A PIG unknown: the first sediment cores recovered from beneath Pine Island Glacier

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To date, only a handful of studies have successfully recovered sediment samples from beneath Antarctic ice shelves. Published data is limited to short cores from beneath the Amery Ice Shelf, one 0.28m core from beneath the Novolazarskiy Ice Shelf and sediments recovered as part of major drilling efforts in the Ross Sea. The lack of data from these environments is surprising given their potential to reveal important information regarding ice shelf history (i.e., thinning and retreat), changes in ocean circulation through time, as well as much needed boundary information about sub-ice shelf sedimentation. The latter information is critical for determining periods of ice shelf presence and absence in the geological record.

Here we present preliminary data on sediment cores recovered from beneath Pine Island Glacier (PIG) during December 2012 and January 2013. Three drill sites (A-C) were established on PIG to access the ocean cavity for oceanographic measurement and sediment cores were successfully recovered at each site. Sites A and C were seaward of the prominent transverse seafloor ridge identified by Autosub, and Drill site B was located on the landward side of the ridge. Sediments were collected using a simple percussion corer, which proved to be enormously effective and simple to deploy. In total, 2.5m of sediment was recovered with a maximum penetration depth of 1.2m (Drill site B). Preliminary physical properties data (sediment density, P-wave velocity and magnetic susceptibility which provides a proxy for terrigenous vs. biogenic sediment as well as information on sediment provenance) and core data will be presented. Detailed investigation of the sediment is currently ongoing (lithological description, sediment provenance, and dating) and will shed light on the processes occurring at or very close to the grounding line (e.g., meltwater discharge, tidal pumping and sediment delivery). In addition, the cores also have the potential to provide a longer-term perspective on recent glaciological and oceanographic changes such as sub-ice shelf ocean circulation and timing of grounding line retreat.