Sediment features beneath Ekström Ice Shelf, East Antarctica, imaged using on-ice vibroseis

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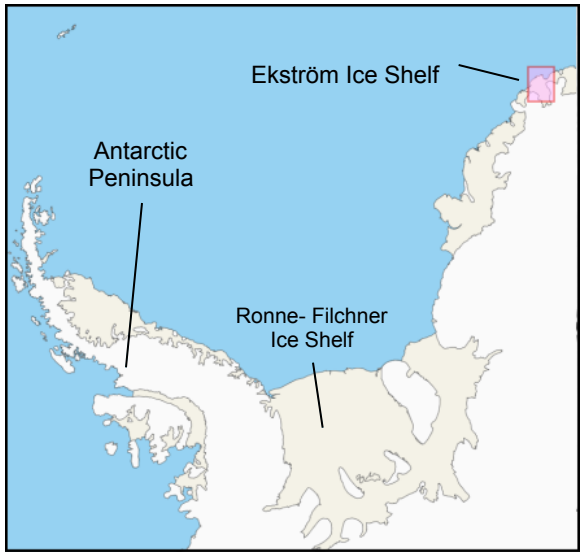
Where?


Ekström Ice Shelf
Antarctic Peninsula
Ronne- Filchner Ice Shelf

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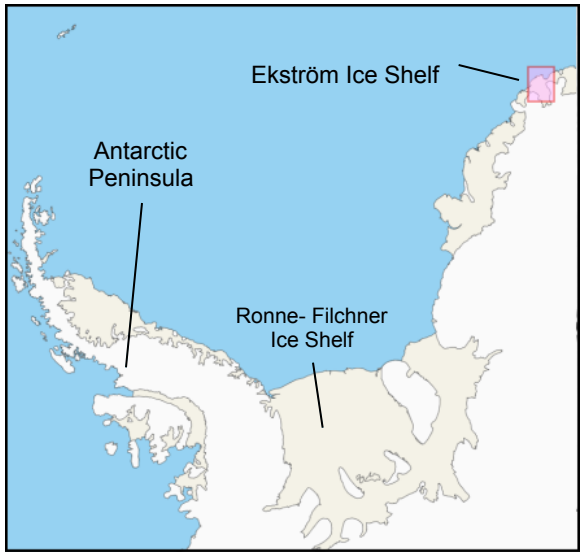

Neumayer III 23/09/2017

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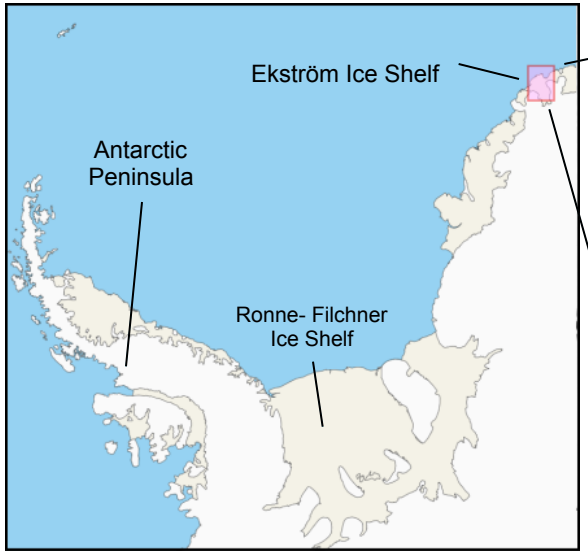

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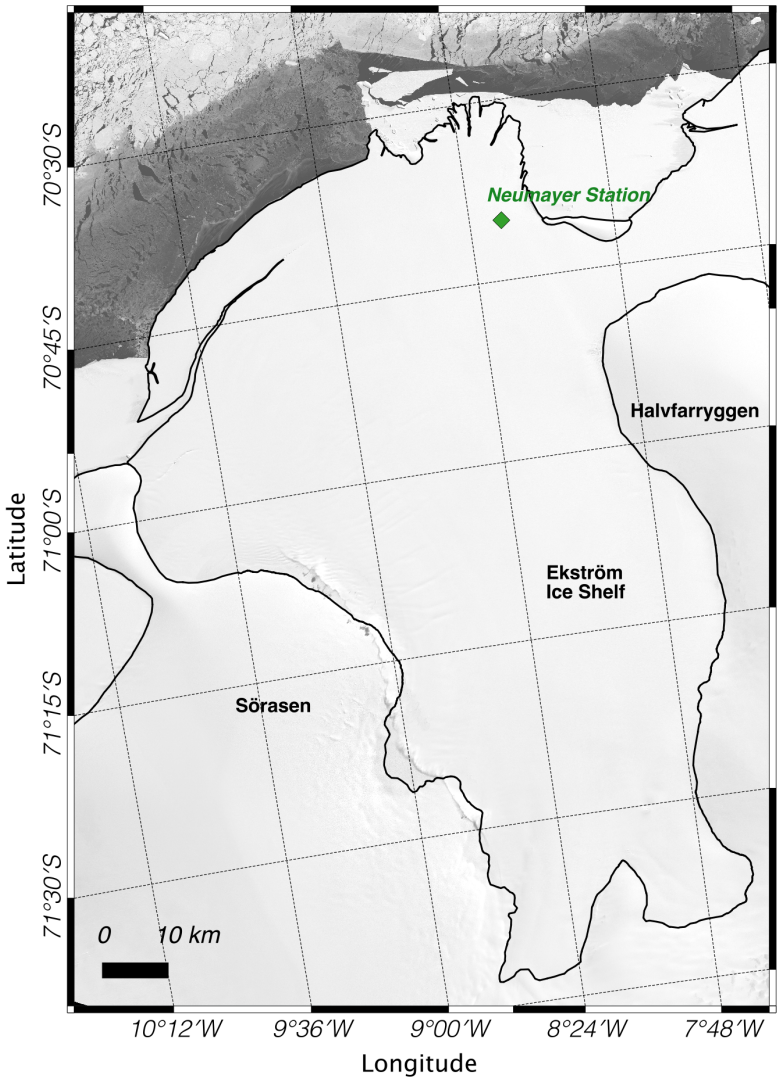

