

A Modern Analogy to Explain Relict Grounding Lines of Kamb Ice Stream, Antarctica

G. Catania

Institute for Geophysics, University of Texas, Austin TX, 78758

C. Hulbe

Geology Department, Portland State University, Portland, OR, 97207

Ground-based, low-frequency ice-penetrating radar data across the northern grounding-line of Siple Dome reveal internal stratigraphy that becomes sharply downwarped over <4 km with an amplitude that increases with depth. This grounding line is also associated with near-bed diffractors that continue seaward that are interpreted as basal crevasses formed as the ice flowing from Siple Dome goes afloat. Additional crossings of this grounding line further towards the west show internal layers that are not as strongly downwarped across the grounding line. This indicates that the process responsible for the downwarped layers is not uniform. We use a 2-D flow line model to examine several possible mechanisms that can create downwarped layers including temporarily, localized basal melt and temporarily increased basal sliding.

The grounding line stratigraphy at this northern Siple Dome boundary has striking similarity to radar profiles previously acquired up to 100 km inland on Kamb Ice Stream by Catania and others, (2006), JGR, doi:10.1029/2005JF000355, and provides a modern analogy that can aid our understanding of the processes affecting Kamb and its recent ice flow history. On this basis, we argue that Kamb Ice Stream experienced grounding line retreat of up to 120 km prior to its shutdown. In addition, retreat of the Kamb grounding line allowed for the formation of slow-moving embayments on both sides of the ice stream outside of its lateral margins similar to the modern-day situation on the northern side of Siple Dome.