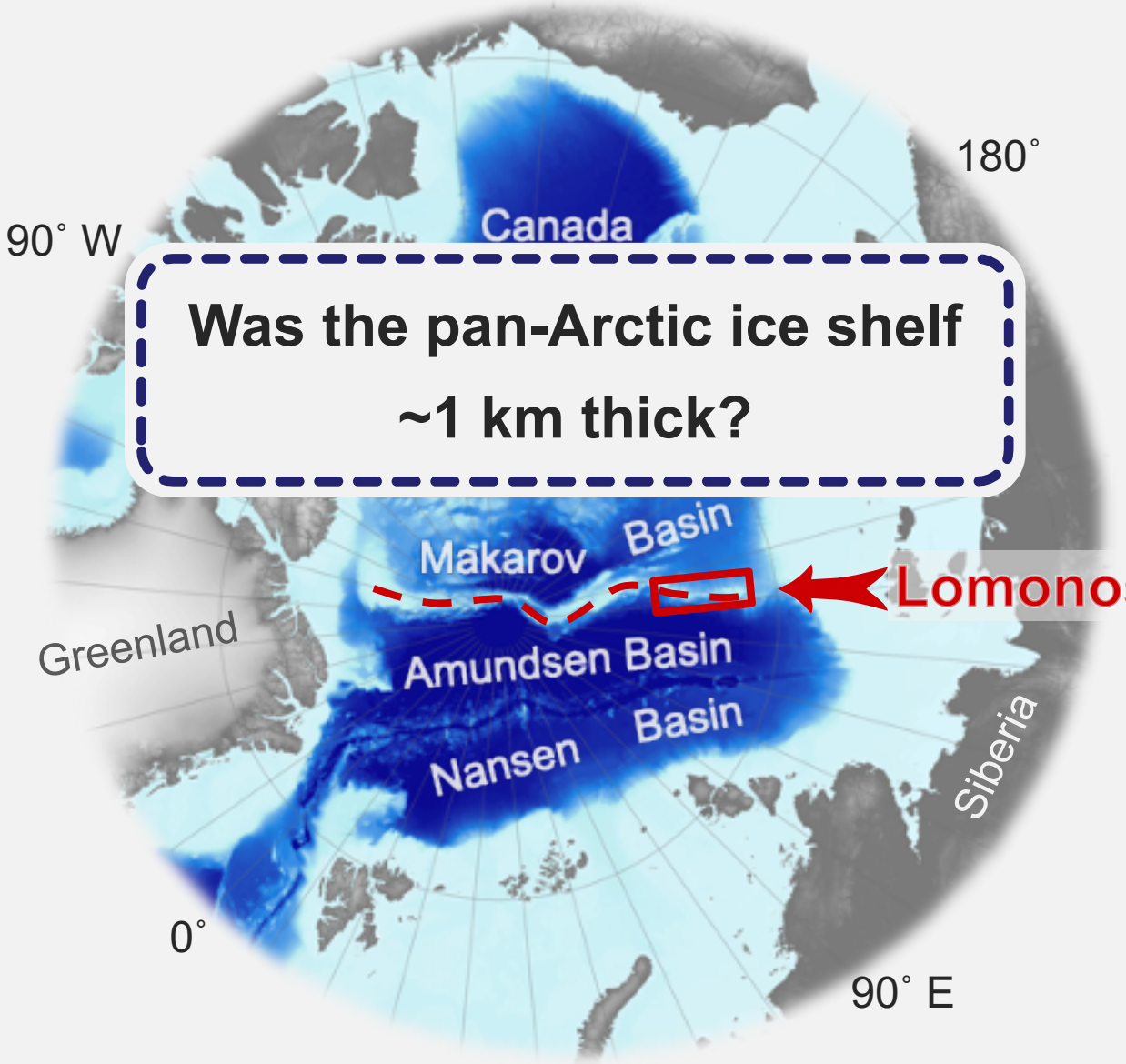

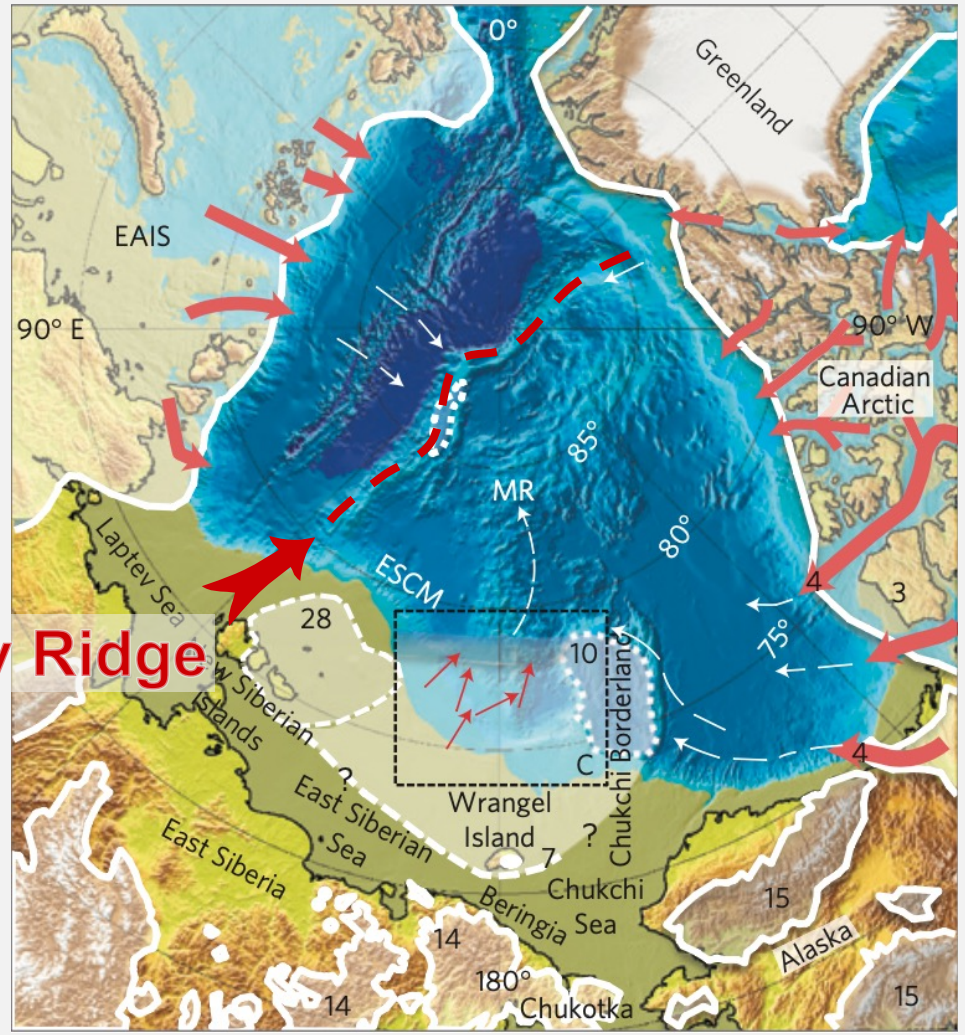