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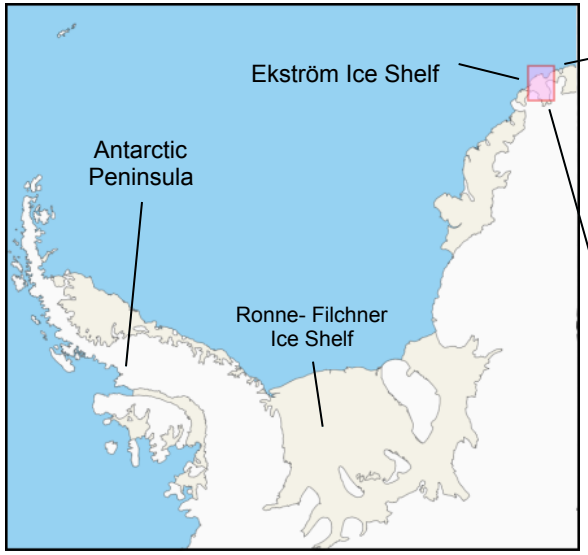

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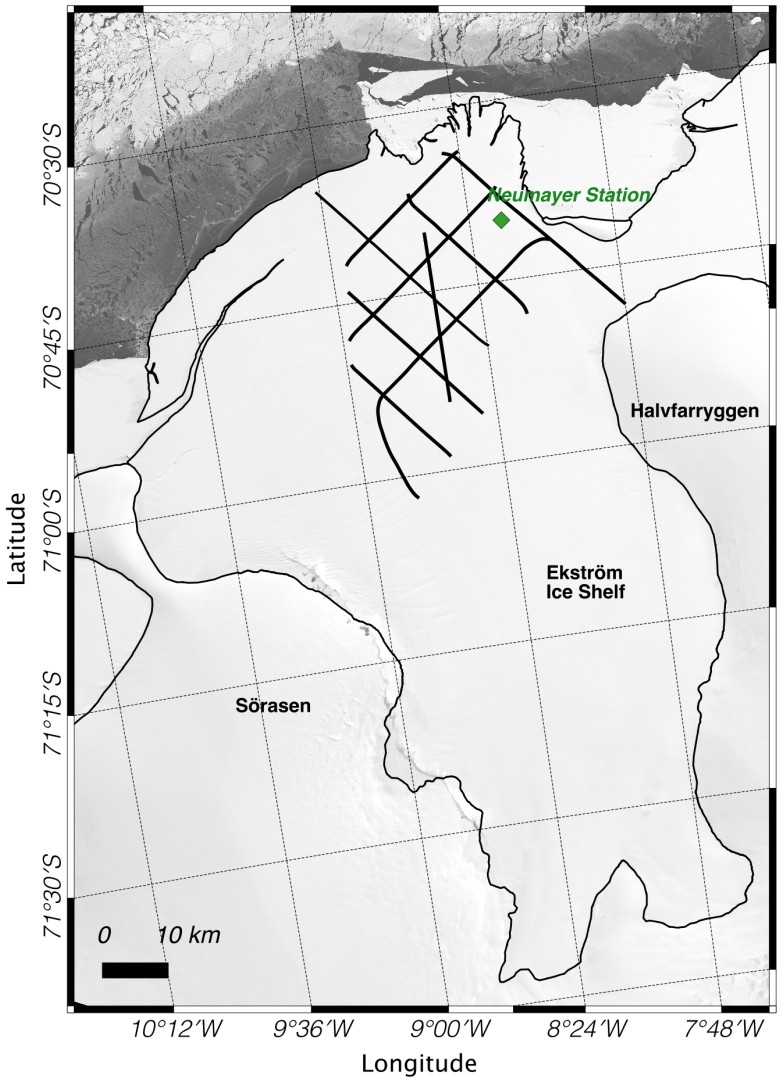

Motivation: Why? And What?

Why?

- Little data documenting landforms beneath ice shelves.
- Sub-shelf = recent evidence of palaeo-flow, retreat and current sediment processes.
- Western Dronning Maud Land (DML) - limited information about the LGM and subsequent deglaciation.

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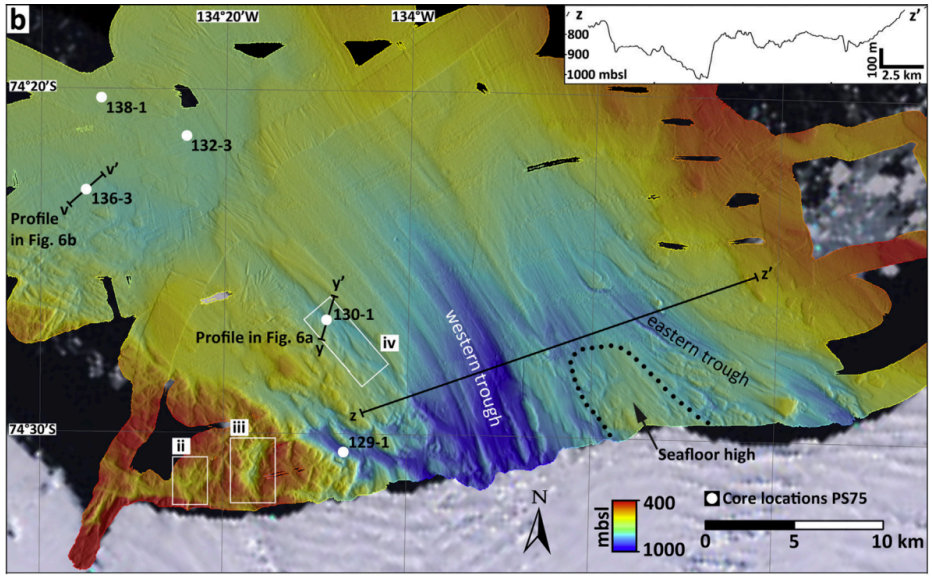
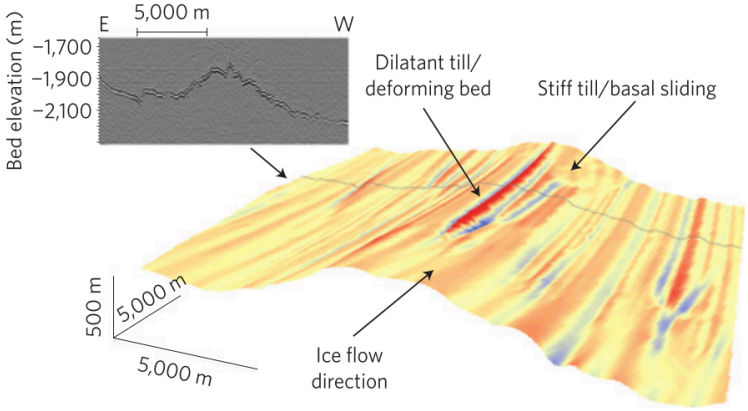


Klages et al., *Quat Sci Rev*, 2014 – Amundsen Sea, Antarctica



King et al., *Nature Geosci*, 2009 – Rutford Ice Stream, Antarctica

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What?

