



Discovery and modeling of till deposition beneath Whillans Ice Stream and implications for ice dynamics

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We report on the discovery of a possible till deposition delta near the grounding line of Whillans Ice Stream, West Antarctica. Deposition is occurring beneath an active ice stream just upstream of the grounding line, strengthening the hypothesis of subglacial transport of till by ice streams. We suggest that such deposition could lead to the formation of a step at the grounding that will tend to stabilize its position against sea level rise. If till-deltas exist at the grounding line of ice streams, then an important question is whether the deposition is subaqueous or, as we suggest, subglacial. In the former case, the ice streams will build outwards from their grounding line, and more-importantly, the grounding line will be close to floatation and small changes in sea-level immediately affect the position of the grounding line. If till deposition is subglacial, then the region upstream of the grounding line will thicken and the ice will flow over and down a "step" to the ice shelf. In this case, the grounding line will be less sensitive to small changes in sea level. We present geophysical data in support of the subglacial deposition hypothesis, as well as numerical modeling results that illustrate the stability of the grounding line in response to sea level rise.