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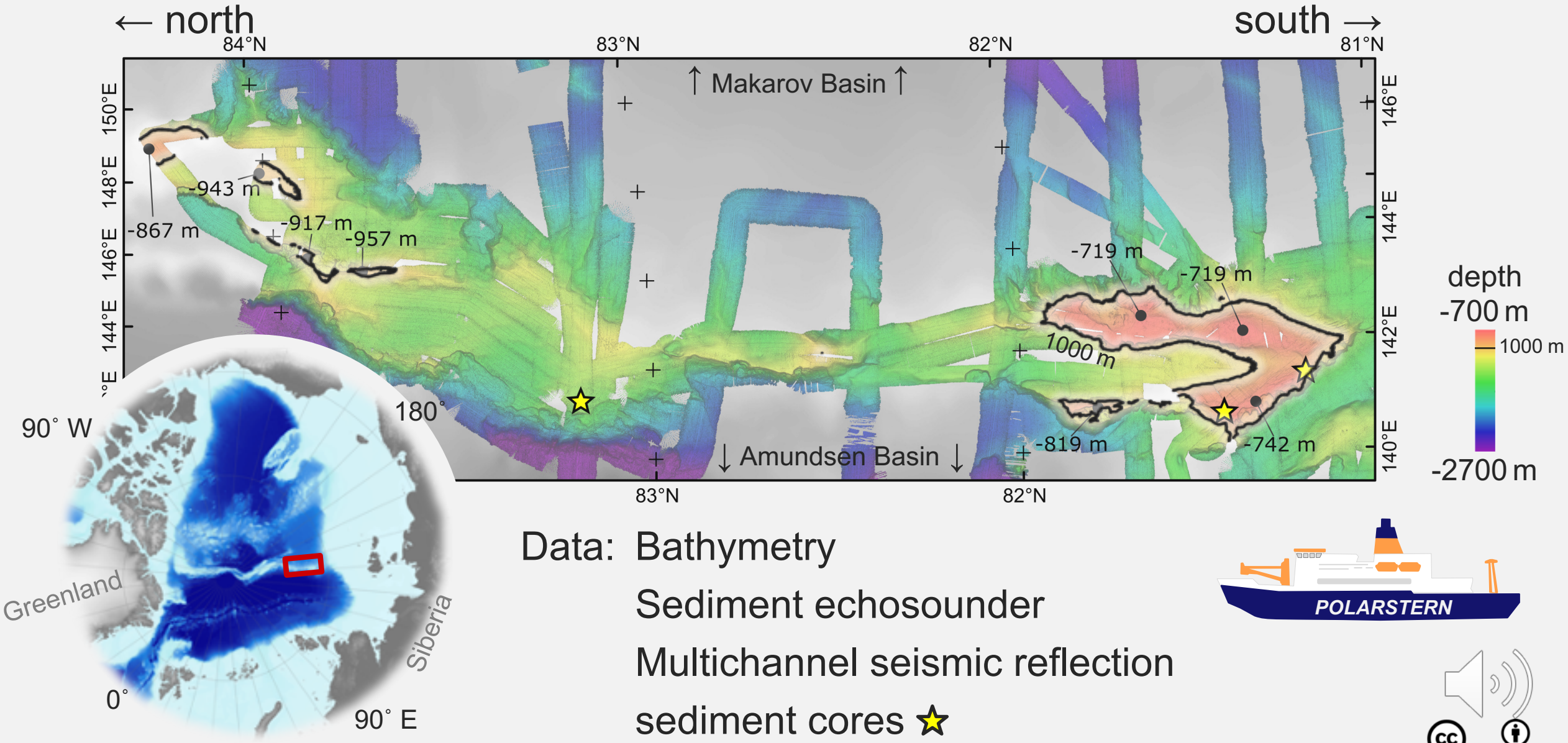
Methods & Data