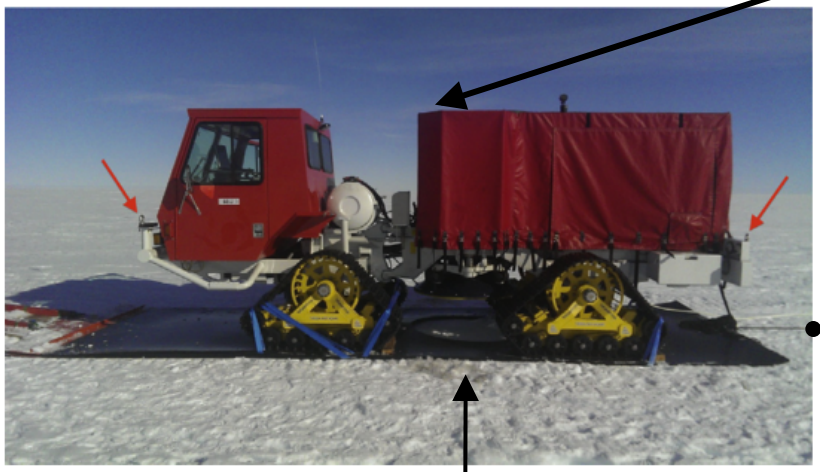
- Sub-shelf bathymetry and sediment features:
  - Geomorphological evidence of past ice flow and retreat
  - Sedimentary volumes and properties

- Parametrise and test ice-flow models

- Important for understanding ice-ocean interactions -> future implications

Data Aquisition: Vibroseis on Ice

Eisen et al., *Polar Sci.*, 2015



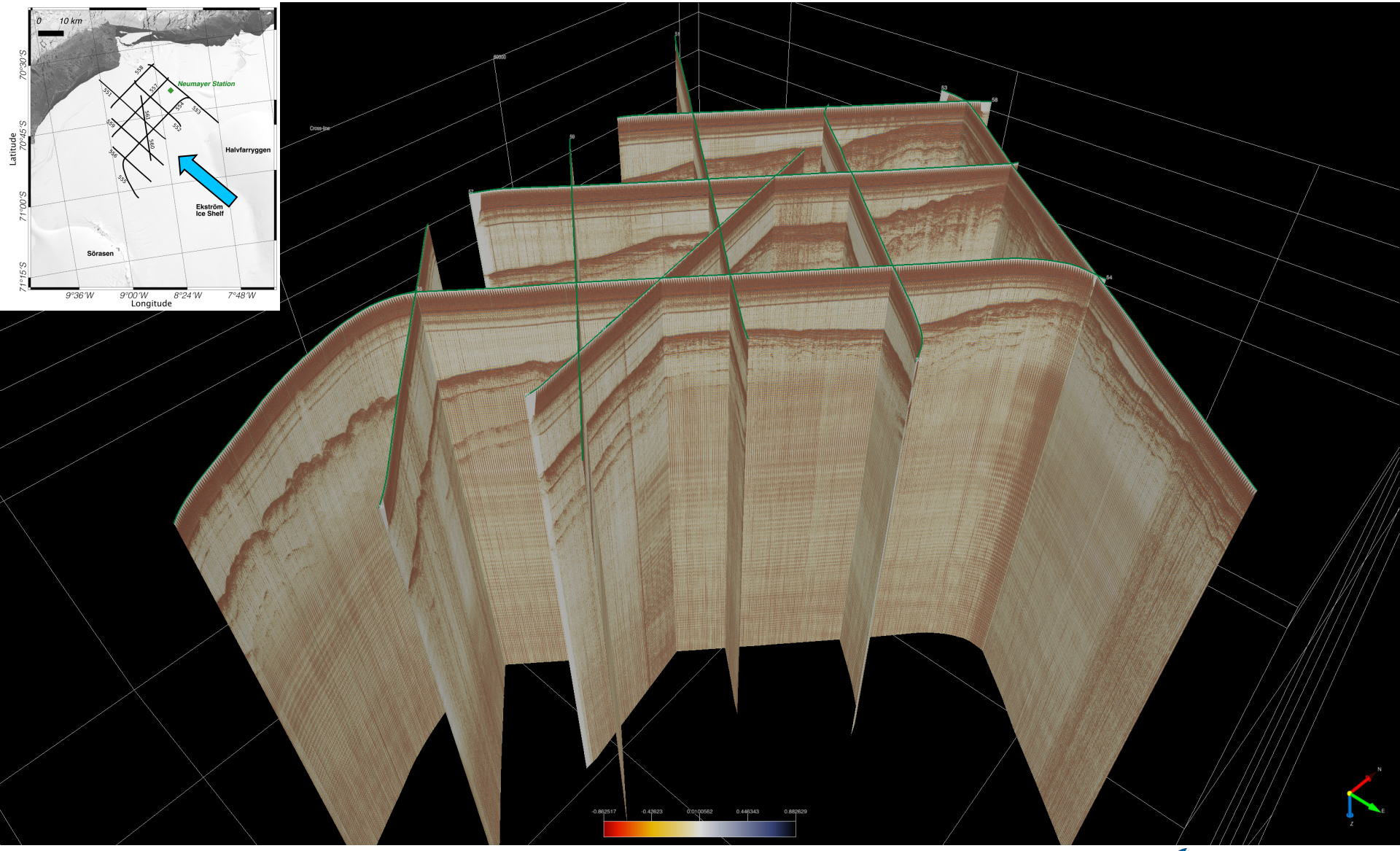
SPs 50 – 125 m

1500 m, 60 channels

Sweep: 10 – 220 Hz
Time: 10 seconds

Total data: ~280 km data in 25 days

Data Aquisition: The Data



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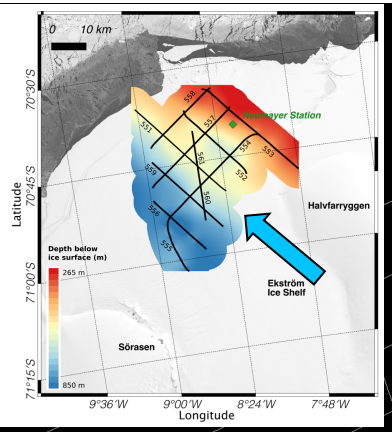

