

Variation in Flow Speed on Ice Stream B

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Several groups have measured variations in flow speed on ice stream B. We have compared previous velocity measurements with a map of velocity covering nearly all of Ice Stream B, which was generated using data collected during the first RADARSAT Antarctic Mapping Mission. Our results confirm earlier estimates of deceleration and greatly expand the number of observations, revealing a pattern of slowdown that extends from the upper reaches of Ice Streams A and B to well downstream of the grounding line. Deceleration appears to have been fairly steady at a rate of 5.5 m/yr^2 on the ice plain a sustained over intervals of upto 34 years. If this rate continues, the ice plain will shutdown completely in 70-80 years. We have used a model for the centerline velocity an ice stream [Raymond, 1996] and the plastic bed model [Tulaczyk et al, 2000] to examine the possible causes for deceleration. At UpB, it is difficult to explain the slowdown as the direct result of the thermo-dynamic evolution of a plastic bed. Instead, a reduction in the driving stress caused by decreases in slope as the ice stream thins appears to be a likely cause. On the ice plain, either a reduction in driving stress or a strengthening of a plastic bed due to basal freezeon provides plausible explanation for the deceleration.