Data: Bathymetry

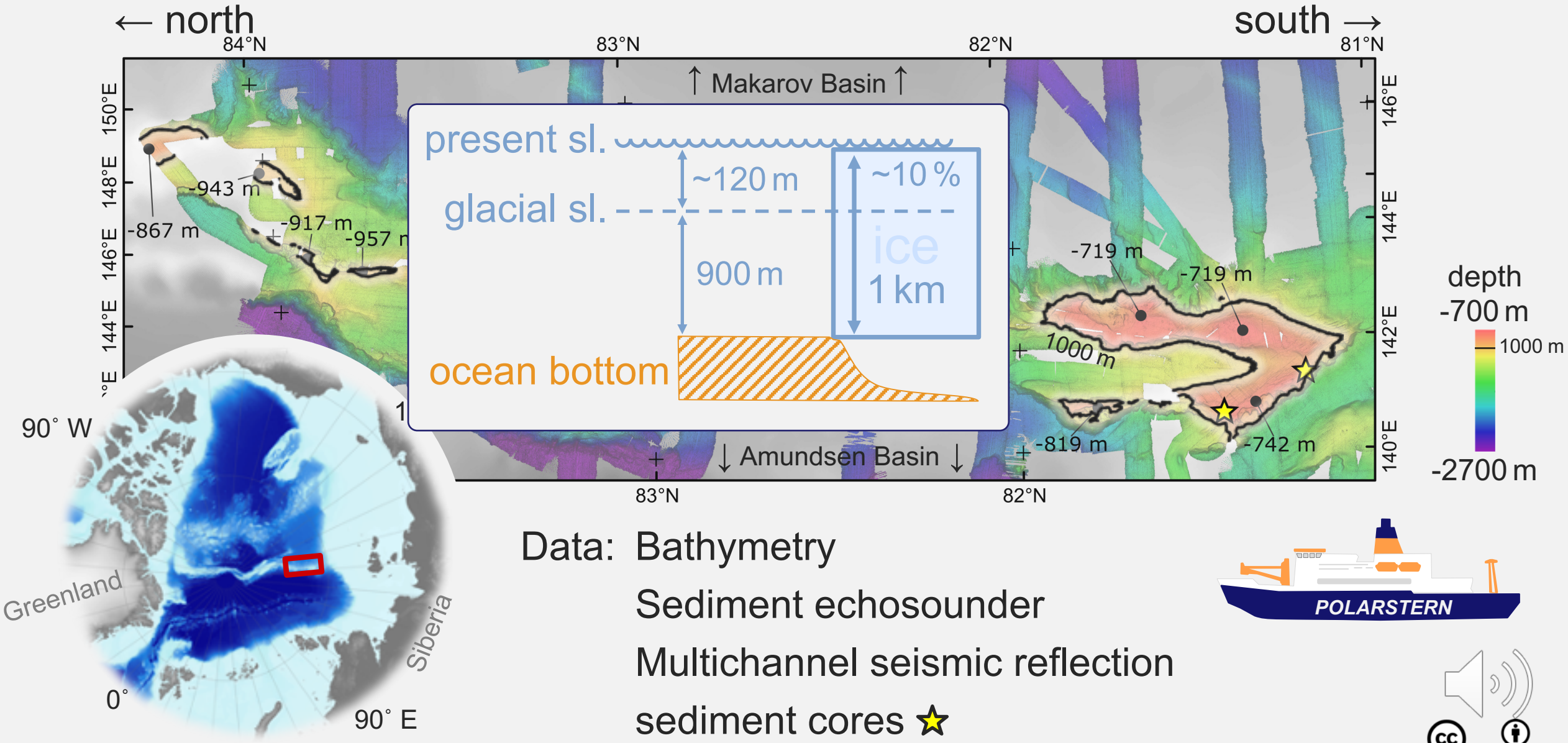
Sediment echosounder

Multichannel seismic reflection

sediment cores ★

POLARSTERN

Methods & Data



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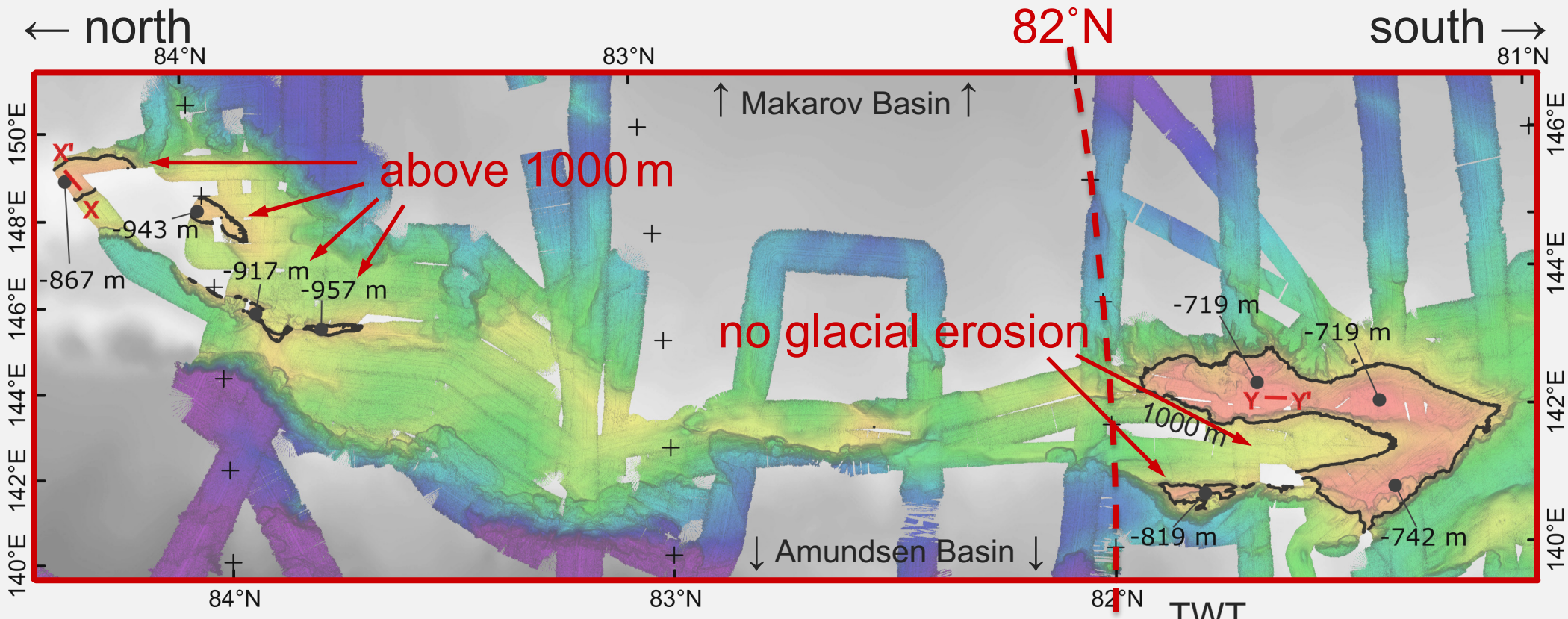
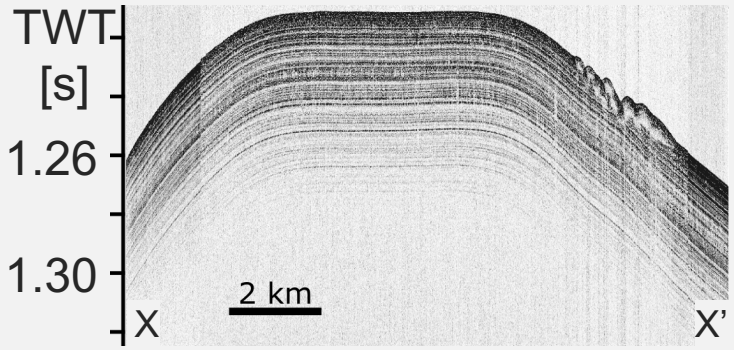
Glacial erosion on Lomonosov Ridge



