



Observations and implications of gully and channel systems on the outermost continental shelf and upper slope of West Antarctica

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Swath bathymetric surveys have revealed numerous gullies dissecting the continental shelf-edge of West Antarctica. Their depth varies from a few meters up to over 150 m, width from a few tens of meters up to 2-3 km, and length from a few km up to 10 km.

The gullies usually start at the shelf edge, although locally they cut back up to 2 km into the outer shelf. Within a few km from the shelf edge the gullies tend to merge and form channels. The channels have been observed to continue down-slope several tens of km and some reach as far as the continental rise. The gullies and channels are entirely erosional on the upper slope. From the mid-slope downwards they locally form levees that are elevated above the adjacent seabed.

Numerous gullies are found at the shelf edge at the mouths of the large cross-shelf glacial troughs, which were occupied by fast-flowing ice streams at the Last Glacial Maximum. The gullies exhibit regular distribution patterns: larger and more numerous gullies dissect the shelf edge near the margins of the troughs, whereas they are smaller and fewer in the central parts.

A few sinuous channels cut into diamictic sediments in the bottom of the troughs on the outermost shelf have also been observed, overprinted by iceberg ploughmarks. These channels connect to the gullies at the shelf edge.

The role of the gully-channel systems as down-slope sediment transport pathways through sediment mass-movements and turbidity currents has generally been recognized. Little is known, however, about their age and origin. New, high-resolution bathymetric datasets enabling detailed studies of their morphology and distribution patterns may shed light on these questions.