HELMHOLTZ GEMEINSCHAFT

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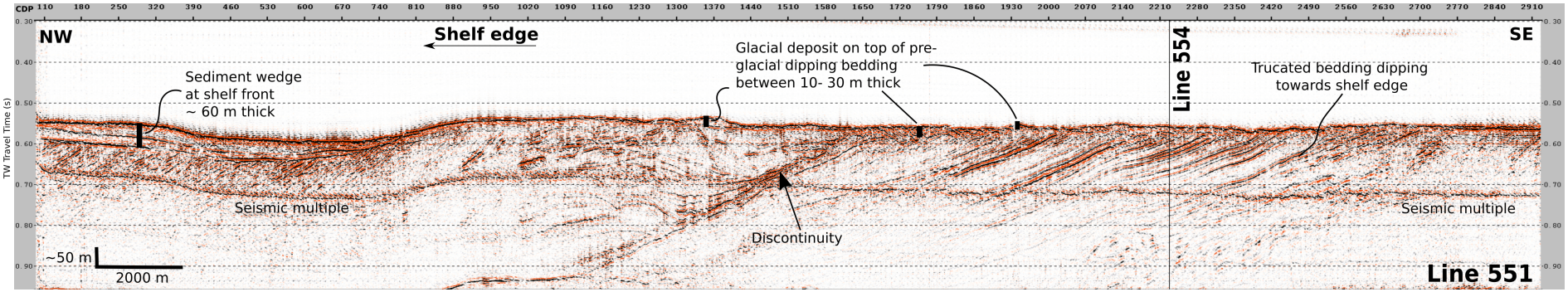

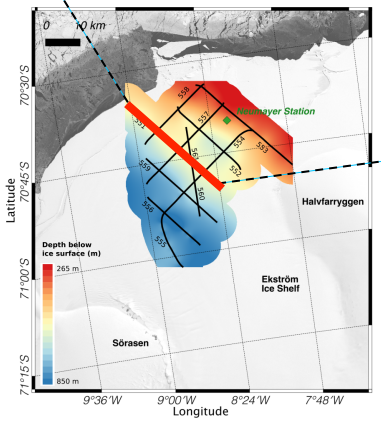

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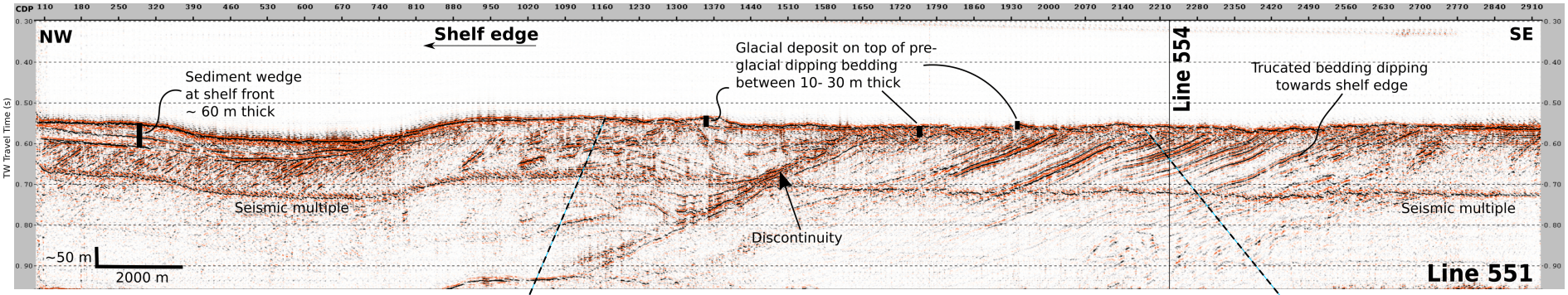