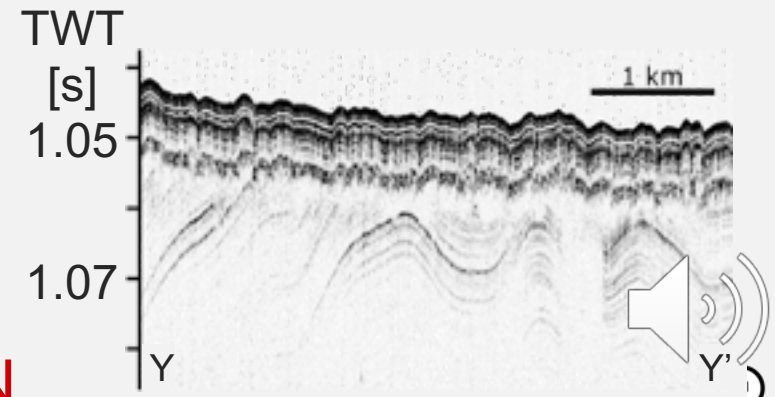
depth
-700 m
1000 m
-2700 m



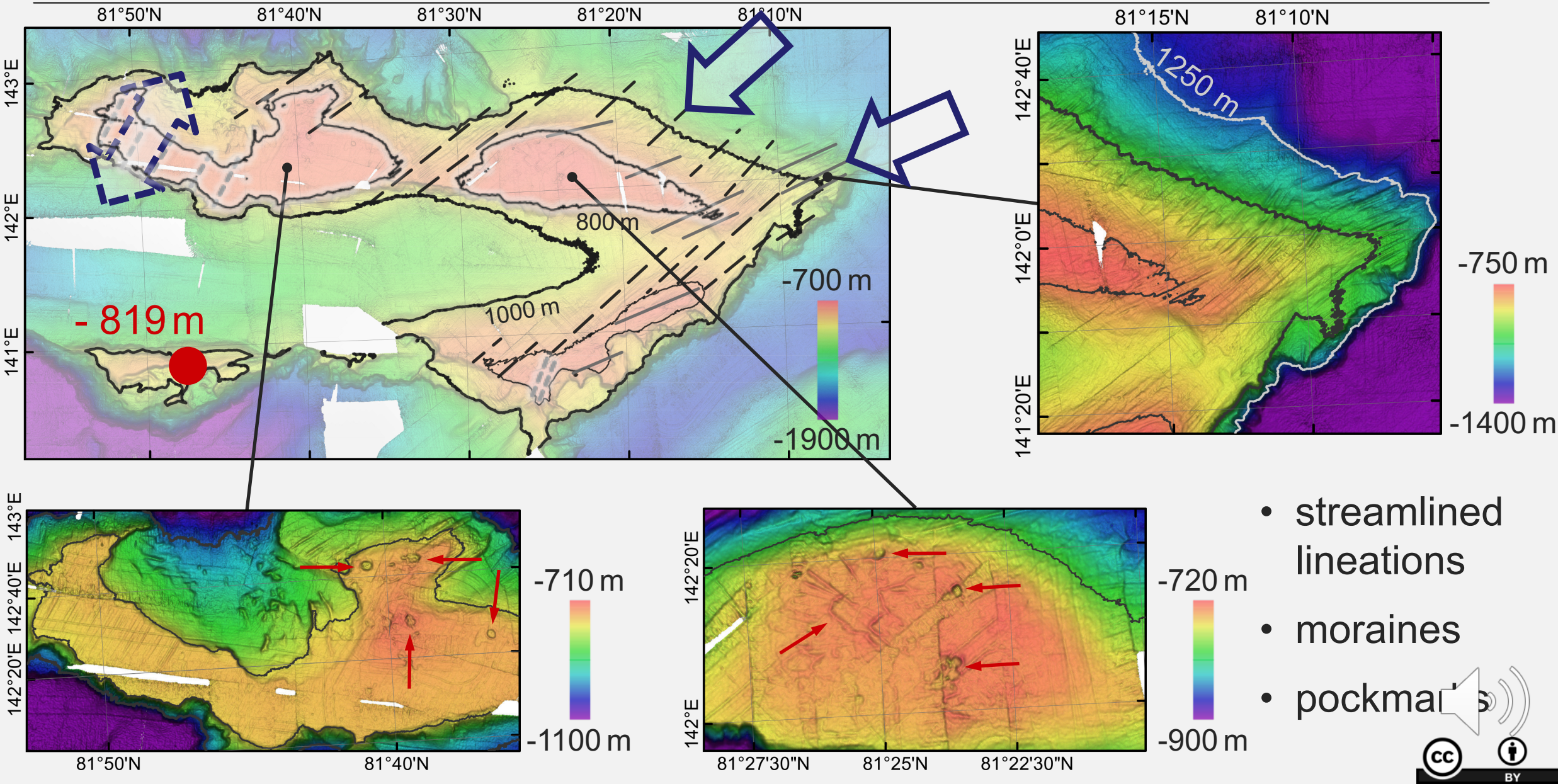
small areas above 1000 m

No hints for glacial erosion.

