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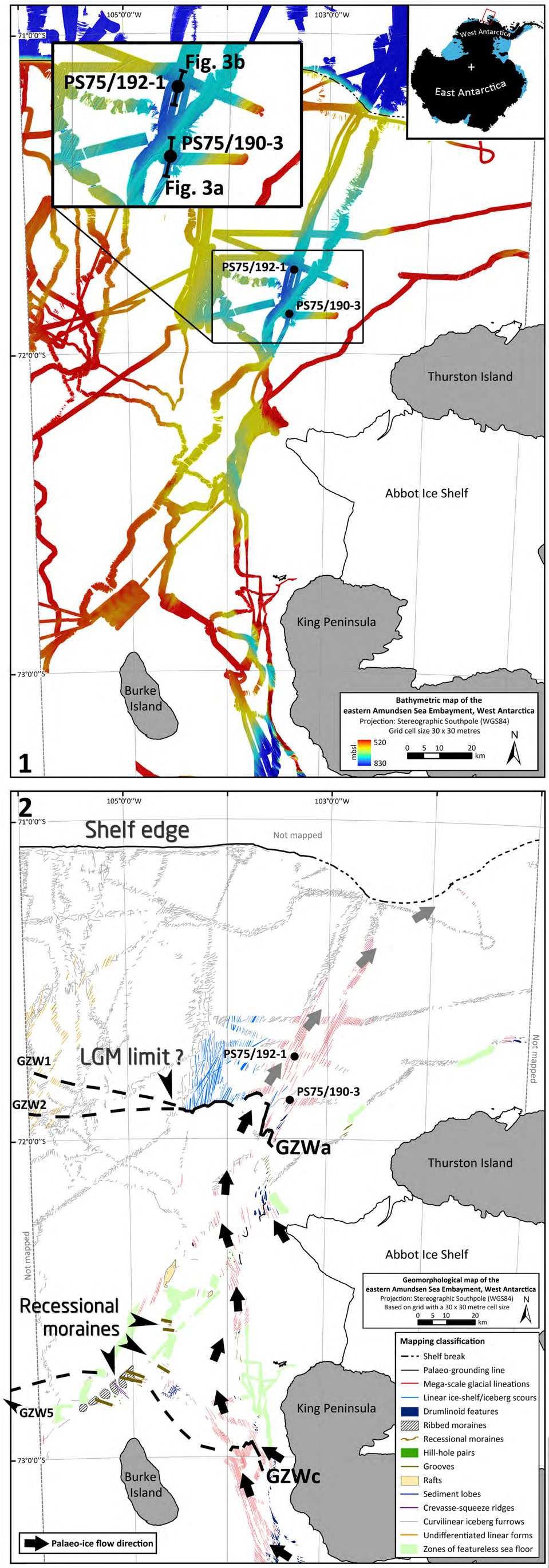
# Assessing the extent of the West Antarctic Ice Sheet on the eastern Amundsen Sea shelf during the last glacial period




## Bathymetry

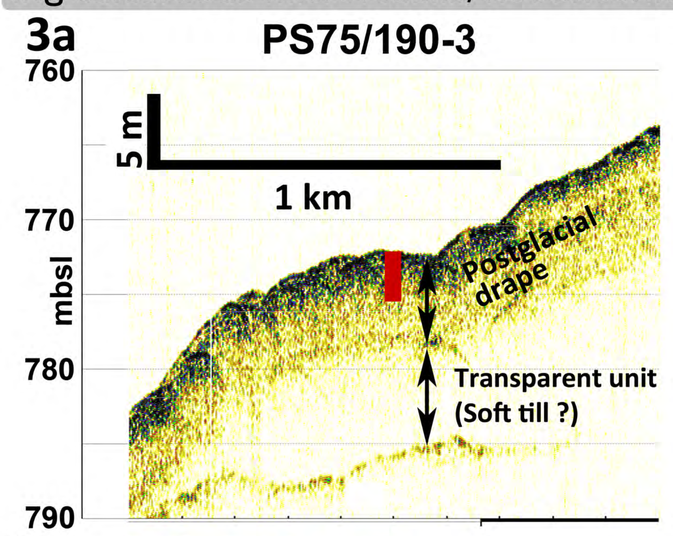
High-resolution swath bathymetry data collected during several research cruises over the past two decades reveal a palaeo-ice stream trough (Abbot Glacial Trough) crossing the middle and outer shelf of the easternmost Amundsen Sea Embayment (ASE; Figs. 1, 2), east of the main Pine Island Trough.