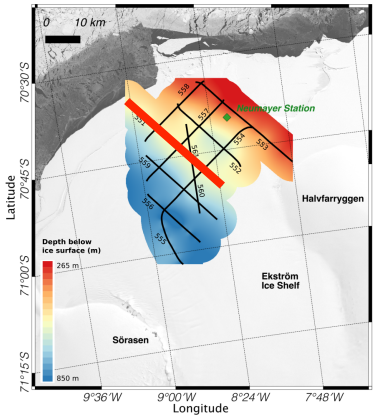

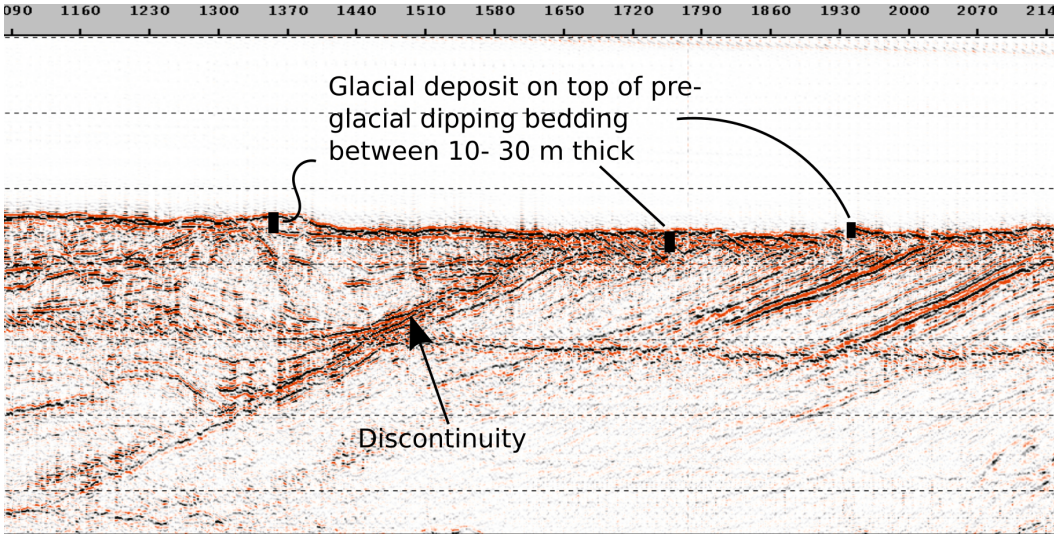

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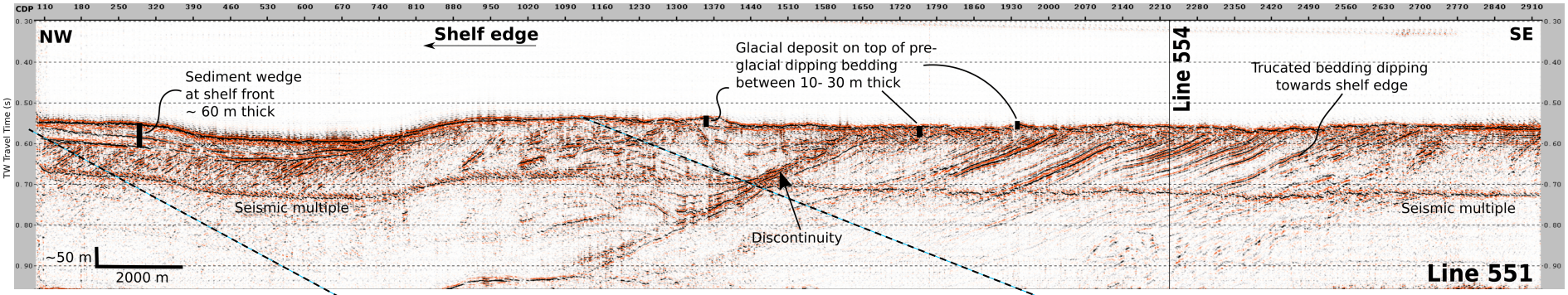

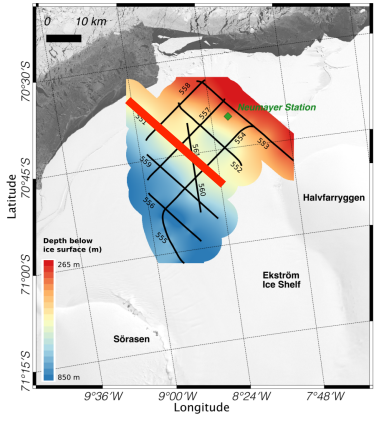

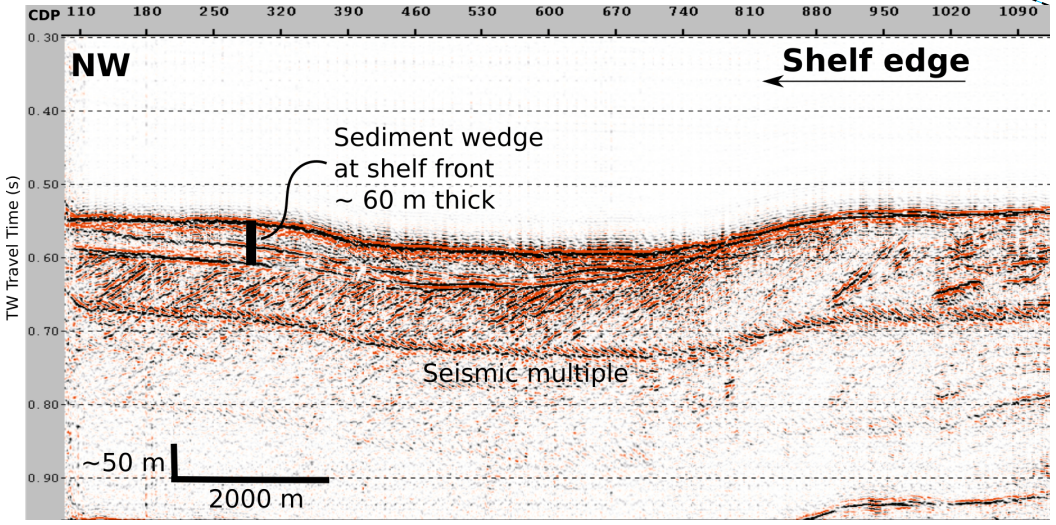

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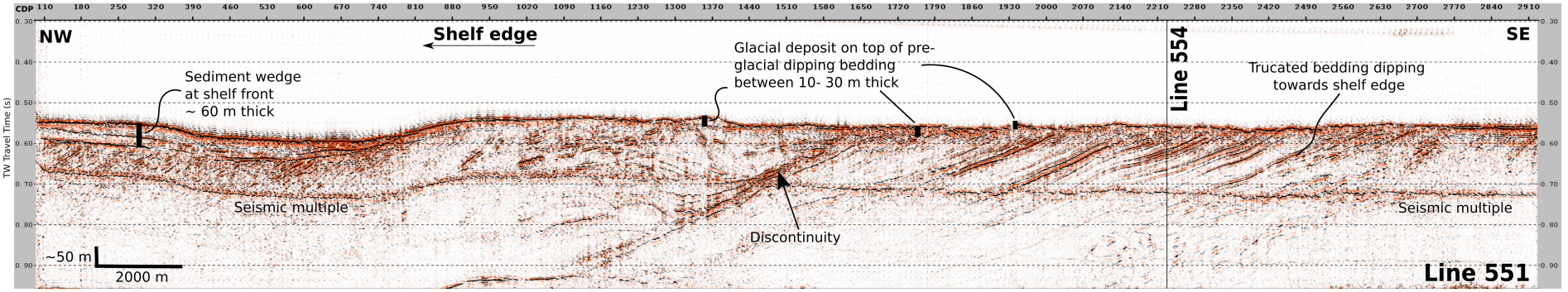