82°N

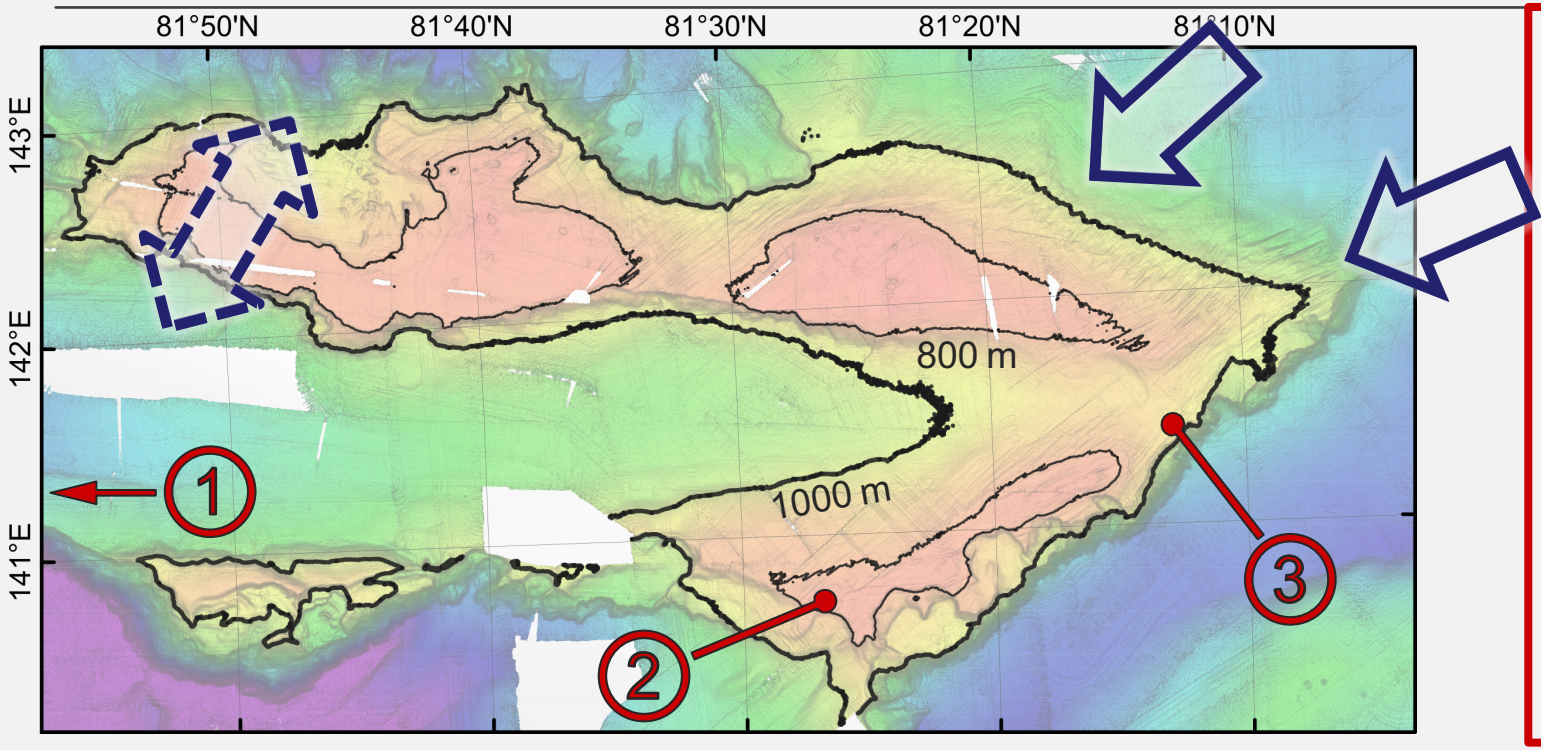


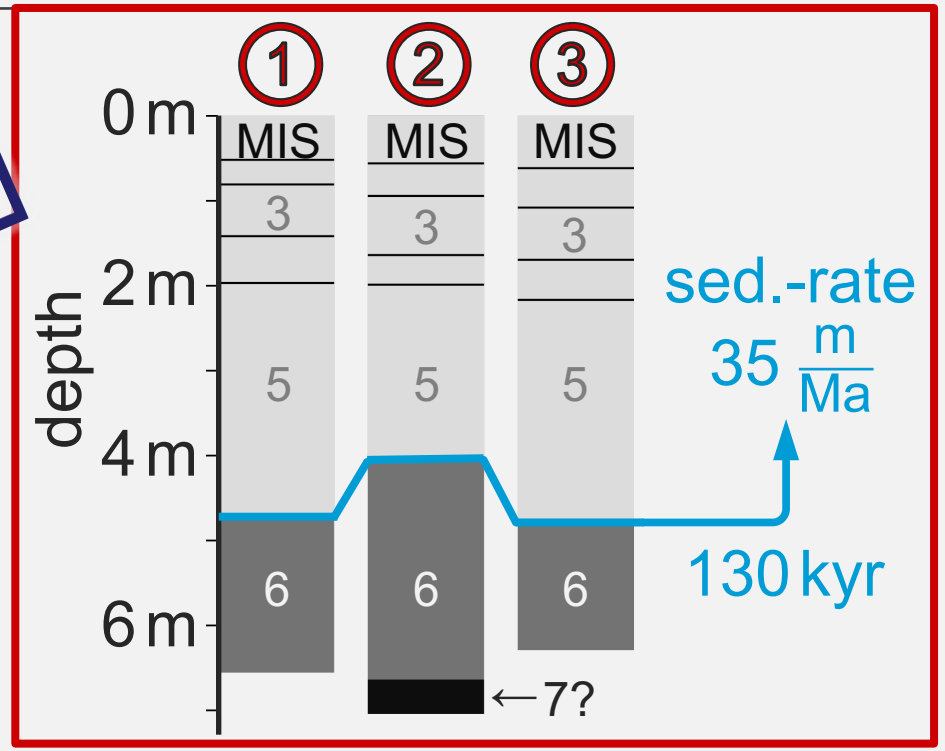