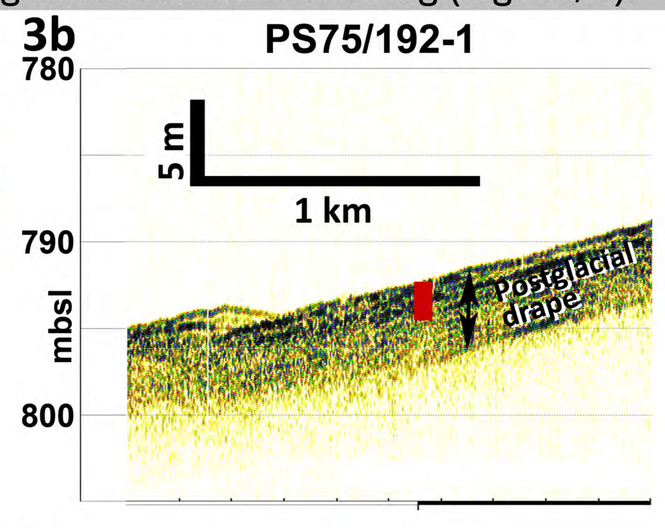
## Glacial geomorphology

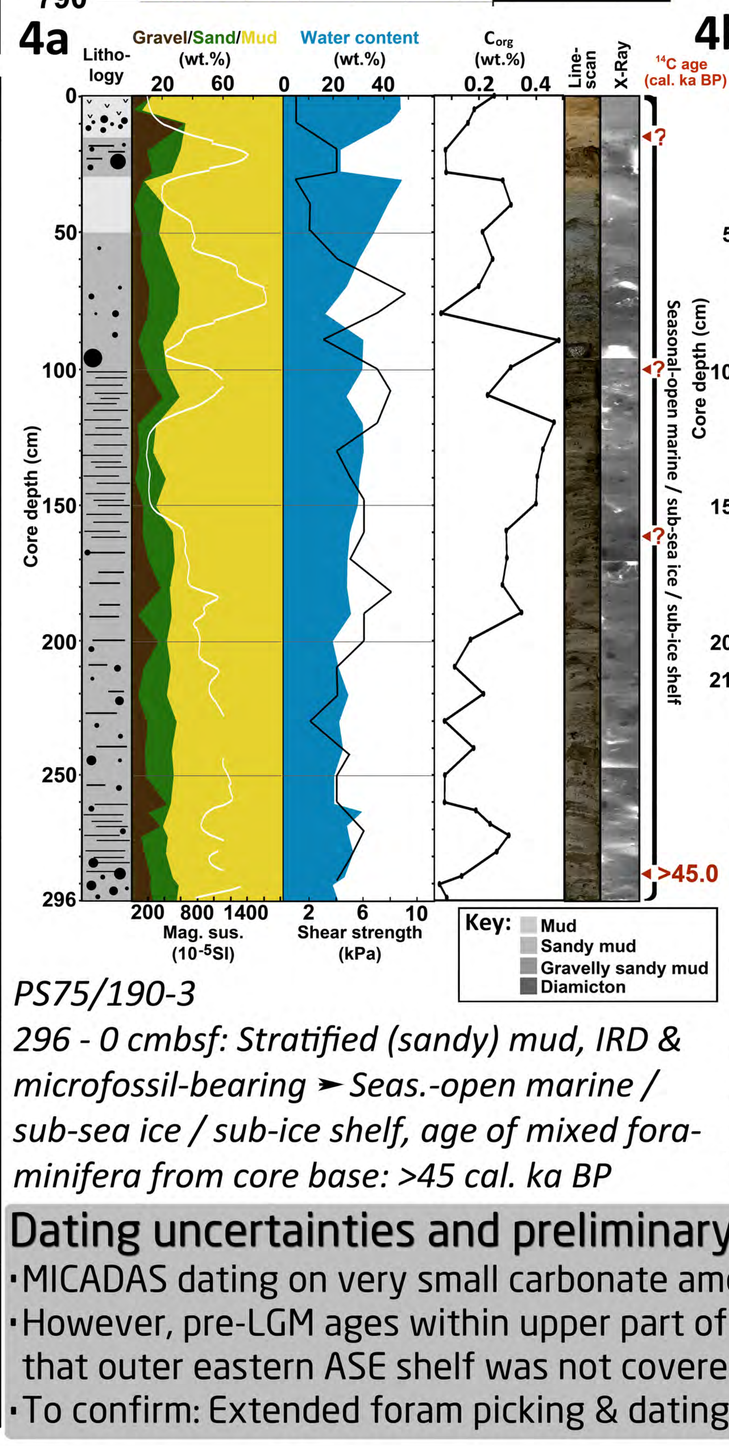
Regions of both fast palaeo-ice flow (within the central trough) and slow palaeo-ice flow (on adjacent seafloor highs referred to as inter-ice stream ridges) bear glacial landforms indicative of phases of grounding-line stabilization of the ice sheet (Fig. 2). Did the West Antarctic Ice Sheet cover the entire shelf during LGM?