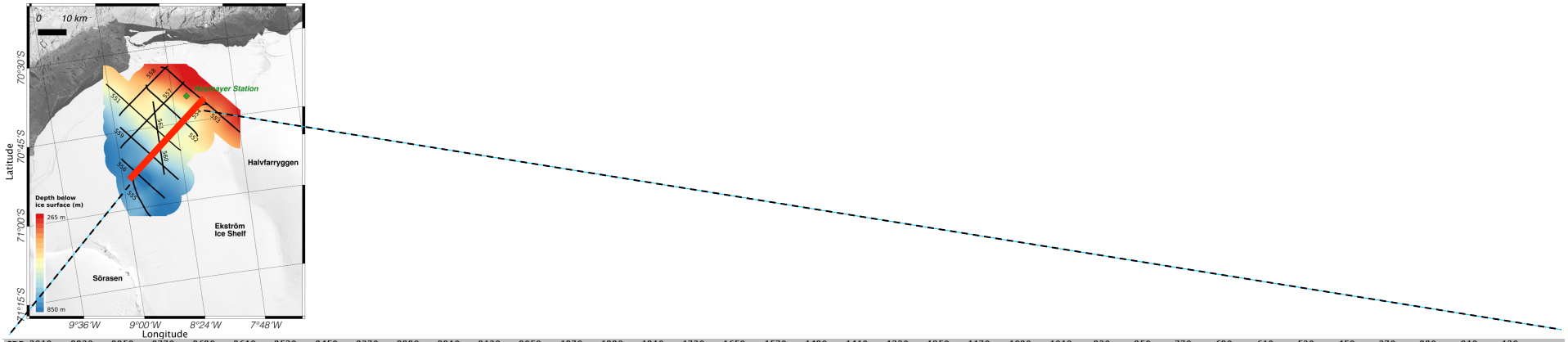

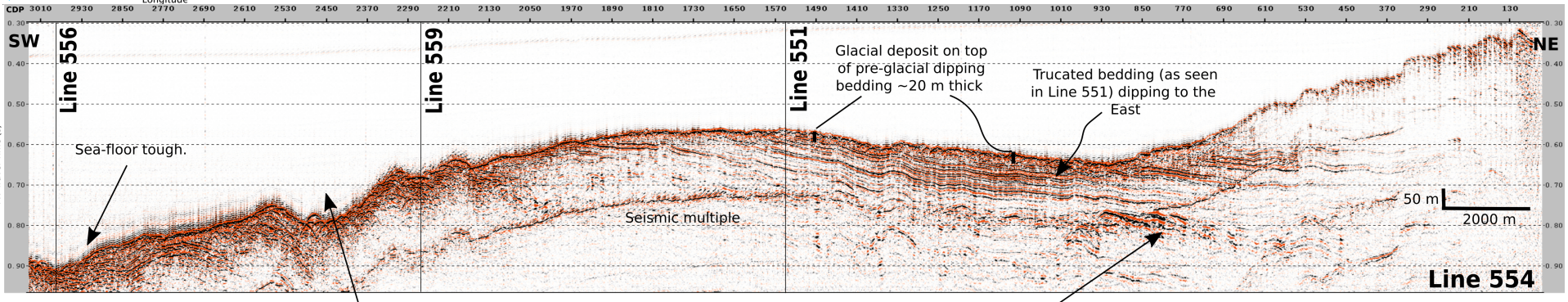

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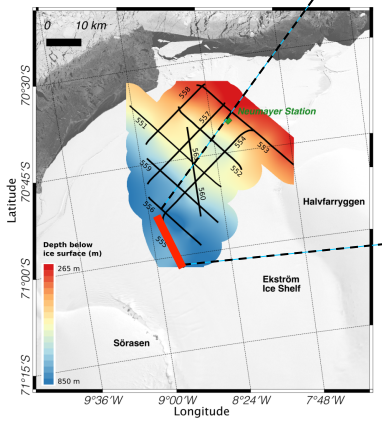

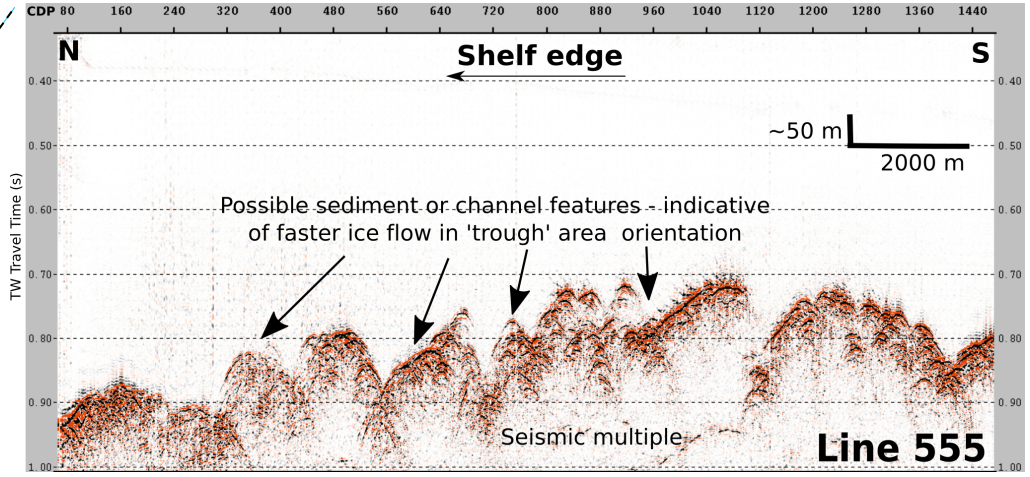

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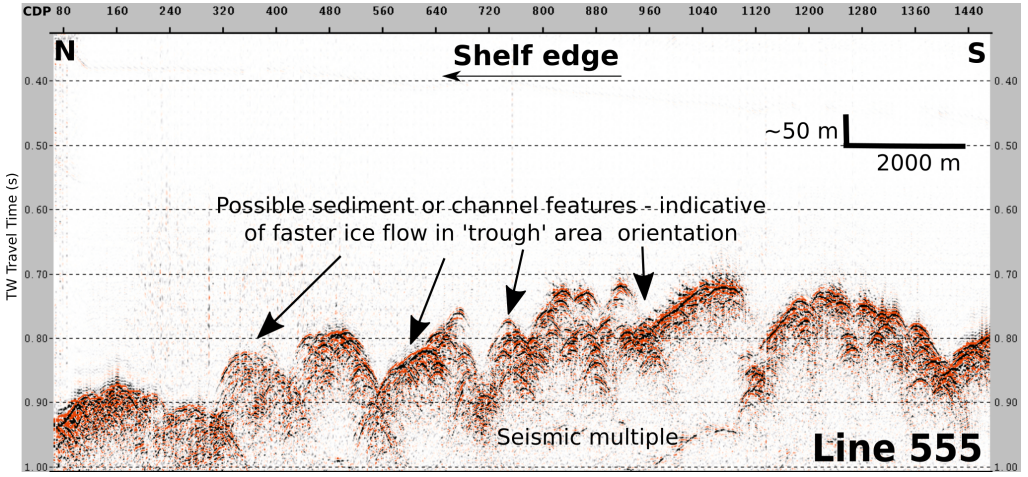