Glacigenic Features



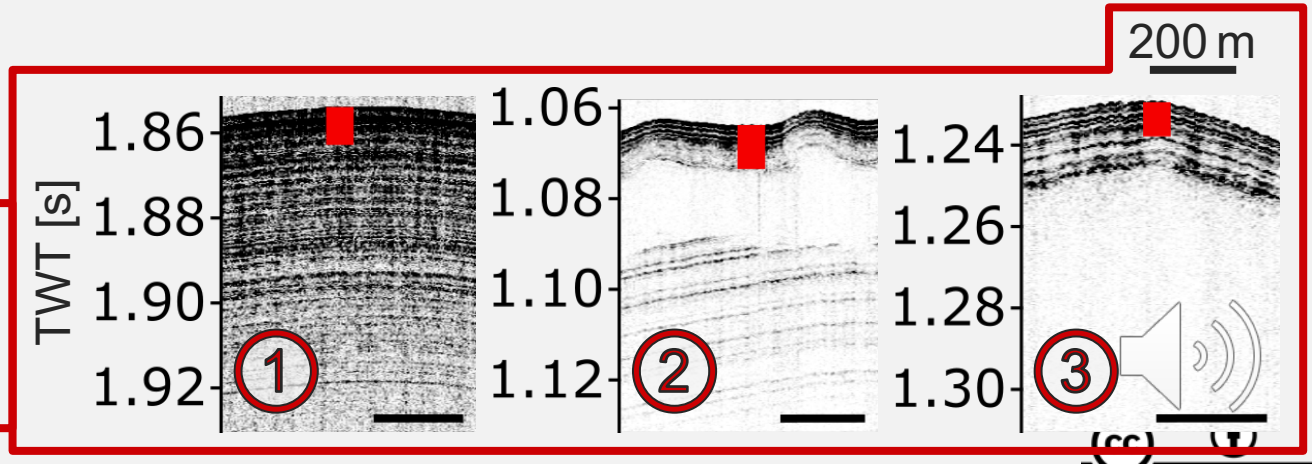
- streamlined lineations
- moraines
- pockmarks