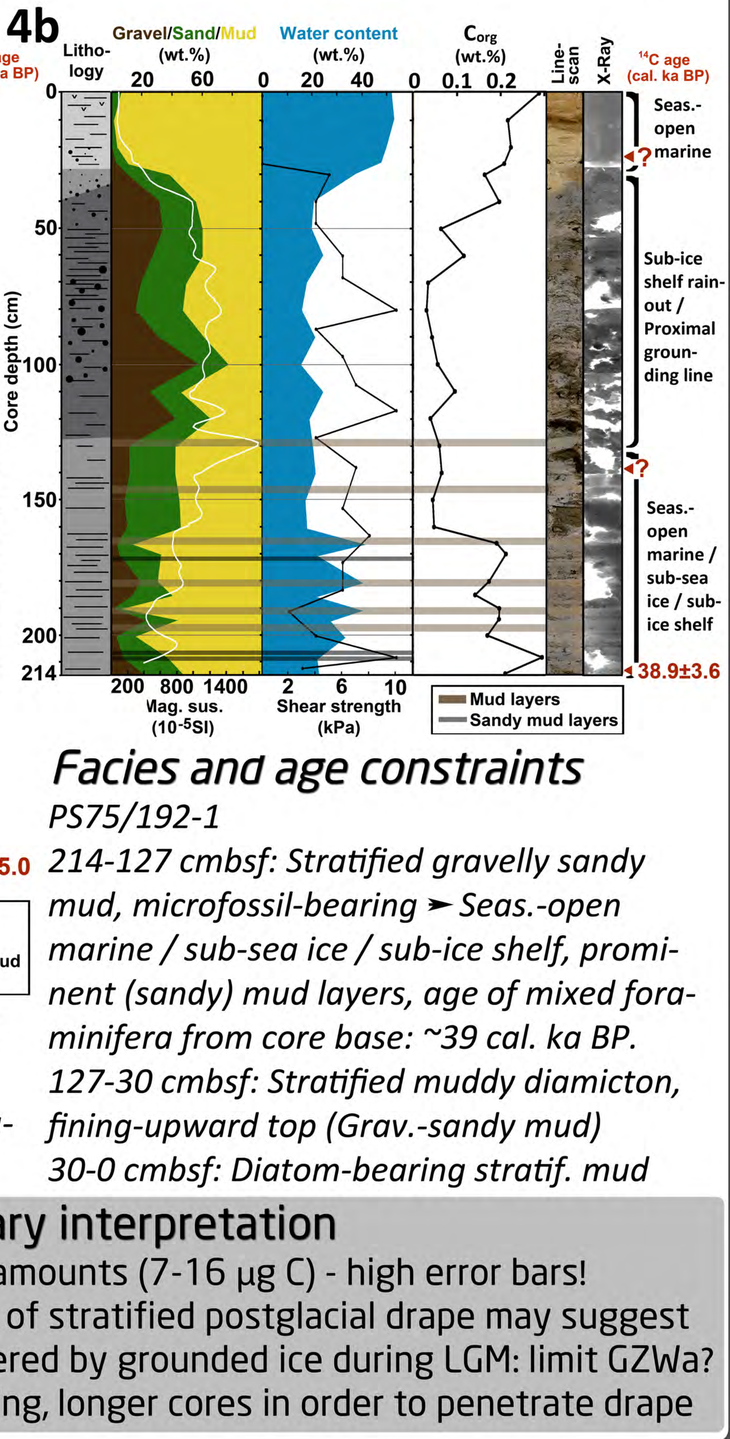
## Sediment echography and sedimentology

New sediment echosounder and sediment core data collected from outer Abbot Glacial Trough, between the seaward limit of the grounding-zone wedge and the shelf edge (Fig. 1), reveal an up to 6 m-thick well stratified drape (Fig. 3a, b) that is composed of unconsolidated glaciomarine sediments occasionally bearing calcareous microfossils, not showing indication for reworking (Fig. 4a, b).




## *Facies and age constraints*

*PS75/192-1*

*214-127 cmbsf: Stratified gravelly sandy mud, microfossil-bearing ➤ Seas.-open marine / sub-sea ice / sub-ice shelf, prominent (sandy) mud layers, age of mixed foraminifera from core base: ~39 cal. ka BP.*

*127-30 cmbsf: Stratified muddy diamicton, fining-upward top (Grav.-sandy mud)*

*30-0 cmbsf: Diatom-bearing stratif. mud*

*PS75/190-3*

*296 - 0 cmbsf: Stratified (sandy) mud, IRD & microfossil-bearing ➤ Seas.-open marine / sub-sea ice / sub-ice shelf, age of mixed foraminifera from core base: >45 cal. ka BP*

## Dating uncertainties and preliminary interpretation

- MICADAS dating on very small carbonate amounts (7-16 µg C) - high error bars!
- However, pre-LGM ages within upper part of stratified postglacial drape may suggest that outer eastern ASE shelf was not covered by grounded ice during LGM: limit GZWa?
- To confirm: Extended foram picking & dating, longer cores in order to penetrate drape

References:

Graham, A.G.C., et al., 2010. Flow and retreat of the Late Quaternary Pine Island-Thwaites palaeo-ice stream, West Antarctica. Journal of Geophysical Research 115.

Klages, J.P., et al., 2013. First geomorphological record and glacial history of an inter-ice stream ridge on the West Antarctic continental shelf. Quaternary Science Reviews 61, 47-61.

Klages, J.P., et al., in prep. Detailed palaeo-ice flow pathways in the easternmost Amundsen Sea Embayment, West Antarctica. To be submitted to Geomorphology.

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