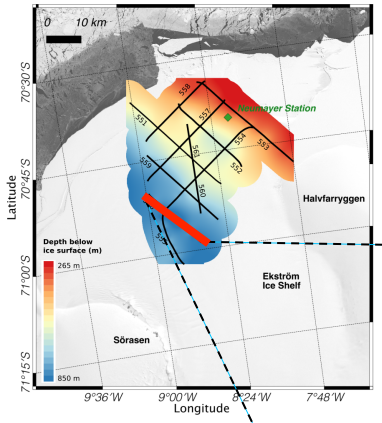

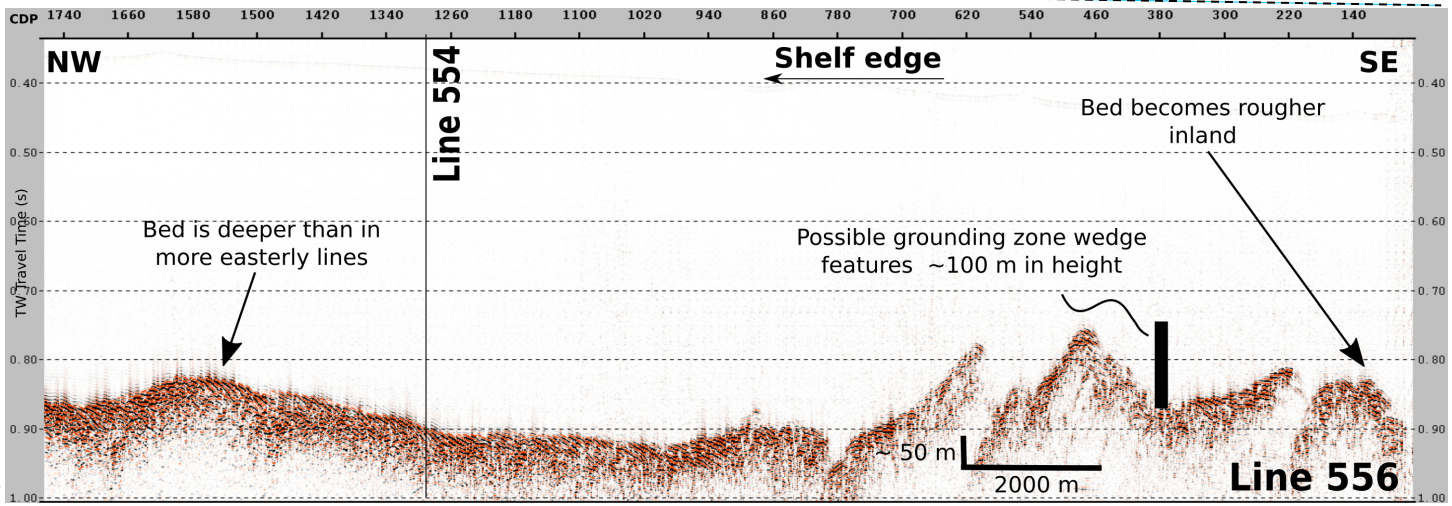

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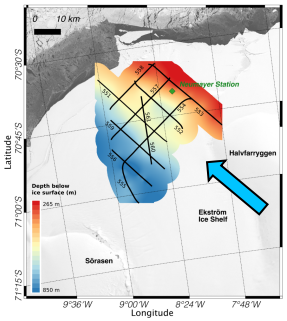