Age estimates from sediment cores

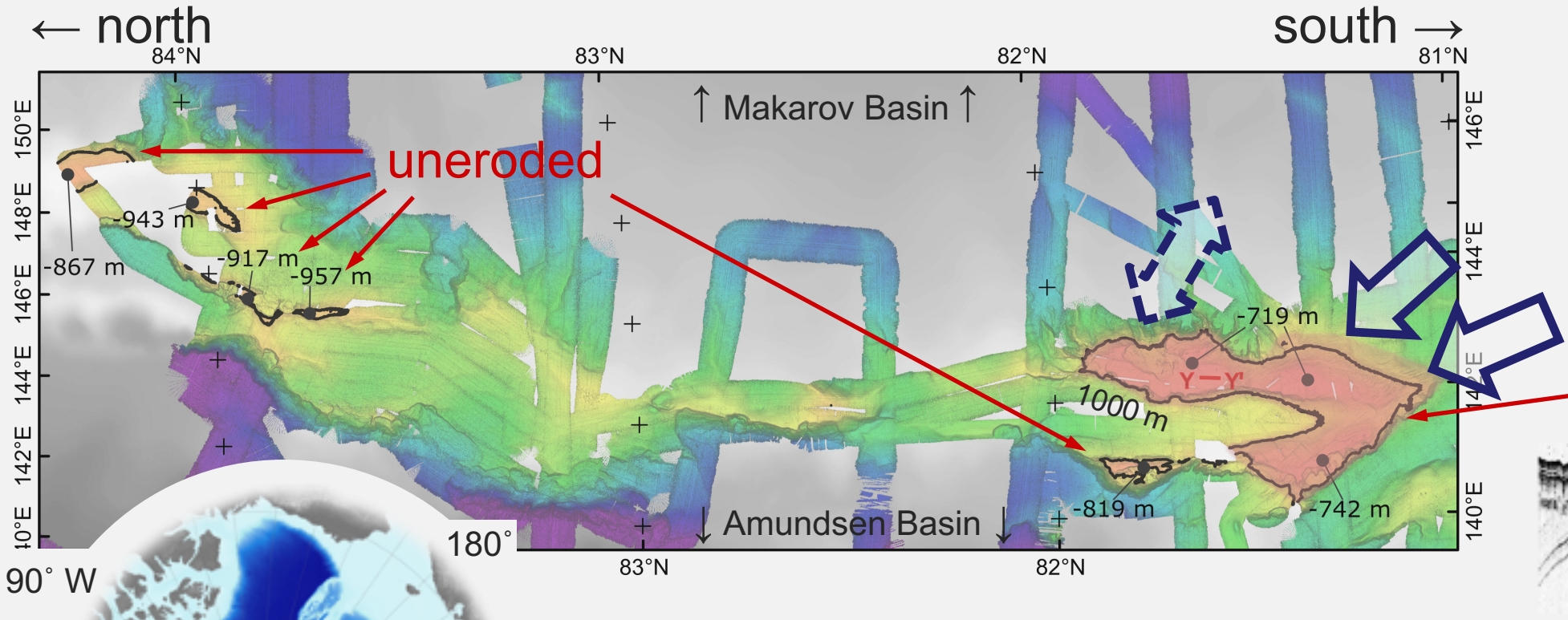




drape thickness [ms TWT]		
	6 – 10	(~4.5 – 7.5 m) MIS 6
	12 – 20	(~9 – 15 m) MIS 12



Was the pan-Arctic ice shelf ~1 km thick?



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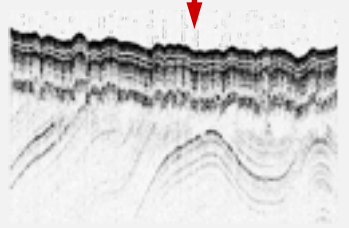
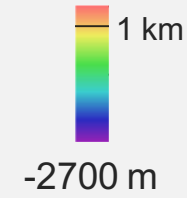
glacially eroded





Variable ice thickness:

