



Comparison of contemporary subglacial bedforms beneath Rutford Ice Stream and Pine Island Glacier, Antarctica

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Detailed subglacial topography derived from radio-echo sounding surveys is available for patches of two active West Antarctic ice streams: Rutford Ice Stream and Pine Island Glacier. Here we compare the type, size, and distribution of bedforms in the two locations. We will also discuss the regional factors that may have a bearing on the sediment type and grain-size distribution to be expected in the topographic troughs that the ice streams flow within.

The Rutford Ice Stream survey covers a 40 x 18 km portion of the bed near the grounding line, where the ice flows at about 350 m/year. Rutford Ice Stream flows in a graben with a high mountain range immediately adjacent on the right flank which is a likely proximal source of mixed grain-sized sediment. The Pine Island Glacier survey covers 25 x 18 km of the bed at 160 km upstream from the grounding line where the flow speed is about 1000 m/year. Pine Island Glacier has more subdued topographic control and is distal from any potential terrestrial sediment sources so basal sediments are more likely to be fine-grained marine sediments deposited during interglacials.

The subglacial bedform assemblages in both locations are dominated by mega-scale glacial lineations (MSGL) and drumlinoids. The Rutford drumlinoids have amplitudes considerably higher than the norm for deglaciated terrains whereas the Pine Island set are relatively subdued. The Rutford drumlinoids are more scattered across the survey area compared to the Pine Island examples which are grouped closely together. In both locations the MSGL align with flow vectors within the ice column and reflect divergence around a basal hill in the Rutford case and convergence between tributary and main trunk flow in the Pine Island case.

Repeated seismic reflection surveys in one location on Rutford Ice Stream showed rates of erosion and deposition at the bed of 5 to 6 m over a six year period. Parts of the Rutford Ice Stream radio-echo sounding survey will be re-measured during the 2016/17 Antarctic field season, nine years after the first data collection. The survey will use the same techniques as the original and should therefore be a sensitive detector of change. We aim to provide a preliminary analysis of key survey lines to answer the question 'How stable are bedforms beneath fast-flowing ice and to what degree do their size, shape and distribution change over time'