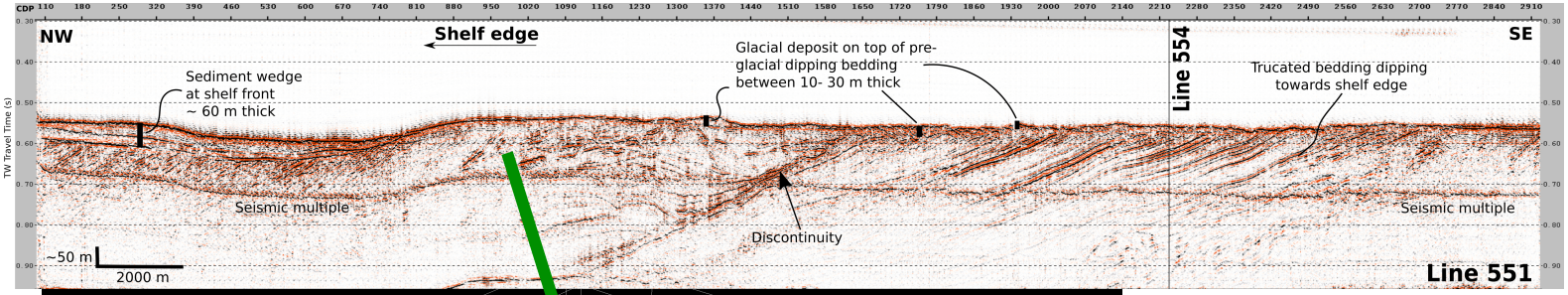

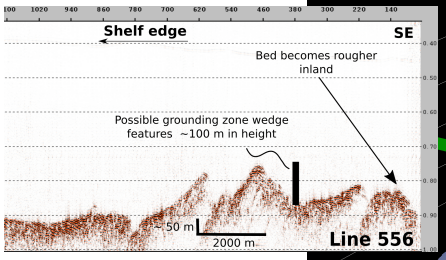

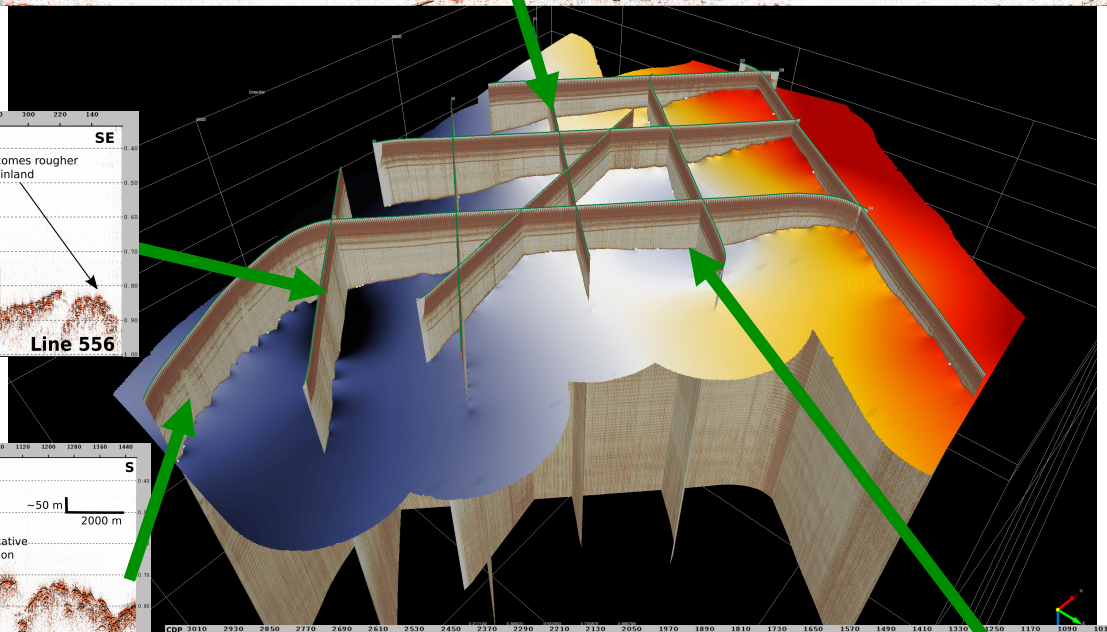

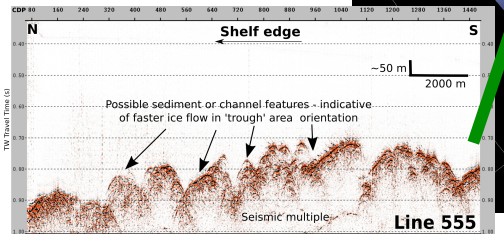

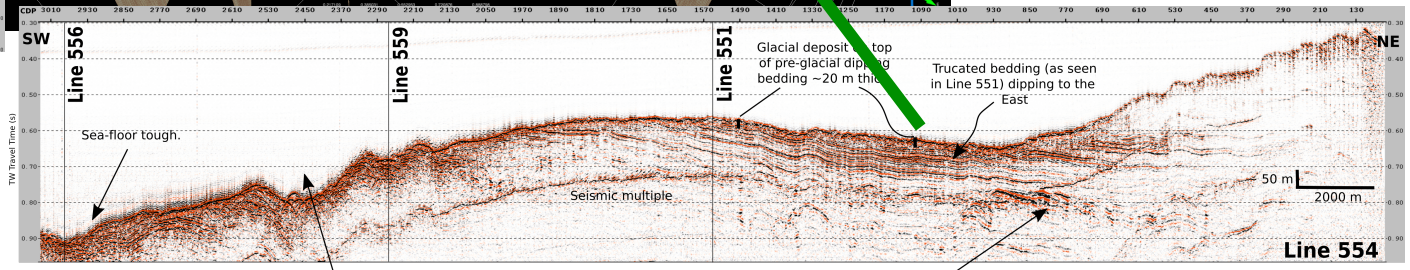

Channel features across flow direction

Volcanic Explora wedge (see *Kristoffersen et al., 2014*)

Summary

- Bathymetry of the sea floor has been determined from seismic reflection data
- Over deepend basin to the West of Neumayer
- Probably sea-floor trough -> palaeo-ice stream at the western edge of survey area with streamlines channels/lineations
- Sediment wedge at ice front - ice retreat feature?
- Likely grounding zone wedge series to the West of the survey area

Seismic vibroseis surveying is a fast effective method to determine sub-shelf bathymetry and deeper features

Sub-shelf contains important information about past deglaciation

Questions? email: emma.smith@awi.de

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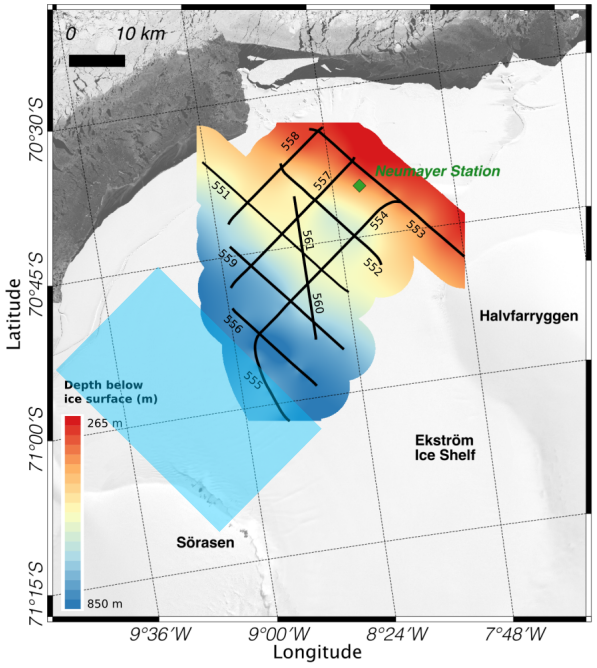

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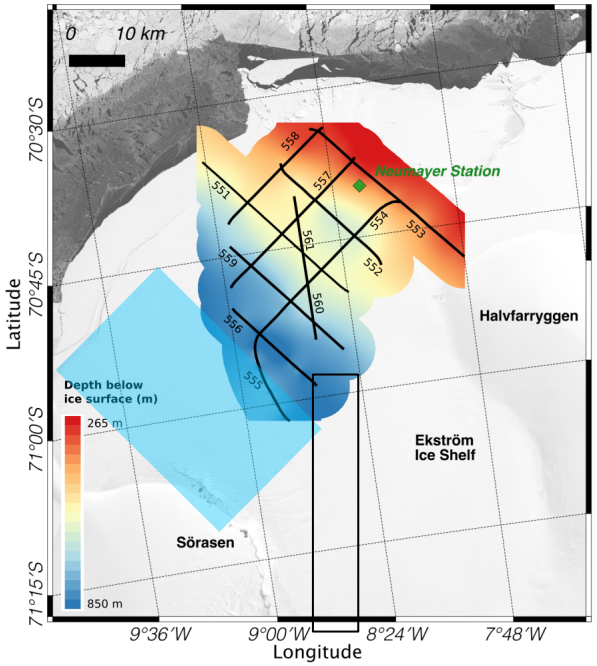

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