up to ~1250 m and thinner than 780 m

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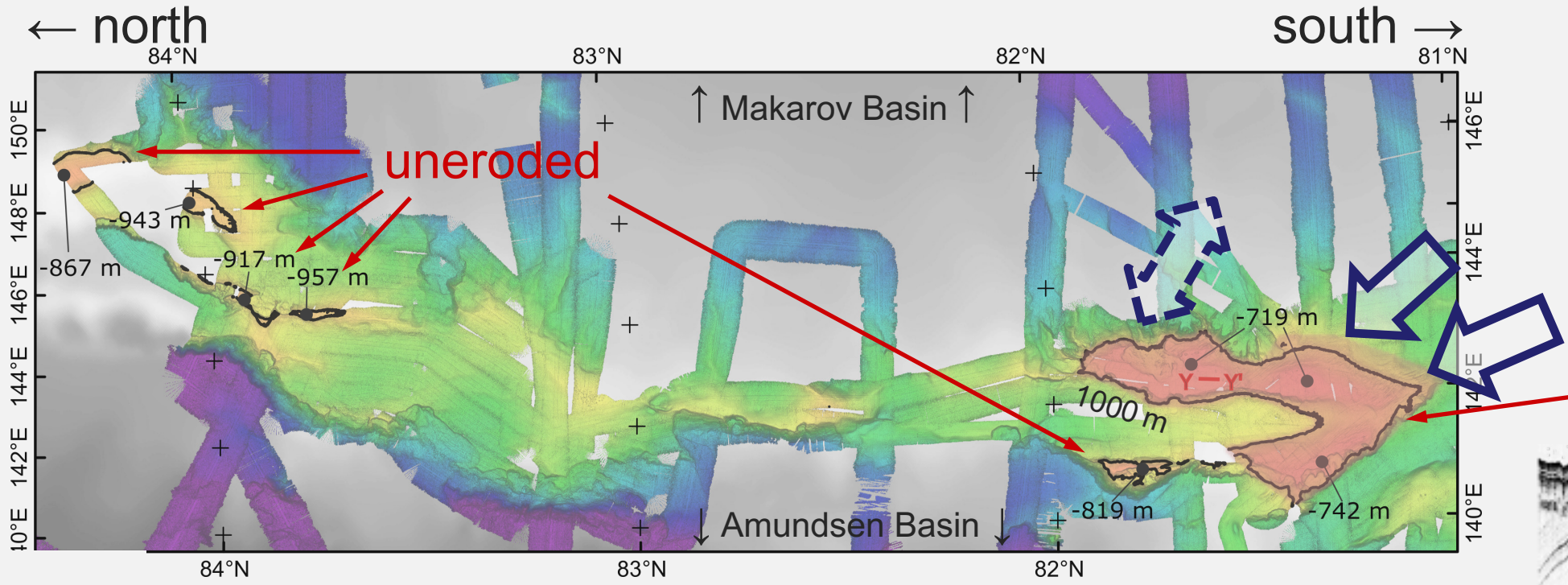

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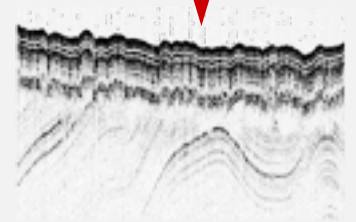

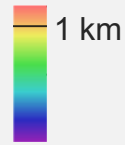

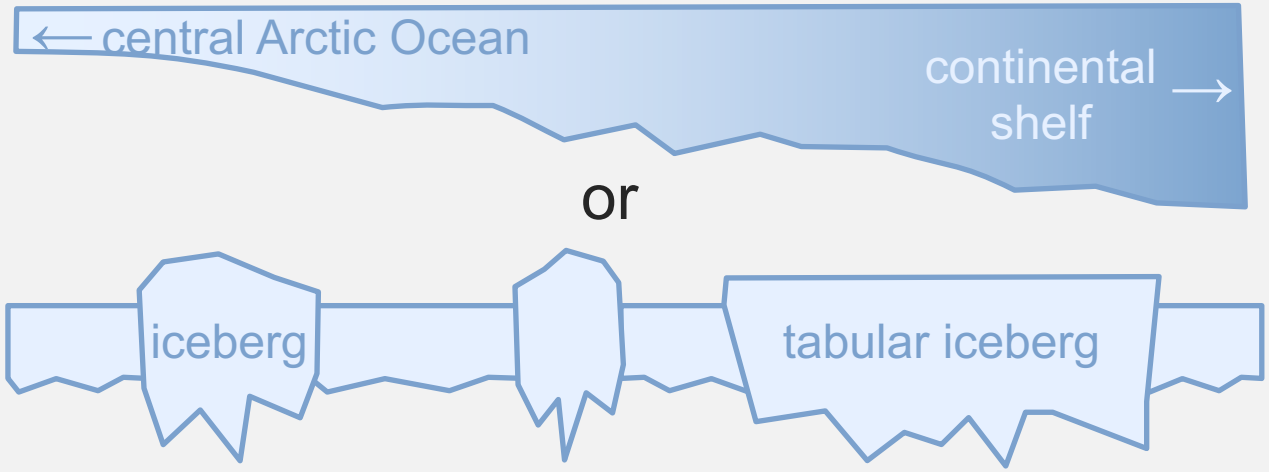

Variable ice thickness:

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THANK YOU

Friday, 17 December 2021; 12:45 - 14:00 CST

Session : C53A – Boundary Conditions and Earth-Ice Interactions Beneath Ice Sheets and Ice Shelves I Oral

Convention Center Room 215 - 216

or

contact: ursula.schlager@awi.de

AGU FALL MEETING

References

[1] Niessen et al., 2013, doi: 10.1038/ngeo1904

other:

IBCAO v.4: Jakobsson et al., 2020, doi: 10.1038/s41597-020-0520-9

Mercer, 1970, doi: 10.1016/0031-0182(70)90076-3

Grosswald & Hughes, 1999, doi: 10.1080/10889379909377663

Geibert et al., 2021, doi: 10.1038/s41586-021-03186-y