

Evidence for rapid ice stream margin migration and sudden narrowing of Kamb Ice Stream, Antarctica

G. Catania, Institute for Geophysics, University of Texas, Austin TX, 78759

T. Scambos, NSIDC, University of Colorado, Boulder CO, 80308

H. Conway, Earth and Space Sciences, University of Washington, Seattle WA, 98195

C. Raymond, Earth and Space Sciences, University of Washington, Seattle WA, 98195

High and low-frequency ice-penetrating radar data confirm the presence of two relict ice stream margins representing two different positions for the northern margin of Kamb Ice Stream in West Antarctica. Ice stream margins are identified by surface topographic troughs in satellite images and disrupted internal layers coincident with near-surface buried crevasses. Our data indicate that the shift in margin position occurred roughly 340 years ago (± 20 years) and was sudden; burial depth of near-surface crevasses remains constant from one margin to the next but rises steeply one kilometer from the innermost margin. Sudden changes in margin position are likely accomplished through rapid changes in basal conditions beneath the margin and adjacent portions of the ice stream. In this case, the timing of inward migration may be coincident with a reduction in basal lubrication as ice in this area became grounded subsequent to grounding line re-advance. In the context of Kamb ice flow history, this inward margin migration represents a narrowing of the ice stream by 25% 200 years prior to its shutdown. Model studies of ice stream cyclicity by Bougamont et. al (2003) suggest that ice stream width is a key factor in sustaining fast flow with increases in width leading to ice stream stoppage through basal freezing. Our evidence suggests that the opposite may also be true; fast ice stream flow may be prolonged despite decreased basal lubrication by sufficient narrowing.